1.6.2 Fiber Optic Cable Entry

A nylon connector is provided on the rear of the RAN cabinet for routing a fiber optic cable into the cabinet. The cord connector provides cable strain relief and a watertight seal at the fiber optic cable entry point. As the connector nut is tightened, a soft neoprene bushing compresses to tightly grip the cable without applying excessive force to the fibers. The connector accommodates cables of a diameter in the range .38 to .50 inches (.97 to 1.27 cm).

Note: If the installer has a larger cable, the manufacturer (Hubbell Inc.) makes bushings that fit this connector in the following size ranges: .500-.625, .625-.750, .750-.875, .875-1.00, 1.00-1.125 inches.

In a typical installation, the connectorized end of a multi-fiber OSP cable is routed into the cabinet through the cord connector and the individual fibers are connected to the optical transceiver on the Synchronous Interface Card (SIF). Excess slack is stored inside the cabinet. The stub end of the cable is routed to an external splice enclosure (not provided) for splicing to the outside plant fiber optic cable.

1.6.3 Antenna Cable Connections

Five N-type plugs are provided on the rear of the RAN cabinet for connecting the antenna coaxial cables. On the inside of the cabinet, coaxial jumper cables (included with the cabinet) are used for connecting to the antenna port on the appropriate multiplexer.

1.6.4 AC Power Wiring Entry and Grounding

The NXD RAN uses 240 VAC power. A one inch (2.54 cm), 90 degree rigid elbow conduit fitting is provided on the rear of the cabinet. The conduit should be routed to an external junction box (not provided). It is suggested that an external AC outlet (not provided) be installed near the cabinet to power test equipment and power tools. The AC source should supply 50/60 Hz, single-phase power through a circuit breaker rated at 20 Amps.

1.6.5 Ventilation

Ventilation openings are provided in the front door of the RAN cabinet to permit entry of air for cooling. A filter removes dirt particles so that only clean air enters the cabinet. The heated air exits the cabinet through the rear side. The four PAAs are each equipped with three cooling fans that pull air through the module and exhaust it to the rear of the cabinet. A fan assembly at the top of the RAN chassis forces the air out the rear side of the cabinet.

1.7 RAN Chassis and Electronic Modules

The RAN chassis, shown in Figure 6, is a standard Compact PCI (cPCI) shelf capable of housing 21 industry standard cPCI circuit cards (called "electronic modules" in this manual). The backplane supports the basic cPCI functions and it has been extended to allow the routing of DIF™, reference clocks and I2C signals between I2C modules. The RAN chassis also houses cooling fans within the Fan Access Panel on the top of the chassis. Table 3 identifies the electronic modules using the callout reference numbers from Figure 6.

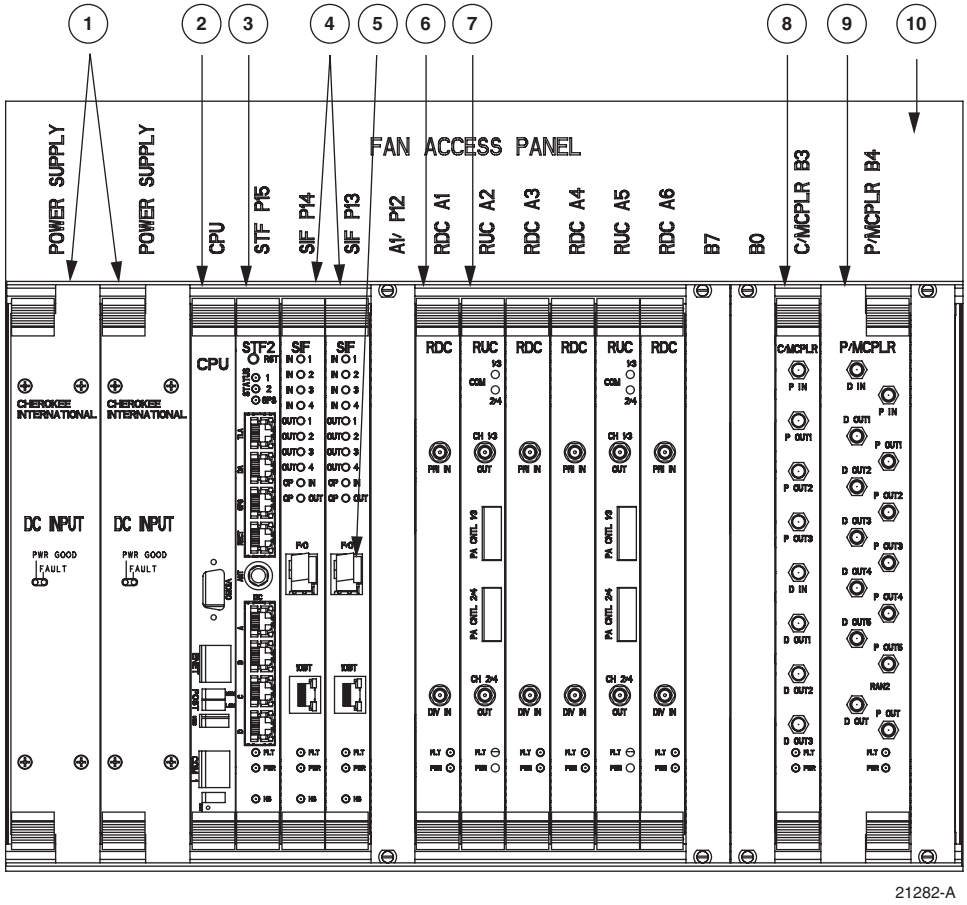

Figure 6. RAN Chassis

Table 3. RAN Chassis Electronic Modules

REF #	MODULE NAME	FOR DETAILS REFER TO
1	cPCI Power Supplies	Section 1.7.1 on Page 12
2	Central Processing Unit (CPU)	Section 1.7.2 on Page 13
3	System Interface (STF2)	Section 1.7.3 on Page 14
4	Synchronous Interface (SIF)	Section 1.7.4 on Page 15

Table 3. RAN Chassis Electronic Modules

REF #	MODULE NAME	FOR DETAILS REFER TO
5	Small Form-Factor Pluggable Optical Transceiver (SFP)	Section 1.7.5 on Page 17
6	RAN Down Converter (RDC or RDC2)	Section 1.7.6 on Page 17
7	RAN Up Converter (RUC2.X or RUC3)	Section 1.7.7 on Page 19
8	800 MHz Multi-Coupler	Section 1.7.9 on Page 20
9	1900 MHz Multi-Coupler	Section 1.7.10 on Page 22
10	Fan Access Panel	Section 1.7.8 on Page 20

Figure 7 is a schematic showing the data flow in the RAN chassis. As shown, data flows in two directions, from the Hub through the RAN to the antenna, and from the antenna through the RAN back to the Hub. In each direction, data conversion occurs, with optical data "upconverted" to RF data in the up direction in the schematic, and RF data "downconverted" to optical data in the down direction. In an up direction, the RUC module converts Digitized Intermediate Frequency (DIF) data into PCS, Cellular, and SMR frequency RF bands. The RF signals are amplified and then transmitted from the RF antenna. In the down direction, the RDC module converts PCS, Cellular, and SMR frequency bands into DIF data. The overall series of events is managed by the CPU using an Ethernet connection to the chassis backplane.

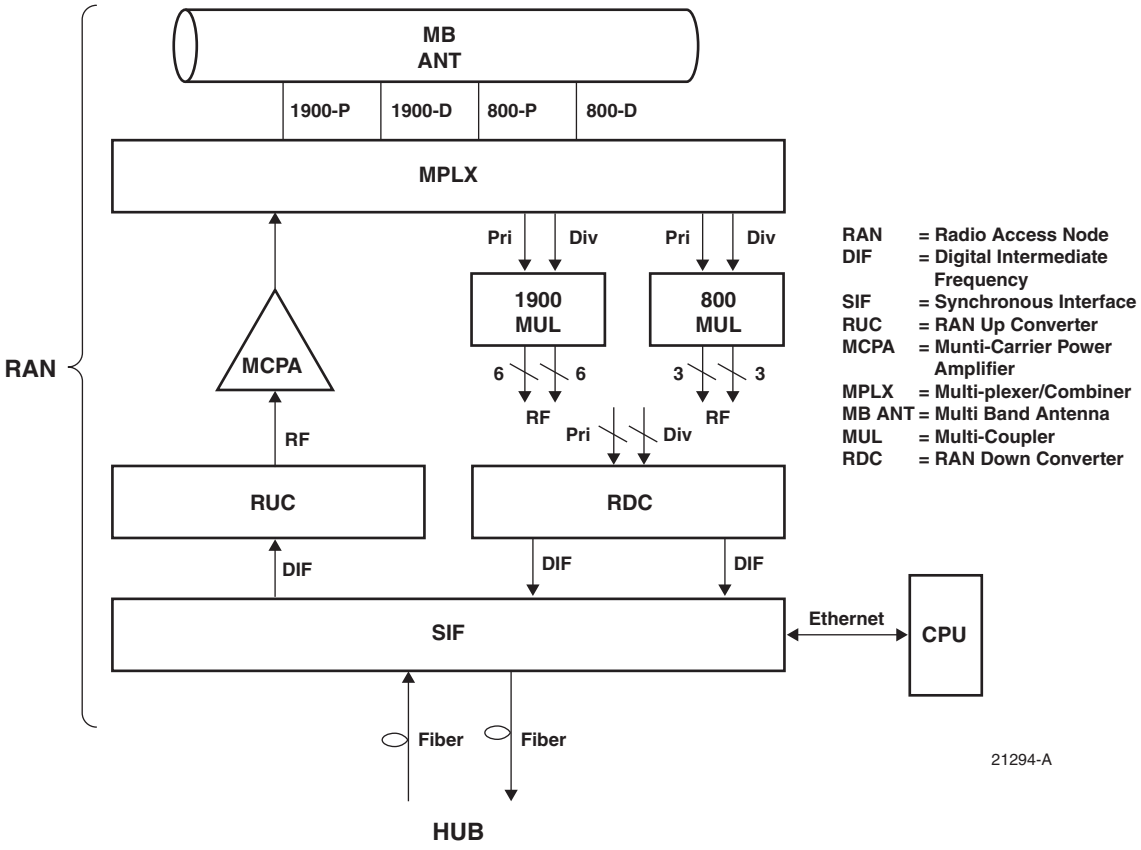

Figure 7. RAN Chassis Schematic

1.7.1 cPCI Power Supply Modules

The Compact PCI (cPCI) Power Supply Modules provide +/-12V, 5V, and 3.3V DC power to the cPCI backplane for use by the cPCI electronic modules. Each RAN requires one power supply module. Two modules can be used to provide redundancy if desired. These modules are hot swappable. Figure 8 shows the cPCI Power Supply Module faceplate. Table 4 describes the faceplate components called out in the figure.

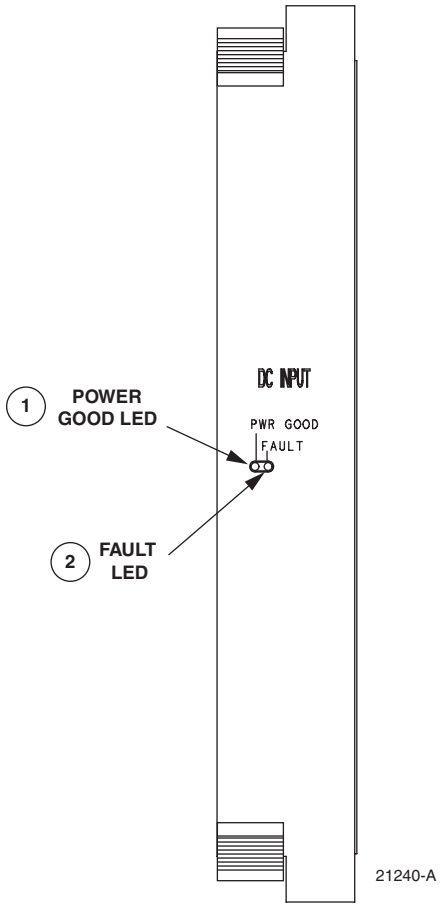

Figure 8. cPCI Power Supply Module Faceplate

Table 4. cPCI Power Supply Module Faceplate

Ref #	DESIGNATION	DEVICE	FUNCTIONAL DESCRIPTION
1	PWR GOOD	Single-color LED (green)	Power Good. Turns green when module has power
2	FAULT	Single-color LED (red)	Fault. Turns red when module has insufficient power to perform its function

1.7.2 Central Processing Unit (CPU) Module

The Central Processing Unit (CPU) Module is a cPCI-based, single-board x86 computer with disk running on a Linux operating system. Each RAN chassis has one CPU module. The CPU runs a process management program that manages all RAN hardware including RF and digital equipment. The program also manages RF signal gain and monitors signal presence and quality. Figure 9 shows the CPU module faceplate. Table 5 describes the faceplate components called out in the figure.

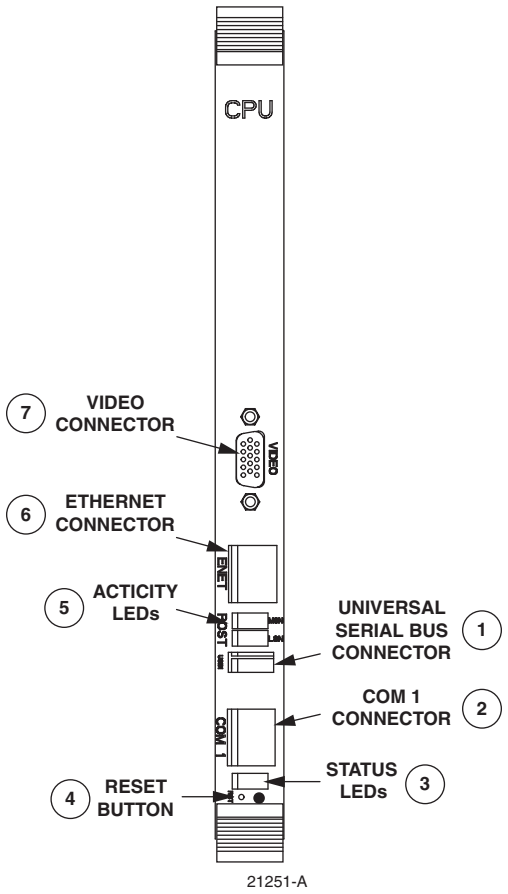

Figure 9. CPU Module Faceplate

Table 5. CPU Module Faceplate Components

REF #	DESIGNATION	DEVICE	FUNCTIONAL DESCRIPTION
1	USB1	USB connector	Front panel input/output for USB connectivity
2	COM 1	RJ-11C connector	Front panel interface for COM1
3	(Unmarked)	Status LEDs	LED 1 is POST (red on start-up, turns green on successful completion of start-up self test); LED 2 & 3 are undefined; LED 4 (blinking green) indicates disk or flash memory activitity

Table 5. CPU Module Faceplate Components

REF #	DESIGNATION	DEVICE	FUNCTIONAL DESCRIPTION
4	RST	Recessed switch	Reset. Used to manually reset the CPU
5	POST	Single-color LEDs (yellow)	Post. Top four LEDs give status of CPU during initial boot process; bottom four give board operation status
6	ENET	RJ-45 connector with single-color LEDs (green and yellow)	Ethernet. 10 BaseT. Connects to RJ-45 connector on SIF module (10BT port) using cable 1001478P001. Connection status (green) and 100 BT (yellow)
7	VIDEO	15-PIN VGA connector	Video. Not used by Digivance system

1.7.3 System Interface (STF2) Module

The System Interface (STF2) Module is a cPCI electronic module that provides the CPU and other electronic modules with the ability to communicate with one another using the four I2C buses on the cPCI backplane. One STF2 is used per RAN. The STF2 also has the GPS antenna input port located in the center of the module faceplate. STF2 modules are specified according to the number of qualifying communications devices being utilized. Table 6 describes the module faceplate components. Figure 10 shows the location of the faceplate components.

Table 6. System Interface Module Faceplate Components

REF #	DESIGNATION	DEVICE	FUNCTIONAL DESCRIPTION
1	RST	Recessed switch	Reset. Used to halt operation of the CPU operating system. A power ON reset is required to restart the CPU
2	STATUS 1	Single-color LED (yellow)	Reserved for future use. Indicator turns yellow when the CPU is not installed or has malfunctioned
3	STATUS 2	Single-color LED (yellow)	Reserved for future use. Indicator turns yellow when the CPU is not installed or has malfunctioned
4	STATUS GPS	Single-color LED (green)	Indicator showing that 1PPS signal is available. Led toggles once per second (RAN only)
5	DA	RJ-45 connector	Door Alarm. Input using cable 1001474P001; small LED on this connector lights (red) when door is open
6	GPS	RJ-45 connector	Not used
7	RECT	RJ-45 connector	Rectifier. Communications to rectifier using cable 1001476P001
8	(Unmarked)	Single-color LED (red)	I2C Error LEDs. One on each I2C RJ-45 connector. Indicator turns red when there is no response on port
9	(Unmarked)	Single-color LED (green)	I2C Comm LEDs. One on each I2C RJ-45 connector. Indicator turns green when an I2C message sent on the port
10	FLT	Single-color LED (red)	Fault. Indicator turns red when module has failed or upon startup until the module has completed initialization

Table 6. System Interface Module Faceplate Components

REF #	DESIGNATION	DEVICE	FUNCTIONAL DESCRIPTION
11	HS	Single-color LED (blue)	Not used
12	PWR	Single-color LED (green)	Power. Indicator turns green when module has power
13	I2C A-D	RJ-45 connectors	I2C (Bus). Connectors to I2C buses
14	ANT	SMA connector	Antenna. Input for GPS antenna signal
15	TLA	RJ-45 connector	Tower Light Alarm (unused)

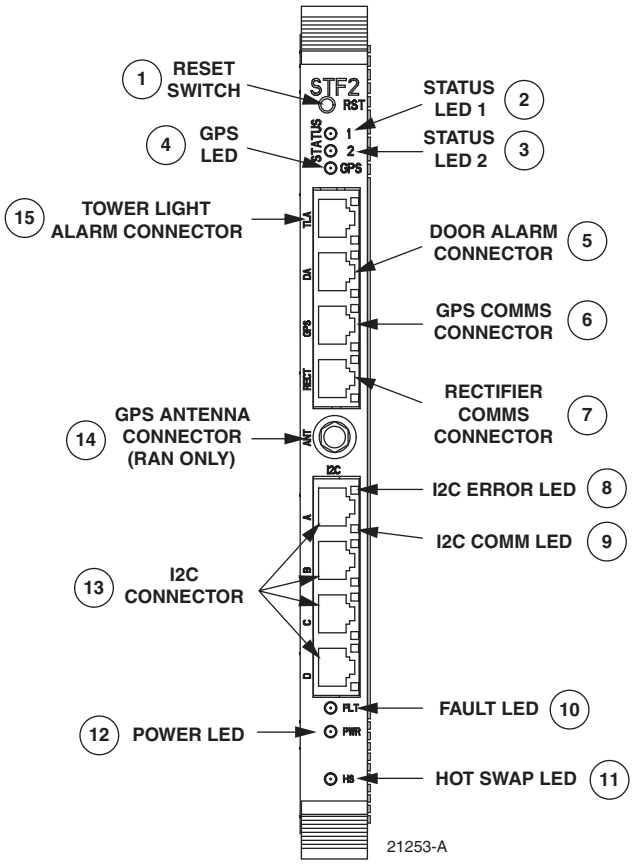

Figure 10. System Interface Module Faceplate

1.7.4 Synchronous Interface (SIF) Module

The Synchronous Interface (SIF) Module provides the optical interface between the Hub and the RAN. This interface provides for exchange of digitized RF signal information and 10BaseT Ethernet command and control information. Each RAN can have up to two SIFs, each handling two bands with diversity receive paths.

The SIF module is equipped with a small form-factor pluggable optical transceiver (SFP) module. (For more information on the SFP, see Section 1.7.5.) Figure 11 shows the SIF module faceplate. Table 7 describes the faceplate components.

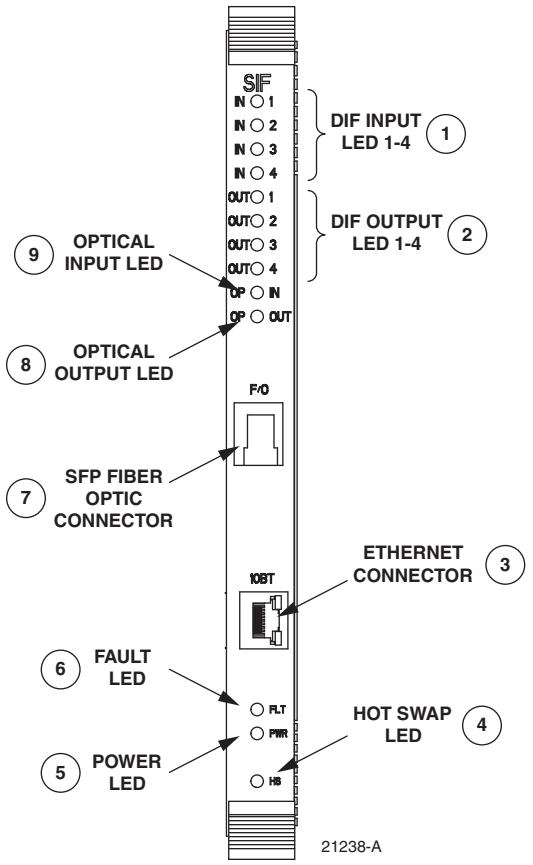

Figure 11. Synchronous Interface Module Faceplate

Table 7. Synchronous Interface Module Faceplate Components

REF #	DESIGNATION	DEVICE	FUNCTIONAL DESCRIPTION
1	IN 1-4	Tri-color LED (green/yellow/red)	In. Indicates if DIF input is not enabled (off), good (green), degraded (yellow), clock issue (blinking), or no DIF tone lock or unused channel (red)
2	OUT 1-4	Tri-color LED (green/yellow/red)	Out. Indicates if DIF output is not enabled (off), good (green), degraded (yellow), clock issue (blinking), or bad data on output of unused channel (red)
3	10BT	RJ-45 connector	10BaseT (Ethernet). Communications between SIF and CPU using cable 1001478P001
4	HS	Blue LED	Not used
5	PWR	Green LED	Power. Lights when module has power
6	FLT	Red LED	Fault. Lights when module has failed and during start-up until module is initialized

Table 7. Synchronous Interface Module Faceplate Components

REF #	DESIGNATION	DEVICE	FUNCTIONAL DESCRIPTION
7	F/O	Dual-LC connectors	Fiber/Optics. Optics connector on SFP optical transceiver
8	OP IN	Tri-color LED (green/yellow/red)	Optical In. Indicates input status of the SFP interface: not enabled (off), good (green), degraded (yellow), or bad output signals (red)
9	OP OUT	Tri-color LED (green/yellow/red)	Optical Out. Indicates output status of SFP interface: not enabled (off), good (green), degraded (yellow), or bad framing, bad parity, no signal, or no signal lock (red)

1.7.5 Small Form-Factor Pluggable (SFP) Optical Transceiver

The Small Form-Factor Pluggable (SFP) Optical Transceiver, located on the SIF module and shown in Figure 12, provides the optical interface between the Hub equipment and the RAN hardware. The SFP has a laser transmitter and an optical receive detector.

The Digivance NXD system uses industry standard SFP optics which offer a number of configuration options depending on the requirements of the project. The SFP modules are available separately and may or may not be installed in the SIF depending on the configuration ordered. The SFP module is specified as up to two per RAN and is able to support two bands with receive diversity.

The standard SFP module has an optical budget of 9 dB. The SFP module is factory and field replaceable with optical transceivers having extended optical budgets up to 26 dB or Coarse Wave-Division Multiplexing (CWDM) optical wavelengths.

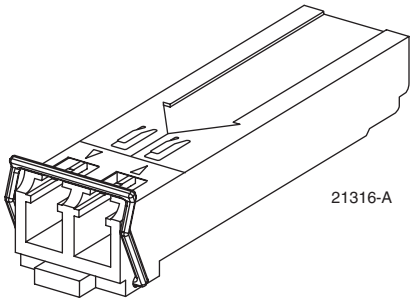

Figure 12. Small Form-Factor Optical Transceiver

1.7.6 RAN Down Converter (RDC or RDC2) Module

The RAN Down Converter (RDC or RDC2) Module is a cPCI electronic module housing a dual-diversity wideband RF receiver. This module takes PCS, Cellular, SMR A, and SMR B signals from a primary and secondary antenna (via the appropriate multicoupler) and converts the signals to Digitized Intermediate Frequency (DIF).

This module also provides a CW test tone for use in reverse continuity testing. The RF signals are input into the module by way of coax cables terminated with SMA connectors on the faceplate (at the ports labeled PRI IN and DIV IN). Figure 13 shows the module faceplate. Table 8 describes the module faceplate components called out in the figure.

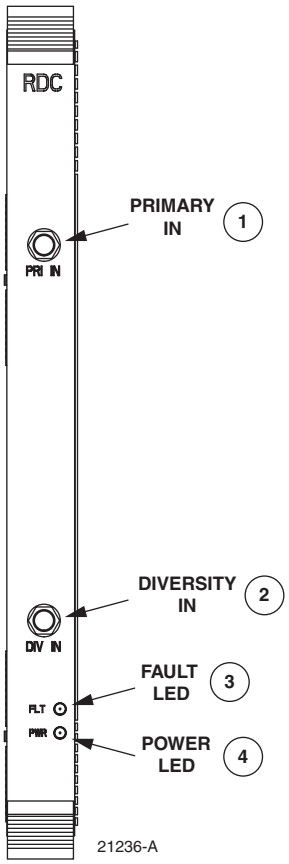

Figure 13. RAN Down Converter Module Faceplate

Table 8. RAN Down Converter Module Faceplate Components

REF #	DESIGNATION	DEVICE	FUNCTIONAL DESCRIPTION
1	PRI IN	SMA connector	Primary In. Receives RF primary output from either C/PMC-PLR or P/MCPLR module. Connection is made using cable 1955000P081
2	DIV IN	SMA connector	Diversity In. Receives RF diversity output from either C/PMCPLR or P/MCPLR module. Connection is made using cable 1955000P081
3	FLT	Red LED	Fault. Lights when module has failed and during start-up until module has initialized; blinks after module receives a system clock and is awaiting initialization
4	PWR	Green LED	Power. Lights when module has power

1.7.7 RAN Up Converter (RUC2.X or RUC3) Module

The RAN Up Converter (RUC2.X or RUC3) Module is a cPCI electronic module that takes Digitized Intermediate Frequency (DIF) signals from a DIF signal generated by the SIF and converts the signals to RF (PCS, Cellular, SMR A, and SMR B frequency bands). Each module supports two simultaneous bands via wideband outputs. The RUC also provides clocking for its neighboring RDC. For module faceplate and callouts, see Figure 14 and Table 9.

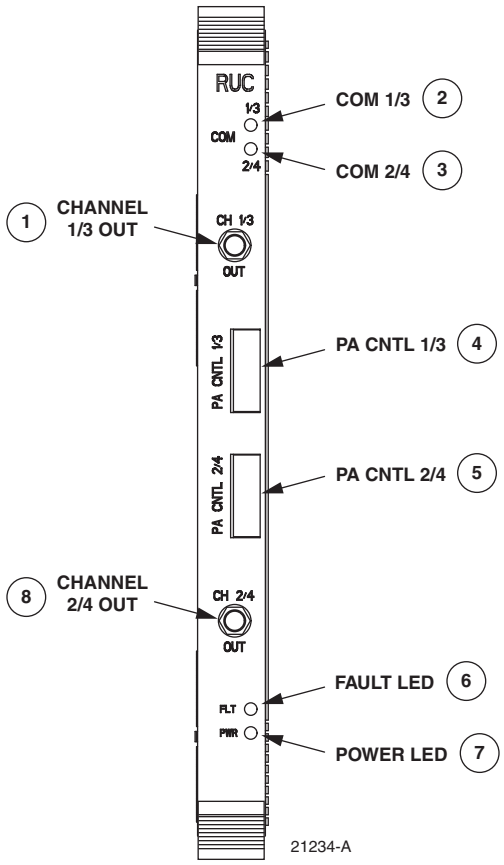

Figure 14. RAN Up Converter Module Faceplate

Table 9. RAN Up Converter Module Faceplate Components

REF #	DESIGNATION	DEVICE	FUNCTIONAL DESCRIPTION
1	CH 1/3 OUT	SMA connector	Channel 1/3 Out*
2	COM 1/3	Yellow LED	COM Port 1/3. Turns yellow when DIF is locked to SIF channel 1 or 3*
3	COM 2/4	Yellow LED	COM Port 2/4. Turns yellow when DIF is locked to SIF channel 2 or 4*
4	PA CNTL 1/3	I2C flatpack connector	PA Control Channel 1 or 3. Outputs control data to the PIC card on the PAA for the channel being provided (using cable 1955000P079)*

Table 9. RAN Up Converter Module Faceplate Components

REF #	DESIGNATION	DEVICE	FUNCTIONAL DESCRIPTION
5	PA CNTL 2/4	I2C flatpack connector	PA Control Channel 2 or 4. Outputs control data to the PIC card on the PAA for the channel being provided (using cable 1955000P079)*
6	FLT	Red LED	Fault. Turns red when the module has failed. Indicator is lit during start-up until module has initialized. Indicator will blink after module receives system clock and is awaiting initialization
7	PWR	Green LED	Power. Turns green when module has power
8	CH 2/4 OUT	SMA connector	Channel 2 or 4 OUT*

* An RUC in slot A2 will connect to PAAs 1 and 2. An RUC in slot A5 will connect to PAAs 3 and 4. Therefore, the RUC front panel indicators of 1/3 and 2/4 will map to PAAs 1 and 2 connections in slot A2 and PAA 3 and 4 connections in slot A5.

1.7.8 Fan Access Panel

The Fan Access Panel, shown in Figure 15, has a hinged front panel that swings down providing access to the two fans cooling the RAN chassis. These fans are user-replaceable. This panel has labels identifying the electronic modules located in the cPCI shelf below the panel.

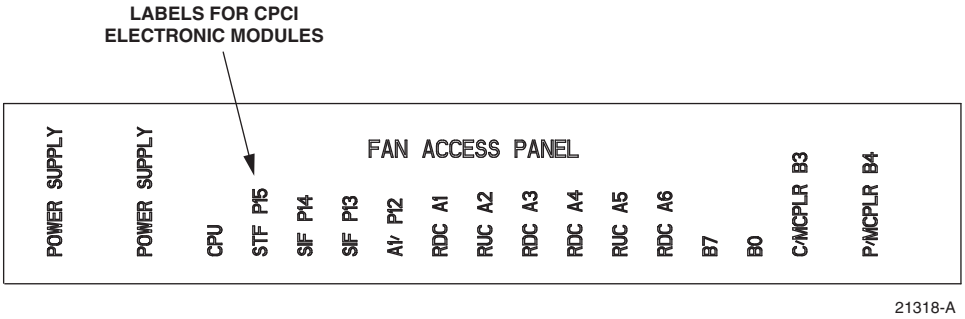

Figure 15. Fan Access Panel

1.7.9 800 MHz Multicoupler (C/MCPLR)

The 800 MHz (C/MCPLR) Module is a cPCI electronic module that houses the dual-diversity, receive unit for the 800 MHz bands. This module interfaces to the multiplexer system and contains the front end low noise amplifiers for the reverse path. The module has six outputs (Cell bands A, B, and 800 MHz, with diversity).

Figure 16 shows the location of the faceplate components. Table 10 describes the faceplate components.

Table 10. C/MCPLR Modules Faceplate Components

REF #	DESIGNATION	DEVICE	FUNCTIONAL DESCRIPTION
1	P IN	SMA connector	Primary In. Receives RF primary reverse path input from primary antenna
2	D IN	SMA connector	Diversity In. Receives RF diversity reverse path input from secondary antenna
3	P OUT	SMA connectors	Primary Out. 3 primary outputs (Cell bands A, B, and SMR-A). Each output being used connects to one RDC electronic module, either in the same RAN or in the extension RAN if present. Connection is made using cable 1955000P081
4	D OUT	SMA connectors	Diversity Out. 3 diversity outputs (Cell bands A, B, and SMR-A). Each output being used connects to one RDC electronic module, either in the same RAN or in the extension RAN if present. Connection is made using cable 1955000P081
5	FLT	Red LED	Fault. Lights when module has failed and during start-up until module has initialized
6	PWR	Green LED	Power. Lights when module has power

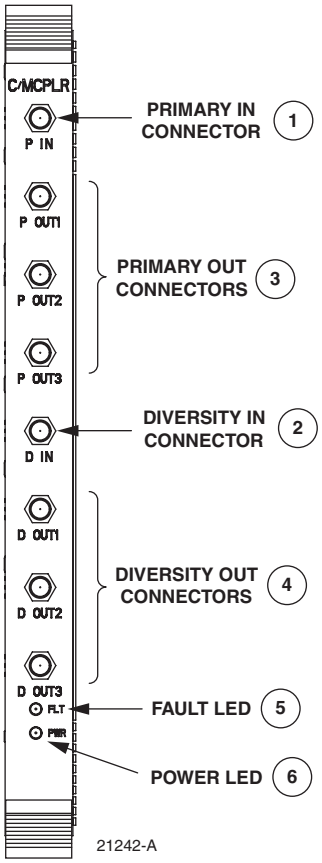

Figure 16. C/MCPLR Module Faceplate

1.7.10 1900 MHz Multicoupler (P/MCPLR)

The 1900 MHz (P/MCPLR) Module is a cPCI electronic module that houses the dual-diversity, receive unit for the PCS band. This module interfaces to the multiplexer system and contains the front end low noise amplifiers for the reverse path. The PCS band has 12 outputs (bands A-F, with diversity). Figure 17 shows the location of the faceplate components. Table 11 describes the module faceplate components.

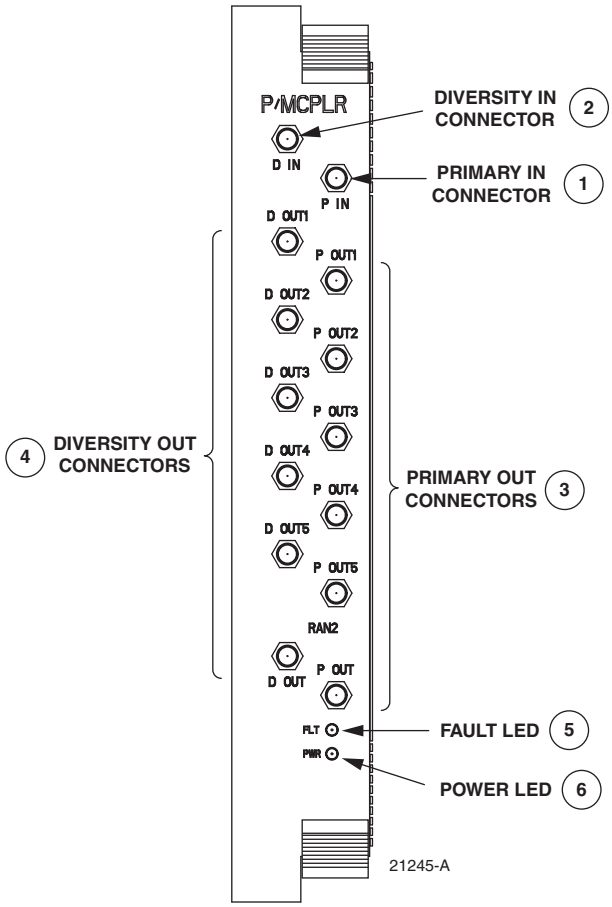

Figure 17. P/MCPLR Modules Faceplates

Table 11. P/MCPLR Modules Faceplate Components

REF #	DESIGNATION	DEVICE	FUNCTIONAL DESCRIPTION
1	P IN	SMA connector	Primary In. Receives RF primary reverse path input from primary antenna
2	D IN	SMA connector	Diversity In. Receives RF diversity reverse path input from secondary antenna
3	P OUT	SMA connectors	Primary Out. 6 primary outputs (bands A-F); each output being used connects to one RDC module, in either same RAN or extension RAN if present. Connection is made using cable 1955000P081

Table 11. P/MCPLR Modules Faceplate Components

REF #	DESIGNATION	DEVICE	FUNCTIONAL DESCRIPTION
4	D OUT	SMA connectors	Diversity Out. 6 diversity outputs (bands A-F); each output being used connects on one RDC module, in either same RAN or extension RAN if present. Connection is made using cable 1955000P081
5	FLT	Red LED	Fault. Lights when module has failed and during start-up until module has initialized
6	PWR	Green LED	Power. Lights when module has power

1.8 Rectifier Shelf

The Rectifier Shelf, shown in Figure 18, is a chassis/backplane device that contains rectifier modules and a Low Voltage Disconnect (LVD) unit. The shelf interconnects the rectifier modules and LVD unit, and provides an interface to external connectors.

Typically, the rectifier shelf contains two rectifier modules. The center panel on the shelf can be removed to add a third rectifier, providing N+ redundancy as more equipment is added to the RAN chassis.

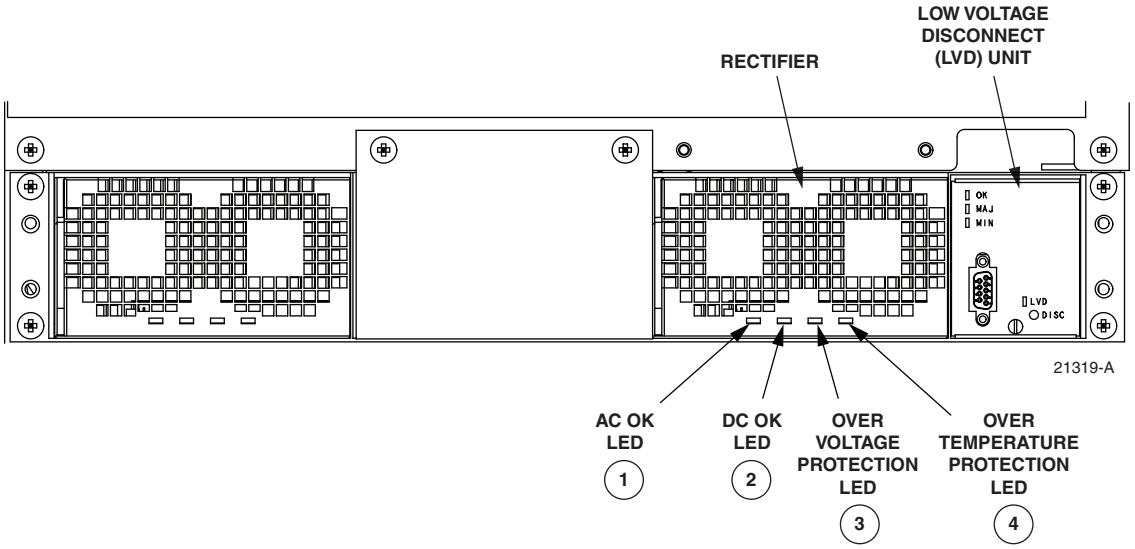

Figure 18. Rectifier Shelf

1.8.1 Rectifier Module

The rectifier module converts 240 VAC prime power into -48 VDC for use within the RAN. Each rectifier has four LEDs, shown in Figure 18 and described in Table 12. The rectifiers are controlled by the LVD unit under command of the STF2 module.

Table 12. Rectifier Indicators

REF #	DESIGNATION	DEVICE	FUNCTIONAL DESCRIPTION
1	(Unmarked)	Green LED	AC OK. Lights when AC power is present
2	(Unmarked)	Green LED	DC OK. Lights when rectifier is limiting current
3	(Unmarked)	Red LED	Over Voltage Protection. Lights when rectifier has failed
4	(Unmarked)	Red LED	Over Temperature Protection. Lights when over temperature compensation circuit is active

1.8.2 Low Voltage Disconnect (LVD) Unit

The Low Voltage Disconnect (LVD) Unit (Figure 19) disconnects power automatically when the RAN voltage falls below a specified minimum. The LVD unit also manages the backup batteries (extended or glitch).

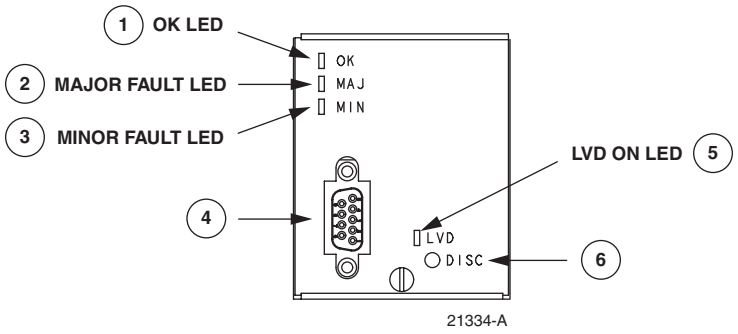

Figure 19. Low Voltage Disconnect Unit

Table 13. LVD Indicators

REF #	DESIGNATION	DEVICE	FUNCTIONAL DESCRIPTION
1	OK	Green LED	Okay. Lights when power system is functioning correctly
2	MAJ	Red LED	Major Fault. Lights when a major fault exists
3	MIN	Yellow LED	Minor Fault. Lights when a minor fault exists
4	(Unmarked)	9-pin connector	Connector for cable 1001476P001 to the RECT (RJ45 connector) port on the STF module
5	LVD	Red LED	Low Voltage Disconnect. Lights when switch has closed due to low voltage
6	DISC	Switch	Disconnect. Pressing this switch disconnects the backup batteries

1.9 Power Amplifier Assembly

The Power Amplifier Assembly (PAA) is an electronic device that amplifies RF signals in the forward path just before they are transmitted to the RAN antenna. Up to four PAAs may be mounted in the RAN, each providing one band. Each PAA consists of a Power Amplifier (PA), a control board called the PA Interface Controller (PIC), and a cooling system. The PA is multi-channel. Different units are used for PCS, Cellular, and SMR 800 bands.

The PIC interfaces to the discrete signals of the PA. The PIC also provides DC power to the PA by converting from -48 VDC to +12 VDC or +28 VDC depending upon which PA is being used. Each PA has its own PIC. The PIC is managed is managed by the CPU over an I2C connection through its corresponding RUC. The cooling system consists of a heat sink and three fans that provide cooling for the PA by blowing external air across the heat sink. The fans are software-controlled. The PIC module monitors the tachometer outputs of the fan.

Figure 20 shows the PA assembly connection points and indicators. Table 14 describes the items called out in the figure.

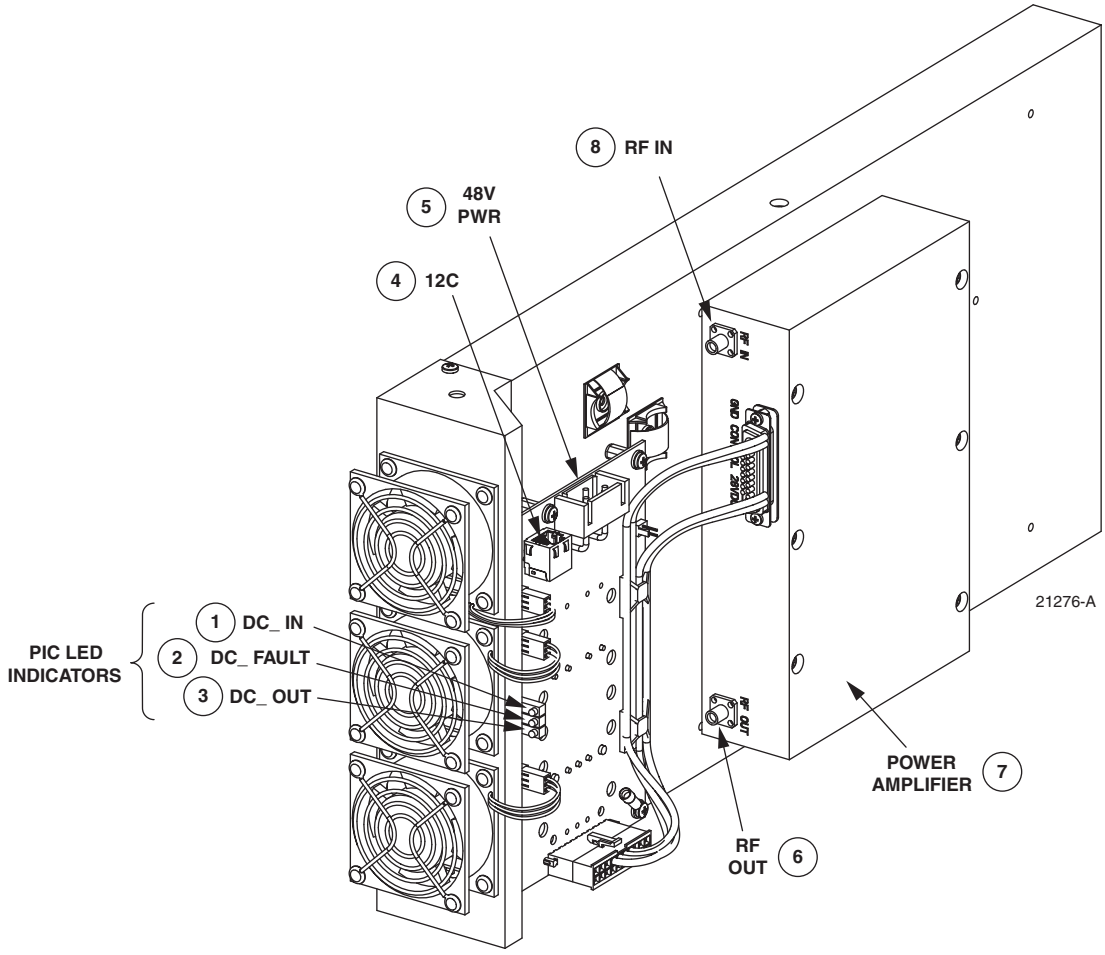

Figure 20. Power Amplifier Assembly

Table 14. PAA Connection Points and Indicators

REF #	DESIGNATION	DEVICE	FUNCTIONAL DESCRIPTION
1	DC_IN	Green LED	DC In. Lighted when PIC has -48 VDC input
2	PA_FAULT	Red LED	PA Fault. Lighted when PA has failed
3	DC_OUT	Green LED	DC Out. Lighted when PIC has +28 VDC output
4	I2C	RJ-45 connector (J1)	I2C (Bus). Connection to RUC module P/A CNTRL using cable 1001475P001
5	48V PWR	Positronic 3-pin connector (J2)	48 Volt DC Power. Input to PIC for -48 VDC using PIC power harness 1001471P001
6	RF OUT	SMA connector	RF Out. Output of PA for cable 1955000P080 to one of the four plexers (depending on band), connector port TX
7	(Unmarked)	Power Amplifier	Power amplifier (see description on preceding page)
8	RF IN	SMA connector	RF In. Input from RUC for cable 19559999P079

1.10 Multiplexer System

The NXD RAN multiplexer system consists of four units that interface to the antenna, PAs, and multicouplers. There are four types found in found in every RAN:

- Quadplexer Primary (PCS Bands A, B, F), interfaces to PCS primary antenna;
- Quadplexer Diversity (PCS Bands D, E, C), interfaces to PCS diversity antenna;
- Triplexer Primary (Cellular Band B, SMR800 band), interfaces to 800 MHz primary antenna;
- Diplexer Diversity (Cellular Band A), interfaces to 800 MHz diversity antenna.

For a schematic of the PCS multiplexers, see Figure 21. For a schematic of the Cellular/SMR multiplexers, see Figure 22.

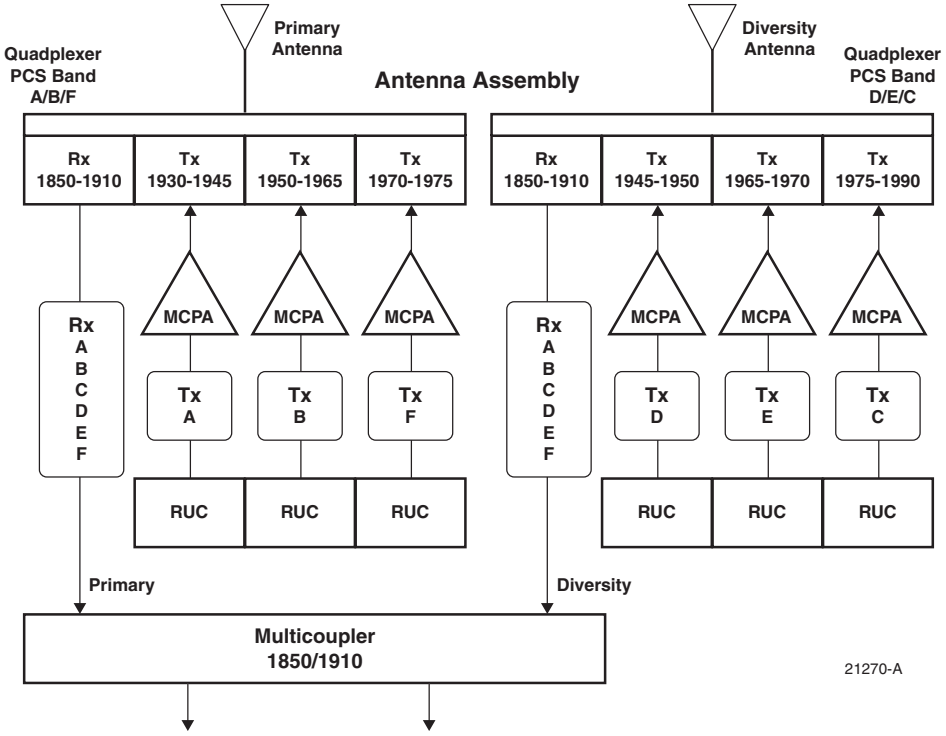

Figure 21. PCS Multiplexers

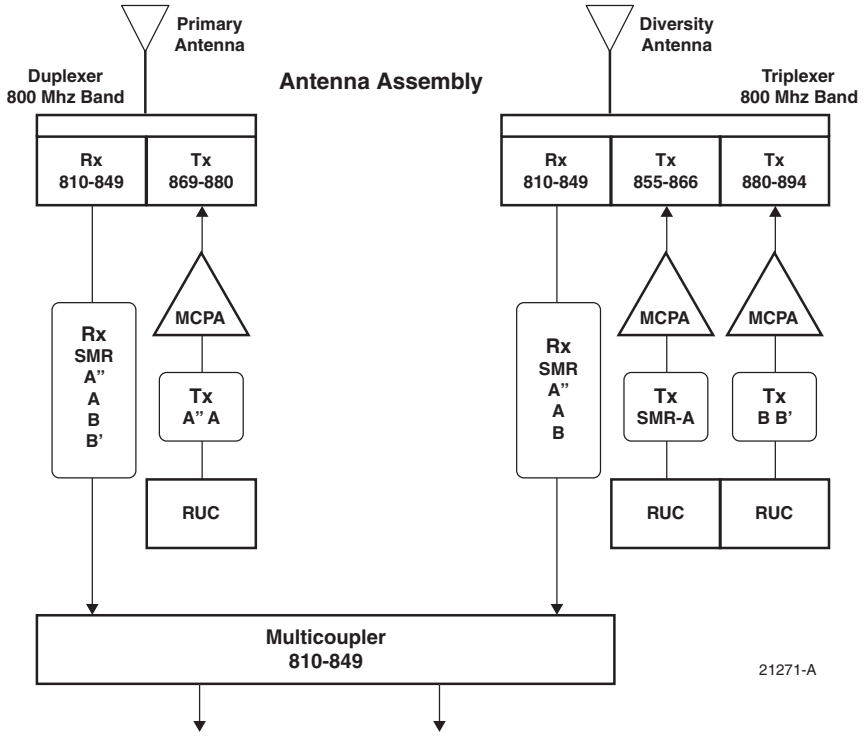

Figure 22. Cellular/SMR Multiplexers

1.11 Circuit Breaker Panel

The Circuit Breaker Panel, shown in Figure 23, contains five circuit breakers. It distributes the RAN's -48 VDC power and protects the RAN's electronics. Table 15 gives the circuit breaker functions. Table 16 describes the panel LEDs.

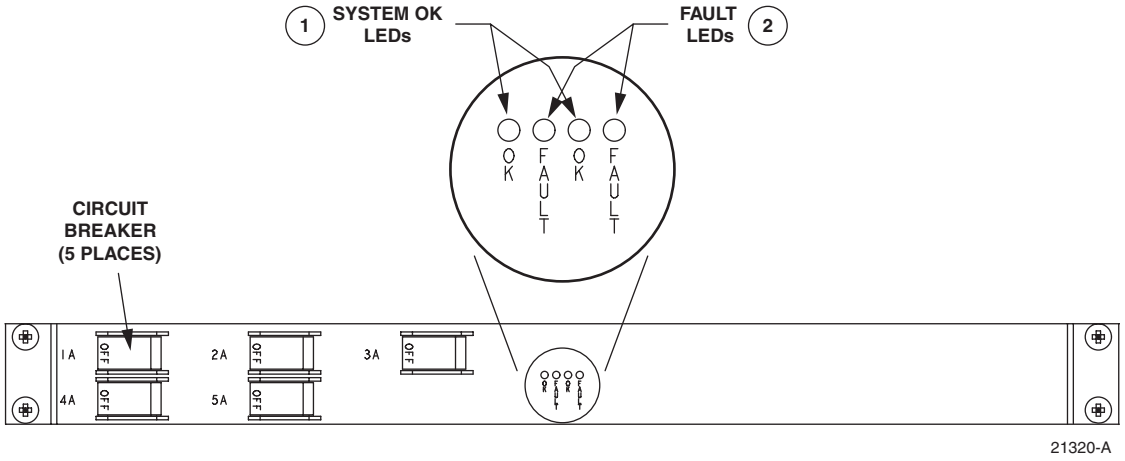

Figure 23. Circuit Breaker Panel

Table 15. Circuit Breaker Functions

BREAKER	FUNCTION
1A	PA1
2A	PA2
3A	PA3
4A	PA4
5A	cPCI chassis

Table 16. Circuit Breaker Panel LEDs

REF #	DESIGNATION	DEVICE	FUNCTIONAL DESCRIPTION
1	OK	Green LED	Okay. Lights when AC power is present
2	FAULT	Red LED	Fault. Lights when rectifier is limiting current

1.12 Backup Batteries

The NXD RAN has two backup battery options:

- **Extended Batteries:** provide backup protection for up to two hours. These are four 12V, 85-100 AH internal batteries connected in series for a -48V system. The four batteries together with associated wiring and hardware weigh 325 pounds (147.7 kg).

- **Glitch Batteries:** provide backup protection for up to five minutes. These are small, motorcycle type batteries connected in a series configuration.

1.13 Antenna

ADC provides a pole-mount antenna kit for use when the RAN is mounted on a wooden utility pole. The kit must be separately ordered from the RAN. Pole mounting is the most common type of RAN installation.

The antenna offered interfaces with the PCS and Cellular/SMR bands and supports two branch diversity receive paths. Also included in the kit is the GPS antenna used by the RAN.

The RAN may also be mounted outdoors on a concrete pad. This type of installation may use a conventional directional antenna in either a sector or quasi-omni antenna configuration, depending on the coverage objective and design. Proper antenna selection and the mounting installation are the responsibility of the design engineer.

Antenna installation is covered in separate publications, available for downloading from the ADC web site, www.adc.com. Refer to RELATED PUBLICATIONS on Page vii.

2 STANDARD INSTALLATION PROCEDURES

This section provides the standard procedures for a typical installation. The RAN may be installed either on a wooden pole or on a concrete pad.

This section is organized as follows:

- Sections 2-1 through 2-4 provide information that is relevant before installing the cabinet. These subsections contain an installation overview, unpacking instructions, a list of required material and tools, and site preparation guidelines.
- Section 2-5 tells how to install a cabinet on a wooden utility pole. Included are instructions for installing the pole mount bracket and then installing the cabinet on the bracket. Also included are instructions for installing the rain shields.
- Section 2-6 tells how to install the RAN on a concrete pad. Included are instructions for pouring the concrete pad, mounting the RAN on the pad, and installing the pedestal enclosure.
- Section 2-7 contains other standard procedures typically done at every installation. These procedures describe how to install the solar shield, grounding wire, RF cables, fiber optic cable, AC power, and backup batteries.

Note: Section 3 contains instructions for installing a second RAN at the same location. Section 4 provides information on non-standard installation procedures such as installing an electronic module.

Installation of the RAN cabinet may proceed separately from the installation of the corresponding Hub equipment. When the installation of the RAN is completed, refer to the

Digivance NXD Multi-Band Distributed Antenna System Operation Manual (ADCP-75-209) for system turn-up and test procedures.

The procedures in this section assume that the required Outside Plant (OSP) fiber optic cable has already been routed between the Hub and the RAN, that the required antenna has been installed, and that a coaxial cable terminated with an N-type connector has been routed to the RAN from the antenna.

⚠ **Danger:** *Wet conditions increase the potential for receiving an electrical shock when installing or using electrically-powered equipment. To prevent electrical shock, never install or use electrical equipment in a wet location or during a lightning storm.*

⚠ **Caution:** *Always allow sufficient fiber length to permit routing of patch cords and pigtails without severe bends. Some fiber optic patch cords or pigtails may be permanently damaged if bent or curved to a radius of less than 2 inches (50 mm).*

2.1 Installation Overview

A standard (typical) installation of the RAN consists of the following steps:

⚠ **Warning:** *Electronic components can be damaged by static electrical discharge. To prevent ESD damage, always wear an ESD wrist strap when handling electronic components.*

➧ **Note:** To insure that all optical connectors and optical ports remain dust-free during installation, leave all dust caps and dust protectors in place until directed to remove them for installation.

1. Checking out and preparing the installation site.
2. Unpacking and inspecting the shipped items.
3. Installing a pole mount frame or pedestal mount.
4. Installing the RAN cabinet on the pole or pad.
5. Installing the rain shields (pole mount) or pedestal enclosure (pad mount).
6. Installing the solar shield.
7. Installing a ground wire.
8. Connecting RF cables between the antenna and RAN.
9. Installing the fiber optical cable that connects the RAN to the Hub.
10. Installing AC power.
11. Installing backup batteries in the cabinet.

2.2 Unpacking and Inspection

The RAN is shipped to the field pre-configured with all modules and components that the customer has ordered. Electronic modules except for the batteries are shipped already installed in the cabinet.

The following optional accessories may also be shipped with the RAN:

- Back-up batteries
- Non-standard SFP optical transceiver

Use the following procedure to unpack and inspect the RAN components:

1. Open the shipping cartons and carefully unpack each component from the protective packing material.
2. Check each component for broken or missing parts. If there are damages, contact ADC for an RMA (Return Material Authorization) and to reorder if replacement is required. For contact information, refer to Section 6 on Page 72.

2.3 Required Materials and Tools

The following materials must be supplied by the installer:

- (Pole mount only) Three galvanized steel square headed bolts with minimum tensile strength of 20,050 lbs., 3/4 in. diameter, and of a length appropriate to pole diameter; Three nuts for bolts, three flat washers, three split ring washers, and three 3-in. square curved washers (see Figure 26 on Page 39)
- (Pad mount only) Four 1/2 in. diameter galvanized steel bolts with four lock washers, four flat washers, and four concrete anchors (see Figure 28 on Page 41)
- 3M 8426-9M cold shrink
- 3M Skothkote Electrical Coating 14853
- Ten Type N plugs (CommScope PN: 540ANM or equivalent)
- Coaxial cable (CommScope PN: FXL540OPE or equivalent)
- Electrician’s tape
- Water seal
- Electrical conduit
- Conduit fittings
- Connector sealant material
- Panduit LLCF6-14B-L or equivalent (X2)
- Two-hole compression lug terminal for #6 AWG wire
- Ground rod
- Connector for attaching #6 AWG grounding wire to approved ground source

The following tools are required to perform this procedure:

- Torque wrench
- Drill
- Drill bit (appropriate for pole width and 3/4 in. bolts)
- 7/16 in. open-end wrench
- Compression pliers for #6 AWG grounding lug
- Wire cutters
- Wire strippers
- Conduit cutter
- Conduit bender

2.4 Site Preparation

This section describes site preparation for installation and is presented only as a guideline for a typical RAN installation.

2.4.1 Space Requirements

When an installation site for the RAN is selected, either on a utility pole or concrete pad, care must be exercised to ensure that the site provides adequate space and clearance to accommodate the current installation and any future upgrades. Table 17 gives RAN dimensions.

Table 17. RAN Dimensions

CONFIGURATION	WIDTH	HEIGHT	DEPTH
RAN	31.35 in. (76.7 cm)	36.5 in. (92.7 cm)	27.5 in. (69.9 cm)
Dual RAN	31.25 in. (76.7 cm)	72 in. (182.9 cm)	27.5 in. (69.9 cm)

2.4.2 Power Requirements

Power must be available at the RAN site. The RAN requires 240 VAC, single phase, 20 Amps service. Included with the power meter must be surge protection and circuit breakers.

The RAN can have up to three 1500 watt rectifiers. For the minimum specified voltage (176 VAC), each can draw up to 10 amps. The RAN will draw up to 1800 watts normally, but when batteries are re-charging that amount will increase the current draw into a RAN to up to 16 Amps. Therefore, one 20 Amps service is required per four band RAN.

In a pole mount installation, the power meter is typically installed on the pole below the unit in separate boxes. In a concrete pad installation, an external junction box is typically placed near the RAN providing AC power, surge protection, and circuit breakers.

2.4.3 Antenna Requirement

ADC offers a pole-mount antenna kit (accessory) for use when the RAN is mounted on a wooden utility pole. Either a 2 in. (5.08 cm) O.D. model or a 9 in. (22.86 cm) O.D. model can be ordered. Pole mounting is the most common installation. The antenna interfaces with the PCS and Cellular/SMR bands and supports two branch diversity receive paths. Also included in the kit is the GPS antenna used by the RAN. Installation instructions for the pole mount antenna are included with the kit.

When the RAN is mounted on a concrete pad, a conventional directional antenna may be used (customer supplied). The antenna may be set to operate in either a sector or quasi-omni configuration, depending on the coverage objective and design. Proper antenna selection and the mounting installation are the responsibility of the design engineer.

2.4.4 RF Cable Requirements

RF cables are required at the installation site to provide the physical link between the RAN and the antenna. In a pole-mount installation, U-duct of an appropriate size is also required to cover the RF cables on the pole. The U-duct provides only physical protection. It should not be considered to provide electrical isolation from conductors on the pole. Adequate clearance must be obtained for the routing of these cables past the existing services as defined in the previous topic. In a concrete pad installation, RF cables from the antenna are routed and protected per the installation plan provided by the design engineer.

2.4.5 Fiber Requirements

Optical fibers are required at the site to provide the physical link between the RAN and the Hub. In a typical installation, the identified fibers are broken out of a multi-fiber sheath and routed to a splice box where they are spliced to pigtails connecting the main sheath to the RAN. The actual fiber bundle location on the utility pole may vary per the agreed to attachment point. Refer to Figure 24. The nylon cable connector on the rear of the RAN accommodates cables of a diameter in the range .38 to .50 inches (.97 to 1.27 cm). For larger size cables, refer to Section 1.6.2 on Page 9.

2.5 Installing a RAN Cabinet on a Wooden Utility Pole

Figure 24 shows the main components and their spatial placement in a typical NXD RAN pole mount installation.

2.5.1 Site Requirements Unique to Pole Mounting Locations

If power lines are present at the top of the pole, spacing requirements applicable to the RF cabling and any other hardware installed in the electric space must be considered. Per the National Electrical Safety Code, vertical clearance at supports for primary-supply conductors above other facilities is required to be 16 in. (40.64 cm) above neutrals and 40 in. (101.6 cm) above communications (60 in. [152.4 cm] if above 8700V).

For supply conductors at voltages up to 8700 between conductors, the minimum horizontal clearance provided by the NESC ANSI C2 is 12 in. (30.5 cm). For higher voltages, it is required that .4 in. (10.2 mm) be added for every 1000V above 8700. Table 18 lists the required clearances for some common high voltages.

Table 18. Antenna Clearance vs. Voltage

VOLTAGE	HORIZONTAL CLEARANCE
8700V	12.0 in. (30.5 cm)
15 kV	14.52 in. (36.9 cm)
28 kV	19.72 in. (50.1 cm)
38 kV	23.72 in. (60.2 cm)

This information is from the Standard Handbook for Electrical Engineers, 13th Edition, McGraw Hill, Chapter 18, Section 151, Pages 18-65.

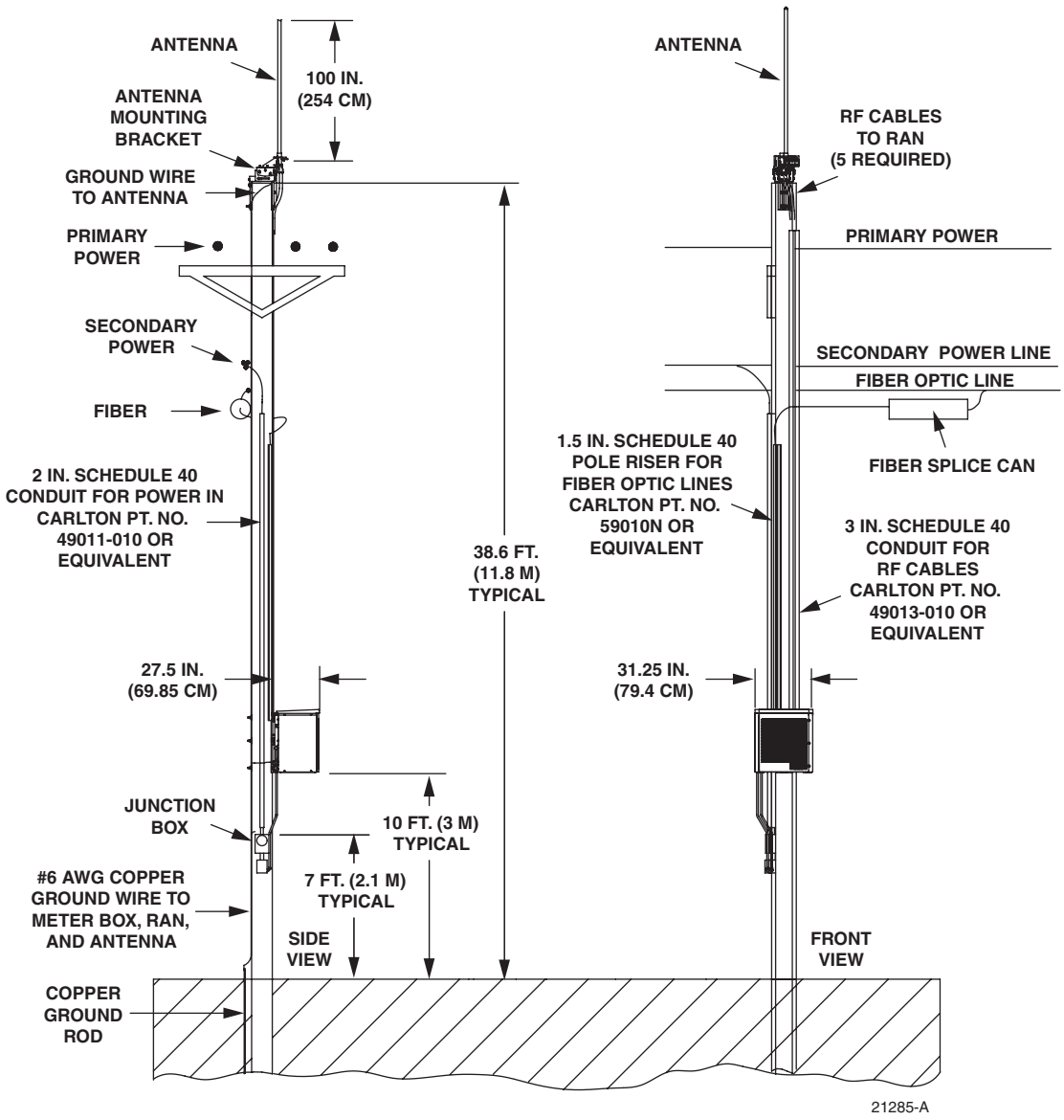

Figure 24. Typical Pole-Mount Installation

2.5.2 Pole Loading Analysis

A pole loading analysis should be performed before the RAN is mounted on the pole to verify that the pole can support the weight of the RAN in various conditions. The analysis should take into account the pole top antenna, the RAN and batteries, and the possibility of an expansion RAN with batteries. Table 19 lists the weights of various NXD components and configurations.

Table 19. RAN Component Weights

CONFIGURATION OR COMPONENT	WEIGHT
Base RAN without batteries	379 lbs. (172.3 kg)
Base RAN with four batteries	679 lbs. (308.6 kg)
Expansion RAN with four batteries	619 lbs. (281.4 kg)
Antenna pole-mount bracket (9 inch)	56 lbs. (25.5 kg)
Antenna pole-mount bracket (2 inch)	57 lbs. (25.9 kg)
Pole-top antenna (9 inch)	47 lbs. (21.4 kg)
Pole-top antenna (2 inch)	12 lbs. (5.5 kg)

Three load types should be considered: static weight loading, ice loading, and wind loading. These types should be considered on the pole, wires, and any equipment installed on the pole. A qualified engineer should perform the pole loading analysis, taking into account both vertical and horizontal forces. The specified horizontal load is applied 2 ft. (60.1 cm) from the top and the assumption is that the pole acts as a cantilever with maximum stresses applied at the ground level. Table 20 provides acceptable loads by pole class.

Table 20. Loading by Pole Class

POLE CLASS	HORIZONTAL LOAD
1	5400 lbs. (2454.5 kg)
2	3700 lbs. (1681.8 kg)
3	3000 lbs. (1363.6 kg)

The strength of the wood pole is defined in Standard Handbook for Electrical Engineers, 13th Edition, McGraw Hill, Chapter 18, Section 135, “Strength of Wood Poles,” Pages 18-57. The wood pole strength calculation is defined in Standard Handbook for Electrical Engineers, 13th Edition, McGraw Hill, Chapter 18, Section 136, Reference NEC.

2.5.3 Installing the Cabinet Mounting Bracket

The Digivance NXD Wood Pole Mounting Bracket, shown in Figure 25, is an accessory item that is used to attach the Digivance NXD cabinet to a power distribution pole or related object. The bracket is attached to the pole using galvanized steel square head bolts that are attached through holes drilled through the wooden pole. An example of an installed NXD wood pole mounting bracket is shown in Figure 25.

Use the following procedure to install the RAN wood pole mounting bracket:

1. Determine the mounting height of the RAN and mark the pole at the desired location of the base of the RAN.

Note: Install the RAN pole mount bracket on the side of the utility pole assigned by the utility company or required by local zoning.

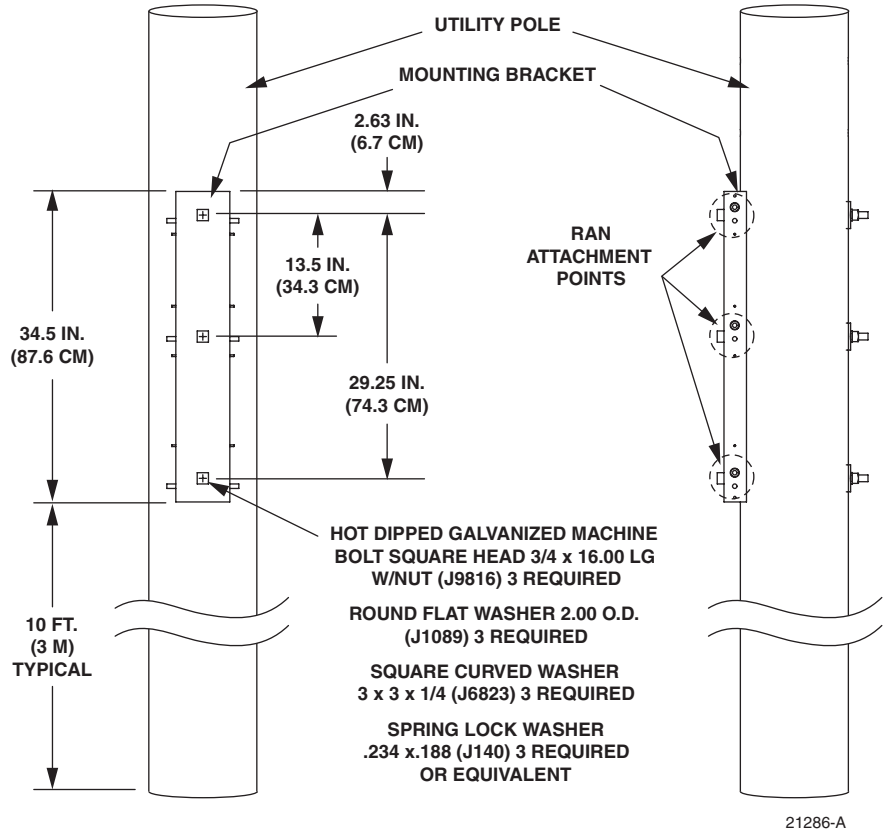

Figure 25. Cabinet Mounting Bracket

2. Place the pole mount bracket against the pole.
3. Strap or otherwise hold the bracket in place.
4. Using a level, adjust the bracket to make it vertically level.
5. Mark the three holes to be drilled through the wood pole.
6. Remove the pole mount bracket.
7. Drill three holes through the pole using a 7/8 in. wood bit.
8. Using a 3/4 in. machine bolt, put a 2 in. flat washer on the bolt.
9. Place the pole mounting bracket against the pole.
10. Align the holes in the bracket with the holes drilled in the pole.
11. Install one bolt through the bracket and pole (using any of the three holes).
12. Place a 3 in. square curved washer, lock washer, and 3/4 in. nut on the other end of the machine bolt; do not tighten.
13. Repeat steps 8-12 for the other two holes.
14. Using a 1-1/8 in. wrench, tighten the mounting hardware to 103 ft.-lbs.

2.5.4 Mounting the RAN Cabinet on the Bracket

The cabinet is shipped with the mounting hardware required for mounting the RAN cabinet on the RAN wood pole mounting bracket. The hardware consists of six 1/2 in. bolts, six nuts, 12 lock washers, and 12 flat washers. Use the following procedure to mount the cabinet. Refer to Figure 26.

Caution: *Do not install batteries in the RAN prior to mounting the RAN securely on the utility pole.*

1. Remove the RAN from the mounting pallet.
2. Securely attach the boom truck cable to the four hoist eyes of the RAN.
3. Carefully raise the RAN toward the cabinet mounting bracket.
4. With a person in the bucket truck and positioned at the RAN pole mounting bracket, guide the RAN onto the RAN pole mounting bracket so that the RAN holds onto the studs on the mounting bracket.

Note: Once the RAN is hung on the studs, the through bolts will self-align.

5. Place a lock washer and a flat washer on a 1/2 in. by 1-3/4 in. bolt.
6. Screw the bolt in hand tight.
7. Repeat the previous two steps for the remaining five mounting holes.
8. Install a flat washer, lock washer, and nut on each of the six studs.
9. Using a 3/4 in. wrench, tighten the bolts to 75 ft.-lbs.
10. Carefully detach the boom truck cable from the hoist eye of the RAN.
11. Remove the hoist eyes by unscrewing from the RAN top.

2.5.5 Installing the Rain Shields

There are two rain shields to be installed on the rear of the RAN. They are identified as “rain shield right” and “rain shield left.” Use the following procedure to install the rain shields. Refer to Figure 26.

1. Using the supplied hardware, place the left rain shield over the three studs in the pole mount bracket and three studs on the RAN.
2. Place a lock washer then a nut on each stud.
3. Using a nut driver or wrench, tighten to 6 ft.-lbs.

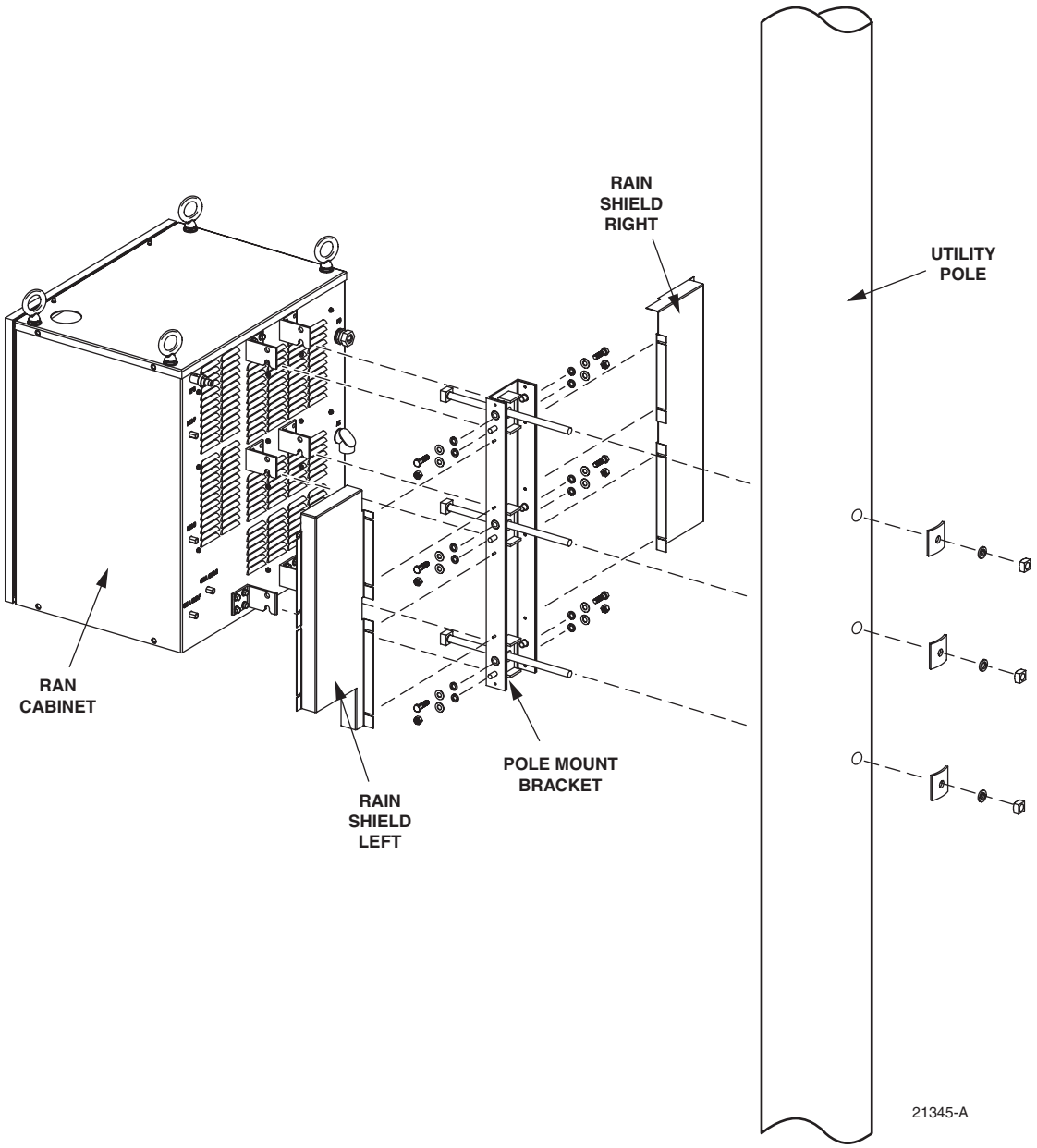

Figure 26. Pole Mount Components

2.6 Installing a RAN Cabinet on a Concrete Pad

This section contains the procedures for installing the RAN on a concrete pad.

Choose an installation site that conforms to all local codes. Obtain all required permits prior to starting installation. Situate the concrete pad along the trench that was used for routing the OSP fiber cables for the system.

2.6.1 Pouring a Concrete Pad

Prepare a base for the concrete pad that meets all local code requirements. The base must have a footing of 4 to 6 inches (10.2 to 15.2 cm) of sand or gravel on firmly compacted soil. Concrete pad height is site and climate dependent. Height should be based on keeping the front door air intake louvers and rear bottom exhaust vent free of obstruction. For dimensions of pad, refer to Figure 27.

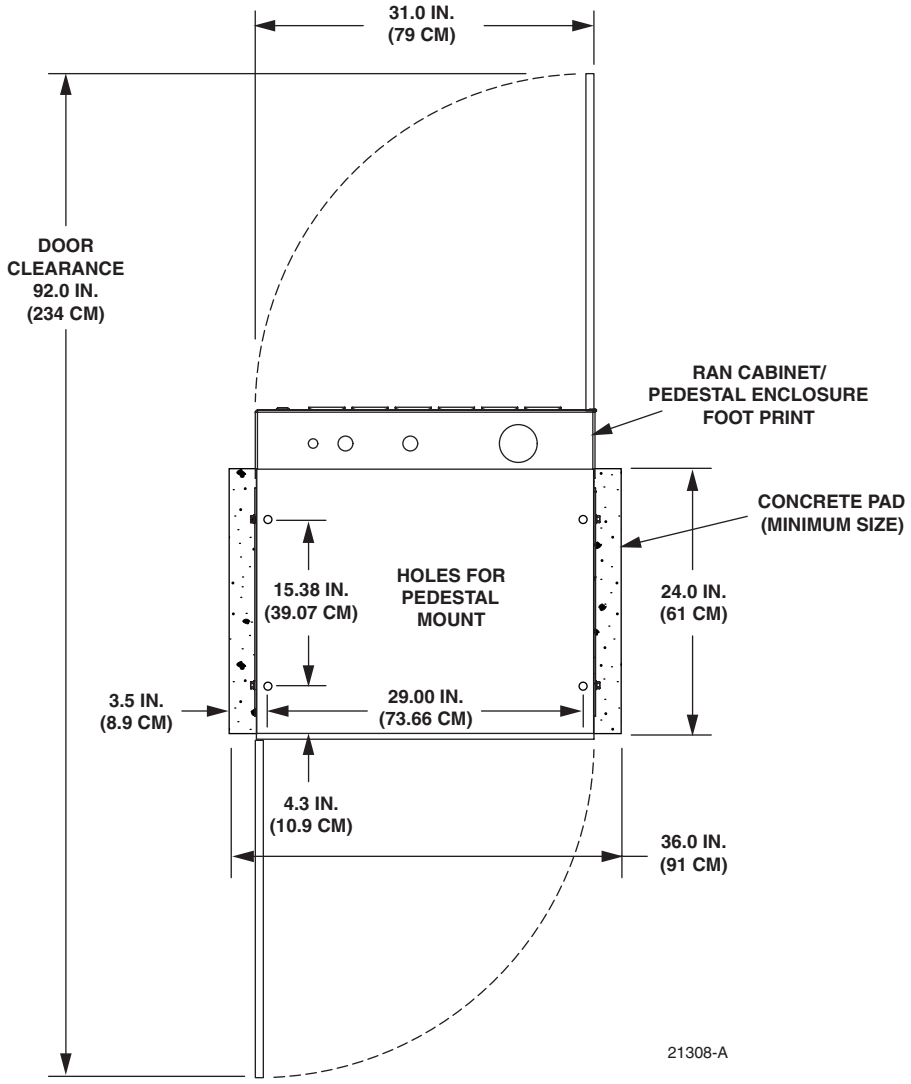

Figure 27. Concrete Pad Dimensions

2.6.2 Mounting the Cabinet on a Concrete Pad

Use the following procedure to mount the cabinet on the concrete pad.

1. Fasten the pedestal mounts to the concrete pad using the customer-supplied hardware identified in Figure 28.

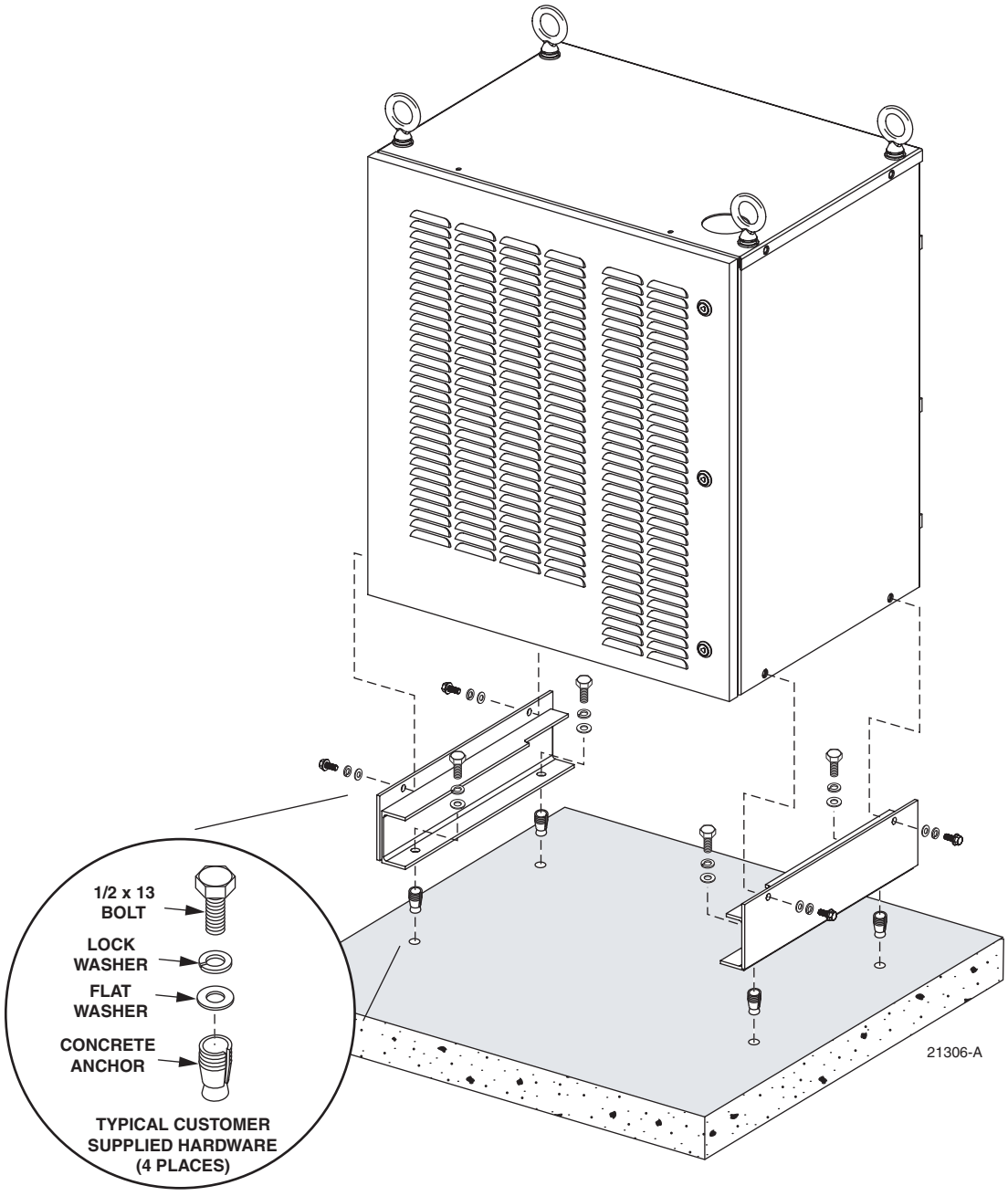

Figure 28. Installing Pedestal Mount and Cabinet

Warning: *Use appropriate lifting equipment when moving or installing the cabinet. Do not stand under the cabinet as it is being hoisted into position for installation. A failure of the lifting equipment could result in serious personal injury.*

2. Using appropriate lifting equipment, lower the cabinet into position on the cabinet mounts.
3. Secure the cabinet from the side, as shown, using the four bolts, four flat washers, and four lock washers from the shipping pallet mounting brackets.

2.6.3 Installing the Pedestal Enclosure

The pedestal enclosure, shown in Figure 29, mounts on the back of the cabinet.

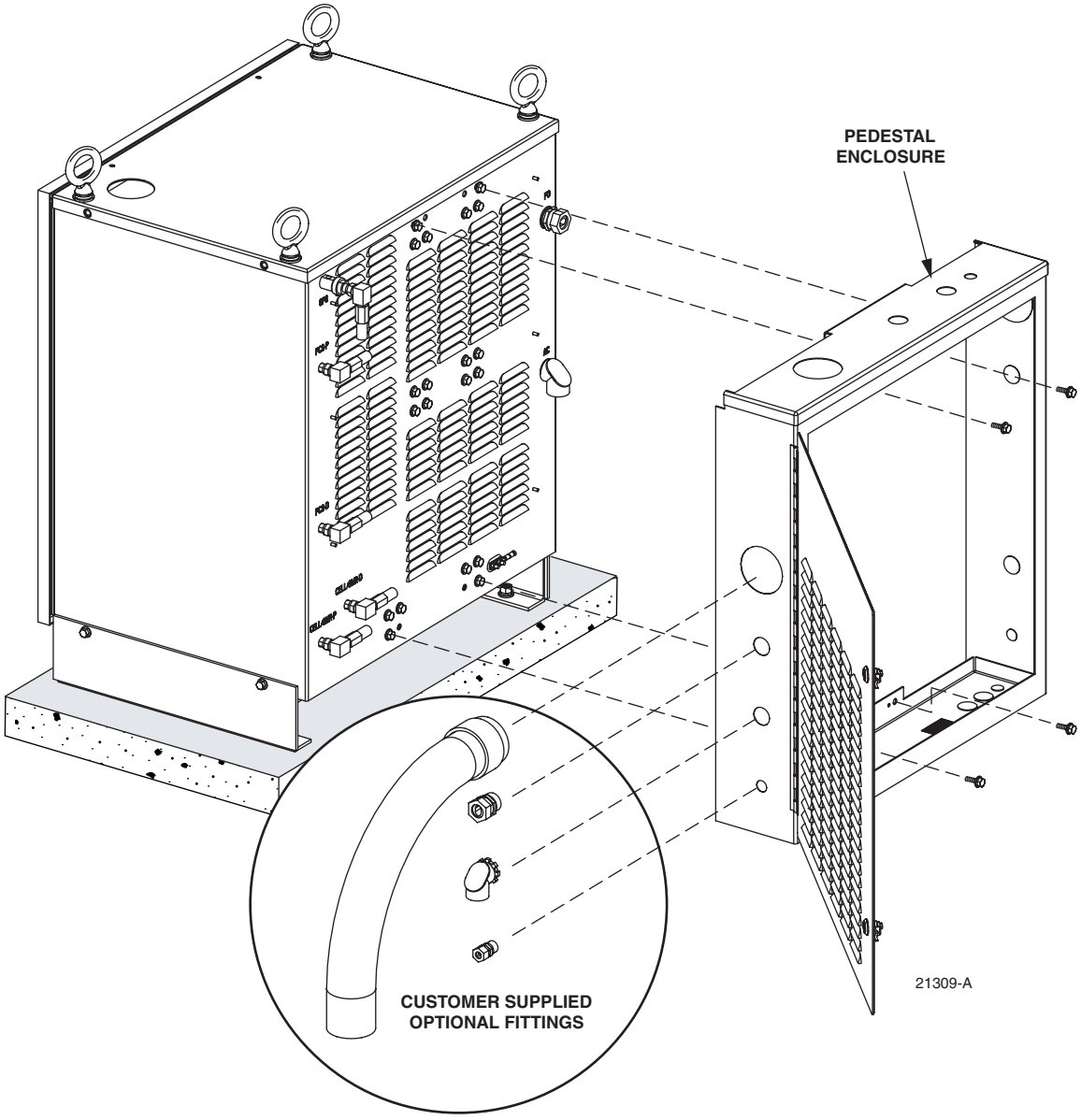

Figure 29. Installing Pedestal Enclosure

Use the following procedure to install the pedestal enclosure:

1. Orient the pedestal enclosure as shown and attach it to the back of the cabinet using the four bolts provided.
2. Close the pedestal enclosure door and secure the door with the key provided.

2.7 Other Standard Installation Procedures

This section contains other procedures done at every installation after the RAN is mounted on a wooden pole or concrete pad.

2.7.1 Installing a Solar Shield

Each RAN has a solar shield that mounts on top of the cabinet. Hardware for the solar shield can be found in a bag fastened to the inside of the battery compartment. The hardware consists of two 1/4 in. bolts, each with flat washer and sealing washer. Use the following procedure to install the solar shield. Refer to Figure 30.

1. Remove the solar shield from its packaging.
2. Place a lock washer and flat washer and then the sealing washer on each 1/4 in. machine bolt.
3. Using the key provided, open the RAN door.

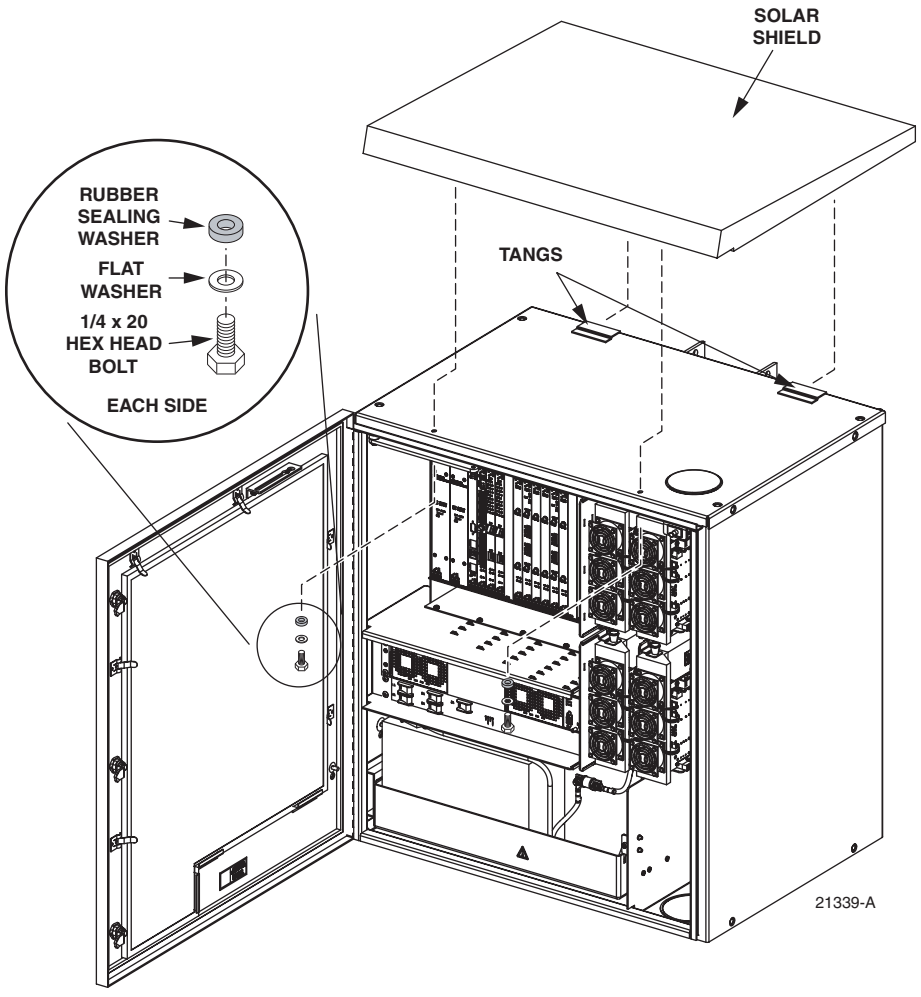

Figure 30. Installing the Solar Shield

4. Locate the two 1/4 in. machine bolts, each with flat washer and sealing washer, in a bag fastened to the inside of the battery compartment.
5. Place the solar shield on the top of the RAN.
6. Push the solar shield backward until it extends slightly beyond the back of the cabinet then pull it forward catching the two tangs of the solar shield on the top of the RAN.
7. Locate the two clearance holes on the left and right sides just inside the door frame.
8. Align the solar shield threaded holes with the clearance holes and insert the two 1/4 in. machine bolts in the hole.
9. Using a 7/16 in. nut driver or socket screw, tighten the two 1/4 in. machine bolts to secure the solar shield. Tighten to 6 ft.-lbs.

2.7.2 Installing a Ground Wire

Each RAN is designed with provisions for connecting to earth ground. Earth grounding is to be done in accordance with the National Electric Code and local building code. Two ground studs for connecting the ground wire are located on the back of the RAN (Figure 31). A 2-hole compression type lug terminal should be installed on the ground studs for connecting a #6 AWG copper grounding wire.

The following material must be supplied by the installer:

- Panduit LLCF6-14B-L or equivalent (X2)
- Two-hole compression lug terminal for #6 AWG wire
- #6 AWG wire
- Connector for attaching the wire to an approved ground source

The following tools are required to perform this procedure:

- Compression pliers for #6 AWG grounding lug
- Wire cutters
- Wire stripper

Use the following procedure to install the ground wire:

⚠ **Caution:** *For proper equipment operation, an approved earth ground connection must be provided. The recommended minimum wire size is #6 AWG copper wire.*

1. Obtain a length of #6 AWG (4 mm) copper wire for use as a cabinet grounding wire.
2. Crimp the #6 AWG copper grounding wire to the compression lug.
3. Secure the compression lug to the back of the cabinet.
4. Route the free end of the grounding wire to an approved earth ground source.
5. Cut the grounding wire to length and connect it to the earth ground source as specified by local code.

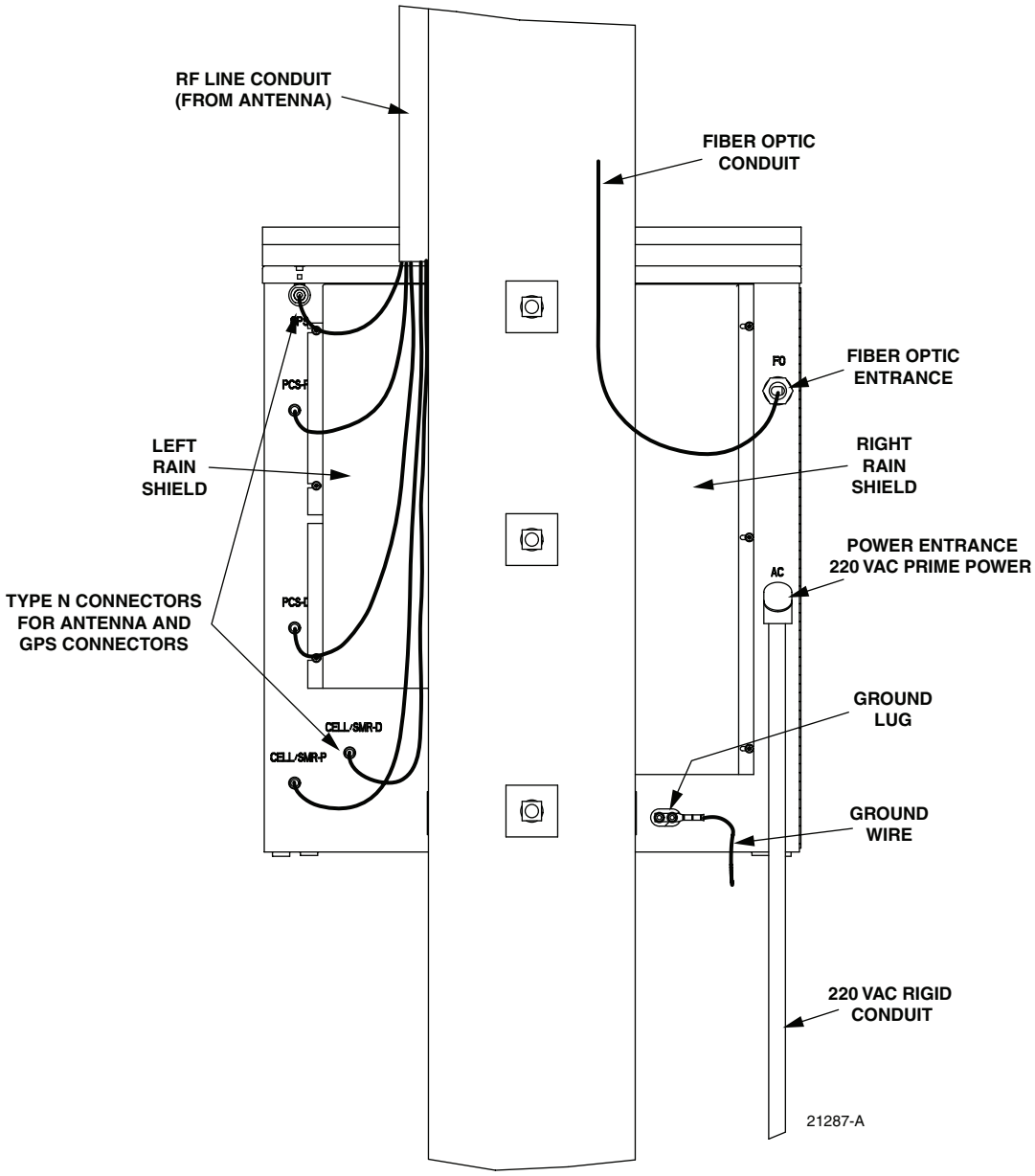

Figure 31. Cable Connection Points

2.7.3 Installing RF Cabling

RF cabling on the RAN connects the RF antenna to the RF input on the back of the RAN. There are five Type N receptacles on the antenna and five Type N receptacles on the back of the RAN, identified in Table 21 on page 47.

There are two main steps in installing RF cables: weatherproofing the cables, and routing and securing the cables.

2.7.3.1 Weatherproofing RF Cables

RF cables should be weatherproofed before being installed. The following materials are required (customer supplied):

Note: Read and understand the manufacturer's instructions prior to using these products.

- 3M 8426-9M cold shrink
- 3M Skothkote Electrical Coating 14853

Use the following procedure to weatherproof the RF cables:

1. Prior to connecting the RF cables to either the RAN or antenna, place one 3M 8426-9M cold shrink kit over the cable end, then connect the cable end to its intended termination point. Follow the manufacturer's directions, which are included with each kit.
2. After the cold shrink has been applied, coat the entire length of the cold shrink material with the 3M Scotchkote Electrical Coating, number 14853.

2.7.3.2 Routing and Securing RF Cables

For cable installation, the following materials are required (customer supplied):

- 10 Type N male plugs (CommScope PN: 540ANM or equivalent)
- Coax cable (CommScope PN: FXL540OPE or equivalent)
- Electrician's tape
- Water seal

Use the following procedure to route and secure the RF cabling:

1. Measure from the antenna base connectors to the RAN connectors to determine the coax cable length including service loops and drip loops. Refer to Figure 24 on Page 35.
2. Install the Type N plugs on each end of each of the RF cables.

Note: Right angle connectors may not be needed if there is enough space or if the coax cable is flexible enough to create a proper bend radius in the cable. Reference the coax cable manufacturer specifications for allowable bend radii.

Note: A cable sweep test is highly recommended. When testing the RF and GPS coaxial cables, use a matched load. The VSWR should be 1:1:1. The return loss should be 26.444 dB or better.

3. Attach each end of the cables to the appropriate connectors on the antenna base and the RAN. Refer to Figure 32 and Table 21.
4. Tighten each connector to 20 ft.-lbs.
5. After each connector is tightened, cover the entire connection with electrician's tape, then wrap the connection in water seal and finally cover the water seal with wraps of electrician's tape.

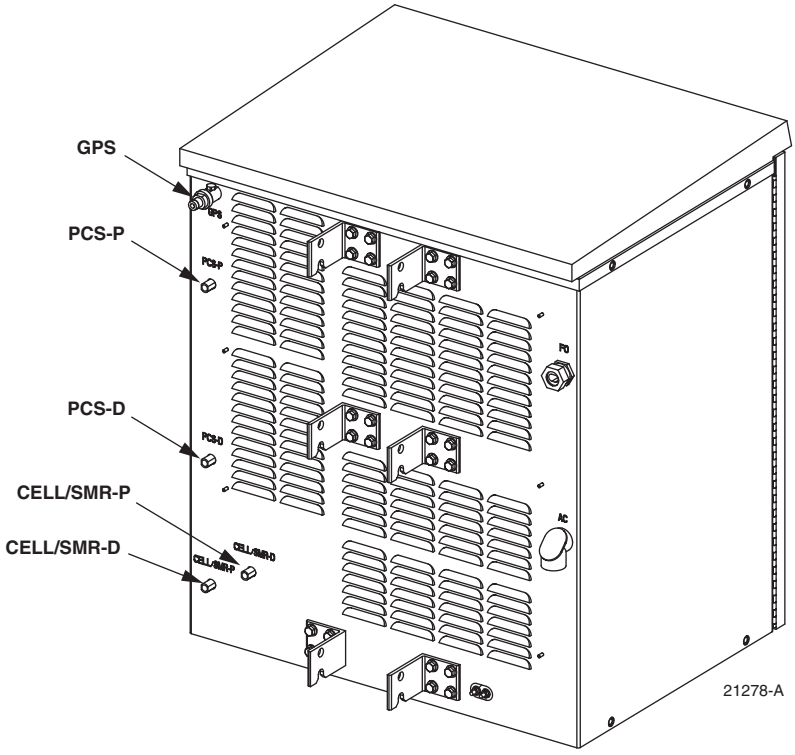

Figure 32. Installing the RF Cables

Table 21. RAN Antenna Ports and Antenna Base Ports

LABEL ON RAN	LABEL ON ANTENNA	BAND
GPS	GPS	Global Positioning System (GPS)
PCS-P	PCS-T	PCS primary receive path and transmits from PCS A, B or F
PCS-D	PCS-B	PCS diversity receive path and transmits from PCS D, E or C
CELL/SMR-D	CELL/SMR-D	Cell/SMR primary receive path and transmits from Cell A"/A
CELL/SMR-P	CELL/SMR-P	Cell/SMR diversity receive path and transmits from SMR A or Cell B/B'

Note: When building out RANs, connect the quadplexers that will contain the first PCS bands to the top of the PCS antenna element. On the Phasar antenna, this is marked on the base PCS-T.

2.7.4 Installing Pre-Connectorized Indoor/Outdoor Fiber Optic Cable

Fiber optic cable installation consists of routing a pre-connectorized outdoor-rated fiber optic cable from an external splice enclosure to the NXD RAN cabinet, routing the cable into the cabinet, and then breaking out the individual fibers for connection. The NXD RAN has a fiber interface on the front of the Synchronous Interface (SIF) Module in the RAN chassis. The fiber enters the cabinet on the rear side.

All fiber optic cable connections require single-mode Dual-LC type connectors.

Figure 33 shows the basic configuration of the optical path between the Hub SIF and the RAN SIF. For optical specifications, refer to Table 2 on page 6.

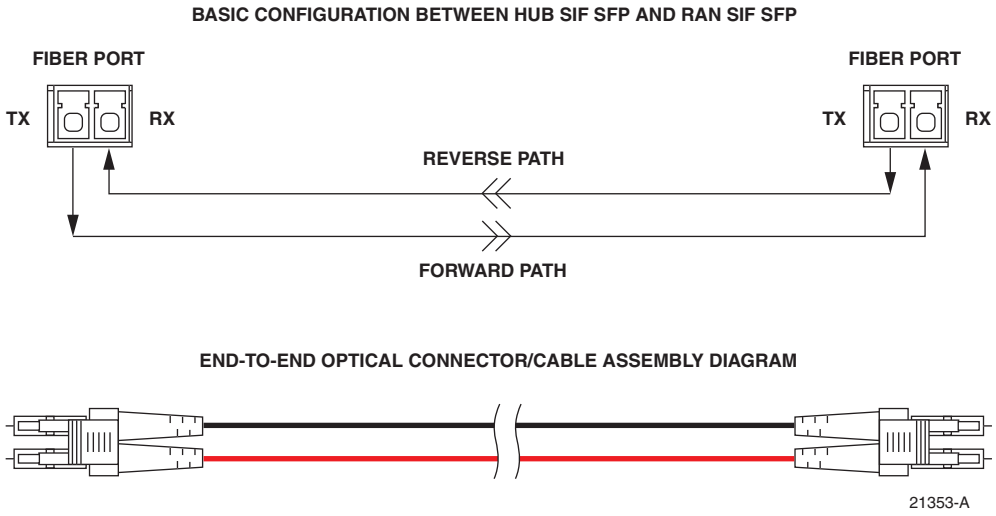

Figure 33. Optical Path Between Hub SIF and RAN SIF

For fiber cable ingress, the RAN is equipped with a nylon fiber optic connector located on the rear side of the cabinet. The connector accommodates cables of a diameter in the range .38 to .50 inches (.97 to 1.27 cm).

Note: If the installer has a larger cable, the manufacturer (Hubbell Inc.) makes bushings that fit this connector in the following size ranges: .500-.625, .625-.750, .750-.875, .875-1.00, 1.00-1.125 inches.

Use the following procedure to install the fiber optic cable:

Note: The routing of an Outside Plant (OSP) fiber optic cable from the Hub to a splice enclosure in the vicinity of the RAN cabinet and the splicing of selected OSP cable fibers to the fibers in the outdoor-rated cable is the responsibility of the installer.

Warning: *This equipment uses a Class 1 Laser according to FDA/CDRH rules. Laser radiation can seriously damage the retina of the eye. Do not look into the ends of any optical fiber. Do not look directly into the optical transmitter of any unit or exposure to laser radiation may result. An optical power meter should be used to verify active fibers. A protective cap or hood MUST be immediately placed over any radiating transmitter or optical fiber connector to avoid the potential of dangerous amounts of radiation exposure. This practice also prevents dirt particles from entering the connector.*

1. Route the connectorized end of the fiber optic cable from the splice enclosure (not provided) to the rear side of the cabinet. Estimated length of cable is 30 feet (9 meters) although this is dependent upon distance from the splice enclosure.