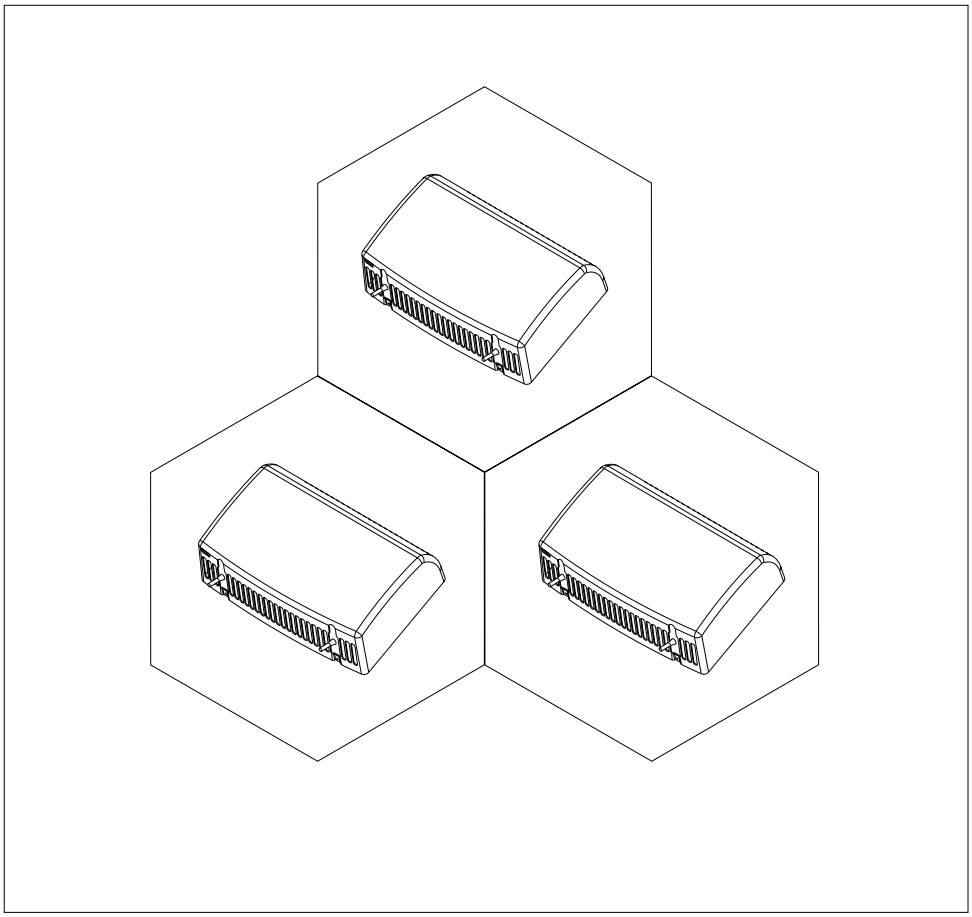
ERICSSON

RBS 884 Pico (1900 MHz) User Guide



AE/LZB 119 3834 P1D 2001-04-04

The contents of this document are subject to revision without notice due to continued progress in methodology, design, and manufacturing.

Ericsson shall have no liability for any error or damages of any kind resulting from the use of this document.

Part 1

RBS 884 Pico (1900 MHz) Introduction

This section describes the information contained in the user guide and the conventions used in its presentation.

1 Introduction

The Radio Base Station (RBS) 884 Pico (1900 MHz) system provides spot coverage for the 1900 MHz Personal Communications Service (PCS) cellular band using Telecommunications Industry Association/Electronics Industry Association (TIA/EIA)-136 technology. The RBS 884 Pico (1900 MHz) consists of remote Radio Heads connected to a Control and Radio Interface (CRI) cabinet through digital transmission links. This product can be used for spot coverage in a larger Ericsson 1900 MHz Time Division Multiple Access (TDMA) system, or it can be used for indoor wireless systems.

2 Reason for Reissue

When this document is reissued, the reason for reissue will be listed in this paragraph.

3 About this User Guide

The target audience for the user guide is RBS site installation, site testing, and site maintenance personnel.

This manual contains the information required to install, troubleshoot, and maintain the RBS 884 Pico (1900 MHz) hardware.

3.1 User Guide Contents

Before this manual is used to perform any activities at an RBS site, telephone transmission facilities and Alternating Current (AC) electrical line power and grounding must be available; and, if required, an external antenna system is installed.

After the information in this manual is used to install the RBS, the RBS will remain powered up and ready for integration into the network by personnel at the Mobile Switching Center (MSC).

This *RBS 884 Pico (1900 MHz) Base Station User's Guide* contains the following parts:

- *Part 1, Introduction*, introduces this users' guide.
- *Part 2, System Description*, describes the functions and features of the RBS 884 Pico.
- *Part 3, CRI Installation*, describes the installation procedures for the RBS 884 Pico Control and Radio Interface (CRI) cabinet, required cabling, and the Alternating Current/Direct Current (AC/DC) Power Supply.
- *Part 4, Radio Head Installation*, describes the installation procedures for the RBS 884 Pico Radio Head.
- *Part 5, Integration and Test*, describes configuration of both the RBS 884 Pico (850 MHz) and the Pico (1900 MHz) and integration to the Pico systems with the MSC.
- *Part 6, Operations and Maintenance*, describes the overall Operations and Maintenance (O&M) concept of the Pico 1900 and the procedures for replacing faulty components.
- *Part 7, Troubleshooting*, provides guidelines and instructions for troubleshooting the RBS 884 Pico system equipment.
- *Part 8, Glossary of Terms*, describes key terms found in this users' guide.
- *Part 9, Acronyms and Abbreviations*, contains an expanded version of all the acronyms and abbreviations found in this manual. The expanded form is also shown in the text when an acronym is first introduced.
- *Appendix A, RF Guidelines*, provides product-specific Radio Frequency (RF) information for the RBS 884 Pico (1900 MHz) system.
- *Appendix B, RBS 884 Pico (1900 MHz) Spare Parts Catalog*, provides a list of parts required for the RBS 884 Pico system.
- *Appendix C, RBS 884 Pico Test Record Form* provides an example of the RBS 884 Pico Test Record form.

- *Appendix D, User Feedback* provides information on *RBS 884 Pico (1900 MHz) User Guide* trouble reporting and ordering.
- *Appendix E, Conversion Table* provides a conversion reference between selected SI and non SI units.

Some of the procedures in the user guide require site-specific data from the *Site Installation Documentation* relating to the particular RBS site where the installation is to take place. This documentation should be available at the site.

The installation and maintenance procedures in the user guide are normally intended to be performed sequentially, in the order presented.

Part 2

System Description

1 Introduction

This part provides a description of the RBS 884 Pico (1900 MHz) system. An RBS overview as well as specific Pico equipment configurations are included.

2 Overview

The RBS 884 Pico (1900 MHz) is a modular radio base station that is capable of supporting all channels in the digital PCS band (1900 MHz). Each Radio Head in the Pico system is equipped with four transceivers (TRXs) that provide air interface communications with mobile phones.

The RBS 884 Pico (1900 MHz) provides the following features:

- Support for 1900 MHz Telecommunications Industry Association/Electronics Industry Association (TIA/EIA)-136 compatible mobile stations.
- Standard digital cell configuration that supports one Mobile Location Verification Module (MVER), one Digital Control Channel (DCCH), and eight Digital Voice Channels (DVCs), and covers a cell radius of approximately 30 to 50 m, depending on propagation conditions.
- Control and operation from the Mobile Switching Center (MSC) that is compatible with existing RBS 884 products.
- Design that meets or exceeds TIA/EIA-136-280 Base Station minimum performance requirements, except for the radio frequency (RF) sensitivity (-105 dBm).
- Compliant with the following regulatory agencies:
  - Nationally Recognized Testing Laboratory (NRTL)
  - Federal Communications Commission (FCC)

Figure 2-1 on page 2-4 shows the main components of the RBS 884 Pico (1900 MHz).

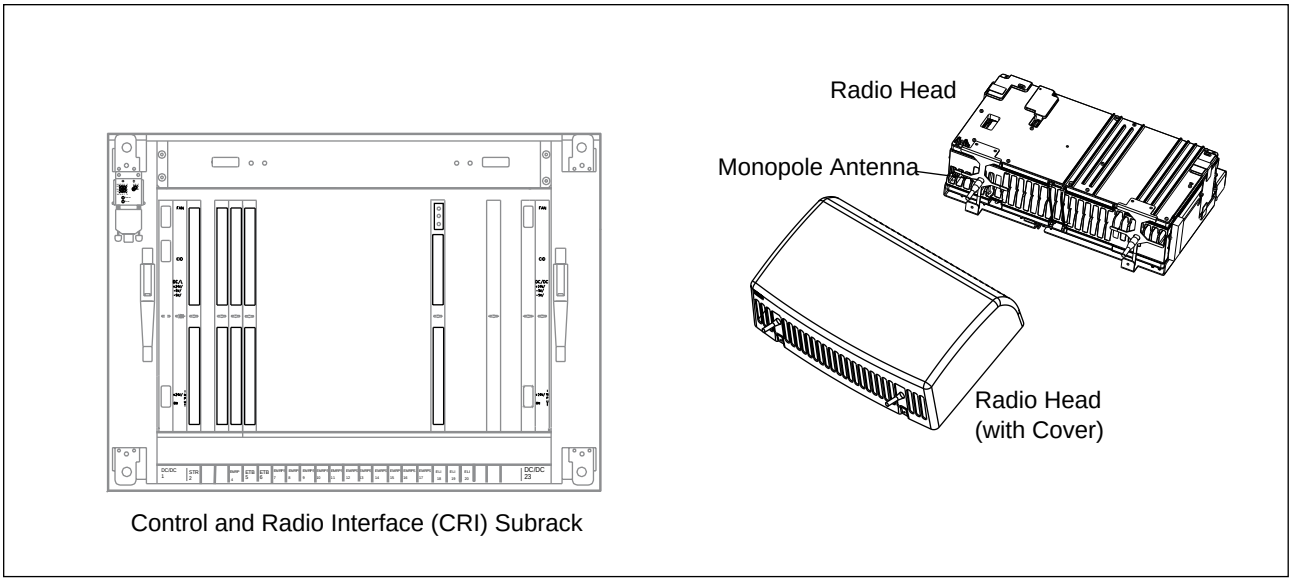


Figure 2-1. RBS 884 Pico (1900 MHz) Components

The RBS 884 Pico (1900 MHz) consists of a CRI that interfaces with remote Radio Heads. The product is used for spot coverage in larger 1900 MHz systems or for indoor wireless systems.

The RBS 884 Pico (1900 MHz) control hardware is installed in a standard 19-in equipment rack or an optional floor mount cabinet. The radio hardware is installed on a wall or other vertical surface separate from the CRI hardware.

With leased T1/E1 connections between the CRI and Radio Heads, the CRI can be centrally located and the Radio Heads can be installed in separate buildings. With non-leased connections between the CRI and Radio Head, the maximum cable loss between the Radio Head and the CRI is 30 dB. This cable loss restriction allows the first Radio Head to be located 800 m to 1000 m from the CRI (as measured by cable length).

To comply with FCC RF exposure requirements, the external antennas used with this device must be mounted to provide a minimum separation distance of 20cm (8 inches) from all persons, with the antenna gain not exceeding 14 dBi. Amplifiers and boosters are not permitted.

Control and Radio Interface (CRI) Hardware

- CRI subrack
  - Signaling Terminal Regional (STR)
  - DC/DC Power Converter (2)
  - Exchange Terminal Board (ETB) (maximum 2)
  - Enhanced Link Interface (ELI) (maximum 4)
  - Extension Module Regional Processor (EMRP)
  - EMRP with Device Speech Bus Access (EMRPS) (maximum 10)
  - Radio Interface Time Switch (RITSW)
  - Cabinet Identification (CID) Unit
  - Fan Unit
  - Sync (synchronization) cable
- Nonintegrated AC/DC Power Converter

Radio Hardware

- Radio Head
  - Dual Transceiver (DTRX) (2)
  - Radio Head Interface (RHI) unit with customer interface
  - Power Supply Unit (PSU)
  - Cascade Adapter Board (CAB) with Pulse Code Modulation (PCM) interface ports
  - External Duplexers (2)
- Antennas
  - Monopole Antennas
  - Patch Antenna Assembly (optional)
  - External Antennas (optional)

The individual RBS 884 Pico (1900 MHz) equipment units are described in Section 3.2 Equipment Unit Description on page 2-12.

2.1 RBS 884 Pico Call Path and Signaling

2.1.1 Control Signaling

Control signaling for the RBS 884 Pico (1900 MHz) system is as follows:

- The MSC central processor sends the control signal to the Signaling Terminal Central (STC) unit.
- The STC unit converts the signal format and sends the signal to the Exchange Terminal Circuit (ETC).
- The ETC inserts the control signal into a time slot on the PCM T1/E1 link to the base station CRI.
- The ETB extracts the control signal and sends it to the STR.
- The STR converts the information back to processor format and outputs it on the Extension Module Regional Processor Bus (EMRPB).
- The EMRPB connects the processing units (EMRP and EMRPSs).
  - The EMRP controls the CRI hardware units, including the RITSW, ETB, and ELI.
  - The EMRPS (through the ELI) controls the TRXs in the Radio Head. The T1/E1 network connection with Link Access Protocol D (LAPD) provides error detection and retransmission.

2.1.2 Speech Signaling

Speech signaling for the RBS 884 Pico (1900 MHz) system is as follows:

- The Public Switched Telephone Network (PSTN) sends a speech or data signal to the Group Switch (GS) at the MSC.
- A digital call is processed by the MSC as follows:
  - Routed to the Transcoder Rate Adaptation Board (TRAB)
  - Converted into compressed format used in the air interface with Algebraic Code Excited Linear Prediction (ACELP)

  - Combined with two other voice paths that share the same frequency
  - Routed to the correct ETC
- The signal is sent over a T1/E1 line to the base station CRI where it is routed to the following units:
  - ETB
  - RITSW
  - ELI
- The ELI unit communicates with TRXs in the Radio Head through a T1/E1 line.
- In the Radio Head, the RHI receives the signal and routes it to the correct TRX, where it is converted to RF. The RF is then filtered and coupled to the antenna(s) for transmission.

2.2 Synchronization

Synchronization is necessary to ensure a stable carrier frequency reference and error-free transmission between the RBS and the MSC.

Jitter and wander introduced by the T1/E1 line between the CRI and the Radio Head is filtered out by the Radio Head Phase Locked Loop (PLL). The frequency accuracy of the Radio Head is better than 0.1 ppm at the presence of maximum wander (138 UI), provided that the reference frequency for the PLL is traceable to a long-term Stratum 2 clock reference from the network.

With non-leased or proprietary connections between the CRI and the Radio Head, the ELI unit is connected to the incoming MSC PCM Stratum 2 reference. The T1/E1 connection on the ETB unit is cabled to the first ELI unit. The first ELI unit uses the PCM reference to provide the transmit clock for the PCM interface to the Radio Heads. The reference from the first ELI unit is passed to the other ELI units through the ETB-ELI Sync Cable.

3 Architecture

The RBS 884 Pico (1900 MHz) controls and handles communication between the MSC and the mobile stations. The configuration of the Pico equipment depends on the following:

- Number of cells
- Number of voice channels in each cell
- Transmit power

Figure 2-2 on page 2-9 shows the main connections to and from an RBS 884 Pico (1900 MHz).

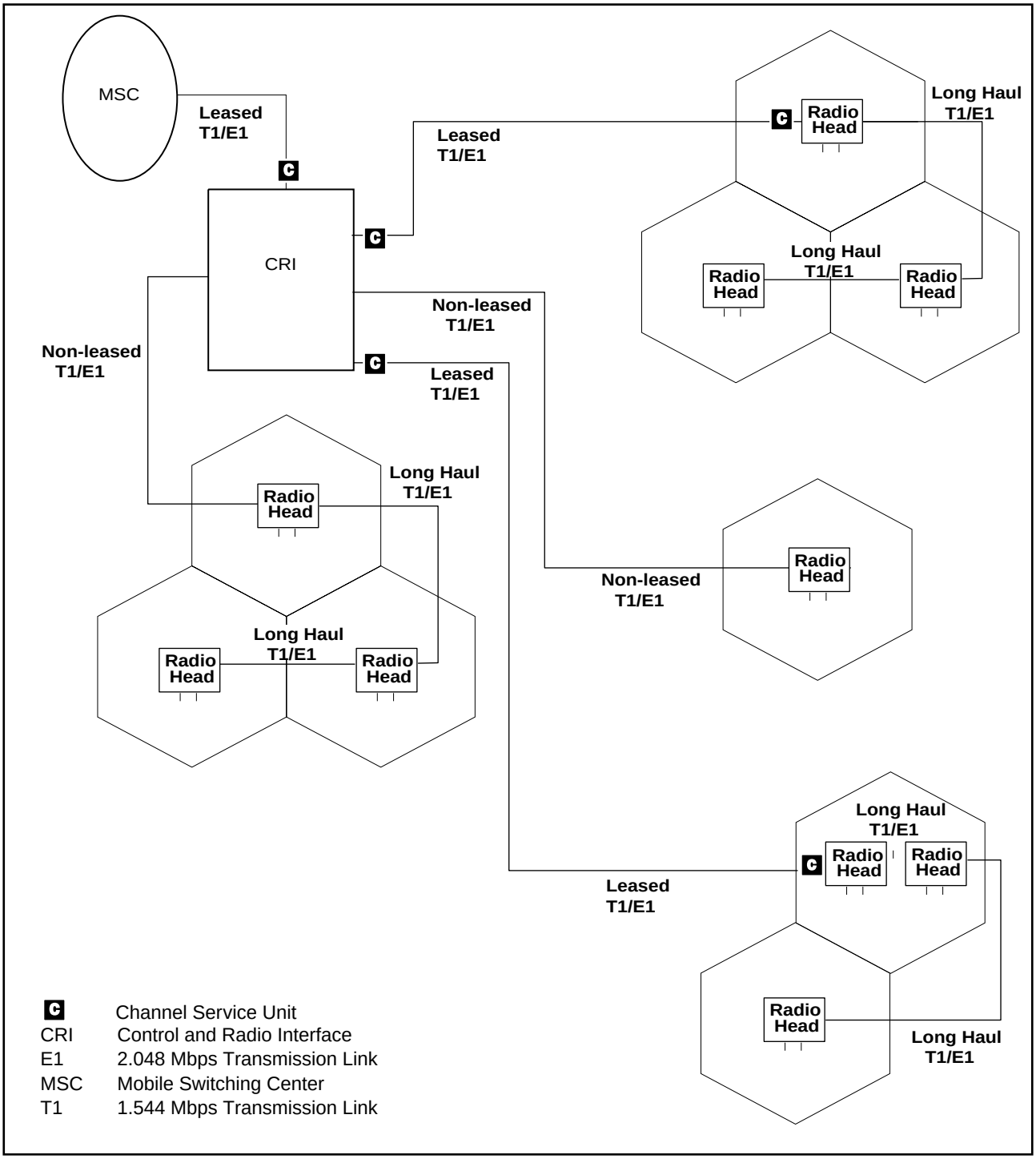


Figure 2-2. General Overview of RBS 884 Pico (1900 MHz) Configuration

The GS at the MSC is responsible for switching calls between subscribers. The calls can be between two mobile subscribers or between a mobile subscriber and a subscriber in the public telephone network. The RBS

contains several regional processors that are controlled by and work with the central processor. The regional processors control the time switch and the TRXs in the base station. The time switch in the base station makes sure that the speech signals from the MSC are connected to the correct TRX. The TRXs generate radio signals that are emitted by the base station antenna to the mobile stations. The semipermanent connections are set up in the MSC. Each TRX handles three digital speech channels, but uses only one channel on the T1/E1 PCM link.

The RBS 884 Pico (1900 MHz) is an application of the Mobile Base Station Subsystem (MBS) and follows the same general functional structure. The basic functional and implementation structure is shown in Figure 2-3 on page 2-11.

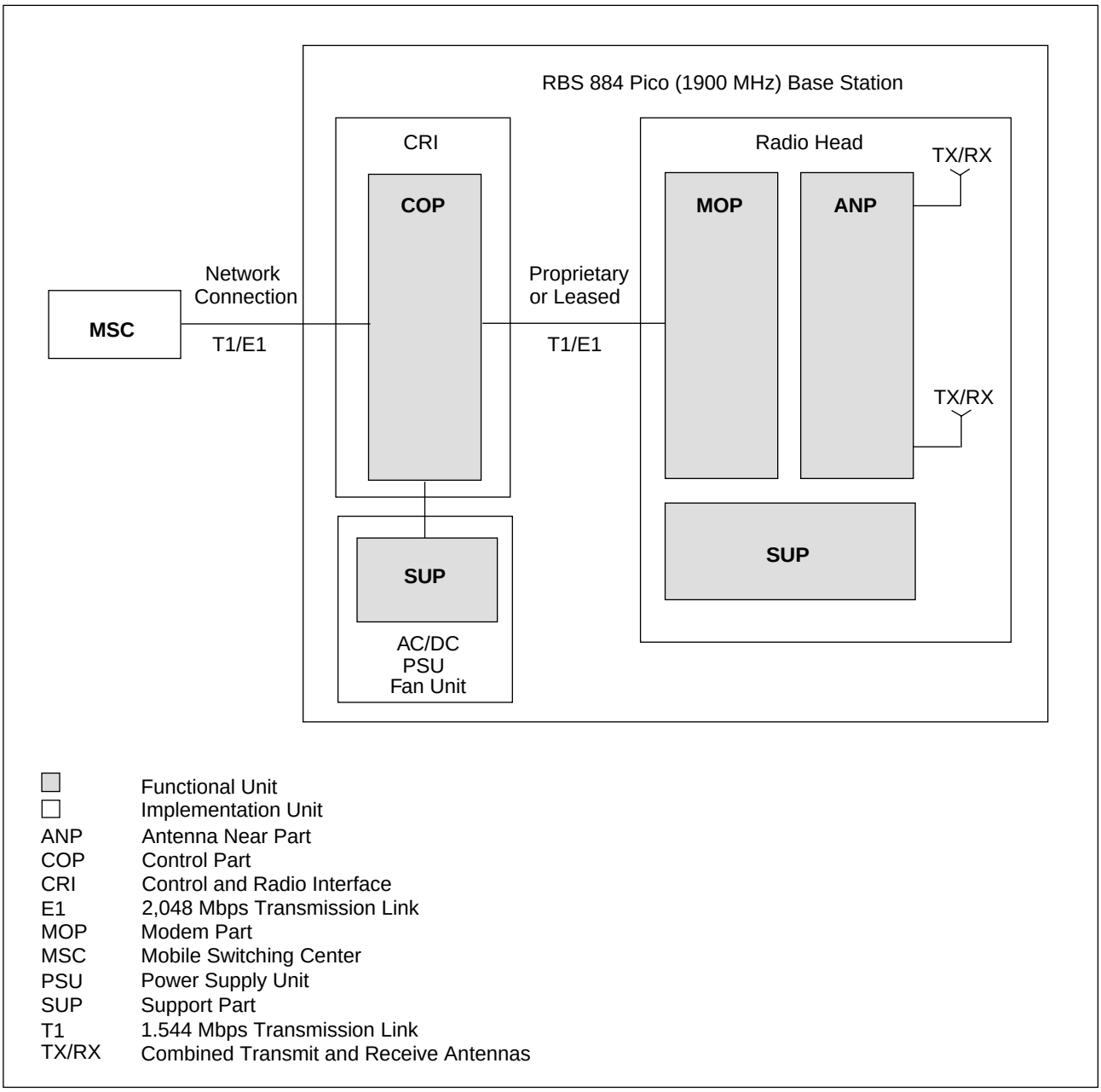


Figure 2-3. RBS 884 Pico (1900 MHz) Functional and Implementation Units

3.1 Functional Unit Description

The following section provides a description of the RBS 884 Pico (1900 MHz) from the working or functional point of view.

3.1.1 Control Part (COP)

The COP provides communication between the RBS hardware the MSC for radio traffic control and statistical data gathering. The COP also provides control for the Modem Part (MOP), Antenna Near Part (ANP), and the Support Part (SUP). Other functions include network synchronization and time switching. COP equipment is located in the CRI cabinet.

Each RBS 884 Picocell requires a control channel for its coverage area. Movement between Picocells triggers the normal hand-off mechanisms in the CMS 8800 system. The RBS 884 Pico (1900 MHz) also supports the hand-off operations of the MS as the MS migrates between the outdoor Microcell/Macrocell environment and the indoor Picocell environment.

3.1.2 Modem Part (MOP)

The MOP functional unit provides conversion from MS speech and control channel data to and from radio waves to communicate with the MS. The voice transcoder part of the MOP functionality resides in the MSC. In the RBS 884 Pico (1900 MHz), the Carrier Frequency stabilization is performed in the Radio Head.

3.1.3 Antenna Near Part (ANP)

The ANP functional unit includes combining and separating RF carriers for transmitting and receiving on the same radio antennas. The RBS 884 Pico (1900 MHz) ANP functionality is localized in the Radio Head hardware. The Radio Head has a fixed antenna configuration and four carriers (two DTRX).

3.1.4 Support Part (SUP)

The SUP provides DC power and cooling to the hardware equipment units.

3.2 Equipment Unit Description

The hardware equipment units are divided into two units: control and radio.

The control equipment units consist of the CRI hardware used to implement the COP and SUP functions. The CRI hardware includes the following components:

- Nonintegrated power (AC/DC) converter
- DC/DC Power Converter (2)

- Cabinet Identification (CID) Unit
- Fan Unit
- Signaling Terminal Regional (STR)
- Exchange Terminal Board (ETB) (2)
- Enhanced Link Interface (ELI) (maximum 4)
- Extension Module Regional Processor (EMRP)
- EMRP with Device Speech Bus Access (EMRPS) (maximum 10)
- Radio Interface Time Switch (RITSW)

The control equipment units are housed in a standard 19-in equipment rack (or optional floor mount cabinet) that includes a Fan Unit to cool the equipment.

The radio equipment units consist of the Radio Head hardware to implement the MOP, ANP, and SUP functions and includes the following components:

- Integrated Power Supply
- Two DTRX (four TRX) units
- Radio Head Interface (RHI) unit
- Cascade Adapter Board (CAB) for T1/E1 connections

3.2.1 Control and Radio Interface (CRI) Subrack

The CRI subrack provides communication functions, APZ (control part of Ericsson's telephone exchange system) regional processing, and static (semipermanent) switching functions for the RBS 884 Pico (1900 MHz).

The CRI equipment consists of the following assemblies:

- standard CRI subrack and Fan Unit assembly
- external AC/DC power supply assembly

The CRI equipment is provided in a rack mount installation, shown in Figure 2-4 on page 2-14 and an optional floor mount installation shown in Figure 2-5 on page 2-15.

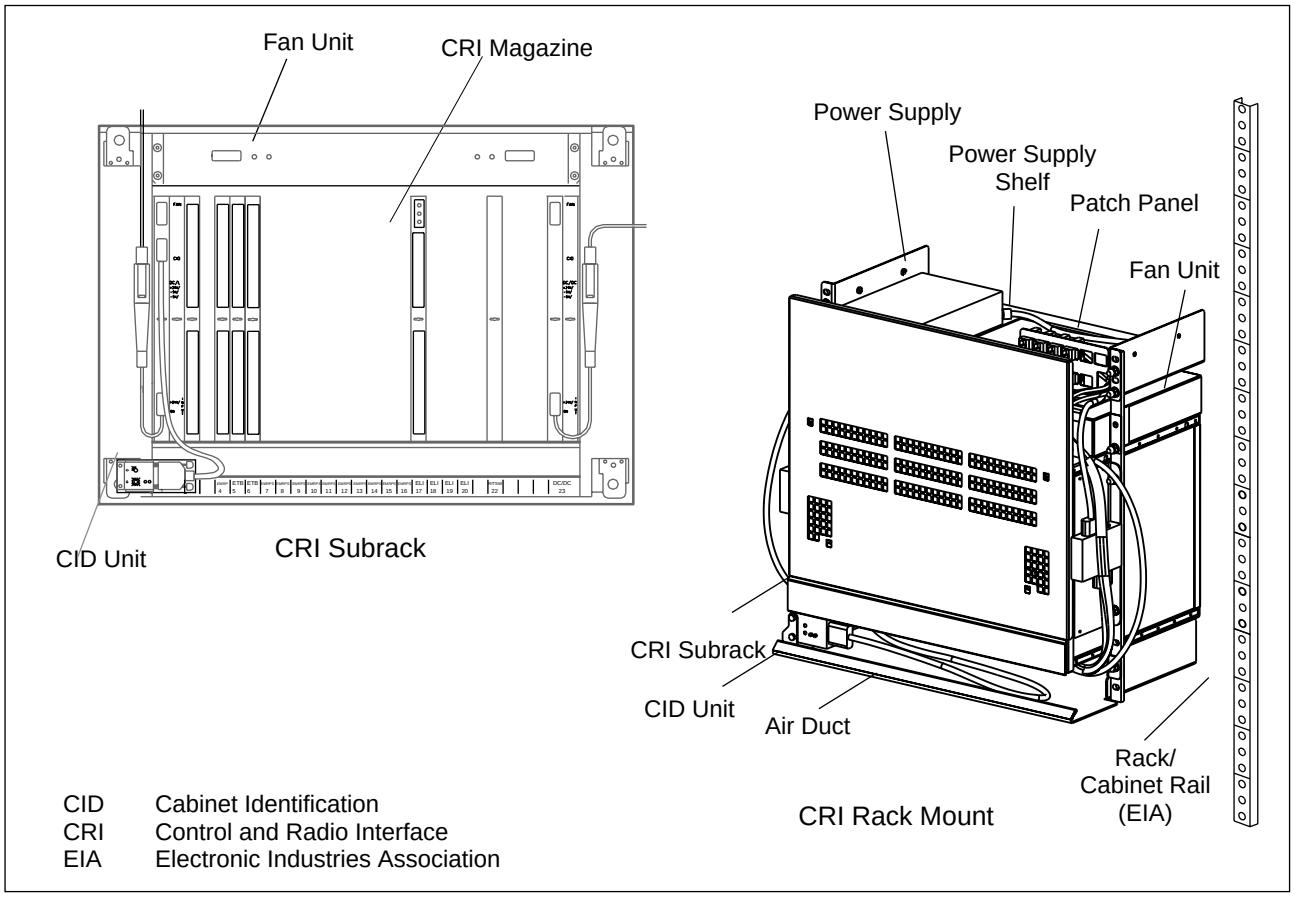


Figure 2-4. CRI Rack Mount Equipment

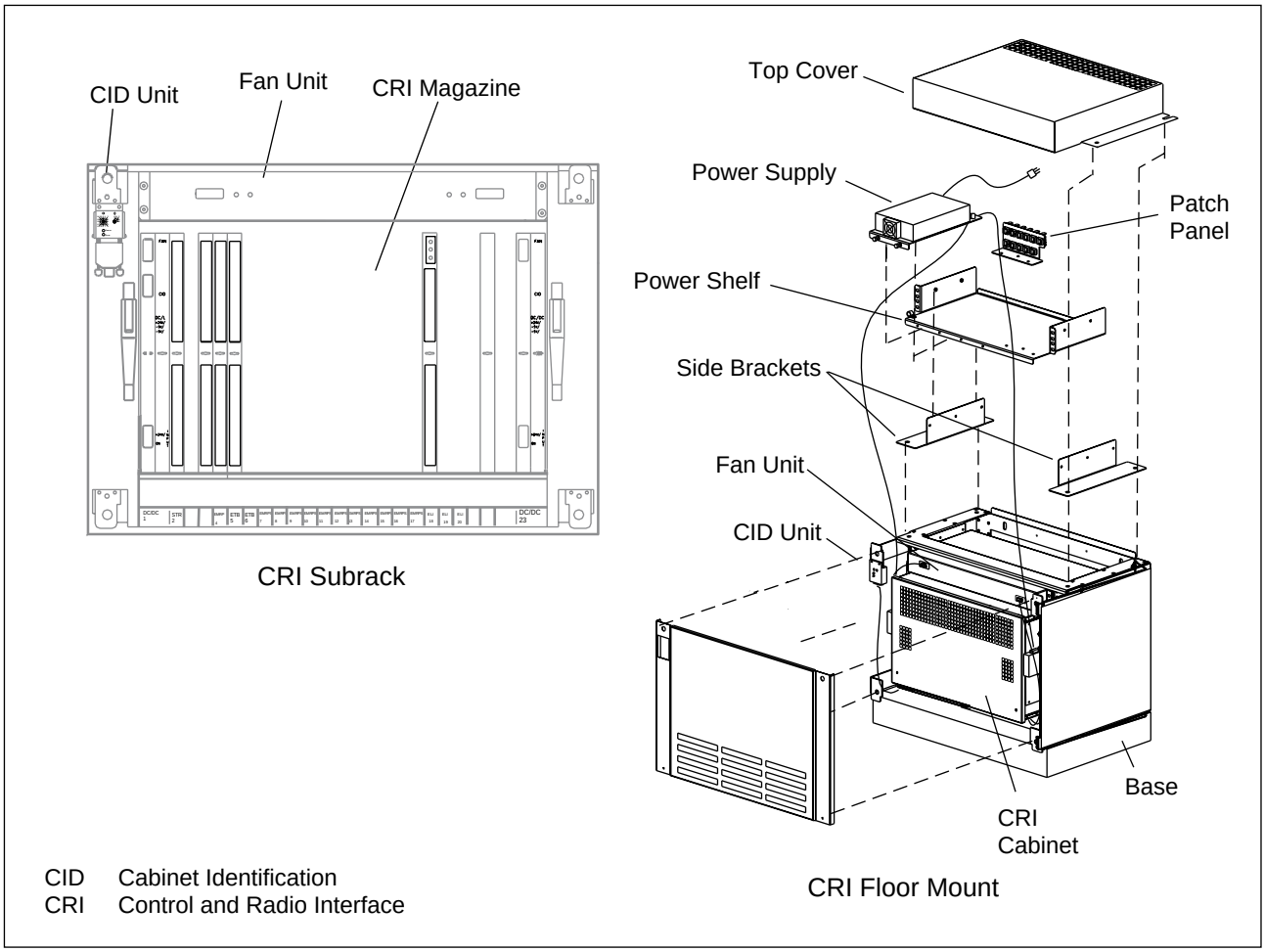
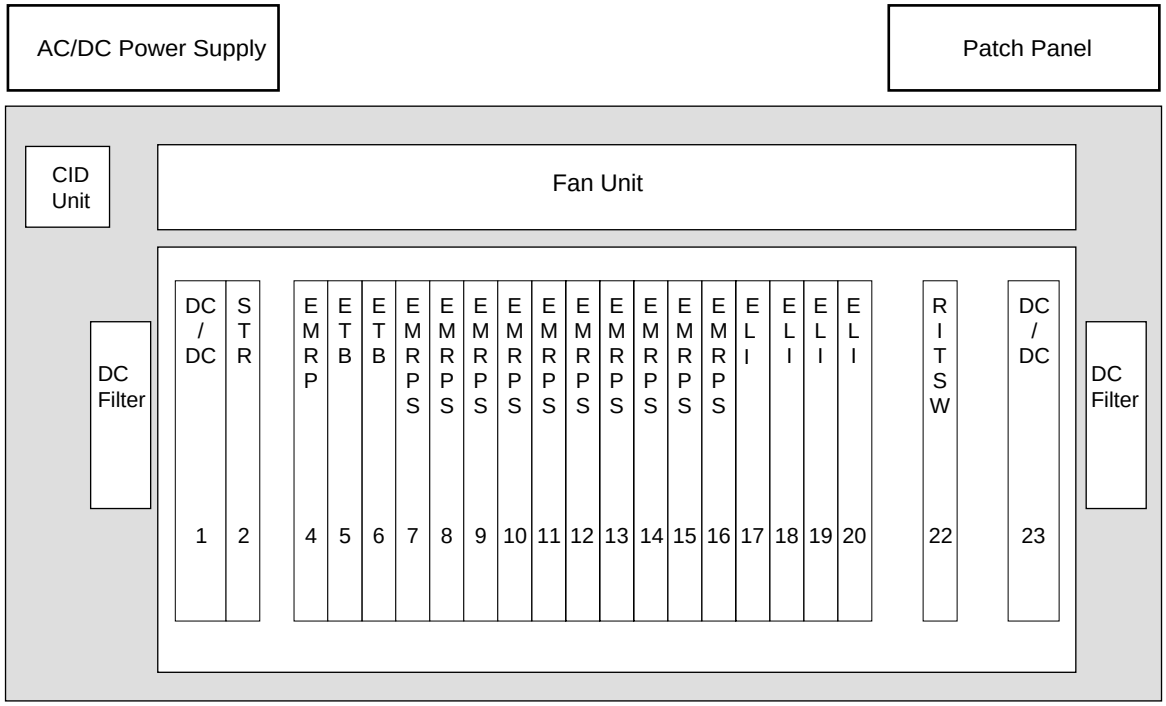


Figure 2-5. CRI Floor Mount Equipment

The CRI units are housed in a standard subrack (or optional floor mount cabinet) that provides Electromagnetic Compatibility (EMC) and Electromagnetic Interference (EMI) shielding, backplane interconnections, and local power conditioning. Figure 2-6 on page 2-16 shows an example of the CRI cabinet layout.

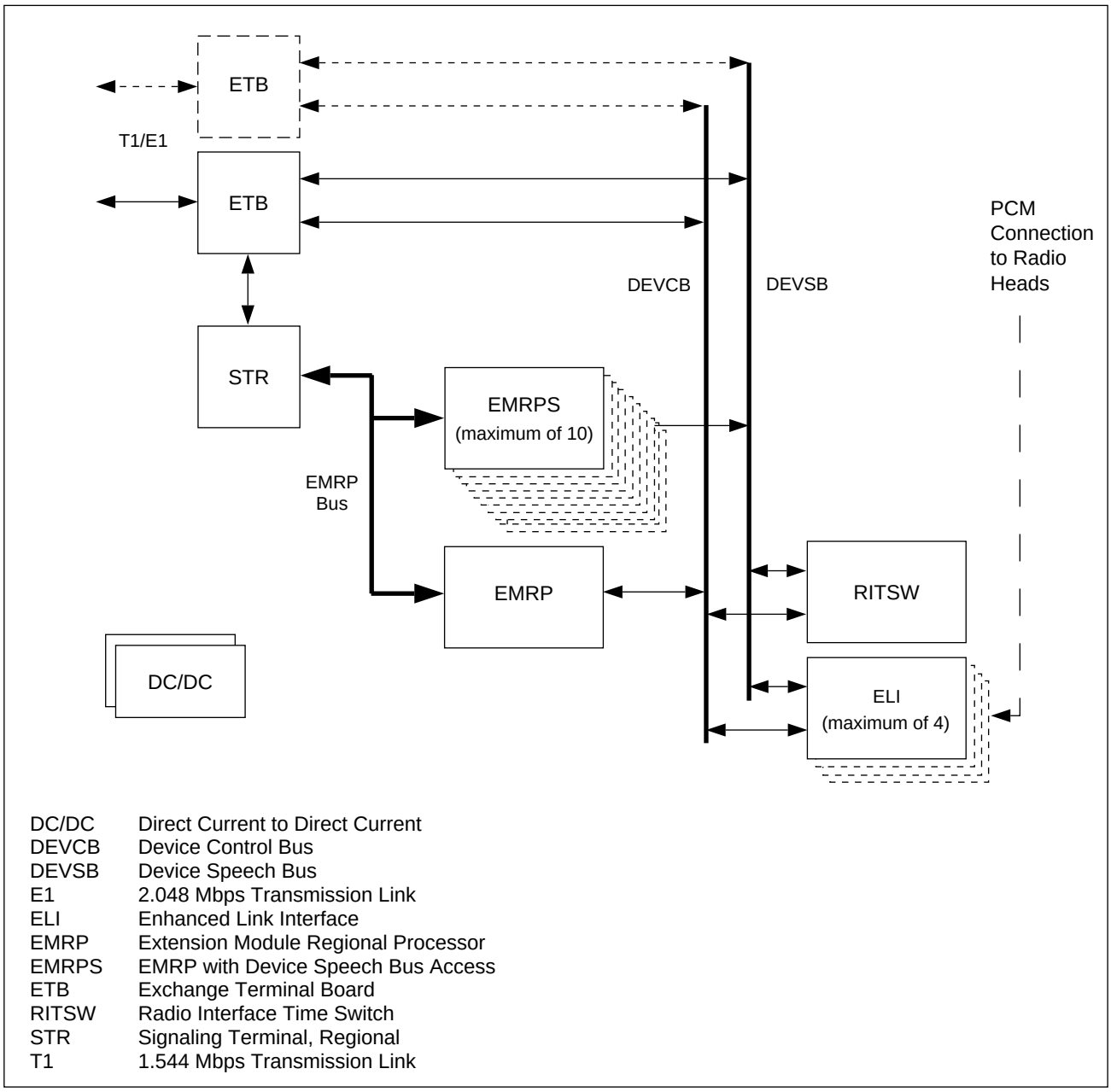


Note: The CID Unit in this illustration is for the Floor Mount cabinet only. The CID Unit for the Rack Mount is located on the bottom left side of the CRI subrack.

AC/DC	Alternating Current to Direct Current
CID	Cabinet Identification Unit
DC/DC	Direct Current to Direct Current
ELI	Enhanced Link Interface
EMRP	Extension Module Regional Processor
EMRPS	EMRP with Device Speech Bus Access
ETB	Exchange Terminal Board
RITSW	Radio Interface Time Switch
STR	Signaling Terminal, Regional

Figure 2-6. CRI Floor Mount Cabinet Layout

Figure 2-7 on page 2-17 shows interconnections of the CRI assemblies.



DC/DC	Direct Current to Direct Current
DEVCB	Device Control Bus
DEVSB	Device Speech Bus
E1	2.048 Mbps Transmission Link
ELI	Enhanced Link Interface
EMRP	Extension Module Regional Processor
EMRPS	EMRP with Device Speech Bus Access
ETB	Exchange Terminal Board
RITSW	Radio Interface Time Switch
STR	Signaling Terminal, Regional
T1	1.544 Mbps Transmission Link

Figure 2-7. CRI Interconnections

The following paragraphs describe the hardware units used in the RBS 884 Pico (1900 MHz) CRI magazine.

3.2.1.1 DC/DC Power Converter Units

The CRI has two DC/DC converter units that supply power to the CRI subrack. The converter units receive power from a single +24 Vdc power feed and convert it to ±5 Vdc for use by the CRI boards.

Each DC/DC converter unit is capable of powering the entire CRI subrack in case of failure of one of the units. When both units are operational, they share the load. The EMRPSs have onboard DC/DC converters.

3.2.1.2 Exchange Terminal Board (ETB)

The ETB unit provides a T1/E1 network interface to the MSC. It is available in a 24 time slot T1 version (ETB24) or a 32 time slot E1 version (ETB32). The physical T1/E1 interface is a quarter-plug connector on the front panel of the ETB. The unit provides frame synchronization and time slot extraction/generation of the T1/E1 signal.

The ETB routes the speech DS0 signals to the RITSW over the CRI backplane. The ETB extracts base station control information from a single T1/E1 time slot. This signal is routed to the STR. The ETB also extracts the 8 kHz frame clock from the network interface link. The frame clock provides the Carrier Frequency Reference (CFR) to the RITSW.

3.2.1.3 Signaling Terminal Regional (STR)

The STR is a protocol converter that communicates with the STC in the MSC. Communication with the MSC is through a single DS0 time slot on the MSC-CRI span. This time slot is routed from the span to the STR by way of the ETB. In addition, the STR generates the EMRPB interface within the CRI.

3.2.1.4 Extension Module Regional Processor (EMRP)

The EMRP is controlled by the MSC. In turn, the EMRP controls the ETB, ELI, and RITSW through the backplane Device Control Bus (DEVCB). The EMRP communicates to the MSC through the EMRPB provided by the STR.

The EMRP executes regional software downloads from the MSC.

3.2.1.5 EMRP with Speech Bus Access (EMRPS)

The EMRPS is an EMRP with extended processor power and a speech bus interface. The EMRPS implements the logical parts of the radio channel functions for the RBS 884 Pico (1900 MHz). The EMRPS executes software downloads from the MSC.

The EMRPS unit communicates with the MSC through the EMRPB interface. Communication with the Radio Heads is through the RITSW and ELI units by way of the DEVSB interface in the CRI backplane. The EMRPS unit is equipped with an onboard DC/DC converter that derives the required internal voltages from the CRI backplane.

3.2.1.6 Enhanced Link Interface (ELI)

The ELI is used to provide a T1/E1 connection between the CRI and the Radio Head. The device supports a single, 100-ohm twisted-pair 1.544 Mbit/s long-haul or short-haul T1 interface, or a single, 120-ohm twisted pair or 75-ohm coaxial 2.048 Mbit/s long-haul or short-haul E1 interface. The ELI unit contains switches to select the link type (T1/E1 leased or non-leased), short-haul T1 line build-up, long-haul attenuation and the 75-ohm coaxial E1 cable grounding.

The ELI maps the DEVSB time slots from the RITSW to the T1/E1 time slots using a predefined multiplexing and mapping scheme. The ELI also handles the LAPD-based retransmission protocol at the CRI end of the connection. On the Radio Head end, the RHI unit handles all time slot mapping and retransmission functionality

The T1 interface utilizes Extended Superframe (ESF) framing format and Bipolar with 8 Zero Substitution (B8ZS) line code. The E1 interface utilizes Frame Alignment Signal-Cyclic Redundancy Check (FAS-CRC) framing format and High Density Bipolar Level 3 (HDB3) line code.

A Light Emitting Diode (LED) lamp on the ELI indicates the status of the T1/E1 line. The ELI transmits the T1/E1 alarms back to the Radio Head corresponding to the quality of the signal received on the T1/E1 line from the Radio Head. The ELI can be monitored and controlled by the EMRP through the backplane DEVCB with Digital Path (DIP) supervision.

See Figure 2-8 on page 2-19 for an illustration of ELI unit and Radio Head connections.

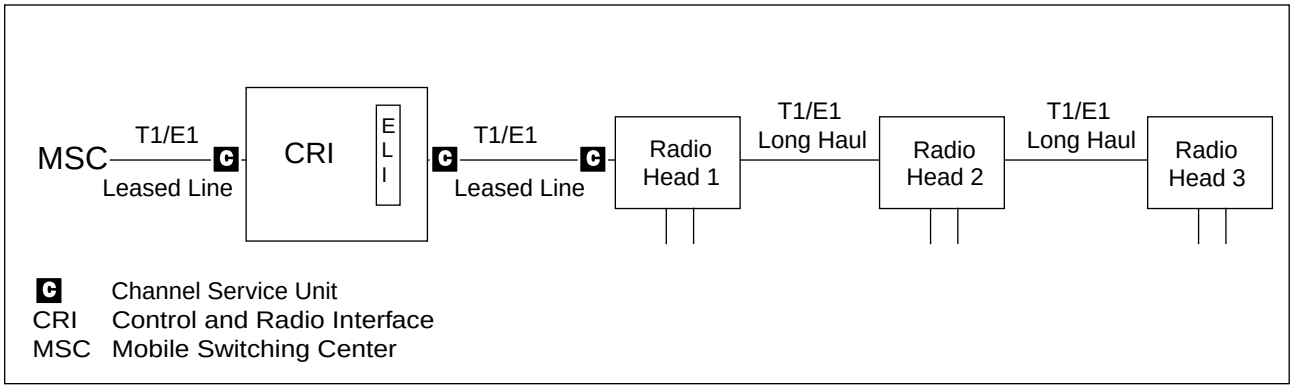


Figure 2-8. ELI Unit with Cascaded Radio Heads

3.2.1.7 Radio Interface Time Switch (RITSW)

The RITSW is a local space/time switch in the CRI that routes DS0 time slots between ETB, EMRPS and ELI. The RITSW also provides the clock synchronization and stabilization in the CRI.

The RITSW is controlled by the EMRP through the backplane DEVCB. The DEVCB interface to RITSW is used to set the semi-permanent DS0 time-slot connections.

3.2.1.8 Fan Unit

The Fan Unit is a physically separate part of the CRI subrack and is mounted directly above the subrack. The Fan Unit contains two fans that are powered by the DC/DC converters in the subrack. The fans are rated such that a single fan can provide sufficient cooling of the CRI.

3.2.1.9 Cabinet Identification (CID) Unit

The CID Unit is located on the top-left side of the CRI floor mount version and on the bottom-left side of the CRI rack mount version. The CID Unit allows a unique identification number to be set for the CRI cabinet during installation. This number is read at the MSC to identify the cabinet for alarm reporting and fault resolution.

3.2.1.10 Internal Alarm Distribution

The CRI distributes and reports the following equipment related alarms:

- Fan alarm
- DC/DC converter alarm

The alarms are distributed in the CRI as shown in Figure 2-9 on page 2-21.

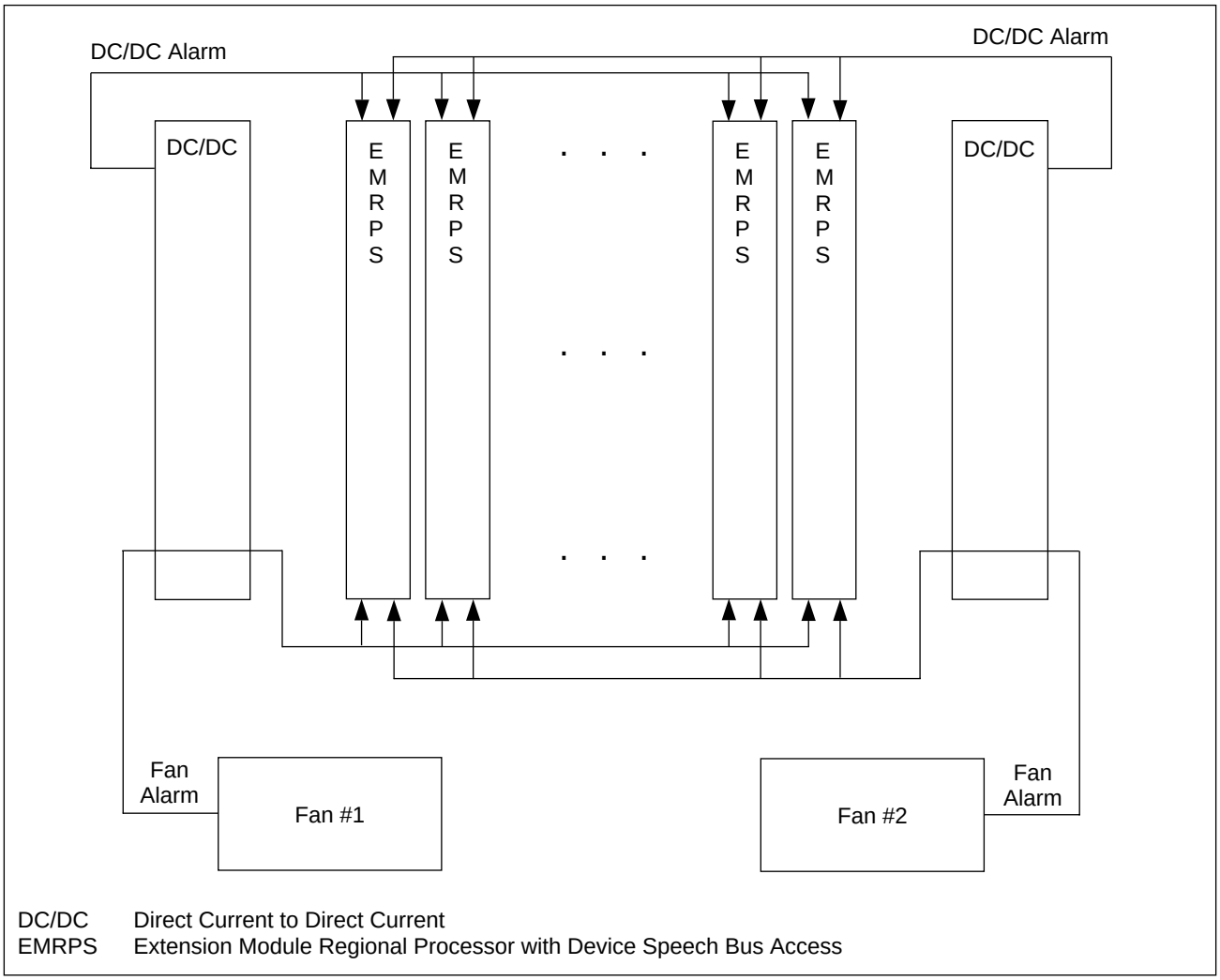


Figure 2-9. CRI Internal Alarm Distribution

3.2.2 External AC/DC Power Supply Unit (PSU)

The external AC/DC PSU is housed in a 19 in rack-mountable assembly. The PSU draws power from the building 110 (50-60 Hz) or 220 Vac (50-60 Hz) power receptacle, and supplies +24 Vdc (nominal) through the DC filter units to the DC/DC converters in the CRI cabinet.

Note: The external AD/DC power unit does not have an ON/OFF switch. The only means for switching the PSU on/off is by plugging and unplugging it from the building power receptacle. The CRI should be installed within easy access of the building power receptacle.

3.2.3 Radio Head

The Radio Head implements the MOP functionality and part of the ANP and SUP functionalities. The Radio Head is located in a custom enclosure. RF shielding minimizes coupling of signals into and from the RF circuitry and allows compliance to EMI and EMC specifications. The Radio Head contains two DTRX units for a total of four TRXs in each Radio Head.

The Radio Head is mounted on a pre-mounted support bracket that is installed on a wall, column, pole, or other vertical surface. Modular RJ-45 connectors, mounted on the top of the Radio Head, provide connections for the primary and secondary PCM link cables.

The Radio Head has its own internal power supply that must be connected to the standard mains power through the AC power plug connector.

RBS 884 Pico (1900 MHz) Radio Head uses two Transmit/Receive (TX/RX) antennas. The Radio Head antennas can be either monopole, patch, or external antennas.

See Figure 2-10 on page 2-22 for an illustration of the Radio Head with monopole antennas. See Figure 2-11 on page 2-23 for a Radio Head block diagram.

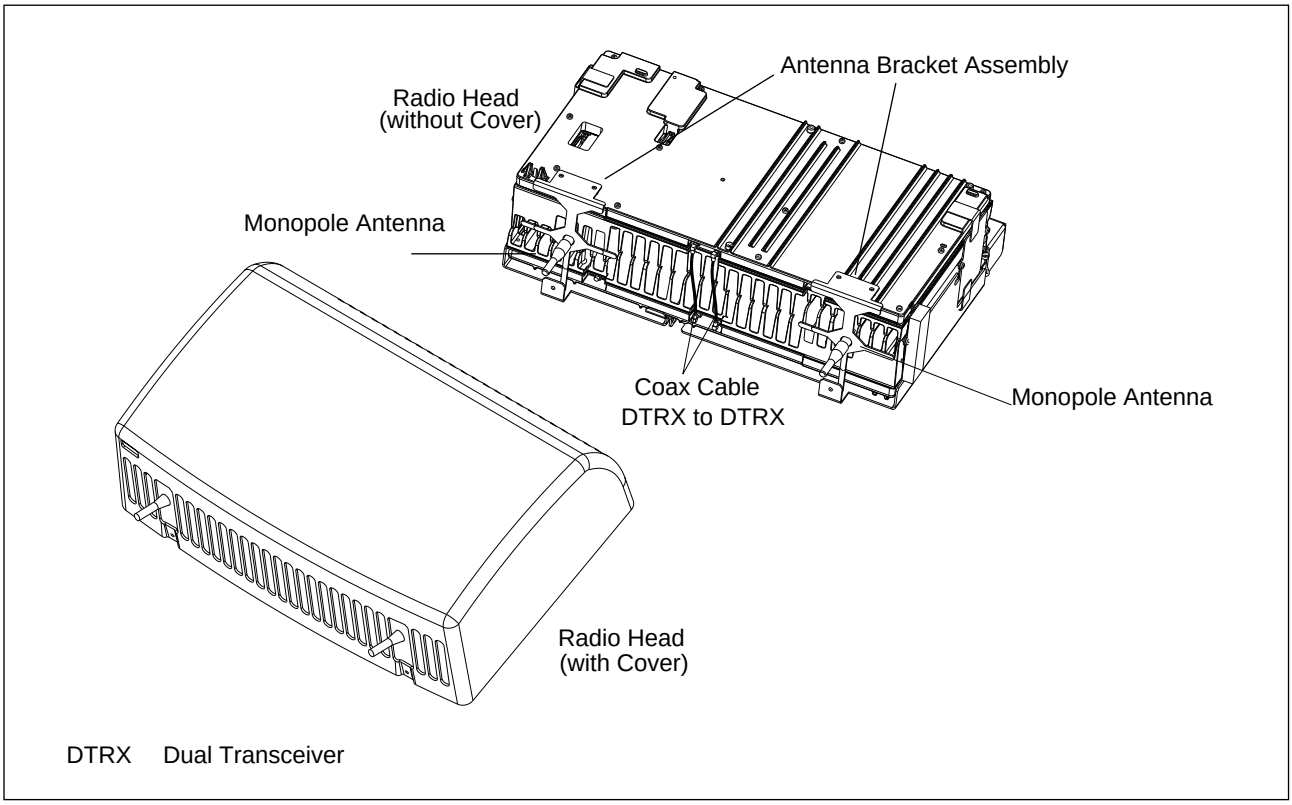


Figure 2-10. Radio Head with Monopole Antennas

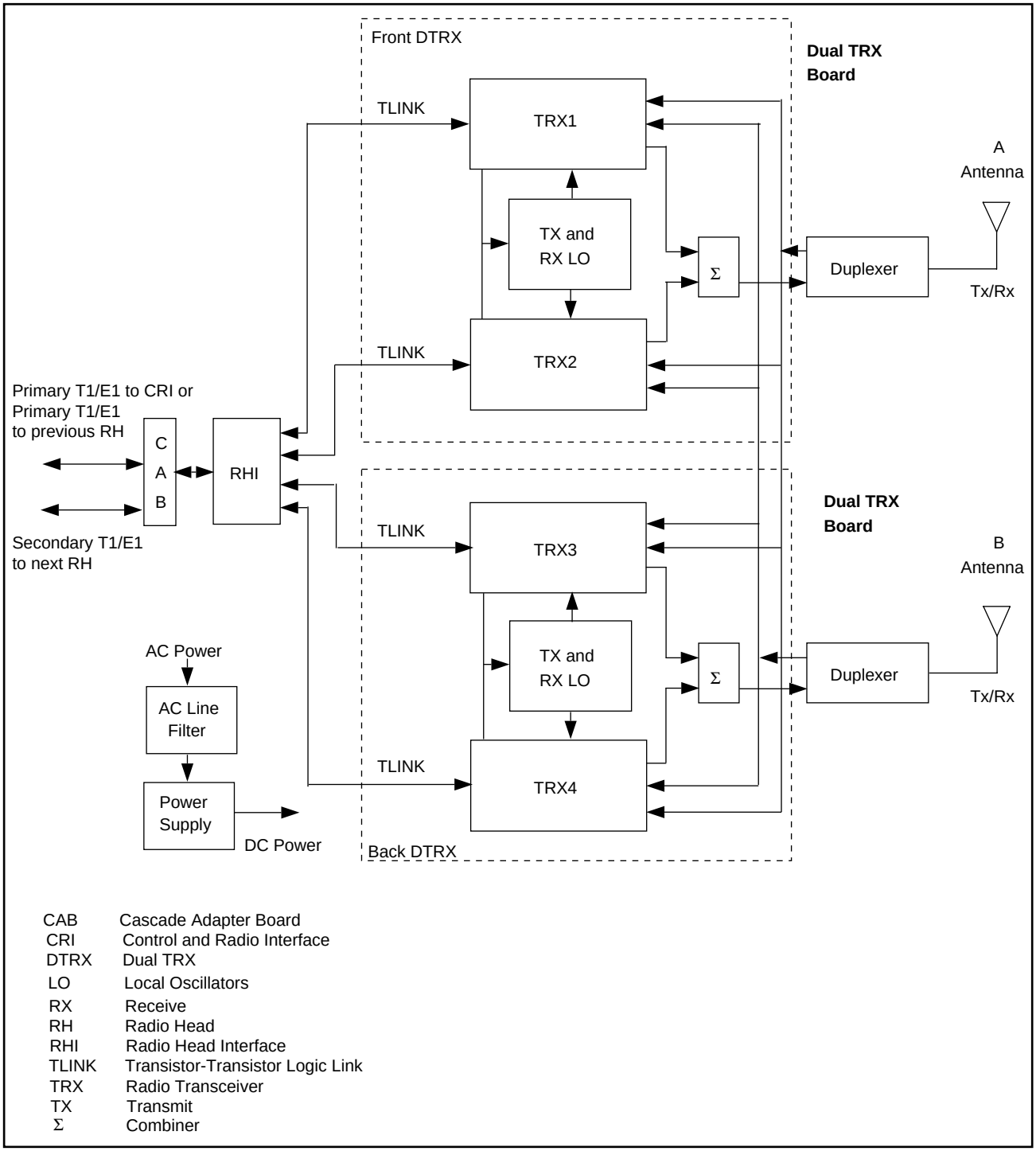


Figure 2-11. Radio Head Block Diagram

3.2.3.1 Dual Transceiver (DTRX) Unit

Each DTRX unit has the functionality of two 1900 MHz TRXs and produces 100 mW (nominal) per carrier (TRX) at the Radio Head antenna port. Each

TRX performs frequency upconversion and downconversion in two stages with both TRXs using the same TX and RX Intermediate Frequency (IF). A single Local Oscillator (LO) is shared between the TRXs.

3.2.3.2 Radio Head Interface (RHI)

The RHI unit is located under the Radio Head chassis and provides the following interfaces:

- Primary T1/E1 interface to the CRI or to the previous Radio Head
- Secondary T1/E1 interface to the next Radio Head
- TLINK connection to the TRXs
- Customer interface with alphanumeric display
- Carrier frequency stabilization
- Local device processor

The RHI software is loaded in the factory. Upgrades to the RHI software can be made by downloading new software through the ELI unit.

3.2.3.3 Antennas

The Radio Head contains two integrated TX and RX monopole antennas, as shown in Figure 2-12 on page 2-25. The monopole antennas provide an omnidirectional pattern. An optional dual patch antenna assembly that mounts on the Radio Head provides a directional pattern with gain.

Note: The monopole RF connectors can be used for two external antennas. External antennas are not provided with the RBS 884 Pico (1900 MHz) system. See *RF Module* EN/LZN 724 0010 for RF engineering guidelines.

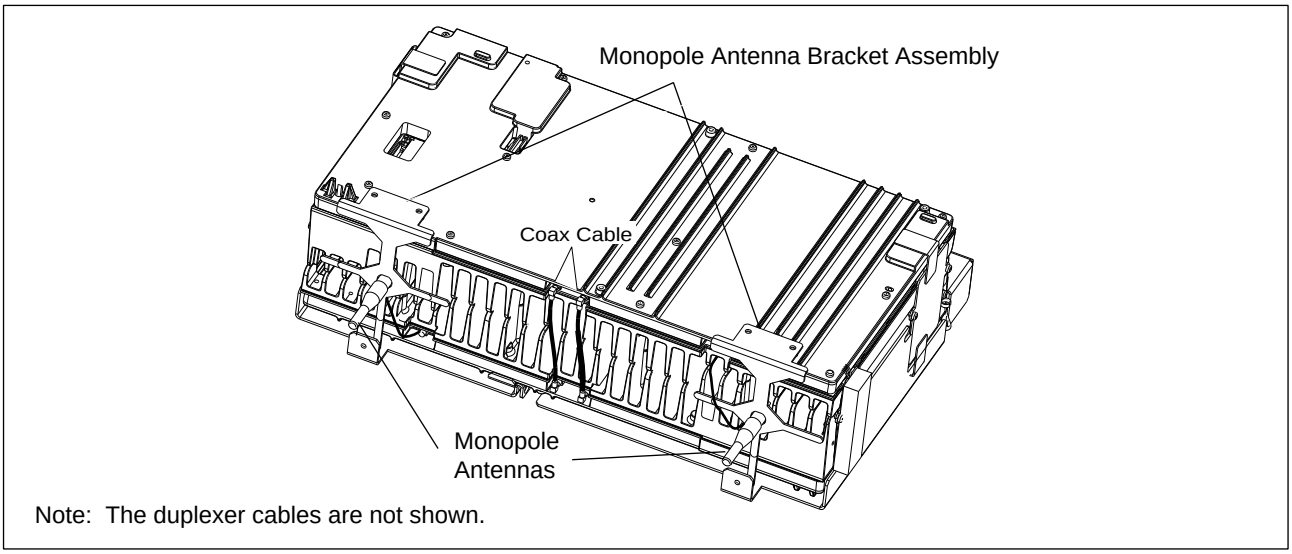


Figure 2-12. Radio Head Monopole Antennas

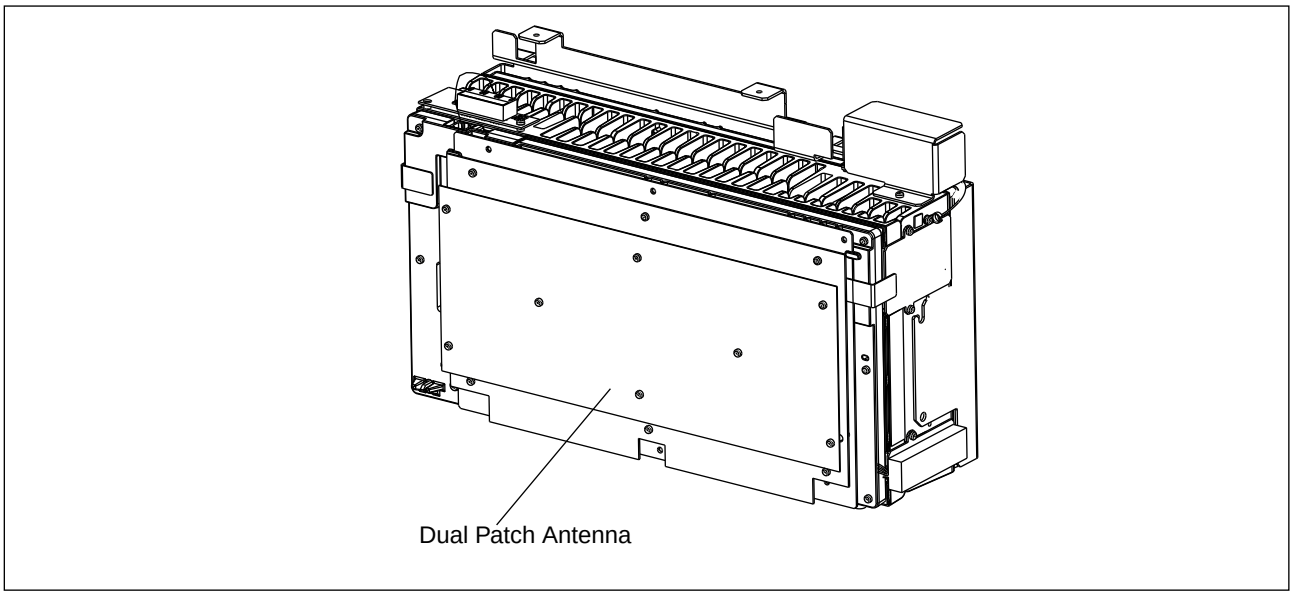


Figure 2-13. Radio Head Dual Patch Antenna

3.2.3.4 Radio Head User Interface

The Radio Head user interface is visible through an opening in the Radio Head chassis. The eight-character alphanumeric display and push buttons allow the user to configure the following parameters:

- Primary PCM link operations mode
  - T1 (long-haul, short-haul, line build-out/attenuation)
  - E1 (long-haul, short-haul)
- Secondary PCM link operations mode
  - T1 (long-haul, short-haul, line build-out/attenuation)
  - E1 (long-haul, short-haul)
- Cabinet ID
- Alarms
  - Primary PCM link
  - Secondary PCM link
  - TRX
- Hardware Unit (Board) Status
  - TRX status
  - Software revision and hardware information
  - PLL status
  - Error logs for use by the local Ericsson Repair Service Center

See Figure 2-14 on page 2-27 for the location of the Radio Head user interface. See *Part 4, Radio Head Installation*, and *Part 6, Troubleshooting* for a detailed description of the user interface and recommended fault resolutions.

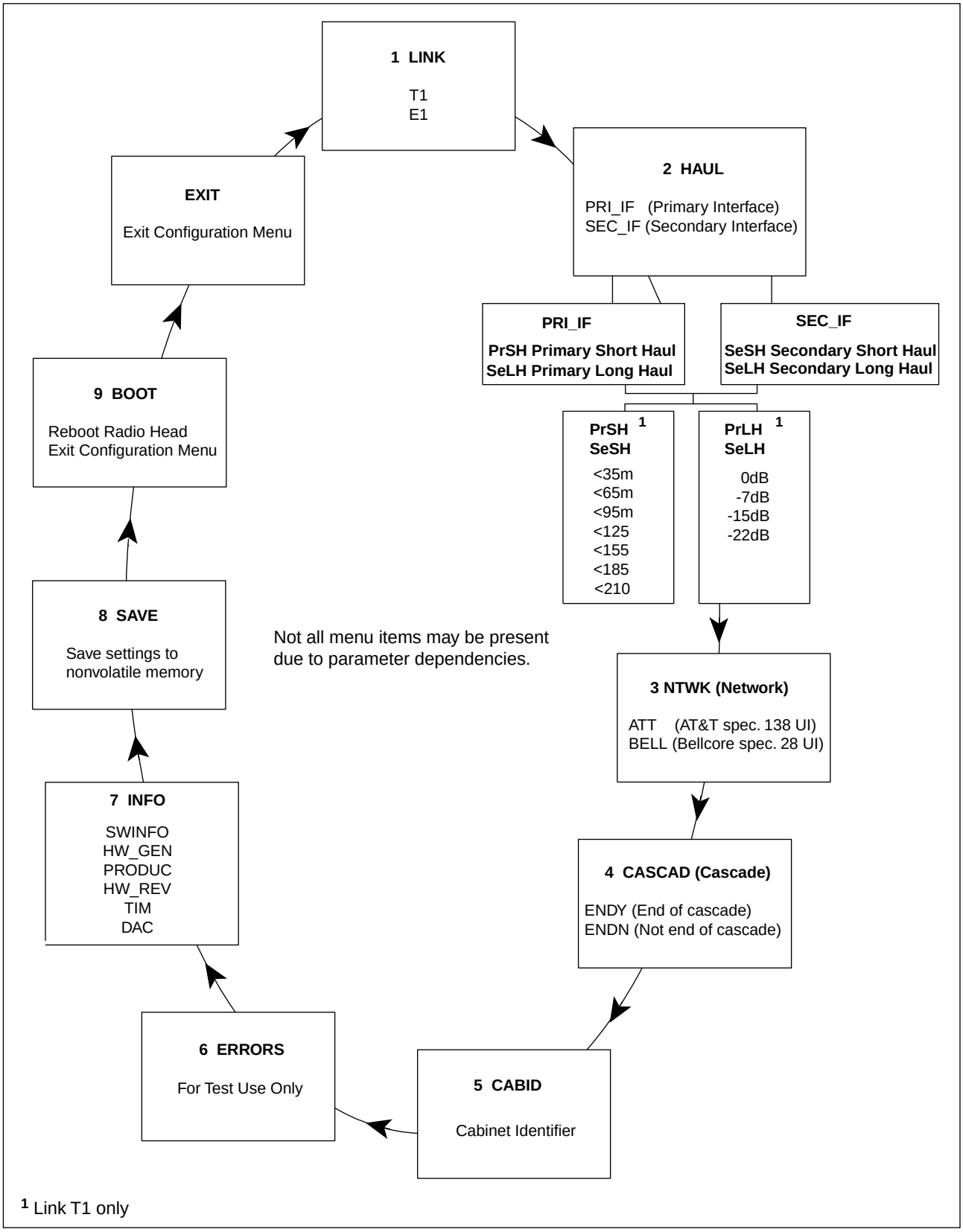


Figure 2-14. Radio Head User Interface

4 Equipment Configurations

The RBS 884 Pico (1900 MHz) Radio Heads can be connected to CRI equipment through non-leased (proprietary) or leased T1/E1 links. Within the RBS 884 Pico (1900 MHz) system, Radio Heads can be separately located in individual cells or colocated within a single cell. Both arrangements allow for cascade connections of up to three Radio Heads with a single proprietary or leased link and up to ten Radio Heads with four links. Refer to Figure 2-2 on page 2-9. The maximum cable loss between Radio Heads is 30 dB.

The maximum cell radius for all cell types is approximately 30 to 50 m (98 to 164 ft) or an approximate area of 2,826 to 7,854 sq m (30,170 to 84,500 sq ft), depending on the propagation conditions.

Refer to Figure 2-15 on page 2-29, Figure 2-16 on page 2-30, and Figure 2-17 on page 2-31 for examples of possible configurations.

Note: Each system implementation is unique and may not be completely represented in this manual. Detailed configuration information is provided in *Part 5 Configuration and Test.*

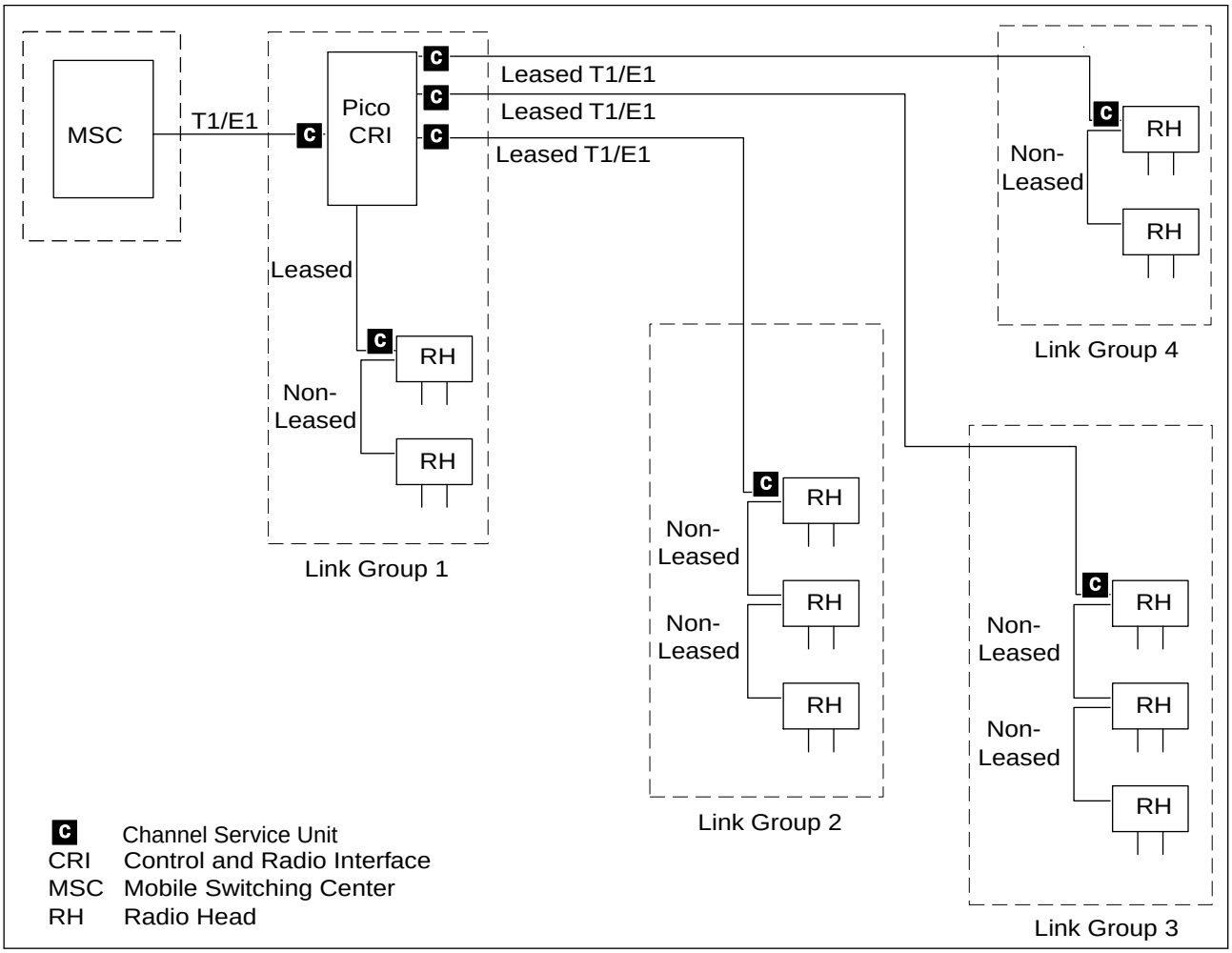


Figure 2-15. RBS 884 Pico (1900 MHz) with Leased Connections, Example

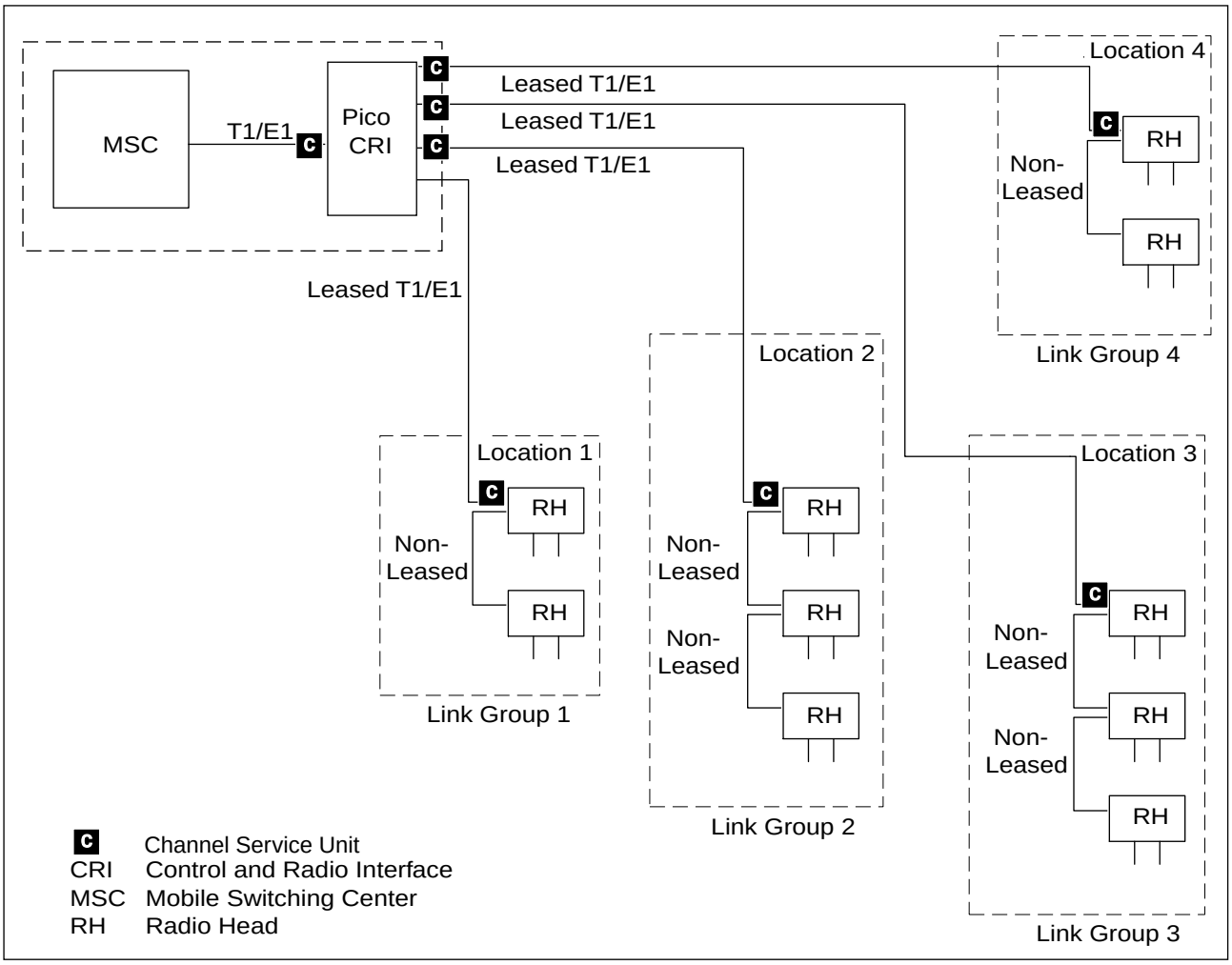


Figure 2-16. RBS 884 Pico (1900 MHz) CRI at the MSC, Example

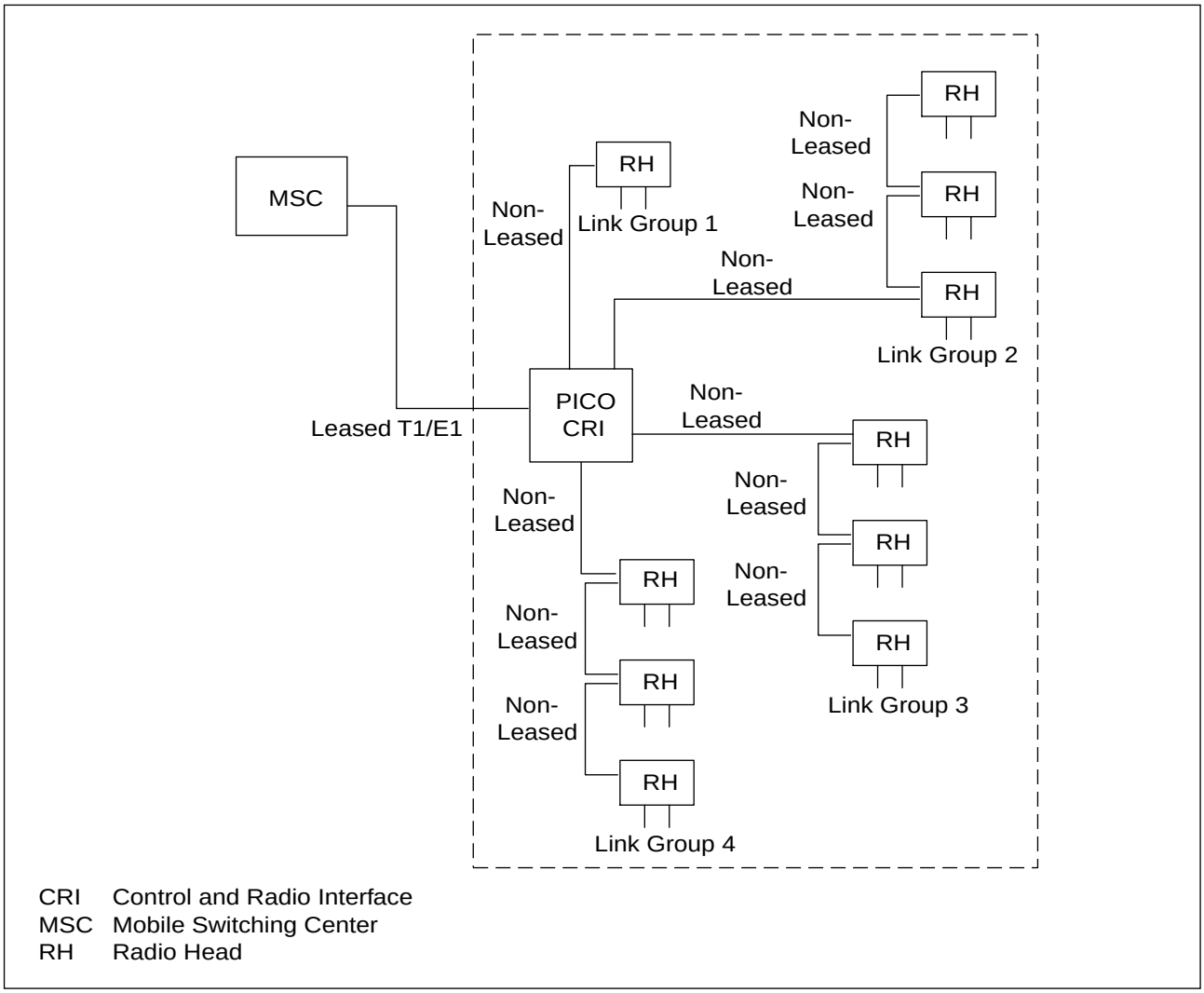


Figure 2-17. RBS 884 Pico (1900 MHz) with Non-Leased Connections, Example

Refer to Table 2-1 on page 2-31 for a list of the other Radio Head placement options. Each cascade location requires one T1/E1 link (proprietary or non-proprietary) from the CRI cabinet.

Table 2-1. RBS 884 Pico (1900 MHz) Radio Head Placement Options

Maximum Number of Radio Heads			
Group 1	**Group 2**	**Group 3**	**Group 4**
3	3	3	1
3	3	1	3
3	1	3	3
1	3	3	3
3	3	2	2

Table 2-1. RBS 884 Pico (1900 MHz) Radio Head Placement Options (Continued)

Maximum Number of Radio Heads			
Group 1	**Group 2**	**Group 3**	**Group 4**
3	2	2	3
3	2	3	2
2	2	3	3
2	3	2	3
2	3	3	2

The RBS 884 Pico (1900 MHz) CRI is delivered partially assembled with the following CRI units:

- DC/DC Converters (2)
- ETB24 or ETB32 (2)
- STR
- EMRP
- ELI (1)
- RITSW

The EMRPS unit and address plugs are shipped with the Radio Head Kit. One EMRPS unit is required for each Radio Head.

4.1 Macro/Pico Information

The RBS 884 Pico (1900 MHz) can be colocated with an RBS 884 Macro (1900 MHz) by installing a Pico ELI unit in the Macro CRI (position 17, 18, 19, or 20). Additional EMRPS units can be ordered for use with the Pico Radio Heads. If the Radio Heads are not connected through leased lines, an ETB-ELI Sync Cable is available to ensure a stable carrier frequency reference for the DTRXs. See Figure 2-18 on page 2-33.

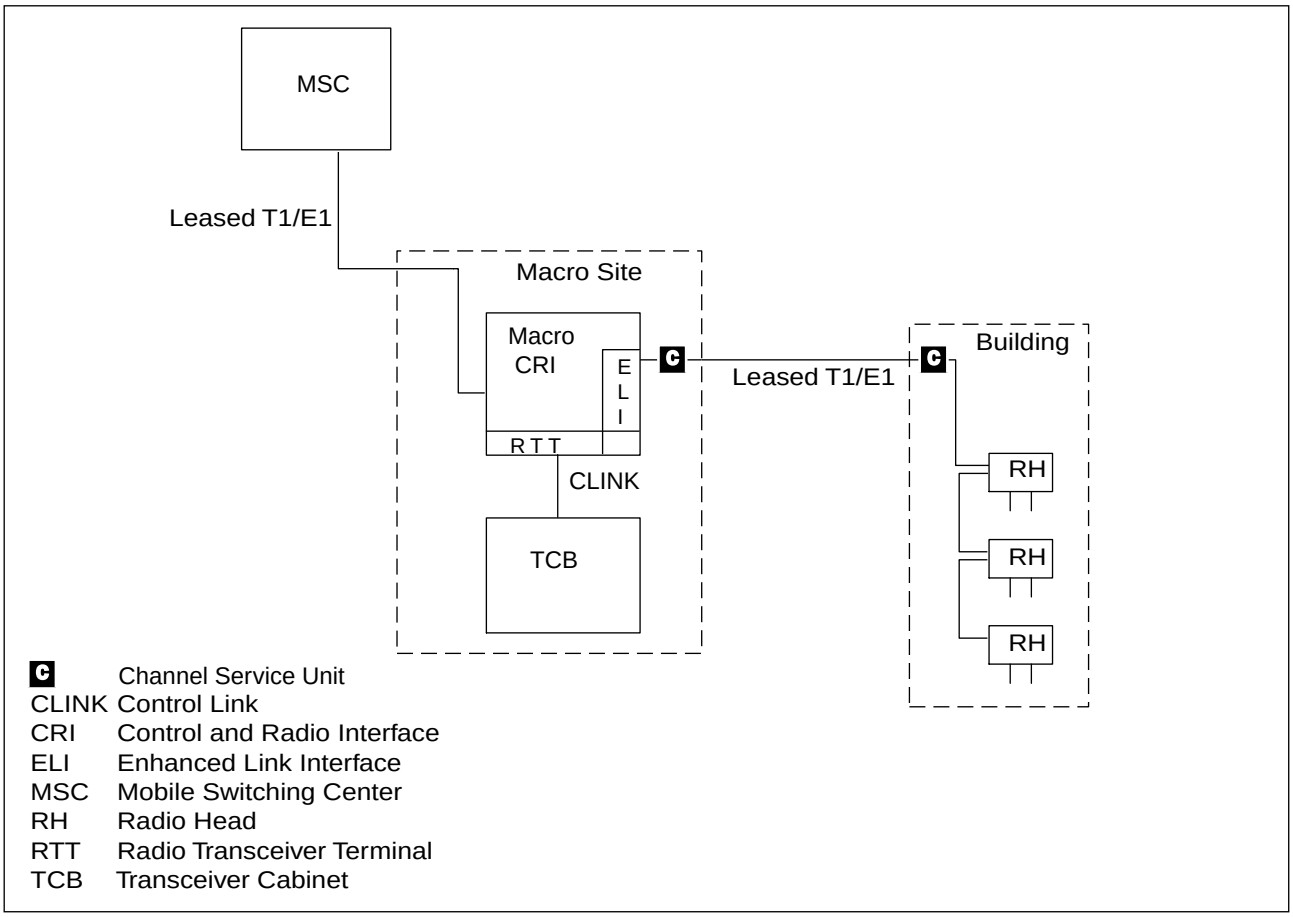


Figure 2-18. Macro Site with Pico ELI and Radio Heads

5 Technical Data

5.1 Capacity

The capacity of an RBS 884 Pico (1900 MHz) system depends on whether separate or colocated Radio Heads are used. The available number of digital voice channels for different configurations is described in Table 2-2 on page 2-34.

Table 2-2. RBS 884 Pico (1900 MHz) Capacity

Configuration	Number of Transceivers	Number of Control Channels	Number of Voice Channels	
			without MVER	with MVER
Separate Radio Heads 1 to 10	4 to 40	1 to 10	11 to 110	8 to 80
Colocated Radio Heads 2 to 10	8 to 40	1	23 to 119	20 to 116
Note: Mobile Verification Channel (MVER)				

5.2 Technical Specifications

General technical specifications for the RBS 884 Pico (1900 MHz) are shown in Table 2-3 on page 2-34 and Table 2-4 on page 2-38.

Table 2-3. RBS 884 Pico (1900 MHz) Technical Specifications

Description	Specification
Number of transceivers (TRX)	40 (maximum) 4 per Radio Head
Number of carriers	4 per Radio Head
Transmitting Characteristics	
Transmitting frequency band	1930 – 1990 MHz
Maximum power into antenna connector	100 mW (20 dBm) per carrier **Note:** Two carriers are attached to each antenna connector.
Channel spacing	120 KHz
Receiving Characteristics	
Receiving frequency band	1850 – 1910 MHz
Minimal receive channel spacing in one cell	120 KHz

Table 2-3. RBS 884 Pico (1900 MHz) Technical Specifications (Continued)

Description	Specification	
Receiver sensitivity (fading, with diversity, 3% BER)	0 km/h 8 km/h	-105 dBm -98 dBm **Note:** The RBS 884 Pico (1900 MHz) is downlink limited due to the low output power (100 mW or 20 dBm) from the Radio Head. The link is balanced when the MS output power is 25 dBm (half the maximum power).
Demodulation, digital mode	Type	pi/4 - DQPSK
	Symbol rate	24.3 ksymbol/s
	Data rate	48.6 kbit/s
	Traffic channels for each carrier	3
Dimensions and Weight		
CRI Cabinet dimensions	Width	482 mm (19 in) rack mount 597 mm (23.5 in) floor mount)
	Height	480 mm (18.9 in) rack mount 483 mm (19 in) floor mount)
	Depth	290 mm (11.4 in) rack mount 400 mm (15.8 in) (floor mount)
	Weight (fully equipped)	35 kg (77 lb)
Radio Head dimensions (with cover)	Width	480 mm (18.9 in)
	Height	320 mm (12.6 in)
	Depth	180 mm (7.1 in)
	Weight	18 kg (39.7 lb) includes mounting brackets, cover, and monopole antennas
PCM Connection (T1)		
PCM Connection ANSI T1.403-1989	Bit rate	1.544 Mbit/s
PCM Connection ANSI T1.403-1989	Board connector	RPV 301 302/1 (CRI) RJ-45 (RH)
	Electrical characteristics	TR-NWT-000499

Table 2-3. RBS 884 Pico (1900 MHz) Technical Specifications (Continued)

Description	Specification	
T1 Format	MSC-CRI	SuperFrame (SF) or Extended SuperFrame (ESF) Alternate Mark Inversion (AMI) or B8ZS line code **Note:** Bit robbed signaling is not used.
	CRI-RH and RH-RH	ESF B8ZS line code **Note:** Bit robbed signaling is not used.
PCM Connection (E1)		
PCM Connection CCITT E1	Bit rate	2.048 Mbit/s
	Board connector	RPV 301 302/1 (CRI) RJ-45 (RH)
	Electrical characteristics	G.703
E1 Format	MSC-CRI	FAS with or without CRC HDB3 line code **Note:** Bit robbed signaling is not used.
	CRI-RH and RH-RH	FAS with CRC HDB3 line code **Note:** Bit robbed signaling is not used.
Additional PCM Parameters		
Synchronization	Traceable to a Stratum 2 reference	
Maximum cable length between cascaded Radio Heads	800 m to 1000 m with maximum attenuation of 30 dB using high quality cable	
Line Build Out (LBO) compensation for short-haul connection to CSU	MSC-CRI	0 – 210 m (0 – 685 ft)
	CRI-RH and RH-RH	0 – 210 m (0 – 685 ft)
Long-haul attenuation	CRI-RH and RH-RH	0 dbB 7.5 dB 15 dB 22.5 dB
Minimum receive level	CRI-RH and RH-RH	-30 dB (T1/E1)

Table 2-3. RBS 884 Pico (1900 MHz) Technical Specifications (Continued)

Description	Specification	
Power Supply		
AC supply voltage	Building supplied voltage for CRI and Radio Head	100 – 240 Vac, 50 – 60 Hz
AC/DC supply voltage	CRI	+24 Vdc ± 0.6 V, 300 W (maximum)
Power consumption, Units (maximum)	Radio Head	110 Vac 2 A 220 Vac 1 A
Environment		
Climatic conditions (transport and storage)	Temperature:	-40°C to +70°C
	Relative humidity	5 – 95%
	Absolute humidity	1 – 50 g/m³
Climatic conditions (normal operation)	Temperature: CRI Radio Head	 5°C to 40°C 5°C to 45°C
	Relative humidity	5 – 85%
	Absolute humidity	2 – 26 g/m³
Mechanical conditions (transport and storage)	Sinusoidal vibration	10 m/s² at 5 – 150 Hz
	Random vibration, Accelerated Spectral Density (ASD)	1 m²/s³ at 5 – 150 Hz
	Mechanical shock	2400 m/s² (6 ms duration pulse)
Mechanical conditions (normal operation)	Sinusoidal vibration	2 m/s² at 5 – 150 Hz
	Random vibration (ASD)	0.5 m²/s³ at 5 – 150 Hz
	Seismic exposure (safe function)	35 s at 1 – 15 Hz (According to IEC 68-2-57 fig 3)

Table 2-4. RBS 884 Pico (1900 MHz) Certification Specifications

Certification	Specification	
TIA/EIA	Telecommunications Industry Association and Electronics Industry Association	TIA/EIA-138
CSA	Canadian Standards Association	CSA 22.2 950-95 CRI: Canada ICES-003 Radio Head: Canada RSS-133
EN	European Committee for Electrotechnical Standardisation	EN 60950
FCC	Federal Communications Commission	CRI: FCC Part 15 (Class A Rating) Radio Head: FCC Part 15 (Class B Rating) and FCC Part 24
IEC	International Electrotechnical Commission	IEC 60 950 2nd Edition IEC 60 215 3rd Edition
NRTL	Nationally Recognized Testing Laboratory (includes Underwriters Laboratory (UL) and Electrical Testing Laboratories (ETL) and CSA	UL 1950 3rd Edition
Electromagnetic Compatibility (EMC) Emissions		
FCC	Federal Communications Commission	Unintentional Emissions: FCC Part 15
CISPR	International Special Committee on Radio Interference	CISPR-22
ICES	Interference-Causing Equipment Standard	ICES 003

Table 2-4. RBS 884 Pico (1900 MHz) Certification Specifications (Continued)

Certification	Specification	
EMC Immunity		
IEC	International Electrotechnical Commission	Radio frequency field: IEC 61000–4–3 Fast Transient Common Mode: IEC 61000–4–4 Magnetic Radiated: IEC 61000–4–8 Voltage Dips and Interrruptions: IEC 61000–4–11

Part 3

RBS 884 Pico (1900 MHz) CRI Installation

1 Introduction

This document contains step-by-step procedures for installing and cabling the Control and Radio Interface (CRI) for the RBS 884 Pico (1900 MHz) System. Additional information is also provided for adding RBS 884 Pico functionality to an existing RBS 884 Macro (1900 MHz) CRI unit.

Note: The Radio Head installation procedures for the RBS 884 Pico (1900 MHz) are described in *Part 4, RBS 884 Pico (1900 MHz) Radio Head Installation*.

2 Safety Precautions

Before starting any installation, test, or maintenance procedures, review the safety regulations provided in this section and any other applicable parts of this manual. Additionally, the installer is responsible for determining that the installation conforms to all applicable electrical, mechanical, communications, and construction codes.

Carefully review each procedure before starting, including the admonishments (dangers, warnings, and cautions) that are applicable to the procedure.

2.1 Voltage Hazards

DANGER!

Hazardous voltages over 100V are used in the operation of this equipment. Use extreme caution when working on energized equipment. Contact with AC power of any voltage can cause injury and sometimes death.

Always observe the following:

- Shut off the power supply, if possible, before working on the equipment.
- Remove all jewelry before working on the equipment.

- Do not touch high voltage connections when installing or operating the equipment.
- If possible, keep one hand away from the equipment to reduce the possibility of current flowing through vital body organs.

2.2 Radio Frequency Radiation

Warning!

Radio frequency from an antenna may be a danger to health, causing severe burns to skin and clothing.

Notify the MSC to switch off the transmitters if you work with or near antennas.

2.3 Beryllium Oxide

Some equipment contains beryllium oxide in ceramic form.

Warning!

Beryllium oxide is poisonous and constitutes a health hazard if present in finely dispersed form, such as dust or smoke, which can be inhaled. Read local hazardous chemical regulations before working with beryllium oxide.

Units with components containing beryllium oxide are marked with a warning label. For detailed information about properties, health and environmental hazards, refer to the regulations issued by the local authorities.

The following rules must be obeyed by all persons handling beryllium oxide:

- Ceramics containing beryllium oxide must not be scraped, filed, ground, treated with acid, or machined in any other way.
- Compressed air must not be used to clean units containing beryllium oxide.
- Always wear protective gloves when handling beryllium oxide.
- Use wet rags to collect dust and particles from damaged beryllium oxide components. After use, place the rags in plastic bags and seal the bags completely.

Scrapped beryllium oxide must be treated as environmentally hazardous waste. Local authorities enforce regulations regarding the treatment and disposal of environmentally hazardous waste. Investigate the applicable local regulations and comply with them.

2.4 Heavy Loads

Warning!

A heavy load (anything over 10 kg (22 lb) lifted incorrectly can cause injury to persons and damage to the equipment. A factory-shipped RBS 884 Pico CRI cabinet weighs approximately 30 kg (66 lb).

3 Electrostatic Discharge

The human body acquires static charge in all situations involving movement. The same effect is achieved when handling ordinary plastic materials.

If the body comes into contact with a grounded Integrated Circuit (IC) component, this static charge may cause an Electrostatic Discharge (ESD) resulting in a spark and damage to the component.

Note: To avoid component damage because of ESD, always follow the instructions for handling sensitive electronic components and circuit boards. Personnel must always use ESD protection equipment when working with such components and circuit boards.

3.1 Storage and Transport

Store and transport components and hardware units in their original packaging.

Alternatively, use a conductive material or special IC carrier that either short-circuits all contacts and pins or insulates them from external contact.

3.2 ESD Wrist Strap

When working with circuit boards, wear an ESD wrist strap to avoid ESD damage to the boards. The strap can be connected to the collection bar located in every cabinet shelf, as shown in Figure 3-1 on page 3-6.

Follow local procedures on testing the wrist strap.

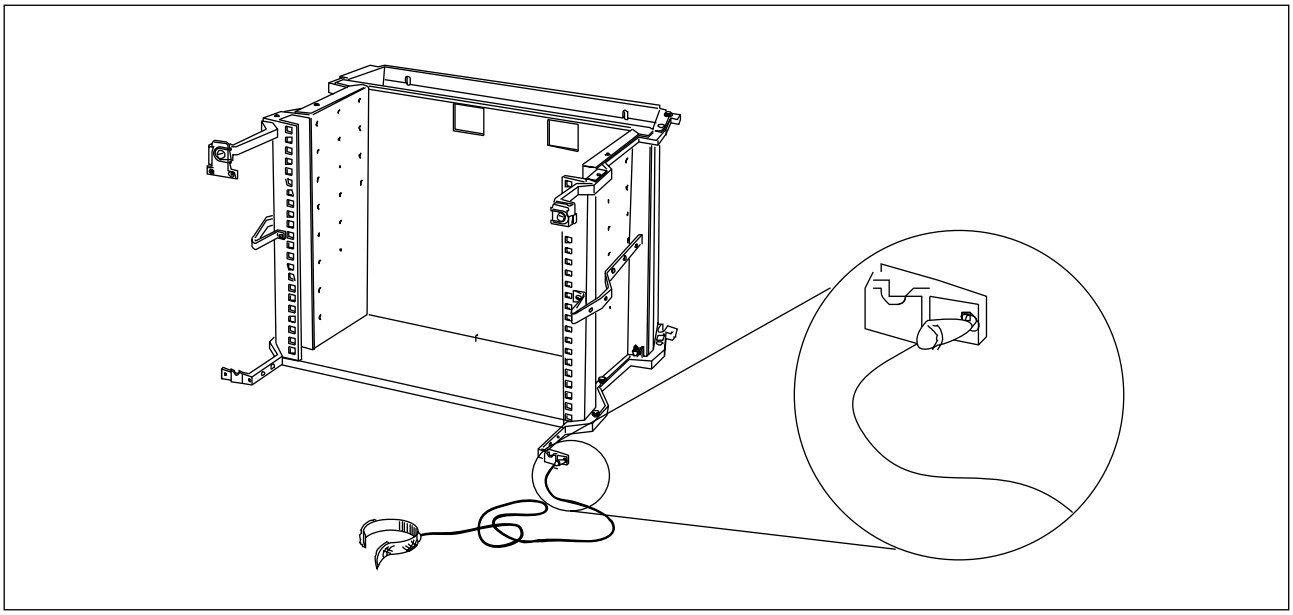


Figure 3-1. ESD Wrist Strap and Cable Connected to the Cabinet

4 General Information

4.1 Basic CRI Subrack

The basic RBS 884 Pico (1900 MHz) CRI subrack arrives on site with the following units pre-installed:

- DC/DC Converter Units (2)
- Signaling Terminal Regional (STR) Unit (1)
- Extension Module Regional Processor (EMRP) Unit (1)
- Exchange Terminal Board (ETB24/ETB32) Units (2)

- Enhanced Link Interface (ELI) Unit (1)
- Radio Interface Time Switch (RITSW) Unit

The EMRP with Speech Bus Access (EMRPS) units and additional ELI units are packaged in separate shipping boxes and are installed based on the number of Radio Heads in the system.

4.2 Order of Installation

If possible, perform the procedures in the order they are presented in the manual.

4.3 Cable Information

The RBS 884 Pico (1900 MHz) internal cabling is partially installed at the factory. The EMRPS, ETB, and ELI cables are installed by the customer at the base station site. Refer to Section 7.2 on page 3-13 for information about the specifications for the external cables.

4.3.1 Cable Labels

Cables are labeled at both ends to facilitate connection and troubleshooting. An example of a typical label is shown in Figure 3-2 on page 3-7.

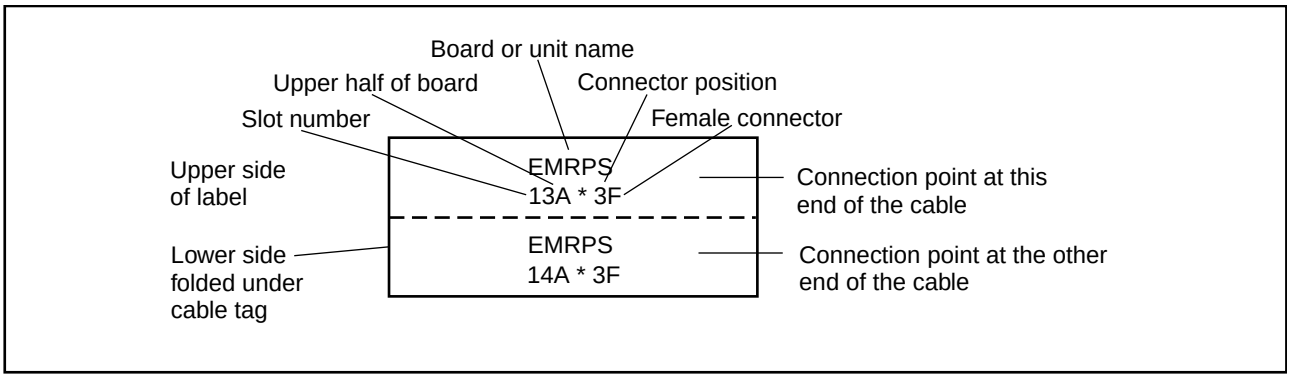


Figure 3-2. Typical Cable Label

4.3.2 Cable Connectors

RBS 884 Pico (1900 MHz) CRI hardware units (boards) accommodate multiple connectors of different sizes. The designation of the connector positions is shown in Figure 3-3 on page 3-8.

A reference to a cable position in the cabinet contains the slot position and the connector position. For example, 15A3 refers to the unit in slot 15 and connector position A3. The connectors in the top half of the subrack are designated as “A”and those in the bottom half as “B” (see Figure 3-3 on page 3-8).

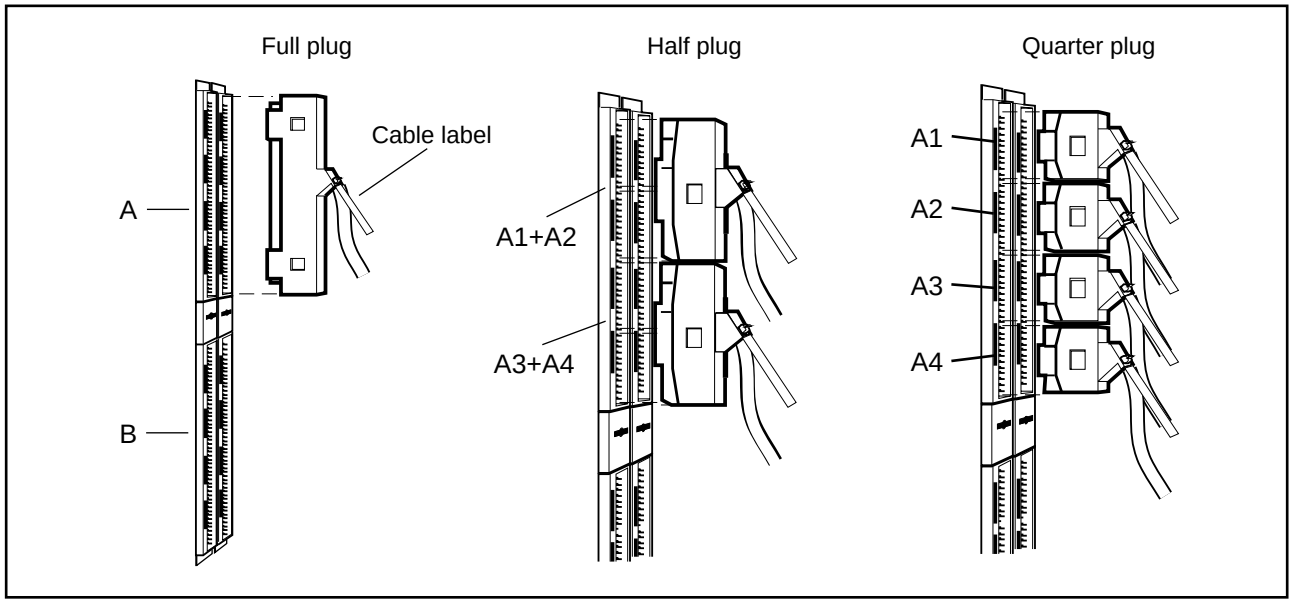


Figure 3-3. Hardware Unit Connections

4.3.3 Bending Radius

Do not make any sharp bends in the transmission cables. Do not let the bending radius be less then 10 times the diameter of the cable. See Figure 3-4 on page 3-8.

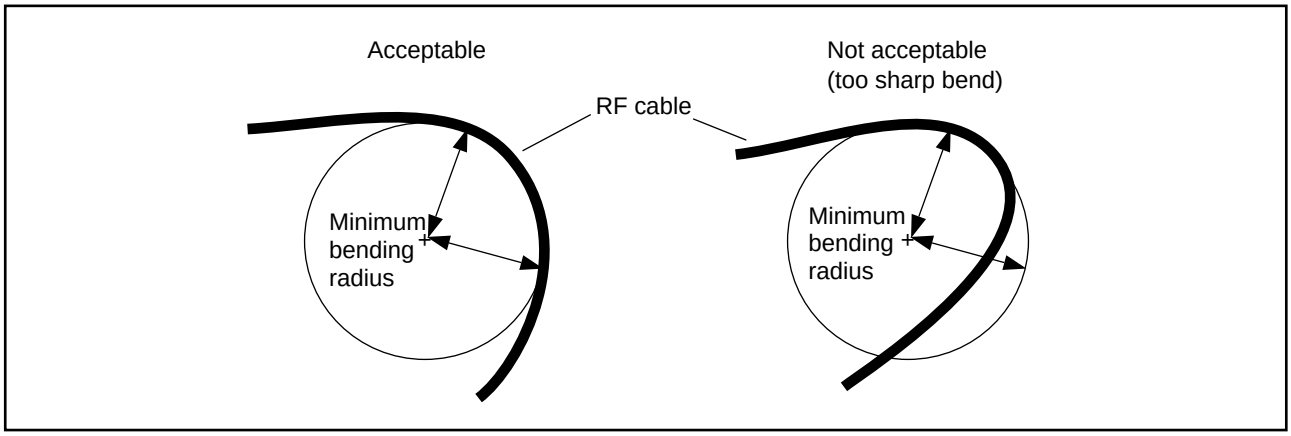


Figure 3-4. Minimum Bending Radius

4.3.4 Coaxial Connectors

Push the coaxial connectors firmly in place. Tighten the connectors, first by hand, then with a torque wrench set to the torque specified in this manual. Use of the proper torque settings prevents damage to the connectors and ensures optimal connection.

Caution !

Coaxial connectors are especially sensitive after tightening. Do not try to change direction of the outgoing cable after tightening. Do not use the outgoing cable as a tool to tighten the connector.

Note: The N-connectors (with a cross-hatched ring) shown inFigure 3-5 on page 3-9 can be sufficiently tightened by hand and, thus, do not require a torque wrench.

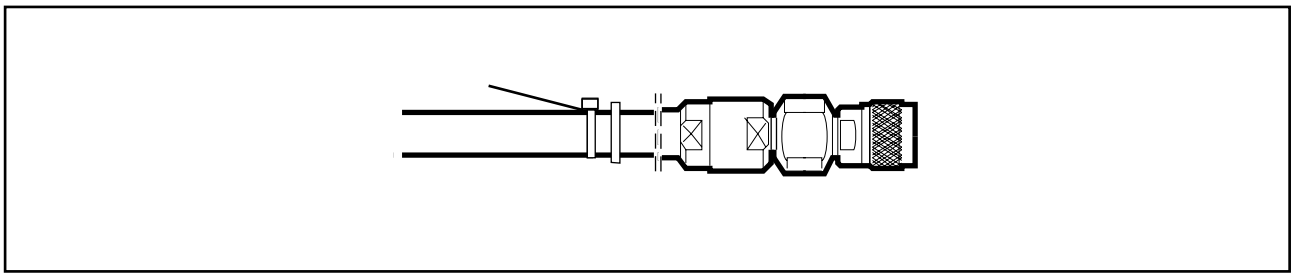


Figure 3-5. Example of an N-Connector (Can also be Angled)

5 Unpacking

The RBS 884 Pico (1900 MHz) is delivered to the site in one or more boxes or transportation crates. Inside the boxes or crates, the equipment is packed in plastic bags or cardboard boxes.

5.1 Tools

A pair of cutters (side-cutting pliers, for example) is recommended for cutting the transport straps, and a knife is recommended for cutting the boxes and bags.

5.2 Inventory

Complete the following instructions before starting the installation:

1. If a box or crate is damaged, inspect the equipment immediately after unpacking. If the equipment appears to be damaged, follow your local procedures or contact the local support office.
2. Check the delivered hardware against the *Shipping List*.
3. Inventory all items.
4. After the equipment has been removed, the boxes or crates can be disposed of according to local regulations.

5.3 Unpacking CRI Equipment

The CRI rack mount equipment is delivered in either one box or one transportation crate. The CRI floor mount equipment is delivered in two or more boxes or crates. The EMRPS Kit is shipped in a separate box according to the number of Radio Heads ordered.

5.3.1 Unpacking Boxes

If the CRI equipment and EMRPS kit are delivered in boxes, unpack and dispose of the boxes according to local procedures.

Note: For RBS 884 Pico (1900 MHz) system orders, one EMRPS Kit is shipped with every Radio Head Kit. The EMRPS unit and address plugs are installed in the CRI cabinet. Do not transfer the EMRPS Kit to the Radio Head site.

5.3.2 Unpacking Transportation Crates

If the equipment is delivered in transportation crates, use the following instructions:

1. Cut the transport straps around the packing crate. Unlock the locking clips for the lid.
2. See Figure 3-6 on page 3-11 for an illustration of the CRI transportation crate.
3. Lift off the lid.
4. Remove the four corner packing pieces.
5. Unlock the locking clips from the bottom of the crate.

6. Lift the frame clear of the equipment.
7. Remove the accessories from the packing bag.
8. Remove the equipment from the packing bag.
9. Dispose of the packing material and crate components according to local regulations.

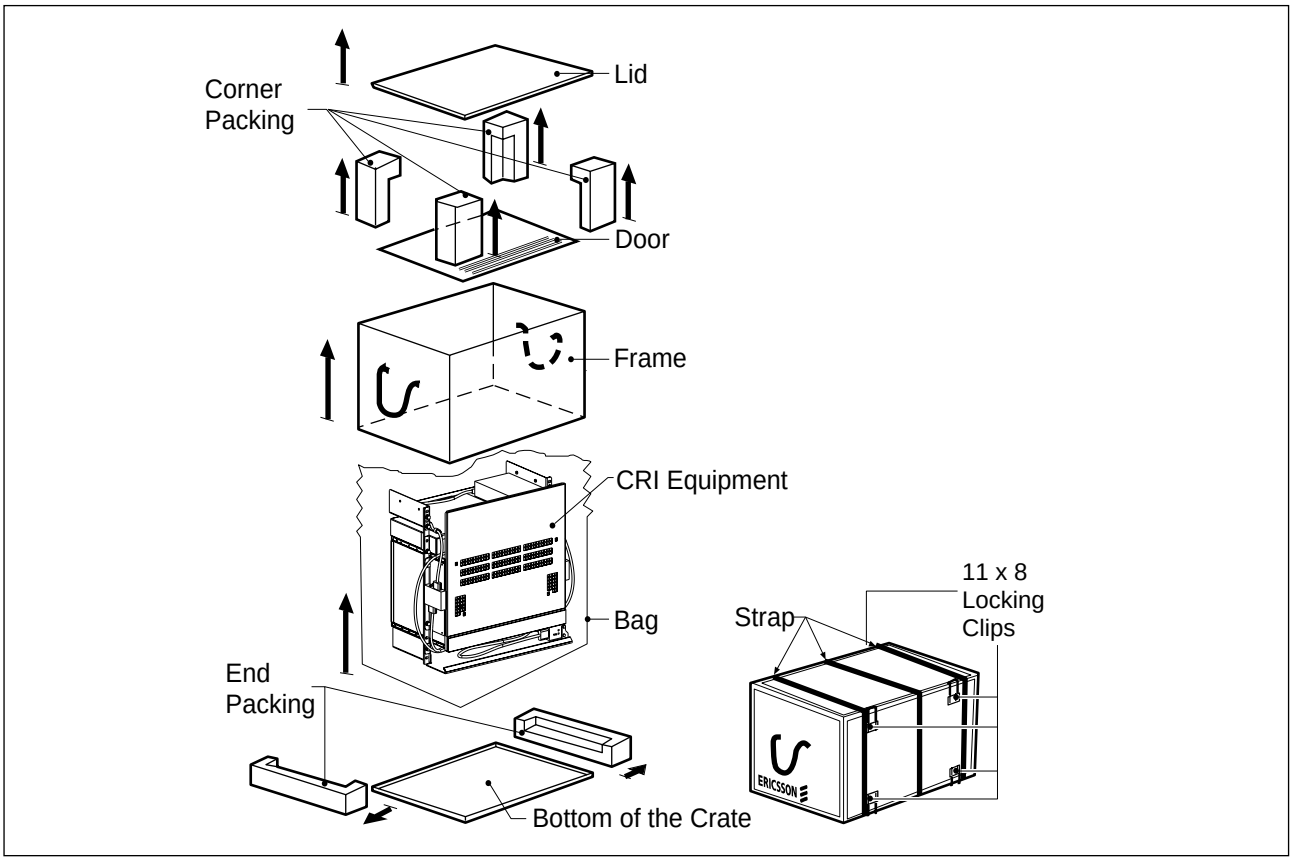


Figure 3-6. Unpacking Transportation Crate

6 Site Preparation

Specific site preparation guidelines for the RBS Pico (1900 MHz) CRI are provided in this section. Verify that the operating environment and power requirements in this section have been met before starting the installation.

6.1 Operating Environment

The CRI is designed to operate in an indoor, temperature-controlled environment. The installation site must comply with the following environmental requirements:

- The air is free of dust, smoke, and debris.
- The walls, ceiling, and floor are completed.
- Ambient temperature is 5°C to 40°C with 5 to 85% humidity.

6.2 Power Requirements

The CRI power supply converts the following AC power sources to +24 Vdc for use in the CRI:

- 110 Vac, 50/60 Hz
- 220 Vac, 50/60 Hz

Note: Select or install, if necessary, a 110/220 Vac power outlet within 1 to 1.5 m (3 to 5 ft) of the CRI. The power outlet serves as the safety power-disconnect point for the CRI power supply.

6.3 T1/E1 Requirements

The T1/E1 connection requirements are as follows:

- MSC Connection
  - T1: 1.544 Mbit/s
  - E1: 2.048 Mbit/s
- Delay: 5 ms maximum
- Clock: Stratum 2 or better

7 Prerequisites and Tools

7.1 Materials

This section describes the hardware prerequisites for the installation of the RBS 884 Pico (1900 MHz) CRI.

Determine if the following equipment and supplies are available prior to starting the CRI installation.

7.1.1 Rack Hardware

A suitable 19-in equipment rack with 11 consecutive rack units is available. Sufficient space to install and maintain the equipment is provided.

7.1.2 Floor Mounting Hardware

All appropriate bolts, washers, and mounting accessories are available for securing the base to the floor. The mounting hardware is not included with the CRI.

7.2 Cables and Network

7.2.1 Transmission Cables

All transmission cables are available, and meet the following requirements:

- T1 – 100-ohm plenum rated, Category 5 (CAT 5), 24-gauge unshielded, twisted-pair (UTP) cable
- E1 – 120-ohm plenum rated, CAT 5, 24-gauge individually shielded, twisted-pair cable
- E1 – 75-ohm dual coaxial cable

The use of high quality cable with a maximum attenuation of 30 dB allows a separation of 800 to 1000 m between Radio Heads based on cable length.

7.2.2 T1/E1 Network Lines

All T1/E1 network lines are available and meet the requirements of Section 6.3 on page 3-12, regardless of medium.

7.3 Transmission Equipment

7.3.1 Impedance Matching Network

A 75 to 120-ohm Impedance Matching Network is available for E1 75-ohm coaxial cable. The Impedance Matching Network converts the impedance of coaxial cable so that its signal can run on twisted-pair wiring. Further information about the Impedance Matching Network and E1 cable installation is provided in *Part 4 RBS 884 Pico (1900 MHz) Radio Head Installation*.

7.3.2 Channel Service Unit (CSU)

An adequate number of Channel Service Units (CSU) are available. The CSUs are required to receive or transmit signals to and from the PSTN.

For a proprietary configuration, CSUs are installed between the MSC and the CRI. For a leased-line configuration, CSUs are installed between the MSC and the CRI and between the CRI and the first Radio Head in each T1/E1 link.

7.4 Tools

The following tools are available to install the RBS 884 Pico (1900 MHz) CRI:

- ESD wrist strap
- Extractor tool for removing cards (handle and button)
- Cable connector torque wrench set including:
  - Torque wrench (preset to 0.6 Nm and 2.8 Nm)
  - Torx bit TX10 and TX8 for circuit board screws
  - Subminiature Connector Type A (SMA) tool for coaxial cables
- Flat-blade screwdriver set for power and data cable connectors
- Phillips screwdriver set
- Torx screwdrivers TX20 and TX30
- T1 or E1 test set with cables
- 8-position crimping hand tool
- RJ-45 connectors

- Side-cutting pliers
- Metric socket set with 100 mm and 300 mm extension bars
- Torque wrench with socket adapter
- Small soldering iron
- Multimeter (voltmeter and ohmmeter)
- Electric light
- Cable ties and cable tie gun
- Extra ESD bag

8 Cabinet Installation Procedures

This section describes the procedures for installing the RBS 884 Pico CRI unit.

The Pico CRI unit is available in the following configurations:

- Rack mount (standard product) for installation in a 19-in equipment rack
- Floor mount (optional product) for installation on a cabinet base as a single configuration or for installation with existing Macro cabinets

Pico cells can also be added to a Macro system by installing a Pico ELI unit in the RBS 884 Macro CRI magazine (see Step 3 on page 3-53).

8.1 Installing the CRI Rack Mount

Preparation

1.

Warning!

The partially-equipped Pico CRI weighs approximately 30 kg (66 lb). Ericsson recommends that two persons are present during the installation.

Verify that all materials have been received and inventoried as described in Section 5 on page 3-9.

Note: A standard 19-in equipment rack holds three RBS 884 Pico (1900 MHz) CRI cabinets.

2. Complete all site preparation according to Section 6 on page 3-11.

Note: Wall supports must not be used in earthquake areas.

Install CRI Subrack

3. Position the 19-in equipment rack and anchor it to the floor and to the cable ladder.

4. Install the assembled CRI subrack (BFE 401 89/1 or 89/2) in the 19-in rack, using eight screws (four screws on each side) to mount the CRI to the rack rail. See Figure 3-7 on page 3-17 for an illustration of the CRI rack mount subrack.

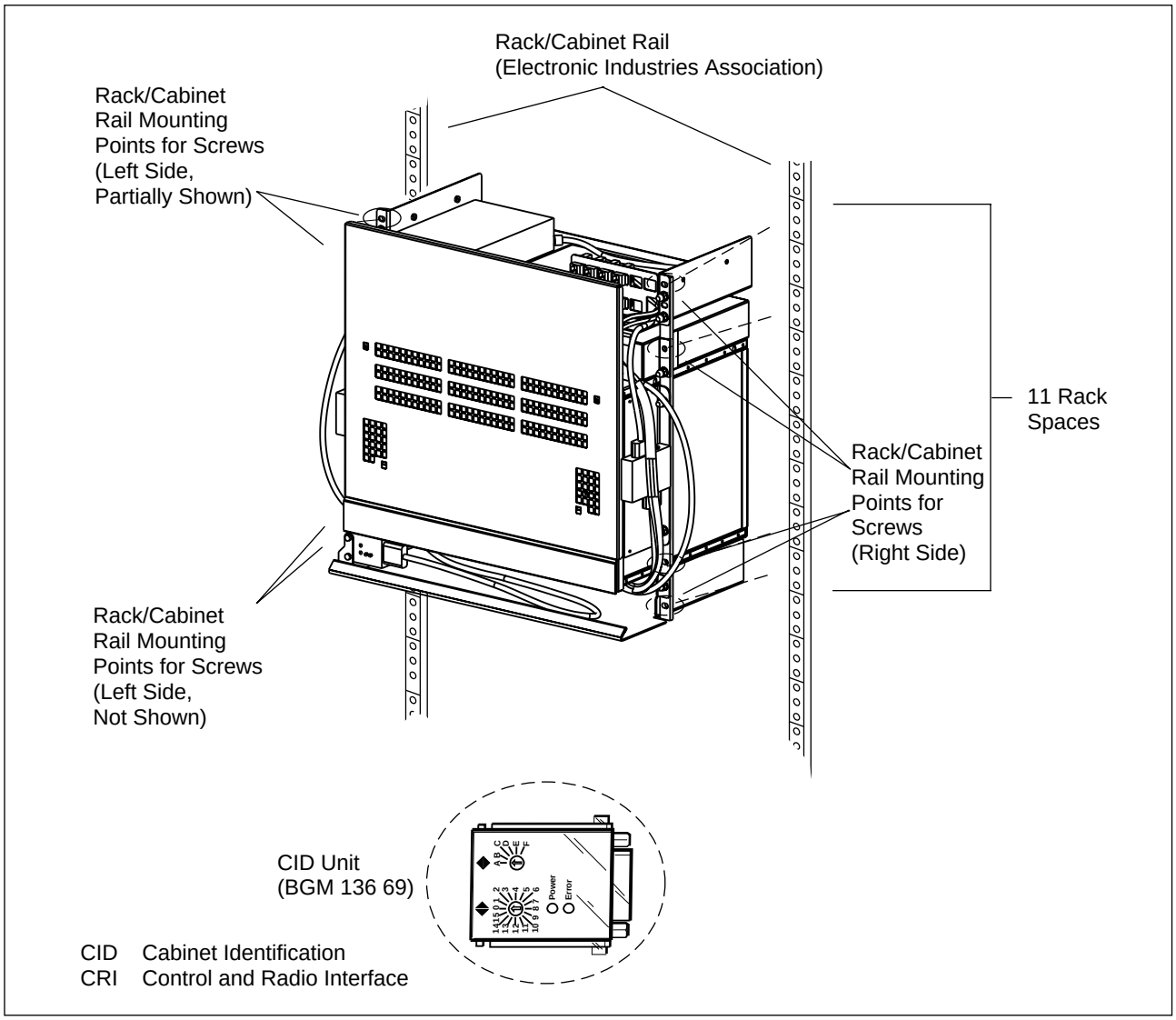


Figure 3-7. CRI Rack Mount Subrack

5. Secure the CRI to the rack rail using four screws on each side. See Figure 3-7 on page 3-17 for the locations of the screw mounting points.

Set CID Unit

6. Call the MSC and request an identification number for the Cabinet Identifier (CID) unit.

7. Using the small flat-head screwdriver, set the rotary switches on the CID unit to the identification number. See Figure 3-8 on page 3-18 for an illustration of the CID unit.

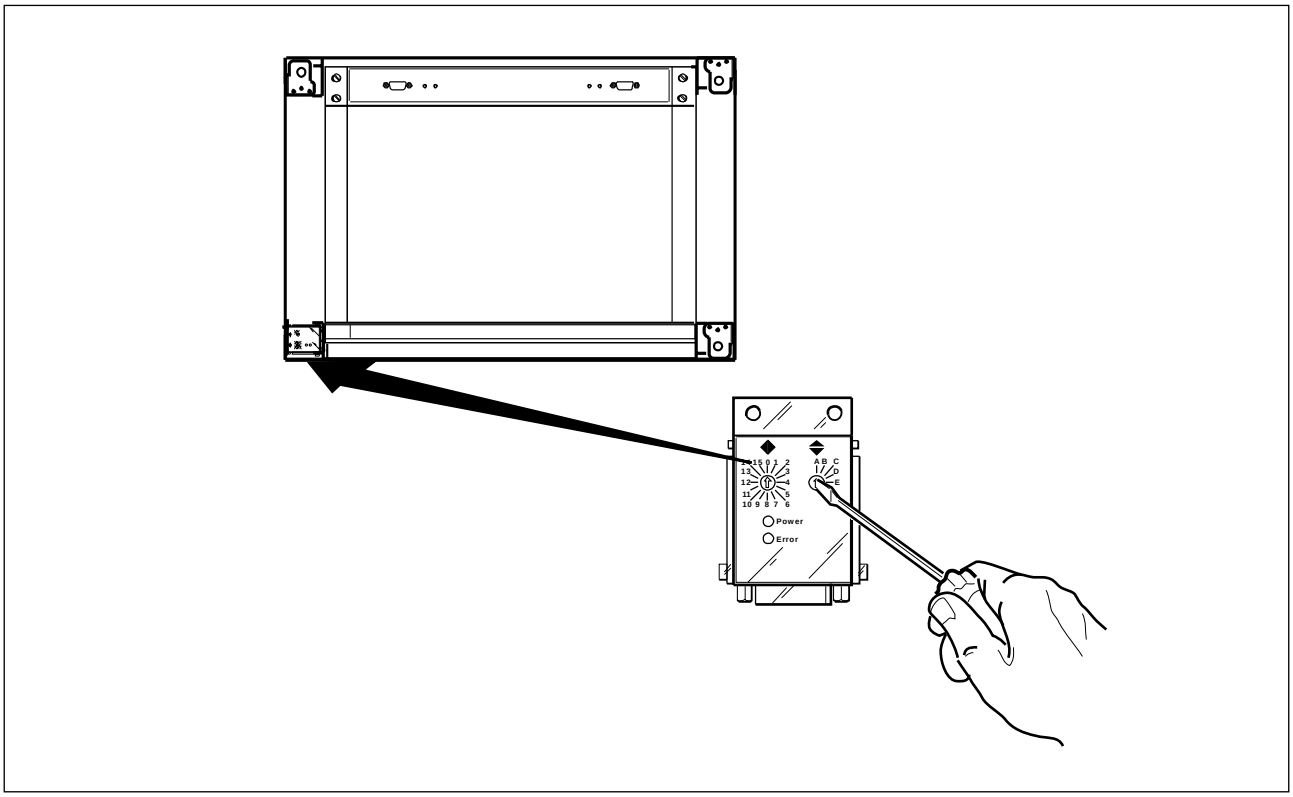


Figure 3-8. Setting the Cabinet Identifier

8. Go to Procedure 9.1 on page 3-50 to set the ETB switches and continue the installation.

8.2 Installing CRI Floor Mount

The optional CRI Floor Mount Kit allows the RBS 884 Pico (1900 MHz) customer to install the Pico CRI on the floor rather than in an equipment rack. The cabinet in the RBS 884 Pico CRI Floor Mount Kit is an Ericsson BYB 502 cabinet.

Warning!

The Pico CRI Floor Mount Kit does not meet IEC and Bellcore earthquake requirements. A separate Earthquake Proof Kit must be used in order to meet IEC 68-2-57 or Bellcore (Verteq 2; Zone 4) requirements.

Preparation

1. Verify that all materials have been received and inventoried as described in Section 5 on page 3-9.
2. Install cable ladders.
3. Complete all site preparation according to Section 6 on page 3-11.
4. Verify that the appropriate bolts, washers, and mounting accessories are available for securing the base to the floor. Concrete floor mounting hardware is included with the CRI.

   Note: Consider the floor type when determining the type of hardware used to secure the base to the floor. The diameter of bolts in the floor mounting hardware cannot exceed 12 mm (M12 bolt or equivalent).

Disassemble the CRI Rack

5. Remove the CID unit from the air intake duct. The CID unit is remounted later in the CRI installation procedure.
6. Remove the following parts that are not used with the CRI floor mount cabinet (see Figure 3-9 on page 3-20):
   - 2 Rack Mount Bar Assemblies (SXK 107 5126/1)
   - Rack Cover (SXA 120 6899/1)
   - Air Intake Duct (SXA 120 6891/1)
   - Identification Strip (to be installed on the rack-mount cable tray)

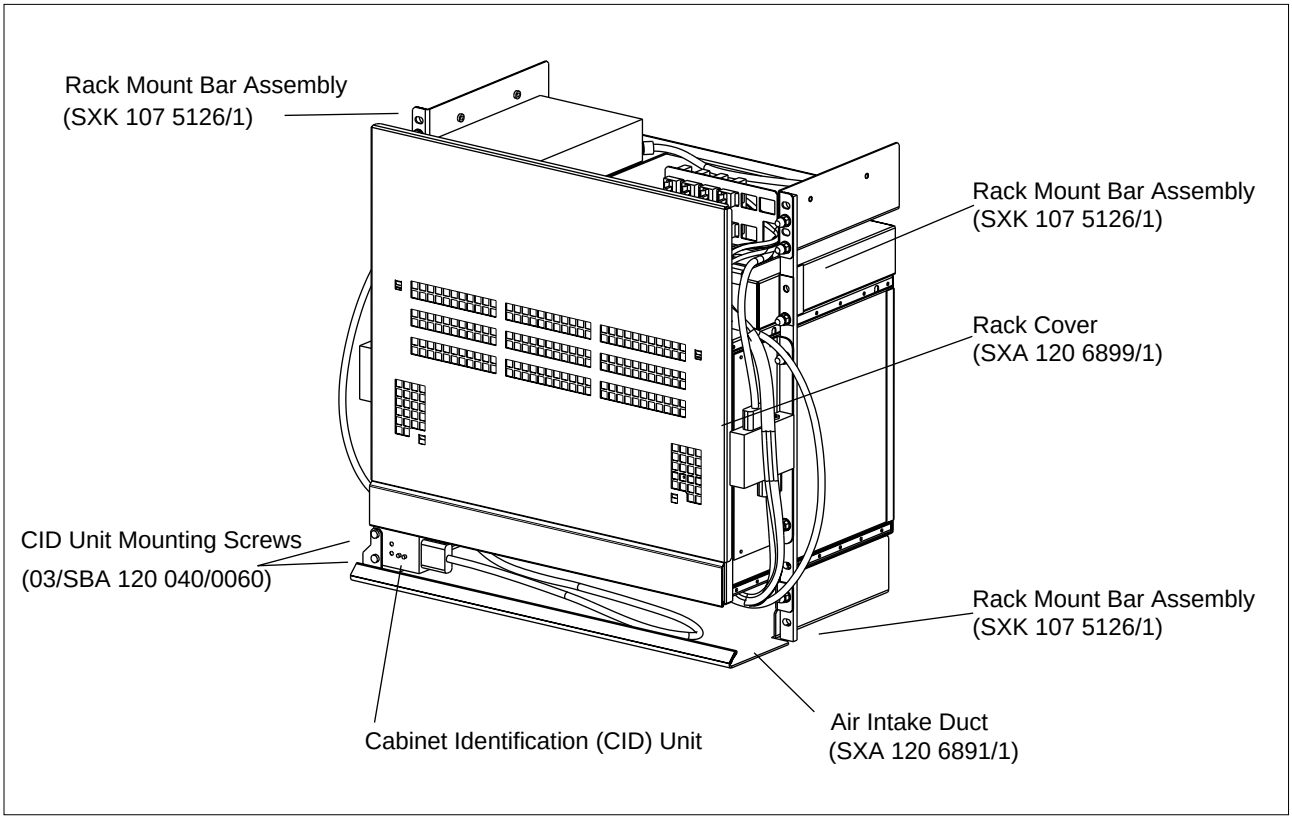


Figure 3-9. CRI Rack Mount

Secure the Base to the Floor

7. Place the mounting base (SXA 123 2023/1) on the floor in the position specified in the *Floor Plan Drawing* (found in the *Site Installation Documents*). If the *Floor Plan Drawing* does not exist, consult the site engineer.

   Note: Unless otherwise stated in the *Floor Plan Drawing*, bases must be placed a minimum distance of 30 mm from any wall.

8. On the floor, mark the fixing holes for the base (as shown in Figure 3-10 on page 3-21 and Figure 3-11 on page 3-21).

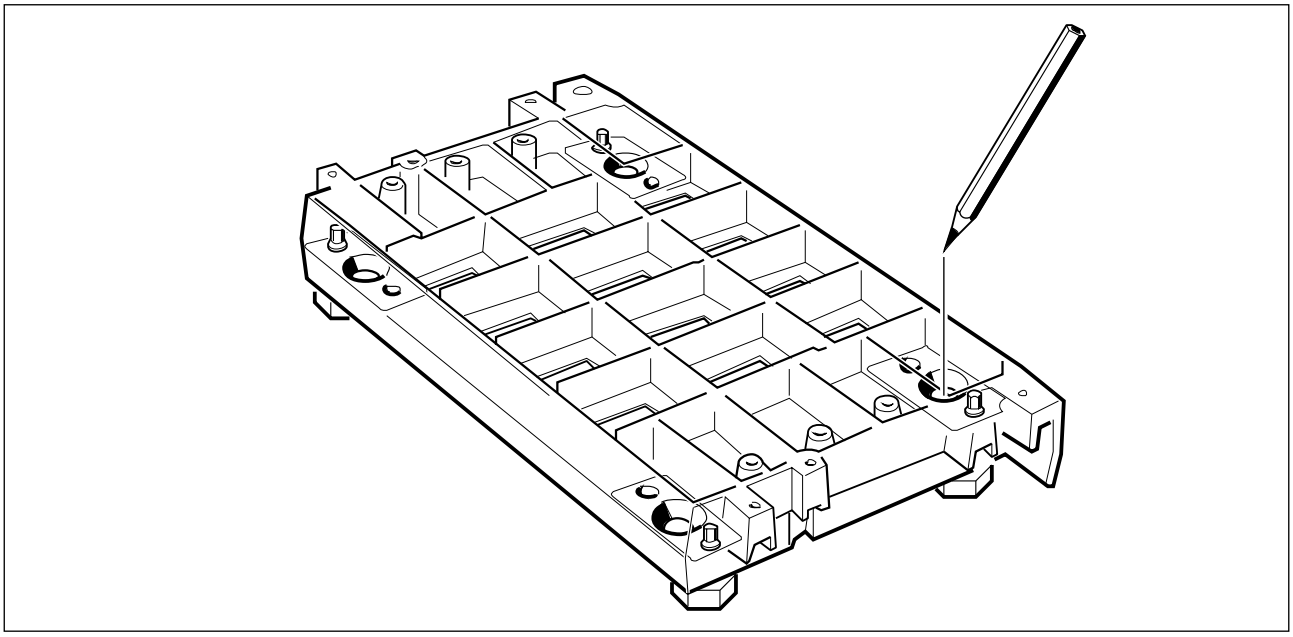


Figure 3-10. Marking the Fixing Hole Locations

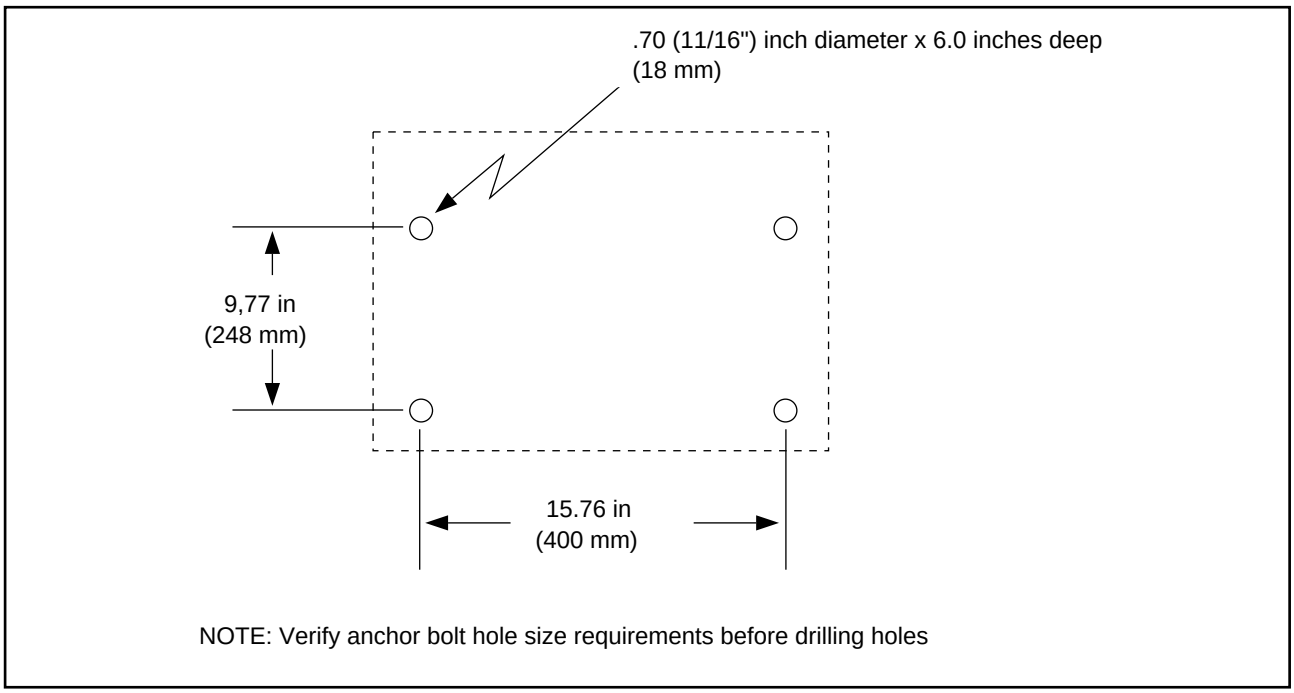


Figure 3-11. Anchor Bolt Spacing for RBS Pico Equipment Base

9. Using a suitable drill size, drill the holes in the floor, as shown in Figure 3-12 on page 3-22, to a depth suitable to the floor composition

and using a suitable drill size. The base contains four anchor holes. Use eye protectors and ear protectors.

Note: The floor-mounting bolts must match the material of the floor and any additional requirements, such as earthquake protection. The diameter of the bolts must not exceed 12 mm (12M bolt or an equivalent). Five expander bolts, suitable for concrete or brick floors, are included in the BYB 502 hardware kit. Refer to Table 3-1 on page 3-22 for technical information on these expander bolts.

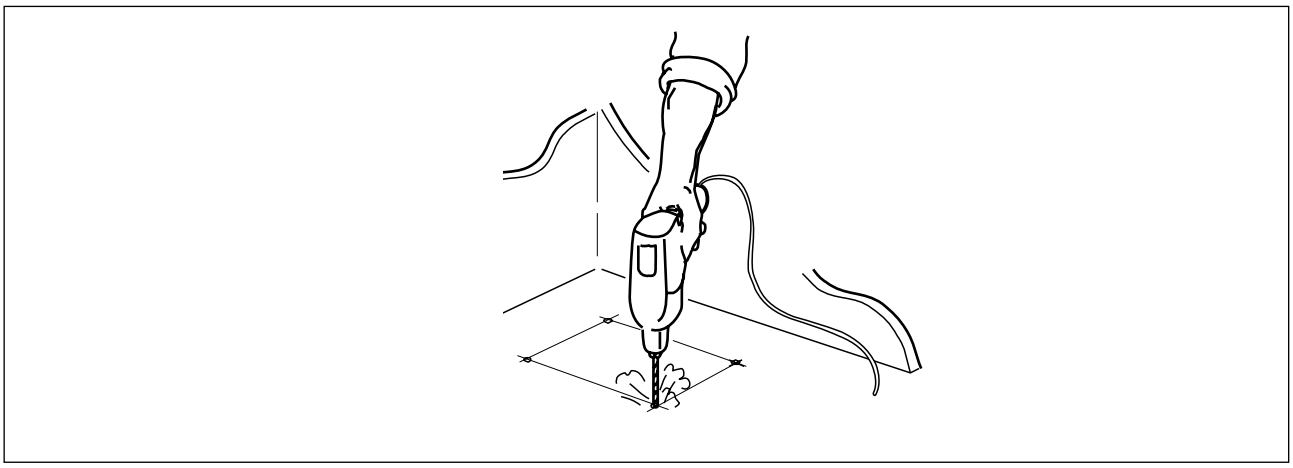


Figure 3-12. Drilling the Fixing Holes

Table 3-1. Technical Data – Expander Bolt

Bolt product number	NSV 905 0805
Drill diameter	8 mm
Total bolt length	90 mm
Minimum depth of drilled hole	75 mm
Note: This bolt does not meet the requirements for full earthquake protection.	

Level the Base

10. Place the base on its correct place on the floor.

    Note: The figures in this sequence show installation on concrete floor, other floor arrangements may look slightly different.

11. Ensure the leveling feet are tightened completely into the base.

12. Insert the four expander bolts with washers in the base without tightening them, as shown in Figure 3-13 on page 3-23.

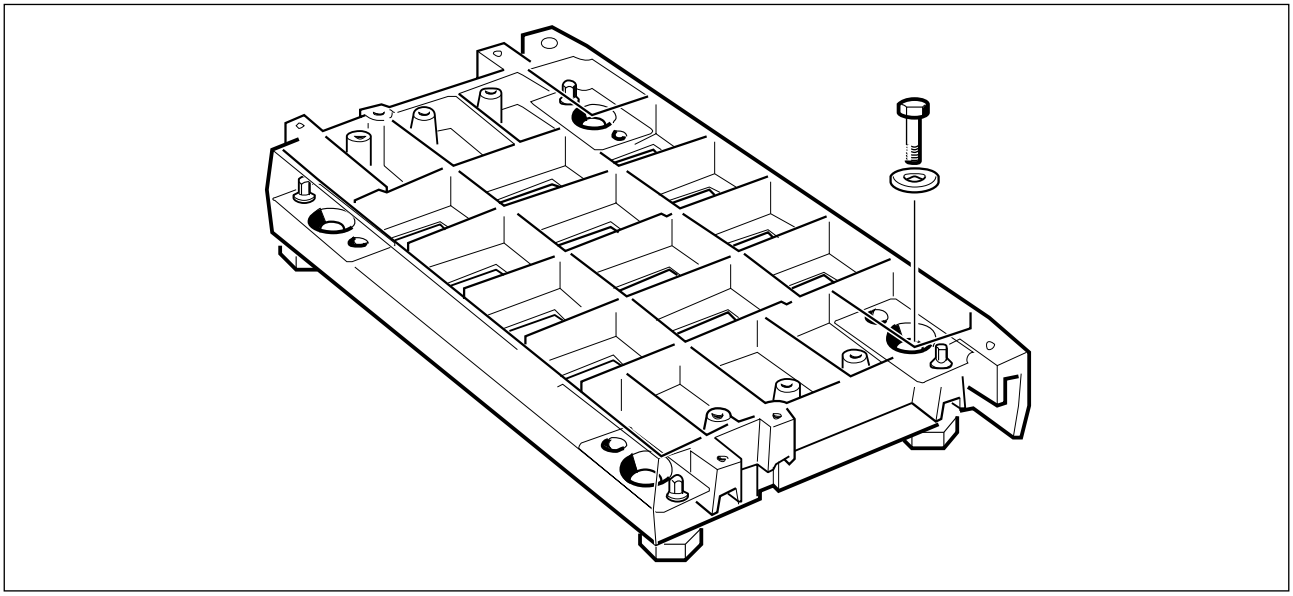


Figure 3-13. Installing the Base Bolts

13. If expander bolts are not used, insert four lead anchors (plugs) in the drilled holes (see Figure 3-14 on page 3-23).

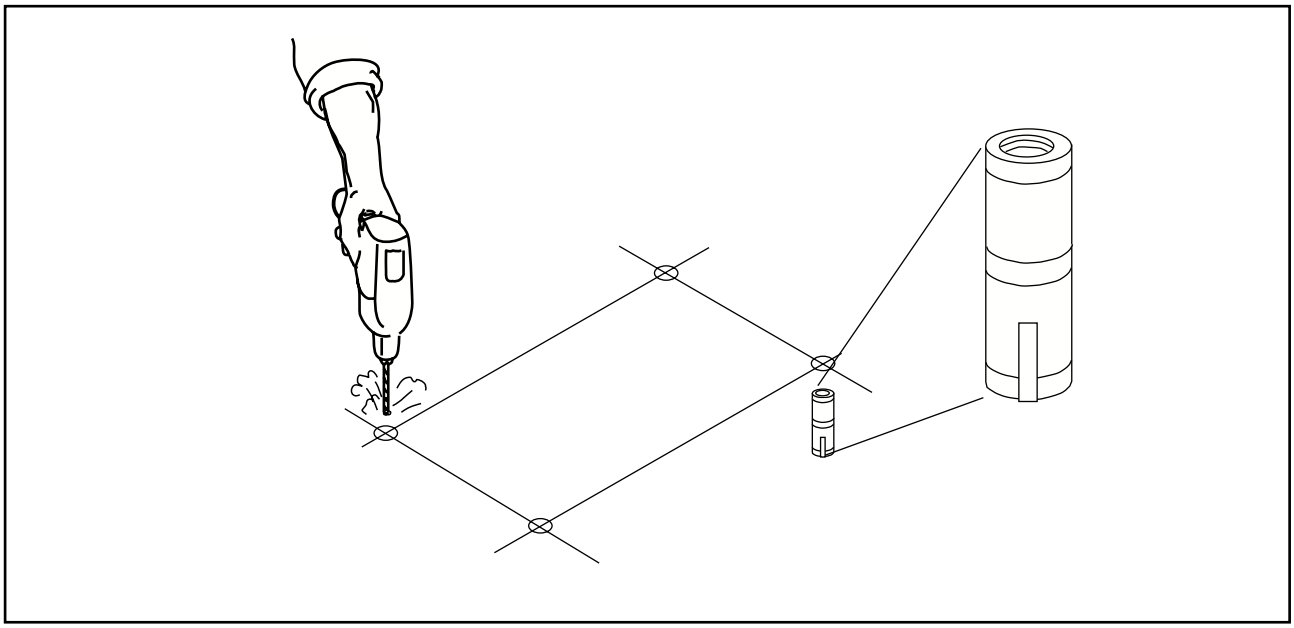


Figure 3-14. Inserting Anchors in the Drilled Holes

14. Place a level on the rear of the base, as shown in Figure 3-15 on page 3-24, and adjust the feet so that the base is level.

    Note: If the base is uneven, start adjusting the foot in the highest corner of the base.

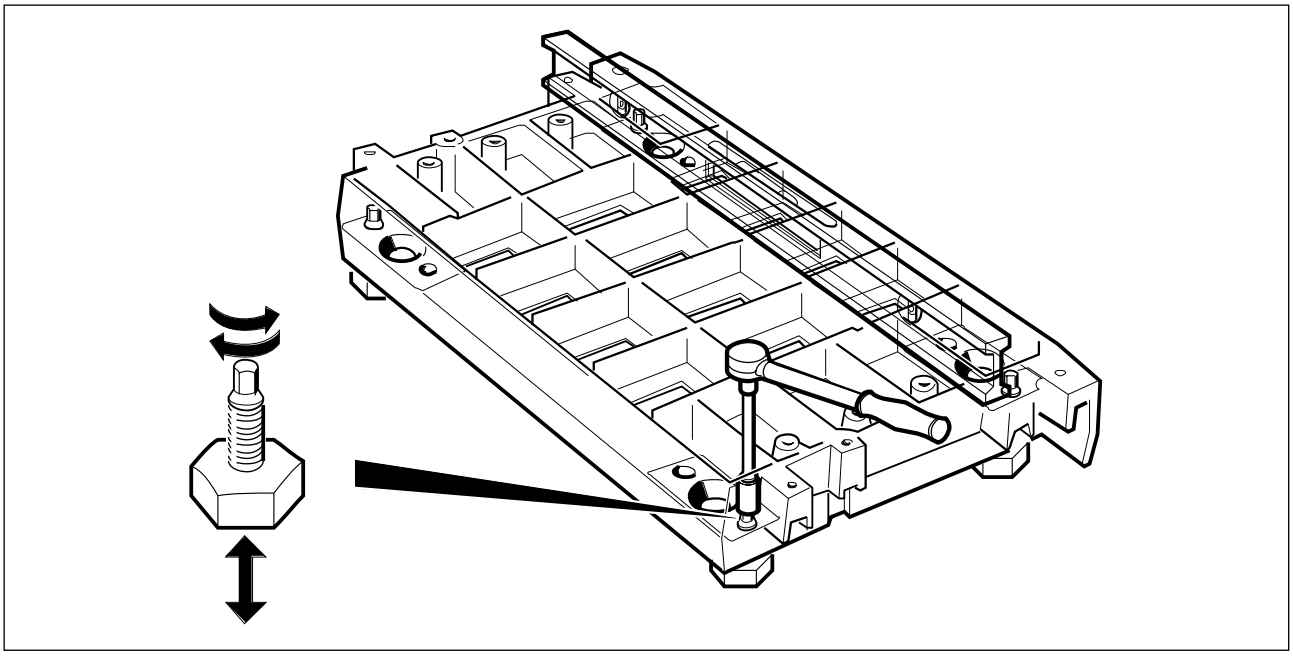


Figure 3-15. Leveling the Rear of the Base

15. Place the level on the left and right sides of the base, as shown in Figure 3-16 on page 3-25, and adjust the feet until the base is level.

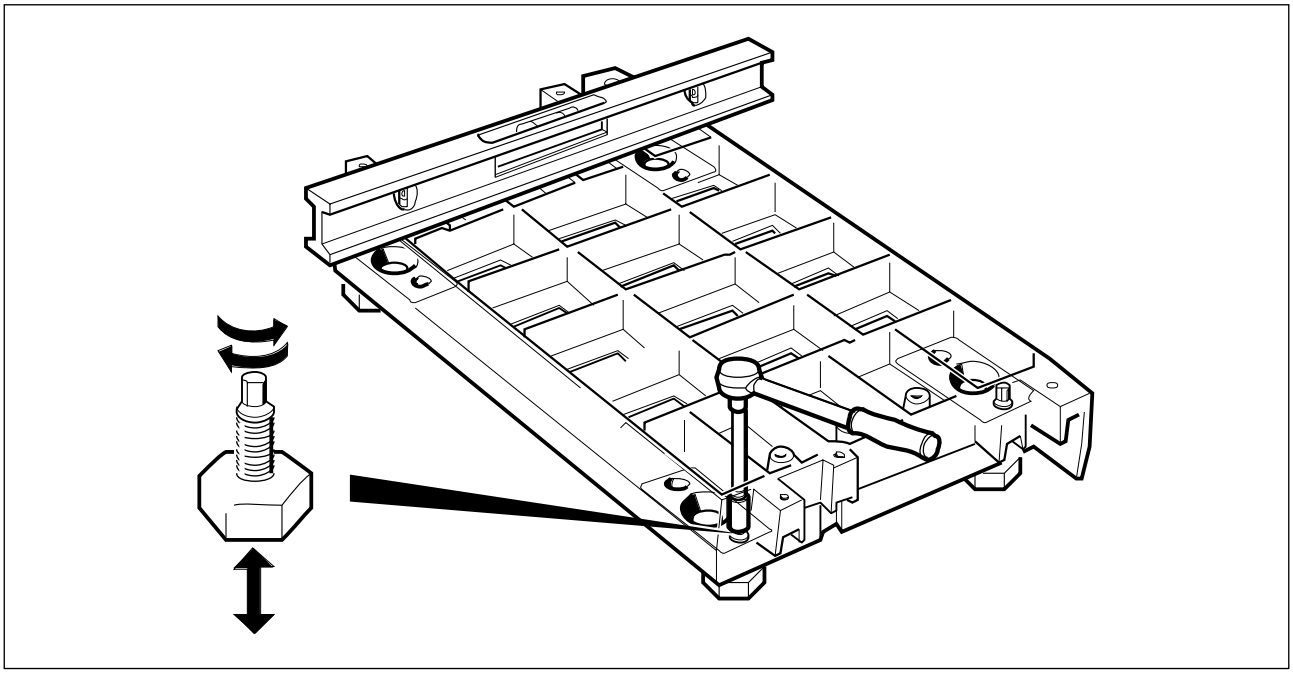


Figure 3-16. Leveling the Sides of the Base

Tighten the Bolts

16. Tighten the left rear bolt, as shown in Figure 3-17 on page 3-26.

    Note: Tighten ordinary M12 bolts to torque setting 70 Nm.

    Note: M8 bolts can be tightened only to torque setting 24 Nm and do not give earthquake protection.

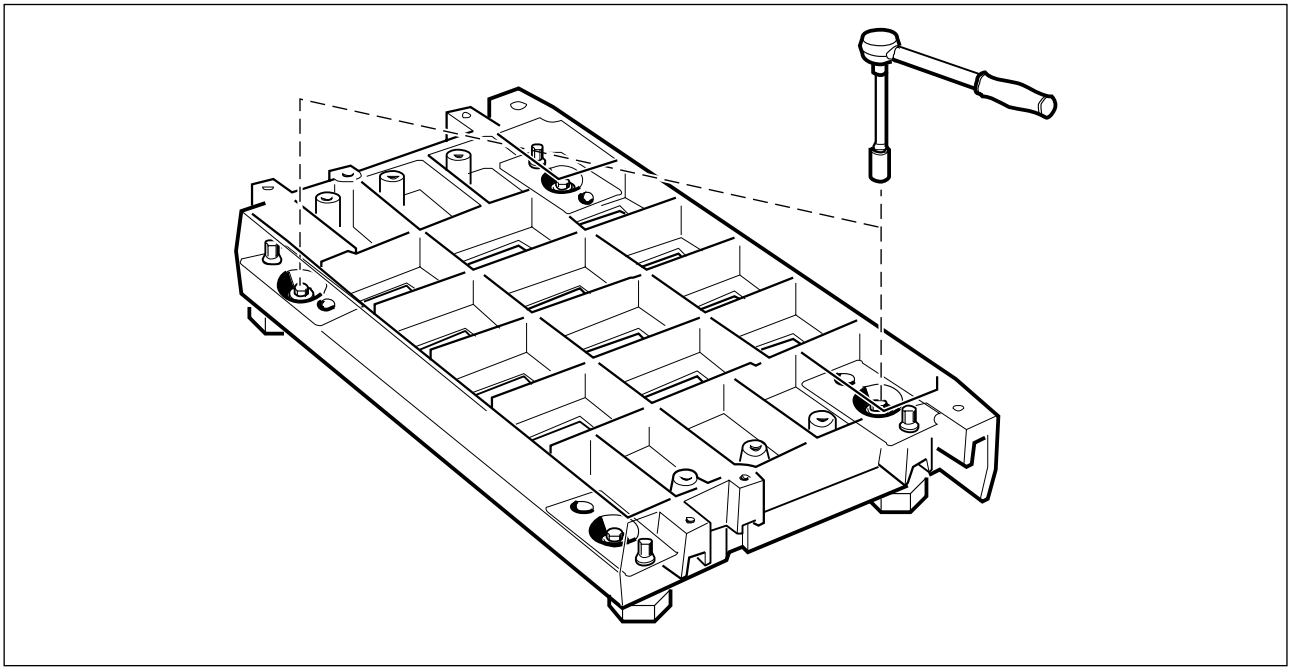


Figure 3-17. Tightening the Base Bolts

17. Tighten the remaining bolts diagonally, as shown in Figure 3-18 on page 3-26.

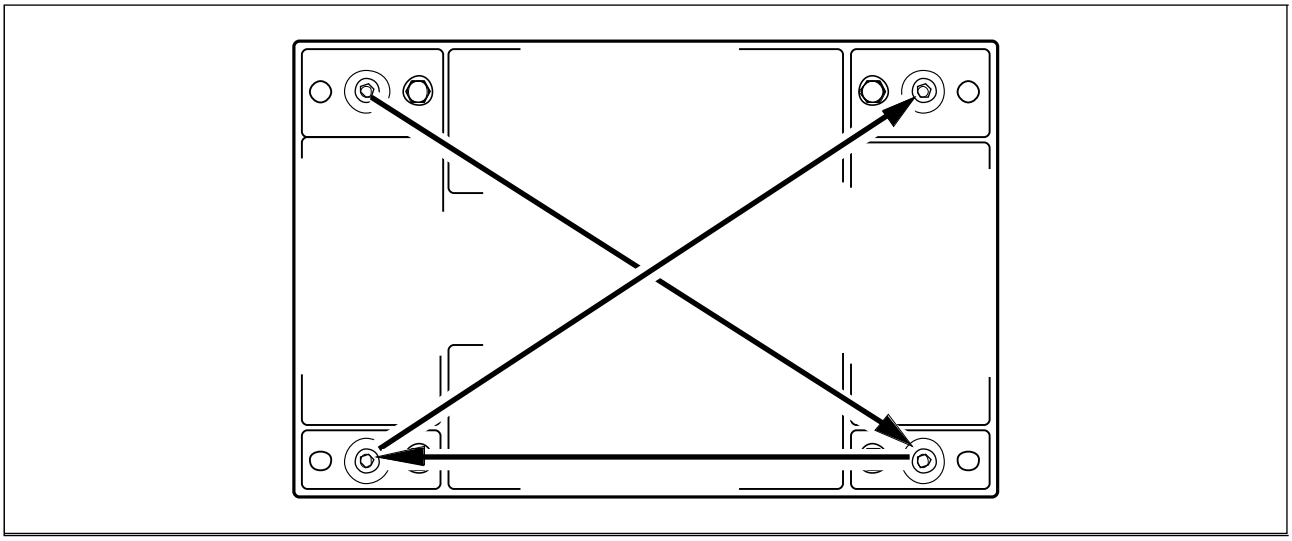


Figure 3-18. Order in which to Tighten the Base Bolts

Mount the Protection Plate

18. Position the protection plate (SXA 123 2038/1) on the base, as shown in Figure 3-19 on page 3-27.

Mount the Cable Chute

19. Hook the cable chute (SXA 105 9360/1) on the front edge of the base as shown in Figure 3-19 on page 3-27.

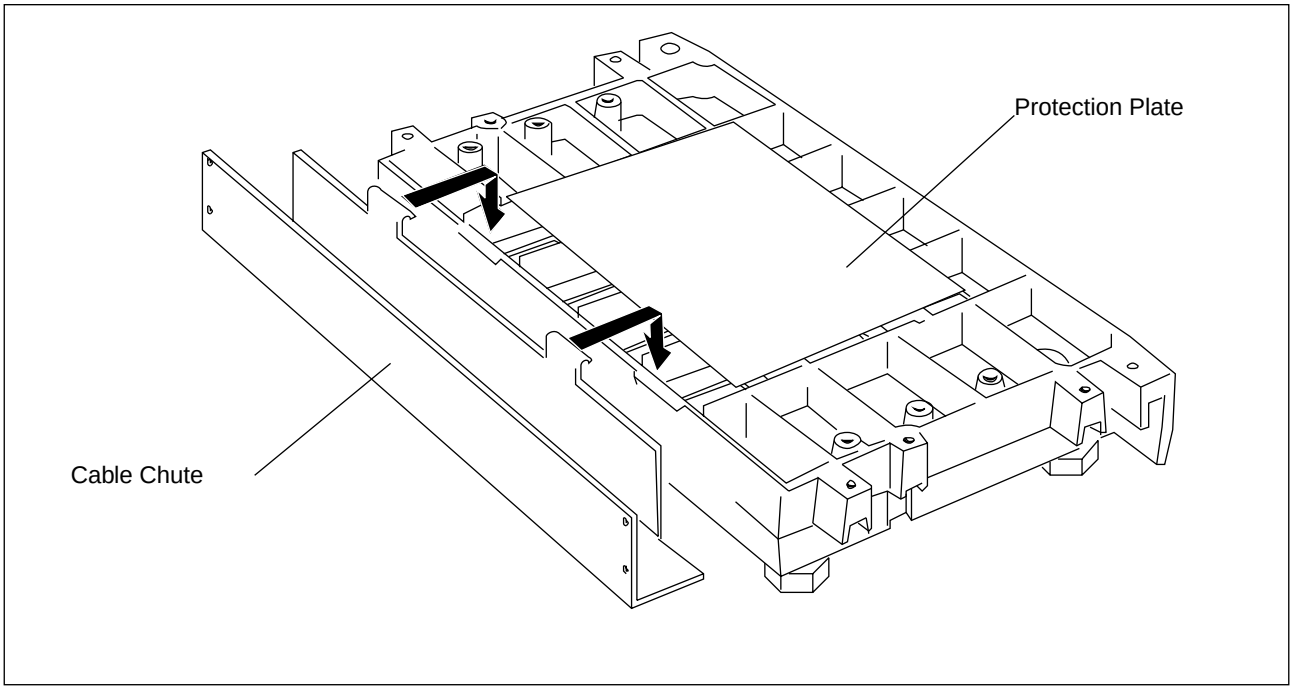


Figure 3-19. Hooking the Cable Chute onto the Base

Install the Cable Shelf and Identification Strip

20. Position the CRI cabinet on the floor with the opening facing up. See Figure 3-20 on page 3-28.

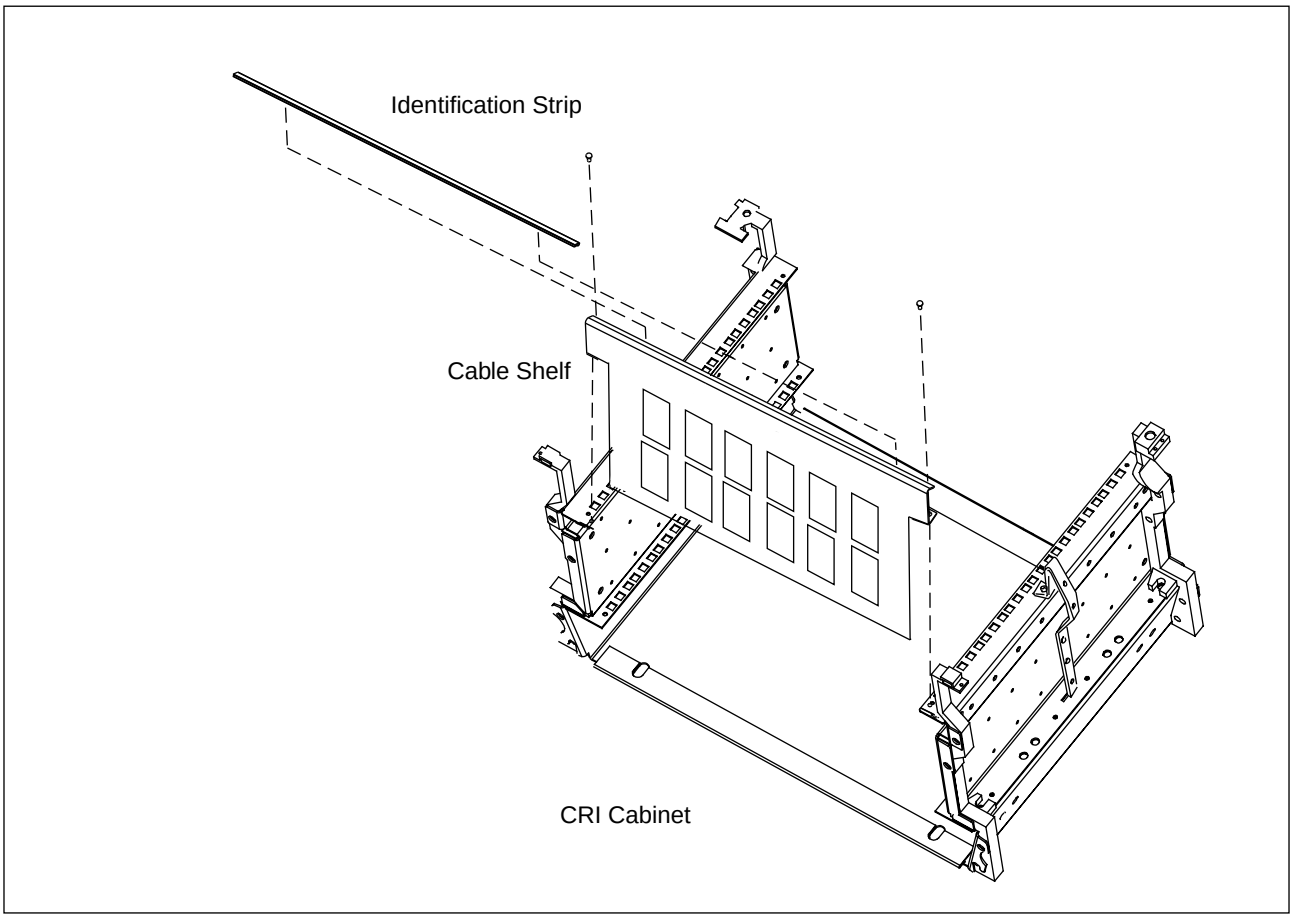


Figure 3-20. Cable Shelf Installation

21. Install the identification strip removed in Step 6 on page 3-19 on the cable shelf. See Figure 3-20 on page 3-28.

22. Use two Torx (TX 20) screws to install the cable shelf. See Figure 3-20 on page 3-28.

23. Install eight captive nuts in positions 1, 2, 23, and 24 on both of the rear flanges in the CRI cabinet. See Figure 3-21 on page 3-29.

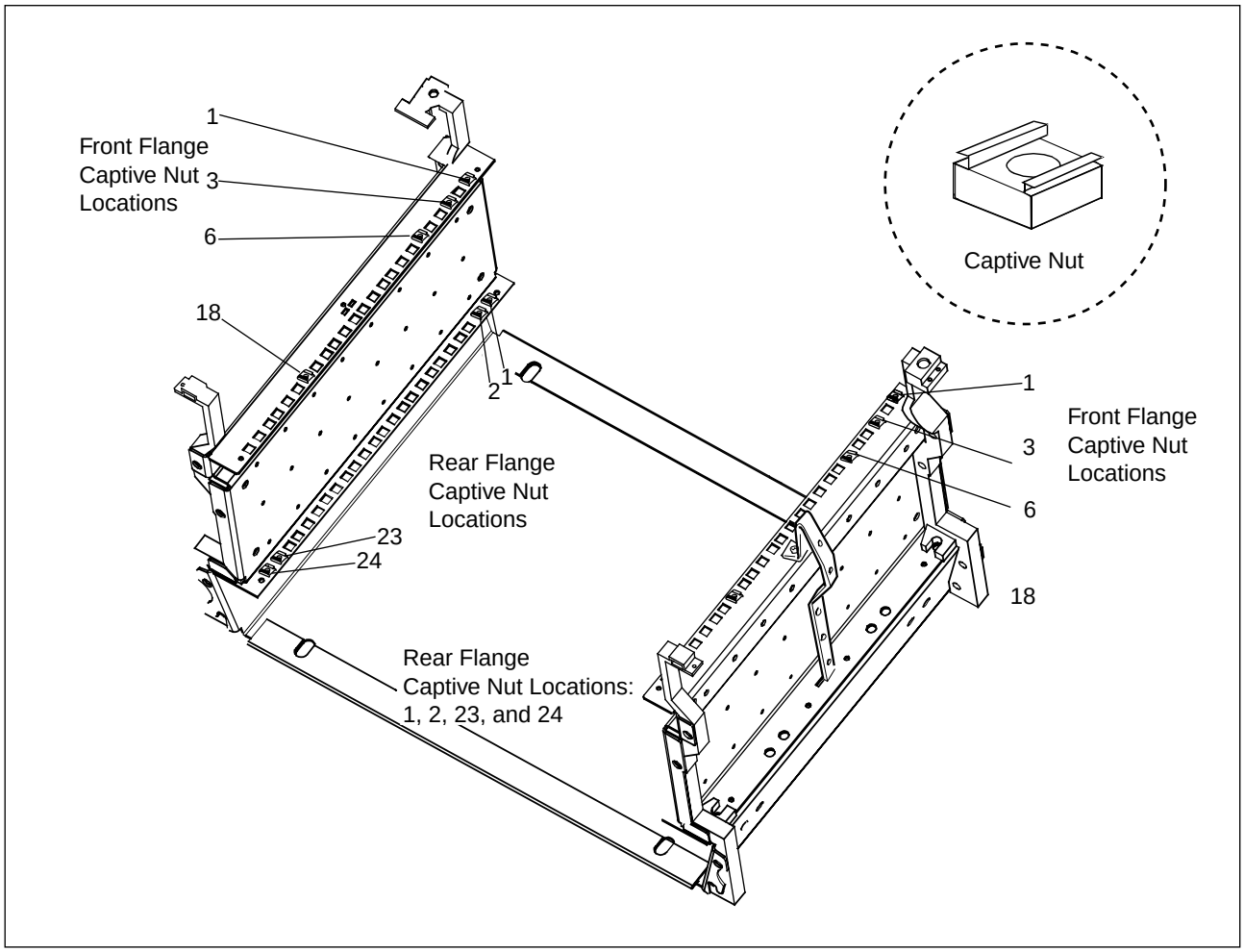


Figure 3-21. CRI Cabinet Captive Nut Installation

24. Install eight captive nuts in positions 1, 3, 6, and 18 on both of the front flanges in the CRI cabinet. See Figure 3-21 on page 3-29.

Install the Rear Plate

25. Install the rear sheet metal plate in the cabinet and insert, but do not tighten, eight Torx (TX 30) screws. See Figure 3-22 on page 3-30.

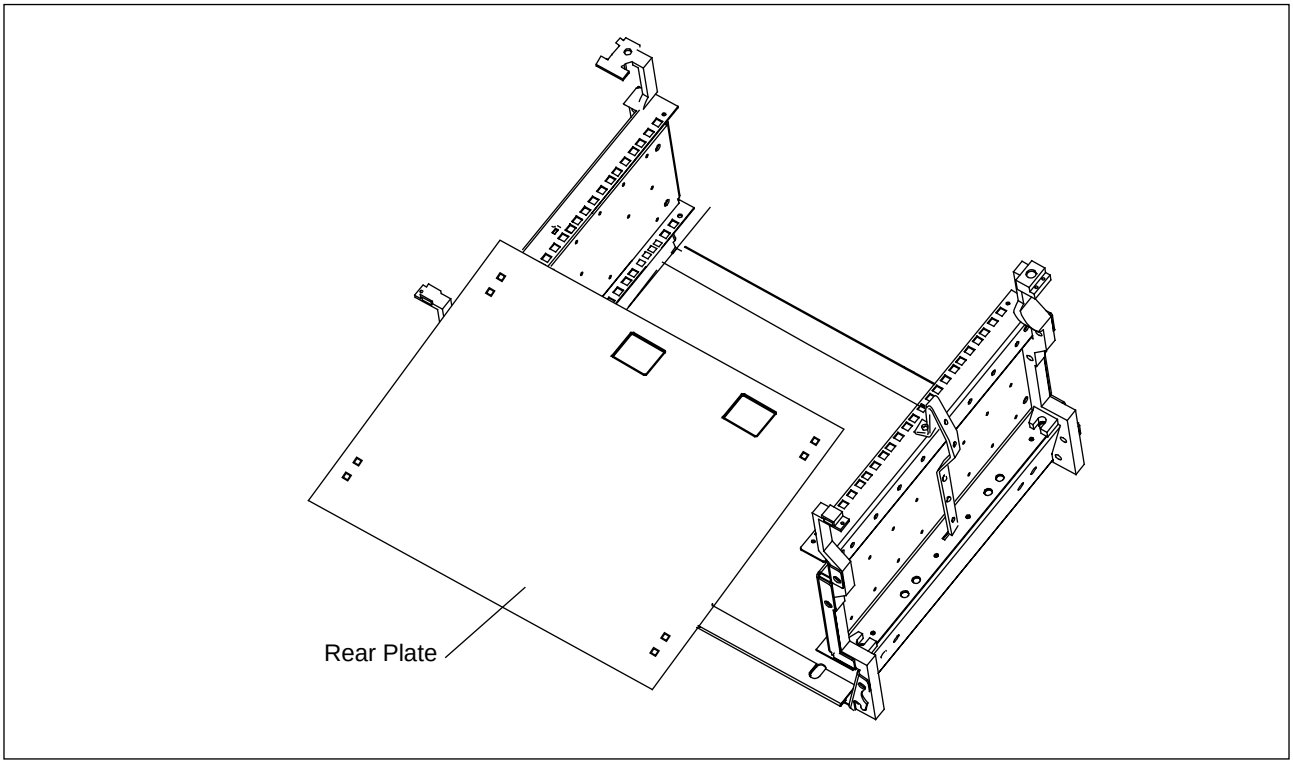


Figure 3-22. Rear Plate Installation

Install the Fan Unit and CRI Subrack

26. Install the fan unit in the cabinet and insert, but do not tighten, four Torx (TX 30) screws.(Figure 3-23 on page 3-31)

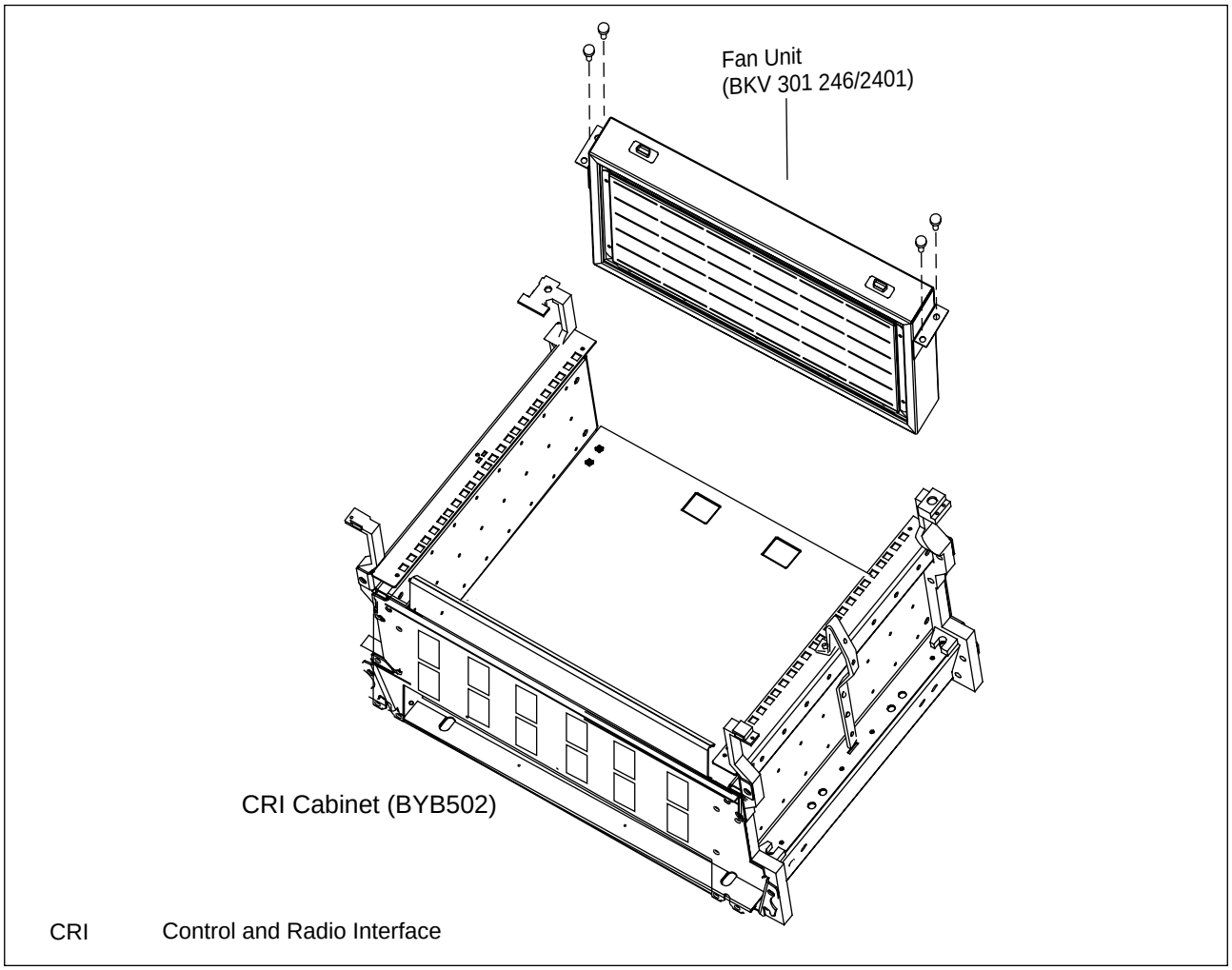


Figure 3-23. Fan Unit Installation

27. Install the subrack in the cabinet and insert, but do not tighten, four Torx (TX 30) screws.(Figure 3-24 on page 3-32).

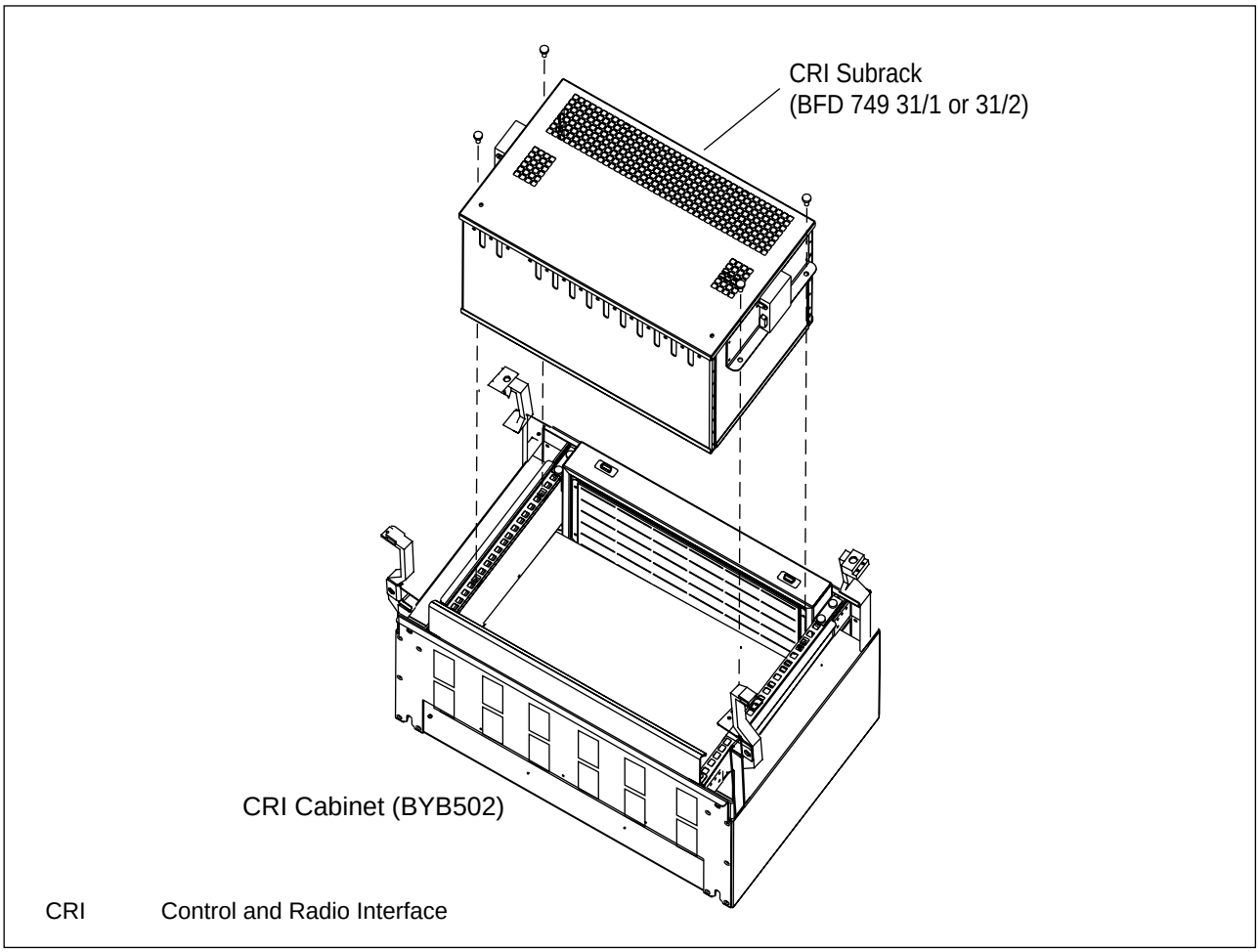


Figure 3-24. CRI Subrack Installation

28. Adjust the position of the fan unit and the CRI subrack so that no space exists between the two units. See Figure 3-25 on page 3-33.

Note: Adjust the Fan Unit and the CRI subrack so there is no space between the two units.

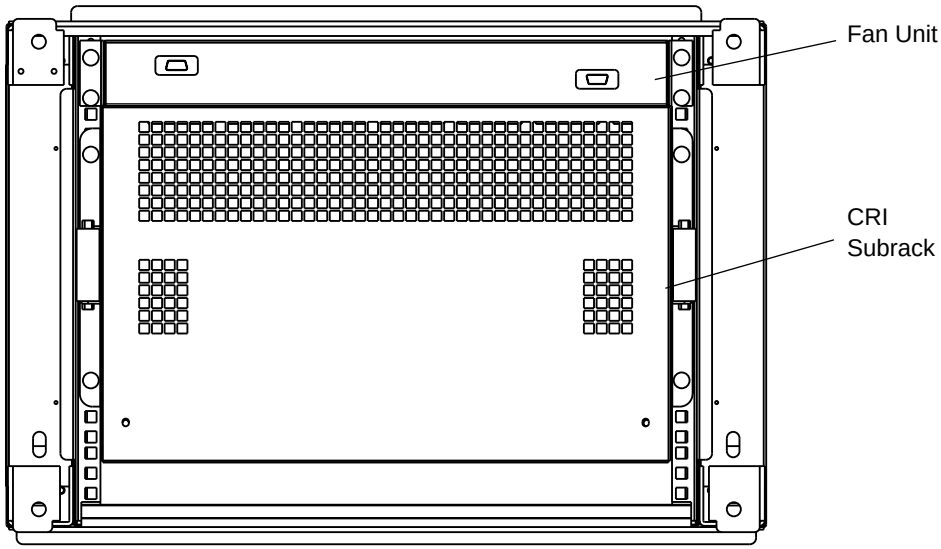


Figure 3-25. Fan Unit and Subrack Adjustment

29. Tighten the four Torx (TX 30) screws to secure the fan unit. See Figure 3-23 on page 3-31.

30. Tighten the four Torx (TX 30) screws to secure the CRI subrack. See Figure 3-24 on page 3-32.

Install the CID Unit

31. Use two Torx (TX 30) screws to install the CID unit. See Figure 3-26 on page 3-34. (Cables are not shown in this illustration.)

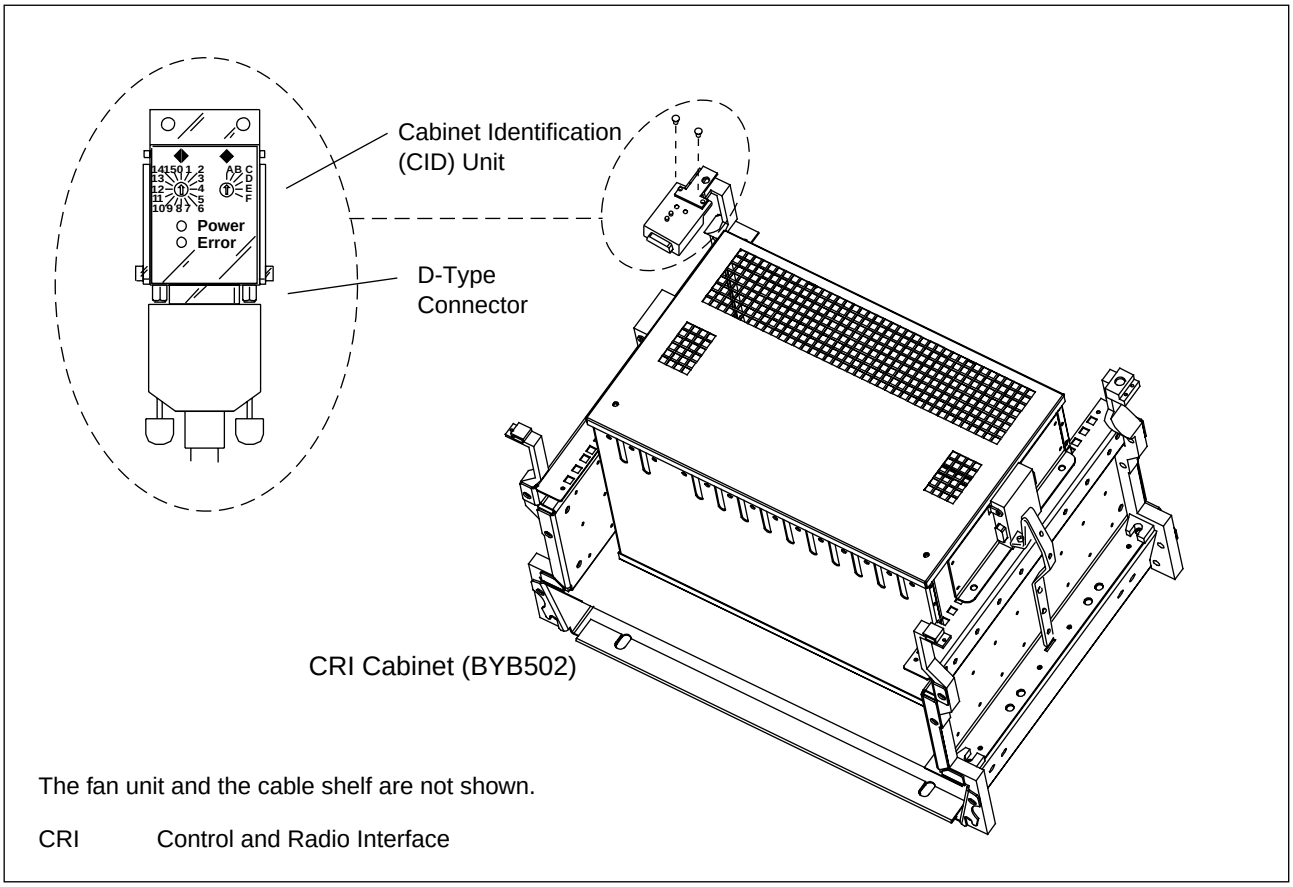


Figure 3-26. CID Unit Installation

32. Call the MSC and request a CID number. Set the CID unit to the corresponding identifier (ID) using a small, flat-head screwdriver. See Figure 3-26 on page 3-34.

Secure the Pico BYB 502 Cabinet on the Base

33. Install, but do not tighten, two rear cabinet bolts (03/SBA 178 080/0400).

    Note: Do not tighten the bolts because the CRI cabinet must slide onto the bolts in Step 35 on page 3-35.

34.

Warning!

The partially-equipped Pico CRI cabinet weighs approximately 30 kg (66 lb). Ericsson recommends that two persons are present during the installation.

Slide the CRI cabinet on the base.

35. Align the slots on the rear of the CRI subrack unit with the rear cabinet bolts (see Figure 3-27 on page 3-35).

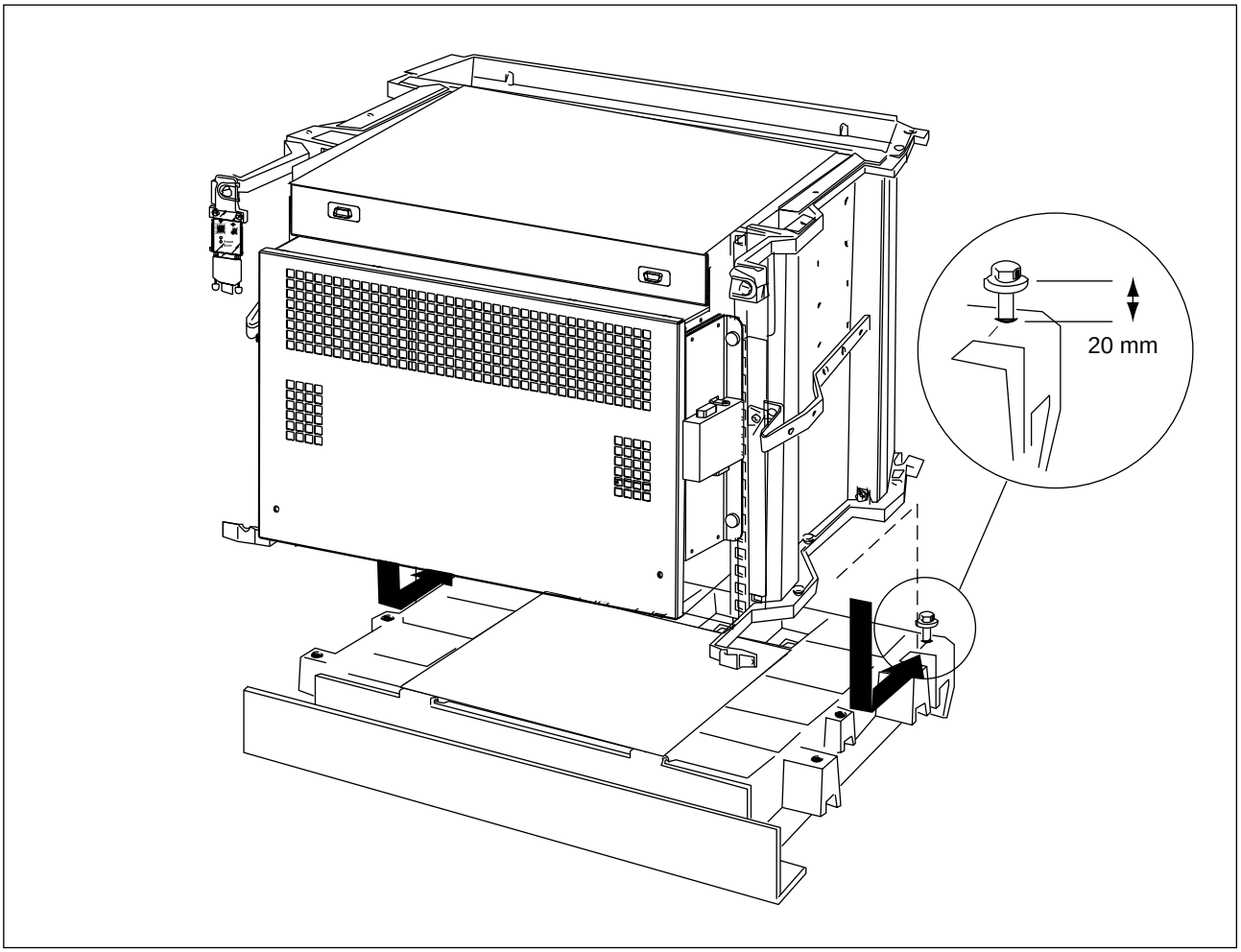
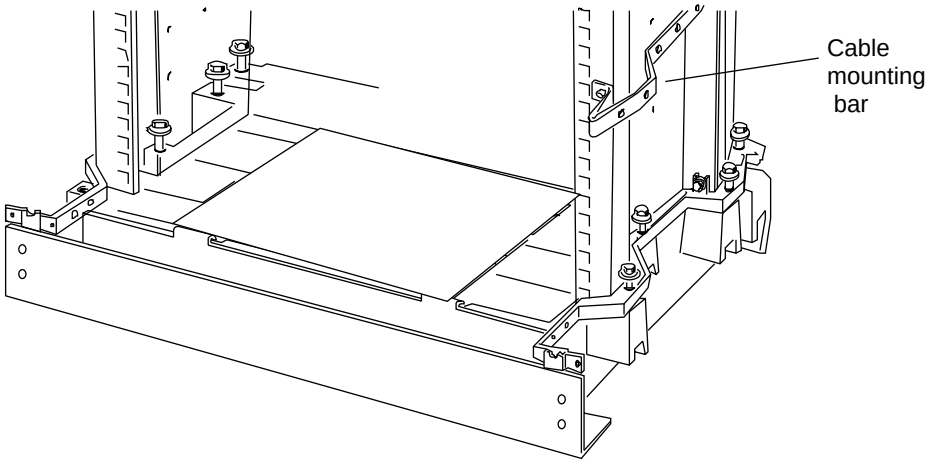


Figure 3-27. Securing CRI on Base

36. Insert, but do not tighten, one bolt (provided in hardware kit) into each of the six remaining fixing holes, as shown in Figure 3-28 on page 3-36.



Note: The RBS equipment is not shown.

Figure 3-28. Bolting the CRI Cabinet to the Base

37. Making sure that the cabinet is in line with the base, tighten the eight bolts to torque setting 20 Nm.

    Note: To simplify this step, the cable mounting bar can be temporarily removed.

Ground the CRI Floor Mount Cabinet

38. If not already present, run a 35 mm or larger insulated cable (RBS ground cable, from Grounding Wire Kit 4/NTM 201 201) on the cable ladder that is located above the equipment. See the *Cable Way Drawing* in the *Site Installation Documents*.

39. Connect the RBS ground cable to the site ground bar (see the *Floor Plan Drawing* in the *Site Installation Documents*) as shown in Figure 3-29 on page 3-37.

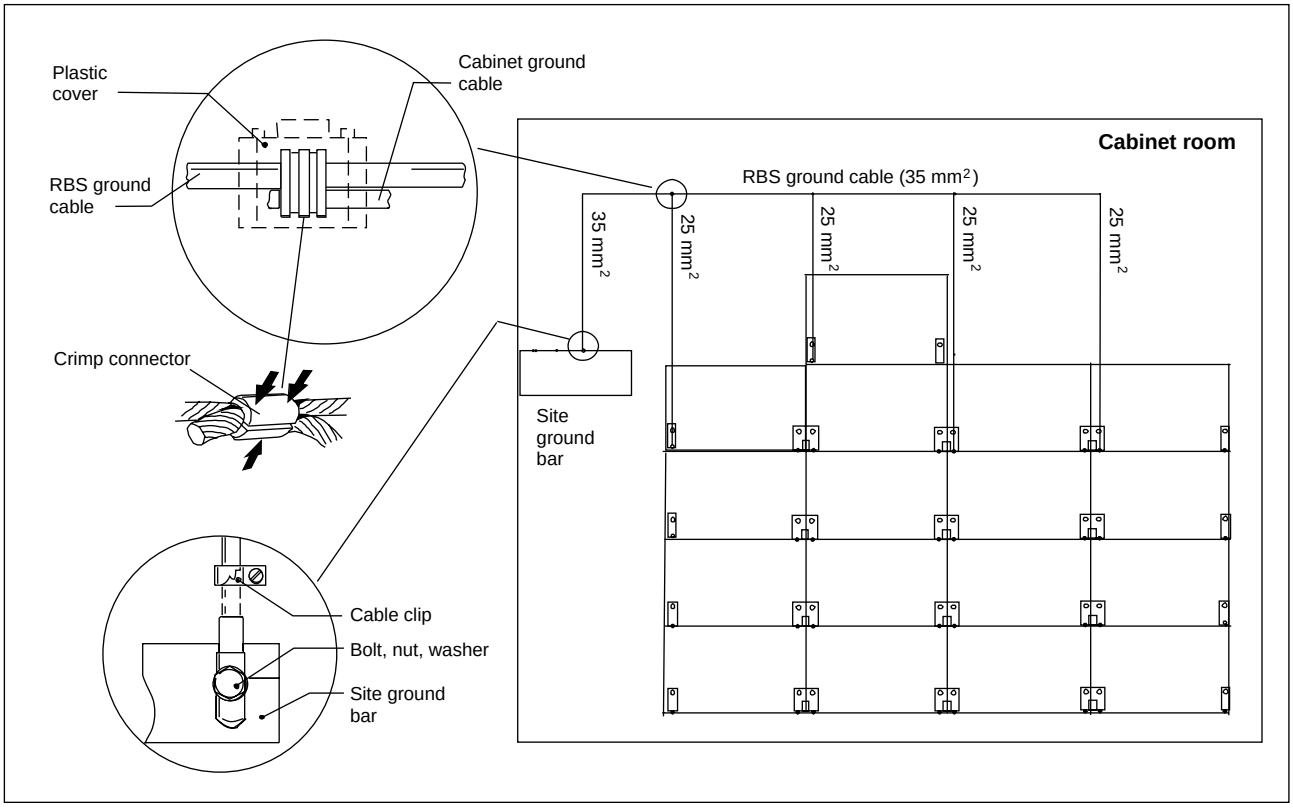


Figure 3-29. Example of Ground Cable Connection

40. Run a 25 mm² or thicker insulated cabinet ground cable (included in Grounding Cabinet Kit 5/NTM 201 201) from the RBS ground cable, vertically down to the right front fixing hole of the cabinet. See Figure 3-29 on page 3-37.

    Note: If the site has mixed BYB 401 and BYB 502 cabinets, the grounding cables are attached to the front fixing holes on the same side of all top cabinets.

41. Use a crimp connector (from Grounding Wire Kit 4/NTM 201 201) and the crimp tool to connect the cabinet ground cable to the RBS ground cable, as shown in Figure 3-29 on page 3-37.

    Use the cable stripper or a knife to remove the sheath (insulation) from the cables to allow galvanic contact between the cables.

42. Put a plastic cover (from Grounding Wire Kit 4/NTM 201 201) on the crimp connector and seal it with tape.

43. Cut the cabinet ground cable to a suitable length (it must reach the connection point on the cabinet).

44. Remove enough cable sheath from the free end of the cabinet ground cable for the cable lug (from Grounding Cabinet Kit 5/NTM 201 201).

45. Use the crimp tool to attach the cable lug to the cable. See Figure 3-30 on page 3-38.

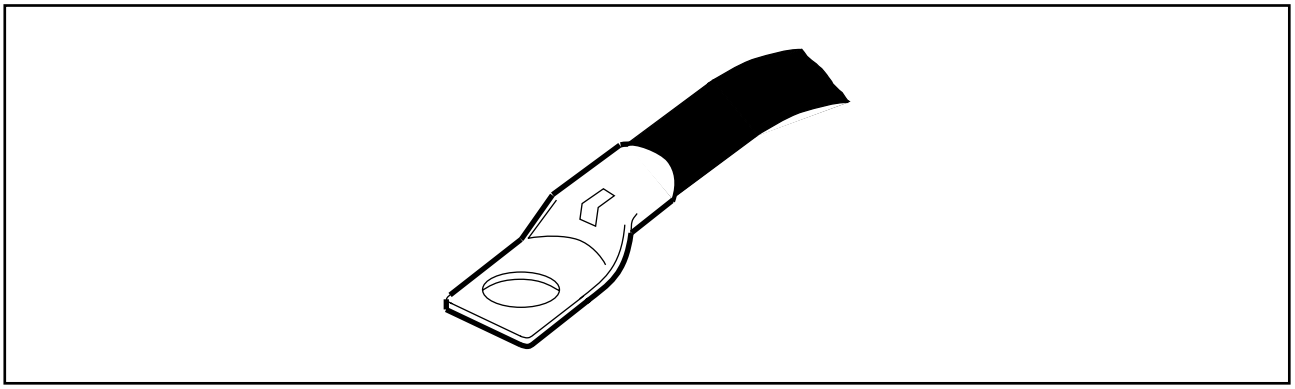


Figure 3-30. Cable Lug Crimped on Ground Cable

46. Connect the ground cable to the Pico BYB 502 cabinet, as shown in Figure 3-31 on page 3-38.

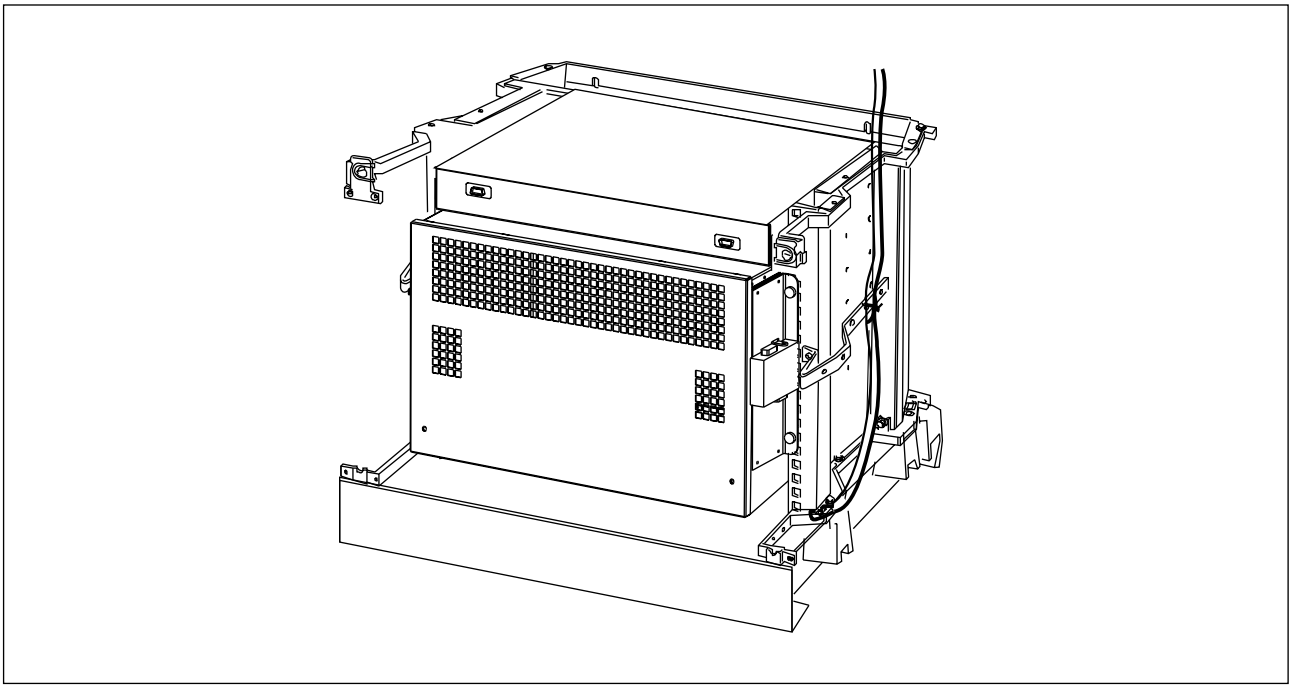


Figure 3-31. Grounding the Pico Cabinet (BYB 502)

Install the Power Shelf

47. Install a right and left power shelf mounting bracket using two Torx (TX 20) screws for each side. See Figure 3-32 on page 3-39.

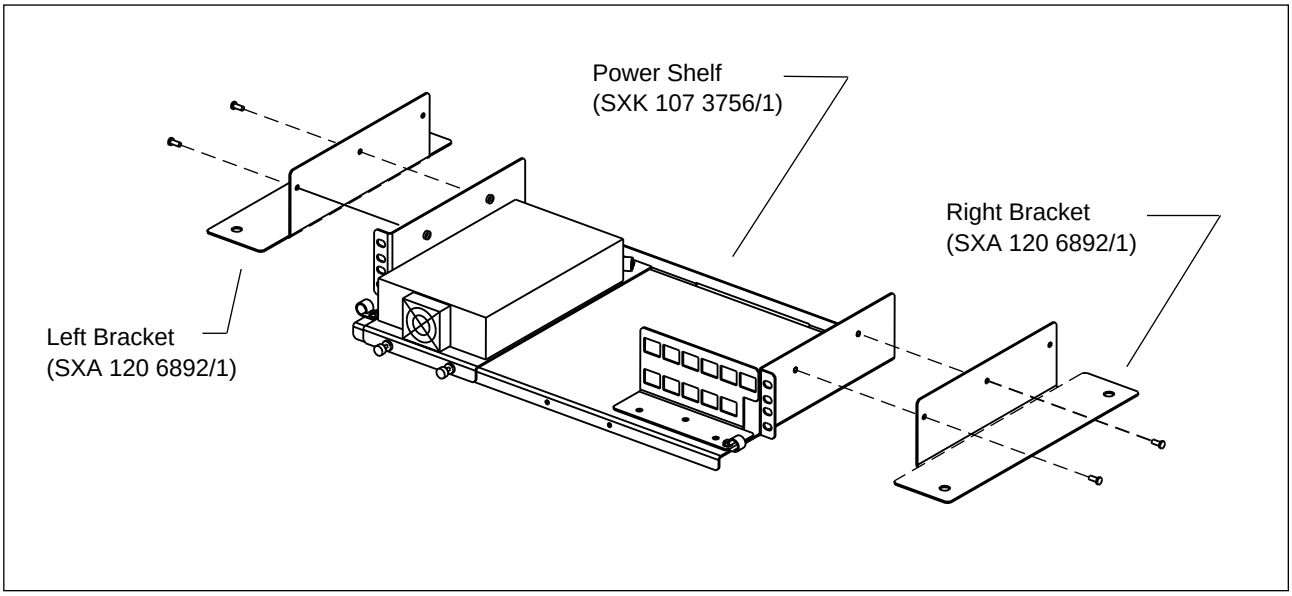


Figure 3-32. Power Shelf Brackets

48. Position the power shelf on the CRI cabinet. See Figure 3-33 on page 3-40.

49. Install one bolt in the rear hole on each power shelf bracket. See Figure 3-33 on page 3-40.

    Note: Do not tighten the bolts.

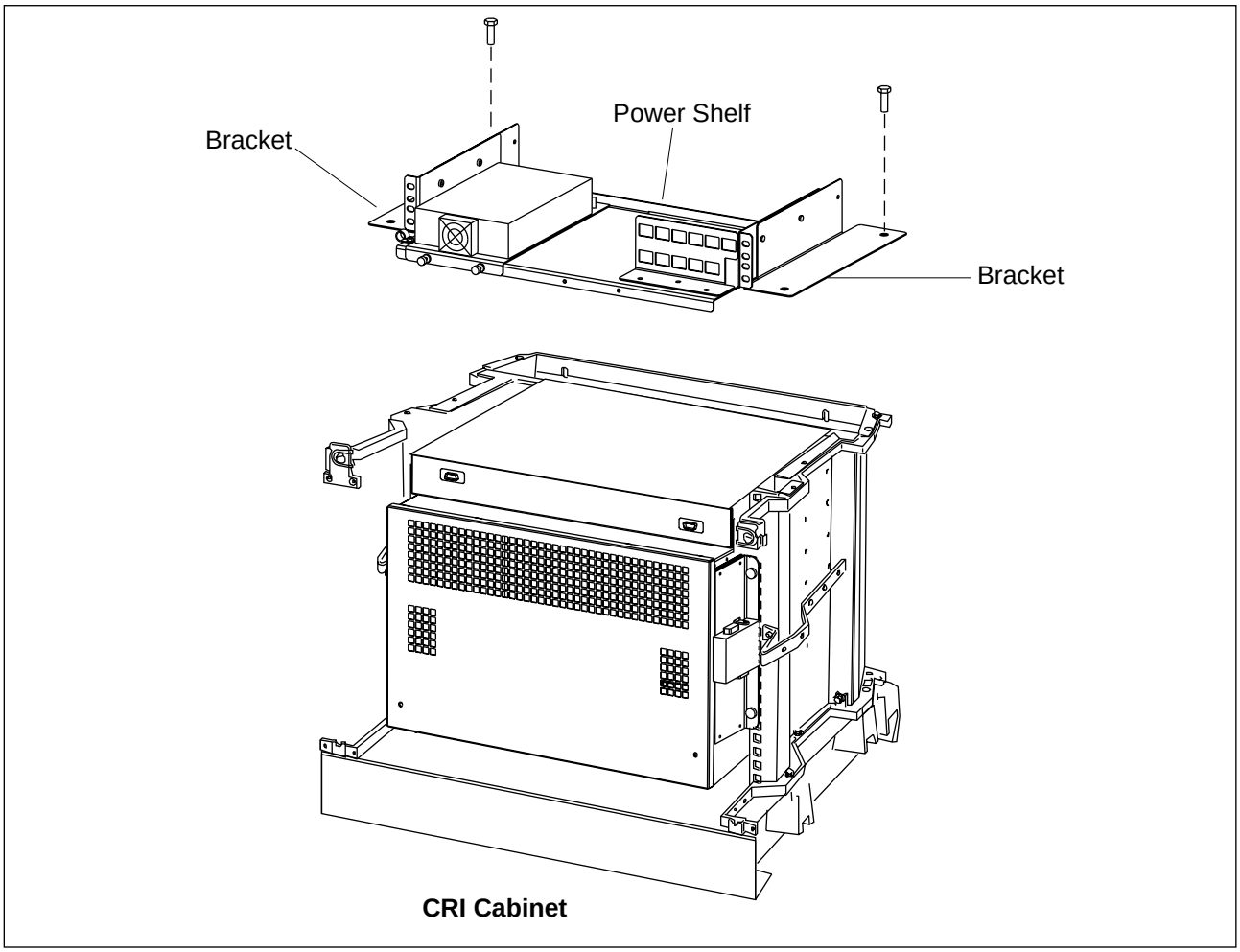


Figure 3-33. Power Shelf Installation

Connect the Power Cables

50. Connect the DC power cable (Y-cable) (RPM 113 1476/1) from the power supply to the left and the right DC filter. See Figure 3-34 on page 3-41.

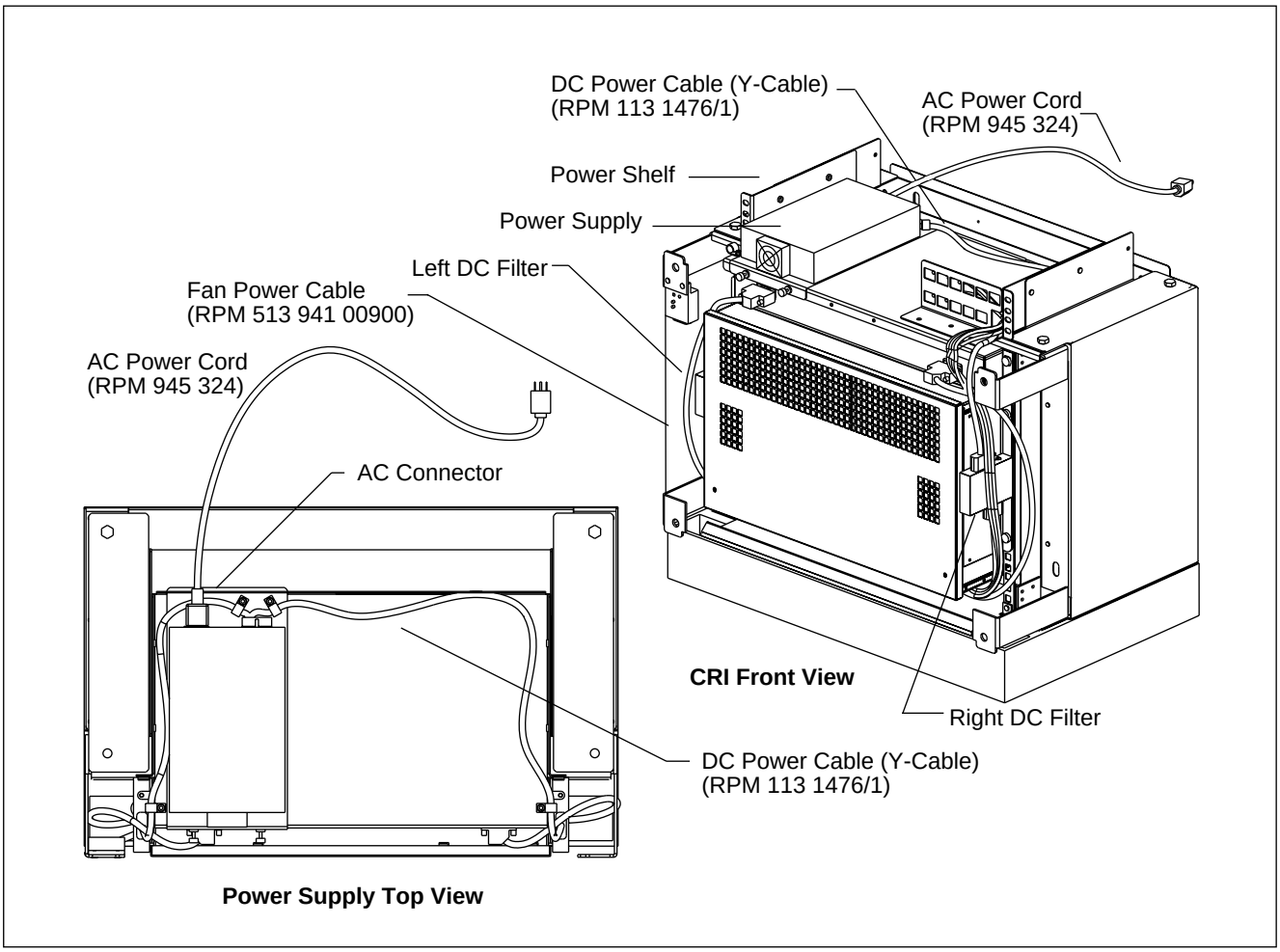


Figure 3-34. Power Cable Installation

51. Connect the Line Cord (RPM 945 324) to the AC connector on the rear panel of the power supply. See Figure 3-34 on page 3-41.

52. Install the cables on the fan unit. See Figure 3-34 on page 3-41.

53. To install the CRI boards later, go to Step 8 on page 3-87 to complete this portion of the CRI installation.

54. To install the CRI boards now, go to Procedure 9.1 on page 3-50 to set the ETB switches and continue the installation.

8.3 Installing a Pico CRI Cabinet with Existing Macro Cabinets

The RBS 884 Pico (1900 MHz) cabinet is an Ericsson BYB 502 cabinet. BYB 502 cabinets can be installed with existing Macro BYB 401 or Macro

BYB 502 cabinets. For other cabinet configurations, refer to *RBS 884 Macro Installation and Hardware Replacement Manual* (EN/LZB 119 3307).

Warning!

The partially-equipped Pico CRI BYB 502 cabinet weighs approximately 30 kg (66 lb). Ericsson recommends that two persons are present during the installation.

8.3.1 Installing a Pico BYB 502 Base Next to a BYB 401 Base

1. If a cabinet is installed on the present base, remove the right front fixing bolt (assuming the new base is to be installed to the right).

2. Use earthquake protection according to local regulations. See RBS 884 *Macro Installation and Hardware Replacement Manual* for IEC 68-2-57 and Bellcore (Verteq 2: Zone 4) requirements. Use earthquake kit 15/BYB 502/1.

3. To measure the distance between the bases, place two double-mount brackets (placed on each other) between the bases at the rear fixing holes, and one double-mount bracket (with inserted bolts) on the front fixing holes. See Figure 3-35 on page 3-43.

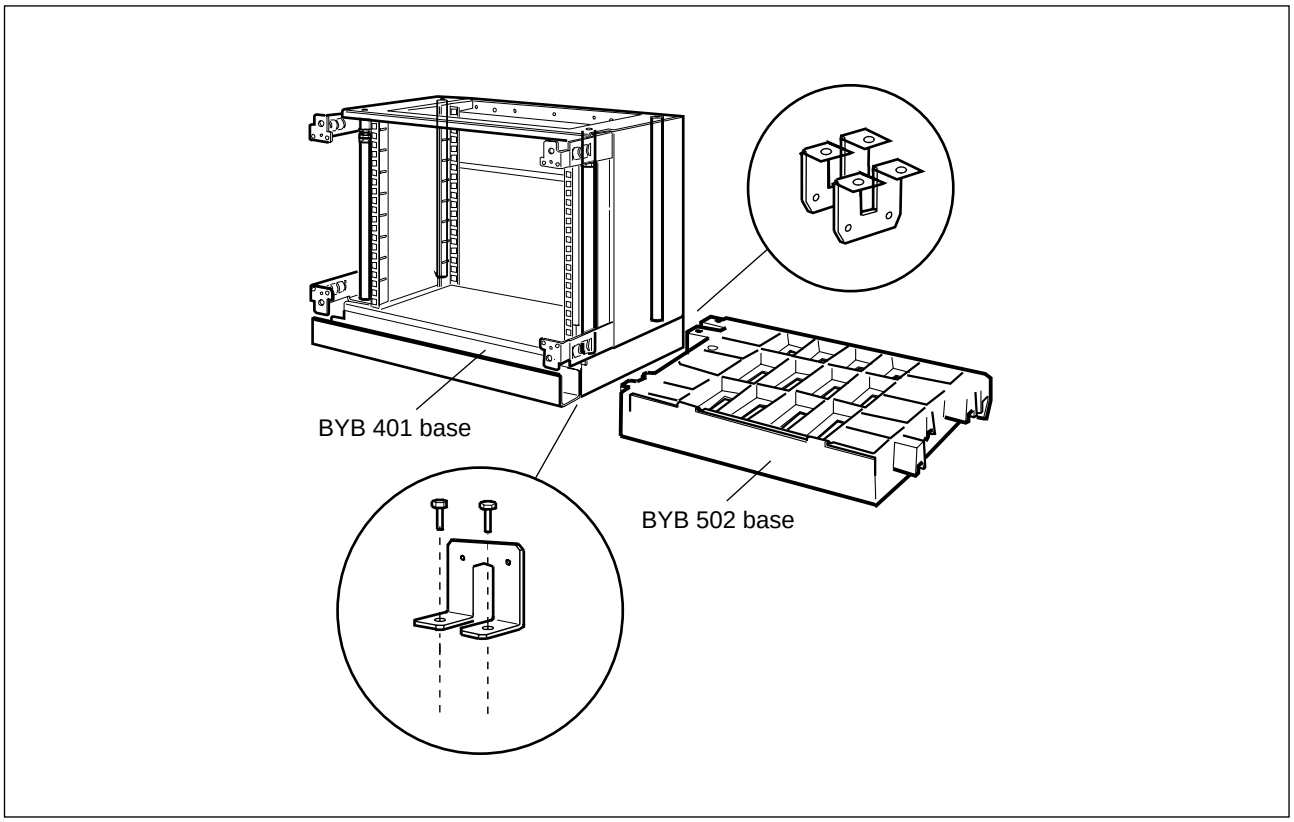


Figure 3-35. Measuring the Correct Separation Between the Bases

4. Drill holes in the floor, insert the bolts, level the base, tighten the bolts (M12 bolts to torque setting 70 Nm, M8 bolts to 24 Nm), mount the cable chute, mount any remaining bases, and mount a base side cover as described in Step 8 on page 3-87.

5. Remove the three double-mount brackets that were used to measure the separation between the bases.

8.3.2 Installing a Pico BYB 502 Cabinet Next to a BYB 401 Cabinet

Site Preparation

1. Before beginning the installation, remove the door from each cabinet.

Row A Installation

2. Insert one bolt into each of the two rear screw holes on the previously installed base, and make sure that the distance between the bolt head and the base is more than 20 mm. See Figure 3-36 on page 3-44.

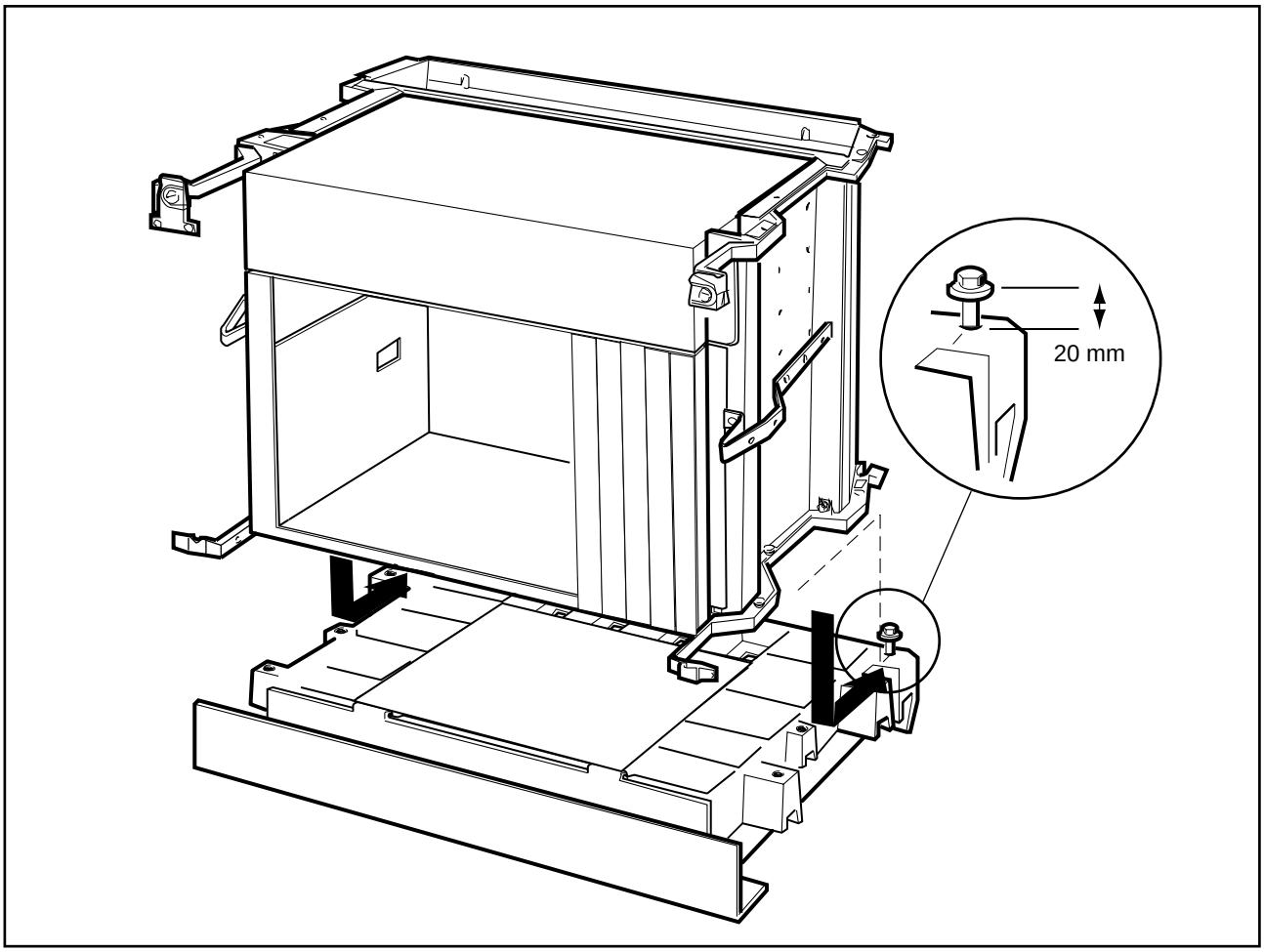


Figure 3-36. Distance between the Bolt Head and the Base

3. Slide the appropriate cabinet into its correct position on the base, and insert one bolt into each of the six remaining fixing holes. Do not tighten the bolts yet.

4. Connect the cabinets at the front fixing holes. Use a double-mount bracket and two washers (six-sided) under the double-mount bracket on the BYB 401 side. No washers are used on the BYB 502 side.

5. Mount a contact bar between BYB 401 and BYB 502 cabinets. Hook the contact bar on the premounted screws. Use a Torx screwdriver TX20 to tighten the screws. See Figure 3-37 on page 3-45.

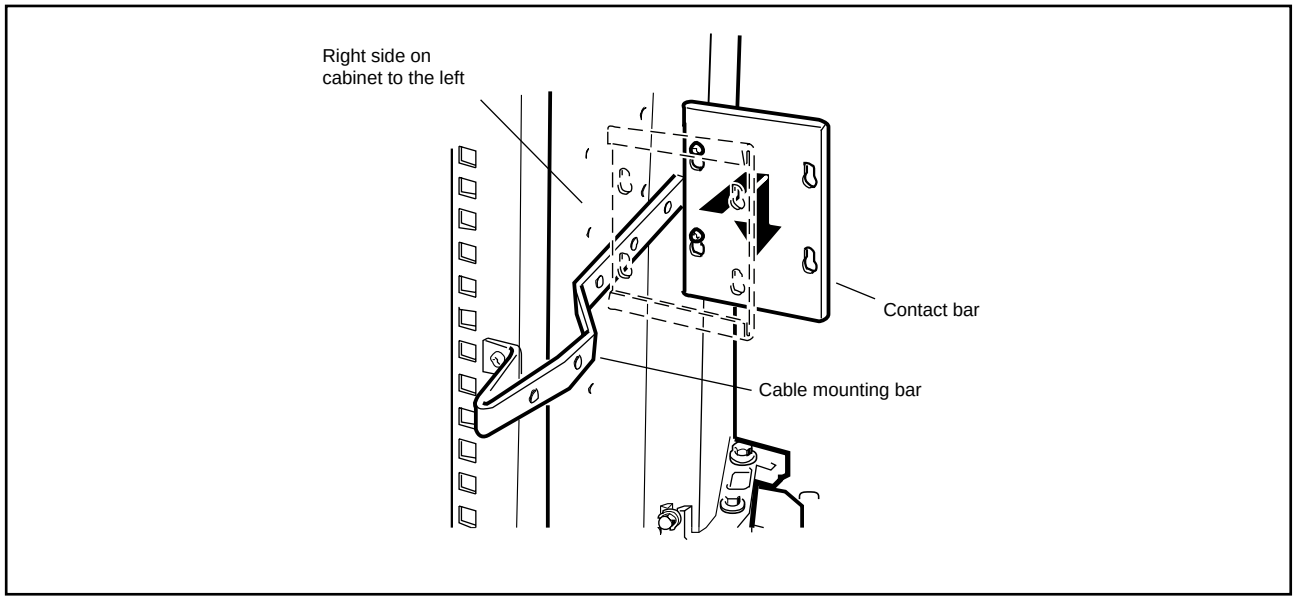


Figure 3-37. Contact Bar

6. Making sure that the cabinet is in line with the base, tighten the eight bolts to torque setting 20 Nm.

7. Perform the Power (POWD) intercabinet cabling according to the *Terminal Drawings* and *Site Installation Documentation*.

   Note: Do not install the Pico CRI power unit and power shelf when using Macro POWD intercabinet cabling.

8.3.3 Installing a Pico BYB 502 Cabinet on Top of a BYB 502 Cabinet

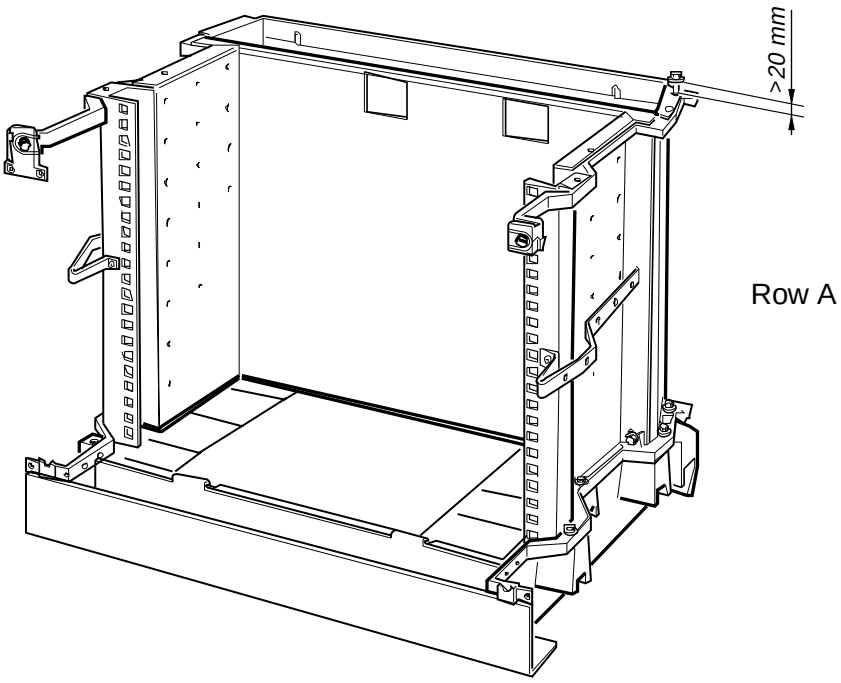
Site Preparation

1. Before beginning the installation, remove the door from each cabinet.

2. Remove the top cover from the supporting cabinet.

Row B Installation

3. Insert one bolt into each of the two rear screw holes on the previously installed base, and make sure that the distance between the bolt head and the base is more than 20 mm. See Figure 3-38 on page 3-46.



Note: The RBS equipment is not shown.

Figure 3-38. Distance between Bolt Head and Cabinet Top

4. Slide the appropriate cabinet into its correct position on the cabinet in Row A, as shown in Figure 3-39 on page 3-47.

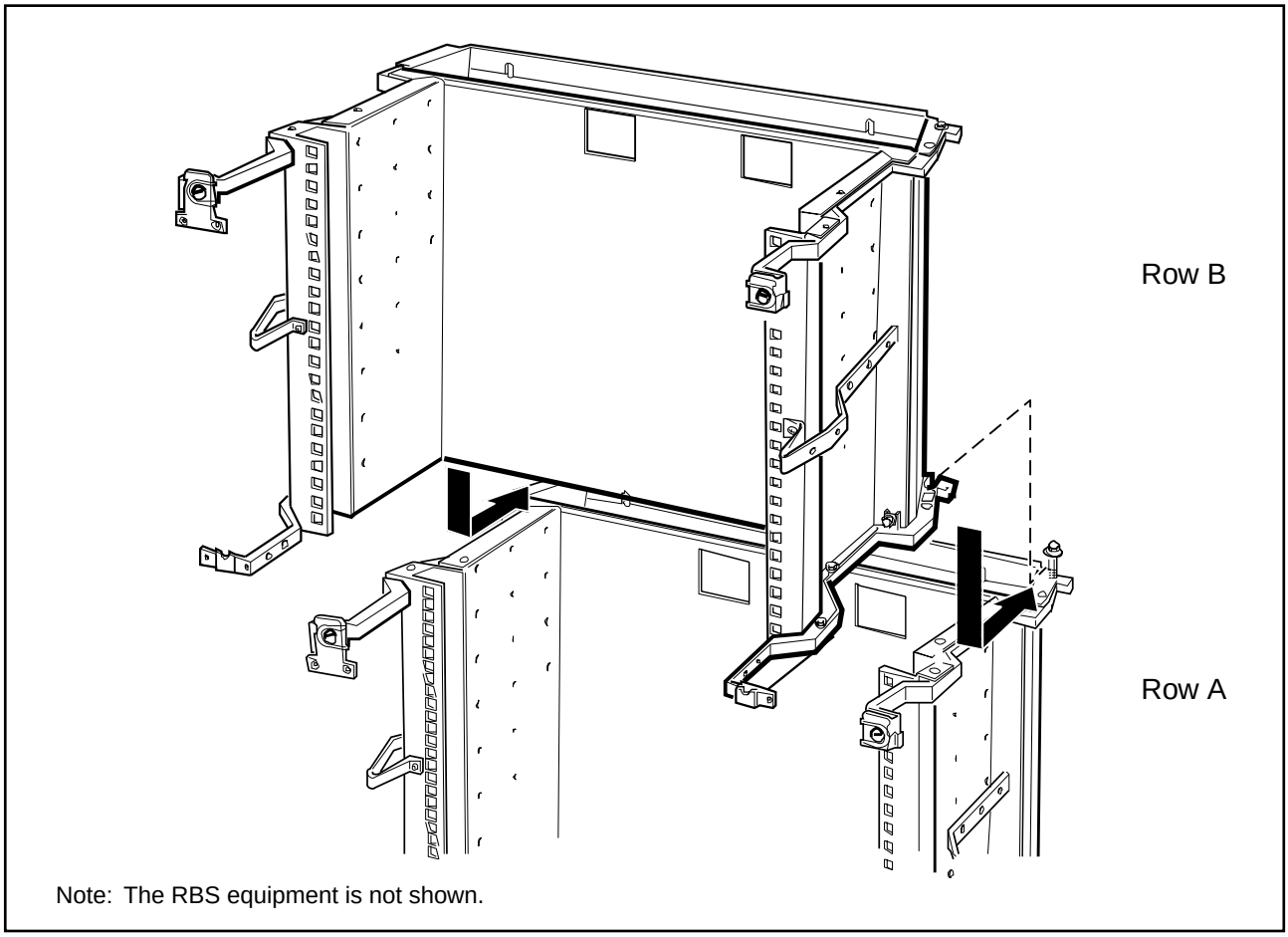


Figure 3-39. Sliding Cabinet into Position on Cabinet

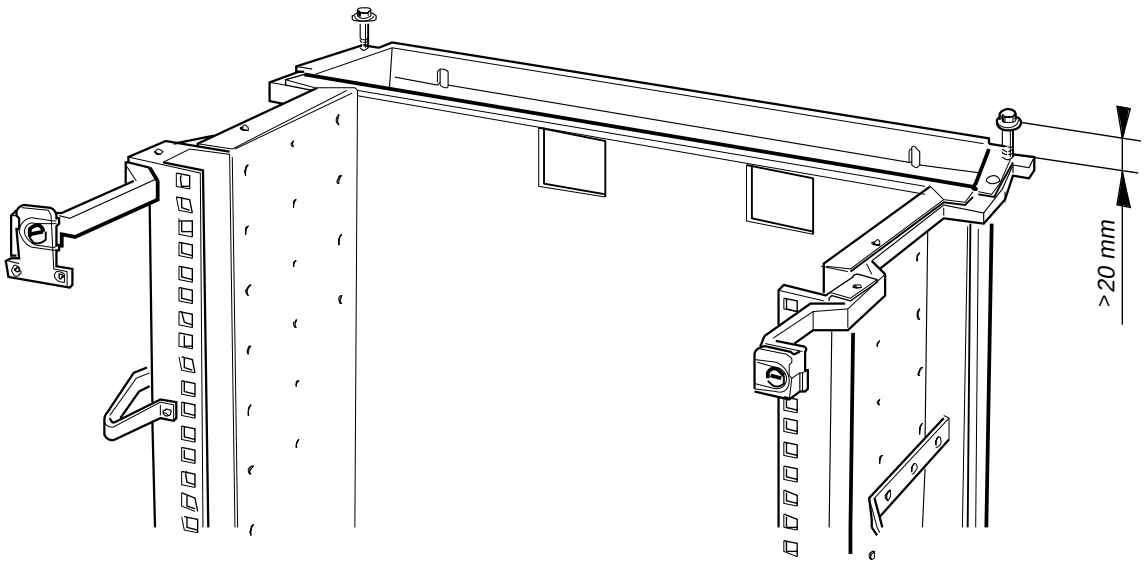
5. Insert (but do not tighten) one bolt into each of the six remaining fixing holes, as shown in Figure 3-39 on page 3-47.

6. Make sure that the cabinet is in line with the cabinet below and tighten the eight bolts to torque setting 20 Nm.

Rows C, D, and E Installation

7. On the supporting cabinet, insert one bolt into each of the two rear screw holes. Make sure that the distance between the bolt head and the cabinet top is more than 20 mm, as shown in Figure 3-40 on page 3-48.

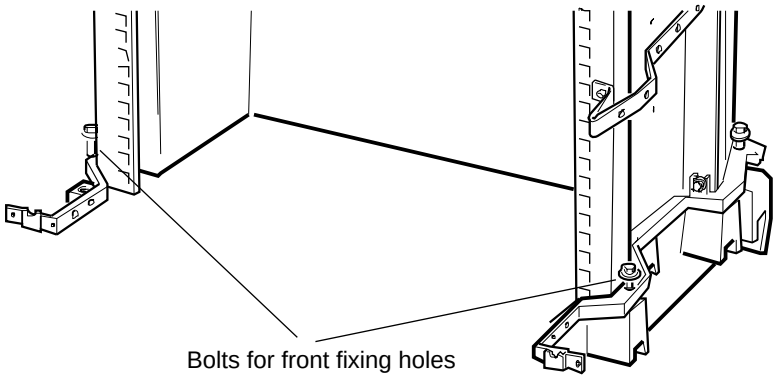
8. Slide the appropriate cabinet into its correct position on the cabinet below, as shown in Figure 3-40 on page 3-48.



Note: The RBS equipment is not shown.

Figure 3-40. Inserting Bolts in Cabinet Rows C, D, or E

9. Insert (but do not tighten) one bolt into each of the two front fixing holes, as shown in Figure 3-41 on page 3-48. Only four bolts are required to fix a cabinet in row C, D, or E.



Note: The RBS equipment is not shown.

Figure 3-41. Inserting Bolts in the Front Fixing Holes for Rows C, D, or E

10. Make sure that the cabinet is in line with the cabinet below and tighten the four bolts to torque setting 20 Nm.

8.3.4 Installing a Pico BYB 502 Cabinet on Top of a BYB 401 Cabinet

Site Preparation

1. Before beginning the installation, remove the door from each cabinet.

Rows B, C, or D Installation

2. Insert one bolt into each of the two rear screw holes on the previously installed base, and make sure that the distance between the bolt head and the base is more than 20 mm (Figure 3-40 on page 3-48).

3. Slide the appropriate cabinet into its correct position on the base, and insert one bolt into each of the six remaining fixing holes. Do not tighten the bolts yet.

4. Use a double-mount bracket and two washers (six-sided) under the double-mount bracket on the BYB 401 side to connect the cabinets at the front fixing holes . No washers are used on the BYB 502 side.

5. Mount a contact bar between the BYB 401 and the BYB 502 cabinets. Hook the contact bar on the premounted screws, and tighten the screws using Torx screwdriver TX20 (Figure 3-42 on page 3-49).

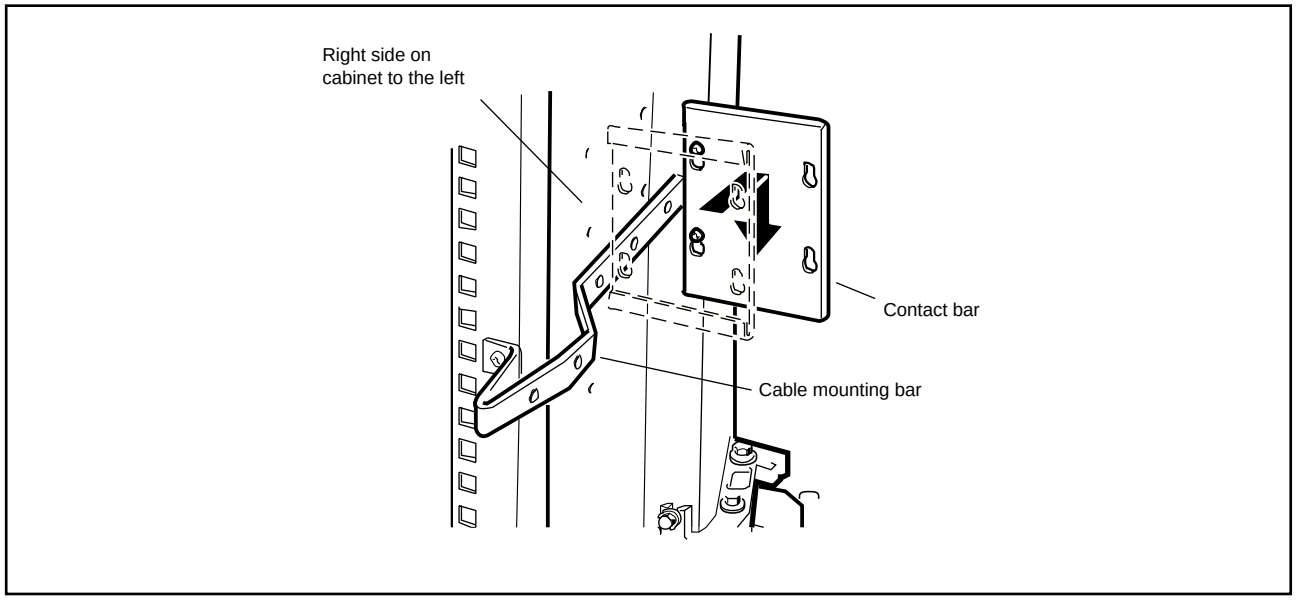


Figure 3-42. Mounting the Contact Bar

8.3.5 Grounding the Rack Top Cabinet

1. Connect the ground cable to the left front fixing bolt.

8.3.6 Cabinet Installation Completion

1. For free-standing racks and visible rear sides, mount a cover strip (SXA 123 2025/1) into the space between the cabinets at the rear side.
2. Use four bolts to mount the top cover. Use an M13 or M10 box wrench to tighten the bolts.
3. When the upgrade is completed, notify the MSC that modification of the Data Transcript is required.

9 CRI Hardware Units and Switches

9.1 Setting ETB Switches

Preparations

1. Remove the rack cover or the EMI cover from the CRI magazine.

Unit Removal

2. Use the extractor tool (LTD 117 02) to remove the ETB boards from slots 5 and 6 in the CRI subrack.
3. Check the backplane connector for bent or broken pins.
4. Locate the switches on the ETB boards. See Figure 3-43 on page 3-51 for the location of the switches.

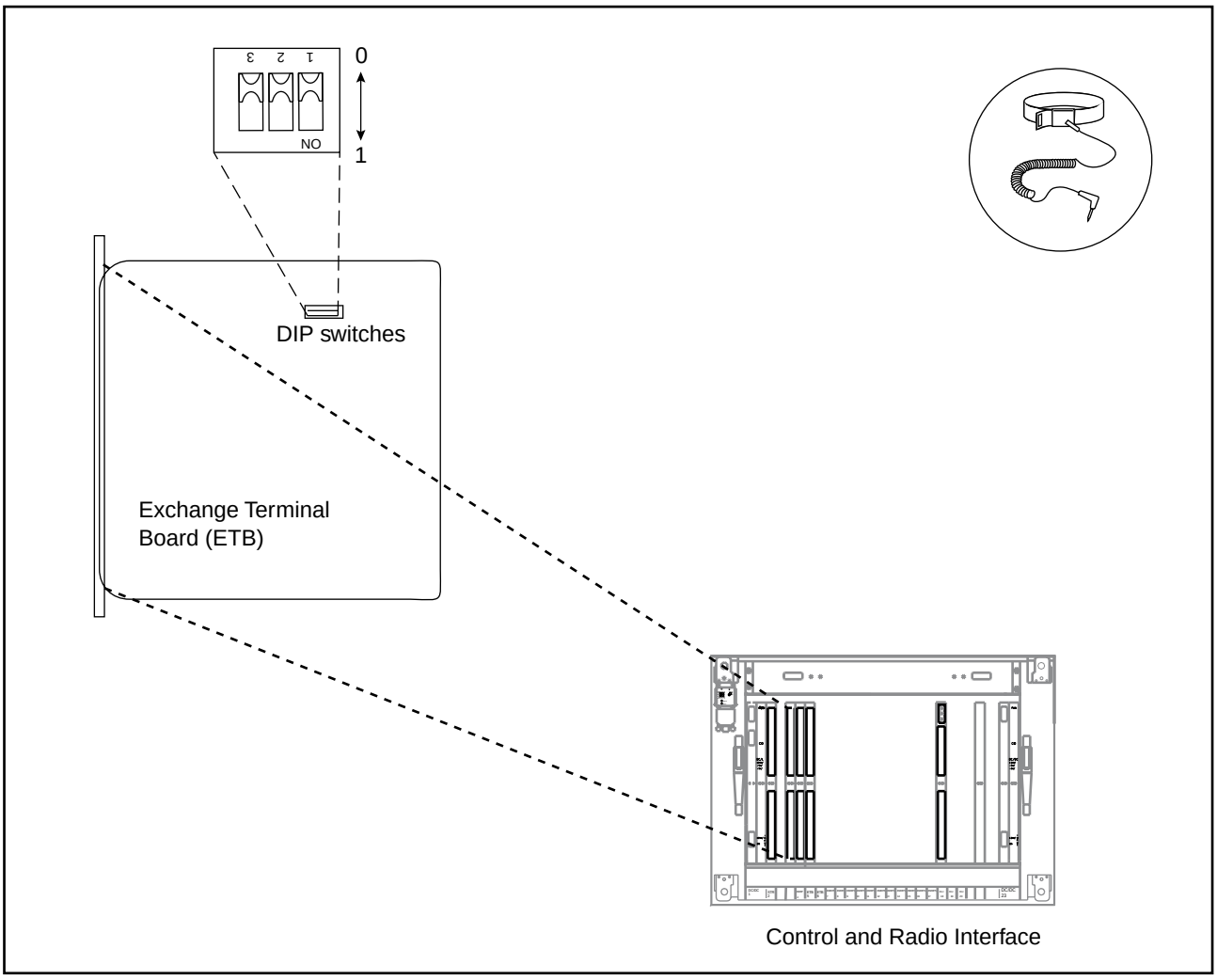


Figure 3-43. Location of ETB Unit DIP Switches

DIP Switch Settings

5. Configure the switches on the ETB unit. Refer to Table 3-2 on page 3-52 or Table 3-3 on page 3-52 for the applicable ETB DIP switch settings.

   Note: Consult the CSU documentation for additional information.

Table 3-2. ETB-24 DIP Switch Settings

Distance (meters) CSU – CRI	ETB-24 DIP Switch Position 1–3
0 – 35	011
25 – 65	101
55 – 95	001
85 – 125	110
115 – 155	010
145 – 185	100
175 – 210	000
Note: The ETB-24 DIP switches indicate the line length in the transmit direction.	

Table 3-3. ETB-32 DIP Switch Settings

ETB-32 DIP Switch Number	
1	2
Receive	Transmit
Switch On = grounded Switch Off = not grounded	
Note: The ETB-32 DIP switches indicate the PCM grounding direction. With twisted-pair conductors, the outer conductor is grounded. With coaxial cable, the screen is grounded.	

6. Reinsert the ETB unit into the designated slot in the CRI magazine.

9.2 Installing ELI Unit and Setting Switches

The RBS 884 Pico (1900 MHz) subrack is shipped with one factory-installed ELI unit. One ELI unit supports one T1/E1 link (three Radio Heads). If extra links are required, additional ELI units (up to a maximum of four) can be installed.

Preparations

1. Verify that additional ELI units, if required, are present at the site.

   Note: Each ELI unit supports up to four Radio Heads.

2. Remove the rack cover or the EMI cover from the CRI magazine.

RTT Unit Removal: Macro CRI

3. When colocating an RBS 884 Pico in an RBS 884 Macro CRI magazine, use the extractor tool (LTD 117 02) to remove the RTT unit, if present, from slot 17, 18, 19, or 20 in the CRI subrack. Store the RTT unit in an ESD bag.

4. Check the backplane connector for bent or broken pins.

ELI Unit Removal: Pico CRI

5. At the top of the CRI magazine, carefully press the plastic retaining catch upwards. Use the extractor tool to remove the ELI unit from the CRI magazine

6. Make sure the ELI unit, rear connector, and the associated back plane connector do not have any bent or broken pins.

7. If additional ELI units are present, remove ELI units (ROF 137 2776/1) from the ESD bags and insert the units into positions 18, 19, and 20 in the CRI cabinet.

ELI Switch Settings

8. Locate the switches on the ELI unit(s). See Figure 3-44 on page 3-54 for the location of the DIP switches.

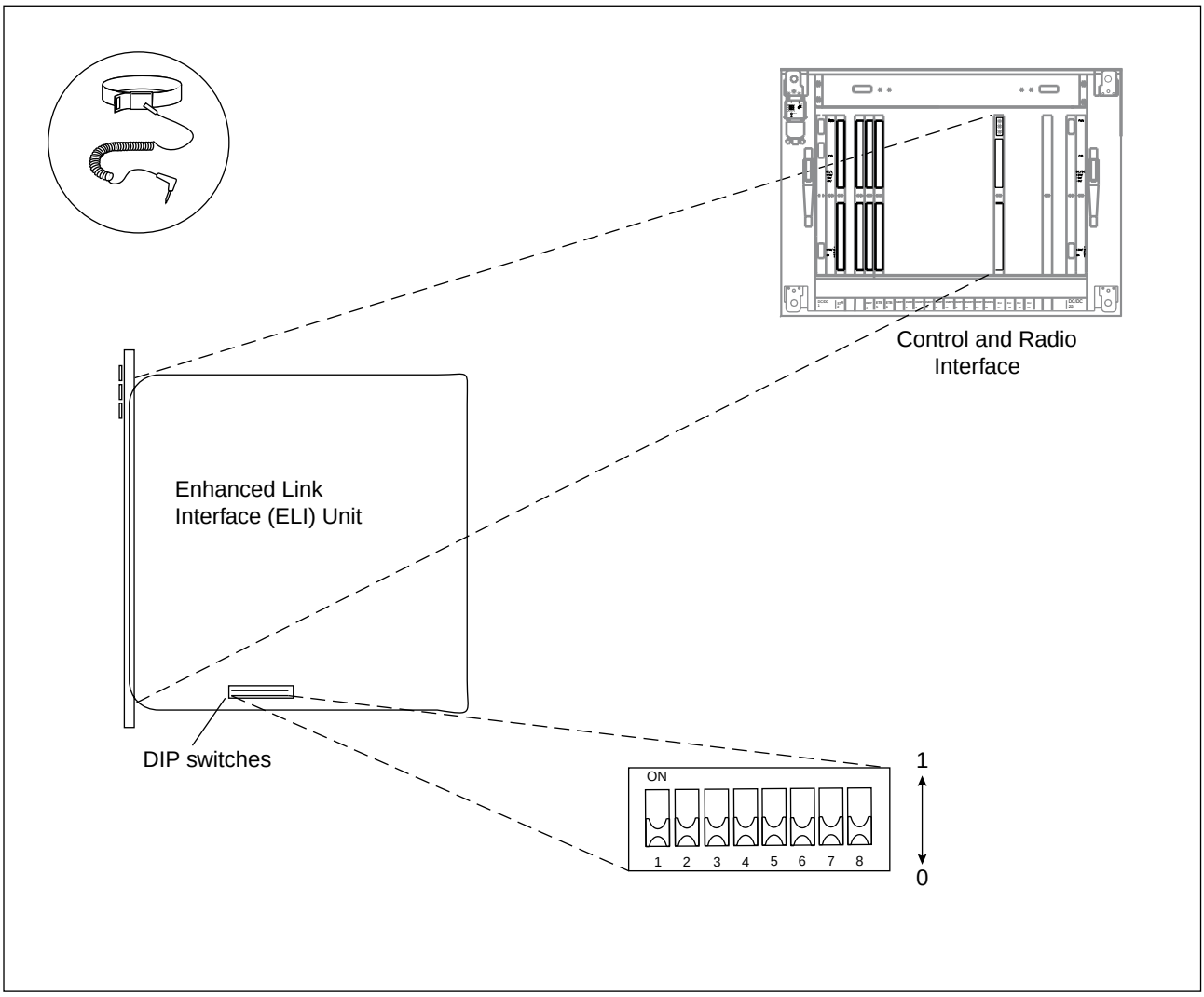


Figure 3-44. ELI Unit and Switch Location

9. Set the ELI DIP switches. If using T1 lines, refer to Table 3-4 on page 3-55 and Table 3-6 on page 3-56. If using E1 lines, refer to Table 3-5 on page 3-56 and Table 3-7 on page 3-57.

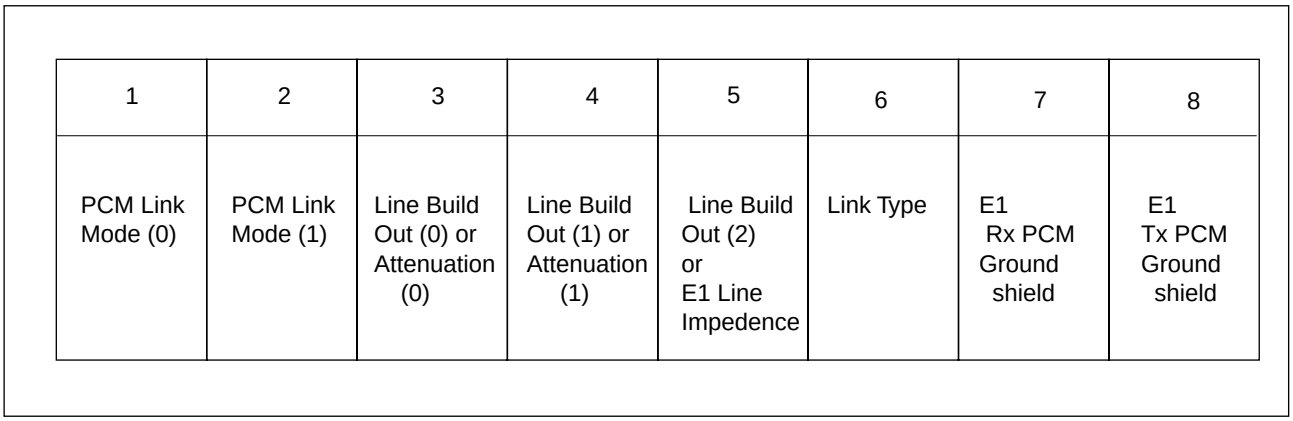


Figure 3-45. Identification of ELI Unit DIP Switches

Table 3-4. DIP Switches T1 Leased

Parameter	DIP Switch Number 1 – 8
PCM T1 Short Haul Distance (meters) CSU – CRI	
0 – 35	000111xx
25 – 65	001011xx
55 – 95	000011xx
85 – 125	001101xx
115 – 155	000101xx
145 – 185	001001xx
175 – 210	000001xx
PCM T1 Long Haul (attenuation) **Note:** Consult the CSU documentation for the attenuation setting.	
0 dB	1000x1xx Recommended
-7.5 dB	1010x1xx
-15 dB	1001x1xx
-22.5 dB	1011x1xx
Note: ON = 1 OFF = 0	

Table 3-5. ELI DIP Switch Settings E1 Leased

Parameter	DIP Switch Number 1 – 8
E1 Short Haul (impedance)	
120-ohm twisted-pair	01xx01xx
75-ohm coaxial	01xx11xx
E1 Long Haul (impedance)	
120-ohm twisted-pair	11xx01xx
75-ohm coaxial	11xx11xx
E1 Short Haul (ground shield)	
Both Rx and Tx shields are grounded (75-ohm coaxial)	01xxx111
Rx shield not grounded and Tx shield grounded (120-ohm twisted-pair)	01xxx101
E1 Long Haul (ground shield)	
Both Rx and Tx shields are grounded	11xxx111
Rx shield not grounded and Tx shield grounded (120-ohm twisted-pair)	11xxx101
Note: ON = 1 OFF = 0	

Table 3-6. ELI DIP Switch Settings for T1 Proprietary or Non-Leased

Parameter	DIP Switch Number 1 – 8
T1 Long Haul (attenuation)	
0 dB	1000x0xx Recommended
-7.5 dB	1010x0xx
-15 dB	10001x0xx
-22.5 dB	1011x0xx
Note: 1 = On 0 = Off	

Table 3-7. ELI DIP Switch Settings for E1 Proprietary or Non-Leased

Parameter	DIP Switch Position 1 – 8
E1 Short Haul (impedance)	
120-ohm twisted-pair	01xx00xx
75-ohm coaxial	01xx10xx
E1 Long Haul (impedance)	
120-ohm twisted-pair	11xx00xx
75-ohm coaxial	11xx10xx
E1 Short Haul (ground shield)	
Both Rx and Tx shields are grounded	01xx0011
Rx shield not grounded and Tx shield grounded (120-ohm twisted-pair)	01xx0001
E1 Long Haul (ground shield)	
Both Rx and Tx shields are grounded	11xx0011
Rx shield not grounded and Tx shield grounded (120-ohm twisted-pair)	11xx0001
Note: 1 = On 0 = Off	

10. Insert the ELI units in the CRI magazine (slots 17, 18, 19, and 20).

9.3 Installing EMRPS Units and Address Plugs

The RBS 884 Pico (1900 MHz) subrack is partially equipped at the factory. The EMRPS units are installed by the customer as described in the following procedure.

Preparations

1. Verify the quantity of EMRPS units. One EMRPS unit for each Radio Head should be included.

   Note: If the number of Radio Heads is not known, consult the next level of maintenance support or the site engineer.

2. Remove the rack cover or the EMI cover from the CRI magazine. Refer to Figure 3-46 on page 3-58 for a view of the partially-equipped subrack.

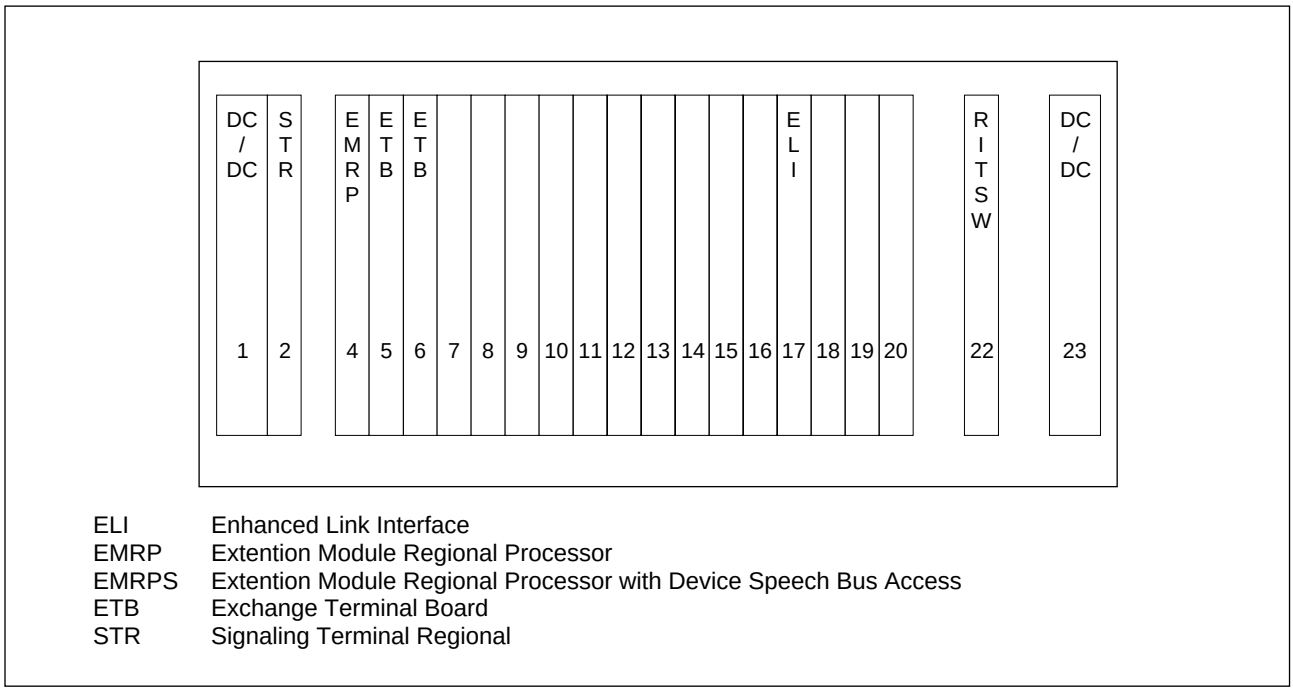
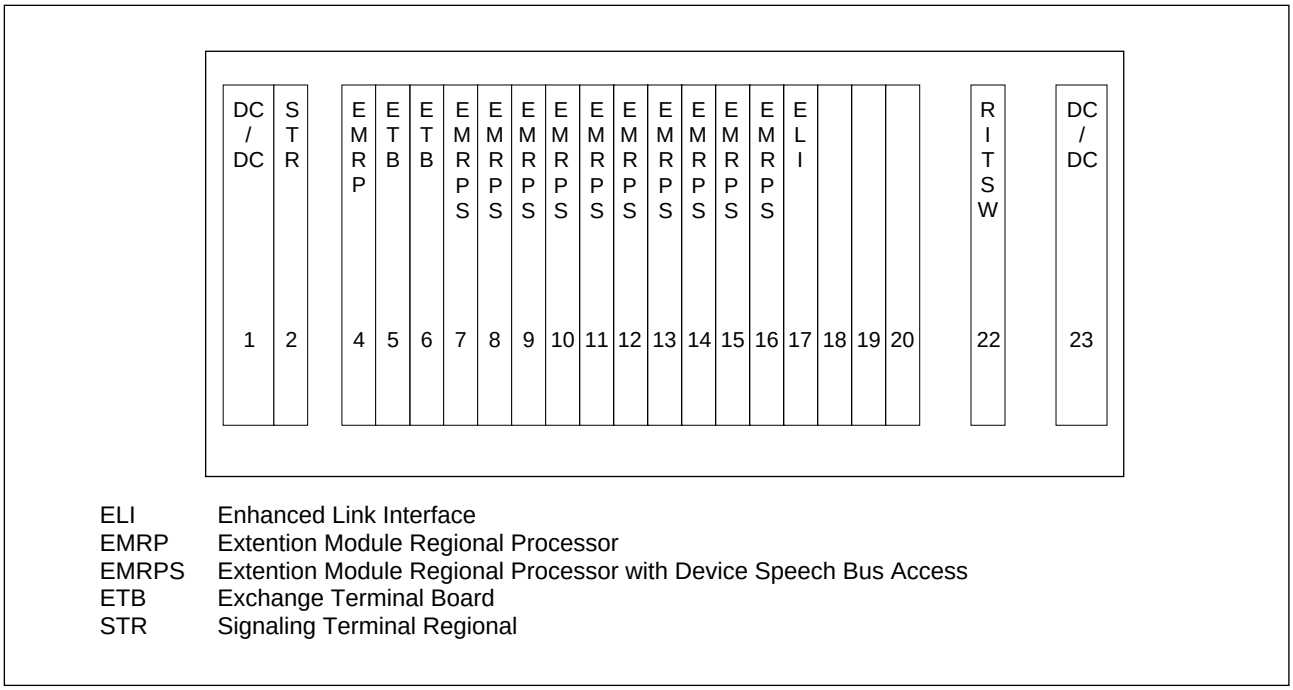


Figure 3-46. RBS 884 Pico (1900 MHz)CRI (as delivered)

Install EMRPS Unit(s)

3. Remove the EMRPS unit (ROF 131 8217/3) from its ESD bag and insert it into the proper slot in the CRI magazine. Refer to Figure 3-47 on page 3-59 for the location of the EMRPS slots in the Pico CRI subrack.



ELI	Enhanced Link Interface
EMRP	Extention Module Regional Processor
EMRPS	Extention Module Regional Processor with Device Speech Bus Access
ETB	Exchange Terminal Board
STR	Signaling Terminal Regional

Figure 3-47. Pico CRI EMRPS Positions

4. If colocating an RBS 884 Pico in an RBS 884 Macro CRI magazine, install additional EMRPS units as required. One EMRPS unit supports one Radio Head. Refer to Figure 3-48 on page 3-60 for the location of the EMRPS slots in the Macro CRI subrack.

   Note: If the number of Radio Heads to be supported by the CRI is not known, consult the next level of maintenance support or the site engineer.

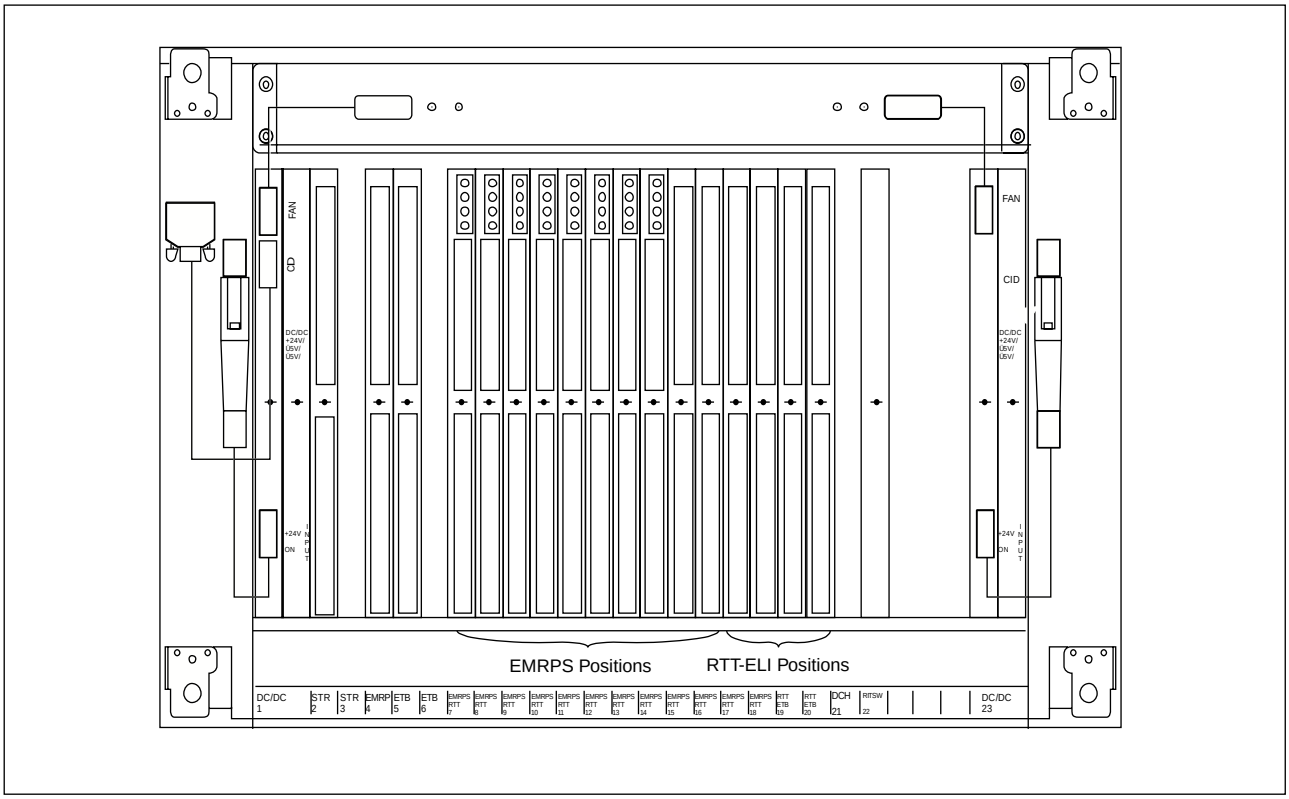


Figure 3-48. Macro CRI EMRPS Positions

5. Repeat Step 3 on page 3-58 until all EMRPS units are installed.

   Note: The number of EMRPS units is determined by the number of Radio Heads. One EMRPS unit supports one Radio Head.

6. Insert the correct EMRP address plug into the EMRPS unit(s) in numerical order. Refer to Figure 3-49 on page 3-61 for the location of the EMRP plugs.

   Note: Eleven EMRP Address Plugs (RNV 991 03/02-12) are provided with each EMRPS Kit. Store the extra address plugs with the radio equipment spare parts.

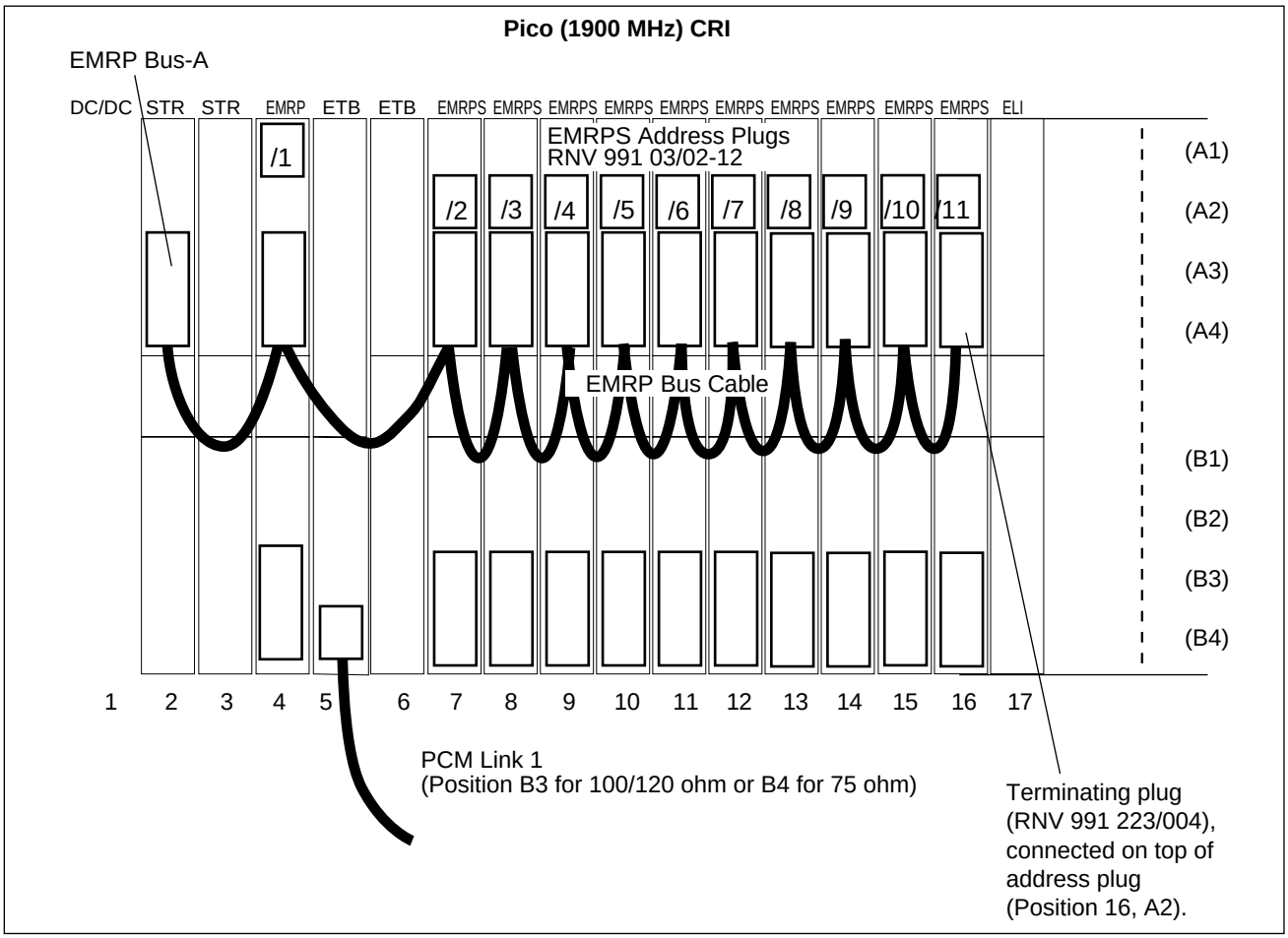


Figure 3-49. ELI Unit, Plugs, and Cables in CRI Cabinet

7. Remove the terminating plug (RNV 991 223/004) from the EMRP unit (position 4).

8. Insert the terminating plug (RNV 991 223/004) into the address plug connector on the right-most EMRPS unit.

Install EMRPS Cables

9. Locate the EMRPS cable labels and attach the labels as indicated in Table 3-8 on page 3-62.

Table 3-8. EMRPS Bus Cable Labels

Label	Origination Address	Destination Address
EMRP 4A * 3F EMRPS 7A * 3F	EMRP	EMRPS1
EMRPS 7A * 3F EMRPS 8A * 3F	EMRPS1	EMRPS2
EMRPS 8A * 3F EMRPS 9A * 3F	EMRPS2	EMRPS3
EMRPS 9A * 3F EMRPS 10A * 3F	EMRPS3	EMRPS4
EMRPS 10A * 3F EMRPS 11A * 3F	EMRPS4	EMRPS5
EMRPS 11A * 3F EMRPS 12A * 3F	EMRPS5	EMRPS6
EMRPS 12A * 3F EMRPS 13A * 3F	EMRPS6	EMRPS7
EMRPS 13A * 3F EMRPS 14A * 3F	EMRPS7	EMRPS8
EMRPS 14A * 3F EMRPS 15A * 3F	EMRPS8	EMRPS9
EMRPS 15A * 3F EMRPS 16A * 3F	EMRPS9	EMRPS10
Terminator 16A * 3F	Not Applicable	EMRPS10

10. Use the information on the cable labels to link the EMRP cables (TSR 204 0201/300) to the referenced EMRPS units.

10 Equipment Cabling and Start-up

Warning!

Configure and cable the Radio Head(s) prior to starting these procedures. Refer to Part 4, “Radio Head Installation.”

10.1 Cabling the CRI Hardware

10.1.1 Installing the ETB-ELI Sync Cable

Preparations

1. Locate the ETB-ELI sync cable.

   Note: The ETB-ELI sync cable is required for non-leased or proprietary connections. The sync cable is not required for T1/E1 leased connections, although its presence does not interfere with leased connections.

ETB-ELI Sync Cable

2. Connect the quarter-plug connectors on the ETB-ELI sync cable (RPM 113 7673) to ELI unit, positions 17–21, B4. Refer to Figure 3-50 on page 3-64 for an example of the sync cable connections.

   Note: The order in which the quarter-plugs are connected does not affect the performance of the base station. However, it is important to connect the first ELI quarter-plug connector to one of the ELI units.

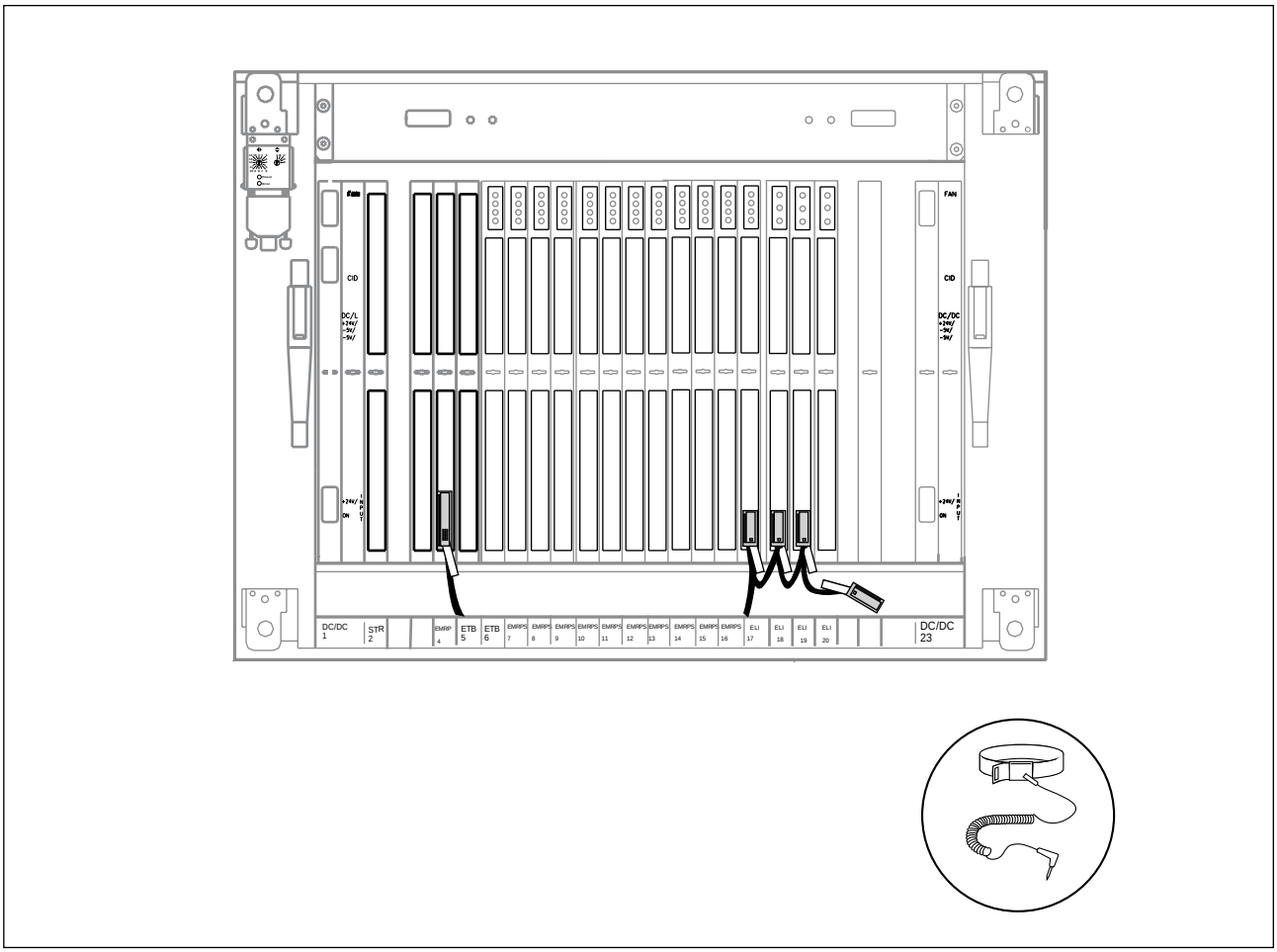


Figure 3-50. Connecting the ETB-ELI Sync Cable to Three ELI Units

10.1.2 Leased T1/E1 Installation (Twisted-Pair Cable)

The following section provides installation information for network or leased lines using T1/E1 100/120-ohm twisted pair cable.

For installation convenience, the CRI to Radio Head cabling information is also included in *Part 3, RBS 884 Pico (1900 MHz) CRI Installation.*

Preparations

1. Ensure that the Radio Heads are properly installed and tested prior to starting this installation procedure.

   Note: The first or primary Radio Head in each link or link group must be installed and connected to the PSTN. Additional Radio Heads are installed after the initial communication is established between the CRI and the primary Radio Heads.

2. Determine the number of Radio Head link groups (usually determined by the number of T1/E1 links). Refer to Figure 3-51 on page 3-66 and Figure 3-52 on page 3-67 for configuration examples.

   Note: If the number of Radio Heads or Radio Head link groups to be connected to the CRI is not known, consult the next level of maintenance support or the site engineer.

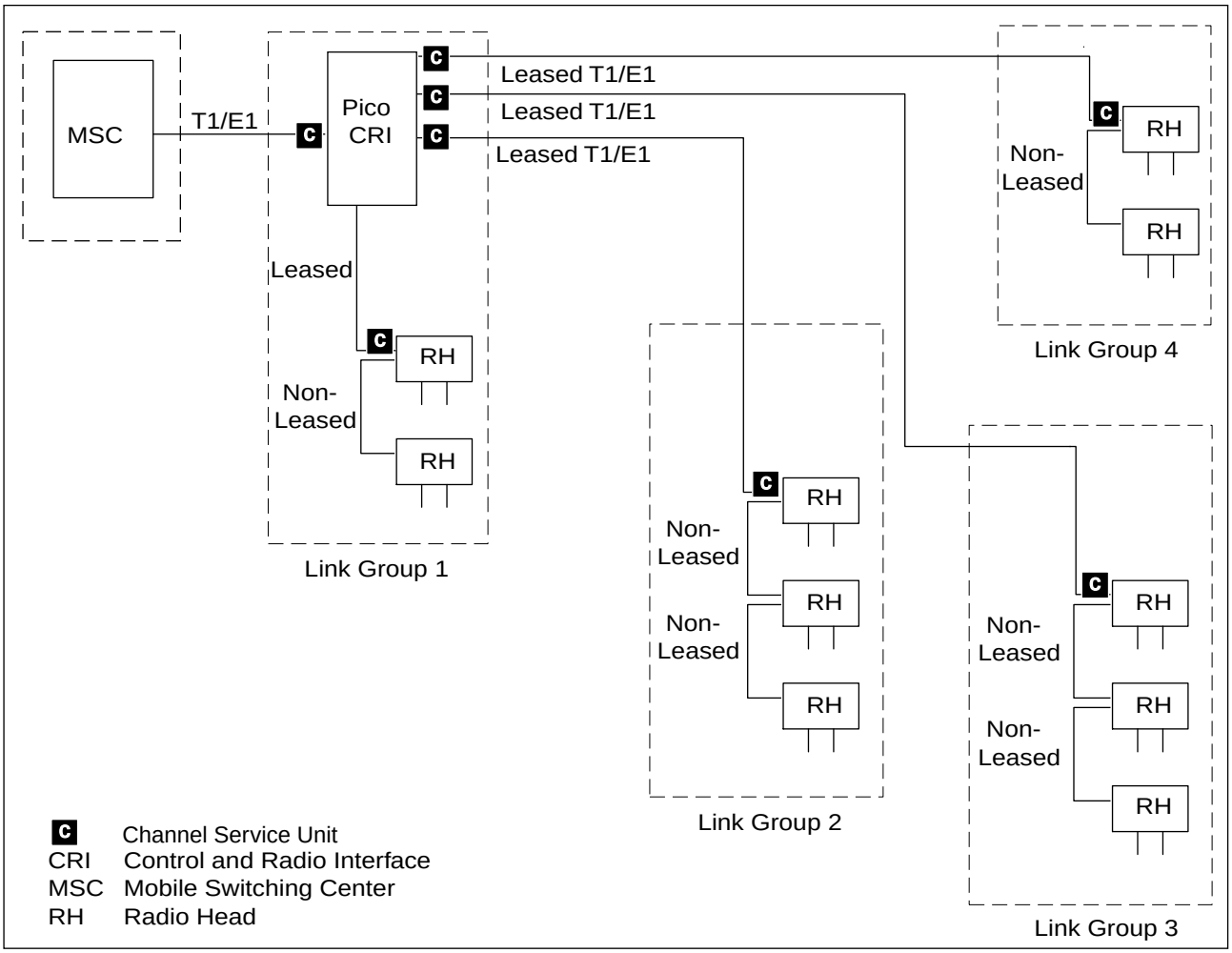


Figure 3-51. RBS 884 Pico (1900 MHz) Configuration Example 1 (Leased Lines)

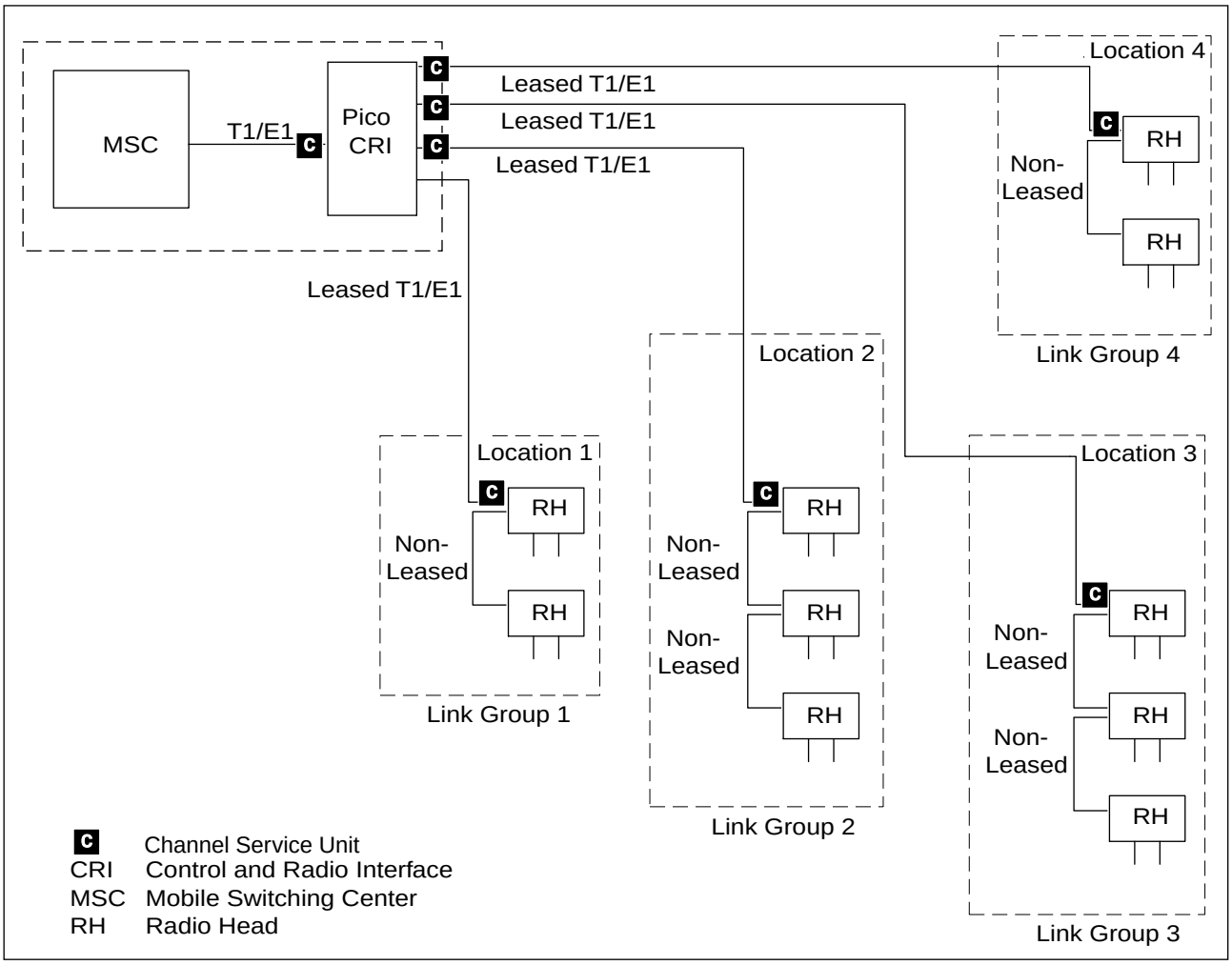


Figure 3-52. RBS 884 Pico (1900 MHz) Configuration Example 2 (Leased Lines)

3. Ensure that the following cables and equipment are available:
   - T1 100-ohm twisted-pair cable with connectors
   - E1 120-ohm twisted-pair cable with connectors
   - Wire/cable strippers and cutters
   - Crimping tool

Radio Head to CRI Cabling

4.

DANGER!

Do not install T1/E1 PCM cable close to fluorescent light fixtures, transformers, or electric motors. For cabling practices, see "Commercial Building Standard for Telecommunications Pathways and Spaces, EIA/TIA-569."

If the CRI is remote and the line to the CRI is leased, install a Channel Service Unit (CSU) and route a T1/E1 PCM cable from the CSU to the first Radio Head (Radio Head 1). If the CRI is local and the line to the CRI is proprietary or non-leased, route the cable directly from the local CRI to Radio Head 1. Refer to Table 4-8 on page 4-35 for the technical specifications for the PCM connections. See Figure 3-53 on page 3-69 and Figure 3-56 on page 3-74.

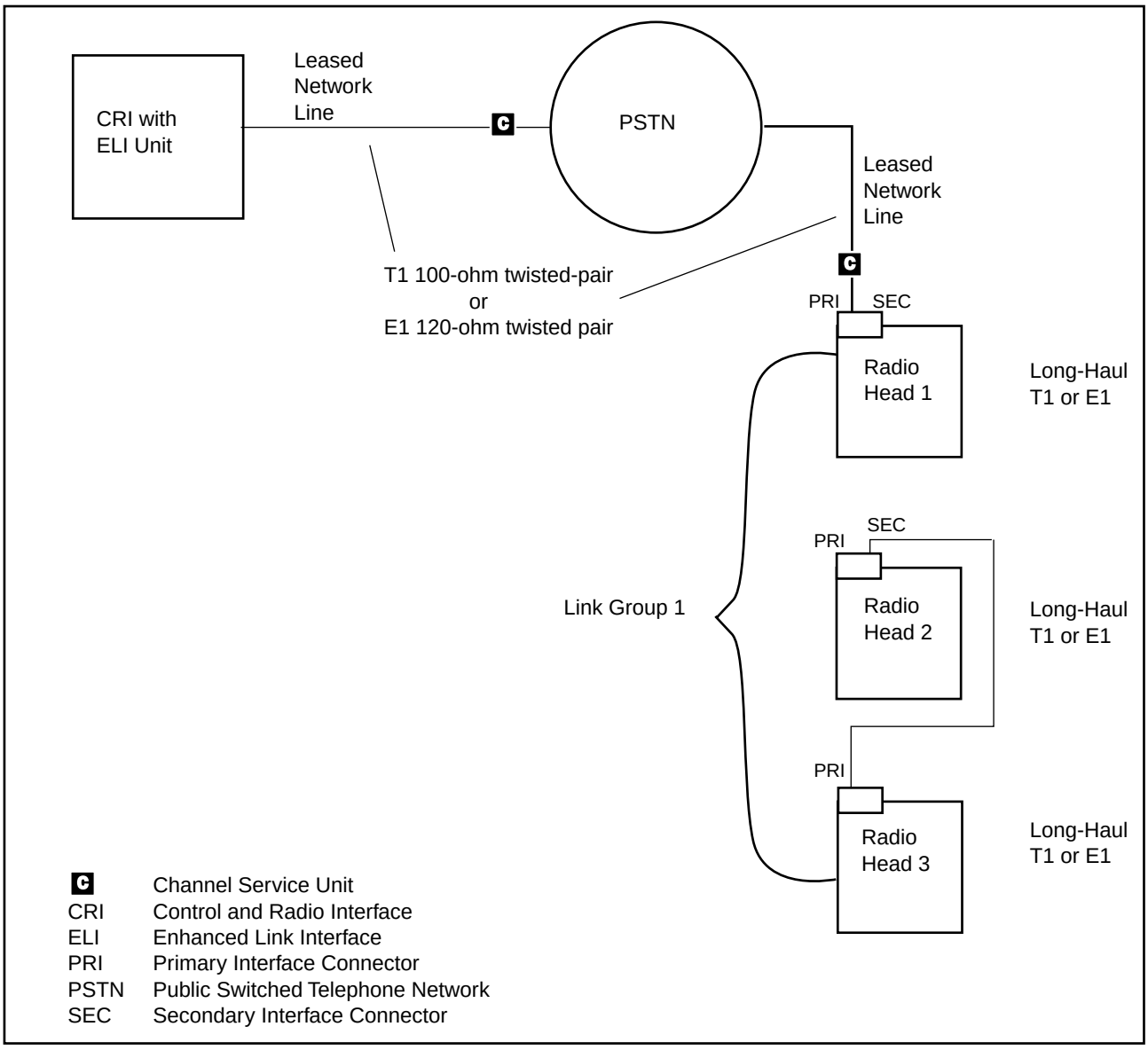


Figure 3-53. T1/E1 PCM Cabling to Radio Heads

Table 3-9. PCM Connection Specifications

Type of Connection	Specifications
Proprietary non-leased line	800 to 1000 m with a maximum attenuation of 30 dB
T1/E1	Receiver sensitivity: -105 dBm (3% BER with diversity) Clock: Stratum 2 or better

5. Follow good lab practices in labeling all cables.

6. Attach an RJ-45 connector to the T1/E1 PCM cable. Refer to Figure 3-54 on page 3-70 and Table 4-9 on page 4-36 for pinout information.

   Note: Pin 1 is on the extreme left of the connector cable opening, looking into the back of an RJ-45 connector with the latch down.

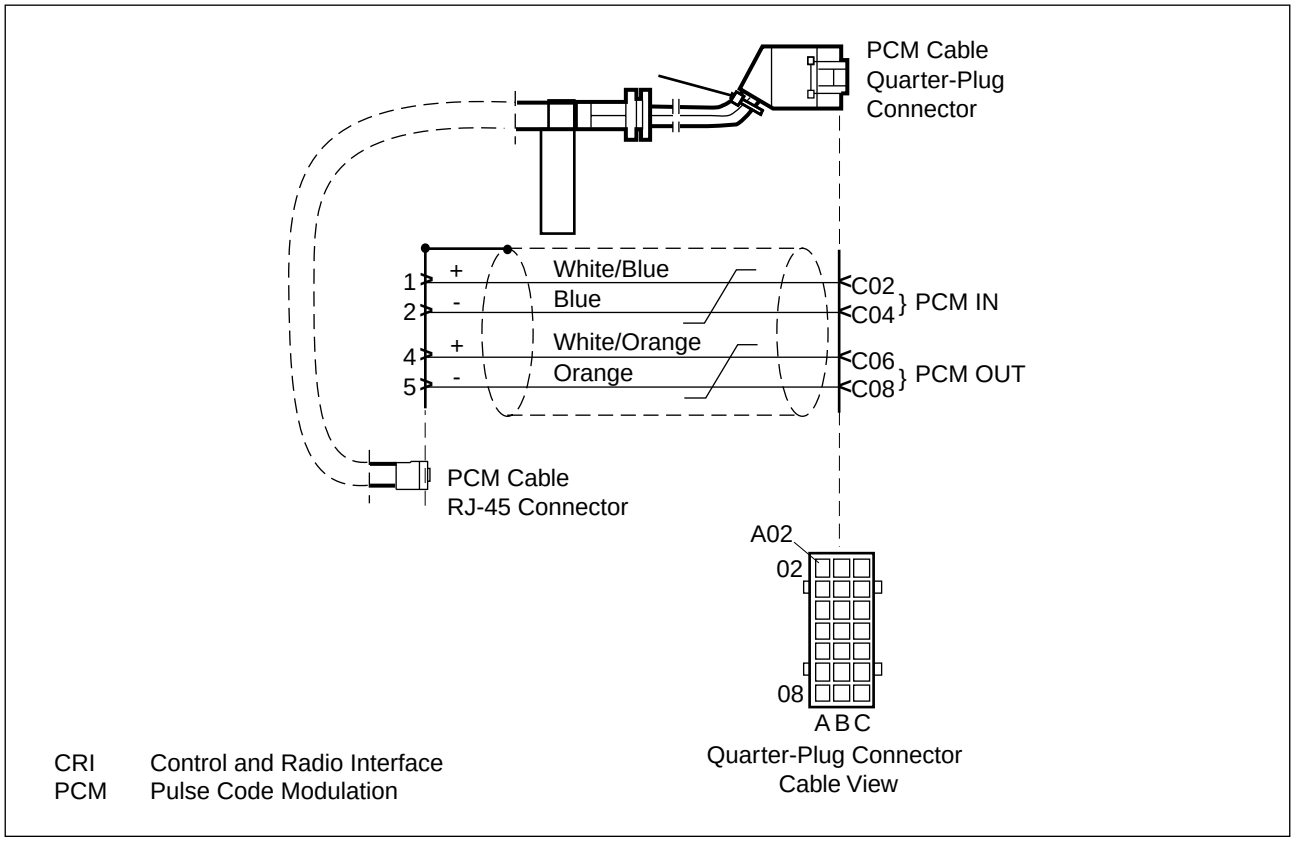


Figure 3-54. PCM Connector (100/120-ohm) Pinouts

Table 3-10. Pinouts for 100/120-ohm Twisted Pair Cable

Transmission	Recommended Wire Color	RJ-45 Pin Number	Quarter Pin Number
PCM In	White-blue	1	C02
	Blue-white	2	C04
PCM Out	White-orange	4	C06
	Orange-white	5	C08

7. If using the CRI patch panel, route the PCM (CRI-RH) cable to the back of the patch panel (see Figure 3-55 on page 3-71).

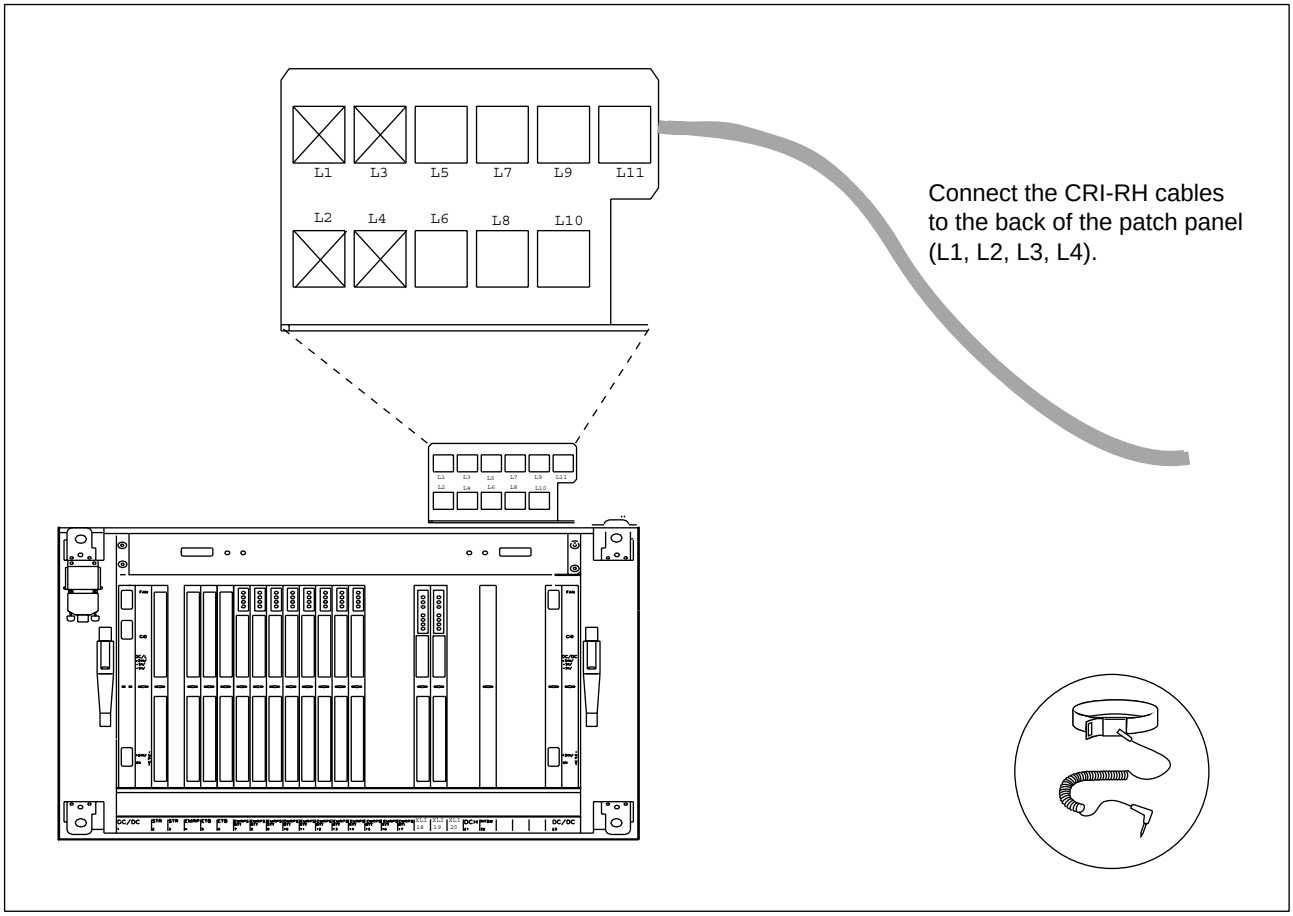


Figure 3-55. Connecting the CRI-RH Cable to the Patch Panel

8. Route a short PCM cable from the front of the patch panel to the front of the ELI unit and attach appropriate connectors. Refer to Figure 3-54 on page 3-70 and Table 4-9 on page 4-36 for pinout information. Refer to Figure 3-56 on page 3-74 for the ELI port locations.

9. If bypassing the patch panel, attach a quarter-plug connector to the T1/E1 PCM cable and plug the cable into the connector port (position B1, B2 or B3) on the front of the ELI unit. Refer to Figure 3-54 on page 3-70 and Table 4-9 on page 4-36 for pinout information. Refer to Figure 3-56 on page 3-74 for the ELI port locations.

PSTN to ETB Cabling

10. Loosen the screws on the forked tray below the CRI subrack.

11.

Warning!

The ETB cable must be grounded at each screen to make sure that the ETB cable is grounded.

Refer to Figure 3-54 on page 3-70 for pinout information and route the PCM (ETB)cable from the incoming network CSU to the ETB, position B3.

12. If a second ETB cable is to be connected, connect it to position B3 in the second ETB (unit position number 6).

10.1.3 Leased E1 Installation (Coaxial Cable)

The following section provides installation information for network or leased lines using E1 75-ohm coaxial cable.

Preparations

1. Ensure that the Radio Heads are properly installed and tested prior to starting this installation procedure.

   Note: The first or primary Radio Head in each link or link group must be installed and connected to the PSTN. Additional Radio Heads are installed after the initial communication is established between the CRI and the primary Radio Heads.

2. Determine the number of Radio Head link groups (usually determined by the number of E1 links). Refer to Figure 3-51 on page 3-66 and Figure 3-52 on page 3-67 for configuration examples.

   Note: If the number of Radio Heads or Radio Head link groups to be connected to the CRI is not known, consult the next level of maintenance support or the site engineer.

3. Ensure that the following equipment is available:

   - E1 75-ohm coaxial cable with British Naval Connector (BNC) fittings
   - Wire/cable strippers and cutters
   - Crimping tool

Radio Head to CRI Cabling

4.

DANGER!

Do not install T1/E1 PCM cable close to fluorescent light fixtures, transformers, or electric motors. For cabling practices, see "Commercial Building Standard for Telecommunications Pathways and Spaces, EIA/TIA-569."

Route the E1 (75-ohm coaxial) leased line to the CRI, allowing extra cable for the CSU and the connectors.

Note: The use of PSTN leased lines requires a CSU to receive or transmit signals to and from the PSTN. Install a CSU between the CRI and the E1 network.

5. Install the CSU using the documentation supplied with the CSU.

6. Connect the 75-ohm coaxial cable from the CSU to the patch panel or directly to the ELI unit positions 17–21, B3. See Figure 3-56 on page 3-74.

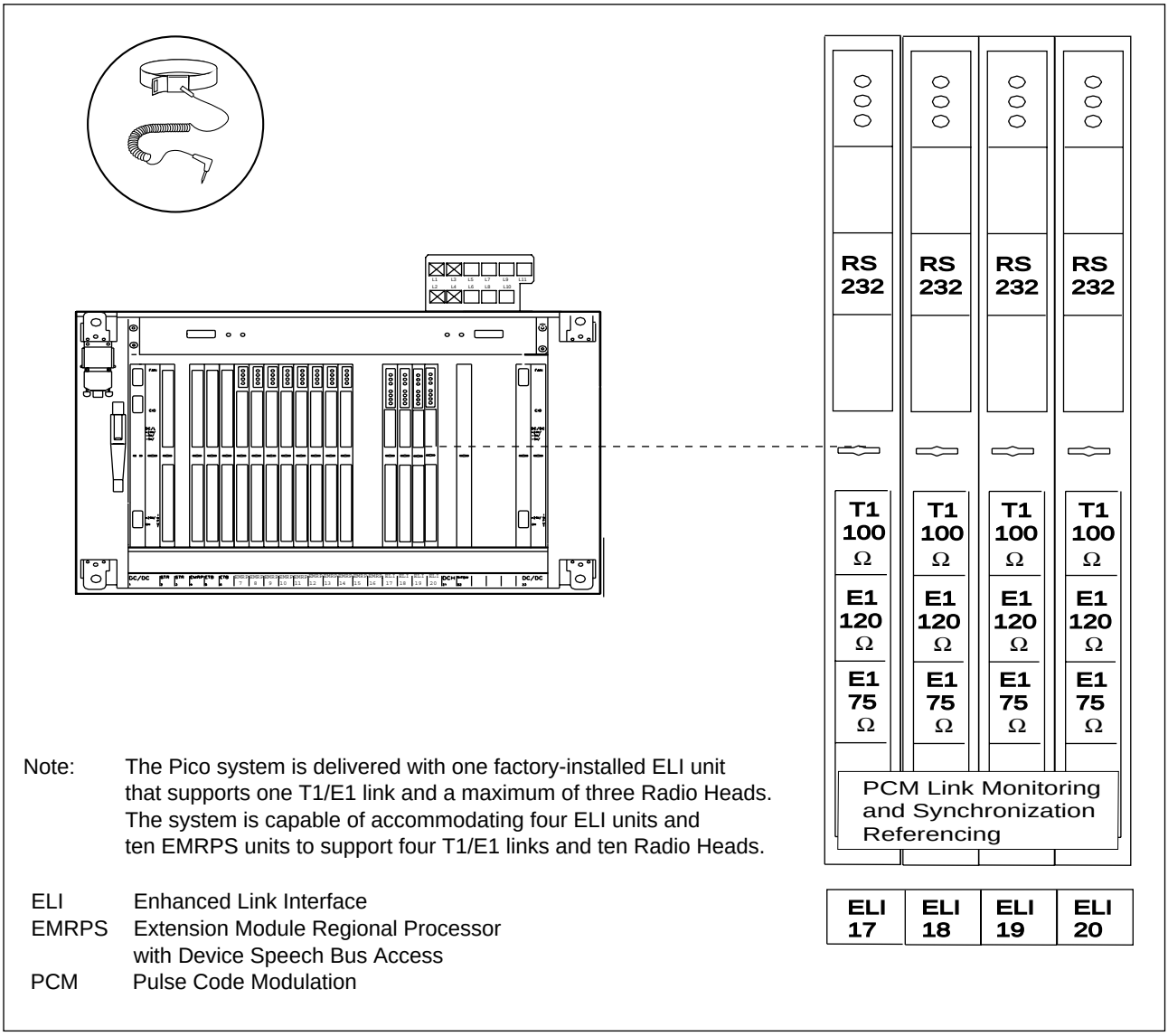


Figure 3-56. ELI Unit and Connector Positions

7. If using a patch panel, route a short PCM cable from the front of the patch panel to the front of the ELI unit and attach appropriate connectors. Refer to Figure 3-54 on page 3-70 and Table 4-9 on page 4-36 for pinout information. Refer to Figure 3-56 on page 3-74 for the port location on the ELI unit.

PSTN to ETB

8. Loosen the screws on the forked tray below the CRI subrack.

9.

Warning!

The ETB cable must be grounded at each screen to make sure that the ETB cable is grounded.

Install the ETB cable from the incoming E1 network to position B4 on the ETB unit. Refer to Table 3-11 on page 3-75 for the cable and pinout information.

Table 3-11. ETB (PCM) Cable for E1 75-ohm Coax Cable

Transmission	Quarter Plug Pin No.
RX (PCM IN)	B03
Shield	C02, C04, A04
RX (PCM OUT)	B07
Shield	C06, C08, A06

10. Attach the ETB (PCM) cable on top of the ETB-ELI sync cable.

    Note: The ETB-ELI sync cable is required for non-leased or proprietary connections. The sync cable is not required for T1/E1 leased connections, although its presence does not interfere with leased connections.

11. If a second ETB cable is to be connected, connect it to position B4 in the second ETB (unit position number 6).

10.1.4 Non-Leased PCM Installation

The following section provides cable installation information for proprietary or non-leased lines.

Preparations

1. Ensure that all Radio Heads are properly installed prior to starting this installation procedure.

   Note: For installation convenience, the CRI to Radio Head cabling information is also included in *Part 3, RBS 884 Pico (1900 MHz) CRI Installation*.

2. Determine the number of Radio Head link groups. Refer to Figure 3-57 on page 3-76 for a configuration example.

   Note: If the number of Radio Heads or Radio Head link groups to be connected to the CRI is not known, consult the next level of maintenance support or the site engineer.

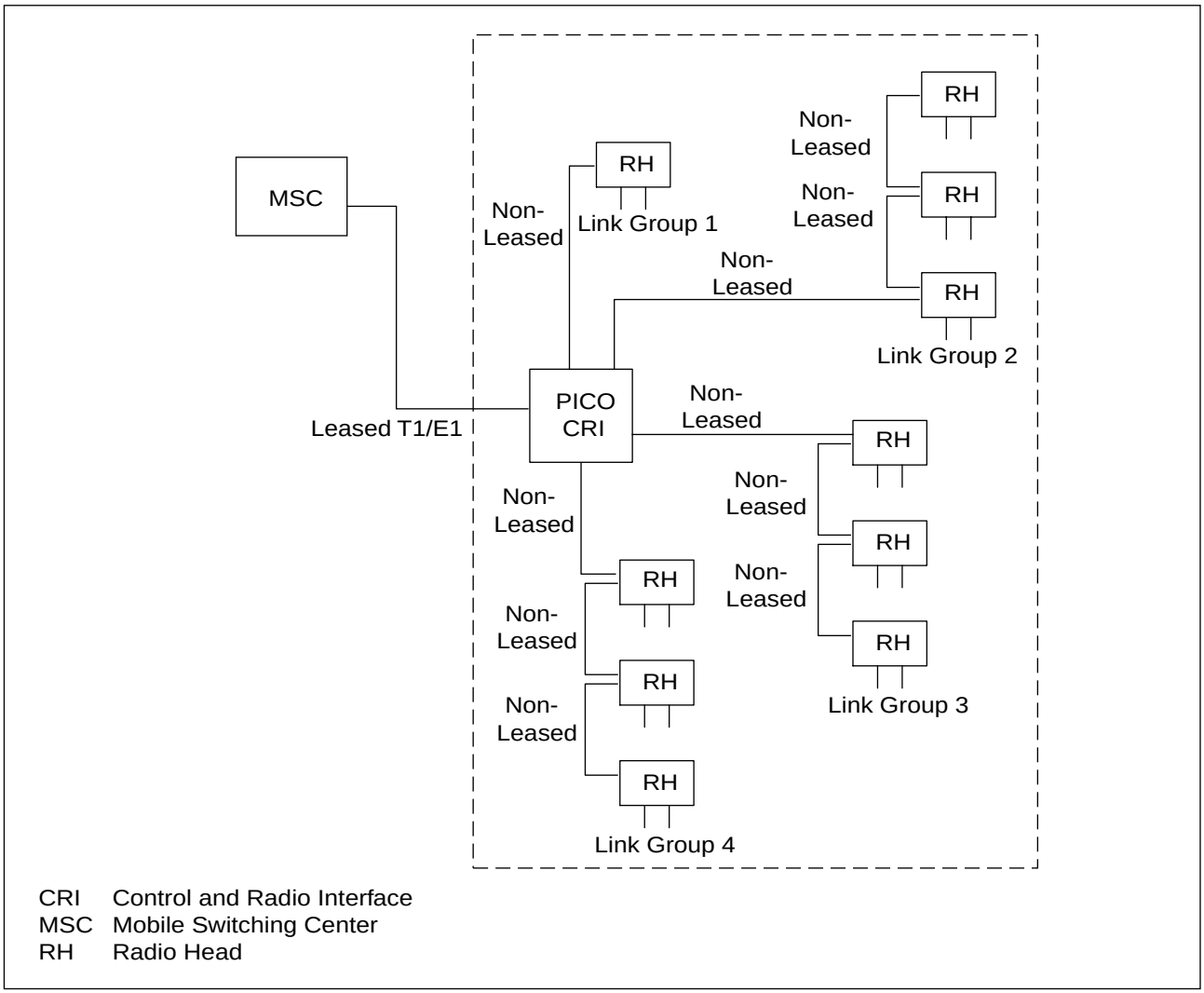


Figure 3-57. RBS 884 Pico (1900 MHz) with Proprietary Configuration Options

CRI to Radio Head

3.

DANGER!

Do not install T1/E1 PCM cable close to fluorescent light fixtures, transformers, or electric motors. For cabling practices, see "Commercial Building Standard for Telecommunications Pathways and Spaces, EIA/TIA-569."

Run a proprietary (non-leased) T1/E1 PCM cable from the ELI unit (position 17) in the CRI or from the patch panel to the first Radio Head. The first Radio Head refers to the Radio Head closest to the CRI. The allowable cable length is 800 to 1000 m with a maximum attenuation of 30 dB.

4. Attach an RJ-45 connector to the Radio Head end of the cable and a quarter-plug connector (for ELI) or RJ-45 connector (for patch panel) to the CRI end. Refer to Figure 3-54 on page 3-70.

   Note: Pin 1 is on the extreme left of the connector cable opening, looking into the back of an RJ-45 connector with the latch down.

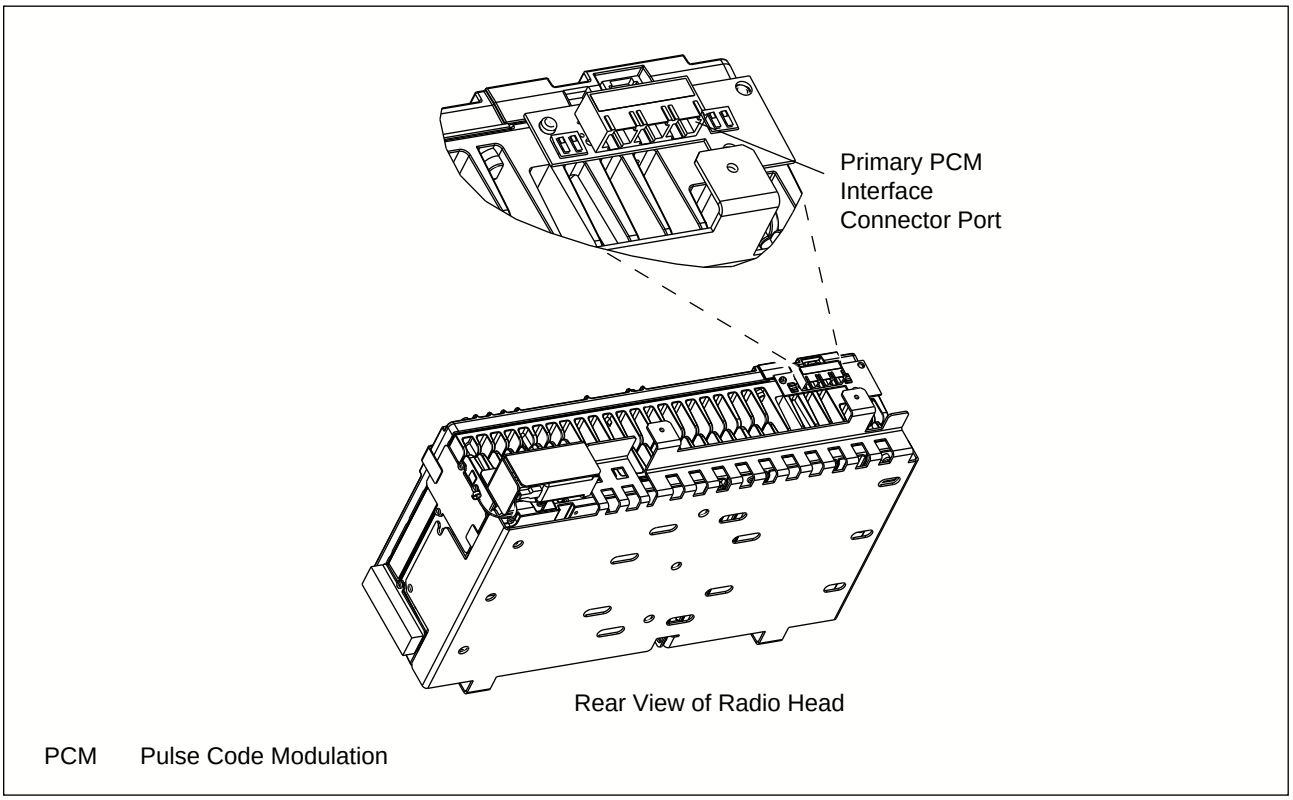


Figure 3-58. Location of Radio Head PCM Interface Connector Ports

5. Connect one end of the cable to the Primary (PRI) PCM interface connector on the top of the first Radio Head in Link Group 1 (see Figure 3-58 on page 3-78 and Figure 3-57 on page 3-76).

6. Run the other end of the cable to the CRI patch panel or directly to the ELI unit position 17, B1/B2.

7. If a second PCM cable is to connected, connect one end of the cable to the Primary (PRI) PCM interface connector on the top of the first Radio Head in Link Group 2 (see Figure 3-58 on page 3-78 and Figure 3-57 on page 3-76) and the other end to the to the second ELI unit position 18, B1/B2, or to the CRI patch panel.

8. If a third PCM cable is to be connected, connect one end of the cable to the Primary (PRI) PCM interface connector on the top of the first Radio Head in Link Group 3 (see Figure 3-58 on page 3-78 and Figure 3-57 on page 3-76) and the other end to the to the second ELI unit position 19, B1/B2, or to the CRI patch panel.

9. If a fourth PCM cable is to be connected, connect one end of the cable to the Primary (PRI) PCM interface connector on the top of the first Radio Head in Link Group 4 (see Figure 3-57 on page 3-76 and Figure

3-58 on page 3-78) and the other end to the second ELI unit position 20, B1/B2, or to the CRI patch panel.

10. If the patch panel is used, route a short PCM cable from the front of the patch panel to the front of the ELI unit and attach appropriate connectors. Refer to Figure 3-54 on page 3-70 and Table 4-9 on page 4-36 for pinout information. Refer to Figure 3-56 on page 3-74 for the ELI port locations.

    Note: If the patch panel positions are not known, consult the next level of maintenance support or the site engineer. Software and hardware assignments are described in *Part 4, Integration and Test.*

Network to CRI Cable

11. Ensure that the following tools and materials are available prior to starting this installation procedure:

    - T1/E1 Cable (see Section 7.2 on page 3-13)
    - Flat-blade screwdriver

12. Loosen the screws on the forked tray below the CRI subrack.

13.

    Warning!

    The ETB (PCM) cable must be grounded at each screen to assure that the ETB cable is grounded.

    Install the ETB cable. Connect to B3 (T1, 100-ohm), B3 (E1, 120-ohm), or B4 (E1, 75-ohm). The ETB (PCM) cable is installed on top of the sync cable. Refer to Figure 3-59 on page 3-80 and Table 3-12 on page 3-80 for pinout information.

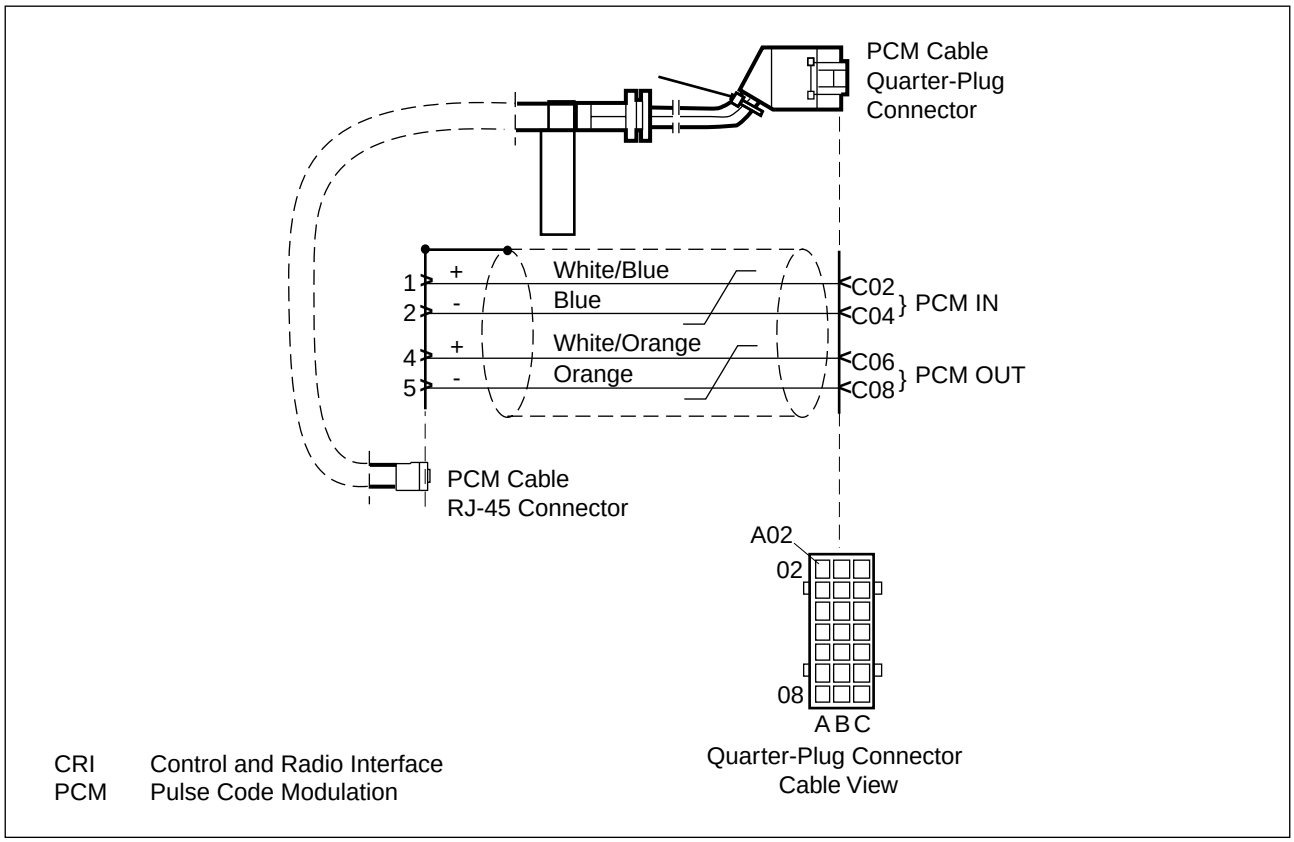


Figure 3-59. Pinout Connections for 100/120-ohm Screened, Twisted pair Cable

Table 3-12. ETB (PCM) Cable for E1 75-ohm Coax Cable

Transmission	Quarter-Plug Pin No.
RX (PCM IN)	B03
Shield	C02, C04, A04
TX (PCM OUT)	B07
Shield	C06, C08, A06

14. If a second ETB cable is to be connected, connect it to position B3 (100/120-ohm) or B4 (75-ohm) in the second ETB (unit position number 6).

10.2 Defining Data Translations

1. Define data translations for the EMRPS units, assign software, and define equipment. See *Part 5, Integration and Test.*

2. Create semi-permanent connections from the EMRPS units to the ELI unit(s) for the control links.

3. Create semi-permanent connections from the ETB unit(s) to the ELI unit(s) for the voice paths.

10.3 Equipment Start-up

Warning!

Applying power to the RBS improperly or in the wrong sequence can damage equipment! Follow the procedures in this document to ensure that the system is properly powered up.

Prerequisites

1. Ensure that the following activities have been completed prior to power up of the RBS 884 Pico (1900 MHz):
   - CRI cabinet installed and grounded
   - All cables terminated
   - All Radio Heads installed
   - If used, patch antennas installed
   - If used, external antennas installed

Apply Power

2. Connect the AC power cable to the AC outlet.
3. Turn the DC/DC converter units to the ON position. See Figure 3-60 on page 3-82 for the location of the DC converter units.

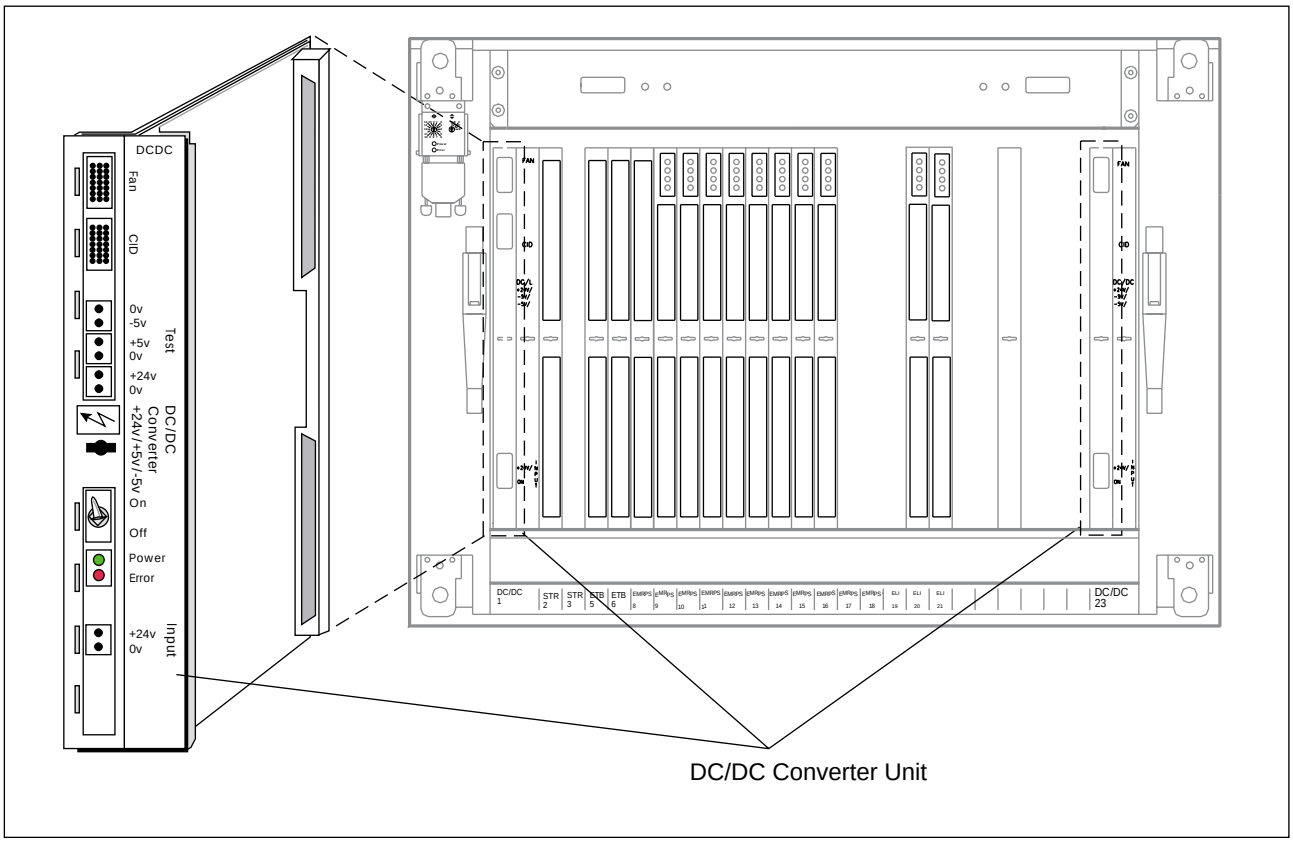


Figure 3-60. DC/DC Converter Units

Notify the MSC

4. Notify the MSC operator that the CRI and Radio Head have been installed. Software must be loaded at the MSC before the self-test is performed.

Check LEDs

5. Verify that all LEDs light briefly during the self-test. If the CRI Error LED remains ON steady red, refer to *Part 6, Troubleshooting*, for a description of the LEDs and recommended troubleshooting solutions.

6. Check the TRX LEDs on the Radio Head. The TRX LEDs are located immediately above the user interface display.

7. Check the Power/Fault LED on the lower-left corner of the Radio Head.

Check the Radio Heads

8. Wait 30 minutes to allow the PLL software in the Radio Heads to lock.

   Note: Note: Under normal circumstances the PLL will lock in less than 30 minutes. In some cases (with wander frequencies of 0.03 Hz or less) the PLL will lock in less than 30 minutes but the display will take more than 30 minutes to indicate lock. In extremely rare cases (with wander of 0.001 Hz at 138 UI) the PLL may take more than 30 minutes to lock.

9. Check the Radio Head user interface display for alarms. If no alarms are present, `OK` appears on the display. Refer to *Part 7, Troubleshooting*, for further information about troubleshooting Radio Head connection problems.

10. If using CSUs, consult the CSU customer documentation to troubleshoot connection problems.

11. Check the TRX LEDs. Refer to Figure 3-61 on page 3-84 for the location of the TRX LEDs. The TRX LEDs should be steady yellow, indicating that the TRXs are deblocked and not carrying traffic. Refer to *Part 7, Troubleshooting*, for further information about troubleshooting TRX problems.

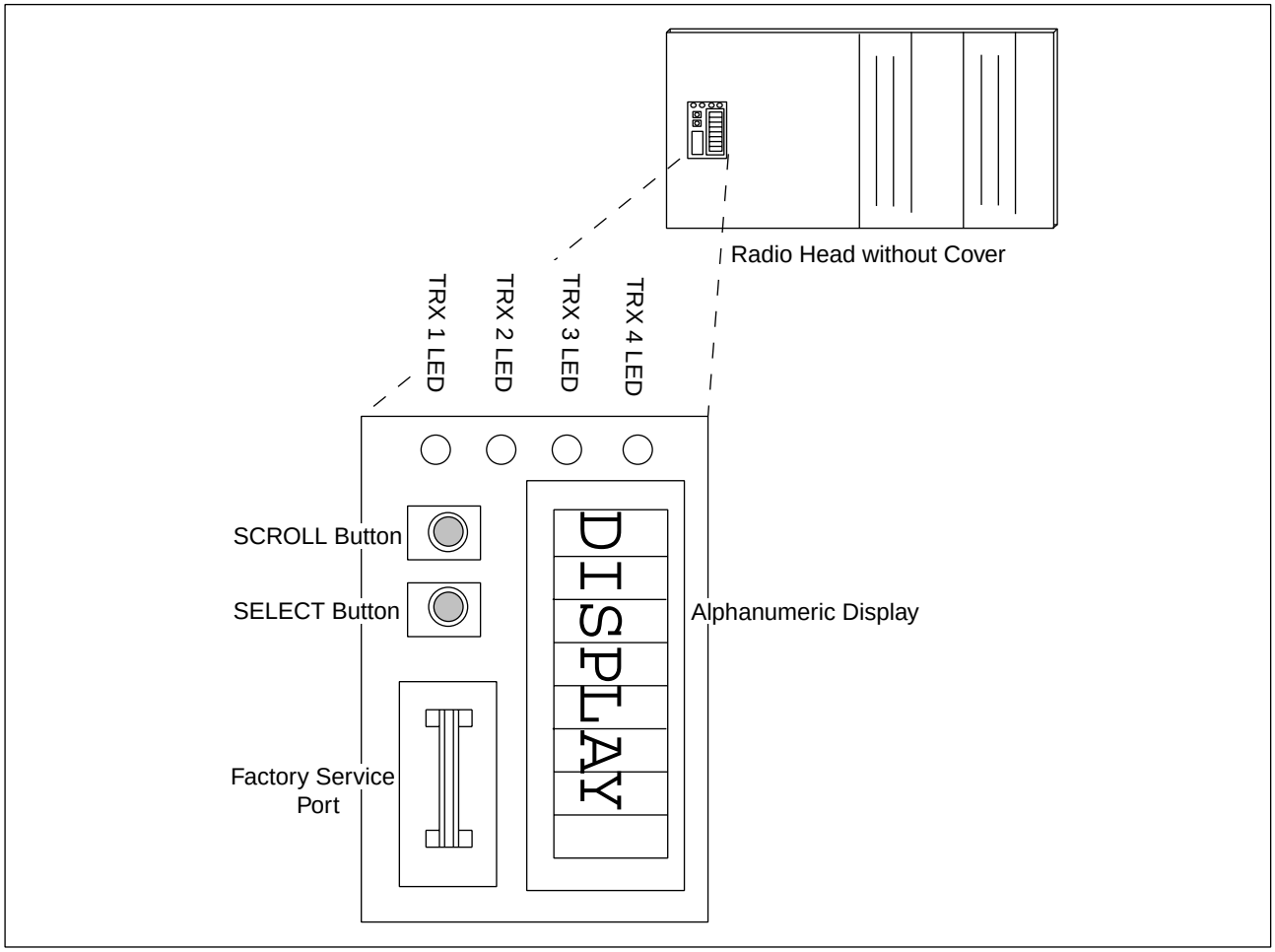


Figure 3-61. Radio Head User Interface

12. Check the Power/Fault LED on the lower-left corner of the Radio Head.

Install Radio Head Cover

13. Use the four tamper-resistant screws provided to install the Radio Head cover on the Radio Head. See Figure 3-62 on page 3-85. Use the Torx driver tool supplied in the Radio Head Hardware Kit (NTM 201 1581).

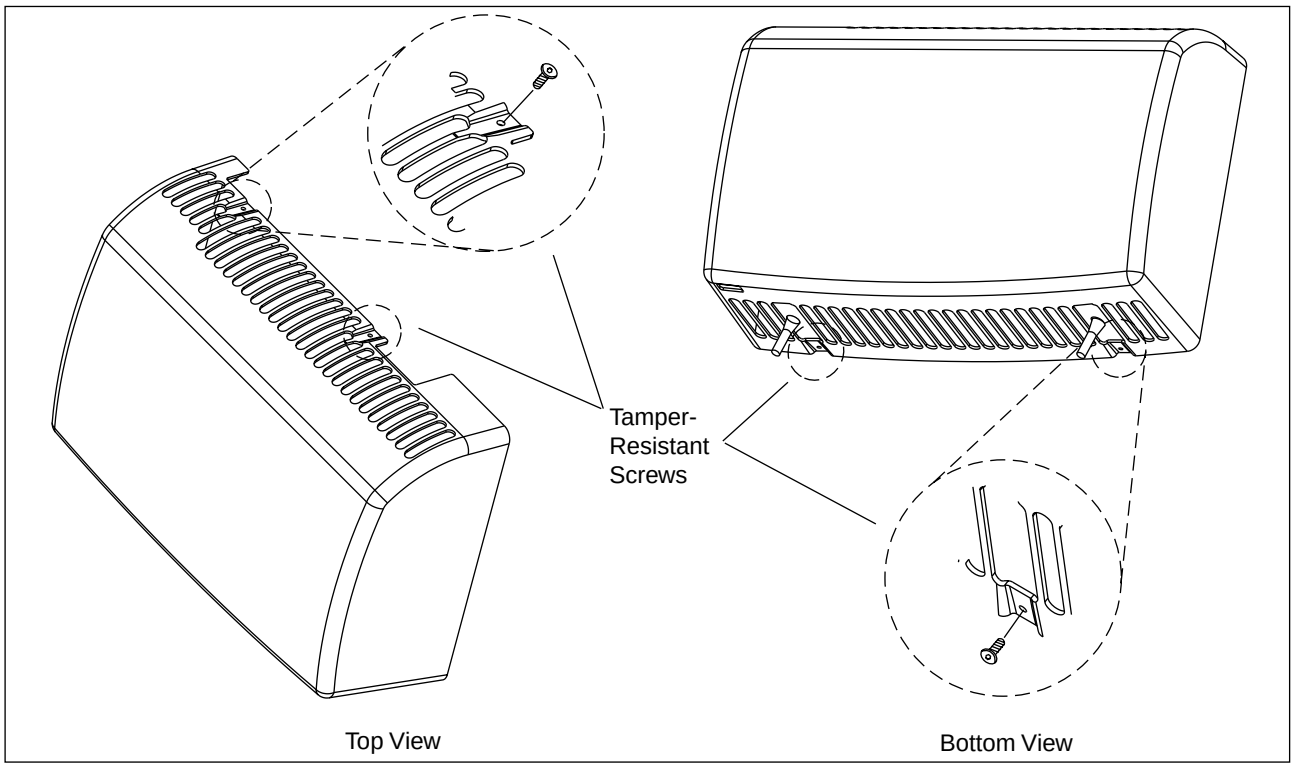


Figure 3-62. Installing Radio Head Cover

14. Install a raceway on all exposed cords and cables to prevent damage or abrasion.

10.4 Completing CRI Installation

Secure Cables

1. Secure the cables in the vertical cable shafts with tie wraps.

2.

Warning!

Improper cutting of the cable ties may leave sharp edges. Make sure that no rough edge remains and the cable tie end is flush with the cable tie knot.

Use the cable tie gun to tighten and cut off the excess tie. If possible, place the cable tie knot at the rear side of the cables.

3. Insert EMC protection blanks into the ground slots in the CRI cabinet. See Figure 3-63 on page 3-86.

   Note: Fill the slots completely with blanks (that is, four pieces including the cable metal collars).

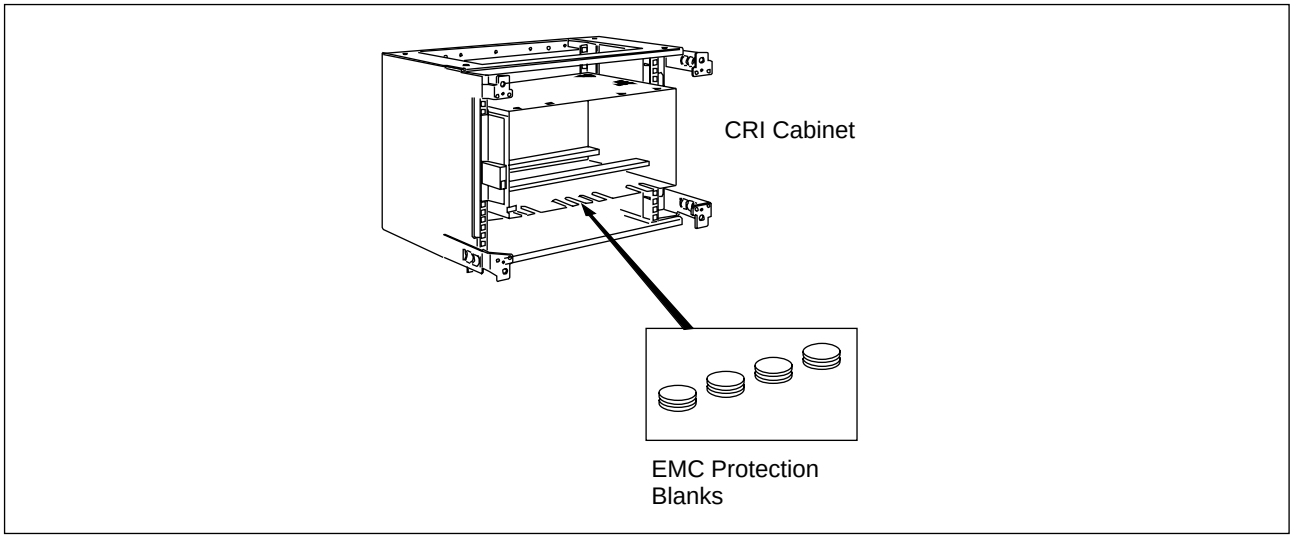


Figure 3-63. Inserting EMC Protection Blanks

4. Tighten the cable retaining screws.

Complete Rack Mount Installation

5. Install the EMI cover (SXK 107 4001/1) on the CRI subrack. See Figure 3-64 on page 3-86.

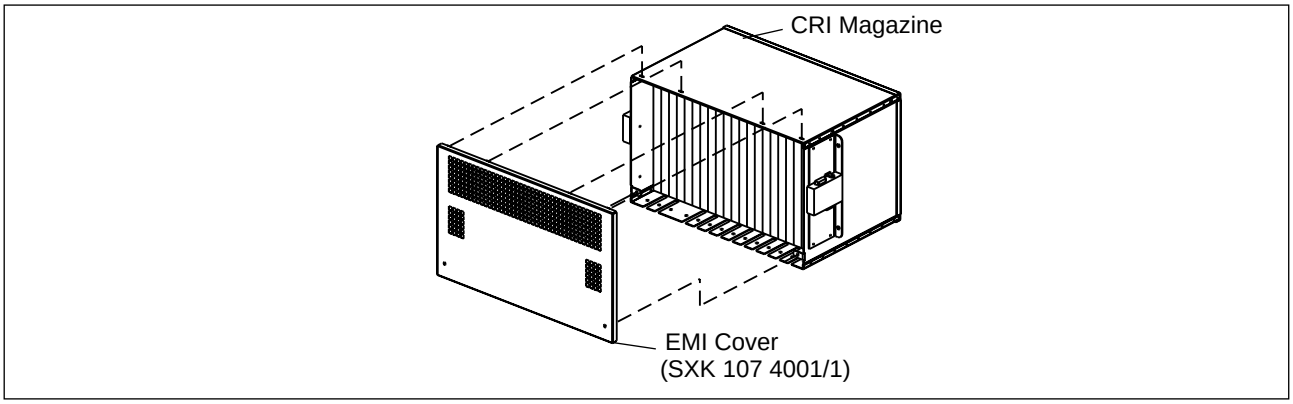


Figure 3-64. EMI Cover Installation

6. Place the door on the front of the CRI cabinet to complete the CRI Rack Mount installation. See Figure 3-65 on page 3-87 for a view of the CRI Rack Mount cover positions.

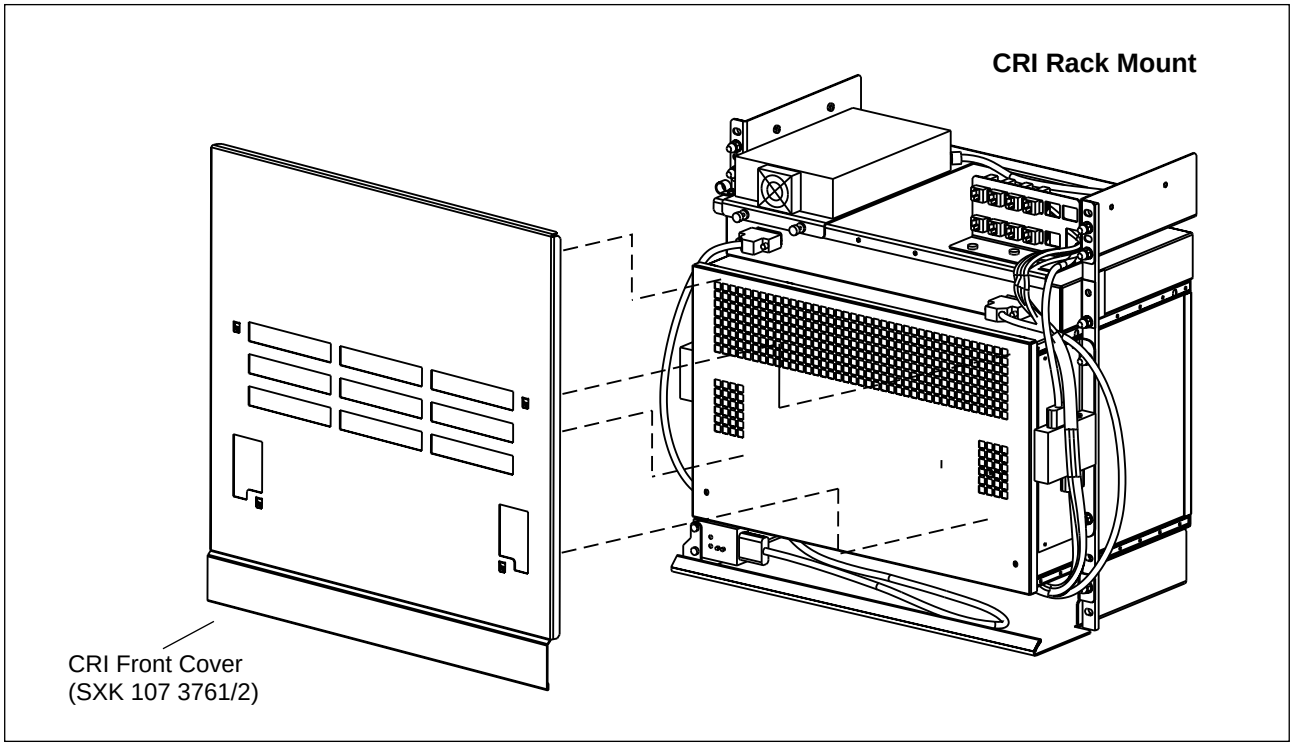


Figure 3-65. CRI Front Cover Installation

7. Notify the MSC operator that the installation is complete.

Complete Floor Mount Installation

8. Install the EMI cover (SXK 107 4001/1) on the CRI magazine (Figure 3-64 on page 3-86).

9. Use two screws for each side to attach the right and left side covers (NTM 201 674/1) to the CRI cabinet assembly (Figure 3-66 on page 3-88).

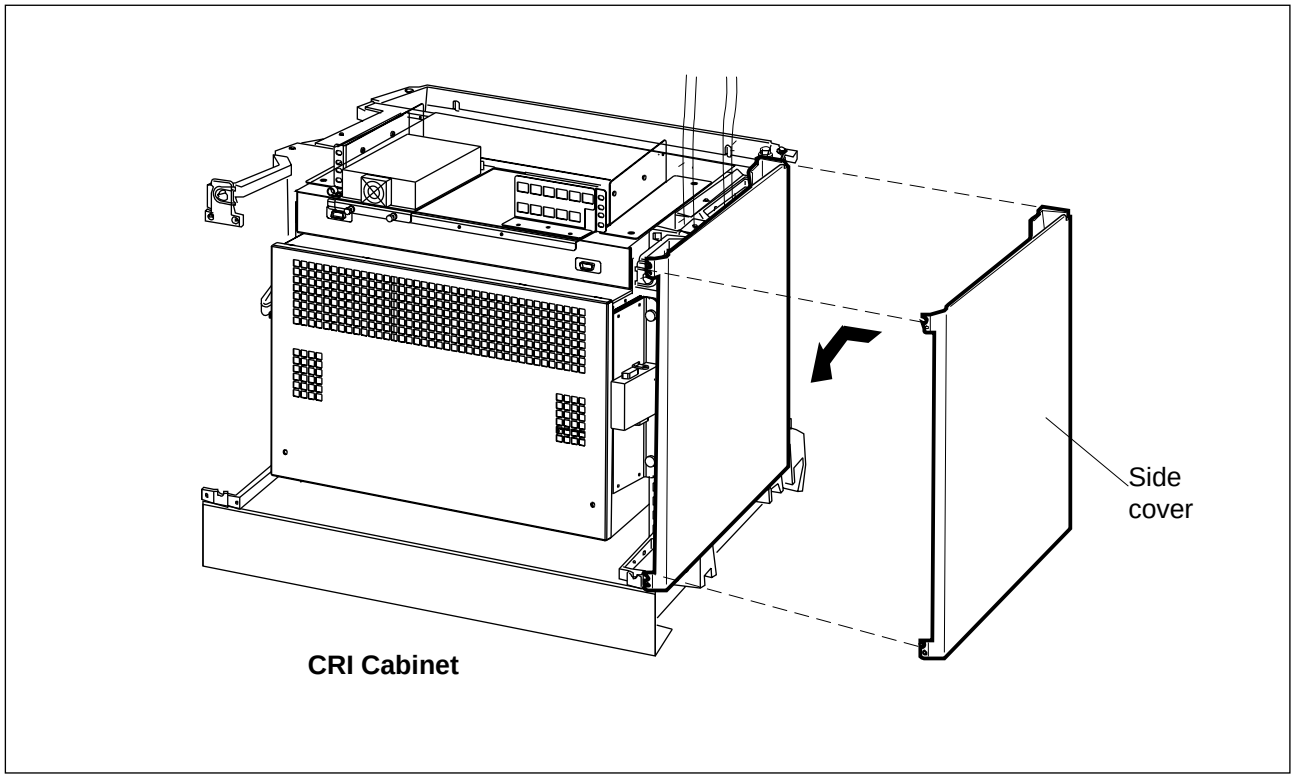


Figure 3-66. CRI Side Cover Installation

10. Use two Torx (TX 20) screws to attach the right and left side covers on the CRI base.

11. Use four Torx (TX 20) screws to attach the rear covers on the CRI base.

12. Slide the top cover (SXA 120 6893/1) onto the two rear bolts on the power shelf. See Figure 3-67 on page 3-89.

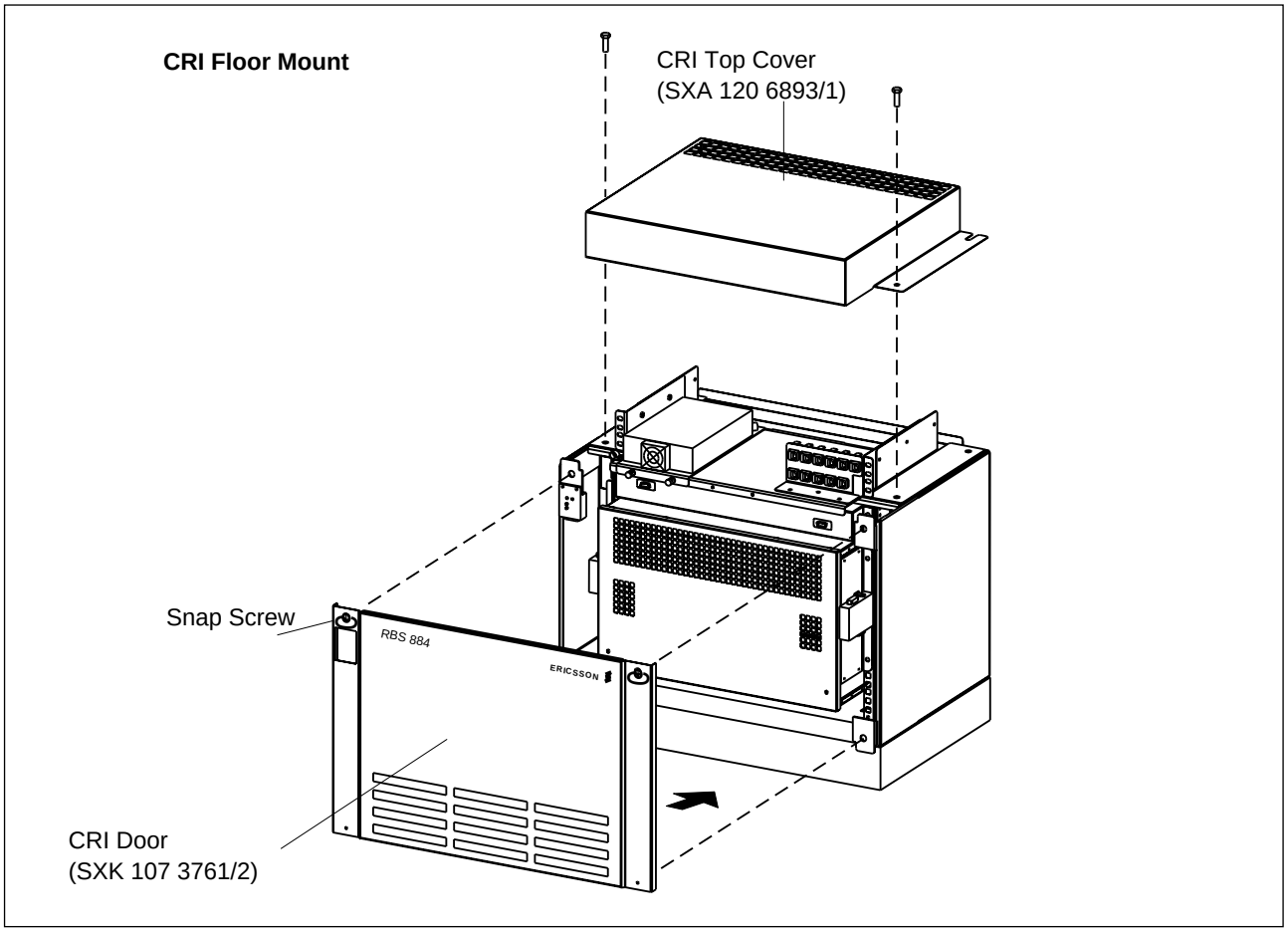


Figure 3-67. CRI Top Cover and Door Installation

13. Install the two front bolts on the top cover. See Figure 3-67 on page 3-89.

14. Tighten the two rear bolts on the top cover.

15. Place the door (SXK 107 3761/2) on the front of the CRI cabinet to complete the CRI floor mount installation. See Figure 3-67 on page 3-89.

16. Notify the MSC operator that the installation is complete.

Part 4

RBS 884 Pico (1900 MHz) Radio Head Installation

1 Introduction

This document contains step-by-step procedures for installing and cabling the Radio Head for the RBS 884 Pico (1900 MHz) system. The quantity, location, and configuration of the Radio Heads in the RBS 884 Pico are based on the Radio Frequency (RF) engineering requirements and the required operating capacity of the system.

2 Safety Precautions

Before starting any installation, test, or maintenance procedures, review the safety regulations provided in this section and any other applicable parts of this manual. Additionally, the installer is responsible for determining that the installation conforms to all applicable electrical, mechanical, communications, and construction codes.

Carefully review each procedure before starting, including the admonishments (dangers, warnings, and cautions) that are applicable to the procedure.

2.1 Voltage Hazards

DANGER!

Hazardous voltages over 100 V are used in the operation of this equipment. Observe safety precautions. Use extreme caution when working on powered up equipment. Do not be misled by the term “Low Voltage.” Contact with AC power of any voltage can cause injury and sometimes death.

Always observe the following:

- Remove all jewelry before working on the equipment.
- Do not touch high voltage connections when installing or operating the equipment.
- Disconnect the power before working on the equipment.
- If possible, keep one hand away from the equipment to reduce the possibility of current flowing through vital body organs.

2.2 Electrostatic Discharge (ESD)

The human body acquires static charge in all situations involving movement (for example, when handling plastic parts).

If any part of the human body comes in contact with a grounded Integrated Circuit (IC) component, the static charge can cause an electrostatic discharge, resulting in a spark and damage to the component.

Always observe the following:

- Follow the instructions for handling sensitive electronic components and printed circuit boards to avoid component damage caused by ESD.
- When working with components and printed circuit boards, use an ESD wrist strap to avoid ESD damage.

3 General Information

Complete the following instructions before starting the installation:

- Compare all boxes or transportation crates with the bill of lading (also called a packing slip), and ensure all items are received.
- Inventory all items.
- Note any damage or discrepancies, and notify your logistics coordinator.

4 Unpacking

The RBS 884 Pico (1900 MHz) Radio Head equipment is packaged in a shipping box that contains the following items:

- Accessory box

  The accessory box contains the Radio Head cover, the Radio Head mounting bracket, a hardware kit, and the installation instructions.

- Radio Head

The Radio Head can be unpacked after the accessory box has been removed from the shipping box.

- Optional Patch Antenna

  If ordered, the optional patch antenna is shipped in a separate box.

Note: One EMRPS kit, consisting of an EMRPS unit, cable, and address plugs, is shipped for each Radio Head.

4.1 Tools

A pair of cutters is recommended for cutting the transport straps, and a knife is recommended for cutting the bags.

4.2 Warranty Notification

Warning!

Do not tamper with the Warranty Seal on the Radio Head. Tampering with this seal voids your warranty. The Radio Head does not contain field serviceable components. Service should only be performed by your local Ericsson repair center.

5 Site Selection and Preparation

Specific site selection and preparation guidelines for the RBS Pico (1900 MHz) Radio Head are provided in this section. Verify that all site selection and preparation requirements in this section have been met before starting the installation.

The maximum pico cell radius is approximately 30 to 50 m (98 to 164 ft) or an approximate area of 2,826 to 7,854 sq m (30,170 to 84,500 sq ft) depending on the propagation conditions.

5.1 Selecting a Location

Use the following guidelines to select an installation location:

- Select an indoor wall. The RBS 884 Pico (1900 MHz) Radio Heads can be mounted on both external and internal walls within an enclosed structure.
- Select a location that is within 1 to 1.5 meters (3 to 5 ft) of a dedicated AC power outlet. Do not use an extension cord or an outlet that contains other power cords.
- Select a location where the AC power outlet is easily accessible.

Note: The AC power outlet serves as the safety power-disconnect point for the Radio Head.

- Select a location free from traffic and equipment. It is important that the Radio Heads are not located in an area where equipment and people can bump into or damage the Radio Heads.
- Select a location that meets the operating environment and clearance requirements in Section 5.1.1 on page 4-6 and Section 5.1.2 on page 4-6.

5.1.1 Operating Environment

The Radio Head indoor operating environment must meet the following requirements:

- Air temperature of 5° to 45°C
- Humidity between 10% to 90%, noncondensing

Note: Refer to *Part 2, System Description* for a complete list of the Radio Head technical specifications.

5.1.2 Clearance Specifications

The Radio Head wall mount location must meet the following minimum clearance specifications for effective cooling of the Radio Head:

- Unobstructed area 23 cm (9 in) from the top of the mounting bracket to the ceiling
- Unobstructed area 30 cm (12 in) below the mounting bracket
- Unobstructed area 30 cm (12 in) on the left side and the right side of the mounting bracket
- Minimum separation distance for patch and monopole antennas 20 cm (8 in) from all persons.

The minimum clearances for the Radio Head are shown in Figure 4-1 on page 4-7.

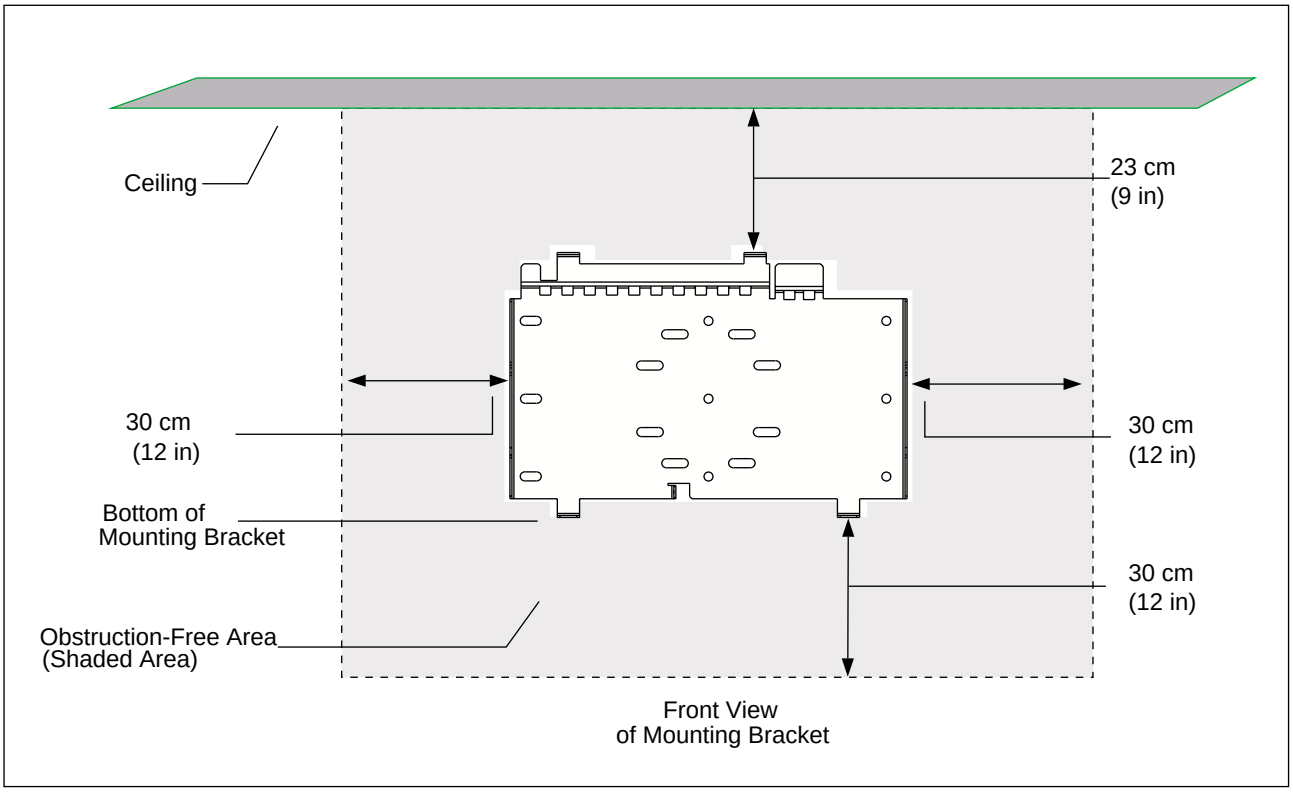


Figure 4-1. Mounting Bracket Clearance Specifications

To comply with FCC RF exposure requirements, the external antennas used with this device must be mounted to provide a minimum separation distance of 20cm (8 inches) from all persons, with the antenna gain not exceeding 14 dBi. Amplifiers and boosters are not permitted.

5.2 Preparing an Installation Location

Determine if a dedicated AC power outlet is located within 1.5 m (5 ft) of the planned Radio Head installation. If necessary, install a dedicated AC power outlet near the planned Radio Head location.

6 Prerequisites and Tools

6.1 Prerequisites

All appropriate mounting hardware (bolts, clamps or screws) must be available for the designated location for securing the mounting bracket (dry wall, brick, masonry, or a steel girder). Refer to the local building practices for information on appropriate mounting hardware.

The mounting hardware must support a minimum of 16 kg (35 lb) and meet any local seismic requirments. Use a minimum of four mounting points. For example, use a minimum of four, 3/8-inch (0.8 cm) diameter bolts to distribute the weight of the Radio Head evenly between the bolts.

The T1 cable must be plenum rated, Category 5 (CAT 5), 24-gauge unshielded, twisted-pair (UTP) cable. The E1 cable may either be 75-ohm coaxial or 120-ohm twisted pair (TP) cable. The allowable cable length is 800 to 1000 m with a maximum attenuation of 30 dB.

6.2 T1/E1 Requirements

The T1/E1 connection must meet the following requirements:

- MSC Connection
  - ANSI T1: 1.544 Mbit/s
  - ANSE E1: 2.048 Mbit/s
- Delay: 5 ms maximum
- Clock: Stratum 2 or better

6.3 Tools and Materials

The tools shown in Table 4-1 on page 4-9 are required for installing a RBS 884 Pico (1900 MHz) Radio Head:

Table 4-1. Tools for Installing Radio Head

Product Number	Description
NTM 201 1581	Hardware Kit
N/A	Crimping tool
LZY 250 01/14	ESD Wrist Strap and Cable
N/A	Open-end wrench set
N/A	Small flat-head screwdriver
N/A	Small plastic stylus to depress customer interface buttons

7 Radio Head Set-up

The Pico Radio Head customer interface has an eight-character alphanumeric display and two push buttons, SCROLL and SELECT. The customer interface is used to view the current alarms and to configure the Radio Head. Refer to Figure 4-2 on page 4-10 for the location of the Radio Head customer interface.

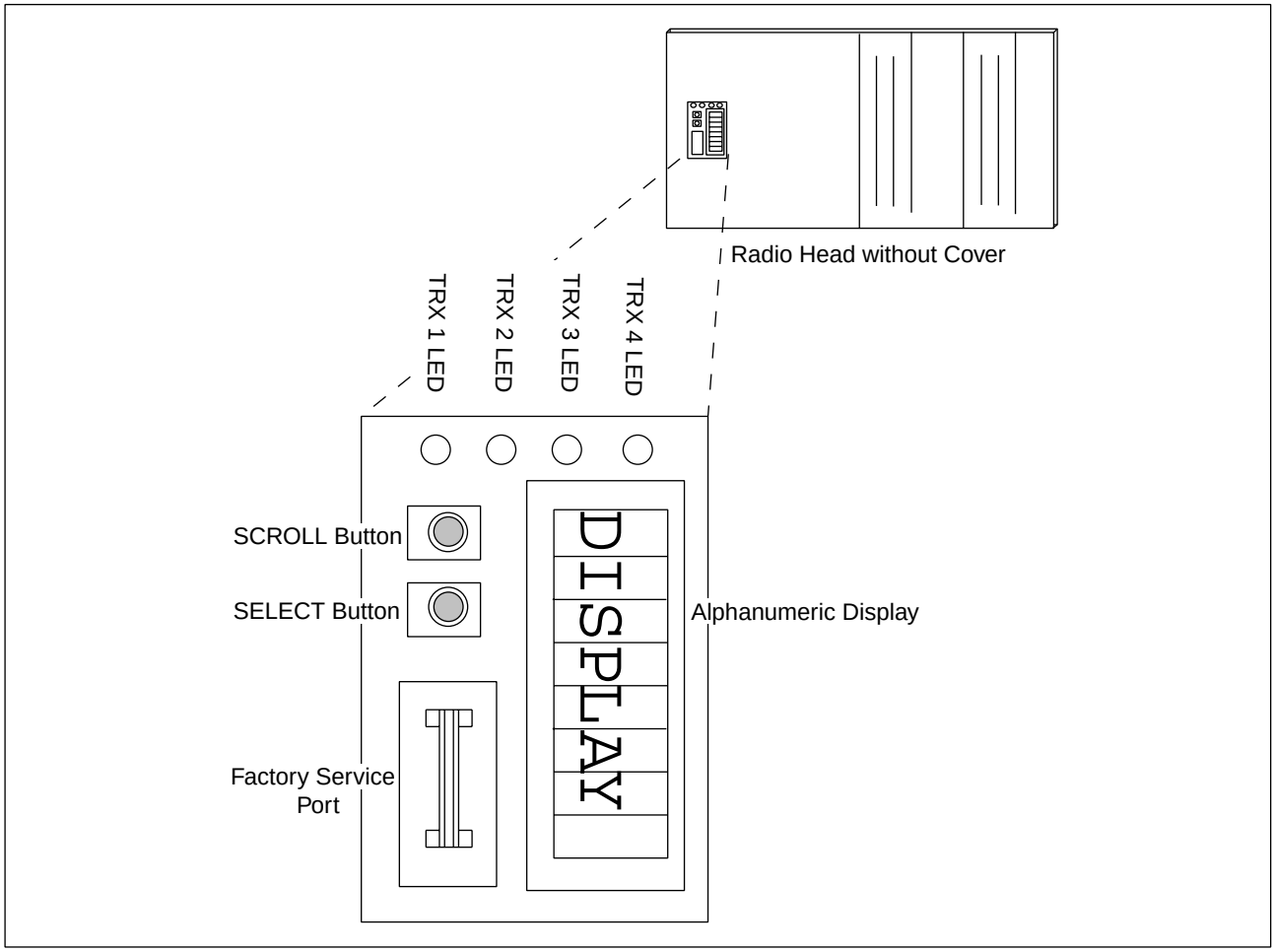


Figure 4-2. Radio Head Customer Interface

Use the SCROLL button to sequentially review all menu items. Use the SELECT button to select the displayed menu item or to activate a submenu.

Note: The current parameters are enclosed in brackets. An asterisk, *****, appears next to parameters that have been selected, but not enabled.

7.1 Radio Head Configuration Procedure

Preparation

1. Ensure that the following tools and materials are available prior to starting this configuration procedure:

- Plastic stylus or other suitable tool to depress the Radio Head customer interface buttons
- Suitable work area with AC power outlet

2. Refer to the site-specific configuration plans, and position the Radio Heads on the floor (or a suitable work area) directly below the planned installation location. Make sure that the alphanumeric display and interface buttons are easily accessible.

   Note: A maximum of three Radio Heads can be installed with one T1/E1 link.

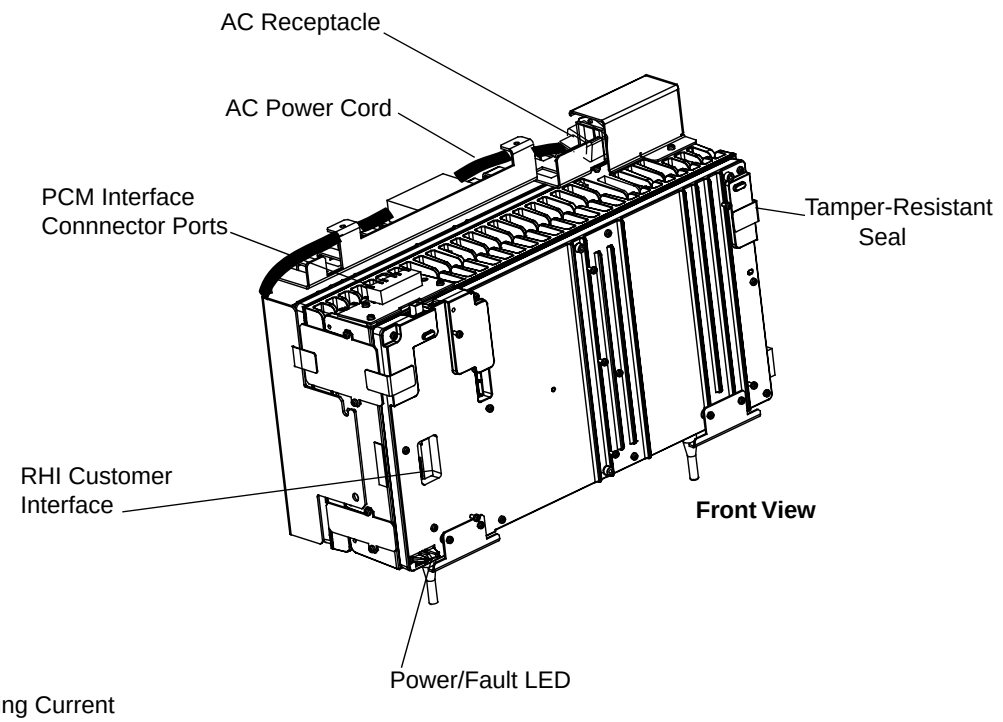
3.

Warning!

Contact the MSC for authority to proceed before configuring the Radio Head. The dual TRX units (four TRX devices) in the Radio Head must be blocked before starting this procedure.

Connect the AC power cord to the AC receptacle on the Radio Head. Insert the AC power cord plug into the AC outlet. See Figure 4-3 on page 4-12 for the location of the AC power cord and AC receptacle.

Note: The supplied AC power cord is a 110 Vac power cord for use in the US market only. If outside of the US market, locate a power cord with the appropriate power plug that meets local government requirements. Make sure that the power cord has the same rating, gauge, and type as the supplied power cord (TSR 952 160/001).



AC	Alternating Current
LED	Light Emitting Diode
PCM	Pulse Code Modulation
RHI	Radio Head Interface

Figure 4-3. Radio Head AC Power Cord and AC Receptacle

Locating User Interface

4. Locate the SCROLL and SELECT buttons on the Radio Head user interface. See Figure 4-2 on page 4-10 for the location of the SCROLL and SELECT buttons.

   Note: The SCROLL button sequentially displays the configuration menu items. The SELECT button activates a submenu or selects the current menu item or parameter.

5. A configuration banner with the current parameter settings scrolls across the alphanumeric display, as shown in the following example:

```
HW Prod ROA 117-9253, Rev 1, SWRev R1A-1,
Freq 1900, Mode RHI, Link T1, PriHaul L:0 dB,
SecHaul L: 0dB, Cascade End NO, Cabid 0, Reset INT
```

Figure 4-4. Configuration Banner Example 1

6. Ignore any alarm messages that appear at this time. Information about the alarm messages is provided in *Part 7 Troubleshooting*.

Overview of Radio Head Configuration Menu

7. Refer to Figure 4-5 on page 4-14 for a diagram of the Radio Head Configuration Menu. All menu items are accessed sequentially in a circular queue. Each submenu must be exited in order to return to the configuration menu.

   Note: The menu item numbers are dynamically reassigned. Some menu item numbers may not be the same as those in the following example.

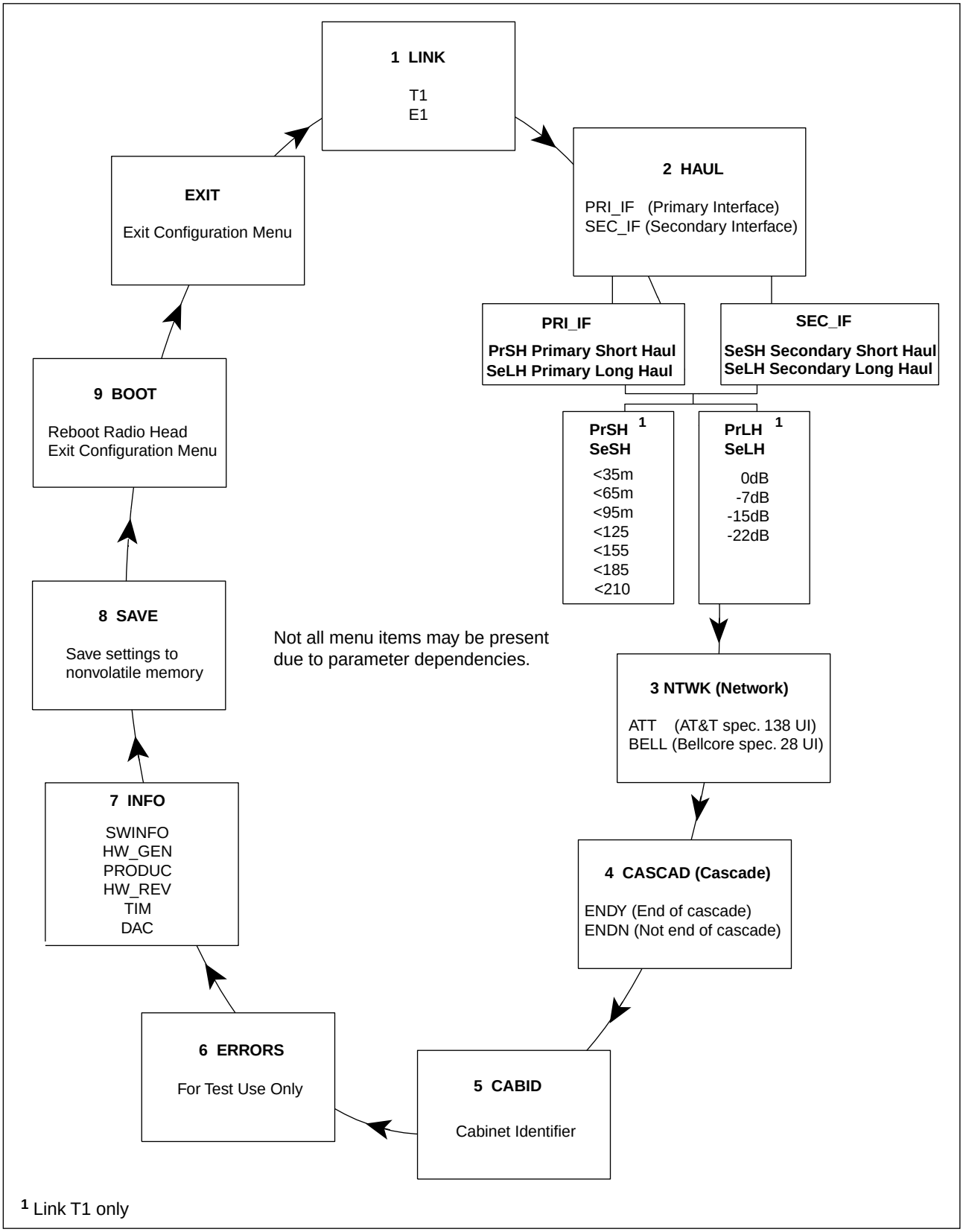


Figure 4-5. Radio Head Configuration Menu

8. The factory default settings are as follows:
   - Link Type = T1
   - Primary Haul Type = Long Haul, 0 dB
   - Secondary Haul Type = Long Haul, 0 dB
   - Network PLL Specification = ATT
   - Cascade Position = ENDN (not at the end)
   - Cabinet ID Number = 0

Setting the Link Type

9. Press the SELECT button to exit the Alarm Status mode and access the Configuration program. The first menu item, `LINK`, appears on the display.

10. Press the SELECT button and `T1` appears. The brackets reflect the current setting.

    Note: The current parameters are enclosed in brackets. An asterisk, *****, appears next to parameters that have been selected, but not enabled.

11. Press the SELECT button to select the T1 parameter or press the SCROLL button followed by the SELECT button to select the E1 parameter.

    Note: Pressing the SELECT button a second time deselects the parameter.

12. Press the SCROLL button followed by the SELECT button to exit the Link Type option.

Table 4-2. Configuration Program – Link Menu

Menu	Parameters	Explanation	Notes
`LINK`	`[T1]`	1.544 Mbps transmission link	Specifies T1 link.
	`E1`	2.048 Mbps transmission link	Specifies E1 link.

Setting the Primary and Secondary Interface Haul Settings (LINK T1 only)

Warning!

Step 13 on page 4-16 to Step 24 on page 4-17 apply to the LINK T1 option only.

13. Press the SCROLL button until `HAUL` appears.
14. Press the SELECT button and `PRI_IF` (Primary Interface) appears.
15. Press the SELECT button and `PrSH` (Primary Short Haul) appears.
16. Press the SELECT button to display the first short haul line parameter (`<35m`).

    Note: The short haul line parameters are listed in meters. See *Appendix E* for a metric conversion table.

17. Press the SELECT button to select `<35m` or press the SCROLL button to cycle through the other short haul line parameters.

    Note: Pressing the SELECT button a second time deselects the parameter.

18. Press the SELECT button to select the appropriate short haul parameter.

    Note: The length of the Radio Head cables must be determined before the short haul parameters are set.

19. Press the SCROLL button until `PrLH` (Primary Long Haul) appears.
20. Press the SELECT button to display the first long haul line parameter (`0dB`).
21. For non-leased connections, select the `0dB` default parameter. For leased connections, consult your CSU documentation for recommended long haul line parameter settings.

    Note: Determine the length of the T1 cables before selecting the long haul line parameter.

22. Press the SELECT button to select the appropriate long haul parameter.
23. Press the SCROLL button until `exit` appears, and press the SELECT button to exit the Primary Interface submenu.

24. Repeat Step 14 on page 4-16 through Step 23 on page 4-16 to configure the secondary short and long haul settings.

Table 4-3. Configuration Program – Haul Menu

Menu	Submenu	Submenu	Parameters	Explanation
HAULLink T1	PRI_IF	PrSH	<35m <65m <95m <125 <155 [<185] <210	Length of the connection from the CRI or the previous Radio Head
		PrLH	[0dB] -7dB -15d -22d	Allowable gain[1]
	SEC_IF	SeSH	<35m <65m <95m <125 <155 <185 <210	Length of the connection to the next Radio Head
		SeLH	[0dB] -7dB -15d -22d	Allowable gain[1]
HAULLink E1	PRI_IF	PrSH PrLH	None	Impedence
	SEC_IF	SeSH SeLH	None	Impedence

[1] Set at 0 dB for optimal performance.

Setting the Primary and Secondary Interface Haul Settings (LINK E1 only)

Warning!

Step 25 on page 4-18 to Step 30 on page 4-18 apply to the LINK E1 option only.

25. Press the SCROLL button until `HAUL` appears.
26. Press the SELECT button and `PRI_IF` (Primary Interface) appears.
27. Press the SELECT button and `PrSH` (Primary Short Haul) appears.
28. Press the SCROLL button to view the `PrLH` (Primary Long Haul) option.
29. Press the SELECT button to select the appropriate impedence option.
30. Press the SCROLL button until `exit` appears, and press the SELECT button to exit the Primary Interface submenu.
31. Repeat Step 25 on page 4-18 through Step 30 on page 4-18 to configure the secondary short and long haul settings (Table 4-3 on page 4-17).

Setting the Network Specifications

32. Press the SCROLL button until `NTWK` appears.
33. Press the SELECT button and `ATT` appears. The brackets reflect the current setting.
34. Press the SELECT button to select the ATT parameter or press the SCROLL button followed by the SELECT button to select the BELL parameter.

    Note: Pressing the SELECT button a second time deselects the parameter.

35. Press the SCROLL button followed by the SELECT button to exit the Network option.

Table 4-4. Configuration Program – Network Menu

Menu	Parameters	Explanation	Notes
NTWK	[ATT]	AT&T Specification for maximum jitter/wander amplitude is 138 UI.	Configures the Timing Module (TIM) or PLL Type
	BELL	Bellcore Specification for maximum jitter/wander amplitude is 28 UI.	Configures the Timing Module (TIM) or PLL Type

Setting the Cascade Position

36. Press the SCROLL button until CASCAD appears.

    Note: Setting the cascade position disables the alarms on the secondary T1/E1 network interface.

37. Press the SELECT button and ENDY appears.

38. Press the SELECT button to select the ENDY (End = Yes) parameter or press the SCROLL button followed by the SELECT button to select the ENDN (End = No) parameter.

    Note: Pressing the SELECT button a second time deselects the parameter.

39. Press the SCROLL button until exit appears, and press the SELECT button to exit the Cascade menu.

Table 4-5. Configuration Program – Cascade Menu

Menu	Parameters	Explanation	Note
CASCAD	ENDY	Last cascade position = Yes	Secondary interface alarms are ignored by the Radio Head.
	ENDN	Last cascade position = No	Secondary interface alarms are displayed by the Radio Head.

Setting the Cabinet Identifier (CID)

40. Press the SCROLL button until CABID appears.

41. Press the SELECT button and 00 [00] appears. The brackets reflect the current CID number.

42. Call the MSC and request a CID number.

43. Enter the Radio Head CID number by pressing the SCROLL button to increase the first two digits from 00 to 15 in a circular manner. The first two digits reflect the new CID number and the last two digits reflect the factory default or current CID number.

44. Press the SELECT button to accept the first two digits as the new unit ID number and exit the Cabinet ID menu.

Table 4-6. Configuration Program – Cabinet ID Menu

Menu	Parameters	Explanation
CABID	XX_[YY]	XX is the new selected ID number (00–15). YY is the current ID number (00–15).

Displaying the Error Log

Warning!

The Error Log is used by the Ericsson repair center to troubleshoot hardware unit (board) problems. Do not attempt to use the Error Log to troubleshoot general RBS 884 Pico (1900 MHz) problems.

45. Press the SCROLL button until `ERRORS` appears.

46. Bypass the Errors menu option by pressing the SCROLL button once, and displaying the next menu option, `INFO`.

Displaying the Configuration Information

47. If `INFO` does not appear on the alphanumeric interface, press the SCROLL button until `INFO` appears.

48. Press the SELECT button and `1_SWINFO` appears. Press the SELECT button again to view the current Radio Head software load information.

49. Press the SELECT button and `2_HW_GEN` appears. Press the SELECT button again to view the Radio Head hardware generation number.

50. Press the SCROLL button until `3_PRODUC` appears. Press the SELECT button and the Radio Head Interface (RHI) unit product number scrolls across the display three times.

51. Press the SELECT button and `4_HW_REV` appears. Press the SELECT button again to view the RHI unit revision level.

52. Press the SCROLL button until `5_TIM` appears, and press the SELECT button.

    Possible TIM Phase Locked Loop (PLL) states include:

    - `INITIAL` (Initial)
    - `LOCKED` (Locked)
    - `UNLOCK_F` (Unlocked Fine)
    - `UNLOCK_A` (Unlocked A)

    Note: This information is used for debugging purposes.

53. Press the SCROLL button until 6_DAC # appears, and press the SELECT button. The current PLL Digital to Analog Conversion (DAC) value is displayed. This value is used for debugging purposes.

Table 4-7. Configuration Program – Information Menu

Menu	Submenu Item	Parameters	Explanation
6_INFO	1_SWINFO	Example: SW:R1A4c	Software product number
	2_HW_GEN	Example: HW:FFF1h	Hardware Generation Number
	3_PRODUC	Example: HW PROD: ROA 117-9253	Hardware product number
	4_HW_REV	Example: HW REV: 1	Hardware product revision number
	5_TIM	Possible state:INITIAL _LOCKED UNLOCK_F UNLOCK_A	Timing Module (TIM) states
	6_DAC #	0 – 4096	Displays current PLL Digital to Analog (DAC) value for debugging purposes

Saving Parameters

54. Press the SCROLL button until SAVE appears.

55. Press the SELECT button and the message Press Select to SAVE scrolls across the display three times.

56. Press the SELECT button and the program checks for updated parameters and displays SAVING and then SAVED_OK, or press SCROLL twice to continue with the next menu.

To see and modify all updated parameters before saving, scroll through the menus and look for the values marked with an asterisk, *****.

Note: If the SELECT button is not pressed while the scrolling message is displayed, the `SAVE` option automatically exits.

Rebooting the Radio Head Software

57. Press the SCROLL button until `BOOT` appears.

58. Press the SELECT button and the following message scrolls three times: `Warning: TRXs must be blocked. Press Select to REBOOT`

59. Press the SELECT button again and the display interface is blanked for a period of five to ten seconds. The message `Rebooting` scrolls across the display interface, followed by the current configuration parameters, as shown in the following example:

```
HW Prod ROA 117-9253, Rev 1, SWRev R1A-1, Freq 1900,
Mode RHI, Link T1, PriHaul L: -7dB, SecHaul L:-7dB,
Cascade: End NO, Cabid 0, Reset PWR...
```

Figure 4-6. Configuration Banner Example 2

60. The Radio Head configuration procedure is complete. The display interface returns to the Alarm Status mode.

    Note: The Radio Head software may also be rebooted by temporarily disconnecting and reconnecting the Radio Head power source.

Removing Power

61. Unplug the AC power cord from the AC outlet.

62. If using a T1 or proprietary connection, go to Procedure 8.1 on page 4-25. If using an E1 connection, go to Procedure 7.2 on page 4-24 to set the Radio Head DIP switches.

7.2 Radio Head DIP Switches (E1 Only)

Locating Radio Head DIP Switches (E1 Only)

1. Locate the Radio Head DIP switches. Refer to Figure 4-7 on page 4-24

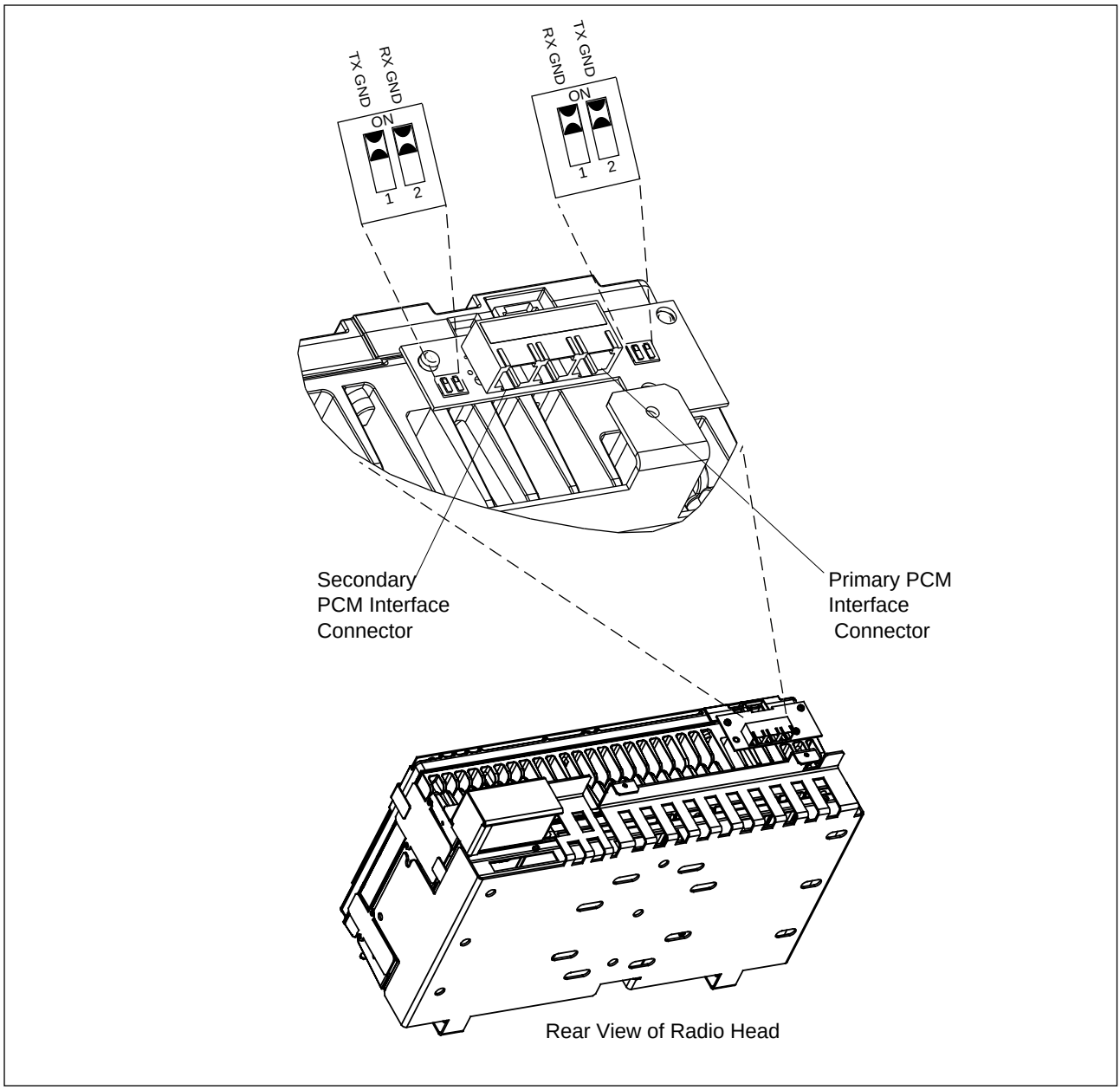


Figure 4-7. Radio Head Interface Ports and DIP Switches

Setting the TX and RX DIP Switches (E1 Only)

2. Set the TX and RX DIP switches to grounded (ON) or non grounded (OFF) depending on the local transmission requirements.

   Note: The DIP switches located beside the Primary PCM Interface Connector are for uplink transmission (primary). The DIP switches located beside the Secondary PCM Interface Connector are for downlink transmission (secondary).

8 Equipment Installation

8.1 Radio Head Installation

Preparation

1. Verify that power has been removed from the Radio Head.
2. Ensure that the CRI cabinet installation procedure is complete prior to starting the Radio Head installation procedure. The CRI cabinet must have one EMRPS unit installed for each Radio Head.

   Note: If the number of EMRPS units in the CRI cabinet is not known, consult the next level of maintenance support or the site engineer.

Preparation for Mounting Optional Patch Antenna Assembly

3. Verify that the optional patch antenna assembly is on site.

   Note: Do not install the optional patch antenna assembly at this time.

4. Disconnect the monopole antenna cable from the external duplexer using an open-ended wrench.

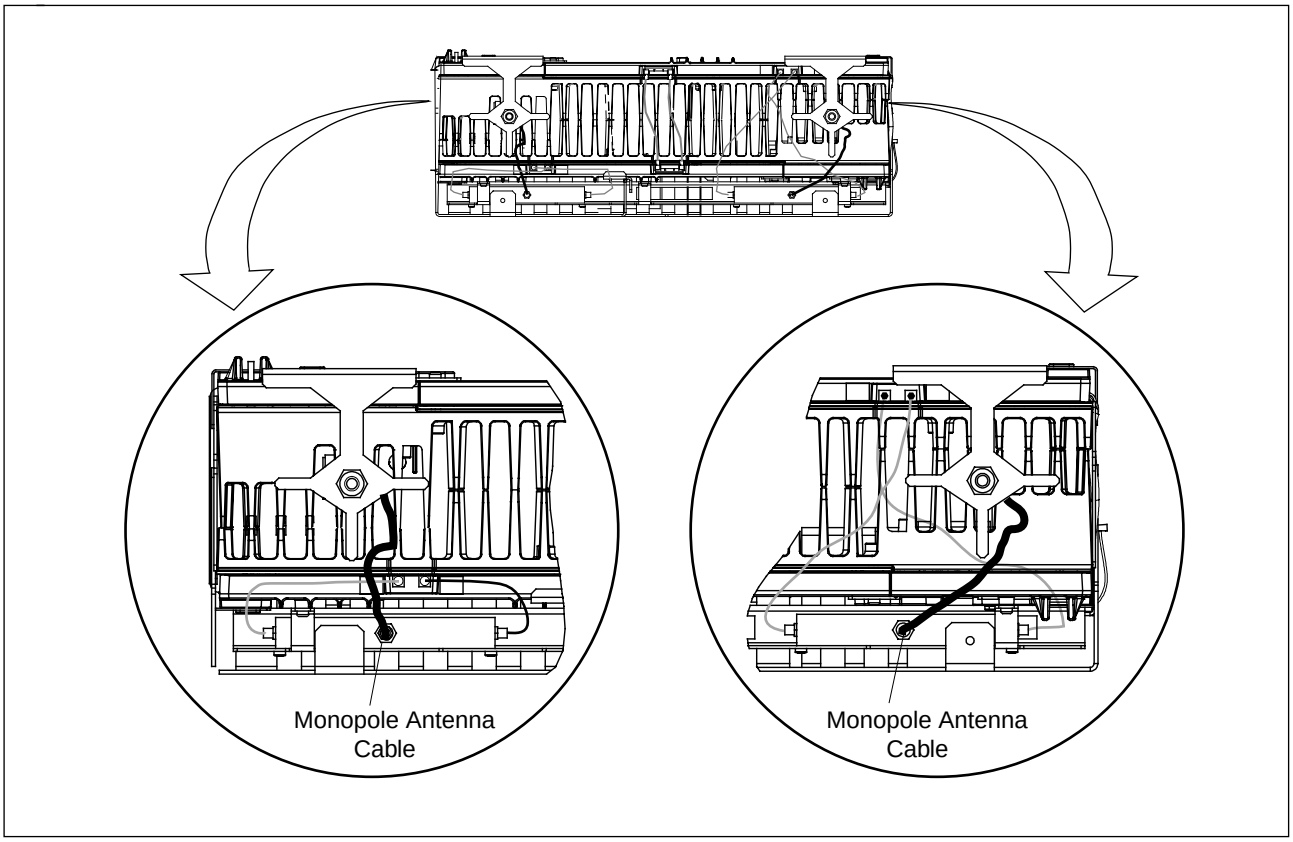


Figure 4-8. Disconnecting the Monopole Antenna Cable

5. Carefully remove two screws from each monopole antenna bracket assembly. See Figure 4-9 on page 4-27 for the location of the screws and the monopole antenna bracket assembly. Save the bracket assembly and the monopole antenna (NTM/KRE 101 1609) for possible future use. The antenna bracket may be used to mount external antennas.

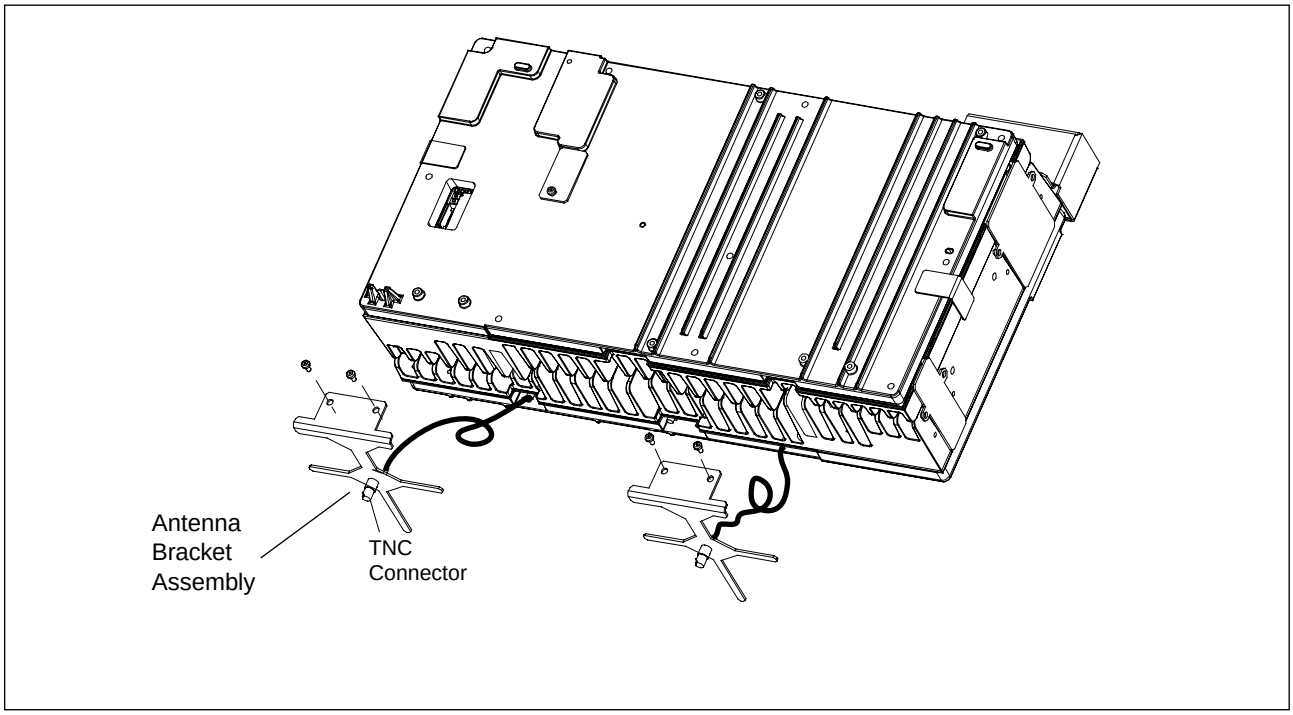


Figure 4-9. Monopole Antenna Bracket Assembly

6. Mount the Radio Head wall bracket and Radio Head prior to installing the optional patch antenna assembly.

Install Radio Head Mounting Bracket

7. Complete the prerequisites described in Section 6 on page 4-8.
8. Select a vertical surface to install the Radio Head.
9. Allow for the following minimum clearance requirements:
   - 23 cm (9 in) above top of bracket
   - 15 cm (6 in) below bottom of bracket
   - 30 cm (12 in) on each side of bracket

   Note: The Radio Head must be installed on a vertical surface.
10. Verify that a dedicated electrical outlet is installed 1 to 1.5 m (3 to 5 ft) from the selected Radio Head location.
11. Using the mounting bracket as a template, mark the wall at the top-left, top-right, and lower-right anchor-hole locations.

12. Drill holes appropriate for the length of the anchor to be used. Use a minimum of four mounting points.

    Note: The hardware must support a minimum of 22.7 kg (50 lb). Use a minimum of four mounting points. For example, use a minimum of four 3/8 in diameter bolts to distribute the weight of the Radio Head evenly between the bolts.

13. Use the appropriate mounting hardware (bolts, clamps or screws) for securing the mounting bracket (for example dry wall, brick, masonry, or a steel girder). See Figure 4-10 on page 4-28 for an illustration of the mounting bracket.

    Note: The mounting hardware is not included with the mounting bracket.

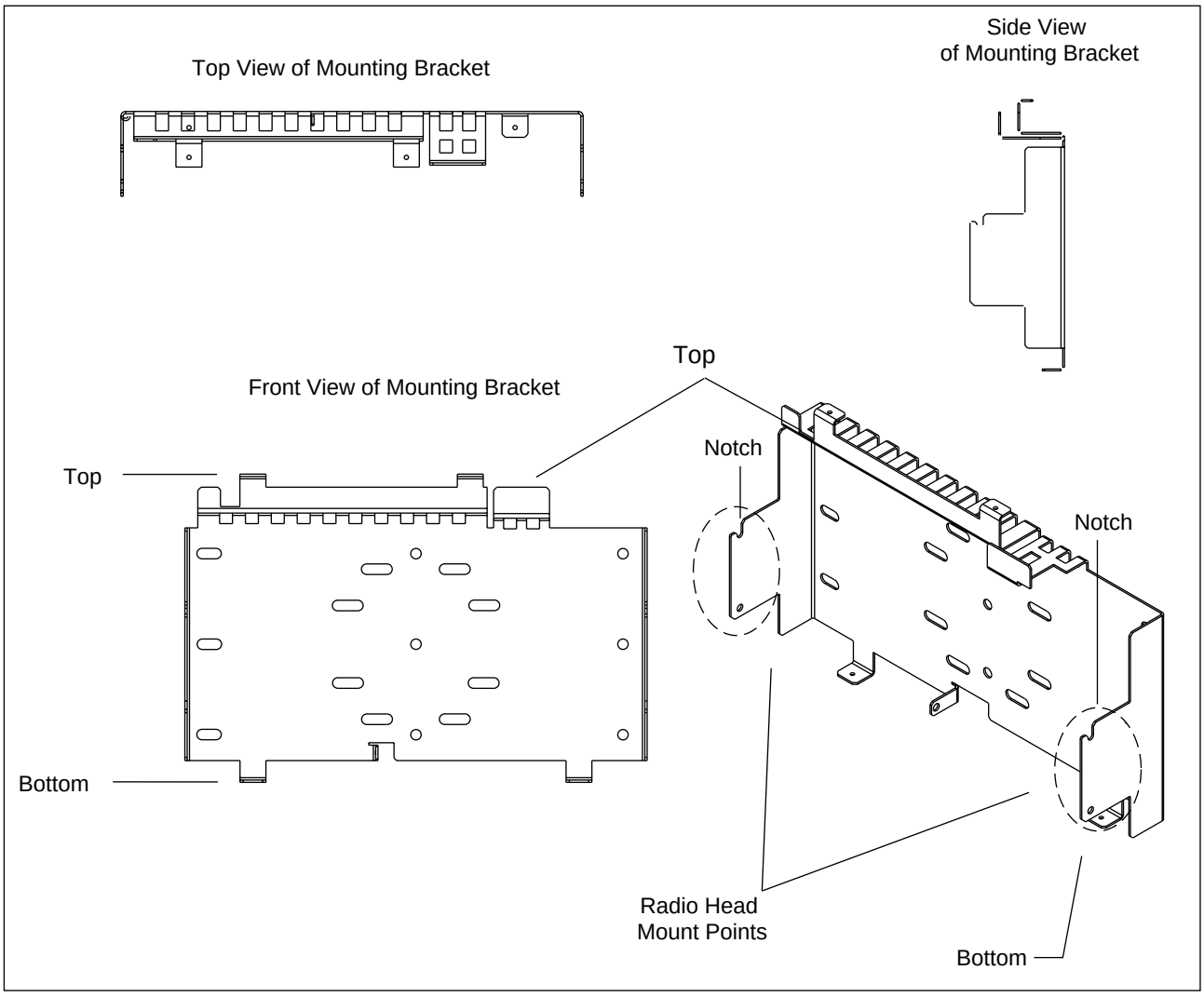


Figure 4-10. Radio Head Mounting Bracket

Install Radio Head on Mounting Bracket

14. Install, but do not tighten, one tamper-resistant screw in top hole on each side of the Radio Head. Leave a sufficient gap between the screw and the Radio Head to allow the screw to slip into the notch on the mounting bracket. See Figure 6-19 on page 6-48 for the location of the top holes on the Radio Head.

    Note: Hardware Kit (NTM 201 1581) contains screws and Torx driver tool for installing the Radio Head.

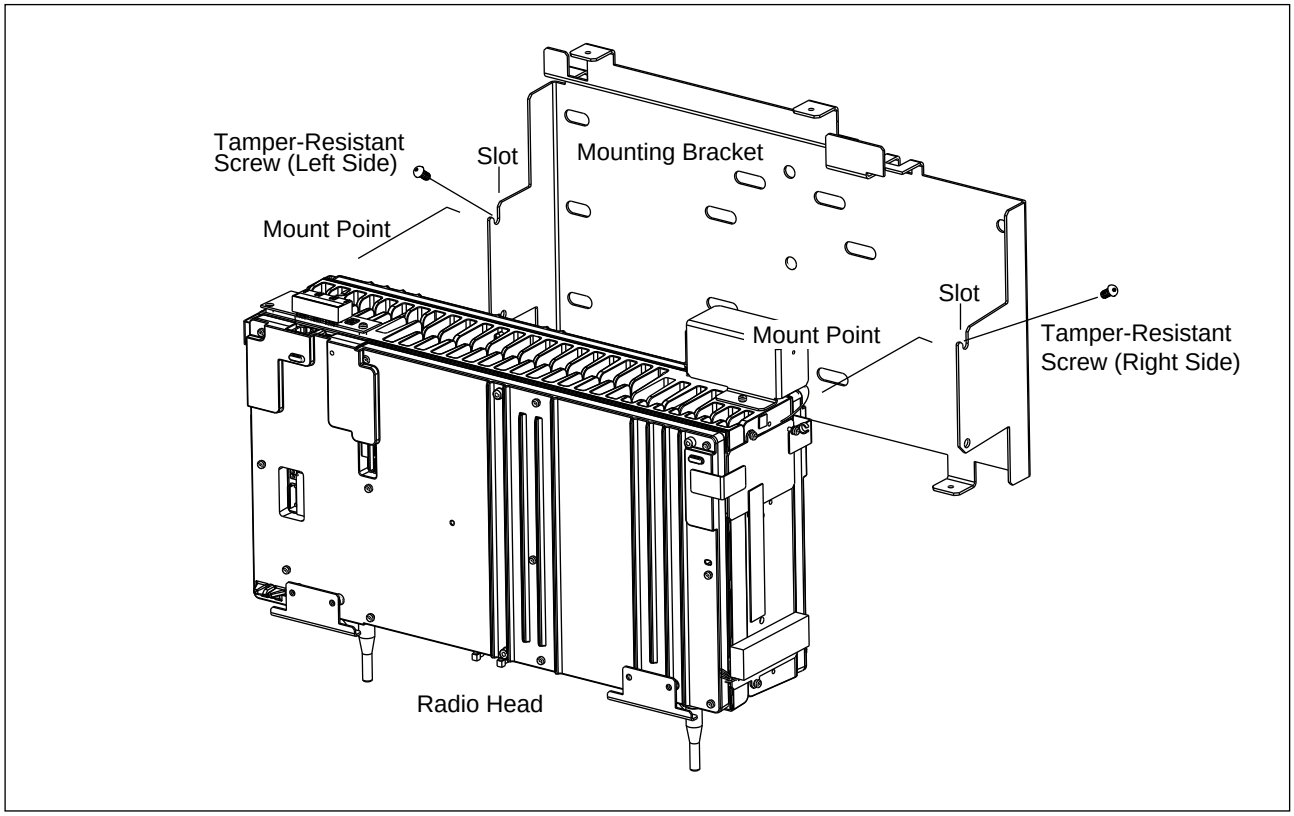


Figure 4-11. Attaching Radio Head to Mounting Bracket

15. Place the Radio Head between the two mount points and slide the tamper-resistant screws into the notches to support the Radio Head on the mounting bracket.

16. Install a second tamper-resistant screw into the lower hole on each side of the Radio Head. See Figure 4-12 on page 4-30 for the location of the lower holes on the Radio Head.