

Tel-Link Point-To-Multipoint

Sector Terminal Installation & Maintenance Manual



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Tel-Link Point-To-Multipoint Sector Terminal Installation & Maintenance Manual Revision Page

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Tel-Link Point-To-Multipoint Sector Terminal Installation Manual

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1.0 General Information

Before installing and operating a Tel-Link Point to Multipoint (PMP) System, P-COM recommends installation personnel read this section in its entirety. Once accomplished, the user can proceed directly to the section or subsection of interest.

This manual provides the installation procedures and guidelines for installing hardware associated with a PMP System. This manual is intended for personnel who are responsible for installing and testing the PMP system. The user should keep this manual next to the system at all times.

P-COM highly recommends the user utilize the P-COM PMP Installation Procedure Checklist located in Appendix A to ensure the correct procedures are followed. For further assistance, contact the P-COM Technical Assistance Center (TAC) at 1-877-674-3600.

1.1 Manual Organization

This manual is part of a set of PMP manuals that focus on specific aspects of the PMP system. The set of manuals consist of the following:

- M68330 - Tel-Link PMP System Description Manual
- M68331 - Tel-Link PMP Local Site Manager Users Manual
- M68332 - Tel-Link PMP Network Management System Users Manual
- M68333 - Tel-Link PMP Sector Terminal Installation & Maintenance Manual
- M68334 - Tel-Link PMP Remote Terminal Installation & Maintenance Manual

The Manual is divided into 12 sections providing specific information needed to install and test the PMP System. The sections are:

Section 1:	General Information - Contains discussions on the use of this manual, summary of the manual, special notations, and general safety reminders
Section 2:	Sector Terminal Overview - Provides a description of the PMP equipment.
Section 3:	Tools and Test Equipment Required - Provides lists of tools and equipment necessary to perform the installation.
Section 4:	Site Preparation - Contains information on how to prepare the installation site.
Section 5:	Equipment Unpacking and Inspection - Provides instructions on how to unpack and inspect the PMP Equipment
Section 6:	Sector Terminal Outdoor Unit Installation - Provides instructions on how to install the Outdoor Unit.

Section 7:	Sector Terminal Indoor Unit Equipment Physical Installation - Provides instructions on how to install the Indoor Unit.
Section 8:	Sector Terminal Wiring and Cabling Installation - Provides instructions on how to wire and cable the Remote Terminal.
Section 9:	Sector Terminal IDU Board Installation - Provides instructions on how to install the boards making up the Sector IDU.
Section 10:	Sector Terminal Initial Power Application - Provides instructions on how to initially apply power to the Remote Terminal.
Section 11:	Initial Terminal Configuration and Testing - Provides instructions on how to configure and test the Remote Terminal.
Section 12:	Technical Support - Provides instructions on how to contact the Technical Assistance Center.

1.2 FCC Requirements Summary

The Base Station/Sector Terminal complies with Federal Communications Commission (FCC) Parts 2 and 101 Regulations.

- **FCC ID for Base Station/Sector Terminal:** L5X-PMP-01-000

Operators must be familiar with the requirements of the FCC Parts 2 and 101 Regulations prior to operating any link using the equipment. For installations outside the United States, contact local authorities for applicable regulations.

1.3 Requesting Changes

P-COM welcomes any suggestions for improving this manual. A Reader Comments Form is provided at the end of this manual for recording comments and suggestions for improvement.

1.4 Special Notations

This manual uses four levels of special notation to alert you to important information concerning your safety, proper equipment handling, or useful tips for easier operation. These notations are shown below in descending order of importance

DANGER! Indicates that personal injury can result if you do not comply with the given instruction. A DANGER! statement will describe the potential hazard, its possible consequences, and the steps you must take to avoid personal injury.

WARNING! Indicates that serious damage to the equipment can result if you do not comply with the given instruction. A WARNING! statement will describe the potential hazard, its possible consequences, and the steps you must take to avoid serious equipment damage.

CAUTION! Indicates that equipment damage and/or process failure can result if there is a failure to comply with the given instruction. A CAUTION! statement will describe the potential hazard, its possible consequences, and the steps that must be taken to avoid equipment damage and/or process failure.

NOTE: Provides supplementary information to emphasize a point or procedure, or gives a tip for easier operation.

1.5 General Safety Reminders

To prevent possible personal injury or equipment damage, always observe the following rules:

- Installation and operations personnel should be familiar with the safety requirements before attempting installation or operation of the equipment covered by this manual. Failure to follow the requirements could result in death or injury to personnel and/or damage to the equipment.
- Always examine the general area for any potential hazards (such as wet floors or overhead wires) before beginning installation.
- Observe all DANGER! notations. Dangerously high voltages are present within this equipment when in operation. Lethal line voltages may be present unless the power has been disconnected.
- Always remove any jewelry or other personal items that may conduct electricity before beginning installation.
- Keep away from live circuits. Whenever feasible in verifying circuits, check by continuity and resistance methods with all power off, rather than directly checking voltages.
- Observe grounding precautions. Verify the unit under test or being installed and all measurement equipment are properly grounded.

- Do not test alone. Testing or adjusting the equipment should only be carried out in the presence of a person qualified to render aid.
- Use proper lifting techniques when lifting the equipment to prevent injury.
- It is the responsibility of the installer and the user to ensure that the public is not exposed to excessive RF levels. Such information must be posted near the antenna in the form of caution or warning notes and signs.

1.6 P-COM PMP Terminology

For the ease of the reader, a Glossary is provided at the end of the manual defining terminology used in P-COM Tel-Link PMP Manuals.

2.0 Sector Terminal Overview

The PMP network is composed of one or more base stations that are strategically located within the desired coverage area (refer to Figure 2-1). Base Station/Sector Terminals are located at the center of each cell and have a radius of up to 10 Km depending on the RF frequency, climate type, desired network availability, line-of-sight profiles, and traffic capacity requirements. The Base Station consists of 1 to 24 Sectors. A sectorized area of a Base Station/Sector Terminal is supported by 1 to 5 Sector Indoor Units (IDUs), depending on the number of Remote Terminals located in that sector. Each Sector communicates directly with the Remote Terminal within a sector area of 22.5° to 90° of coverage within the 360° area around the base station. Each base station also interfaces to the Public Switched Network (PSN) through a high-speed backbone link.

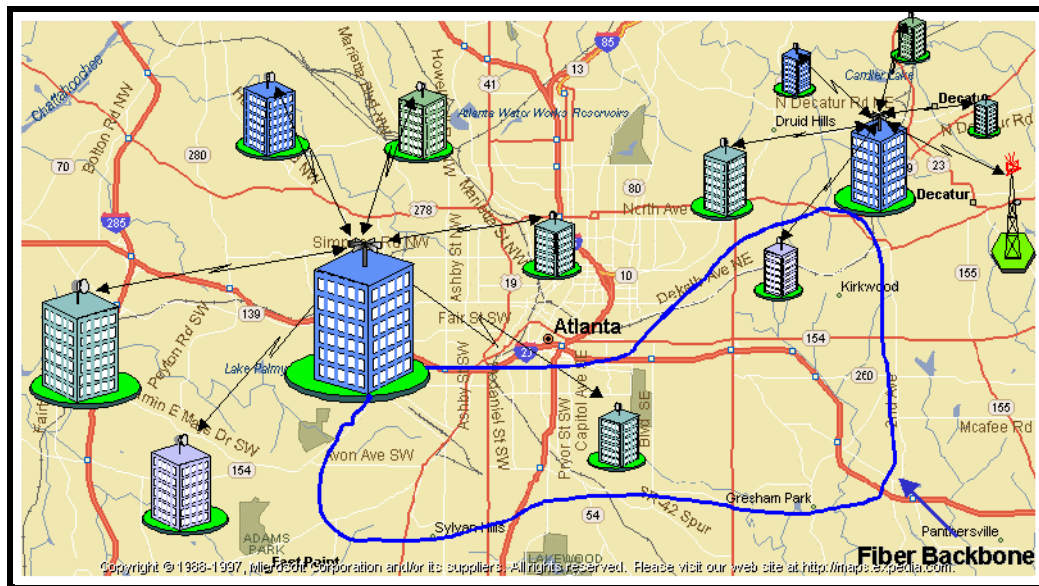


Figure 2-1 - Example of Simplified Base Station Site

The system utilizes an ATM cell-multiplexed, continuous carrier to transmit data from the base station to the Remote Terminals. Each sector uses one or more downlink carriers to deliver these cells to the Remote Terminals. These carriers are transmitted at different frequencies to avoid interference. Either a FDMA or TDMA scheme is used by the Remote Terminals to transmit information to the Base Station. When FDMA uplinks are used from the Remote Terminals, each Terminal communicates on a separate frequency channel with a demodulator at the Base Station for each channel. When TDMA uplinks are used from the Remote Terminals, multiple remotes share a single carrier by transmitting in designated time slots.

The Sector Terminal consists of following components:

- Basic IDU chassis containing Modulators, FDMA Demodulators, Burst TDMA Demodulators, OC-3 SAC and ODU Multiplexers (MUX)
- Optional Expansion IDU Chassis containing a Sector Expansion Controller (SEC), TMDA or FDMA Demodulator and Receive IF Demux's
- Sector ODU Power Supply consisting of a rack mounted unit supplying power to the ODU
- Outdoor Unit(s) ODUs containing the RF components
- Antenna and mounting hardware
- Interfacility Link (IFL) consisting of one coaxial cable connecting the ODU to the Indoor Unit (IDU)

2.1 Indoor Unit (IDU)

The Sector IDU is located indoors at the Base Station site and is connected to the Sector ODU via an IFL cable. The Sector Basic IDU is comprised of the following components:

- Basic rack mount chassis with IDU power supplies
- Modulators
- Demodulators (FDMA network)
- Burst Demodulators (TDMA network)
- Sector ATM Controllers
- ODU MUXs

The Sector Expansion IDU is comprised of the following components:

- Expansion rack mount chassis with IDU power supplies
- Demodulators (FDMA)
- Demodulators (TDMA)
- Sector Expansion Controllers
- Receive IF Demultiplexers

Chassis configuration is performed from a Local Site Manager (LSM) laptop or desktop PC using P-COM's WaveView Windows application. Each card has specific variables and must be properly configured in order to establish RF and data links. Each card in the chassis has a specific slot where it is to be located. Figure 2-2 is a block diagram illustrating a Basic ID Chassis and an Expansion IDU Chassis configuration.

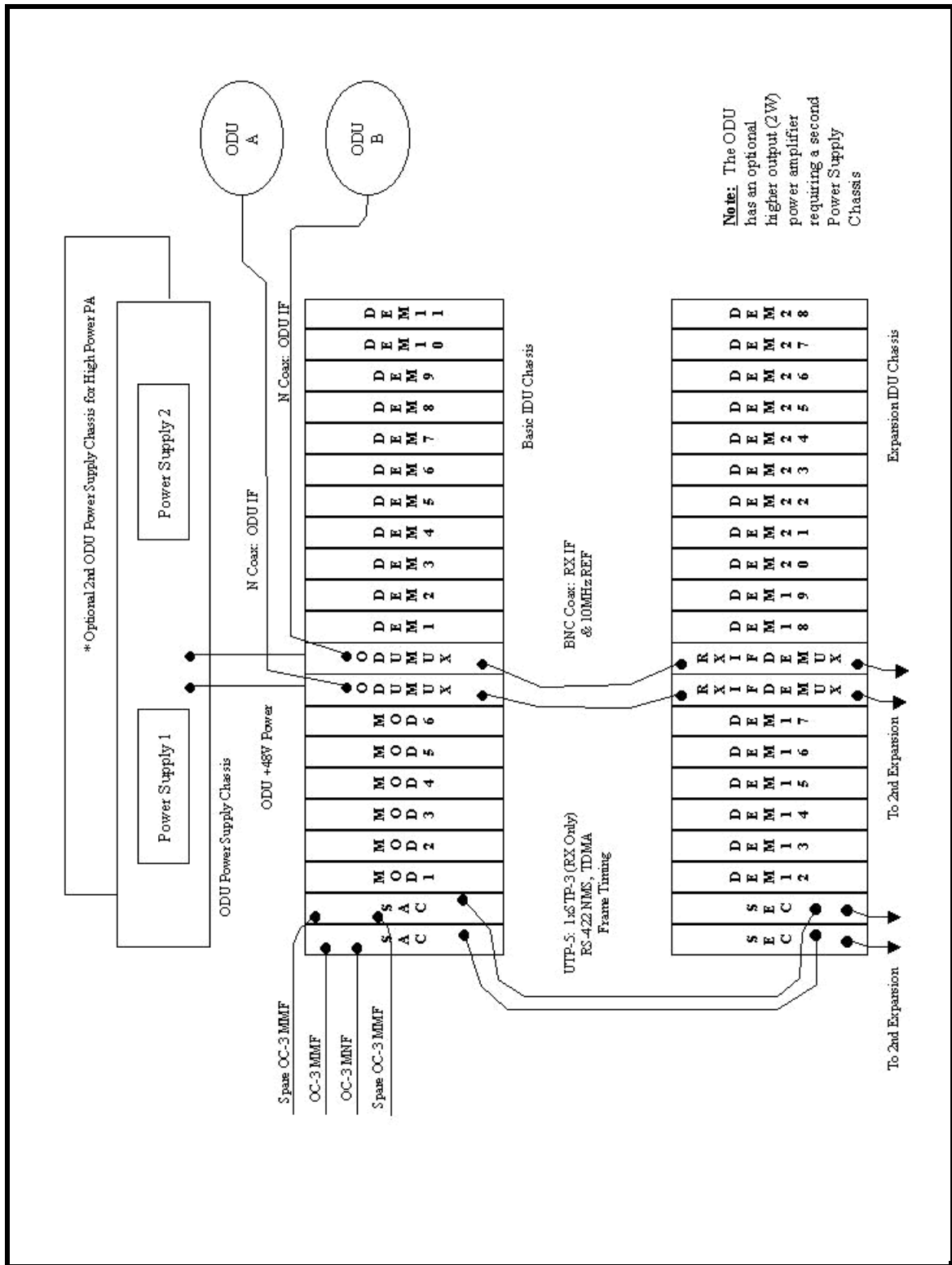


Figure 2-2 - Sector IDU Configuration (Block Diagram)

Both IDU chassis measure 38 cm (H) x 45 cm (W) x 43 cm (D) (15" x 17.75" x 17") and are rack mounted. Figure 2-3 illustrates a Sector IDU Chassis. Figure 2-4 and Figure 2-5 show the rear views of the Basic IDU Chassis and Expansion IDU Chassis. The sector IDU chassis can be connected to an optional battery Uninterruptible Power Supply (UPS) system that can provide hours of operation during primary power failure.

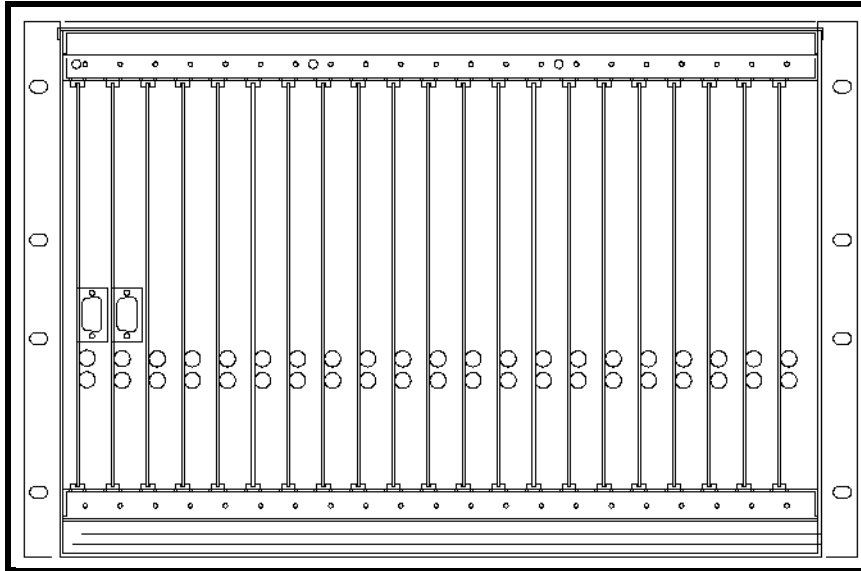


Figure 2-3 - Sector IDU Chassis

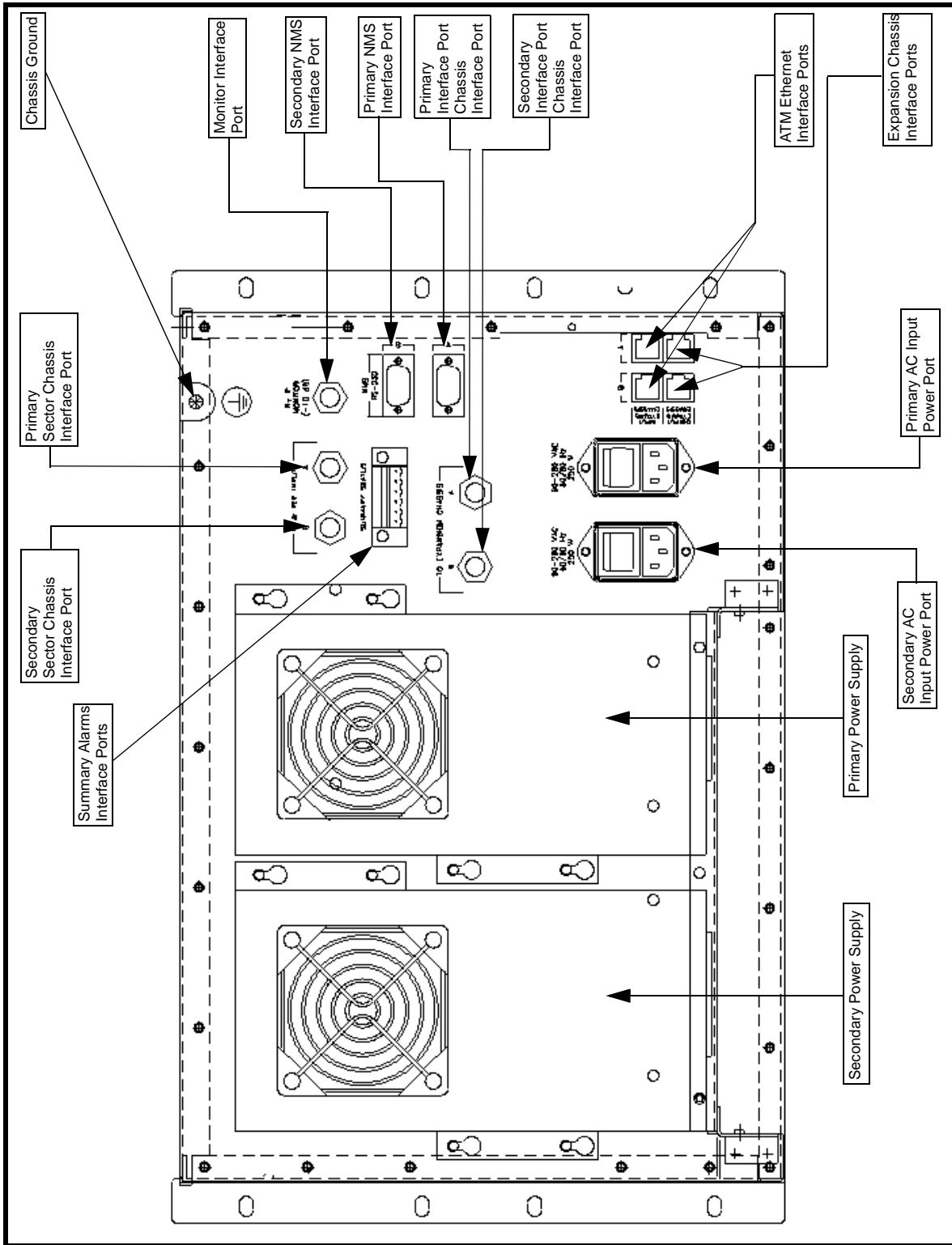


Figure 2-5 - Expansion IDU Chassis (Rear View)

2.2 Sector ODU Power Supply

The Sector ODU Power Supply is a rack mounted unit supplying DC power to the ODUs and designed to avoid single points of failure and ease of replacement of failed components. This unit is redundant utilizing two power supplies within the chassis that load share and is fan cooled (refer to Figure 2-6, Figure 2-7 and Figure 2-8). A single Power Supply Unit is capable of powering two standard Sector ODU's, thus allowing replacement of an ODU Power Supply Module without causing service interruption. The two Power Supply Modules are load sharing. When Power Supply Module B is removed, +48 VDC will still be present on the output connector labeled ODU B. When the optional higher power (2W) output ODU is selected, a second ODU Power Supply is required.

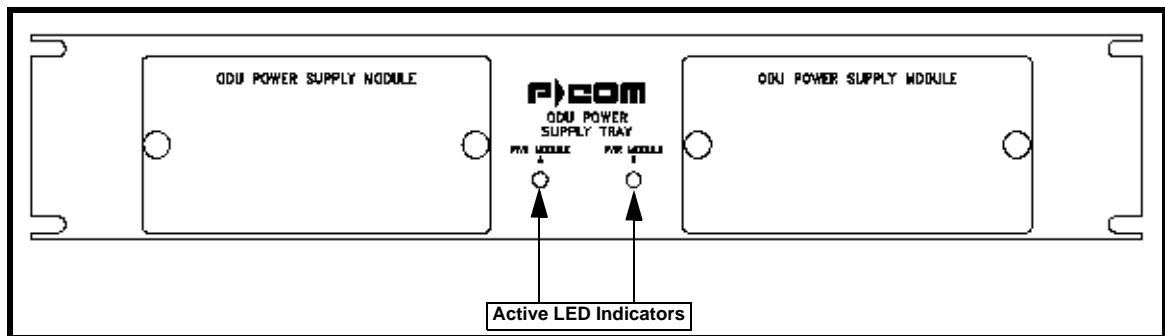


Figure 2-6 - Sector ODU Power Supply (Front View)

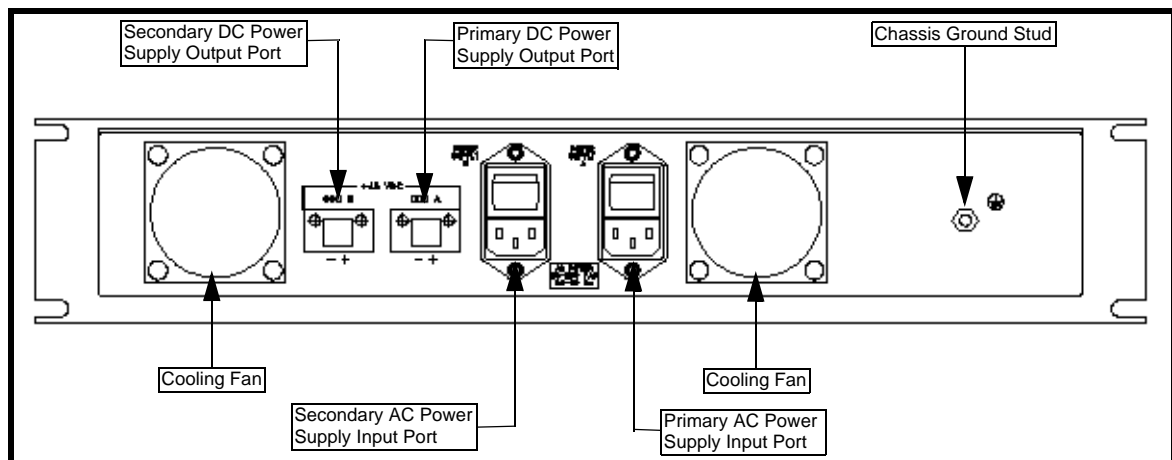


Figure 2-7 - Sector ODU Power Supply AC (Rear View)

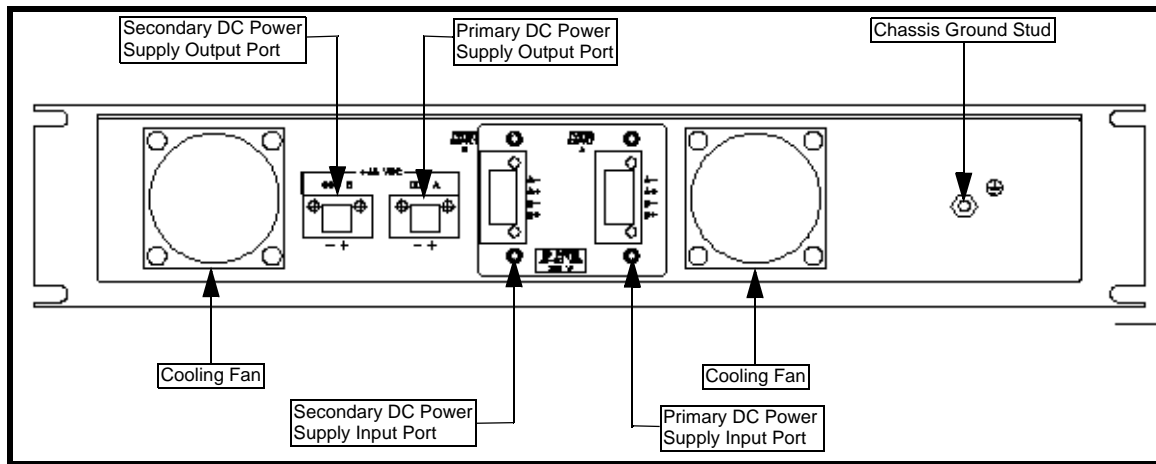


Figure 2-8 - Sector ODU Power Supply DC (Rear View)

2.3 Outdoor Unit (ODU)

Figure 2-9 illustrates a typical RF/Antenna configuration for the Sector Terminal Outdoor Unit. The packaging includes the following components:

- ODU Enclosure
- RF Electronics
- ODU Controller Card responsible for controlling and monitoring ODU functions and for interfacing with the IDU

The ODU is frequency agile so that the same ODU can typically be used throughout the entire allocated frequency band. Subsequently, this reduces sparing levels.

The ODU meets all National Electrical Code requirements pertaining to lightning and power transients and meets or exceeds FCC and ETSI regulations pertaining to conducted and radiated Electromagnetic Emissions.

The ODU is sealed against the environment and is capable of functioning in ambient temperatures ranging from -40°C to $+60^{\circ}\text{C}$, with up to 100% relative humidity. The ODU can survive steady state winds of 40 m/s with gusts to 55 m/s (89 mph/123 mph).



Figure 2-9 - Sector Terminal Outdoor Unit

2.4 Antenna

The Sector Antenna is a lensed-horn antenna. For 24-26 GHz; two horns are used for transmit and receive functions. At 38 GHz, a single horn antenna is used. Antennas are selected based on desired horizontal or vertical polarizations and for azimuth beamwidths of 22.5°, 30°, 45°, 60° and 90°. The elevation beamwidth is typically 6°.

The antennae are mounted on a rectangular mounting plate with mounting hinges used to install on a pole. One of the hinges allows for elevation adjustment. Components of the antenna are:

- Waveguide
- Radome/Horn
- Mount

2.5 IF Cable Run

A single coaxial cable is used to connect the sector ODU to the Basic IDU chassis. This carries the transmit IF signal, receive IF signal, telemetry, 10 MHz Reference Signal and DC Power between the IDU Chassis and Sector ODU. The IDU chassis and ODU contain "N" type female connectors for interconnection of the coaxial cable. The DC power for the ODU is supplied to the Basic IDU chassis from the rack mounted ODU Power Supply chassis.

Double-screened LMR-400 coaxial cable is recommended for its good EMC performance and possess the following characteristics described in Table 2-1:

Table 2-1 - LMR-400 Performance Characteristics

Property	LMR-400	
Shielding	> 90 dB	
Impedance	50 Ohms	
Velocity	85%	
Capacitance	2.39 pF/ft	
Center Conductor	0.109" (0.28 cm)	
Attenuation (25°)	30 MHz	0.70 dB/100 ft
	220 MHz	1.80 dB/100 ft
	450 MHz	2.7 dB/100 ft
	900 MHz	3.90 dB/100 ft
Phase Stability	+/- 10 ppm/deg C	
DC Resistance	1.39 Ohms/1000 ft	
Bend Radius	1" (2.54 cm)	
Temperature Range	-40°F to 185°F (-40°C to 85°C)	
Maximum Length	1000 Feet (300 meters)	
IF Connector	Type N Male	

Table 2-2 shows the signals carried between the Sector IDU and Sector ODU on the coaxial IFL cable:

Table 2-2 - IFL Signals

IFL Signal	Frequency	Variation
IDU Transmit	205 MHz	±5 MHz
IDU Receive	490 MHz	±5 MHz
Telemetry	800 KHz (On/Off Keying)	30 KHz
Reference Signal	10 MHz	1 ppm
IFL Power	Voltage	Variation
ODU Power	+44 VDC	+40 to +57 VDC
IFL Connector	Termination 1	Termination 2
Type N Male	IDU	ODU

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3.0 Tools and Test Equipment

Table 3-1 and Table 3-2 are the recommended list of tools and test equipment necessary for the following activities:

- **Site Survey**
- **Installation**
- **Commissioning**

NOTE: This is a typical Installers tool kit. On some installations additional tools may be necessary.

Table 3-1 - Recommended Tools and Equipment (Site Survey)

DESCRIPTION	QNTY	BRAND	PART NO.
Area Map	1	NA	NA
Binoculars	1	NA	NA
Camera (Digital Preferred)	1	NA	NA
Compass	1	NA	NA
Computer, Laptop (Pentium) (with Link Budget Software)	1	NA	NA
Flag or Red Towel (to identify site from a distance)	2	NA	NA
Flashlight	1	NA	NA
Global Positioning System Receiver	1	NA	NA
Multimeter, Handheld	1	Klein	44100
Radio, 2-Way or Cell Phone	2	NA	NA
Safety Belt	2	NA	NA
System Configuration Document	1	NA	NA
Site Survey Checklist	1	NA	NA
Wood Stick	1	Desco	517F

Table 3-2 - Recommended Tools and Equipment (Installation/Commissioning)

DESCRIPTION	QNTY	BRAND	PART NO.
AC Circuit Tester	1	Ideal	6-035
Antenna Alignment Tool	1	P-COM	28055-1
Anti-Static Material Kit	1	Charleswater	16430
Binoculars	1	NA	NA
Bit Error Rate Test Set, (with correct UIM interface module)	1	FireBerd Portable	6000A
Cable Cutter	1	Klein	63050
Compass	1	NA	NA
Computer, Laptop (Pentium) (with Link Budget Software)	1	NA	NA
Crimp Tool, Die Set (RG-58, 59)	1	IDEAL	30-581
Crimp Tool Die Set, (LMR-400, RG-8)	1	RF Industries	RFA-4005-02
Crimp Tool	1	RF Industries	RFA-4005-020
Crimp Tool, (RJ-45)	1	IDEAL	30-559
Crimp Tool, (Solderless Connectors)	1	NA	NA
Diagonal Cutters, Flush Cut	1	NA	NA
Flashlight	1	NA	NA
Global Positioning System Receiver	1	NA	NA
Inclinometer	1	NA	NA
Knife, Utility	1	NA	NA
Multimeter, Handheld	1	Klein	44100
Pliers, Needle Nose 4" Insulated	1	NA	NA
Pliers, Slip Joint 6" Insulated	1	NA	NA
Ratchet, 3/8" Drive	1	NA	NA
Radio, 2-Way or Cell Phone	2	NA	NA
RF Connector (Type N Male)	AR	RF Industries	RFN-1006-31
Rope, Nylon 100 Ft	2	NA	NA
Safety Belt	2	NA	NA
Safety Glasses	2	NA	NA
Screwdriver, #1 Phillips	1	NA	NA
Screwdriver, #2 Phillips	1	NA	NA
Screwdriver, #2 Phillips Stubby	1	NA	NA

Table 3-2 - Recommended Tools and Equipment (Installation/Commissioning)

DESCRIPTION	QNTY	BRAND	PART NO.
Screwdriver, 1/4 x 1" Slotted	1	NA	NA
Screwdriver, 1/4 x 4" Slotted	1	NA	NA
Screwdriver, 1/8 x 2" Slotted	1	NA	NA
Screwdriver, 1/8 x 8" Slotted	1	NA	NA
Screwdriver, 3/16 x 3" Slotted	1	NA	NA
Socket Set (Deep well) 3/8-3/4 (3/8 drive)	1	NA	NA
Solder	1	Weller	SP23
Soldering Iron, 25 watt	1	NA	NA
Tape Measure (25 ft)	1	NA	NA
Tie Wraps, Black	AR	NA	NA
Weather Proof Tape	AR	NA	NA
Wire Brush	1	NA	NA
Wire Stripper, 10-18 AWG	1	IDEAL	45-120
Wire Wrap Tool, 24 & 26 Gauge, Manual	1	NA	NA
Wire Wrap Tool, 24 & 26 Gauge, Power	1	NA	NA
Wood Stick	1	Desco	517F
Wrench, 8" Adjustable	1	NA	NA
Wrench, Combination ASE 1/4 - 3/4 Set	1	NA	NA

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4.0 Site Preparation

Prior to beginning physical installation of the Tel-Link PMP equipment, the Site preparation work should be complete. Site preparation includes but is not limited to the following:

- Completed Site Survey Checklist (P-COM highly recommends the use and completion of the Site Survey Checklist located in Appendix B)
- System Configuration Document Specification

The criteria below should be evaluated prior to designating Remote to Sector terminal RF paths with the use of Site Surveys and Link Budgets:

- An unobstructed line-of-sight
- Be within range (distance separation) with respect to the desired operational parameters (i.e., rain, region, availability, modulation type, bit error rate performance, etc.)
- Be within the antenna beamwidth

NOTE: P-COM highly recommends a blower or fan be used with an enclosed rack containing three or more IDUs.

The IDU is designed to be installed in a 19-inch equipment rack or enclosed cabinet in a location that is:

- Dry, clean and well ventilated
- Easily accessible
- Within 600 feet (with CAT-5 cable) of subsequent Customer Premise Equipment (CPE)
- Within 1000 feet of the ODU when using LMR-400 or equivalent Coaxial cable
- Compliant with all environmental specifications

4.1 ODU/Antenna Installation Preparation

Verify the location selected has the following characteristics:

- Space on pole is adequate for mounting the antenna and ODU.
- Verify the pole for the ODU/Antenna assembly is installed in the location identified on the Site Survey Checklist.
- Verify the pole has been securely installed and is grounded per local code.

4.2 IDU Installation Preparation

Verify the location selected has the following characteristics:

- Identify IDU mounting location as specified in a completed Site Survey Checklist.
- Verify the required rack (if used) is installed, secured to the floor, and ready to accept the IDU.
- Sufficient space is provided for the installation of the ODU Power Supply.

4.3 Power Preparation

Verify the location selected has the following characteristics:

- Verify the correct power source has been provided within close proximity to the IDU location.
- Verify the power source is controlled through an appropriately sized circuit breaker or fuse

4.4 IFL Installation Preparation

NOTE: Maximum cable length of 1000 ft (300 meters) between the IDU and ODU.

P-COM recommends the IFL should be Times-Microwave LMR-400 coaxial cable.

- Verify the IFL between the ODU and Basic IDU chassis location is present.
- Verify a sufficient length of IFL is present at both ends to provide a service loop prior to being terminated to the equipment.
- Terminate each end of the IFL with a Type-N male connector per manufacturers instructions.
- Apply liquid electrical sealant to the outdoor connector outer crimp ring to ensure a waterproof seal between the cable and connector.

5.0 Equipment Receiving, Unpacking and Inspection

5.1 Introduction

This procedure provides information for unpacking and inspecting the PMP equipment prior to physical installation.

5.2 Receiving and Unpacking the Equipment

At a minimum, check for the following:

- STEP 1.** Check the outside of the shipping crates for visible signs of damage. Crushed corners or tears in cardboard may indicate rough handling which may result in hidden damage to the equipment.
- STEP 2.** Inventory shipping crates and other packages received in the shipment. Verify that all items listed on the Electronic Goods Descriptive Inventory or applicable shipping document were received. Identify all missing items on the inventory sheet.
- STEP 3.** Record any noted damage to the outside of the packaging material on the carrier's Bill of Lading and have the transportation company initial the sheet. All notations should indicate location and condition.

Example: 1" x 2" scratch on left front (LF) metal panel; not LF panel scratched. Another example would be 4" x 6" dent in center panel (not dent in panel).

WARNING! The warranty will be violated if you do not take anti-static precautions when unpacking or assembling the PMP boards in the PMP shelf. Circuit modules can be damaged by electrostatic discharge. Ensure that an approved anti-static wrist strap is connected between the wrist of the person and an electrical ground before handling any of the circuit modules.

- STEP 4.** Carefully open the equipment packaging.

5.3 Inspecting the Equipment

- STEP 1.** For each of the PMP subsystems received, verify the equipment received matches the shipping list by Part Number and Serial Number. Report any discrepancies immediately using the field return procedure outlined in Section 12 of this manual. The Tel-Link PMP system may be ordered in different configurations. Table 5-1 shows the Part Number for all system parts. In addition, the quantities of boards for redundant and non-redundant configurations are identified. The Equipment Parts List may contain more than the users specific requirements.

CAUTION! Tampering with seals will void the warranty.

Table 5-1 - PMP Sector Terminal Equipment Parts List

SECTOR INDOOR EQUIPMENT		
Description	Part Number	Quantity
Sector IDU Chassis		1
Sector Expansion Chassis		As Required
Sector ATM Controller		As Required
Modulator		As Required
Demodulator		As Required
ODU Multiplexer		As Required
Power Supplies		
ODU Power Supply		1:2
IDU 90-260 VAC Module		1:2
IDU +39 to 59VDC Module		1:2
SECTOR OUTDOOR UNIT (ODU)		
Description	Part Number	Quantity
Sector ODU	Frequency Dependent	1
Waveguide Antenna (Tx/Rx)	Frequency Dependent	1

- STEP 2.** After unpacking the equipment, visually inspect the equipment for damage and ensure that:
- All components mounted on the individual boards are secure.
 - The circuit boards are not cracked.
 - There are no loose leads.
 - The shelf unit has not been dented or damaged in any way.
- STEP 3.** Dispose of as much packing material as possible. P-COM suggests that the user retain at least one of each box with all packing materials. In the unlikely event that it is necessary to return a unit, the user will possess the required packing material for safe shipment of the unit.
- STEP 4.** Make claims for any damages incurred during shipment to the transportation company involved in accordance with company procedures.

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6.0 Sector Terminal ODU Installation

6.1 Introduction

This procedure provides instruction for installing a P-COM Tel-Link Point to Multipoint Sector Terminal ODU/Antenna assembly.

6.2 Tools Required

Multiple vendors of antenna and mounting assemblies may be used to operate with the P-COM PMP ODU. A listing of tools necessary to install an antenna/mounting assembly, can be found in the vendor's antenna installation manual.

6.3 Materials Required

- Antenna/mounting assembly. This assembly typically includes all hardware needed to install the antenna to the mount, and the mount to a pole.
- Outdoor Unit (ODU)

6.4 Sector Terminal ODU/Antenna Installation Procedure

WARNING! Failure to follow installation procedures may result in damage to the ODU/Antenna and render the radio unusable. Read through the entire procedure before attempting installation. If there are any questions, please contact P-COM Technical Assistance Center (TAC) at 1 (877) 674-3600.

- STEP 1.** Install the Mounting Bracket on the pole with the elevation adjusting screw either at the top or bottom of the mount, depending on the desired angle of the Sector Antenna relative to the Remote sites (refer to Figure 6-1).

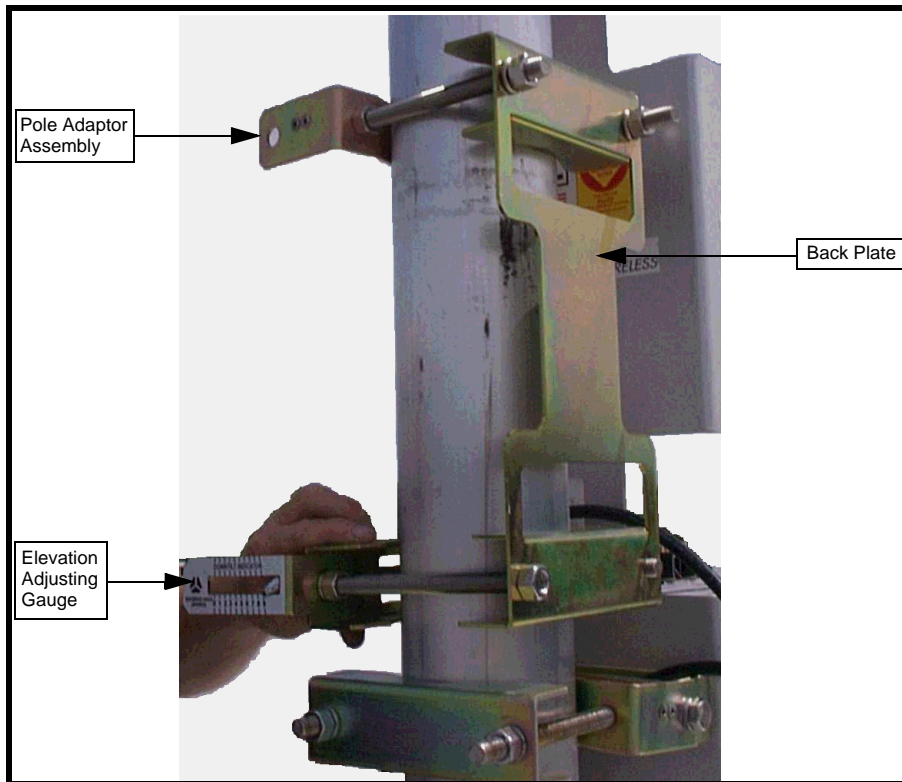


Figure 6-1 - Mounting Bracket Assembly

- STEP 2.** Tighten the four retaining nuts on the backplate of the Mounting Bracket. The backplate must be positioned such that it is perpendicular to the center point of the desired sector field of view (refer to Figure 6-1).
- STEP 3.** Attach the Antenna Mount Assembly to the Mounting Bracket by securing two bolts at the pole adaptor assembly. Insert the threaded rod from the pivot assembly into the Elevation Adjusting Knob. This will control the amount of elevation induced (refer to Figure 6-2).

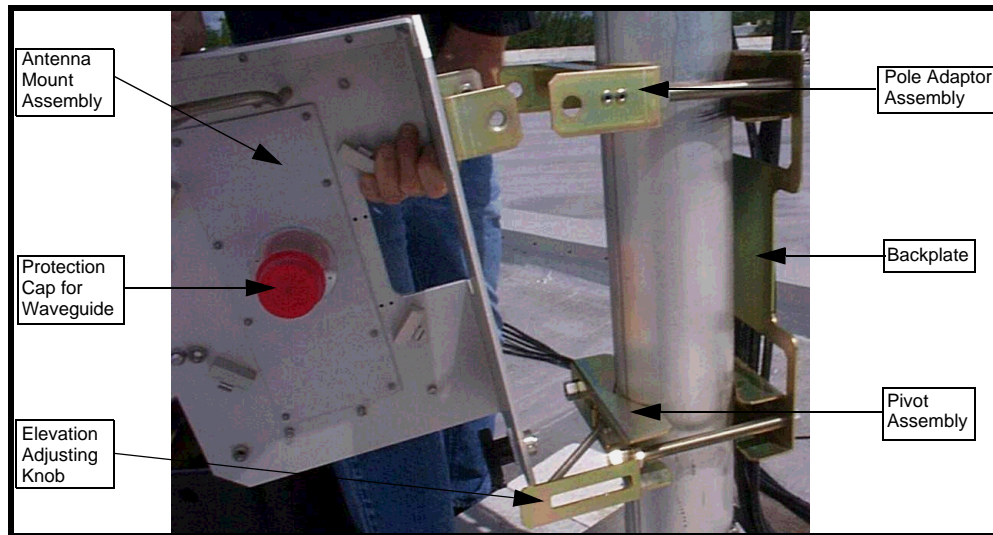


Figure 6-2 - Antenna Mount Assembly

NOTE: If installing a 38 GHz system proceed to Step 5

STEP 4. The Antenna Feedhorns are attached to the Antenna Mount Assembly by two bolts each. Transmit and Receive Feedhorns are attached to the ODU waveguides beneath the protective cover (refer to Figure 6-3). Use Mylar tape and protective plastic caps to protect the waveguide orifices to minimize contaminants in the waveguide. Proceed to Step 6.

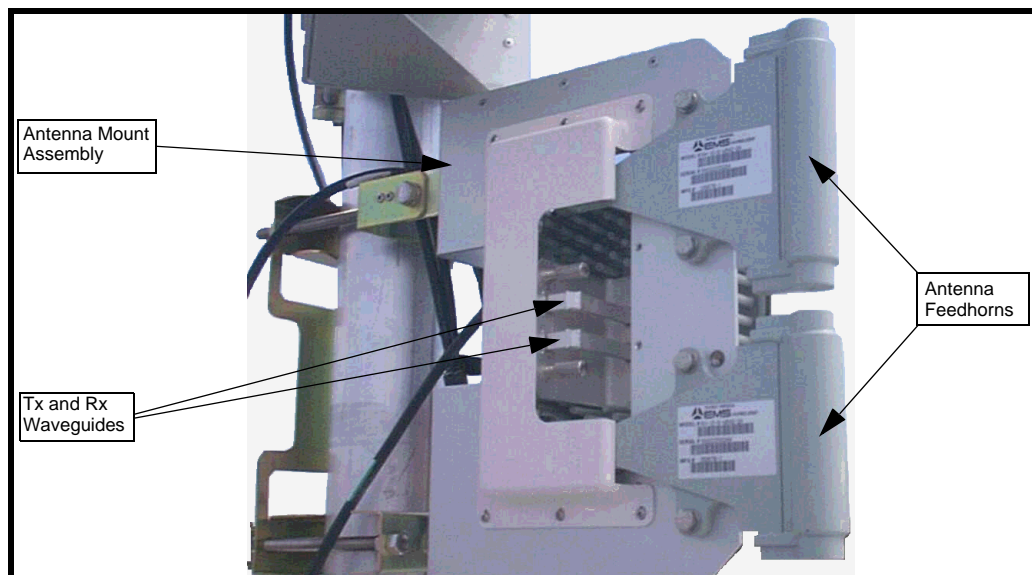


Figure 6-3 - Tx and Rx Antenna Feedhorns

STEP 5. A 38 GHz system utilizes only one Antenna Feedhorn and waveguide and is attached to the Antenna Mount Assembly by two bolts. Always keep the protective cap in place when no ODU is attached. This minimizes contaminants in the waveguide (refer to Figure 6-4).

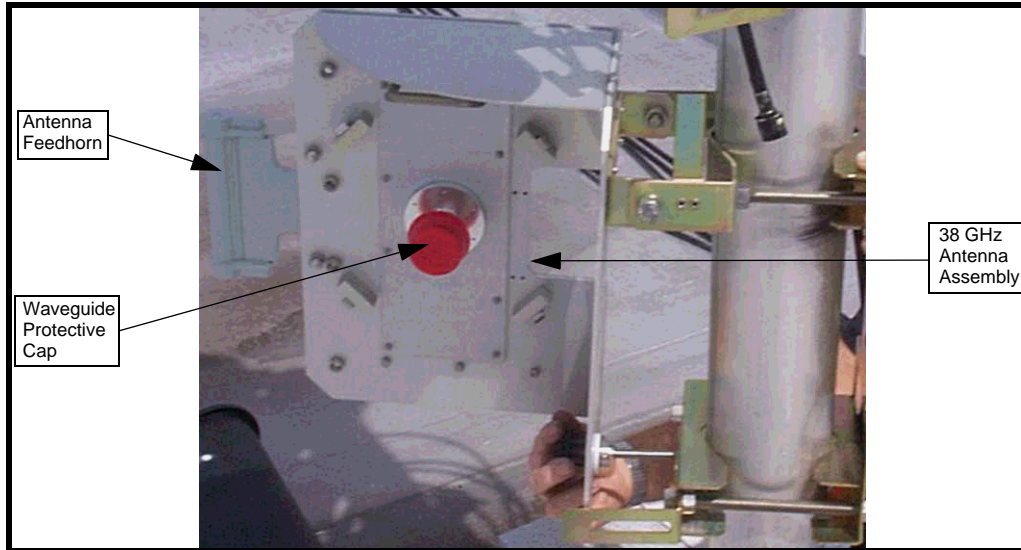


Figure 6-4 - 38 GHz Antenna Feedhorn

STEP 6. Using binoculars, locate the Remote site locations at both extremes of the sector. Align the Antenna Feedhorn such that they point in the center of those two locations. A compass should be sufficient to aim the antenna in the desired general direction within $\pm 3^\circ$, taking Magnetic Deviation into consideration when comparing the angle read on the compass to the desired azimuth angle (refer to Figure 6-5).

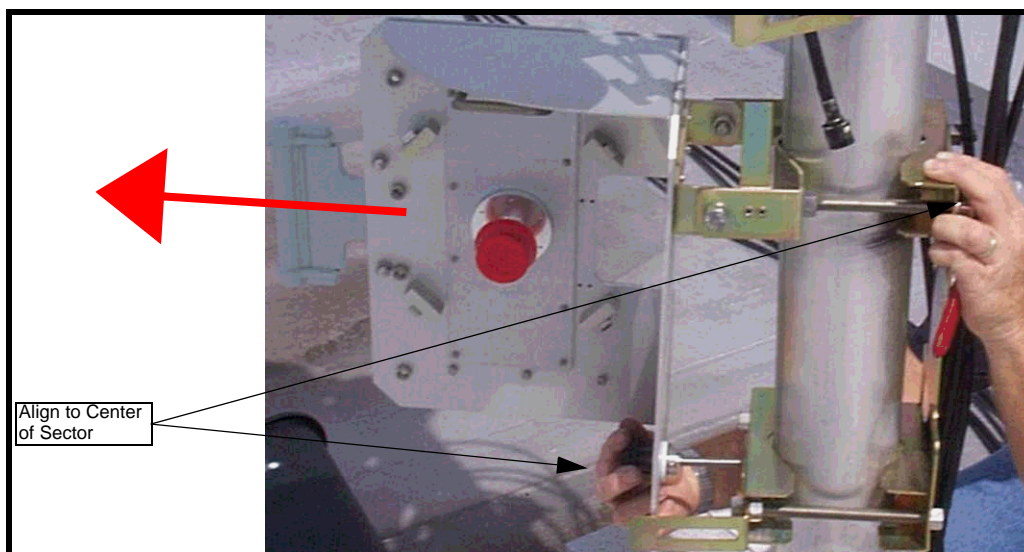


Figure 6-5 - Aligning the Sector Antenna

STEP 7. Secure the Mounting Bracket retaining nuts once course alignment is complete.

NOTE: If installing a 38 GHz system proceed to Step 10

STEP 8. Attach the ODU by positioning it to the back side of the Antenna Mount Assembly with the help of a protruding supporting handle. Hook the handle and let the ODU hang in place. Once positioned properly, snap tight the retaining clips mounted on the ODU to the hook clips of the Antenna Mount Assembly (refer to Figure 6-6).



Figure 6-6 - Attaching ODU to Antenna Mount Assembly

STEP 9. Attach the ODU Tx and Rx waveguide assembly to the appropriate ports on the Antenna Assembly. The Rx waveguide is the port closest to the center of the ODU. Thumbscrews, at the antenna end of the waveguide, are used to attach the waveguide assembly to the Antenna (refer to Figure 6-7)

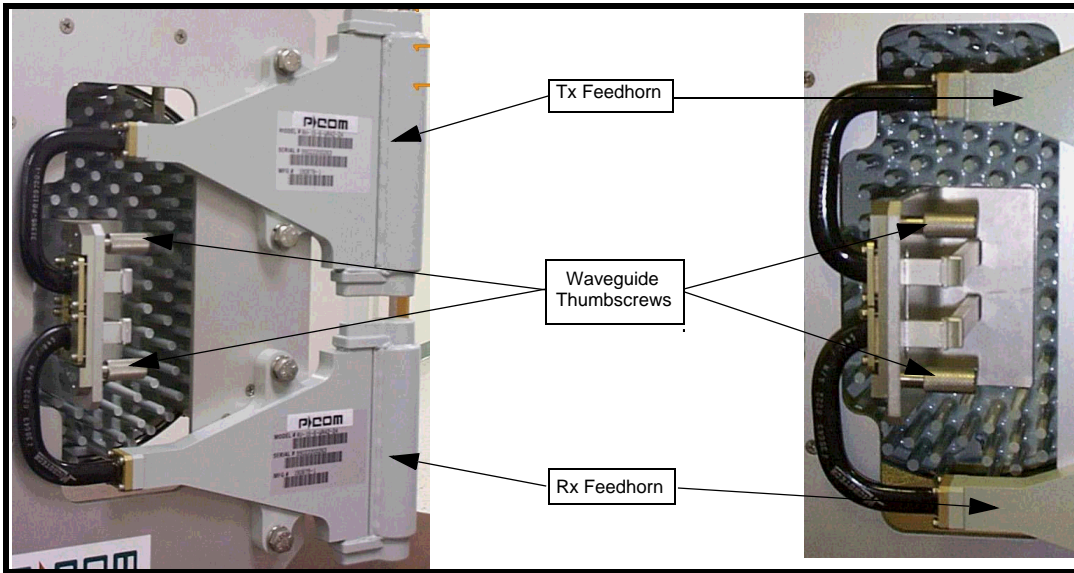


Figure 6-7 -.Attaching the Waveguides

STEP 10. Attach the ODU by seating the circular waveguide into the ODU orifice and positioning it to the back side of the Antenna Mount Assembly. Once positioned properly, snap tight the retaining clips mounted on the ODU to the hook clips of the Antenna Mount Assembly (refer to Figure 6-8).



Figure 6-8 - Attaching 38 GHz ODU to Antenna Mount Assembly

7.0 Sector Terminal IDU Chassis & ODU Power Supply Chassis Rack Installation

7.1 Introduction

This procedure provides instructions for installing the Basic and Expansion IDU chassis and the ODU Power Supply chassis in a standard 19 inch common equipment rack or cabinet. Actual quantity of chassis installed in a rack depends upon space allocation, requirement of expansion IDU chassis, and other factors. A potential rack layout for both the IDU Chassis and ODU Power Supply in a rack is illustrated in Figure 7-1.

7.2 Sector IDU Chassis Rack Installation

7.2.1 Tools Required

Refer to Table 3-2 in Section 3.0 for applicable tools.

7.2.2 Materials Required

- Eight (8) cage nuts per Basic IDU Chassis. (May not be required, consult rack manufacturer's documentation.)
- Eight (8) equipment mounting screws with washers per Basic IDU Chassis. (Consult rack manufacturer's documentation for required size.)
- Eight (8) cage nuts per Expansion IDU Chassis. (May not be required, consult rack manufacturer's documentation.)
- Eight (8) equipment mounting screws with washers per Expansion IDU Chassis. (Consult rack manufacturer's documentation for required size.)

7.2.3 Sector IDU Chassis Rack Installation Procedure

NOTE: P-COM highly recommends that a blower or fan be used with an enclosed rack containing three or more IDU's

- STEP 1.** Install Cage nuts on the rack if necessary
- STEP 2.** Install the IDU using screws in the eight mounting holes for Basic IDU chassis.
- STEP 3.** If an Expansion IDU chassis is required, physical installation is similar to the Basic IDU chassis. Repeat Steps 1 and 2.

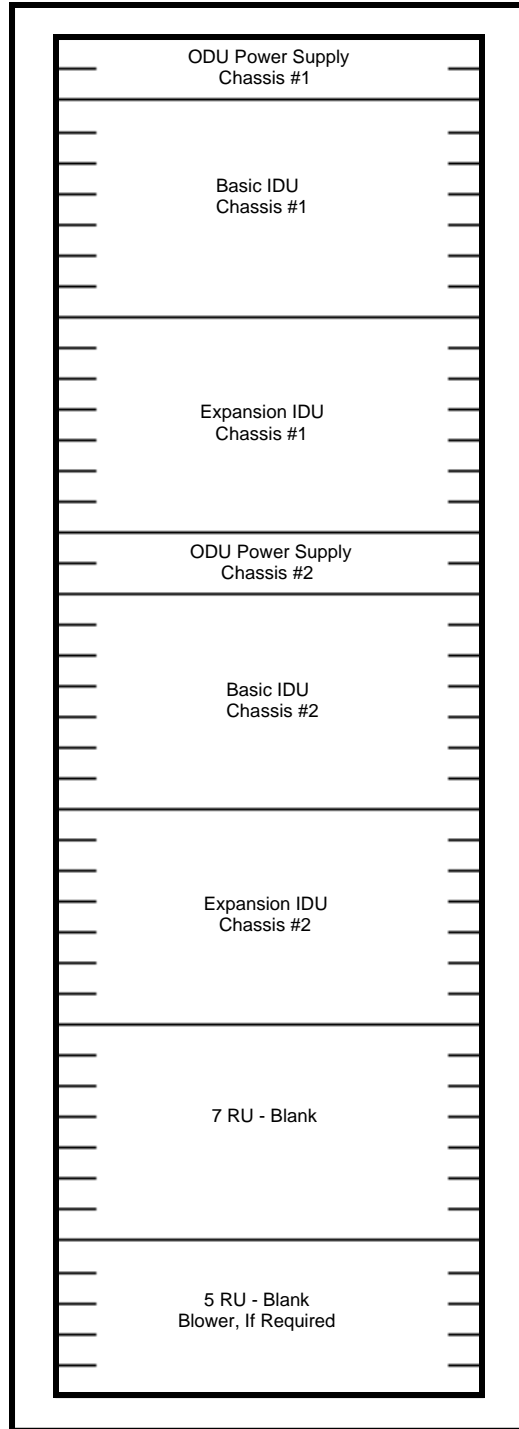


Figure 7-1 - Rack Elevation of a Sector Terminal

7.3 ODU Power Supply Chassis Rack Installation

7.3.1 Tools Required

Refer to Table 3-2 in Section 3.0 for applicable tools.

7.3.2 Materials Required

- Four (4) cage nuts. (May not be required, consult rack manufacturer's documentation.)
- Four (4) equipment mounting screws with washers. (Consult rack manufacturer's documentation for required size.)

7.3.3 ODU Power Supply Chassis Rack Installation Procedure

STEP 1. Install Cage nuts on the rack if necessary

STEP 2. Install the ODU Power Supply chassis using screws in the four mounting holes. The ODU Power Supply chassis is typically mounted above the Basic IDU chassis.

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8.0 Sector Terminal Wire and Cabling Installation

8.1 Introduction

This procedure provides instructions for wiring and cabling for the Sector IDU chassis, ODU Power Supply chassis and the ODU. The following shelf wiring is required for full system operations:

- IFL Cabling interconnect (IDU to ODU)
- Power Supply Cabling
- ODU Power Supply Cable (ODU Power Supply to the IDU)
- Grounding
- Expansion IDU chassis wiring (where applicable)

8.2 Ground, Power and Signal Wiring

8.2.1 Tools Required

Refer to Table 3-2 in Section 3.0 for applicable tools.

8.2.2 Material Required

- IFL cable (LMR-400 recommended)
- 90° Type-N Adapter
- RF connectors (Type-N)
- Weatherproofing sealant
- Outside Grounding Wire IAW local code
- 12 AWG Green Stranded Cable
- 12 AWG Compression Ring Lugs
- 16 AWG Twisted Pair Cable
- Power Cord (as applicable)

8.2.3 Grounding

NOTE: Ensure the outdoor antenna assembly pole and indoor equipment rack are grounded per applicable local code.

- STEP 1.** Ground all IDU chassis using the Chassis Ground screw on the rear of the chassis (refer to Figure 8-1 and Figure 8-2). Ground the IDU chassis by installing compression type lug and connecting the lug to the rack frame vertical channel, or local grounding bar, by using 12 AWG (or larger) copper wire. Remove any paint or oxidation from the surface of the equipment.

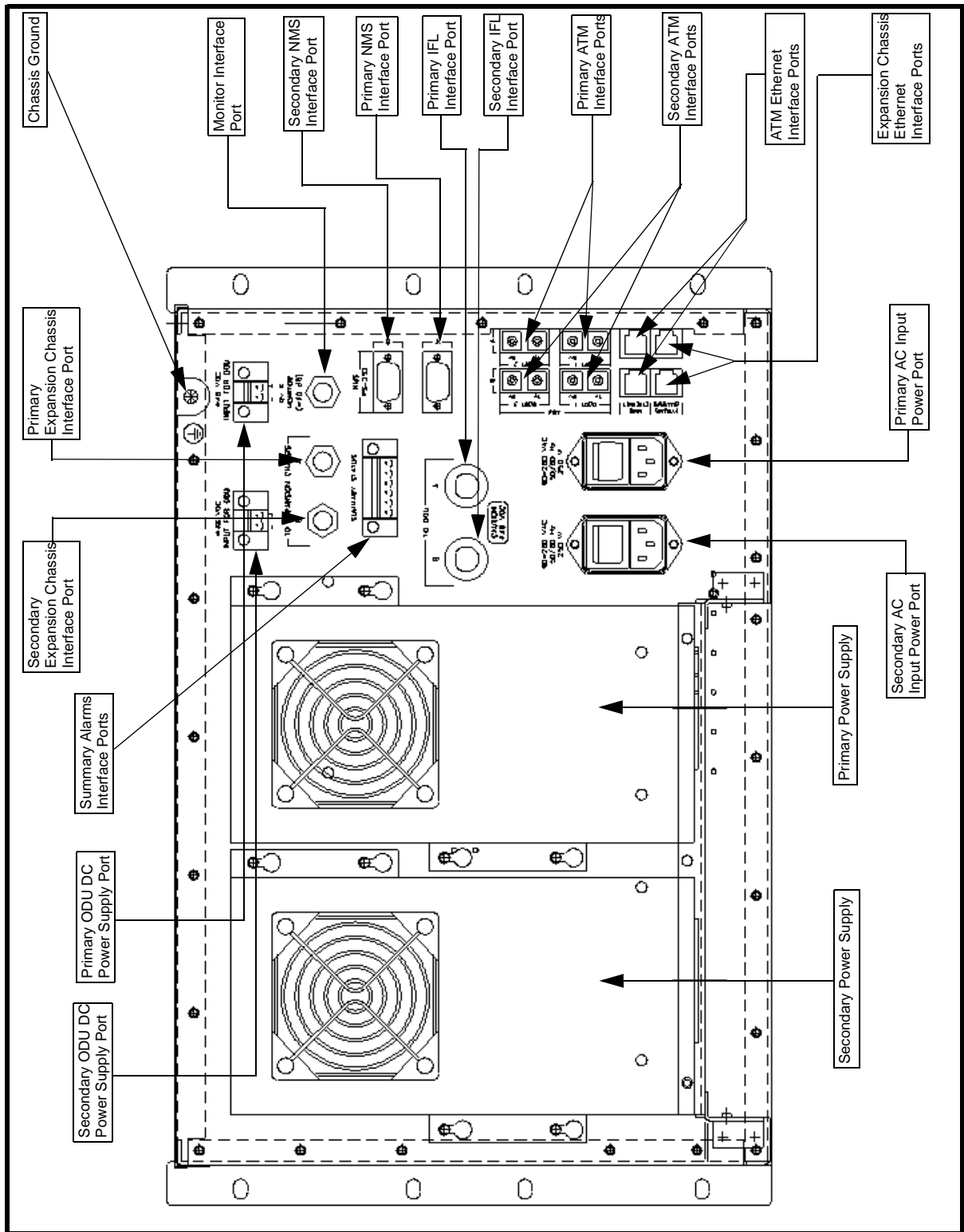


Figure 8-1 - Basic Sector Chassis AC Input (Rear View)

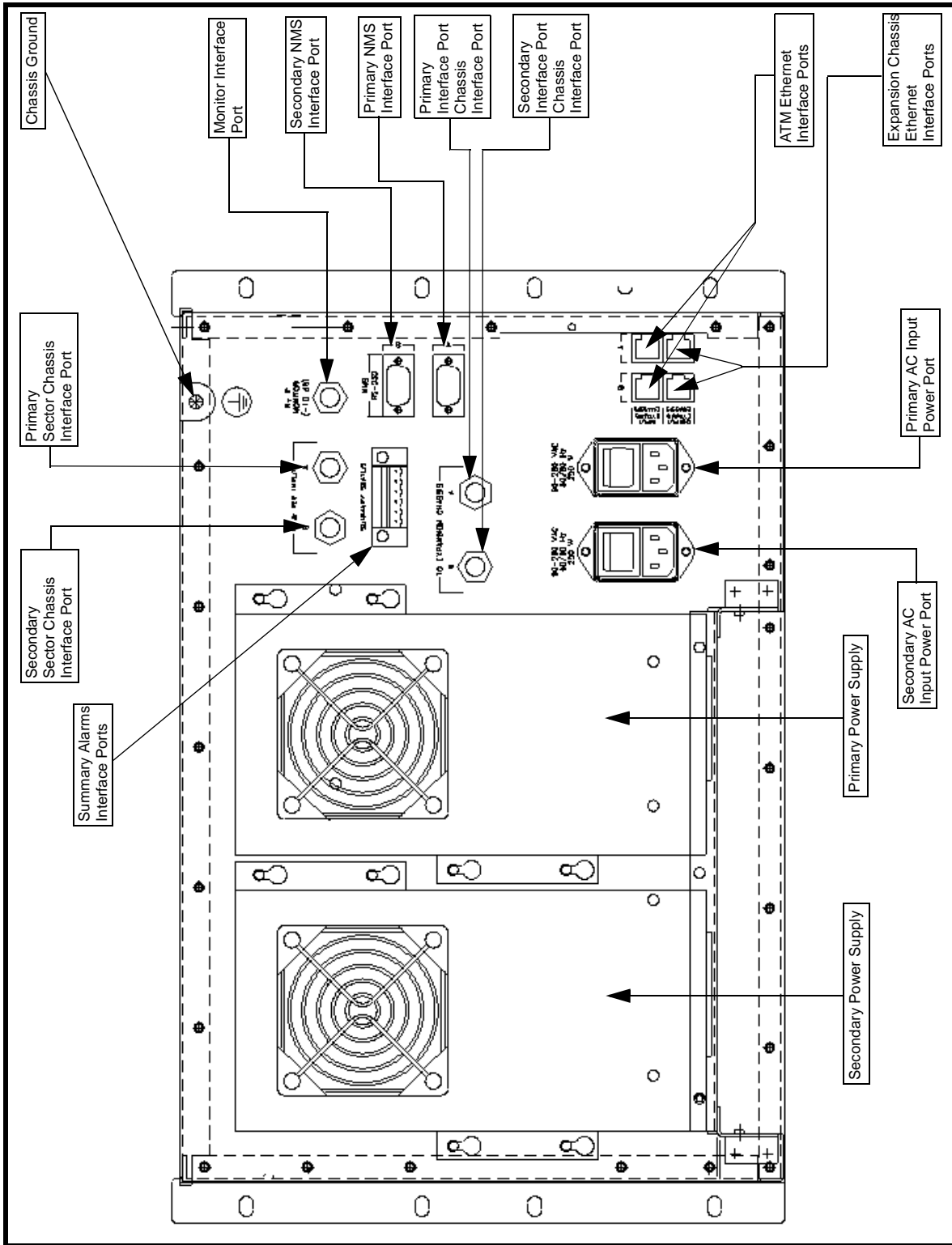


Figure 8-2 - Expansion Chassis AC Input (Rear View)

- STEP 2.** Ground ODU Power Supply chassis using the Chassis Ground stud on the rear of the power supply (Refer to Figure 8-3). Ground the ODU Power Supply chassis by installing compression type lug and connecting the lug to the rack frame vertical channel, or local grounding bar, by using 12 AWG (or larger) copper wire. Remove any paint or oxidation from the surface of the equipment.

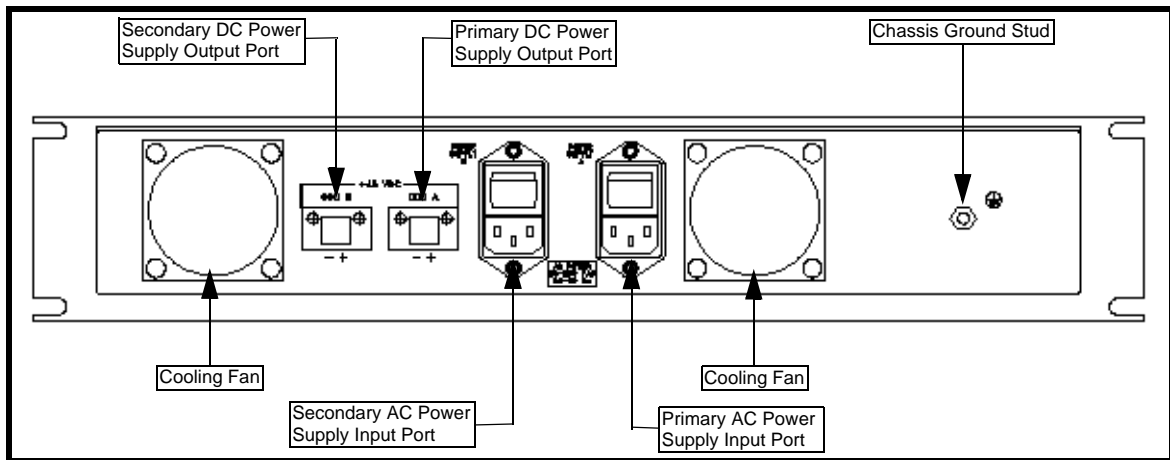


Figure 8-3 - Sector ODU Power Supply AC Input (Rear View)

- STEP 3.** Attach and secure grounding cable, in accordance with local code, from building ground to the antenna assembly pole structure for proper ODU grounding.

8.2.4 AC Power Supply

DANGER! Before connecting the AC cord to the IDU, ensure that the power switch is turned off.

NOTE: AC power does not apply to ODU wiring.

8.2.4.1 ODU Power Supply Chassis

For AC operations, two standard computer AC power cables rated for 10 Amp capacity are supplied with each ODU Power Supply chassis. The AC receptacle is found on the rear of the ODU Power Supply chassis (refer to Figure 8-3).

8.2.4.2 Sector IDU Chassis

For AC operations, two standard computer AC power cable rated for 10 Amp capacity are supplied with each IDU chassis. The AC receptacle is found on the rear of all IDU chassis (refer to Figure 8-1 and Figure 8-2).

8.2.5 DC Power Supply

DANGER! Before connecting the DC cable to the IDU, ensure that the protection fuse is removed to prevent the application of power at this time.

8.2.5.1 ODU Power Supply Chassis

The ODU receives its power from the ODU Power Supply chassis via the Basic IDU chassis through an IFL cable and may be measured at the center pin of the IFL when connected to the IDU Chassis (refer to Figure 8-4).

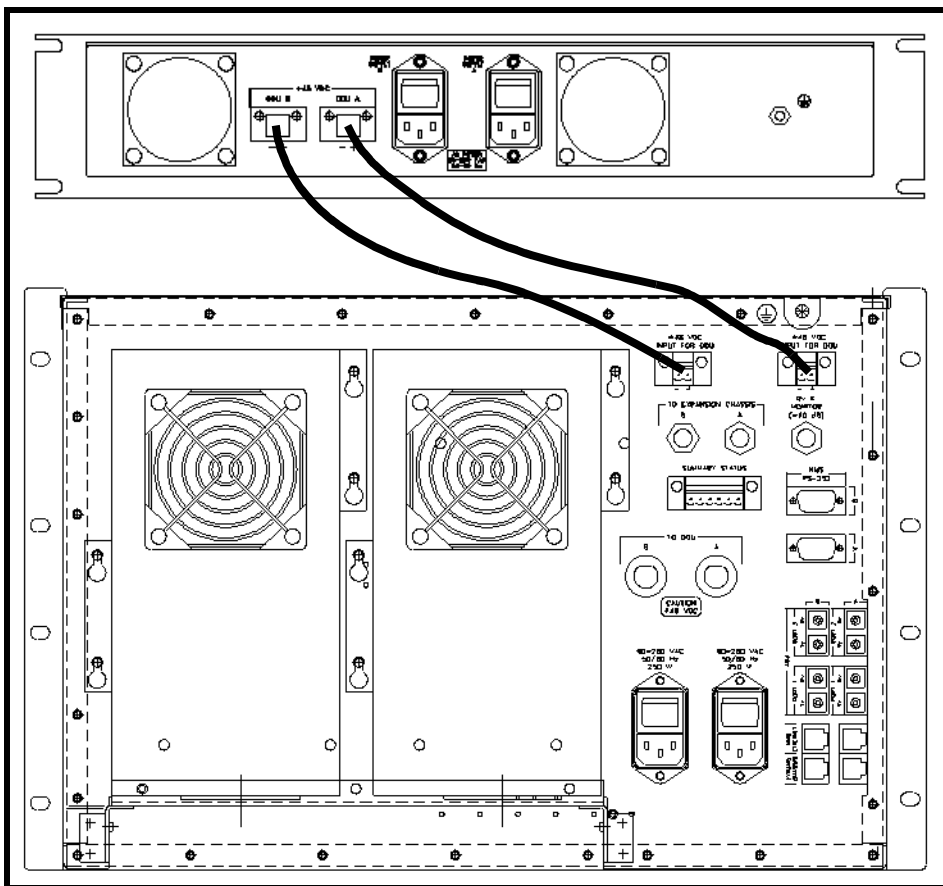


Figure 8-4 - Interconnecting of the ODU Power Supply to the Sector IDU

For DC operations, 16 AWG, 2-conductor twisted pair cable is supplied. The cables for carrying DC power to the ODU Power Supply chassis should be routed to a DC distribution panel preferably installed in the same rack. The DC distribution panel should provide individual fuse protection to each chassis. The DC receptacle is found on the rear of the ODU Power Supply chassis (refer to Figure 8-5). The DC power to the ODU Power Supply chassis should be protected with a 5.0 Amp fuse.

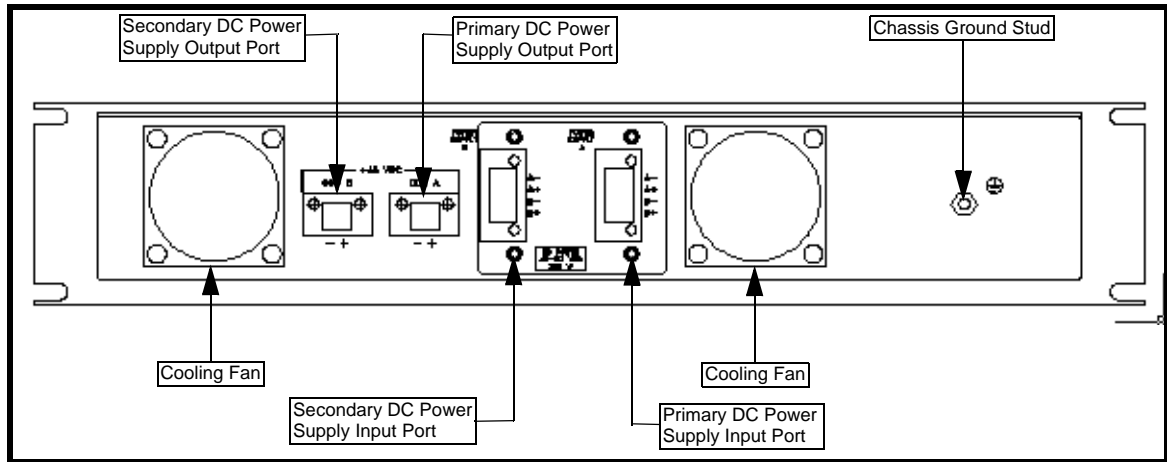


Figure 8-5 - Sector ODU Power Supply DC Input (Rear View)

8.2.5.2 Sector IDU Chassis

For DC operations, 12 AWG, 2-conductor cable is supplied. The cables for carrying DC power to the Sector IDU should be routed to a DC distribution panel preferably installed in the same rack. The DC distribution panel should provide individual fuse protection to each chassis. The DC receptacle is found on the rear of the IDU (refer to Figure 8-6). The DC power to the Sector Terminal should be protected with a 5.0 Amp fuse.

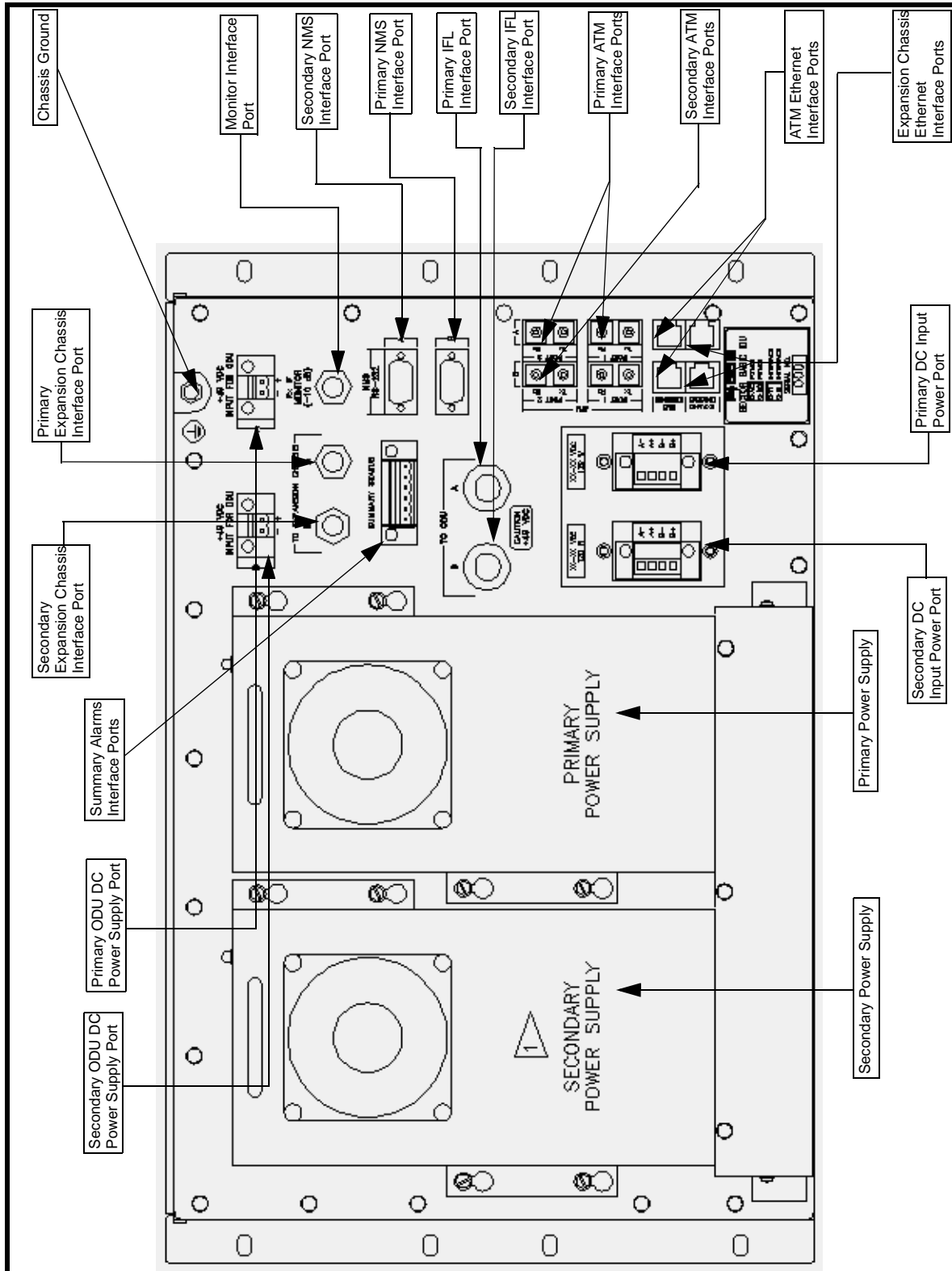


Figure 8-6 - Basic Sector Chassis DC Input (Rear View)

8.2.6 IFL Cabling

WARNING! Do not plug the IDU into the AC outlet or DC power source until the cable to the ODU is connected. If power is on, a DC voltage (44 VDC) will be present on the N connector of the IDU and could be shorted when installing the coaxial cable to the ODU.

If an Expansion IDU Chassis is being installed connect it to the Basic IDU Chassis via an IF cable (RG-58) 50-ohm, coaxial cable with male BNC connectors and UTP-5 Cable (refer to Figure 8-7). The length of the cable should be sufficient to allow a small service loop near each end and shall not exceed 20 ft (6 meters). When connecting the Basic IDU Chassis to the ODU, sufficient length of cable should be used to allow routing along the side of the rack, and a service loop. Perform the following steps to complete IF Cabling (refer to Figure 8-1).

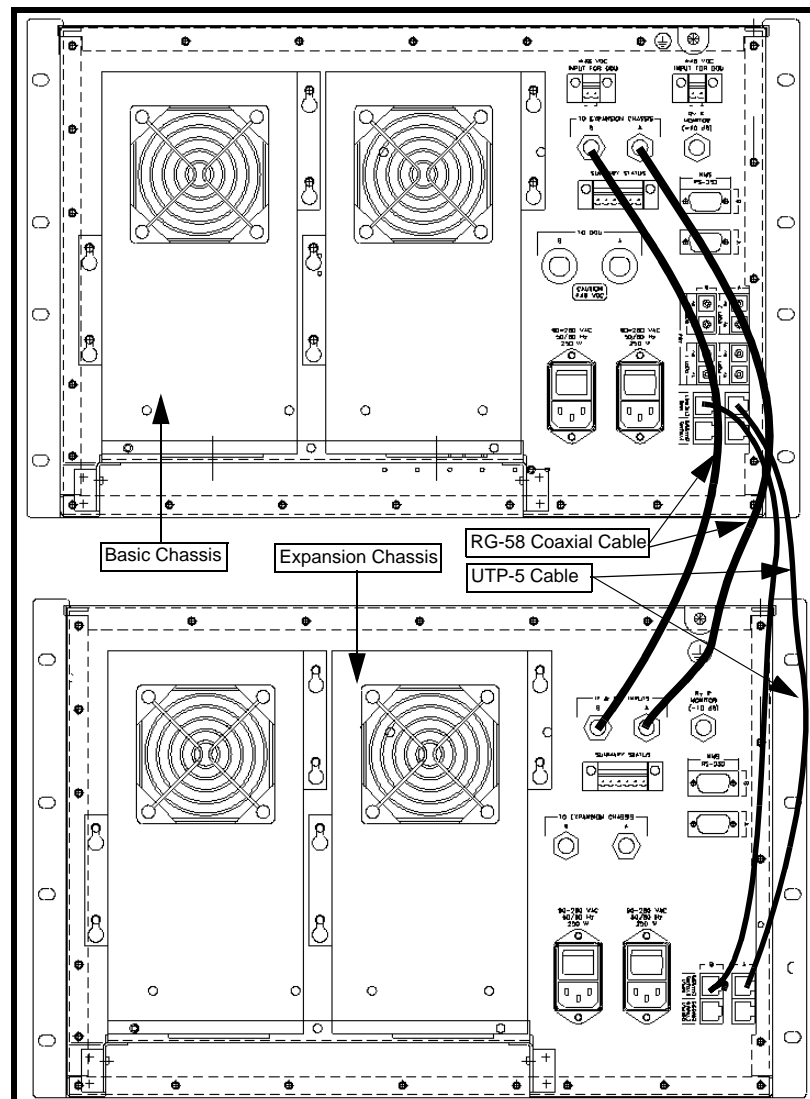


Figure 8-7 - Basic Chassis Connection to Expansion Chassis (Rear View)

- STEP 1.** Terminate IF Cable ends with Type-N Male RF connectors
- STEP 2.** Connect one end of the RG-58 coaxial cable to the Primary Sector Chassis Interface Port of the Expansion IDU chassis to the Primary Expansion Chassis Interface Port of the Basic IDU chassis. Connect one end of the RG-58 coaxial cable to the Secondary Sector Chassis Interface Port of the Expansion IDU chassis to the Secondary Expansion Chassis Interface Port of the Basic IDU chassis.
- STEP 3.** Connect the Primary IFL cable to the Primary IFL Interface Port on the Sector IDU
- STEP 4.** Ensure a 90° Type-N Adapter is securely attached to the ODU Type-N female port
- STEP 5.** Connect the IF cable to the 90° Type-N Adapter of the ODU and apply Weatherproofing sealant
- STEP 6.** Connect one end of the Primary UTP-5 cable to the Primary Expansion Chassis Ethernet Interface Port of the Basic Chassis to the Primary Expansion Chassis Ethernet Interface Port of the Expansion Chassis. Connect one end of the Secondary UTP-5 cable to the Primary Expansion Chassis Ethernet Interface Port of the Basic Chassis to the Secondary Expansion Chassis Ethernet Interface Port of the Expansion Chassis.

8.3 IDU to NMS and CPE Cabling

8.3.1 Tools Required

Refer to Table 3-2 in Section 3.0 for applicable tools.

8.3.2 Material Required

- Serial, straight-through, computer cable with DB-9 male/female connectors, 15-25 ft in length

8.3.3 NMS Cabling

- STEP 1.** Connect the NMS serial cable to the NMS Interface Port located in the rear of all IDU chassis (refer to Figure 8-1 and Figure 8-2). Screw down the connector to the NMS Interface Port to maintain secure connection.
- STEP 2.** Connect ATM Interface Port cables to customer supplied equipment, e.g., ATM Switch.

9.0 Sector Terminal IDU Board Installation

9.1 Introduction

The Basic IDU chassis consists of a power supply module(s), Modulators, Demodulators (FDMA network), Burst Demodulators (TDMA network), Sector ATM Controllers and ODU MUXs. The Expansion IDU chassis consists of Demodulators (FDMA), Demodulators (TDMA), Sector Expansion Controllers, and Receive IF Demultiplexers. The Sector IDU is designed to avoid single points of failure and ease of replacement of failed components. These cards are hot pluggable/swappable and can be configured for redundant operations as shown in Table 9-1 and Table 9-2. The Expansion chassis provides expansion of additional FDMA and TDMA Demodulator boards for larger sectors (Refer to Figure 3-1).

Table 9-1 - Basic IDU Chassis Redundancy

Name	Ratio	Description
Modulator	1:5	5 online Modulators, 1 Redundant
Demodulator	1:10	10 online Demodulators, 1 Redundant
Controller	1:1	1 online Controller, 1 Redundant
ODU Multiplexer	1:1	1 online ODU MUX, 1 Redundant
IDU Power Supply	1:1	1 online Power Supply, 1 Redundant

Table 9-2 - Expansion IDU Chassis Redundancy

Name	Ratio	Description
Demodulator	1:15	15 online Demodulators, 1 Redundant
Controller	1:1	1 online Controller, 1 Redundant
RX IF Demultiplexer	1:1	1 online ODU MUX, 1 Redundant
IDU Power Supply	1:1	1 online Power Supply, 1 Redundant

WARNING! Precautions for anti-static protection should be taken whenever handling printed circuit boards. Circuit modules can be damaged by electrostatic discharge. Ensure that an approved anti-static wrist strap is connected between the wrist of the person and an electrical ground before handling any of the circuit modules.

Placement of the common equipment boards within the IDU chassis is critical, and should follow the layout as shown in Figure 9-1 and Figure 9-2. Insert the boards from left to right for each board type

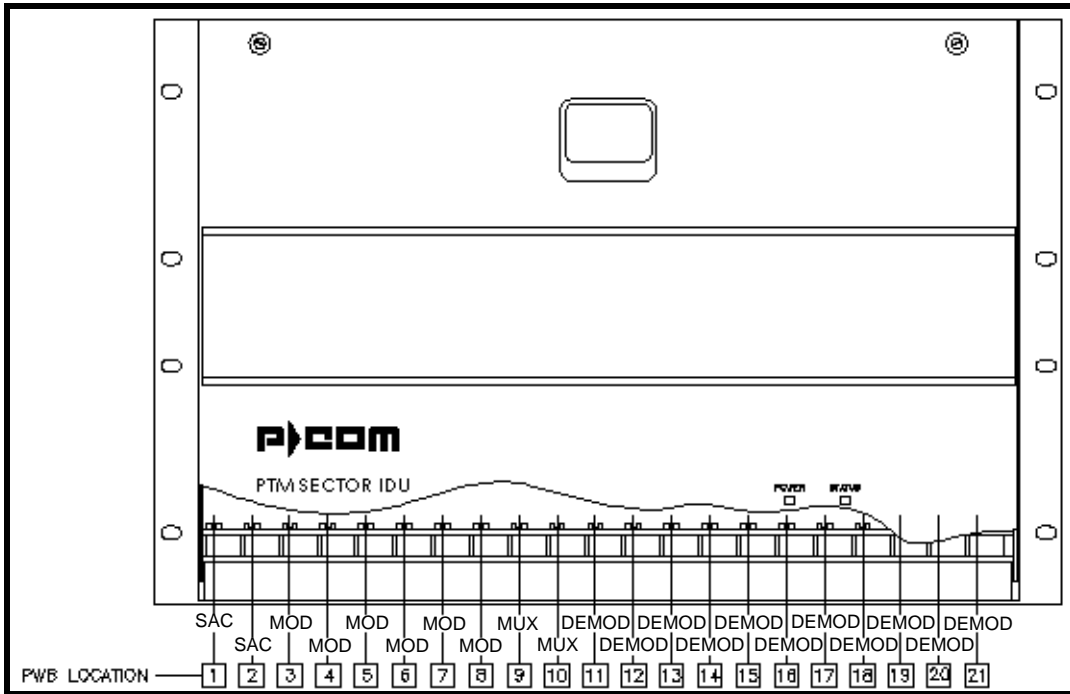


Figure 9-1 - Basic IDU Chassis Board Placement

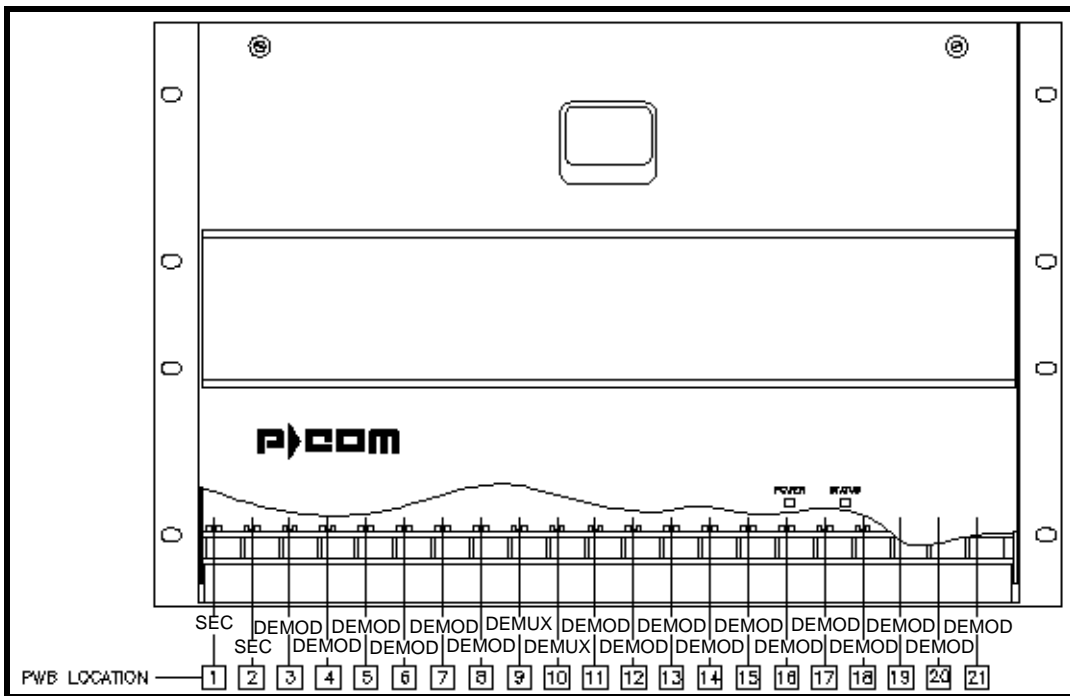


Figure 9-2 - Expansion IDU Chassis Board Placement

9.2 Board Installation

The printed circuit board has a high-density connector on one edge of the board and two black tabs on the opposite edge of the board (refer to Figure 9-3). Within the chassis, a board slot consists of nylon guides located at the top and bottom of a board slot, and a high density mating connector located on the motherboard within the chassis. Refer to Table 5-1, Sector IDU Parts List, for part numbers of the appropriate cards.

- STEP 1.** To insert a printed circuit board, vertically align the printed circuit board with the board slot of the chassis. The majority of the components on the printed circuit board should be facing towards the right of the chassis. The high-density connector located on the printed circuit board is inserted into the chassis first, orientated to allow mating with the corresponding high-density receptacle on the motherboard within the chassis.
- STEP 2.** The two colored tabs on the front edge of the board are to be held in an extended orientation. Slide the board into the chassis, along the guides, until the two high-density connectors are close to mating. Use the grips of the black tabs to attach to the chassis frame, pressing the tabs towards the printed circuit board edge, making a secure connection with the two high-density connectors.

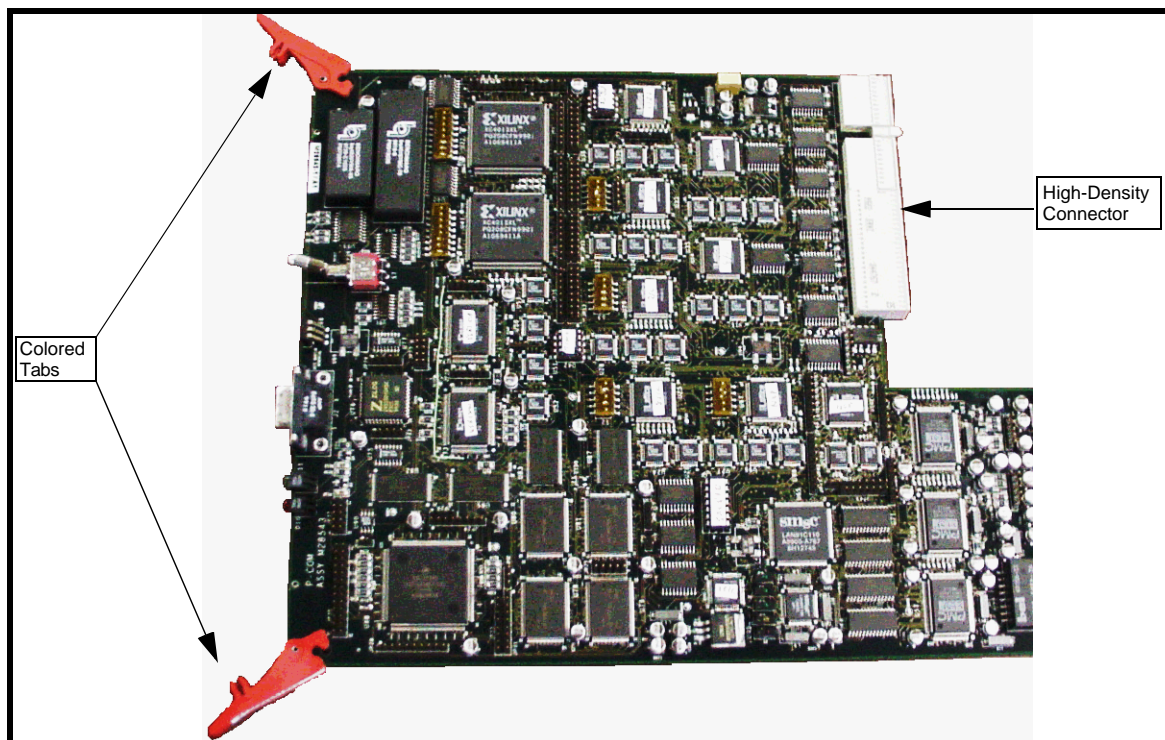


Figure 9-3 - Example of Printed Circuit Board

9.3 Power Supply Installation

The power supply is mounted on the rear of all IDU chassis in the right receptacle as seen from the rear (refer to Figure 9-4). If redundant power supplies are used the secondary unit is mounted in the left receptacle as seen from the rear.

- STEP 1.** Position the power supply on the rear of the IDU such that the retaining screws protrude through the four (4) mounting openings of the power supply box.
- STEP 2.** Slide the power supply down so the multi-pin connector on the bottom of the power supply mates with the opposite connector on all IDU chassis.
- STEP 3.** Secure the four (4) retaining screws to all IDU chassis.

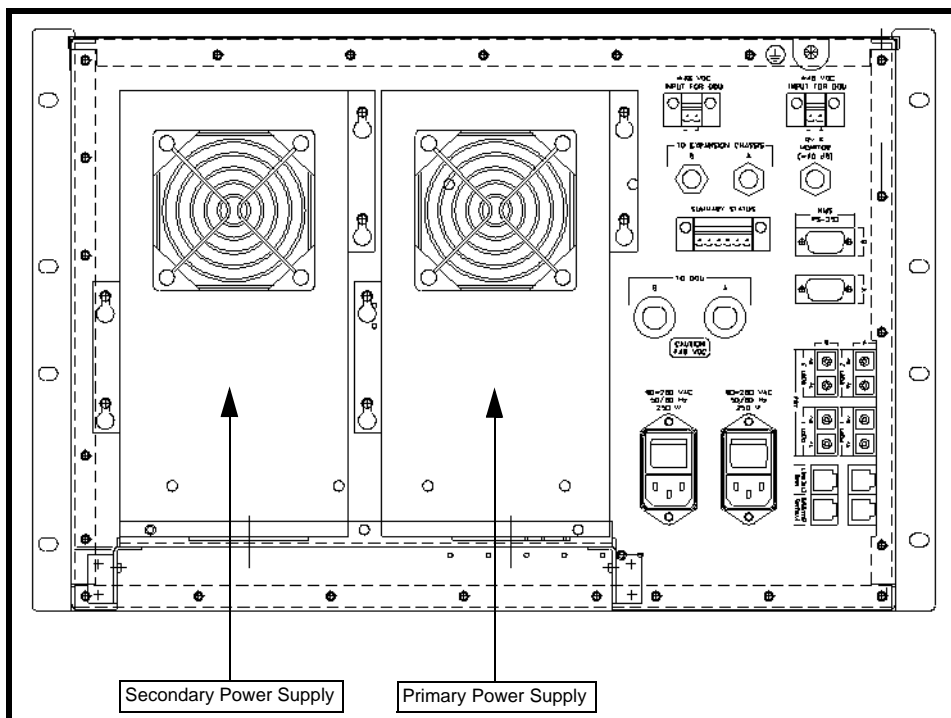


Figure 9-4 - Basic Sector Chassis (Rear View)

9.4 Board Removal

- STEP 1.** To remove a printed circuit board, grab the two tabs on the edge of the printed circuit board (refer to Figure 9-3). Extending these tabs will separate the printed circuit board high-density connector from its mate within the chassis. Slide the printed circuit board out of the chassis to complete the removal.

9.5 Power Supply Removal

STEP 1. Loosen the four (4) retaining screws that secure the power supply to the IDU chassis.

STEP 2. Slide the power supply out to disconnect it from the IDU chassis.

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10.0 Sector Terminal Initial Power Application

10.1 DC Power Application

- STEP 1.** Ensure the DC connector to the Sector IDU and ODU Power Supply are not connected.
- STEP 2.** Verify the appropriately sized fuses are installed IAW procedures in Section 8.0. Two fuses may be used for optional redundant power supply configuration.
- STEP 3.** Plug in the DC connector into the DC Power Port of the Sector IDU and ODU Power Supply. The right-most DC Input Power Port should be used first.
- STEP 4.** Verify power is applied to the chassis by viewing the LEDs on the front panel.
- STEP 5.** If the LEDs on the boards do not illuminate, remove the DC connector from the appropriate equipment and verify wiring and voltage polarity.

10.2 AC Power Application

- STEP 1.** Ensure the AC power switch of the Sector IDU and ODU Power Supply are in the OFF position.
- STEP 2.** Plug the AC cord for the Sector IDU and ODU Power Supply into the AC source. The right-most DC Input Power Port should be used first.
- STEP 3.** Place the AC power switch on the Sector IDU and ODU Power Supply in the ON position.
- STEP 4.** Verify power is applied to the chassis by viewing the LEDs on the front panel.
- STEP 5.** If the LEDs on the boards do not illuminate, remove the AC connector from the appropriate equipment and verify wiring and AC voltage.

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11.0 Initial Terminal Configuration and Testing

Proper functioning of this command and response exchange verifies that the IDU's Local Site Manager (LSM) agent and other critical software components are present and operational. Refer to the Tel-Link PMP - Local Site Manager Users Manual No.M68331 for detailed information on LSM operations. From the PC, the installer can use the Get and Set commands to communicate with the LSM agent in the IDU to program and interrogate the IDU configuration. Completion of the configuration will ensure items are properly loaded.

11.1 Terminal Configuration

- STEP 1.** After applying power to the IDU, allow the unit to warm up for five minutes.
- STEP 2.** Verify that each card has completed its self-test process and the LEDs on the front of each card are in a operational state. (Refer to Table 11-1).

Table 11-1 - Board LED Indications

BOARD	LED COLOR	INDICATION	DESCRIPTION
Modulator	Green	Blinking	Operational
		Off or Solid On	Fault
	Red	Solid On	Fault
		Off	Operational
Demodulator	Green	Blinking	Operational
		Off or Solid On	Fault
	Red	Solid On	Fault
		Blinking	Link Acquisition Mode
		Off	Operational
Sector ATM Controller	Green	Blinking	Operational
		Off	Fault
	Red	Solid On	Fault
		Blinking	Frequencies Incorrectly Configured
		Off	Operational
ODU MUX	Green	Blinking	Operational
		Off or Solid On	Fault
	Red	Solid On	DC removed from ODU
		Off	Operational

11.2 Antenna Alignment

STEP 1. Enable the transmitter

- Set the **sc_Commissioning_Complete** register to **Yes**.

11.3 Terminal Commissioning

11.3.1 LED Functionality

The following steps will verify the functionality of the LEDs of each board of the Sector IDU:

STEP 1. Verify the LEDs are in the following state:

BOARD	GREEN LEDs	RED LEDs
Sector ATM Controller	Blinking	Off
Modulator	Blinking	Off
ODU Mux	Blinking	Off
Demodulator	Blinking	Off

STEP 2. Turn off the Toggle Switch on the ODU Mux and verify the following LED state occurred:

BOARD	GREEN LEDs	RED LEDs
Sector ATM Controller	Blinking	Off
Modulator	Blinking	Off
ODU Mux	Blinking	Off
Demodulator	Blinking	Blinking

STEP 3. Turn on the Toggle Switch on the ODU Mux and verify the following LED state occurred:

BOARD	GREEN LEDs	RED LEDs
Sector ATM Controller	Blinking	Off
Modulator	Blinking	Off
ODU Mux	Blinking	Off
Demodulator	Blinking	Off

STEP 4. From the LSM initiate a software reset for the SAC by setting **sac_Reset** parameter to **Software_Reset** and then right clicking on **sac_Reset** and selecting **Set**. Verify the following LED state changes occur. This action should not interrupt customer traffic:

BOARD	GREEN LEDs	RED LEDs
Sector ATM Controller	Blinking	Blinking first then Off
Modulator	Blinking	Off
ODU Mux	Blinking	Off
Demodulator	Blinking	Off

STEP 5. From the LSM initiate a hardware reset for the SAC by setting **sac_Reset** parameter to **Hardware_Reset** and then right clicking on **sac_Reset** and selecting **Set**. Verify the following LED state changes occur. This action will interrupt customer traffic, causing all Sector IDU boards to temporarily display red LEDs, then resuming their nominal state. The system will recover within 60 seconds:

BOARD	GREEN LEDs	RED LEDs
Sector ATM Controller	Blinking	Blinking first then Off
Modulator	Blinking	Blinking first then Off
ODU Mux	Blinking	Blinking first then Off
Demodulator	Blinking	Blinking first then Off

11.3.2 Hot Swap/Redundancy Test

The following steps will demonstrate the “Hot Swap” and redundancy features of the Sector IDU. Boards will become functional when inserted into a powered chassis. A functional redundant board automatically replaces a simulated board failure with the time frame listed below:

SECTOR IDU BOARD	RECOVERY TIME
Sector ATM Controller	< 15 Seconds
Modulator	< 15 Seconds
ODU Mux	< 10 Seconds
Demodulator	< 15 Seconds

NOTE: The Sector IDU Chassis shall be equipped with a non-redundant set of boards and has achieved an operational state. A communications link between a Sector and Remote Terminals shall be established with the Remote Terminal configured in a network loopback state.

11.3.2.1 Sector ATM Controller (SAC)

- STEP 1.** Insert a SAC board into the secondary SAC slot and allow the SAC to undergo its self-test functions. Verify the secondary SAC is configured as the spare unit.
- STEP 2.** Pull the primary SAC board.
- STEP 3.** Initiate a **Get All** command on the SAC Section. The SAC Chassis Window should refresh with configuration parameters and the following will occur:
 - The redundant SAC board will show the configuration parameters of the “Failed” primary board.
 - The Red LED on the redundant SAC board will extinguish.
 - The link to the Remote Terminal will lose lock and then reacquire within 10 seconds

11.3.2.2 Modulators

- STEP 1.** Insert a Modulator board into one of the empty modulator slots and allow the Modulator to undergo its self-test functions. Configure the secondary Modulator as the spare unit.
- STEP 2.** Pull the primary Modulator board.
- STEP 3.** Initiate a **Get All** command on the MOD Section. The Mod Chassis Window should refresh with configuration parameters and the following will occur:
- The Red LED on the redundant Modulator board will extinguish.
 - The link to the Remote Terminal will lose lock and then reacquire within 15 seconds

11.3.2.3 ODU Mux

- STEP 1.** Insert an ODU Mux board into the empty ODU Mux slot and allow the ODU Mux to undergo its self-test functions. Configure the secondary ODU Mux as the spare unit.

NOTE: Spare ODU must be connected.

- STEP 2.** Pull the primary ODU Mux board.
- STEP 3.** Initiate a **Get All** command on the ODU MUX Section. The ODU MUX Chassis Window should refresh with configuration parameters and the following will occur:
- The Red LED on the redundant ODU Mux board will extinguish.
 - The link to the Remote Terminal will lose lock and then reacquire within 15 seconds

11.3.2.4 FDMA Demodulators

- STEP 1.** Insert a Demodulator board into one of the empty Demodulator slots and allow the Demodulator to undergo its self-test functions. Configure the secondary Demodulator as the spare unit.
- STEP 2.** Pull the primary Demodulator board.
- STEP 3.** Initiate a **Get All** command on the DEMOD Section. The DEMOD Chassis Window should refresh with configuration parameters and the following will occur:
- The redundant Demodulator board will show the configuration parameters of the “Failed” primary board.
 - The Red LED on the redundant Demodulator board will extinguish.
 - The link to the Remote Terminal will lose lock and then reacquire within 15 seconds

11.3.3 Power-up Restoration

The following steps will ensure the PMP equipment will restore back to an operational state with the interruption of power:

- STEP 1.** Connect an ATM Test Set to the Sector Physical Port. Place an ATM Port of the Remote IDU into an ATM mode and the ATM Test Set will generate ATM packets.
- STEP 2.** Allow the system to stabilize into an operational state and turn the power off to the Sector Terminal. The ATM Test Set should be displaying bit/packet errors.
- STEP 3.** Reapply power to the Sector Terminal. After approximately one minutes, the bit/packet errors displayed on the ATM Test Set should halt.

11.3.4 ATM Connectivity (End-to-End) Test

The following steps will verify end-to-end ATM connection has been established between a Sector and Remote Terminal:

- STEP 1.** Provision, with the ATM Test Set, a CBR connection with the appropriate VPI/VCI between the ATM switch and the Remote IDU.
- STEP 2.** Place the Remote IDU under test into ATM Loopback.
- STEP 3.** Reset the ATM Test Set and allow the test to run for 5 minutes.
- STEP 4.** Verify the equipment can handle the traffic with no cell loss.
- STEP 5.** Perform tests on all ports.

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12.0 Technical Support

12.1 Warranty

P-COM warrants PMP products to be free from defects in materials and workmanship for a period of twelve (12) months from the date of shipment from the factory. Extended warranty options are available.

12.2 Return Process

The boards of the PMP product requiring service may be sent to P-COM Florida at any time whether the unit is under warranty or not. There is a charge for repairs after the twelve-month warranty period.

A product requiring service should be returned with a Return Material Authorization (RMA), a detailed description of the problem and proof of purchase date if the twelve-month warranty has not expired. The product should be returned in its original shipping carton to ensure that in-transit damage does not occur.

The following process is used whenever returning equipment to P-COM:

- STEP 1.** Contact P-COM TAC at the telephone number below to obtain an RMA number and return shipping address:

P-COM Technical Assistance Center

Phone Number:1-877-674-3600

FAX Number:1-407-674-3700

Hours of Operation

8:00 AM to 5:00 PM Eastern Time (standard or daylight savings)

NOTE: All equipment received without an RMA will be returned to the sender.

- STEP 2.** Pack the equipment in the original shipping containers, if possible. If original shipping containers have been discarded, pack the failed unit so as to protect it from shipping damage.
- STEP 3.** Obtain insurance from the shipper that will cover the entire value of the equipment being returned.
- STEP 4.** Send the equipment (pre-paid shipping) to the address received from the Technical Assistance Center.
- STEP 5.** P-COM will notify the sender, upon receipt of the equipment, of an estimated time to repair and for return shipping instructions. An estimate of the repair cost will be given for all non-warranty repairs

All repairs covered under warranty will be completed at no cost and the return shipping (surface) will be paid for by P-COM. Repairs not covered by the warranty will be performed at current P-COM labor rates and material costs and billed to the customer. In addition, shipping will be billed for non-warranty repairs.

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November 1999

APPENDIX A: PMP Installation Procedure Checklist

PMP INSTALLATION PROCEDURE CHECKLIST			
Technician(s) Name:		Date:	
INTRODUCTION			
<p>This Installation Procedure Checklist is provided to ensure correct installation procedures of P-COM PMP equipment. The Checklist is to be completed for each site installed and the installer is to check-off each step as completed. The installer will sign and date the Checklist and forward it to the P-COM Technical Assistance Center (TAC) when the installation is completed.</p>			
Site Name:			
Site Designation:			
	Sector Terminal	<input type="checkbox"/>	Remote Terminal
FORMS:			
	<input type="checkbox"/>	Verify possession of completed Site Survey Form for the designated site.	
	<input type="checkbox"/>	Verify possession of System Configuration Document for the designated site.	
	<input type="checkbox"/>	Verify possession of Commissioning Test Form for the designated site.	
INVENTORY:	The shipping list contains all equipment ordered by the customer for the total number of Sector and Remote Terminals.		
	<input type="checkbox"/>	Verify possession of completed Site Survey Form for the designated site.	
	<input type="checkbox"/>	Verify possession of System Configuration Document for the designated site.	
NOTE:	Any visible damage should be reported immediately to the customer and to P-COM TAC at: 1-(877) 674-3600		
INTERFACILITY LINK (IFL) INSTALLATION SEQUENCE			
IFL INSTALLATION PREPARATION:	The IFL should be Times-Microwave LMR-400 coaxial cable, or equivalent, unless otherwise stated in the P-COM Site Survey Form		
	<input type="checkbox"/>	Verify presence of an appropriate IFL between ODU and IDU locations.	
	<input type="checkbox"/>	Verify sufficient length (4 ft) of IFL exists at both ends to provide a service loop prior to being terminated to the equipment.	
	<input type="checkbox"/>	Terminate each end of the IFL with Type-N male connectors.	
Page 1 of 5			

PMP INSTALLATION PROCEDURE CHECKLIST			
Technician(s) Name:		Date:	
OUTDOOR UNIT (ODU) INSTALLATION SEQUENCE			
ODU/ANTENNA INSTALLATION PREPARATION:			
<input type="checkbox"/>	Verify the pole used to mount the ODU/Antenna assembly is installed at the location identified in the Site Survey Form.		
<input type="checkbox"/>	Verify the pole is securely mounted and connected to earth ground in accordance with local code.		
ODU/ANTENNA INSTALLATION:			
<input type="checkbox"/>	Install the ODU/Antenna assembly in accordance with the P-COM Installation and Maintenance Manual.		
<input type="checkbox"/>	Sector ODU/Antenna: Course align the antenna in the direction for operation as specified in the P-COM System Configuration Document.		
<input type="checkbox"/>	Remote ODU/Antenna: Align the antenna in the general direction of the designated Sector Terminal. Fine-tuning will be performed during the "Initial Power-up and Test Sequence."		
ODU INTERCONNECT:			
<input type="checkbox"/>	Sector Terminal: Connect the IFL cable between the appropriate ODU and Basic IDU Chassis.		
<input type="checkbox"/>	Remote Terminal: Connect the IFL cable between the ODU RF Port (Type-N Connector and Remote IDU.		
INDOOR UNIT (IDU) INSTALLATION SEQUENCE			
IDU INSTALLATION PREPARATION:	Each Site should be identified, In the P-COM Site Survey Form, if the IDU is to be rack mounted or placed on a tabletop.		
<input type="checkbox"/>	Verify presence of IDU chassis and all cards intended to populate the IDU.		
<input type="checkbox"/>	Verify presence of customer's interface demarcation		
<input type="checkbox"/>	Verify required rack/table is installed, secured to the floor, and ready to accept the IDU.		
<input type="checkbox"/>	Verify correct power source has been provided within close proximity to the location where the IDU is to be installed and is controlled through an appropriate sized circuit breaker or fuse		
<input type="checkbox"/>	Verify power to the IDU is in the Off position (AC) or disconnected (DC).		
Page 2 of 5			

PMP INSTALLATION PROCEDURE CHECKLIST	
Technician(s) Name:	
Date:	
IDU INSTALLATION:	
<input type="checkbox"/>	Properly install the IDU in accordance with P-COM Installation & Maintenance Manual.
IDU INTERCONNECT:	
<input type="checkbox"/>	Sector Terminal: Connect the IFL cable to the RF Port of the IDU.
<input type="checkbox"/>	Remote Terminal: Connect the IFL cable to the RF Port of the IDU.
<input type="checkbox"/>	Sector and Remote Terminals: Connect the power leads/cords to the IDU Input Power Port. Terminate the power leads/cord to the appropriate AC or DC power source. Two power leads/cable may be terminated for a Sector IDU with optional redundant power supplies.
<input type="checkbox"/>	Sector and Remote IDUs: Connect a ground wire from the chassis to a local earth ground.
CUSTOMER PREMISE EQUIP- MENT (CPE) PREPARATION:	
<input type="checkbox"/>	Verify CPE has been installed within close proximity to the IDU equipment.
<input type="checkbox"/>	Verify sufficient length of CPE cable is present to provide a service loop prior to being terminated to the equipment.
<input type="checkbox"/>	Sector and Remote Terminals: After completion of the Commissioning Test Plan connect the CPE cable to the appropriate port on the rear of the IDU chassis
ODU POWER SUPPLY:	The ODU Power Supply should be installed at least 1 RU above each Sector bank of IDUs to prevent air flow restriction.
<input type="checkbox"/>	Properly install the ODU Power Supply in accordance with P-COM Installation & Maintenance Manual.
Page 3 of 5	

PMP INSTALLATION PROCEDURE CHECKLIST			
Technician(s) Name:		Date:	
ODU POWER SUPPLY:			
<input type="checkbox"/> Connect the ODU Power Supply to the Basic Chassis IDU in accordance with the P-COM Sector Terminal Installation & Maintenance Manual.			
<input type="checkbox"/> Connect a ground wire from the ODU Power Supply to a local earth ground.			
<input type="checkbox"/> Connect the power cord/leads to the Input Power Port. Terminate the power cord/leads to the appropriate AC or DC Power Source.			
INITIAL POWER-ON AND TEST SEQUENCE			
<input type="checkbox"/> Turn the circuit breaker assigned to the IDU to the ON position when prepared to apply power to the IDU.			
SECTOR TERMINAL:			
<input type="checkbox"/> Apply power to the Sector IDU and ODU Power Supply. Allow the terminal to warm up for 5 minutes.			
<input type="checkbox"/> Verify each card has completed its self-test process and the LEDs are in an operational condition. Interpretation of LED conditions may be found in Table 11-1, Board LED Indications of the P-COM Installation Manual.			
<input type="checkbox"/> Connect the LSM to the Controller card via DB-9 cable.			
<input type="checkbox"/> Verify appropriate software in the IDU			
<input type="checkbox"/> Load (Set/Get) appropriate registers in the IDU			
<input type="checkbox"/> Verify configuration loaded successfully.			
<input type="checkbox"/> Verify transmitter is disabled. The sc_Commissioning_Complete register should indicate "No".			
<input type="checkbox"/> Perform Terminal (Local) Testing in accordance with P-COM PMP Installation Manual.			
<input type="checkbox"/> Enable the transmitter. Set the sc_Commissioning_Complete register to "Yes".			
<input type="checkbox"/> Verify proper transmit level.			
Page 4 of 5			

PMP INSTALLATION PROCEDURE CHECKLIST			
Technician(s) Name:		Date:	
REMOTE TERMINAL:			
<input type="checkbox"/> Apply power to the Remote IDU. Allow the terminal to warm up for 5 minutes.			
<input type="checkbox"/> Verify each card has completed its self-test process and the LEDs are in an operational condition. for the 7 RU Interpretation of LED conditions may be found in Table 11-1, Board LED Indications of the P-COM Installation Manual.			
<input type="checkbox"/> Connect the LSM to the Controller card via DB-9 cable.			
<input type="checkbox"/> Verify appropriate software in the IDU			
<input type="checkbox"/> Load (Set/Get) appropriate registers in the IDU			
<input type="checkbox"/> Verify configuration loaded successfully.			
<input type="checkbox"/> Verify transmitter is disabled. The rc_Commissioning_Complete register should indicate "No".			
<input type="checkbox"/> Perform Terminal (Local) Testing in accordance with P-COM PMP Installation Manual.			
<input type="checkbox"/> Align the Remote Terminal antenna. Connect a AAU to the test port of the ODU. Adjust the antenna in elevation, then in azimuth to obtain a peak voltage measurement. Align antenna for a peak reading on the AAU. Tighten down all mounting bolts.			
<input type="checkbox"/> Verify proper receive level is registered at the IDU.			
<input type="checkbox"/> Enable the transmitter. Set the rc_Commissioning_Complete register to "Yes".			
<input type="checkbox"/> Perform BER tests on the Remote Terminal f for a minimum of 30 minutes.			
INSTALLATION COMPLETED			
This concludes the P-COM PMP equipment installation sequence. Sing and date in the spaces provided below and proceed to the P-COM PMP Commissioning Test Plan.			
Completion Number:			
Date:			
Signature:			
Page 5 of 5			

APPENDIX B: Site Survey Checklist

SITE SURVEY CHECKLIST						
Engineer:			Date:			
Customer			Address:			
Contact Names:						
Telephone Numbers:						
SITE CHARACTERISTICS						
Prior to site installation planning visit, complete line-of-sight, transmission engineering and preliminary frequency coordination work to establish viability of path selected.						
Site Name:						
Site Designation:						
		Sector Terminal	<input type="checkbox"/>	Remote Terminal	<input type="checkbox"/>	
Coordinates:	GPS			Degrees	Minutes	Seconds
	EPE					
	Latitude:					
Longitude:						
Ground Elevation AMSL (Above Mean Sea level)						
Distance Between Hub and Remote Terminals (kilometers)						
Azimuth (True) From Sector:						
Hub/Sector:			Remote:			
Transmit Frequency (High/Low Band; Polarization)						
Transit:			Receive:			
Available Conduit:						
Page 1 of 6						

SITE SURVEY CHECKLIST					
Customer		Date:			
Site Name:					
OUTDOOR EQUIPMENT					
Roof Access (Describe):					
Site Access					
	Yes	No		Yes	No
Roof Access Door	<input type="checkbox"/>	<input type="checkbox"/>	Ladder Req	<input type="checkbox"/>	<input type="checkbox"/>
Permit Req	<input type="checkbox"/>	<input type="checkbox"/>	Access Keys Req	<input type="checkbox"/>	<input type="checkbox"/>
Roof Penetration	<input type="checkbox"/>	<input type="checkbox"/>	Wall Penetration	<input type="checkbox"/>	<input type="checkbox"/>
Special Tools Req	<input type="checkbox"/>	<input type="checkbox"/>	On-Site Escort Req	<input type="checkbox"/>	<input type="checkbox"/>
If Yes, What Special Tools:			If Yes, Who is Needed as the Escort:		
Sketch/photos of Equipment and Site (on pages 5 and 6) - Include Site Layout (Topographical Map and Building Blueprints if available), Location of Antenna/ODU, and briefly explain how the Antenna/ODU will be installed below:					
Tripod:					
Wall Mount					
Parapet:					
Tower:					
Other:					
Pole Diameter:					
Show details in sketch of proposed mounting and hardware (pole) location. Show relationship to coaxial cable access and building ground. Show lightning rod ground connect point if applicable.					
Terrain Considerations:					
Obstructions:					
Other Considerations:					
					Page 2 of 6

SITE SURVEY CHECKLIST			
Customer		Date:	
Site Name:			
INTERFACILITY POWER AVAILABILITY			
Available Power (Voltage and Current)			
NOTE: Do not mount radio equipment in the proximity of machinery that can either generate large electromagnetic fields or large voltage spikes as they cycle On/Off (i.e. air conditioners, elevator motores, etc.)			
	Yes	No	
AC Power On Roof:	<input type="checkbox"/>	<input type="checkbox"/>	AC Power At Rack:
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Identify Location and Distance to Available AC Power:			
Distance Between ODU and IDU:			
NOTE: Maximum distance of LMR-400 Cable is 1000 Feet.			
		Yes	No
Has Cable Been Ordered?		<input type="checkbox"/>	<input type="checkbox"/>
IFL Cable Supplied By:	P-COM	<input type="checkbox"/>	Customer
		<input type="checkbox"/>	<input type="checkbox"/>
Distance Between IDU and Customer Premise:			
Sketch/Photos Of Equipment - Cable Run from ODU to IDU			
Show Access Points (i.e. Floors) (Sketch) (Space available on Pages 5 and 6)		Yes	No
		<input type="checkbox"/>	<input type="checkbox"/>
IFL Exists in-place:		<input type="checkbox"/>	<input type="checkbox"/>
Is Plenum Rated Cable Required:		<input type="checkbox"/>	<input type="checkbox"/>
Length:		Type:	
		Yes	No
Is Pull Rope Installed in Conduit		<input type="checkbox"/>	<input type="checkbox"/>
Is New Pull Rope Required:		<input type="checkbox"/>	<input type="checkbox"/>
Page 3 of 6			

SITE SURVEY CHECKLIST					
Customer		Date:			
Site Name:					
INDOOR EQUIPMENT					
What Type of Terminating Equipment Will Be Used (Customer Premise Equipment)					
Check Site For:					
	Yes	No		Yes	No
Phone Jack:	<input type="checkbox"/>	<input type="checkbox"/>	AC/DC Power:	<input type="checkbox"/>	<input type="checkbox"/>
Fuse Panel:	<input type="checkbox"/>	<input type="checkbox"/>	Battery Back-up	<input type="checkbox"/>	<input type="checkbox"/>
Number of IDUs Required:					
IDU Mounting	Rack Mounted	<input type="checkbox"/>	Tabletop Mounted	<input type="checkbox"/>	
Rack/Table Supplied By	P-COM	<input type="checkbox"/>	Customer	<input type="checkbox"/>	
Rack or Table Ordered:				Yes	No
				<input type="checkbox"/>	<input type="checkbox"/>
Limitations on Rack or Table Floor Space:					
Temperature/Humidity Controlled Room				Yes	No
				<input type="checkbox"/>	<input type="checkbox"/>
Air Flow Restrictions:				<input type="checkbox"/>	<input type="checkbox"/>
Fans Needed:				<input type="checkbox"/>	<input type="checkbox"/>
Other Rack Installation Considerations:					
TOOLS REQUIRED					
	Yes	No		Yes	No
Binoculars	<input type="checkbox"/>	<input type="checkbox"/>	Camera	<input type="checkbox"/>	<input type="checkbox"/>
Cellular Phone (2 each)	<input type="checkbox"/>	<input type="checkbox"/>	Compass	<input type="checkbox"/>	<input type="checkbox"/>
Flashlight/Strobe	<input type="checkbox"/>	<input type="checkbox"/>	GPS Receiver:	<input type="checkbox"/>	<input type="checkbox"/>
Tape Measure	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Other Equipment:					
					Page 4 of 6

Glossary

<u>NAME</u>	<u>DESCRIPTION</u>
AAL	ATM Adaption Layer - A collection of standardized protocols providing services to higher layers by adapting user traffic to a cell format.
AAU	Antenna Alignment Unit
Active Window	The window whose Title Bar is highlighted. Active windows lie in front of all windows that intersect them in three dimensional space
AGC	Automatic Gain Control
AIS	Alarm Indicator Status - One of the Operations and Maintenance function types used for fault management.
AMI	Alternate Mark Inversion - A type of bipolar line signaling used by DS-1 and DS-3 interfaces.
ANSI	American National Standards Institute. A US technology standards organization.
AMSL	Above Mean Sea Level
ASIC	Application Specific Integrated Circuit
ATM	Asynchronous Transfer Mode - A broadband switching and multiplexing, connection-oriented, high-performance and cost effective integrated technology.
B8ZS	Bipolar with Eight Zero Substitution - A line code substituting 8 zeros with Bipolar Violations for bit synchronization purposes.
Base Station	The center of a cell where Sector Terminal(s) are installed.
BER	Bit Error Rate - A measure of the rate of bit errors in a digital system.
BNC	Bayonet Nut Connector
BOD	Bandwidth-On-Demand - A technique allocating more bandwidth to users requiring it and reduces bandwidth to users that do not.
BPV	Bipolar Violation - DS-1 and DS-3 line fault alarms.
BRI	Basic Rate Interface - A ISDN service specification that provides two 64-Kbps B-channels and one 16-Kbps D-channel.
Calibration File	A file used by the LSM to calibrate a particular model of ODU
CAS	Channel Associated Signaling
CBR	Constant Bit Rate - One of five service classes for the ATM layer. This service type allows a user to define a specific cell delay, cell delay variation, and reserve a specific constant fixed bandwidth on the network.
CCITT	Consultative Committee on International Telegraphy and Telephony.

<u>NAME</u>	<u>DESCRIPTION</u>
CCS	Common Associated Signaling
CHAMP	Connector
Chassis Number	An integer value that uniquely identifies a chassis
Chassis Parameter	A value that may be read and/or written from/to a board that exists within a chassis. Examples of chassis parameters include odu_Temperature for the ODU, or sc_Tx_Frequency in the Sector Controller
Chassis Window	The window that displays information about the individual boards making up a chassis. The operator interacts with this window to control and monitor chassis parameters.
CLAV	Cell Available
Client Area	The area of a window excluding the title bar and bounded by the window frame. The client area is used to display the document visually to the operator.
Closing a Window	Expanding a window down to its maximum size. Maximizing a window under Windows 95 is performed by clicking on the maximize button on the Title Bar
Configuration Files	Files that contain the labels, desired values, sampling intervals, and sampling active states for chassis parameters. These files are displayed graphically within Chassis Windows.
Configuration Section	A section of a Configuration File containing parameters for a given board that do not exist within any configuration tables.
Configuration Table	A table of parameters lying within a configuration section,
Continuous Get	The process of automatically performing Gets on chassis parameters at selected intervals
CPE	Customer Premise Equipment - Customer provided equipment that connects to the interface port(s) of the IDU.
CRC	Cyclic Redundancy Check - A process used to check the integrity of a block of data.
Current Value	The current setting of a chassis parameter. Used in conjunction with a Get operation
DBPSK	Differential Bi-Phase Shift Keyed
Debug Port	The serial port used by the LSM to monitor and debug a PMP System.
Definition Files	Files that contain the VID number, PID number, sample rate and sampling active settings, as well as enumerated values for chassis parameters. These files are displayed graphically with Chassis Windows

<u>NAME</u>	<u>DESCRIPTION</u>
Desired Value	The value that the operator wishes to change a chassis parameter to. Used in conjunction with a Set operation
Desired Value	The value one wishes to change a chassis parameter to. Used in conjunction with a Set operation.
Desktop	The backdrop against which applications run in the Windows 95 environment. It is in reality the parent window of all windows present with Windows 95.
Detailed Help	Detailed information about an object, available by clicking on the arrow/question mark button in the Toolbar and then clicking on the object.
DFM	Drive Fault Monitor
Dialog Box	A window consisting of controls with which an operator interacts. Dialog boxes come in two flavors: modal dialog boxes, which require that the operator terminate the dialog box before other window objects present in the application may be accessed, and modeless dialog boxes, which allow the operator to interact with other window objects at any time while the dialog box exists.
DLL	Dynamic Link Library - Libraries of code shared by applications
DLL Libraries	Libraries of code shared by applications
Down Link	The RF communications path from a Base Station to the Remote Terminal
DQPSK	Differential Quadrature-Phase Shift Keyed
DSP	Digital Signal Processor
DSX	DS-n customer premise equipment
EIA	Electronics Industry Association
EIRP	Effective Isotropic Radiated Power
EMC	Electromagnetically Coupled
EPLD	Electronically Programmable Logic Device
Error Code	An integer value indicating success/failure at performing a Set/Get operation.
Error Message	A message received from the PMP System via the LSM Port that gives information on an error that was detected within the PMP System. Error messages may be displayed via the Error Message Window.
ESF	Extended Super Frame Format - Combination of 24 T1 frames.
ETSI	European Telecommunications Standards Institute - European equivalent of ANSI.

<u>NAME</u>	<u>DESCRIPTION</u>
Explorer	Short for Windows 95 Explorer, the application that comes bundled with Windows 95 allowing the manipulation of drives, directories and files.
EXZ	Excessive Zero Events - Used by DS-3 interface.
FCC	Federal Communications Commission - A US regulatory commission.
FDDI	Fiber Distributed Data Interface - ANSI standard for implementing high-speed (100-Mbps) LAN over fiber.
FDMA	Frequency Decision Multiple Access - A technique that allows multiple users access to bandwidth by subdividing into multiple channels.
FEC	Forward Error Correction - An error correction technique allowing the receiver to correct some errors in the received signal.
FERF	Fare End Receive Failure
FPGA	Field Programmable Gate Array
FSK	Field Shift Keyed
FWA	Fixed Wireless Access
Get Operation	The process of obtaining the current value of a chassis parameter
GUI	Graphical User Interface
HDB3	High Density Bipolar Order 3
HDLC	High-level Data Link Control - A synchronous bit-oriented protocol for serial data.
Hex Records	Records collectively making up a hex .rec file, the file format used for software updates. Motorola defines the standard for the records used by the LSM for software updates.
IDU	Indoor Unit - PMP chassis, including cards populating the chassis, located inside a building.
IF	Intermediate Frequency
IFL	Interfacility Link - A communications link between the IDU and ODU
Incoming Packets	Packets of data received by the Local Site Manager via a serial port
ISDN	Integrated Services Digital Network - Digital service for voice, data, and video.
ISP	Internet Service Provider
Keyboard Accelerator	A keystroke sequence that emulates the selection of a menu item
Keystroke Sequence	A group of keys on the keyboard simultaneously depressed

<u>NAME</u>	<u>DESCRIPTION</u>
Label	A name uniquely identifying a chassis parameter
LAN	Local Area Network
LCD	Liquid Crystal Display
LED	Light Emitting Diode
LIU	Line Interface unit
LMCS	Local Multi-Point Communications Services
LMDS	Local Multi-Point Distribution System
LNA	Low Noise Amplifier
Logs	Status information reports accumulated over time. Examples include incoming packets logs, or error message logs.
LOS	Loss of Signal
LSM	Local Site Manager -Laptop or desktop PC based software tool used to monitor, control and configure the PMP System.
LSM Installer	The software application that installs the LSM and all subordinate files
LSM Port	The serial port used by the LSM to communicate with a PMP System
LSM Uninstaller	The software application that uninstalls the LSM and all subordinate files
Main Window	The window that contains the menu bar and toolbar, serving as the parent of all windows and dialog boxes. Closing the Main Window terminates the LSM
Maximizing a Window	Expanding a window to its maximum size. Maximizing a window under Windows 95 is performed by clicking on the maximize button in the title bar.
MC	Modem Controller
MCF	Motorola Cold-Fire Processor
Menu Bar	A list of individual menus. Present at the top of the Main Window
Menu Item	An individual item that resides within a menu which may be selected by the operator
MIB	Management Information Base - Database containing information regarding network management and performance.
Minimizing a Window	Shrinking a window down to a single title bar. Minimizing a window under Windows 95 is performed by clicking on the minimize button on the Title Bar
Mouse Cursor	The cursor that displays the current position of the mouse

<u>NAME</u>	<u>DESCRIPTION</u>
NCO	Numerical Control Oscillator
NMA	Network Management Agent
NMS	Network Management System
NOC	Network Operations Center
ODU	Outdoor Unit - PMP communications equipment located outside a building connected to an antenna.
OMT	Othogonal Mode Transducer
Operator	The person who is interacting with the Local Site Manager
OTA	Over the Air
Outgoing Packets	Packets of data transmitted via the LSM Port to the PMP System.
PA	Power Amplifier
PCB	Printed Circuit Board
PD	Pattern Detect
PID	Process ID - A number uniquely identifying a process with a board.
PMP	Point-to-Multipoint
PMP System	The combination of hardware and embedded software that make up the P-COM Point-to-Multipoint System
Popup Menu	A menu that comes into existence when a Windows Object is selected by the operator while the right mouse button is pressed. Popup Menus serve as a convenient means of querying/changing the settings for a given Window Object
POST	Power Up Self Test
PSN	Public Switched Network
PTN	Public Telephone Network
QAM	Quadrature Amplitude Modulation - A high bandwidth efficiency modulation technique
QPSK	Quadrature Phase Shift Keyed - Digital modulation technique.
Quick Help	A brief summary of a chassis parameter, available by double clicking on the chassis parameter in the label column of a Chassis Window.
RAC	Remote ATM Controller - ATM controller card used in the Remote Terminal IDU to manage and control the traffic a the Remote site.
RAM	Random Access Memory
RCS	Redundancy Control Switch

<u>NAME</u>	<u>DESCRIPTION</u>
Remote IDU	Remote Terminal Indoor Unit chassis located at the remote location
Remote ODU	Remote Terminal Outdoor Unit located at the remote location, connected to a directional antenna pointed towards the Sector Terminal.
Remote Terminal	Consists of a Remote IDU, Remote ODU and Interfacility Link
Restoring a Window	Resizing a window to its previous size. Restoring a window under Windows 95 is performed by clicking on the restore button in the title bar.
RF	Radio Frequency
RMA	Return Material Authorization
ROM	Read Only Memory
RSSI	Receive Signal Strength Indicator
RU	Rack Unit
Rx	Receive Signal
SAC	Sector ATM Controller - ATM controller card used at the Base Station/ Sector Terminal IDU to manage and control the traffic at the sector.
Sample Interval	The rate at a Continuous Get is performed on a chassis parameter
Sampling Active	Whether or not Continuous Gets will be performed on a chassis parameter
SAW	Surface Acoustic Wave
SCC	Serial Communication Controller
Scroll Bars	Bars present at the bottom and/or right edge of a Window enabling the operator to scroll the data upwards or downwards, thus observing information that lies beyond that capable of being displayed in the window
SDH	Synchronous Digital Hierarchy - A hierarchy for very high-speed digital transmissions over optical fiber links
Sector	A geographic area radiating out from a Base Station. Typically referred to as the area covered by a Sector Antenna
Sector IDU	Sector Terminal Indoor Unit chassis located at the Base Station
Sector ODU	Sector Terminal Outdoor Unit chassis located at the Base Station location, connected to an antenna providing coverage over a sector.
Sector Terminal	Consists of one or more Sector IDUs connected to a common, or redundant, set of Hub IF Combiners and Sector ODU/Antenna assemblies

<u>NAME</u>	<u>DESCRIPTION</u>
Selection	Highlighting an item for an action via the process of single clicking on the item. Holding down the Shift Key while selecting items allows contiguous selections. Holding down the Ctrl Key while selecting items allows noncontiguous selections.
Set Operation	The process of changing the current value of a chassis parameter
Settings	Options for customizing the Local Site Manager to an operator's preferences. Available from the Setup Dialog Box
SF	Super Frame Format
Shortcut	A Windows 95 Object that points to an application or data file. Double clicking on a shortcut to an application executes the application. Double clicking on a data file executes the application tied to the data file
Site Diagnostic Report	A report produced listing detailed information about the current status of all chassis making up the system
Slot Number	A value that uniquely identifies a board within a chassis
SNMP	Simple Network Management Protocol - Protocol for exchanging network management information.
SNR	Signal-to-Noise Ration - A measurement of the strength of the RF signal when compared to the background noise level.
Software Updating	The process of updating code for a board that resides within a chassis
Splitter Bar	A vertical bar separating panes of a window. The splitter bar may be dragged to resize the panes of a window.
Start Menu	A menu containing applications (or shortcuts to applications) that are to be executed whenever Windows 95 boots
Status Bar	An area which enables the displaying of detailed information about the current menu item that is selected, or about the current status of an operation. Present at the bottom of the Main Window
STM	Synchronous Transfer Mode
STP	Shielded Twisted Pair
STS	Synchronous Transport Signal
System Menu	The menu accessible by clicking on the icon that resides at the far left corner of the title bar of a window. The System Menu contains a list of operations commonly performed on windows.
TAC	Technical Assistance Center
Task Bar	The bar that runs along the bottom of the Windows 95 User Interface
TDM	Time Division Multiplex

<u>NAME</u>	<u>DESCRIPTION</u>
TDMA	Time Division Multiple Access - A technique allowing multiple users access to a single channel through time sharing.
Title Bar	The bar that runs along the top of Windows. The title bar contains the name of the document (or some means of identifying its purpose), as well as the close box, minimize box, and maximize box.
Toolbar	A list of buttons serving as an equivalent to the selection of menu items that reside within the Menu Bar. Present immediately below the Menu Bar of the Main Window
Tooltip	A small popup window appearing whenever the mouse cursor hovers over an object for a given amount of time. Tooltips are most often used to supply concise help for Toolbar buttons.
Tx	Transmit Signal
UNI	User Network Interface - Interface between the Remote Terminal and the ATM network. The ATM forum has defined two contexts in which the UNI appears: Public UNI, connecting ATM equipment within a private network, either hosting or switching with public network provider networks. Private UNI, used exclusively to connect hosts to switches where both are managed by the same administrative entity.
Uplink	The RF Communications path from the Remote Terminals to the Base Station
VID	Variable ID - A number uniquely identifying a parameter.
VOM	Volt-Ohm-Meter
Whitespace	Tabs or spaces. This term originates from the Unix world
Windows Object	An object presented to the operator through the Windows 95 user Interface. Window objects encompass such things as icons, menus, and windows
WLL	Wireless Local Loop
VBR-nt	Variable Bit Rate-non real time - One of five service classes for the ATM layer.

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