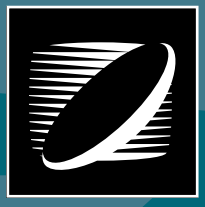
Access Kit User Guide



DirecPC™

FCC ID: K3YHNS9200-1

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Caution

Any changes or modifications to this equipment not expressly approved by the manufacturer could void the user's authority to operate this equipment.

Caution

This add-on card model DirecPC ISA is intended to be installed in a CSA certified equipment in the field by the user in manufacturer's defined operator access area. Check the equipment operating/installation instructions and/or equipment manufacturer to verify/confirm if your equipment is suitable for user-installed application cards.

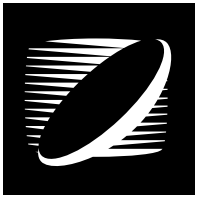
Attention

Cette carte d'extension, modele DirecPC ISA est destinee a etre instalee par l'utilisateur, sur place et a l'interieur de la zone definie par le fabricant, dans un appareil certifie csa. Consulter le mode d'emploi ou le fabricant de l'appareil pour verifier ou confirmer si l'utilisateur peut y installer lui-meme des cartes peripheriques.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna
- Increase the separation between the equipment and receiver
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Access Kit User Guide



DirecPC™

Important safety instructions pertaining to a risk of fire, electric shock, or injury to persons

The following information is provided for your own safety and protection. Please read this section carefully and familiarize yourself with all warnings, cautions, and instructions. Then, keep this guide in a safe, convenient place for your easy reference.

Warnings, cautions, and notes, defined as follows, are used throughout this guide to help you become familiar with possible safety or equipment hazards.

WARNING

Indicates a procedure that may result in personal injury or death caused by electric shock.

WARNING

Indicates a procedure that may result in personal injury or death if not strictly observed.

Caution

Indicates a procedure that may result in equipment damage if not strictly observed.

Note: A note presents additional information or interesting sidelights.

WARNING

Before installing the DirecPC adapter into the personal computer, disconnect the power cord plug from the outlet. Failure to do so could result in severe personal injury.

WARNING

For continued protection against risk of electric shock and fire, the DirecPC adapter should be installed only in products equipped with a three-wire grounding plug, a plug having a third (grounding) pin. This plug will only fit into a grounding-type power outlet. This is a safety feature. If you are unable to insert the plug into the outlet, contact your electrician to replace your obsolete outlet. Do not defeat the safety purpose of the grounding-type plug.

WARNING

You can be *killed* if the antenna comes into contact with electric power lines. Verify that there are none nearby before performing the following procedures. Watch out for overhead power lines. Check the distance to the power lines before starting installation. We recommend that you stay a minimum of 20 feet (6 meters) from all power lines.

If any part of the antenna or mast assembly comes into contact with a power line, call your local power company. *Do not try to remove it yourself!* They will remove it safely.

WARNING

Local electrical codes and the National Electrical Code require the antenna to be connected to a grounding electrode. Even if you will be installing the antenna onto a pole inserted into the ground, a grounding electrode still must be connected to the antenna.

WARNING

Heed Warnings. All warnings on the product and the operating instructions should be adhered to.

WARNING

For your own safety, follow these important safety rules:

- **Perform as many functions as possible on the ground.**
- **Do not use metal ladders.**
- **Do not install the antenna on a windy day.**
- **If you start to drop the antenna or mast assembly, get away from it and let it fall.**

WARNING

Before you dig any holes or trenches, call your local utility companies so they can help you locate underground power, telephone, cable, gas, water, and sewer lines in the area.

WARNING

Assembling the dish antenna on a windy day can be dangerous. Because of the antenna surface, even slight winds create strong forces. For example, a 1.0-meter antenna facing a wind of 20 MPH (32 km/h) can undergo forces of 60 lbs. (269 N). Be prepared to safely handle these forces at unexpected moments.

Do not attempt to assemble, move, or mount a dish on windy days or serious, even fatal accidents can occur. Hughes Network Systems, Inc., is not responsible or liable for damage or injury resulting from antenna installations.

WARNING

Antennas improperly installed or installed onto an inadequate structure are extremely susceptible to wind damage. This damage can be very serious or even life threatening. The owner and installer assumes full responsibility that the installation is structurally sound to support all loads (weight, wind, and ice) and properly sealed against leaks

Hughes Network Systems, Inc., will not accept liability for any damage caused by a satellite system due to the many unknown variable applications. It is also recommended that you consult your local building safety code before installation.

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CHAPTER 1

Introduction

Thank you for purchasing the Hughes Network Systems (HNS™) DirecPC™ Access Kit (DAK). This *DirecPC Access Kit User Guide* provides instructions for the following:

- Installing the DirecPC adapter
- Installing the DirecPC antenna on a non-penetrating mount (NPM), ground-mounted pole, or universal mount
- Aligning the antenna to the satellite
- Obtaining DirecPC services with an IBM™ PC-compatible computer

In addition, appendix A provides grounding information, appendix B contains design information for HNS DirecPC distribution systems, and appendix C describes accessory components you can purchase to support a variety of system distribution designs using long cable runs or multiple PC applications.

For best results, read the contents of this guide before you install the DirecPC system.

1.1 Audience

This guide is intended for an installer experienced in performing the various tasks described in this guide. These tasks include:

- Working with cement
- Routing coaxial cable
- Working near power lines
- Grounding the antenna and coaxial cable as recommended in National Electrical Code sections 810 and 820

If you do not feel comfortable about doing these tasks or complying with installation requirements, contact your DirecPC dealer for information on having your DirecPC system installed by an authorized professional installer.

Caution

Before installing the antenna, check local zoning codes, covenants, and other restrictions. Some communities prohibit installing satellite antennas or place limits on the mounting height of the antenna.

1.2
DirecPC overview

DirecPC is a high-speed satellite information service. The DAK is the equipment which, when installed in a PC, enables the PC to access a wide range of information from DirecPC's 12-million-bit-per-second (Mbps) satellite link (see figure 1-1).

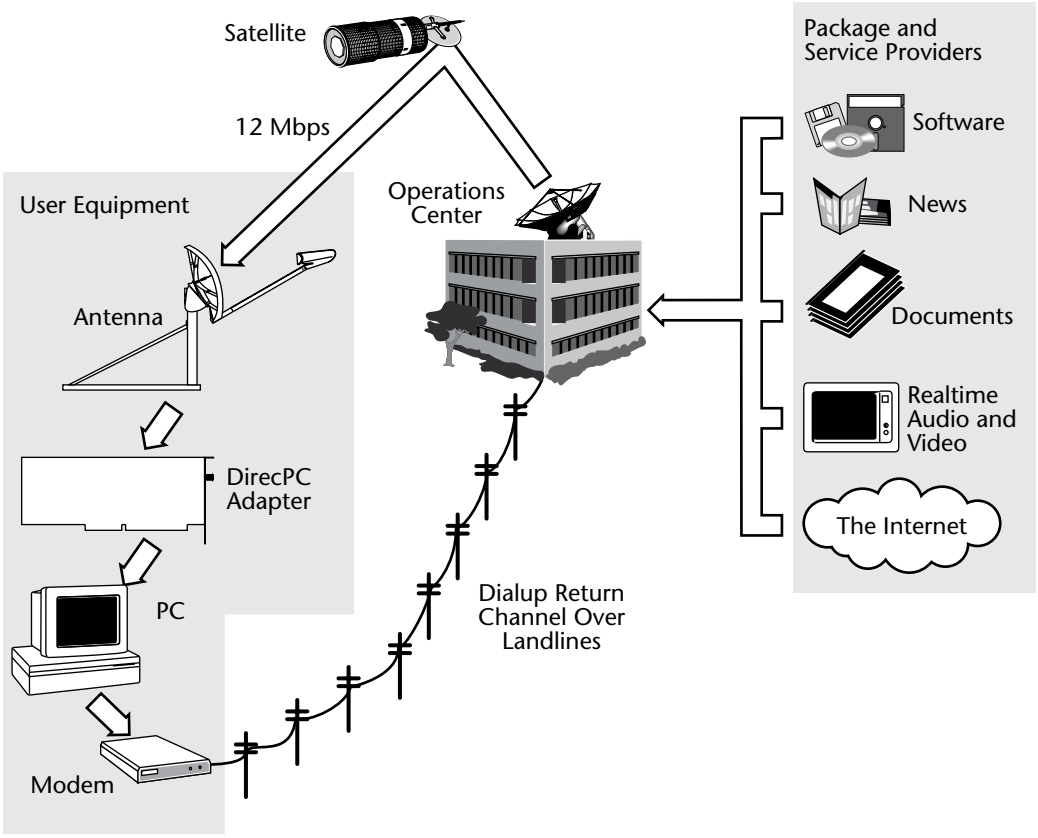


Figure 1-1. DirecPC system

1.3 DirecPC components

The following components of the DirecPC system provide services for specific corporate applications as well as information of general interest such as the Internet, video news, and software packages.

- The Operations Center processes the package/service provider's information for delivery to the user over the 12-Mbps satellite link. Customer Care Center personnel at the Operations Center manage the delivery of DirecPC information as well as provide customer support for DirecPC users (such as assistance with shipping, service, and billing inquiries).
- A Ku-band satellite carries the DirecPC information services from the Operations Center to the user's satellite reception equipment.
- DirecPC user equipment consists of:
  - A 20 x 36-inch elliptical satellite antenna and coaxial cable connected to the PC.
  - A 16-bit ISA DirecPC adapter card and software installed in the user's PC.
  - A modem (not included in the DAK) and phone line for a dial-up connection to the DirecPC Customer Care Center.

1.4 DirecPC classes of service

DirecPC services are grouped into three classes:

- DirecPC Digital Package Delivery—high-speed (up to 3-Mbps) transmission of information in the form of PC files.
- DirecPC Turbo Internet—high-speed (up to 400-kbps), low-cost Internet access using all the normal Internet applications including: Mosaic, Gopher, FTP, E-Mail, News, and so on.
- DirecPC Multimedia—the *data pipe* that provides real-time audio and video broadcast services to DirecPC receivers.

In addition to these basic services, HNS offers customized software and support services to meet the needs of specific

customers, including file storage at the DirecPC Customer Care Center, custom user interface software, backhaul support, video compression support, and customized billing.

The DirecPC kit contains all the software needed to support the package delivery service. The kit also provides the software drivers needed to support the Turbo Internet and Multimedia services but does not include the actual application software (Frontier Technologies Corporation's SuperTCP, for example, for Turbo Internet) which must be purchased separately.

1.5 Getting started

After unpacking the components of the DirecPC Access Kit and inspecting them for damage:

1. Install the DirecPC adapter according to the instructions in chapter 2, "Installing the DirecPC adapter."
2. Install the DirecPC software according to procedures in chapter 3, "Installing the DirecPC software."
3. Install the antenna according to the instructions in chapter 4, "Installing the antenna."
4. Align the antenna towards the satellite according to procedures in chapter 5, "Registering your system and fine-aligning the antenna."
5. Select one of the three services supported by DirecPC as described in section 1.4, "DirecPC classes of services," and begin your DirecPC operations.

CHAPTER

2

Installing the DirecPC adapter

This chapter provides instructions for configuring and installing the DirecPC adapter.

2.1
Installation procedure

WARNING

Before installing the DirecPC adapter into the personal computer, disconnect the power cord plug from the outlet. Failure to do so could result in severe personal injury.

Caution

The DirecPC adapter is for use only with the IBM AT or compatible UL Listed personal computers that have Installation Instructions detailing user installation of card cage accessories.

1. Switch off your personal computer (PC) and all peripheral devices, and unplug the power cord from the outlet (see figure 2-1).

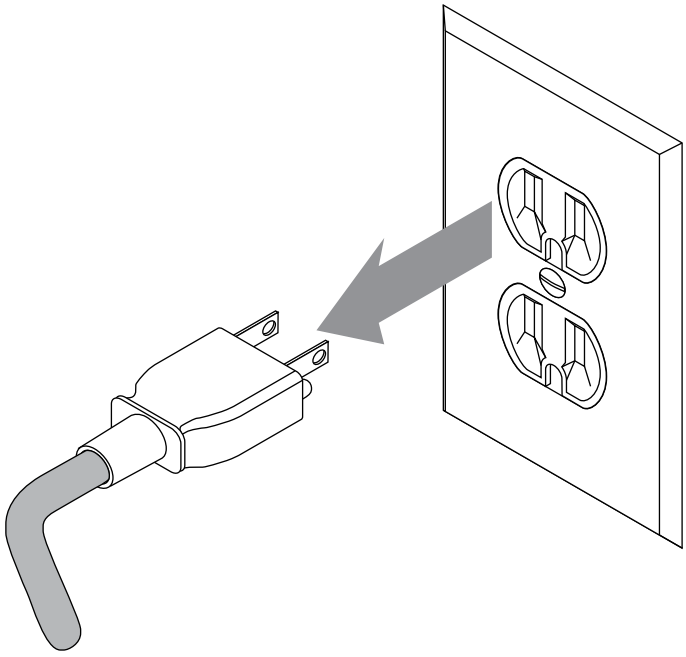


Figure 2-1. Unplugging the ac power cord from the receptacle

2. Touch a metal surface on your computer to ground yourself to discharge any static electricity.
3. Remove the cover from your computer (refer to the documentation that came with your computer for the procedure).

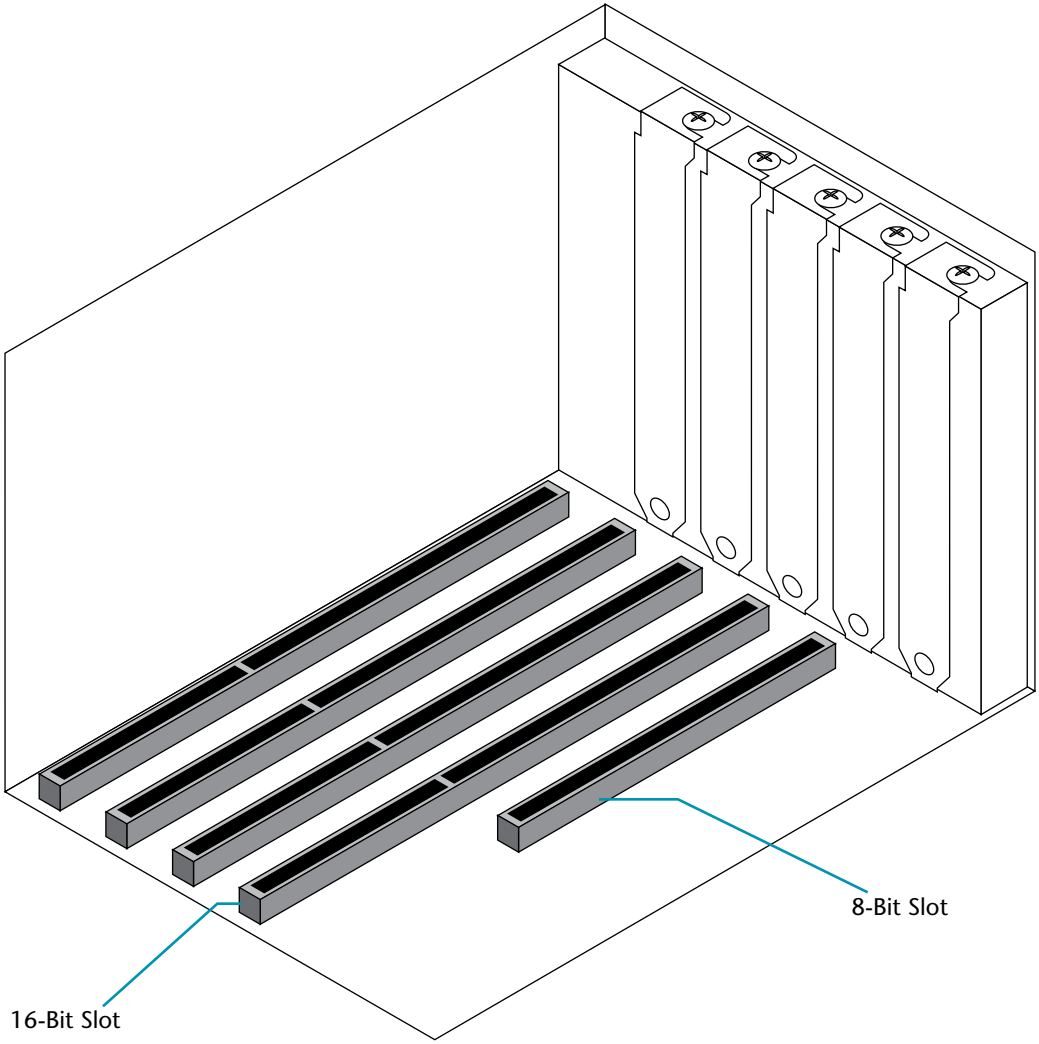


Figure 2-2. Locating a 16-bit expansion slot

4. Locate a free 16-bit expansion slot inside your computer. A 16-bit slot has two connectors, one slightly shorter than the other (see figure 2-2), as opposed to the 8-bit slot, which has only one connector.

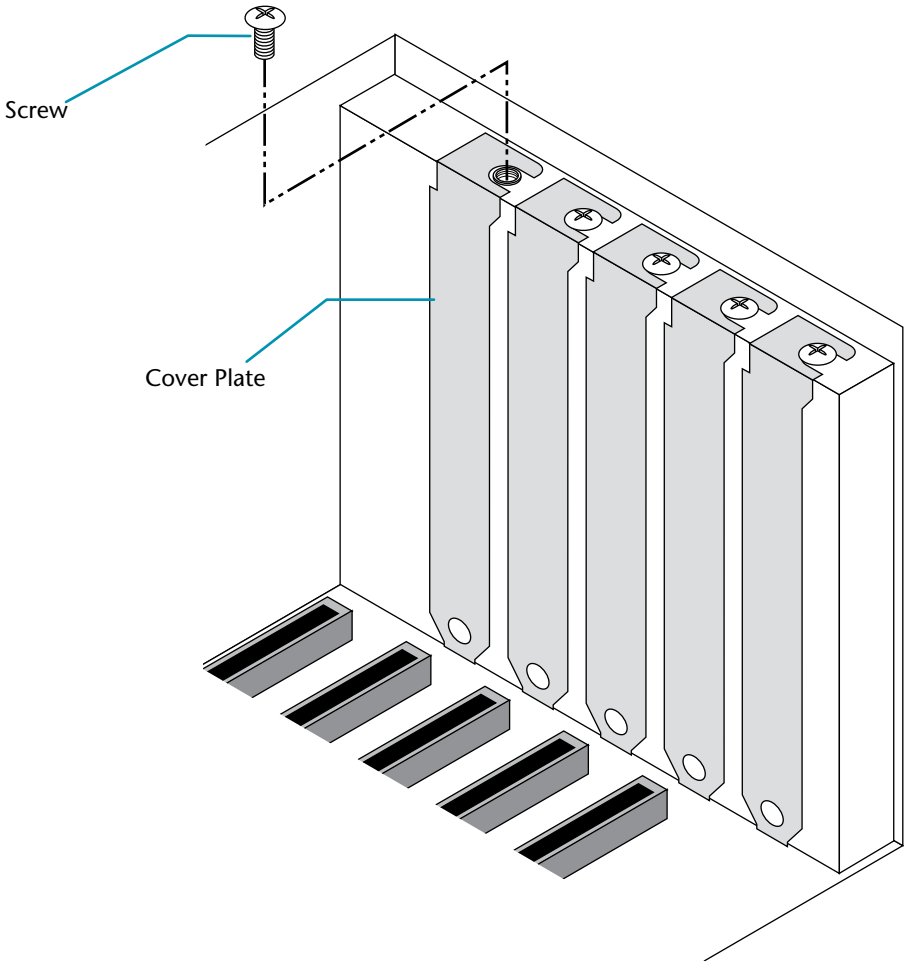


Figure 2-3. Removing the cover plate

5. Remove the screw from the metal plate covering the slot you have chosen (see figure 2-3). Save the screw; you will be using it again later in this procedure.

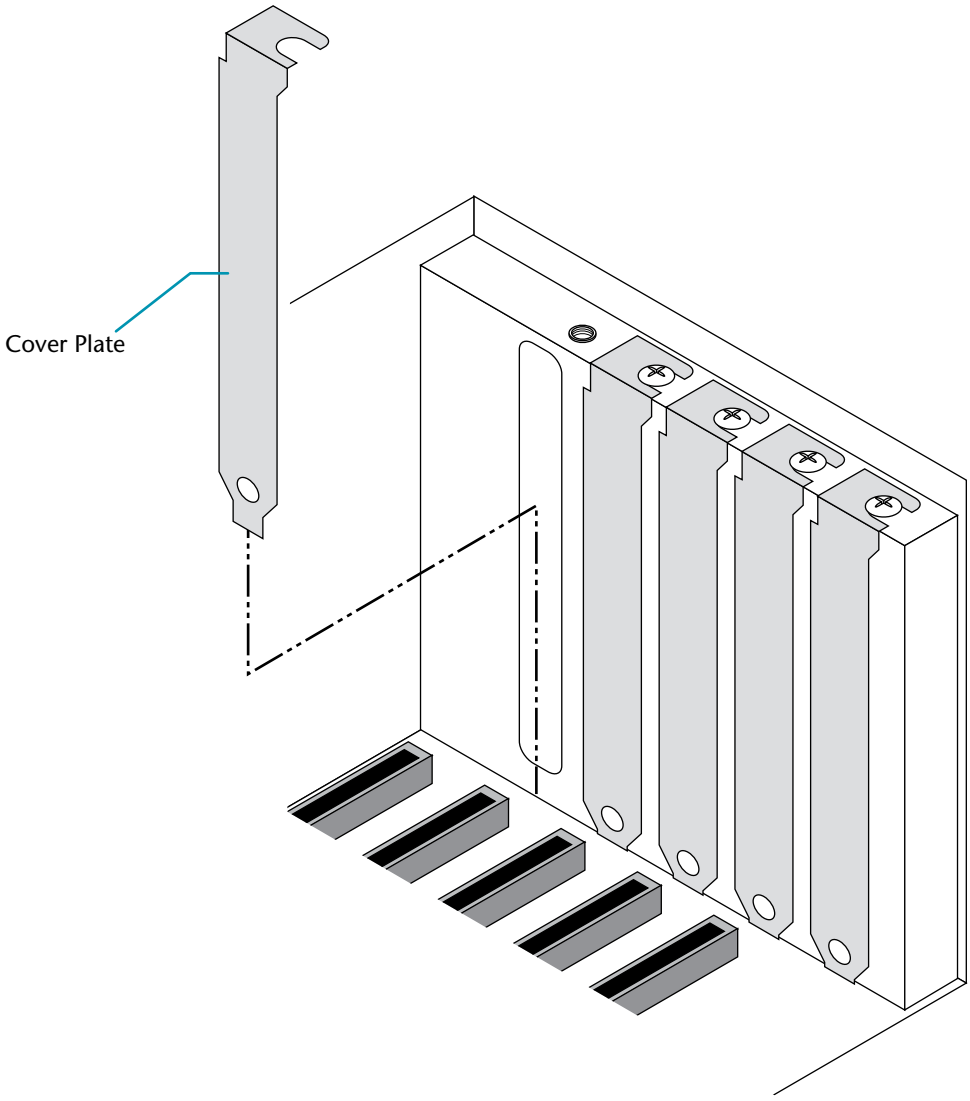


Figure 2-4. Removing the cover plate

6. Remove the cover plate from the slot (see figure 2-4).

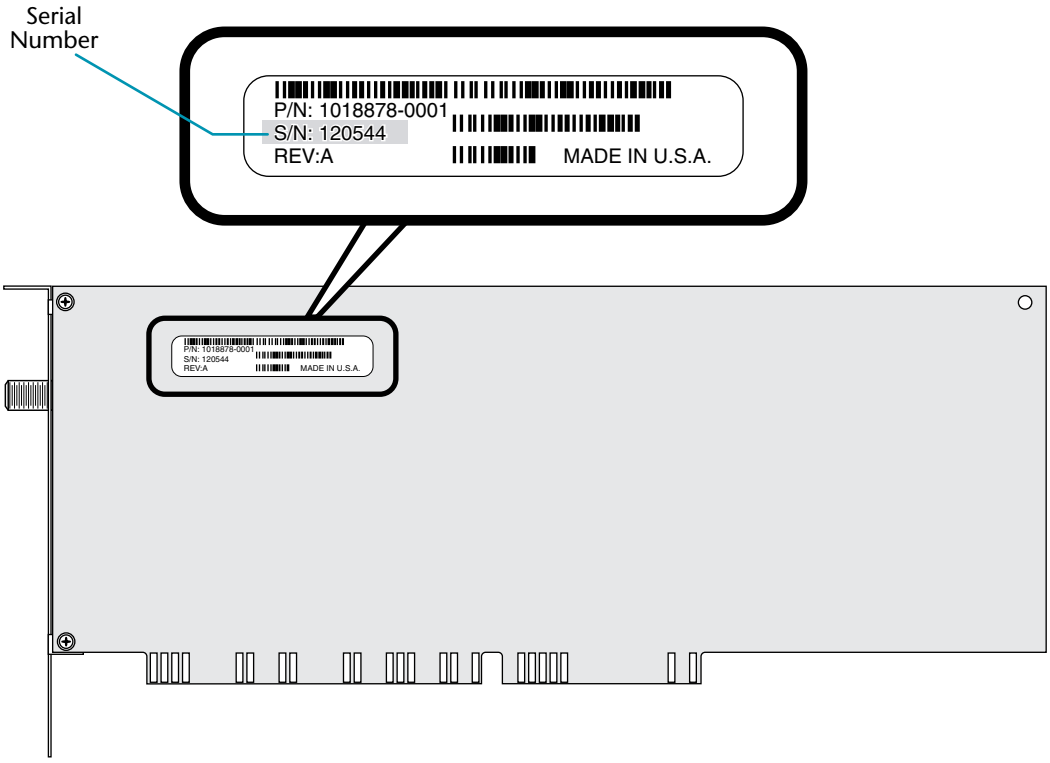


Figure 2-5. Locating the DirecPC adapter serial number

7. Make a note of the DirecPC serial number included on the label shown in figure 2-5. You will need the number later when you register your system.

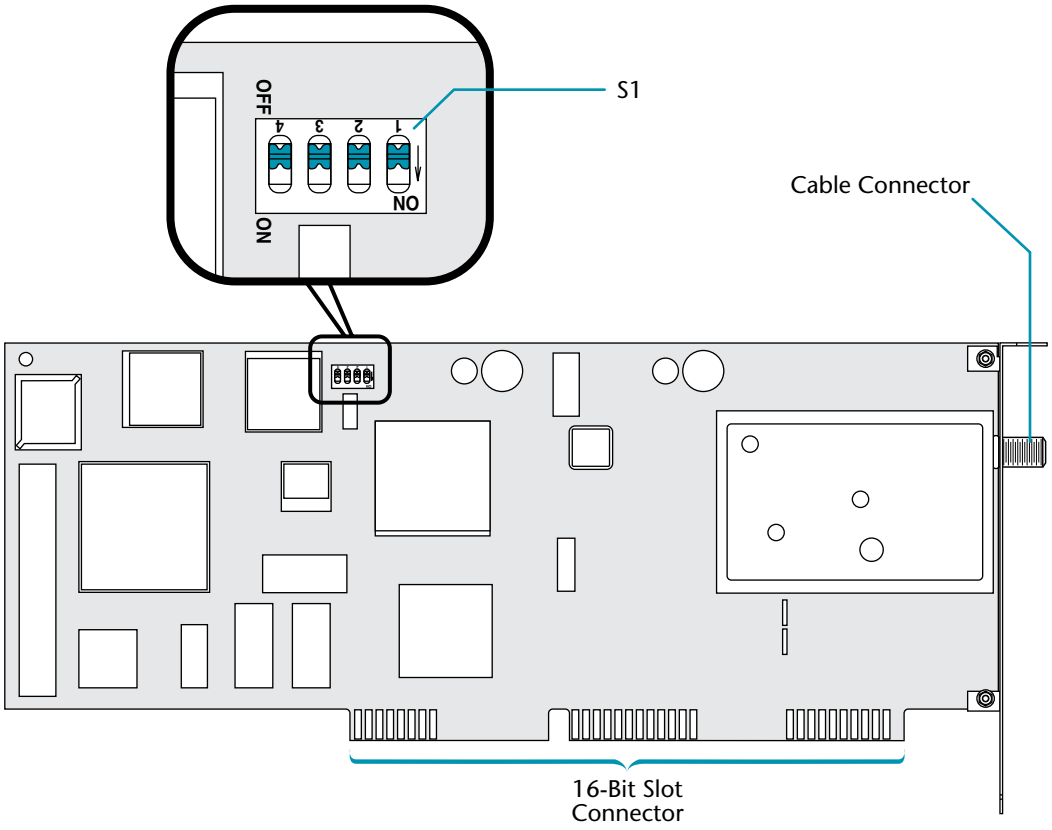
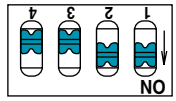
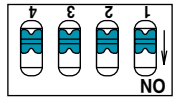
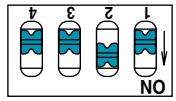
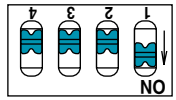


Figure 2-6. Locating S1 and the cable connector

8. Verify that S1 on the DirecPC adapter (see figure 2-6 for location) is set to one of the configurations shown in table 2-1.

Note: S1 controls how the input/output (I/O) base address for the DirecPC adapter is programmed. If S1 is configured to any of the settings shown in table 2-1, the DirecPC adapter's I/O base address is automatically set by software.

Table 2-1. Configuring S1

Switch settings				Settings diagram
4	3	2	1	
OFF	OFF	ON	ON	
OR				
OFF	OFF	OFF	OFF	
OR				
OFF	OFF	ON	OFF	
OR				
OFF	OFF	OFF	ON	

Note: If you need to change a switch setting, use the tip of a pen to slide the switch to its new position—either ON or OFF—as shown in figure 2-7.

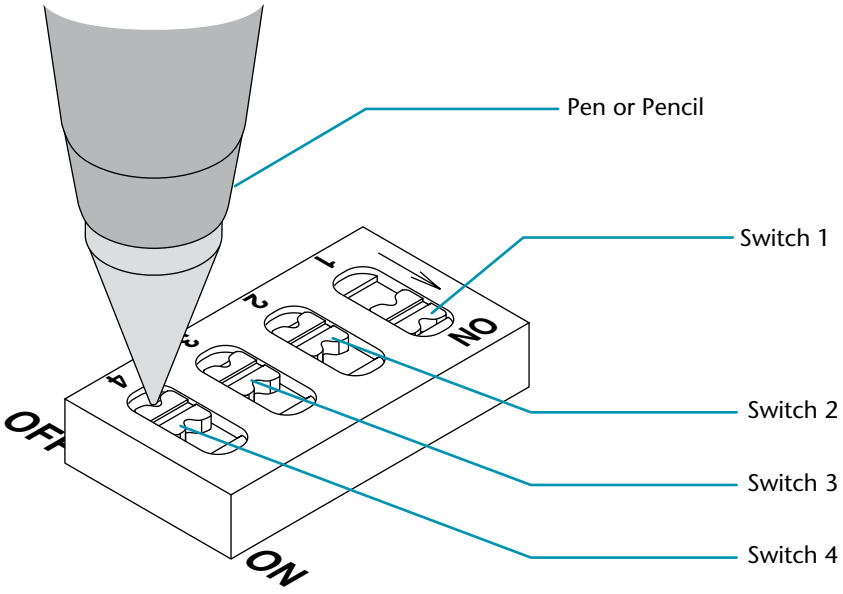


Figure 2-7. Changing a switch setting

9. Install the DirecPC adapter into the slot as follows: while being careful not to damage the cable connector (see figure 2-6 for location) align your adapter's 16-bit slot connector with the expansion slot and firmly press on the adapter until it is fully seated into the slot (see figure 2-8).

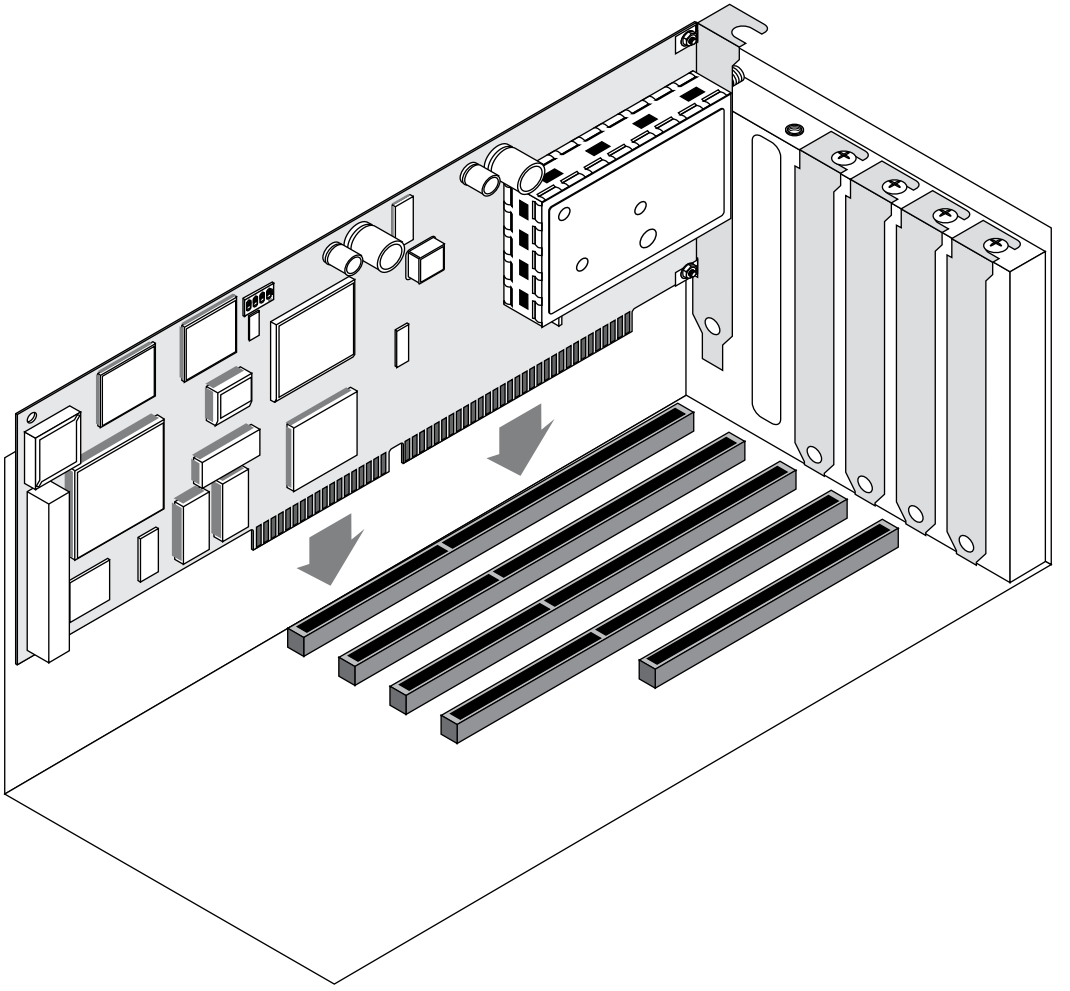


Figure 2-8. Installing the DirecPC adapter into the slot

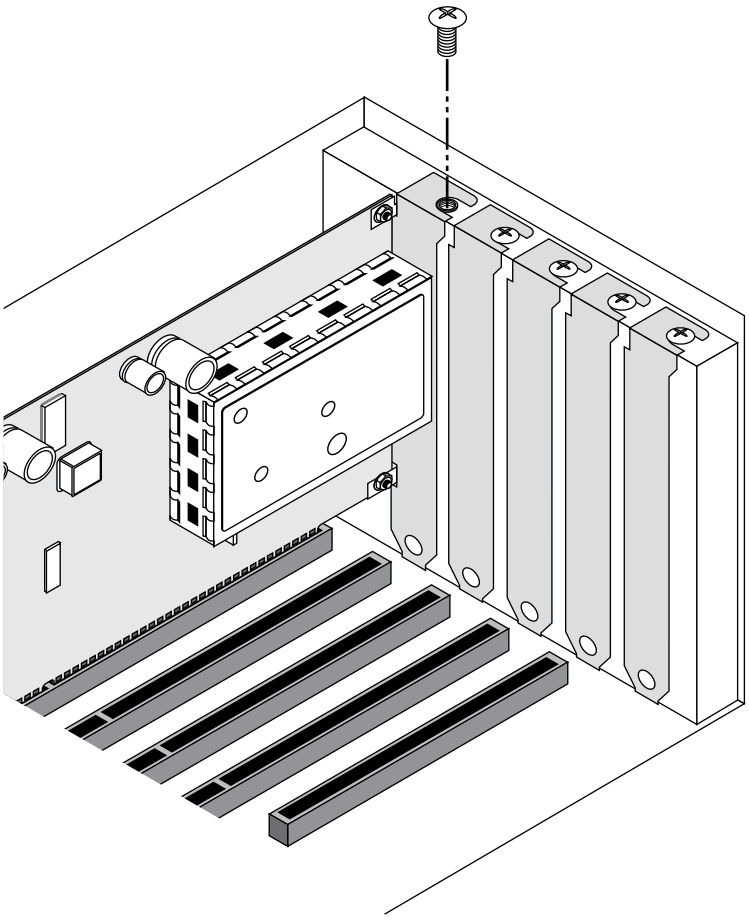


Figure 2-9. Installing the cover plate screw

10. Secure the adapter to the expansion slot with the screw you removed from the cover plate (see figure 2-9).

Caution

The cover plate screw that secures the DirecPC adapter to the PC chassis must be completely tightened to provide continuous bonding between the DirecPC adapter and the PC chassis.

11. Install the computer cover and plug the AC power cord into the power outlet.
12. Save the DirecPC adapter shipping box and packing material. If the adapter ever needs to be returned for servicing, it should be mailed in the original container.

Note: All the safety and operating instructions should be read before the DirecPC product is operated. These instructions should be retained for future reference.

12. Turn the PC on and verify that it functions normally. If so, go to chapter 3. If there is a problem that prevents the system from operating properly, you will have to manually configure the IRQ and I/O base address. Refer to chapter 7, “Maintenance,” and perform steps 1 through 6 to remove the adapter from your computer. Then refer to chapter 3 to install the DirecPC software so you can manually assign the IRQ and I/O base address.

CHAPTER

3

Installing the DirecPC software

This chapter provides instructions for installing the software needed to configure and operate the DirecPC system. DirecPC software runs on a variety of operating systems. Choose from the following operating systems the one that your computer is using, then refer to the appropriate section.

- Microsoft Windows 3.1 or 3.11 (Windows for Workgroups), see section 3.2
- Microsoft Windows 95, see section 3.3
- IBM OS/2, see section 3.4

> Note: After you have installed the DirecPC software, refer to the DirecPC help files for detailed information on using the software.

3.1
User equipment requirements

Before installing your DirecPC software, review your computer system. To install and use the DirecPC software, you need the equipment listed in table 3-1.

Table 3-1. DirecPC user equipment requirements

Component	Recommended	Minimum
Computer	66-MHz 80486 or higher	33-MHz 80486
Random-access memory (RAM)	12 Mbytes or more	8 Mbytes
Monitor	VGA (or better) with 1-Mbyte of VRAM for 256 colors	VGA with 512 Kbytes of VRAM
Mouse	Windows-compatible mouse, graphics tablet, or other pointing device	Windows-compatible mouse
Hard disk drive	10 Mbytes for application, plus 100 Mbytes for Reuters News Wheel Video storage	10 Mbytes for application, additional storage space is required to hold downloaded packages
Modem (for transmitting data)	Hayes-compatible 9600-baud (V.32) modem	Hayes-compatible 9600-baud (V.32) modem

Making a backup copy of your software

You may make one backup copy of the DirecPC software diskettes. Before you install the software on your hard disk, make backup copies of the diskettes. Then, use the backup disks to install the program. Be sure you store your original diskettes in a safe place.

Your original DirecPC software diskettes are write-protected to prevent you from accidentally erasing or writing over any of the files. It is safest to leave them that way and to write-protect your backup diskettes as well.

3.2

Loading software in a Windows 3.1 or Windows 3.11 environment

Installing the DirecPC software takes about 10 minutes. Perform the following procedure to install the software:

1. Run Microsoft Windows on your computer.
2. Locate the Windows diskettes, then insert *Disk 1* into the appropriate disk drive of your computer (for example, drive A).
3. Choose *Run…* from the File menu in Windows Program Manager.
4. Type in the Run dialog box, [drive]:\SETUP (where [drive] is the name of the drive into which you inserted the Disk 1 diskette (for example, A:\SETUP). Click on the *OK* button. After a short delay, the DirecPC Setup Program Screen displays.

Run the DPCSetup utility. Refer to the Help menu contents and select the topic "Configuring your system" to enter the IRQ and I/O base address information.

3.3

Loading software in a Windows 95 environment

Installing the DirecPC software takes about 10 minutes. Perform the following procedure to install the software:

1. Run Microsoft Windows 95 on your computer.
2. Locate the Windows 95 diskettes, then insert *Disk 1* into the appropriate disk drive of your computer (for example, drive A).
3. Click on the *Start* button.
3. Select the *Run* command.
4. Type in the Run dialog box, [drive]:\SETUP (where [drive] is the name of the drive into which you inserted the Disk 1 diskette (for example, A:\SETUP). Click on the *OK* button. After a short delay, the DirecPC Setup Program Screen displays. Follow the instructions on the screen to finish installing the software.

Run the DPCSetup utility. Refer to the Help menu contents and select the topic "Configuring your system" to enter the IRQ and I/O base address information.

3.4

Loading software in an OS/2 environment

The OS/2 version of the DirecPC software is called the Package Delivery Server (PDS). The PDS provides most of the Package Delivery Server capability found in the Windows versions of the DirecPC software, except that PDS uses a command-line interface instead of a graphical user interface. The main features of this PDS are:

- PDS runs as a background process that can function unattended once the PDS has been started.
- provides commands, executed from an OS/2 window, that allow the user to:
  - start and stop the PDS
  - determine what files are available for this site to download
  - select a "requestable" file for download from the DirecPC Network Operations Center
  - define "clients" in order to directly download to the client directories.
  - determine status of the PDS
- allows user to request "requestable" files and allows users to receive "push" or "pull" type files. "periodicals" and "purchase" files are not supported with this version.
- provides utilities to assist in DirecPC Satellite Antenna pointing.
- allows users to read the OS/2 PDS User Guide on-line using a provided Acrobat reader.

The PDS is installed onto an OS/2 machine using the IBM Software Installer utility as follows:

1. Insert *Diskette 1* of the Package Delivery Server into the A: drive
2. Type *a:install*— you will be prompted for responses - *do not re-install the Initialization component if you have already installed it and modified it from a previous release!*

   The installation modifies your \config.sys file. Entries modified include:

   a. PATH - adds entry for the DirecPC "bin" directory

   b. LIBPATH - adds entry for the DirecPC "bin" directory

c. A DEVICE for the DirecPC Adapter - you may need to change the default IRQ and the I/O Port to match what is available in your environment. The default is no IRQ (uses a timer) and an I/O Port of hexadecimal 300. The I/O Port matches the switches on the DirecPC Adapter.

d. Optionally, change "PRIORITY_DISK_IO = NO" to improve download performance

4. the initialization file created in \direcpc\bin\direcpc.ini may need to be modified. Use any "ini" file editor available or the \direcpc\bin\editini editor provided from IBM Corp. Two of the most common items needing change are:

   a. ComPort - set it equal to the async communications port you attach the modem to - Default = COM1

   b. DialOutPrefix - set it equal to required dial-out prefix at your site - Default = 9

Obtaining the DirecPC OS/2 Package Delivery User Guide (8051691)

A copy of the User Guide is available in \direcpc\doc\manual.pdf. You can read it by first installing the "Acrobat" reader on the diskette provided and then access the User Guide using the reader. The reader executes under the Windows 3.1 Program Manager. To install the reader:

1. copy the file "reader.exe" off the Acrobat diskette into a temporary directory
2. Execute the "reader.exe' file. It is a self extracting zip file creating the "acroread.exe" file.
3. Execute the "acroread.exe" file from Win 3.1. This will install the reader/ icon.
4. Point the Acrobat reader software at the \direcpc\doc\manual.pdf to read the User Guide.

CHAPTER

4

Installing the antenna

This chapter describes selecting a site to install the antenna, installing the antenna, and aiming it towards the satellite.

4.1
Locating the satellite

The satellite that the DirecPC system uses is located approximately 22,300 miles (35,900 kilometers) in orbit above the equator. The orbit is referred to as being geostationary because the satellite travels above Earth's equator from west to east at a speed matching that of Earth's rotation, thus remaining stationary in relation to Earth. To aim the antenna at the satellite you need to know the azimuth and elevation measurements. As shown in figure 3-1, azimuth is the side-to-side measurement, elevation is the up-or-down measurement.

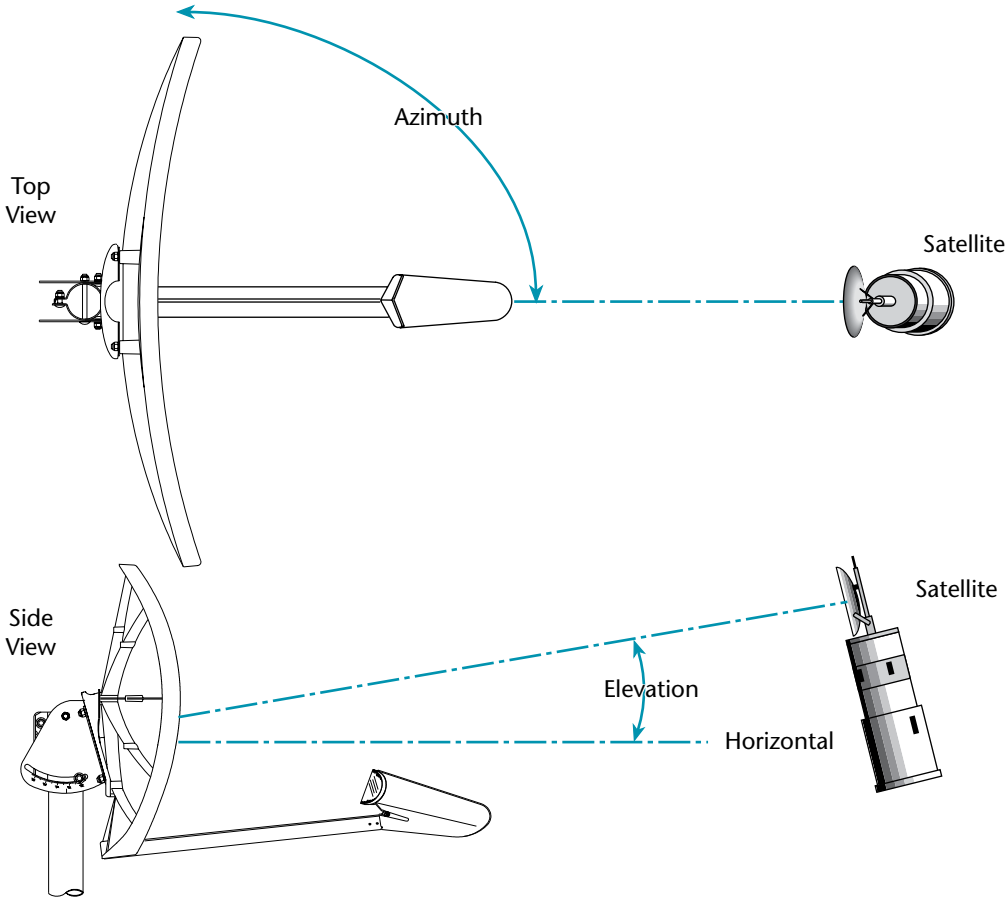


Figure 4-1. Definition of azimuth and elevation angles

To determine the azimuth, elevation, and polarization values, use the Antenna Pointing utility.

4.2
Choosing the antenna installation site

Perform the following steps to select the best site to install the antenna:

1. Go to the location where you plan to install the antenna.
2. Using a compass like that shown in figure 3-2, hold the compass level so the needle can rotate freely. When the needle stops rotating, it will be pointing to North. Doing so carefully so as not to disturb the needle, rotate the body of the compass so that the *0°* or *N* marks printed on the compass align with the painted end of the needle. The compass is now aligned with magnetic North.

Note: Large metal structures near the compass may reduce its accuracy. Such metal structures are common on the roof of a commercial building. If you are near such structures, move several feet away and repeat the measurement to verify the readings.

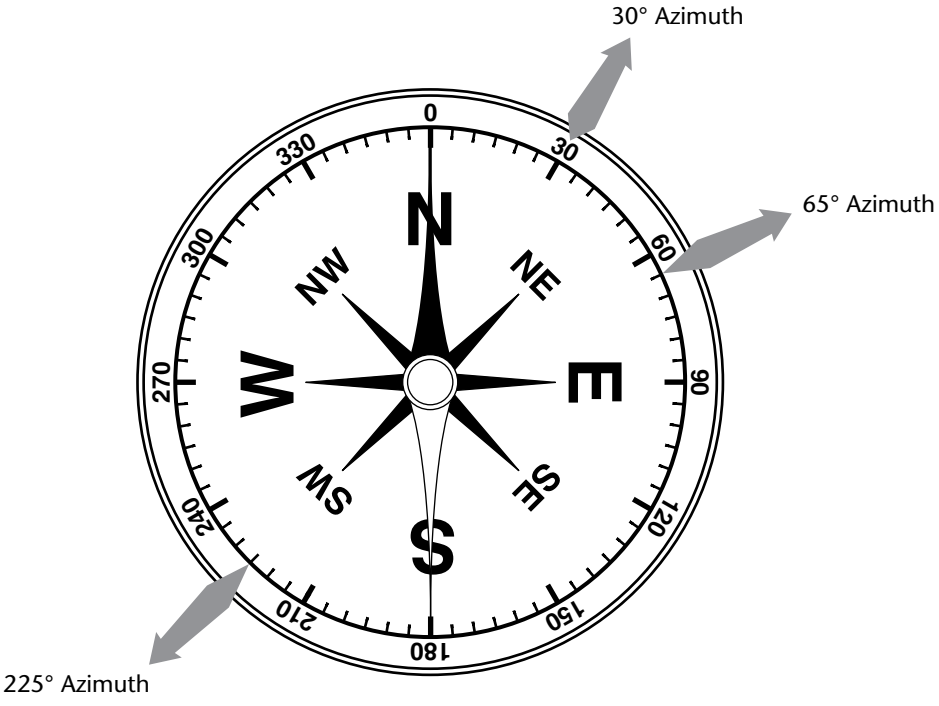


Figure 4-2. Finding the azimuth measurement

3. Draw an imaginary line from the center of the compass to the magnetic azimuth value indicated on the antenna pointing calculations window. This is the direction for pointing the antenna toward the satellite. Use a rock or some other object to mark the location where you are standing; then pick a landmark in the distance that aligns with the magnetic azimuth bearing, or mark the azimuth direction in some way.

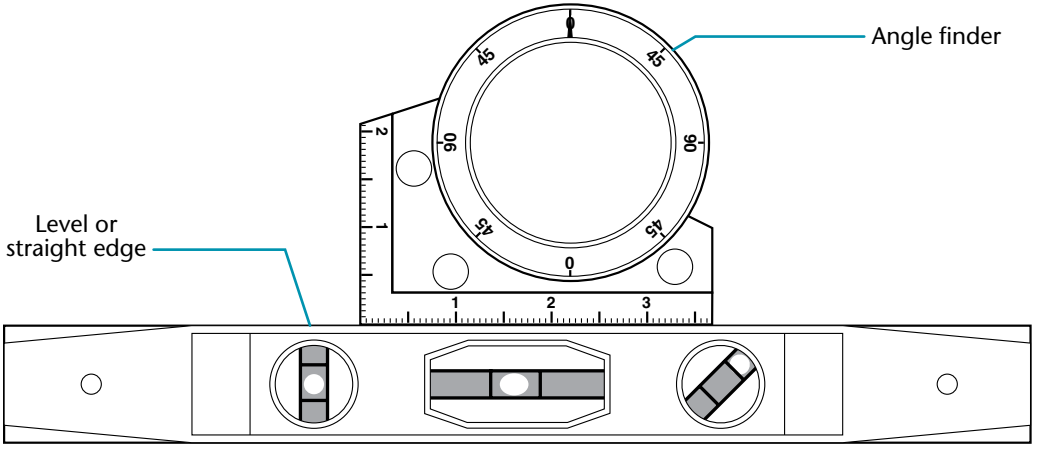


Figure 4-3. Angle finder and level

4. Using an angle finder and level or straight edge (see figure 4-3), verify that there is an unobstructed line-of-sight toward the satellite. To do this, align a straight edge along the azimuth bearing. Then, using the angle finder, lift the front of the straight edge to the elevation value indicated on the antenna pointing calculations window. Sight along the straight edge (see figure 4-4) to verify that there are no obstructions, (such as buildings or trees) blocking the view. Also, avoid installing the antenna next to electrical equipment such as air-conditioning units, because they can cause signal interference.

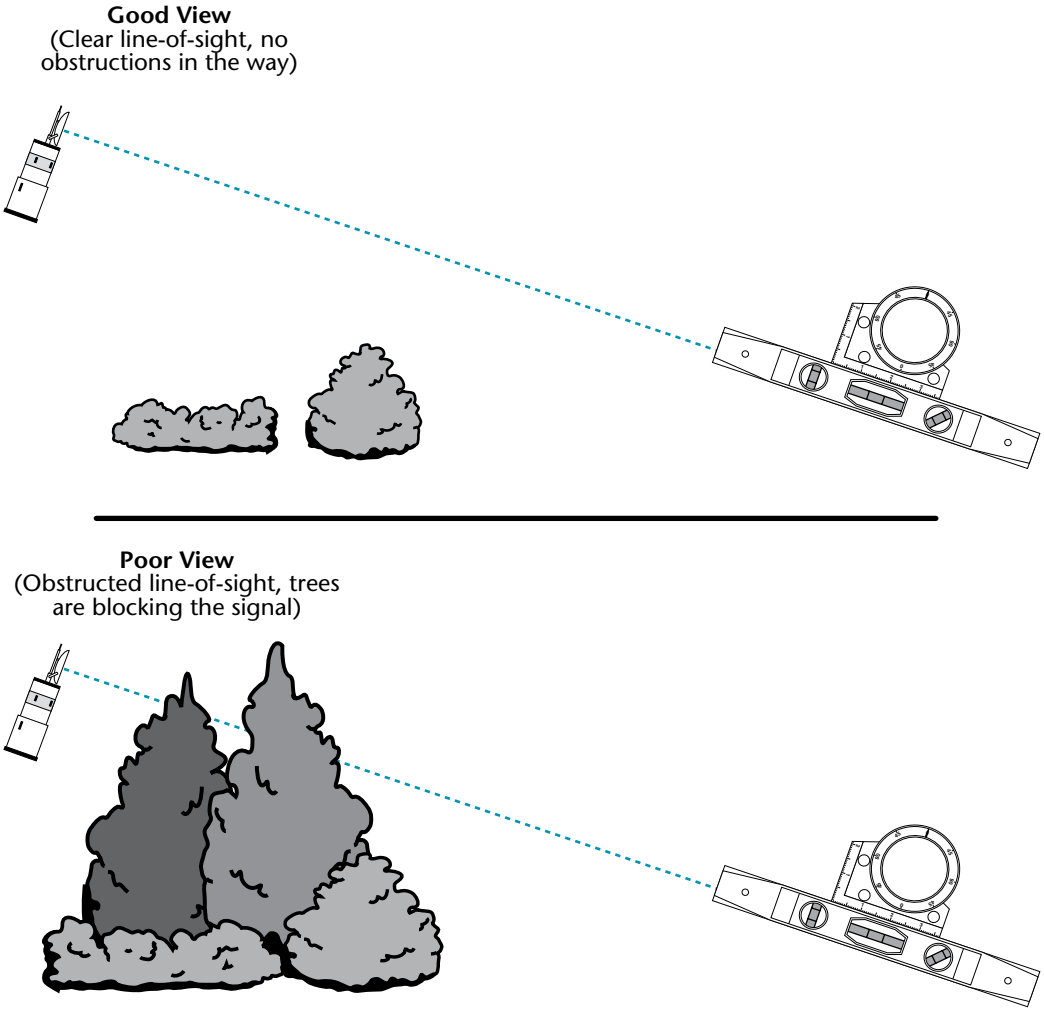


Figure 4-4. Verifying that there is a clear line-of-sight to the satellite

Refer to one of the following sections for the antenna installation procedure that most closely matches the configuration selected for your site:

- If you will be installing the antenna on a non-penetrating mount (NPM), refer to section 4.3, “Installing an NPM-mounted antenna.”
- If you will be installing the antenna on a pole, refer to section 4.4 “Installing a pole-mounted antenna.”
- If you will be using the universal mount to install the antenna on a surface such as a wall or roof, refer to section 4.5, “Installing the antenna using the universal mount.”

4.3 Installing an NPM-mounted antenna

This section describes installing the antenna assembly onto a non-penetrating mount (NPM) (see figure 4-5). Information on ballast requirements is also included. Read this section thoroughly before beginning system assembly. For best results in the assembly process, perform each step in the same sequence as listed in this manual.

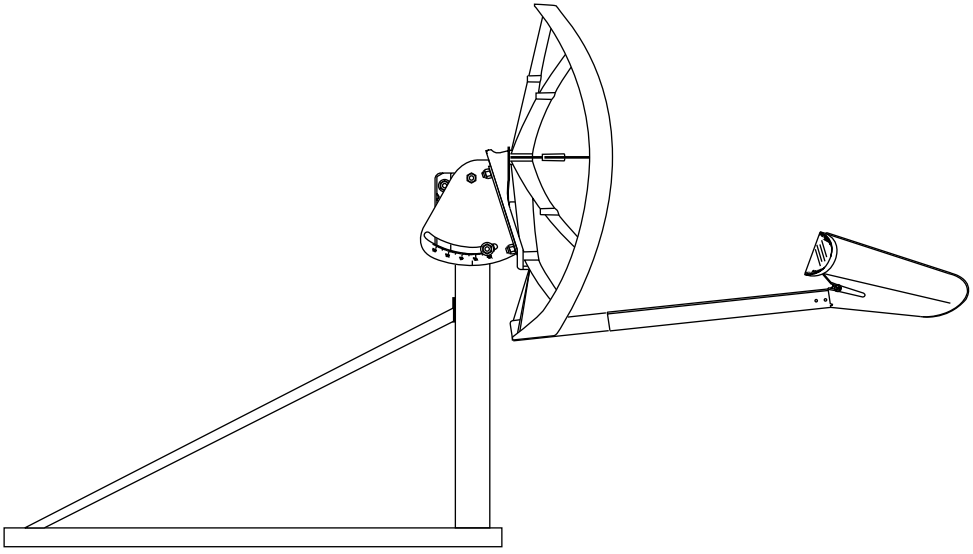


Figure 4-5. Non-penetrating mount installation

WARNING

You can be seriously injured or *killed* if the antenna comes into contact with electric power lines. Verify that there are none nearby before performing the following procedure.

WARNING

Antennas improperly installed or installed onto an inadequate structure are extremely susceptible to wind damage. This damage can be very serious or even life threatening. The owner and installer assumes full responsibility that the installation is structurally sound to support all loads (weight, wind, and ice) and properly sealed against leaks.

Hughes Network Systems, Inc., will not accept liability for any damage caused by a satellite system due to the many unknown variable applications. It is also recommended that you consult your local building safety code before installation.

WARNING

Local electrical codes and the National Electrical Code require the antenna dish to be connected to a grounding electrode.

Caution

If you are installing the NPM onto a roof, the roof section must be flat and of sufficient area for the base of the roof mount (see ballast requirement and location chart for base size). The roof section must also be able to withstand the weight of ballast, antenna, and mount assembly.

Distributed loads (lb./sq. ft) and total dead load are shown in tables 4-1 and 4-2 (see pages 46 and 48). It is the customer's responsibility to verify that distributed loads of this product do not exceed roof design loads. *If you do not know your roof design loads, consult a professional engineer.*

Assembly tools recommended

Have on hand the following tools:

- Torque wrench
- Phillips screwdriver
- Ratchet wrench, 3/8-inch drive
- 10-mm socket, 3/8-inch drive (for M6 bolts)
- 13-mm socket, 3/8-inch drive (for M8 bolts)
- 10-mm nut driver
- 13-mm nut driver
- 3/8-inch electric drill
- 1/2 inch drill bit (for coax cable routing)

Materials recommended

Have on hand the following materials according to your installation needs:

- Grounding rod clamp, grounding block and wire (as required by the National Electrical Code and local codes; refer to Appendix A "Electrical Grounding").
- RG-6 coaxial cable with F-type connectors, impedance: 75 ohms, shielding: minimum double shield (requires a minimum 100% foil shield covered with a 40% woven braid), outer cover: PVC (must be suitable for both indoor and outdoor use; length as required).

- To install the antenna mounted on an NPM base frame on a flat roof, place protective material between the antenna and roof for roof protection and for anti-skid friction. Use a 36 X 36 X 3/8-inch foam pad; such as, product names like Ceramar®, Griffolyn, or RMAX. Layers to a thickness to 3/8-inch of 40- or 60-pound asphalt roofing can also be used.
- Spray adhesive, 3M Super 77 (or equivalent) for attaching foam pad to NPM base frame.
- Solid concrete cap blocks, 3.6 X 7.6 X 15.6 inches (quantity determined in section "Ballast," tables 4-1 and 4-2).
- Coaxial cable sealant (COAX-SEAL or equivalent) to prevent moisture from seeping into the LNB from the coaxial connector.
- Cable ties for securing the LNB cable to the antenna feed leg.
- If you will be anchoring the NPM with tethering cables (see section "Tethering the NPM," for more information), you will need:
  - Tethering cable, 1/8-inch diameter minimum (1200 lb. minimum breaking strength) 7 X 7 or 7 X 19 construction, stainless steel or galvanized steel (length as required).
  - Cable clamps, 6 minimum.

Assembling the NPM

Perform the following steps to assemble the non-penetrating mount.

Note: 10-mm tools fit M6 hardware and 13-mm tools fit M8 hardware.

1. Clear the installation area of all debris, gravel, or other loose materials.
2. Place NPM base assembly at the location selected in section 4.2, "Choosing the antenna installation site."

Note: If the NPM is being installed on a roof, place a layer of roofing paper under the NPM base frame. Also, if you install a Ceramar foam pad to the base, spray the adhesive with care—*do not spray on the mounting hardware.*

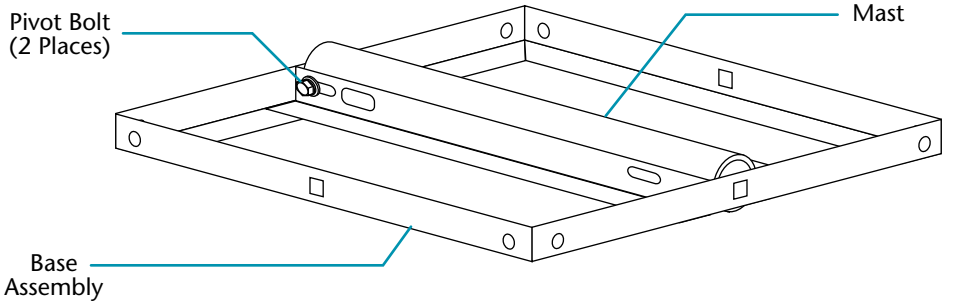


Figure 4-6. Loosening the pivot bolts

3. Loosen the pivot bolts (see figure 4-6).
4. Swing mast up to the vertical position.
5. Secure mast to base with an M8 X 20 hex-head bolt and lock washer, as shown in figure 4-7.

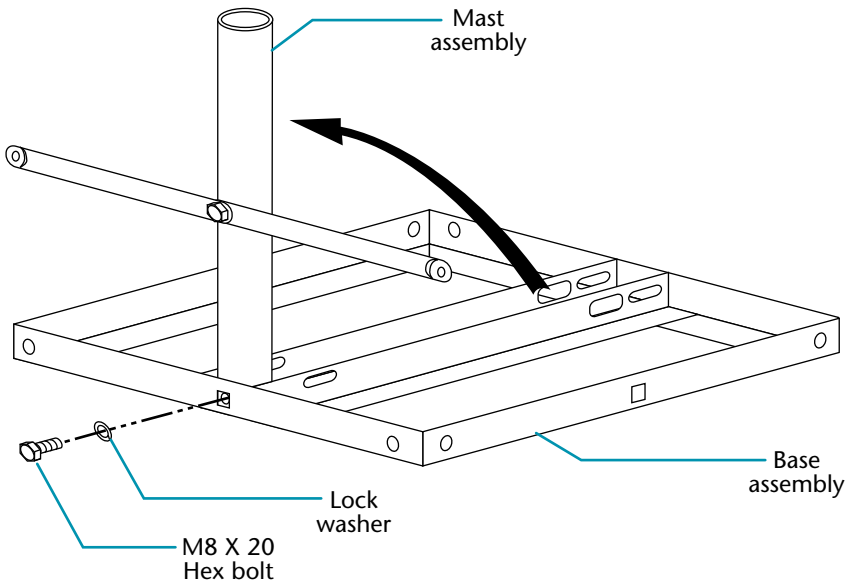


Figure 4-7. Securing mast to the base

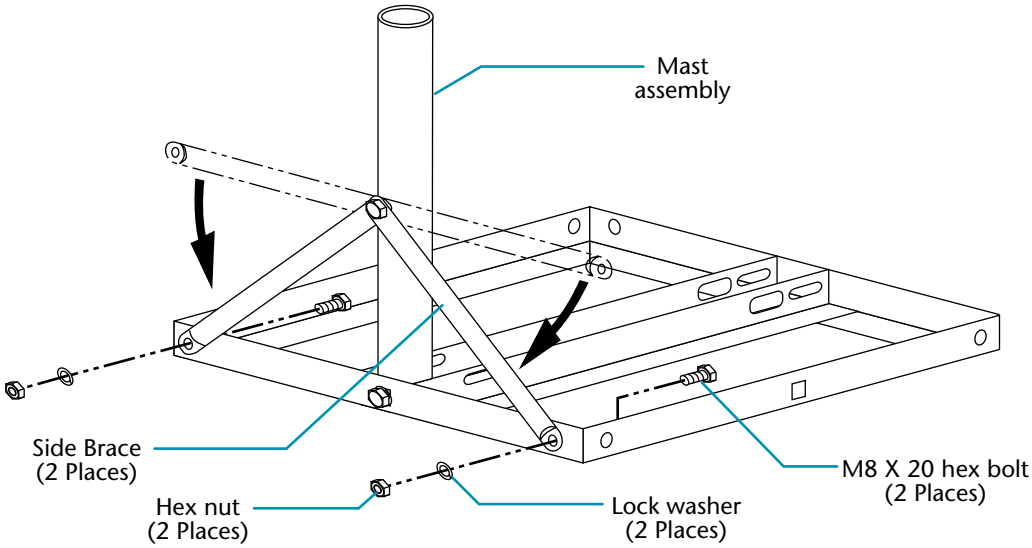


Figure 4-8. Securing side braces to base

6. Swing side braces down and align holes in braces with holes in base. Secure with two M8 X 20 hex-head bolts, lock washers, and hex nuts (see figure 4-8).

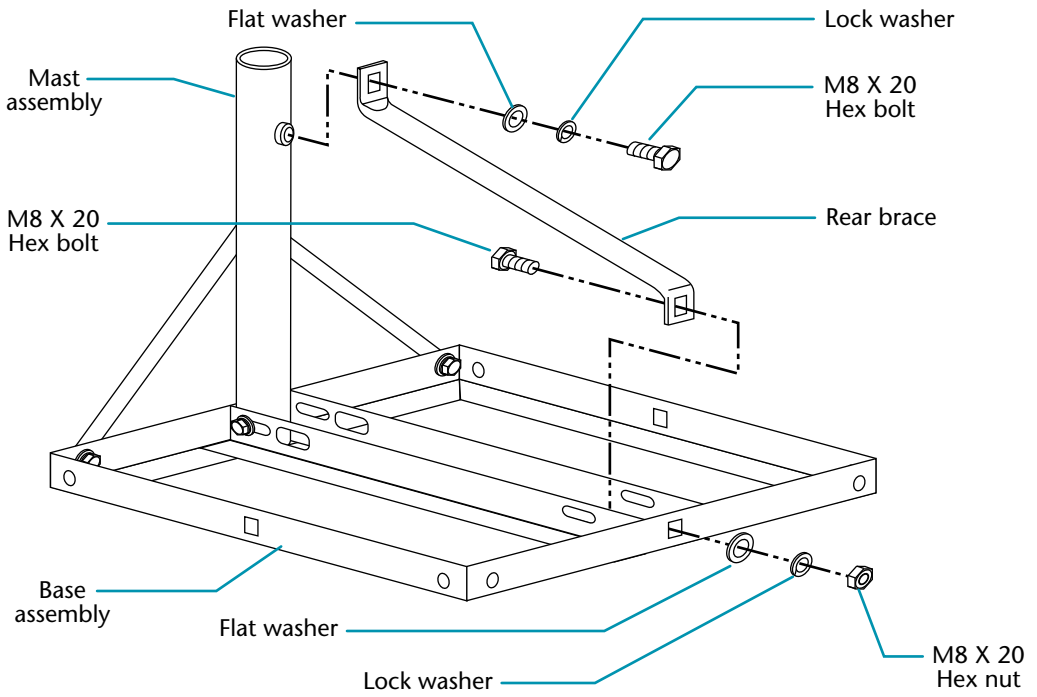


Figure 4-9. Assembling rear brace to mast and base

7. Secure rear brace to mast using an M8 X 20 hex-head bolt, lock washer, and flat washer (see figure 4-9). Pull up on brace so that outer edge of flat washer is seated against brace bend.
8. Secure brace to base using an M8 X 20 bolt, lock washer, and hex nut (see figure 4-9). Push down on brace to lock hex-head bolt when tightening hex nut.
9. Tighten and torque all hardware to 18 ft.-lbs. (24 N-m).

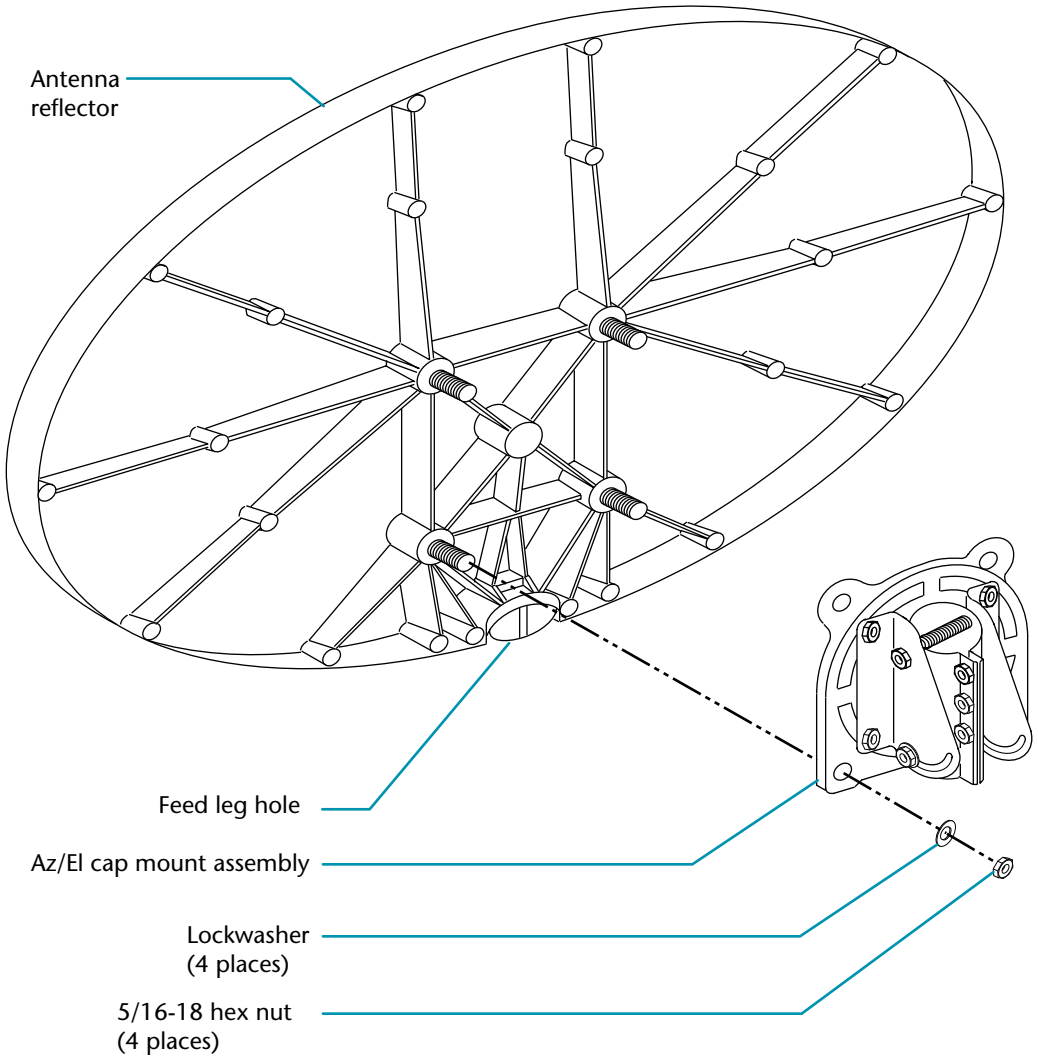


Figure 4-10. Assembling antenna reflector onto AZ/EL cap mount

Assembling antenna reflector to AZ/EL cap mount

Perform the following steps to assemble the antenna reflector onto the azimuth/elevation (AZ/EL) cap mount.

1. Insert the four threaded studs on back of antenna reflector through corresponding holes on AZ/EL cap mount assembly (see figure 4-10).

Caution

Verify that feed leg hole is oriented downward as shown in figure 4-10.

2. Install four lock washers and 5/16-inch hex nuts onto threaded studs. Tighten and torque hex nuts to 18 ft.-lbs. (24 N-m).

Assembling antenna/cap mount onto mast

Perform the following steps to assemble the antenna/cap mount onto the NPM mast.

Note: Do not remove the abrasive pad from inside the cap mount assembly; it remains as a part of the assembly.

1. Lift antenna/cap mount assembly and slide AZ/EL cap mount onto mast tube (see figure 4-11). Face of antenna should be parallel to front of base (see figure 4-5).

WARNING

Failure to mount the antenna parallel to the front of the base may greatly reduce the allowed wind speed values shown in tables 4-1 and 4-2, which could result in damage or injury.

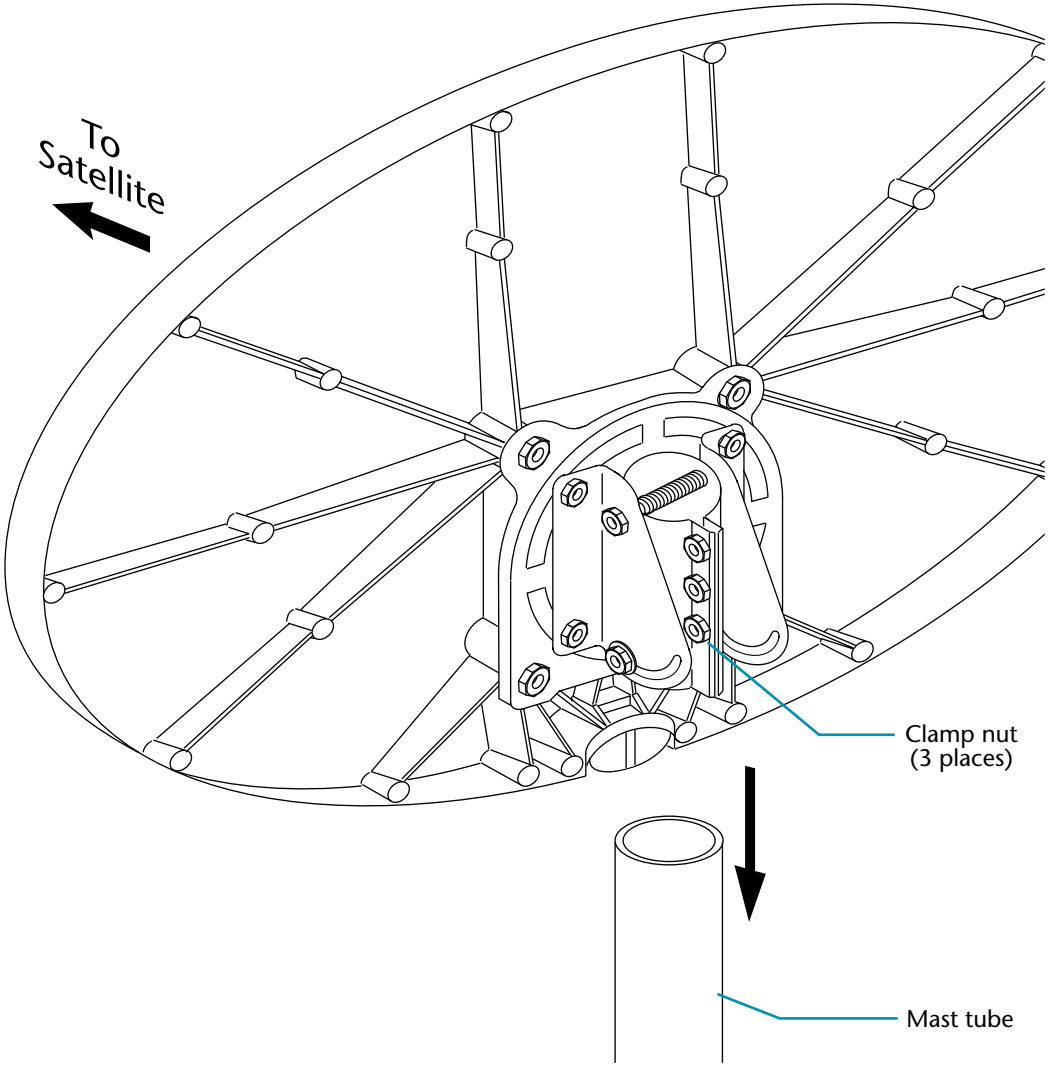


Figure 4-11. Installing antenna/cap mount assembly onto mast

2. Tighten M8 clamp nuts so that the antenna/cap mount assembly is held stationary on mast but can be swiveled with slight pressure.

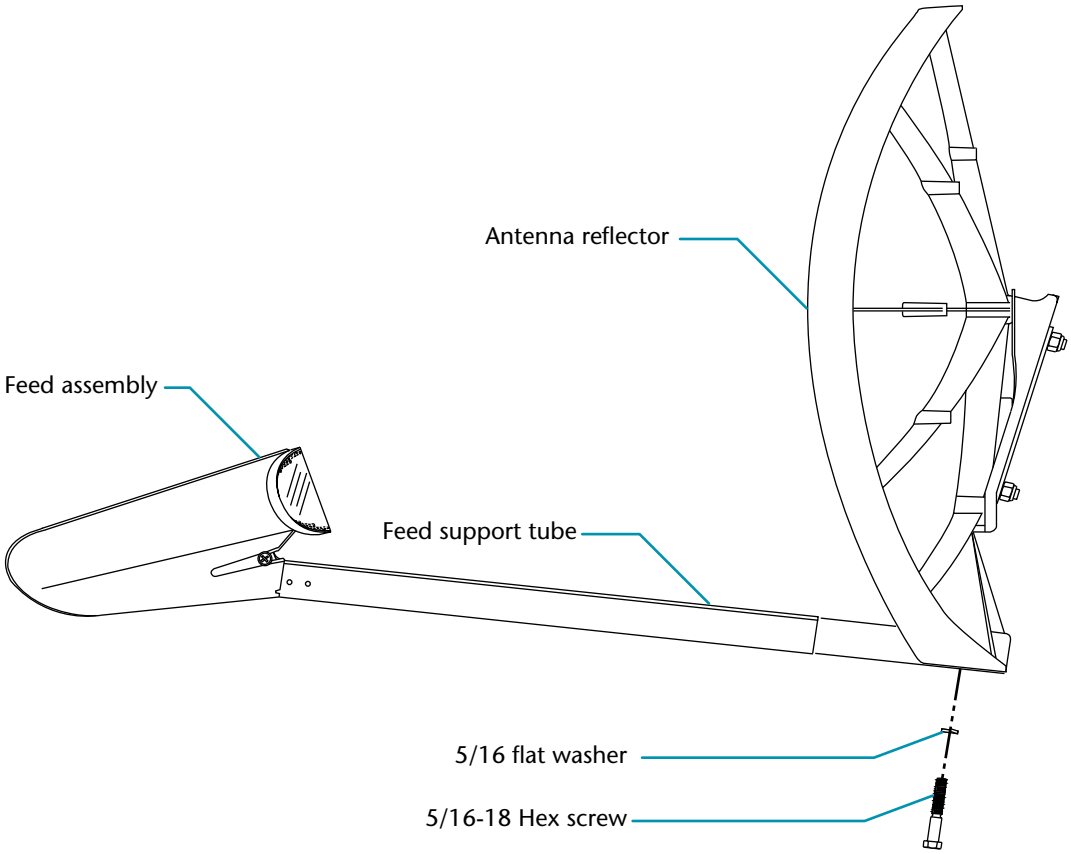


Figure 4-12. Installing feed assembly and feed support tube onto antenna reflector

Feed assembly and feed support tube installation

Perform the following steps to install the feed assembly and feed support tube onto the antenna reflector. The feed support tube is keyed to assure that it will seat properly in the feed support socket.

1. Install the feed leg into the feed support socket on the antenna reflector (see figure 4-12).
2. Secure the feed leg with a 5/16 flat washer and 5/16-18 hex screw as shown in figure 4-12). Use a torque wrench to tighten the hex screw to 8 to 10 ft-lbs.

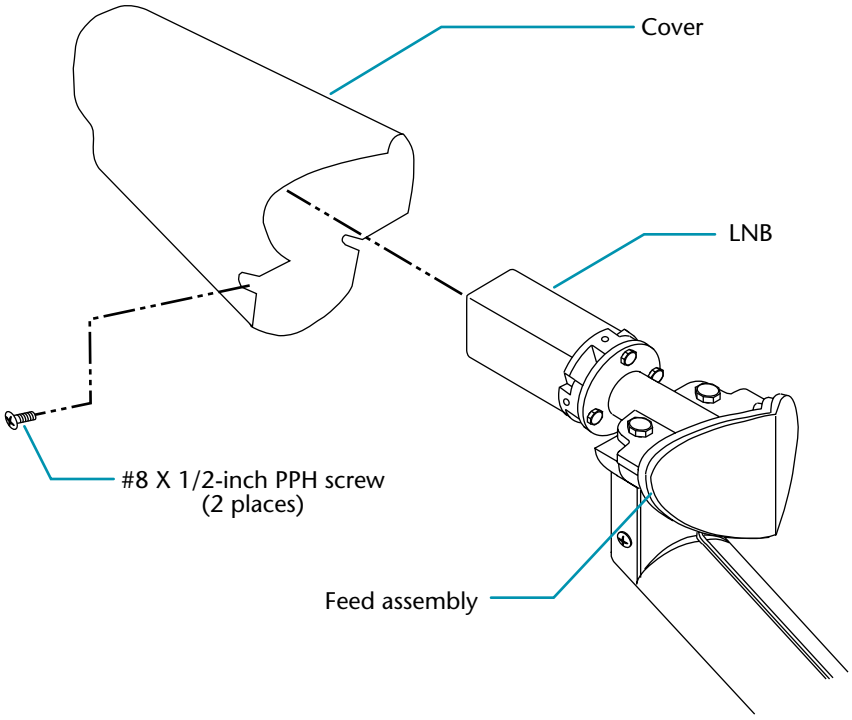


Figure 4-13. Removing cover from feed assembly

Installing the LNB cable onto the LNB

Perform the following steps to install the LNB cable onto the LNB.

1. Using a Phillips screwdriver, remove the two #8 X 1/2-inch PPH screws from the feed assembly cover (see figure 4-13).
2. Remove the feed assembly cover.
3. Route one end of the RG-6 coaxial cable from the back of the antenna reflector along the inside of the feed support tube until approximately 12 inches (30.5 cm) of cable extends from the top of the support tube.

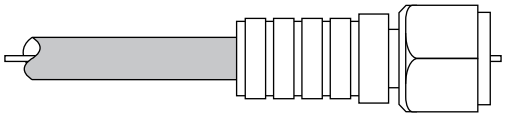


Figure 4-14. Weatherproof F-type connector

4. If the cable already has an F-type connector on it, go to step 5. Otherwise, install an F-type connector (see figure 4-14) onto the end of the cable.

Note: If the F-type connector you are using is not weatherproof, you need to use a coaxial cable sealant (COAX-SEAL or equivalent) to prevent moisture from seeping into the LNB from the coaxial connector. The copper-plated center conductor in the RG-6 cable can experience electrolytic corrosion at the LNB connector. Moisture and DC current cause this type of corrosion.

5. Install the coaxial cable onto the LNB connector (see figure 4-15).

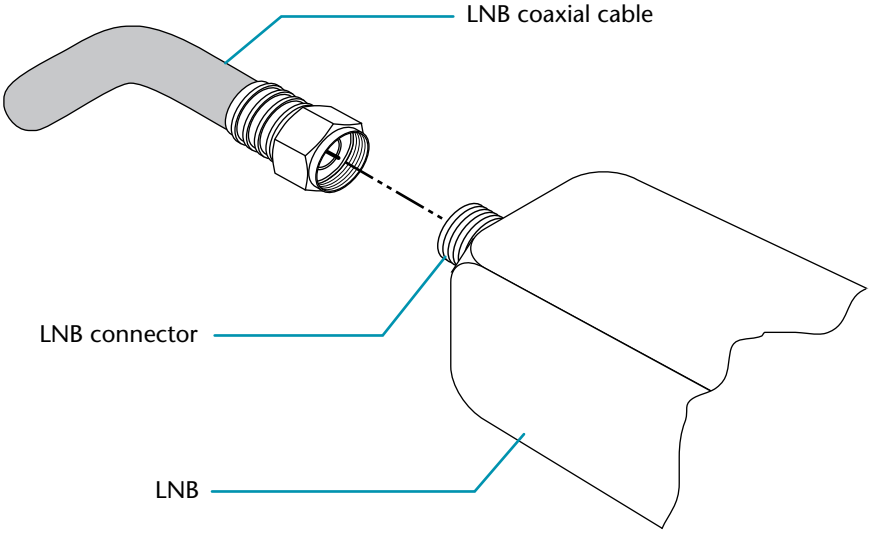


Figure 4-15. Installing LNB cable onto LNB connector

6. Install the feed assembly cover using the two M4 X 10-mm PPH screws removed in step 1.

Grounding the NPM frame

Perform the following steps to ground the NPM assembly in accordance with current National Electrical Code and local electric codes. Refer to appendix A, "Electrical Grounding," for grounding information. Use a copper ground wire for an underground installation.

WARNING

All installations must conform to the latest issue of the National Electrical Code.

1. Insert one end of the ground wire through the ground lug (see figure 4-16).

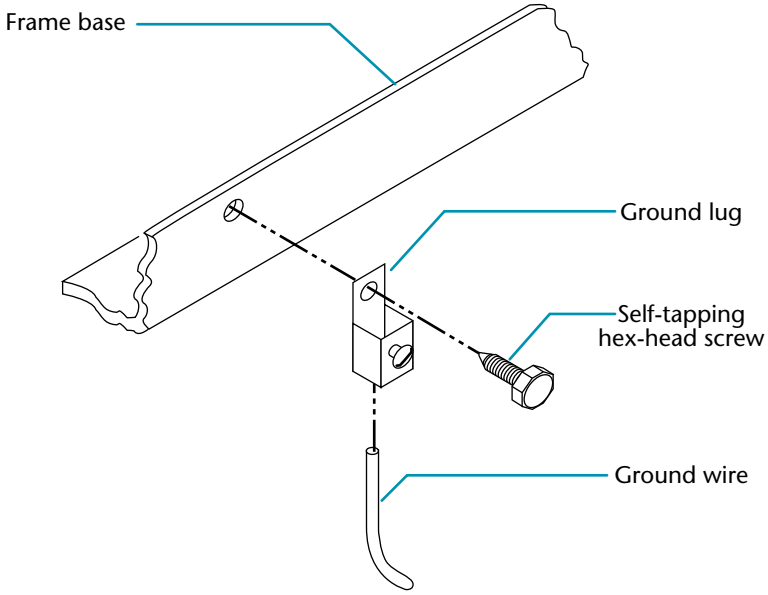


Figure 4-16. Grounding the antenna

2. Tighten the ground lug clamp screw until the ground wire is secured.
3. Install the ground lug onto the NPM frame base using the self-tapping hex-head screw as shown in figure 4-16.
4. Refer to the National Electrical Code (NEC) Section 810 and local electric codes for the specific instructions on grounding the remaining end of the ground wire.

Performing a coarse azimuth alignment

Do the following to make a coarse azimuth alignment:

1. Temporarily place a concrete block on the base during the coarse azimuth adjustment (see figure 4-17).

Caution

Do not rotate antenna and cap mount on mast to obtain coarse azimuth setting. To do so would greatly reduce allowed wind-speed values shown in tables 4-1 and 4-2 (see pages 46 and 48).

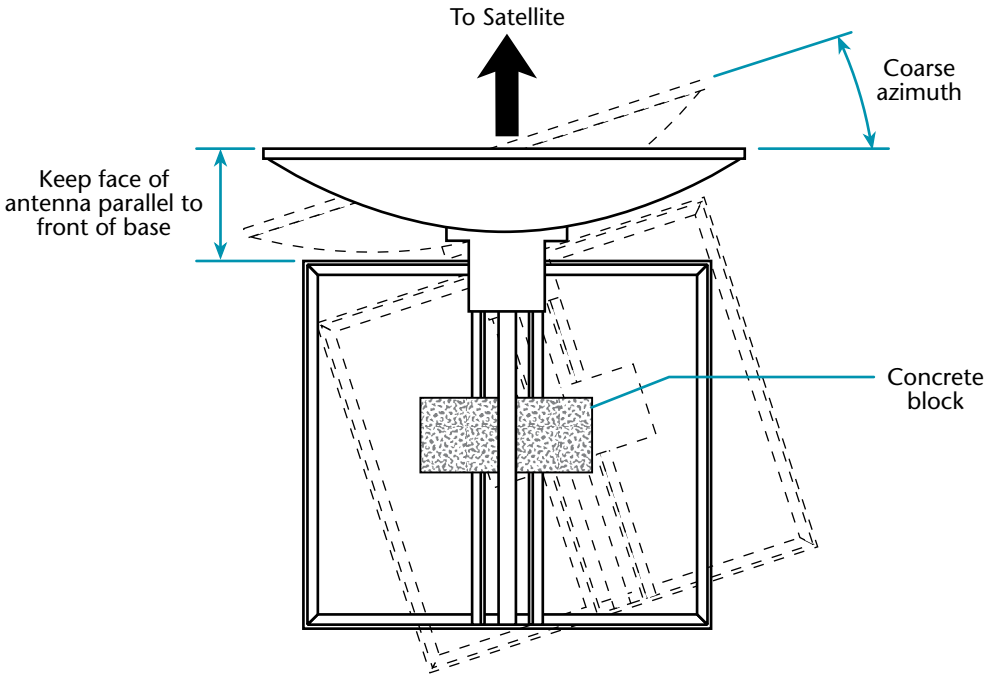


Figure 4-17. Rotating antenna and base for coarse azimuth setting

2. Rotate antenna and mount assembly, pointing it to the correct compass reading. This will be an approximate setting. Optimum setting is achieved during fine alignment.

Ballast

Locate your installation site on the wind speed map in figure 4-18. Determine the windspeed indicated for your antenna location.

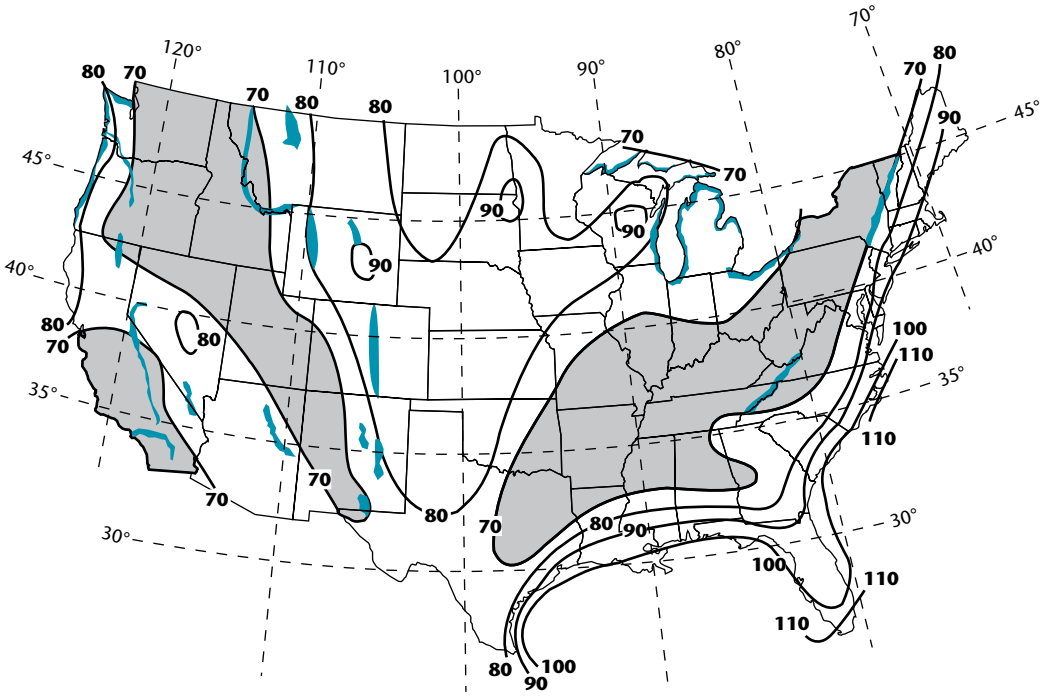


Figure 4-18. Wind speed map

Select the exposure factor (B or C) for your antenna location from the following descriptions:

Exposure B indicates the terrain of urban and suburban areas, wooded areas, or other terrain with numerous closely spaced obstructions. The obstructions extend at least 1500 feet in all directions from the antenna installation.

Exposure C indicates a flat terrain which is generally open; including obstructions less than 30 feet high, and extending one-half mile or more from the site in all directions from the antenna installation.

Refer to table 4-1 for the ballast requirements for a tethered antenna and to table 4-2 for an untethered antenna. See figure 4-19 for the location of the ballast; add the number of concrete blocks for ballast onto the NPM base frame, taking care not to move the base when adding the ballast.

Table 4-1. Ballast requirements (wind speed tethered)

Number of blocks	Location Number	Total Weight (lbs.) of ballast and antenna system	Dist. Load lbs./sq. ft.	Exposure	Allowable wind speed (MPH) when height from ground to center of antenna is: 15 ft.	30 ft.	60 ft.
8	1 thru 8	288	32.2	B	108	98	87
				C	83	77	71
10	1 thru 10	352	39.4	B	119	107	96
				C	91	84	78
14	1 thru 14	480	53.7	B	—	125	112
				C	106	98	91
18	1 thru 18	608	68.0	B	—	—	125
				C	119	110	102

Note 1: Antenna and NPM maximum survivable wind velocity is 125 MPH.

Note 2: Select ballast from table 4-1 based on wind velocity, height above ground, and roof material.

Note 3: Ballast consists of 8 X 16 X 3-inch concrete cap blocks weighing 32 lbs. each, plus 45-lb. combined weight of antenna and NPM.

Note 4: Ballast calculated to meet Uniform Building Code Exposure B or C and 1.5 stability.

Note 5: Ballast based on overturning requirements with 1.5 stability. To prevent overturning, tether as shown in figure 4-20.

Note 6: The NPM is tethered to prevent overturning (see section "Tethering the NPM," following figure 4-20).

Note 7: If the NPM will not be tethered, refer to table 4-2.

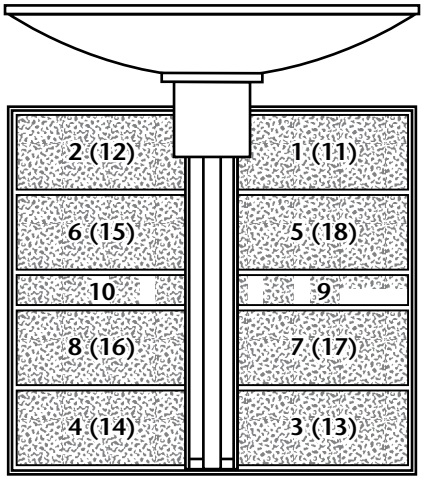


Figure 4-19. Ballast locations

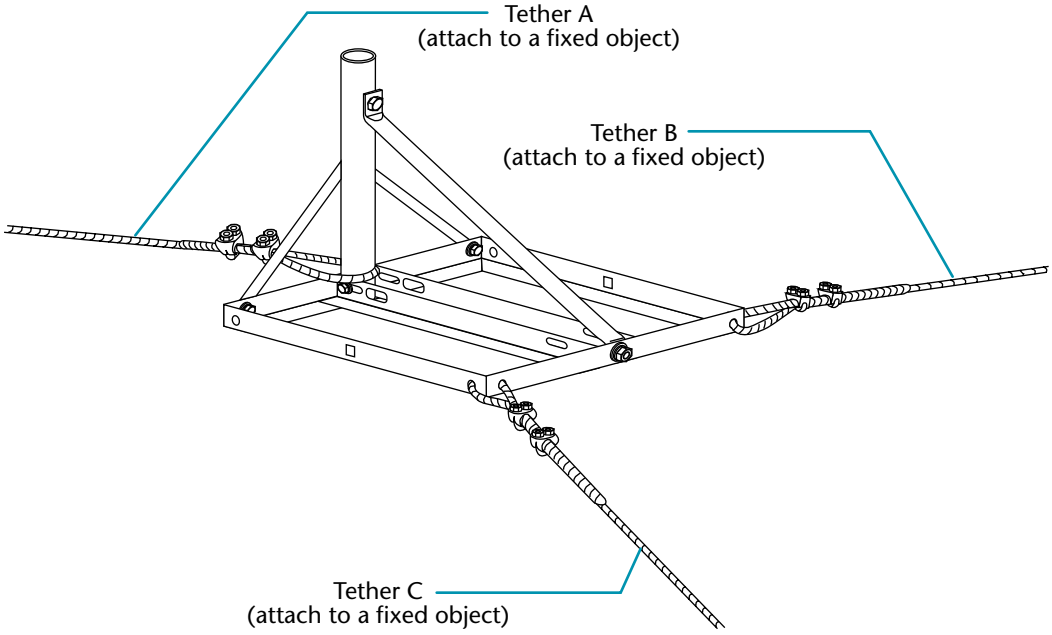


Figure 4-20. Typical tethering

Tethering the NPM

To keep the NPM from overturning, attach three cables, as shown in figure 4-20, between the NPM and fixed objects capable of supporting 110 lbs. The tethering cable must be 1/8-inch diameter minimum stainless or galvanized steel (7 X 7 or 7 X 19, 1200 lbs. minimum breaking strength).

Table 4-2. Ballast requirements (wind speed untethered)

					Built-up roof tar and rock friction coefficient: .55 with foam pad		
Number of blocks	Location Number	Total Weight (lbs.) of ballast and antenna system	Dist. Load lbs./sq. ft.	Exposure	Allowable wind speed (MPH) when height from ground to center of antenna is: 15 ft.	30 ft.	60 ft.
8	1 thru 8	288	32.2	B	97	87	78
				C	74	69	64
10	1 thru 10	352	39.4	B	110	99	88
				C	84	78	72
14	1 thru 14	480	53.7	B	131	119	106
				C	100	93	86
18	1 thru 18	608	68.0	B	—	135	121
				C	115	106	99
					Built-up roof modified bitumen friction coefficient: .47 with foam pad		
Number of blocks	Location Number	Total Weight (lbs.) of ballast and antenna system	Dist. Load lbs./sq. ft.	Exposure	Allowable wind speed (MPH) when height from ground to center of antenna is: 15 ft.	30 ft.	60 ft.
8	1 thru 8	288	32.2	B	102	93	83
				C	78	73	67
10	1 thru 10	352	39.4	B	110	99	88
				C	84	78	72
14	1 thru 14	480	53.7	B	122	111	99
				C	94	87	81
18	1 thru 18	608	68.0	B	134	121	108
				C	103	95	88
					Built-up roof Hypalon or EDPM friction coefficient: .55 with foam pad		
Number of blocks	Location Number	Total Weight (lbs.) of ballast and antenna system	Dist. Load lbs./sq. ft.	Exposure	Allowable wind speed (MPH) when height from ground to center of antenna is: 15 ft.	30 ft.	60 ft.
8	1 thru 8	288	32.2	B	87	78	70
				C	66	61	57
10	1 thru 10	352	39.4	B	95	86	77
				C	73	67	52
14	1 thru 14	480	53.7	B	110	99	88
				C	84	78	72
18	1 thru 18	608	68.0	B	122	111	99
				C	94	87	81

Note 1: Antenna and NPM maximum survivable wind velocity is 125 MPH.

Note 2: Select ballast from table 4-2 based on wind velocity, height above ground, and roof material.

Note 3: Ballast consists of 8 X 16 X 4-inch concrete cap blocks weighing 32 lbs. each, plus 45-lb. combined weight of antenna and NPM.

Note 4: Ballast calculated to meet Uniform Building Code Exposure B or C and 1.5 stability.

Note 5: Wind speed in table 4-2 is based on worst-case friction coefficients and 1.5 sliding and overturning stability.

The antenna is installed. Refer to section 4.6, "Installing the LNB cable," for information on routing the LNB cable to the building and installing it.

4.4 Installing a pole-mounted antenna

This section describes installing the antenna assembly onto a ground pole (see figure 4-21). Read this section thoroughly before beginning system assembly. For best results in the assembly process, perform each step in the same sequence as listed in this manual.

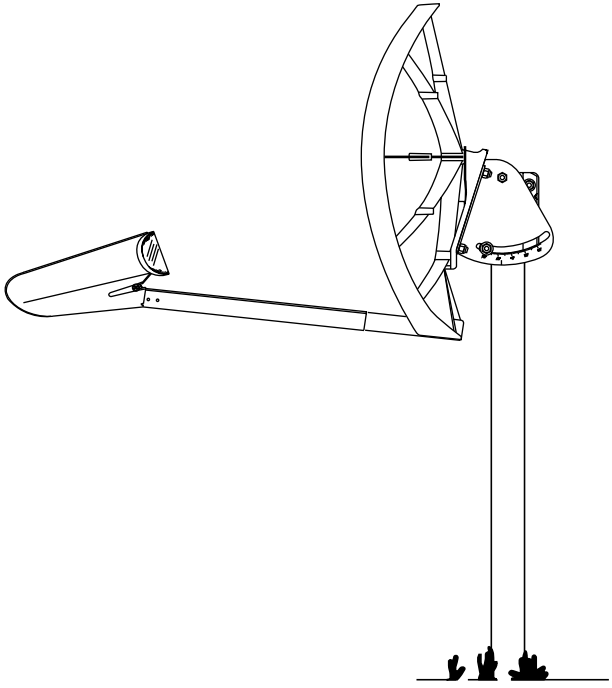


Figure 4-21. Pole mount installation

WARNING

You can be seriously injured or *killed* if the antenna comes into contact with electric power lines. Verify that there are none nearby before performing the following procedure. Watch out for overhead power lines. Check the distance to the power lines before starting installation. We recommend that you stay a minimum of 20 feet (6 meters) from all power lines.

If any part of the antenna or mast assembly comes into contact with a power line, call your local power company. *Do not try to remove it yourself!* They will remove it safely.

WARNING

For your own safety, follow these important safety rules:

- **Perform as many functions as possible on the ground.**
- **Do not use metal ladders.**
- **Do not install the antenna on a windy day.**
- **If you start to drop the antenna or mast assembly, get away from it and let it fall.**

WARNING

Before you dig, call your local utility companies so they can help you locate underground power, telephone, cable, gas, water, and sewer lines in the area.

WARNING

Assembling the dish antenna on a windy day can be dangerous. Because of the antenna surface, even slight winds create strong forces. For example, a 1.0-meter antenna facing a wind of 20 MPH (32 km/h) can undergo forces of 60 lbs. (269 N). Be prepared to safely handle these forces at unexpected moments.

Do not attempt to assemble, move, or mount a dish on windy days or serious, even fatal accidents may occur.

WARNING

Local electrical codes and the National Electrical Code require the dish to be connected to a grounding electrode, even if the dish is mounted on a pole mount system does not satisfy the requirements of a grounding electrode. Therefore, always connect the dish to a proper ground electrode.

Caution

If you will be using a pole other than the one recommended as an optional purchase for the DirecPC pole mount system, read the following:

- The pole must have a 2-3/8 inch outside diameter (OD). Pole and pipe sizes are measured by inside diameter (ID) and wall thickness. To obtain a pole with the correct OD, look for a pole with a 2-inch ID and a Schedule-40 wall thickness.
- The pole should be at least six feet long.

Assembly tools recommended

Have on hand the following tools:

- Hole digging tools
- Hammer or driver for grounding rod
- Wheelbarrow or concrete mixing box
- Bubble level
- Assorted open-end wrenches
- Torque wrench (to 18 ft. pounds)
- Phillips screwdriver
- Ratchet wrench, 3/8-inch drive
- 10-mm socket, 3/8-inch drive (for M6 bolts)
- 13-mm socket, 3/8-inch drive (for M8 bolts)
- 10-mm nut driver
- 13-mm nut driver
- 1/2-inch drill bit
- 3/8-inch electric drill (for coax cable routing)

Materials recommended

Have on hand the following materials: .

- 3 40-lb. bags of quick-setting concrete.
- 1-1/2 inch ground clamp (if not using recommended pole).
- RG-6 coaxial cable with F-type connectors, impedance: 75 ohms, shielding: minimum double shield (requires a minimum 100% foil shield covered with a 40% woven braid), outer cover: PVC (must be suitable for both indoor and outdoor use, length as required).
- Coaxial cable sealant (COAX-SEAL or equivalent) to prevent moisture from seeping into the LNB from the coaxial connector.
- Silicone sealant.
- A grounding rod and clamp (as required by the National Electrical Code and applicable local codes; refer to Appendix A "Electrical Grounding").

Installing the pole mount

Perform the following steps to install the pole mount.

Note: 10-mm tools fit M6 hardware and 13-mm tools fit M8 hardware.

1. If you are using the recommended DirecPC pole, go to step 2. Otherwise, use a hacksaw to cut the bottom edge of the pole at a 45° angle, as shown in figure 4-22. This prevents the pole from rotating in the concrete over time.

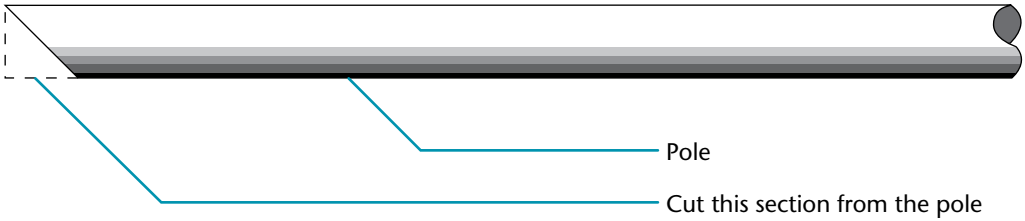


Figure 4-22. Cutting bottom of pole at a 45° angle

Note: If you live in an area where the frost line is never deeper than 36 inches below grade, refer to figure 4-23 and table 4-3 for specifications as you perform the following steps to install the pole. Otherwise, refer to figure 4-24 and table 4-4 for specifications that describe installing the pole in soil where the frost line extends 36 inches or deeper below grade

2. Refer to table 4-3 or 4-4 to determine how deep and wide the pole mount hole should be; then dig the hole to the specified dimensions.

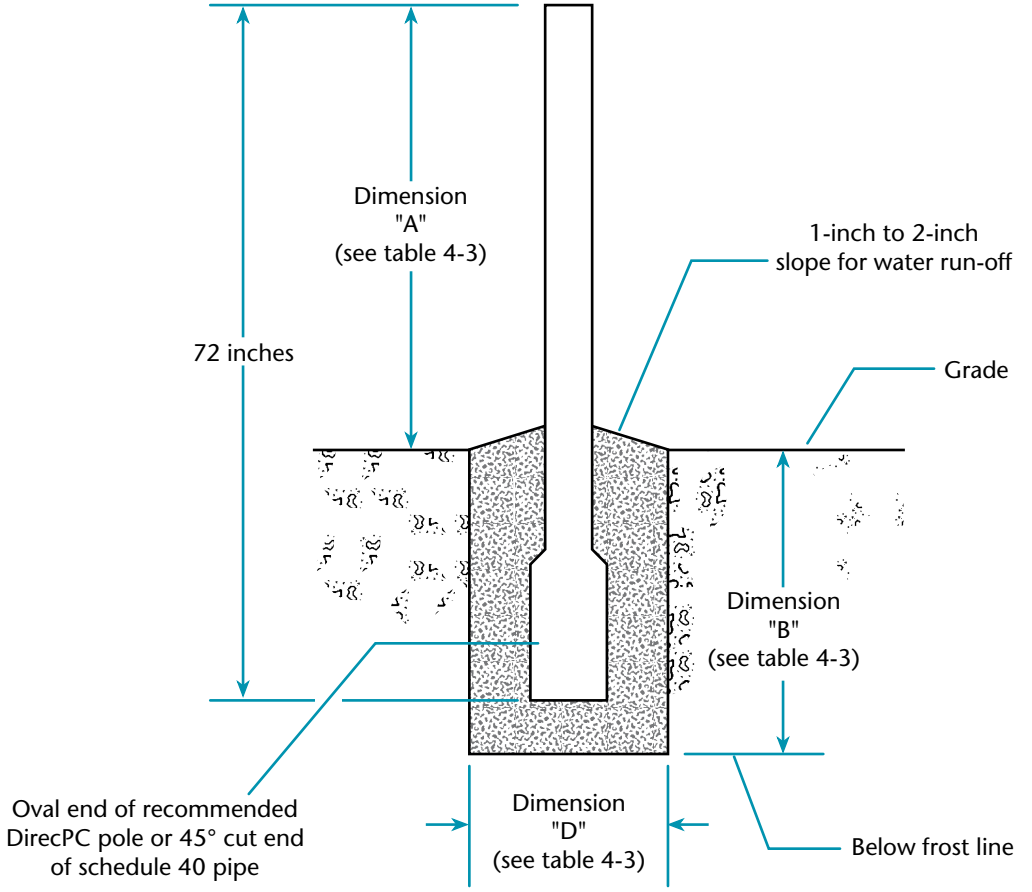


Figure 4-23. Standard DirecPC pole mount pier foundation diagram

Note 1: Pole and foundation design is based on the following criteria:

- Uniform Building Code Exposure B or C and 1.5 stability factor.
- Vertical soil pressure of 2,000 pounds per square foot.
- Lateral soil pressure of 400 pounds per square foot.
- Concrete compressive strength of 2,500 pounds per square inch in 28 days.

Note 2: The foundation design shown in figure 4-23 is intended as a guide only, it does not represent a specific site plan. Because soil conditions vary and may not meet design criteria listed in Note 1, you should consult a local professional engineer to determine your soil conditions and appropriate foundation.

Note 3: Exposure B indicates the terrain of urban and suburban areas, wooded areas, or other terrain with numerous closely spaced obstructions. The obstructions extend at least 1500 feet in all directions from the antenna installation.

Note 4: Exposure C indicates a flat terrain which is generally open; including obstructions less than 30 feet high, and extending one-half mile or more from the site in all directions from the antenna installation.

Table 4-3. Standard pier foundation specifications

	Exposure B				Exposure C			
Wind Velocity	Dimensions A	B	D	Concrete Volume	Dimensions A	B	D	Concrete Volume
80 MPH	37 in.	36 in.	7 in.	0.9 feet^3	37 in.	36 in.	7 in.	0.9 feet^3
90 MPH	37 in.	36 in.	7 in.	0.9 feet^3	37 in.	36 in.	7 in.	0.9 feet^3
100 MPH	37 in.	36 in.	7 in.	0.9 feet^3	37 in.	36 in.	7 in.	0.9 feet^3
110 MPH*	37 in.	36 in.	7 in.	0.9 feet^3	34 in.	39 in.	7 in.	0.95 feet^3
120 MPH*	34 in.	36 in.	7 in.	0.9 feet^3	34 in.	39 in.	8 in.	1.25 feet^3

* 2-3/8 O.D. X 14 GA wall ground pole (#9007869-0005) is rated at 110 MPH at heights shown.

2-3/8 O.D. X Schedule 40 (0.154 wall) ground pole is rated at 120 MPH at heights shown.

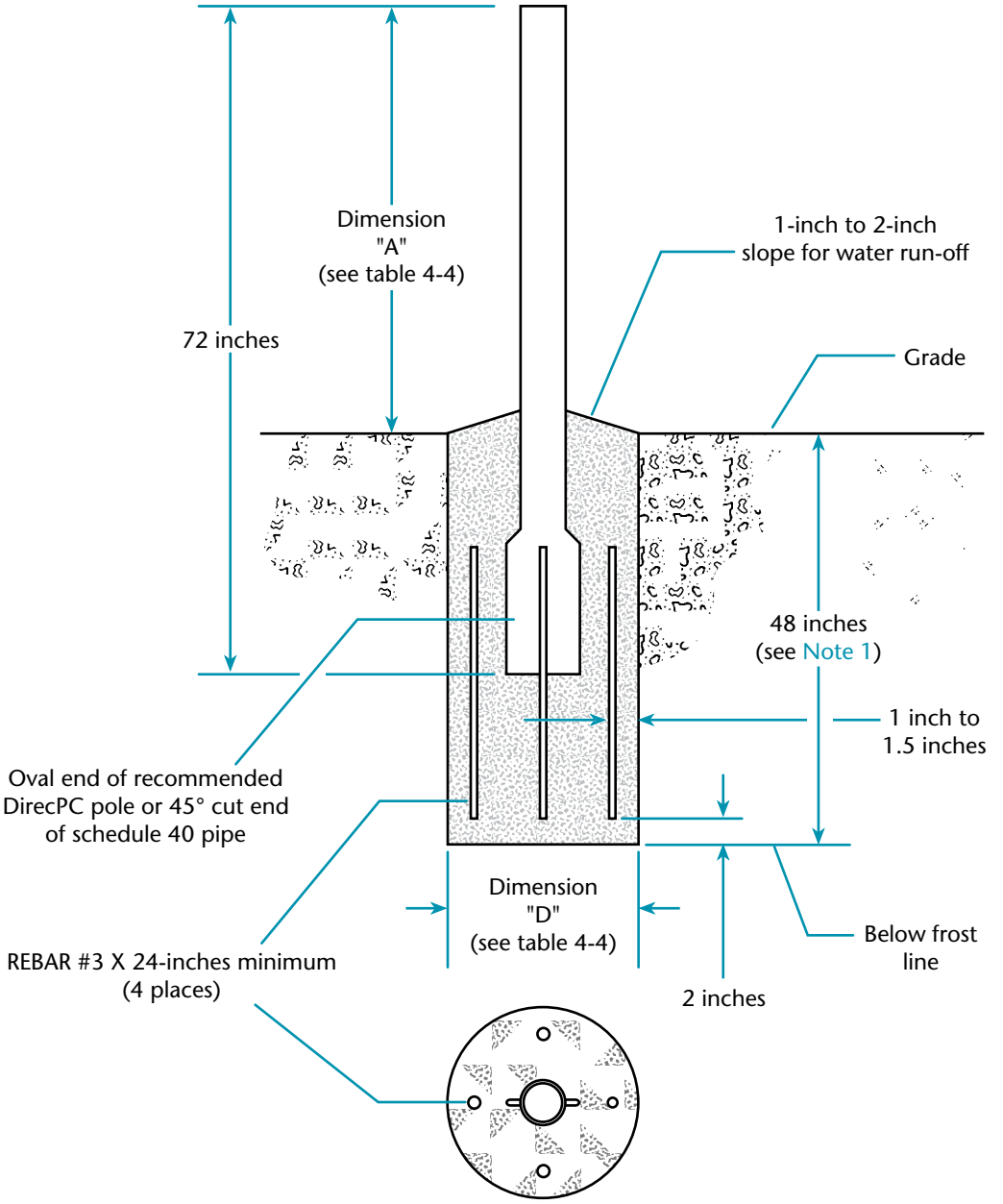


Figure 4-24. Deep frost line DirecPC pole mount foundation diagram

Note 1: The 48-inch hole depth may be increased as necessary for your particular site. If you do make the hole deeper, also increase the concrete, and extend the length of the rebar accordingly.

Note 2: Pole and foundation design is based on the following criteria:

- Uniform Building Code Exposure B or C and 1.5 stability factor.
- Vertical soil pressure of 2,000 pounds per square foot.
- Lateral soil pressure of 400 pounds per square foot.
- Concrete compressive strength of 2,500 pounds per square inch in 28 days.

Note 3: The foundation design shown in figure 4-24 is intended as a guide only, it does not represent a specific site plan. Because soil conditions vary and may not meet design criteria listed in Note 2, you should consult a local professional engineer to determine your soil conditions and appropriate foundation.

Table 4-4. Deep frost line foundation specifications

	Exposure B			Exposure C		
Wind Velocity	Dimensions A	Dimensions D	Concrete Volume	Dimensions A	Dimensions D	Concrete Volume
80 to 125 MPH	37 in.	7 in.	1.2 feet^3	37 in.	7 in.	1.2 feet^3
110 MPH*	37 in.	7 in.	1.2 feet^3	34 in.	7 in.	1.2 feet^3
120 MPH*	34 in.	7 in.	1.2 feet^3	34 in.	7 in.	1.2 feet^3

* 2-3/8 O.D. X 14 GA wall ground pole (#9007869-0005) is rated at 110 MPH at heights shown.

2-3/8 O.D. X Schedule 40 (0.154 wall) ground pole is rated at 120 MPH at heights shown.

3. Place the pole into the hole, and place rocks (for example) around the pole to stabilize it in a vertical position.

4. Using a bubble level, plumb the pole in at least two different locations on the side of the pole, as shown in figure 4-25. These two measurements should be at right angles to each other. When the pole is plumb, secure it with the rocks, or attach guy wires to hold it upright.

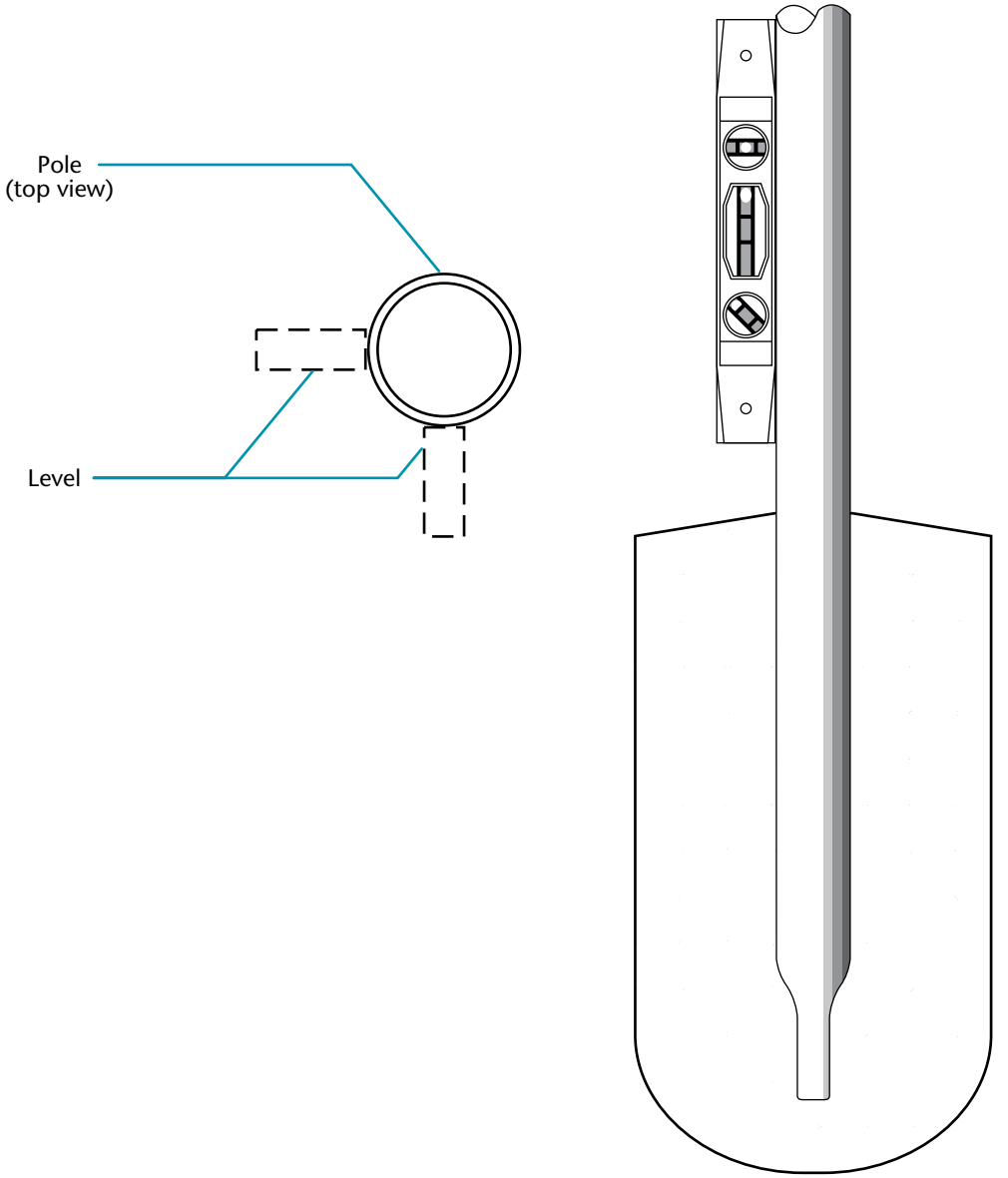


Figure 4-25. Leveling the pole

5. Fill the hole with prepared quick-drying cement. Shape the top of the concrete with a slope to improve drainage as shown in figures 4-23 and 4-24.
6. Let the cement dry for 24 hours before you mount the antenna assembly onto the pole.

Note: To allow the concrete to cure uniformly, keep it moist or use a product called Visqueen or an equivalent.

Grounding the pole mount

Perform the following steps to ground the pole mount.

WARNING

Local electrical codes and the National Electrical Code require the dish to be connected to a grounding electrode, even if the dish is mounted on a pole mount system does not satisfy the requirements of a grounding electrode. Therefore, always connect the dish to a proper ground electrode.

1. Insert one end of the ground wire through the ground lug (see figure 4-26). If the ground wire is to be routed under ground, use a copper ground wire.

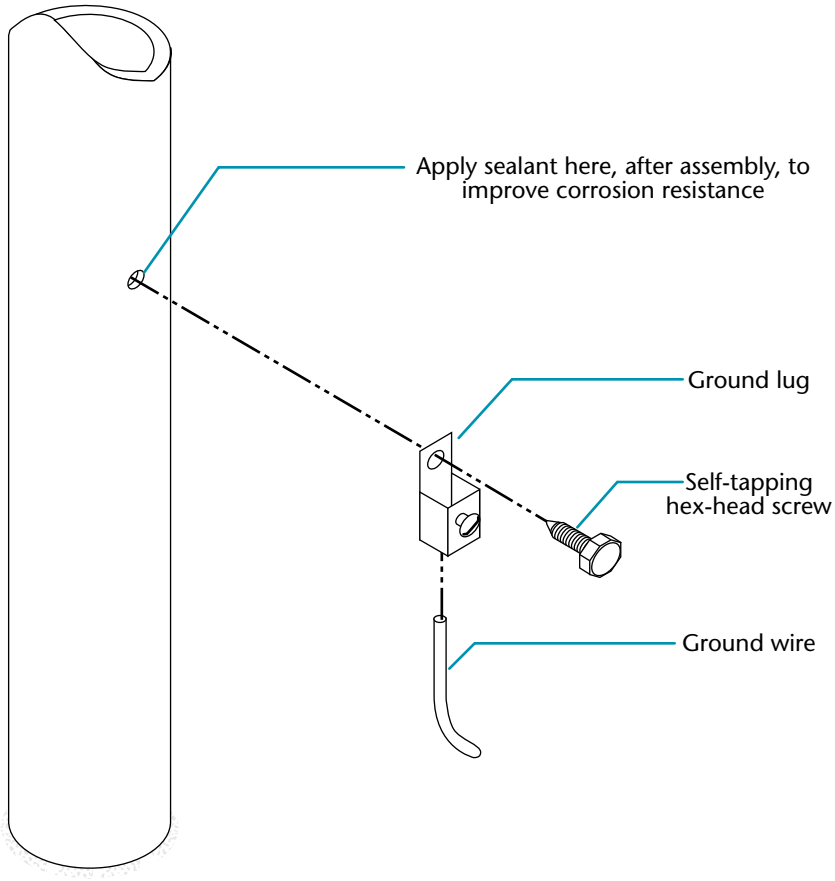


Figure 4-26. Ground wire installation diagram for a pole mount

2. Tighten the ground lug clamp screw until the ground wire is secured.
3. Install the ground lug onto the pole mount using the self-tapping hex-head screw as shown in figure 4-26).

4. Refer to the National Electrical Code (NEC) Section 810 and local electric codes for the specific instructions on grounding the remaining end of the ground wire.

Assembling antenna reflector to AZ/EL cap mount

Perform the following steps to assemble the antenna reflector onto the azimuth/elevation (AZ/EL) cap mount.

1. Insert the four threaded studs on back of antenna reflector through corresponding holes on AZ/EL cap mount assembly (see figure 4-27).

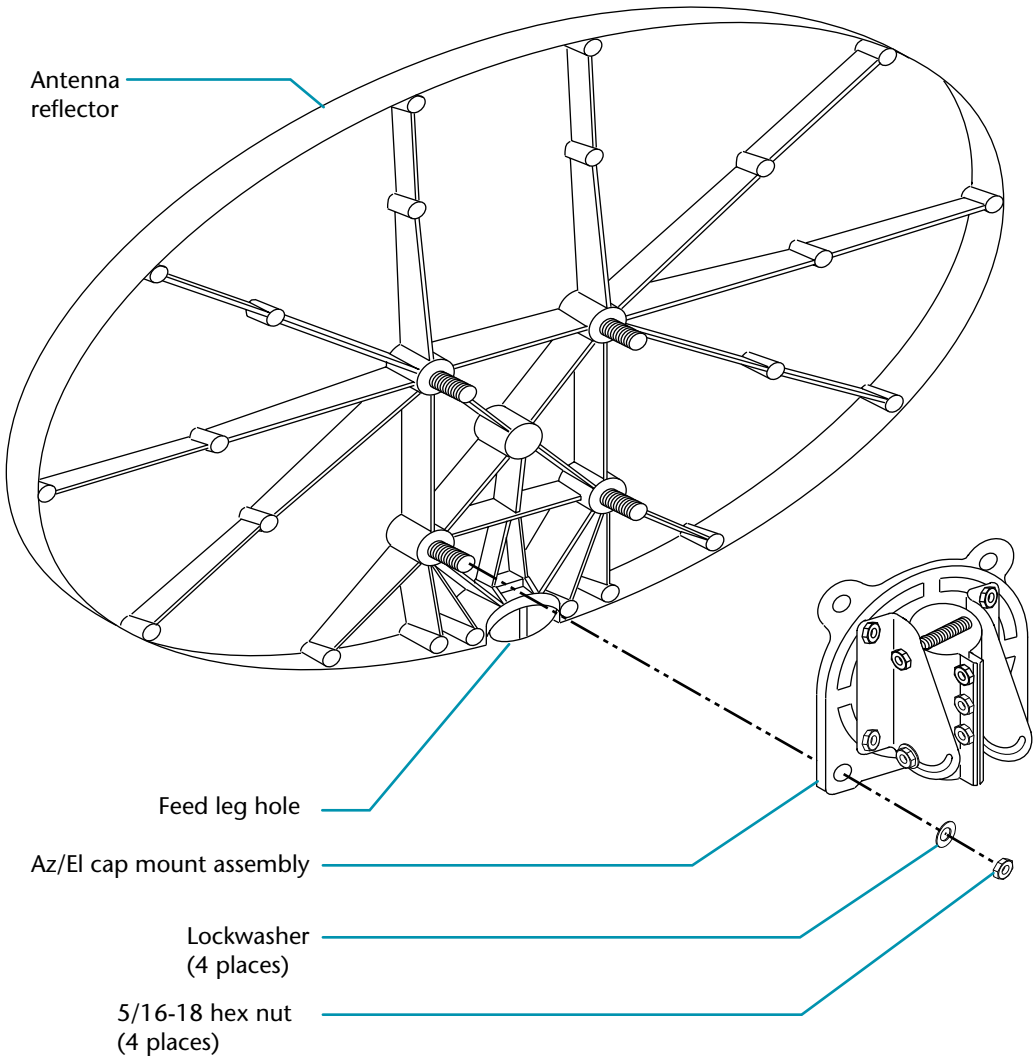


Figure 4-27. Assembling antenna reflector onto AZ/EL cap mount

Note: Verify that feed leg hole is oriented as shown in figure 4-27.

2. Install four lock washers and the M8 hex nuts onto threaded studs. Tighten and torque the hex nuts to 18 ft.-lbs. (24 N-m).

Assembling antenna/cap mount onto pole

Perform the following steps to assemble the antenna/cap mount onto the pole mount.

Note: Do not remove the abrasive pad from inside the cap mount assembly; it remains as a part of the assembly.

1. Lift antenna/cap mount assembly and slide AZ/EL cap mount onto pole tube (see figure 4-28).
2. Tighten 5/16-inch clamp nuts so that the antenna/cap mount assembly is held stationary on pole but can be swiveled with slight pressure.

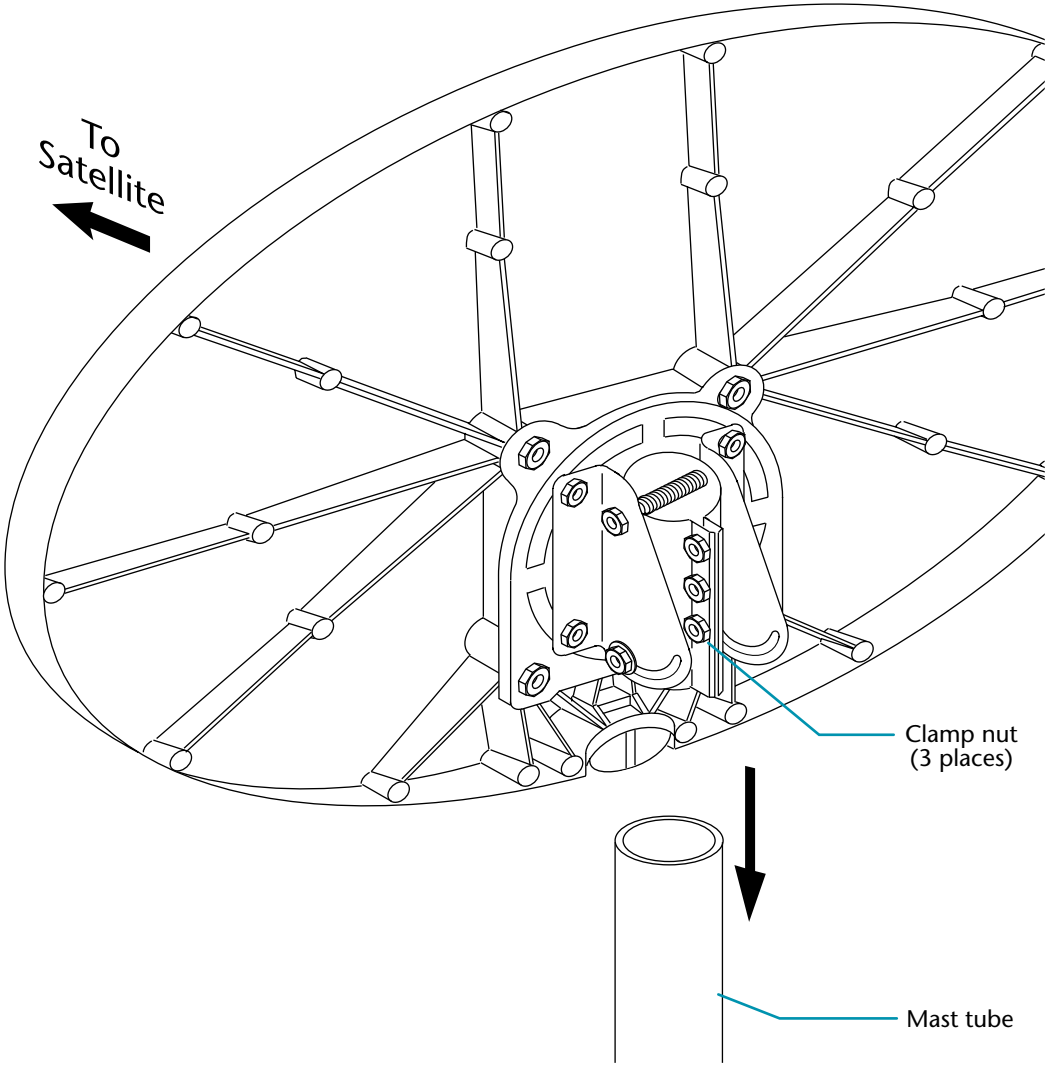


Figure 4-28. Installing antenna/cap mount assembly onto pole mount

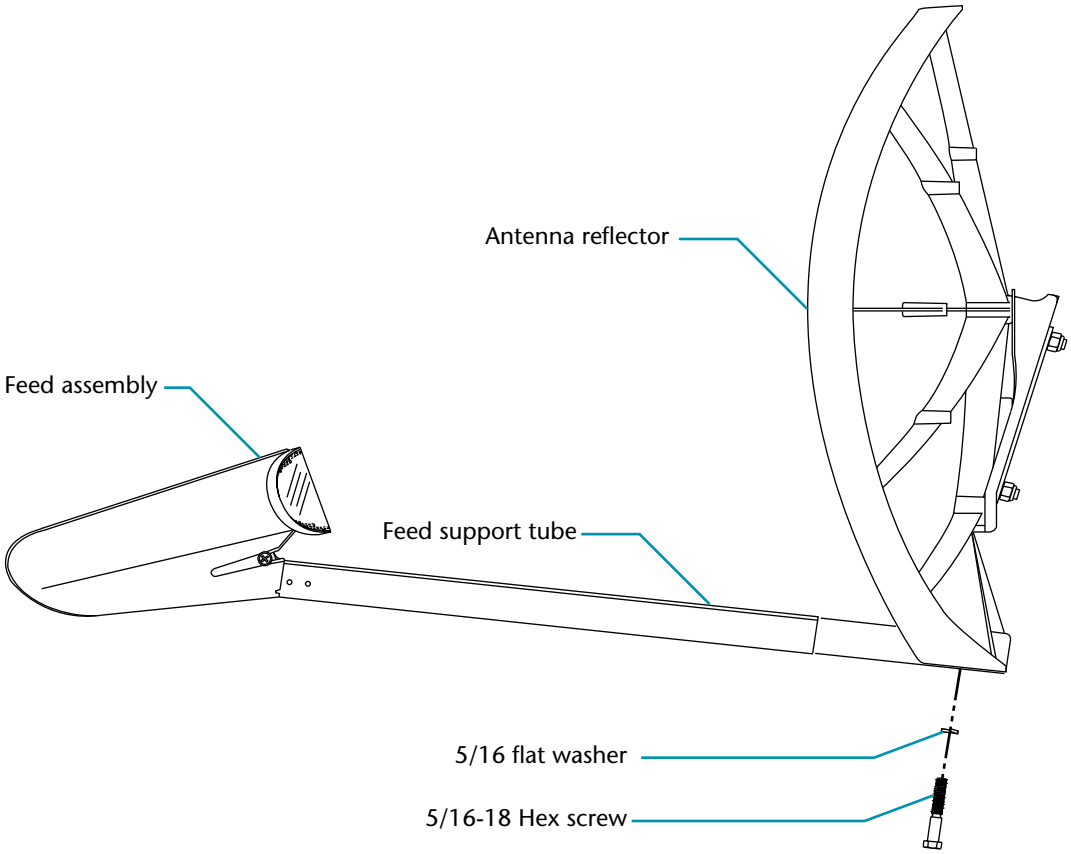


Figure 4-29. Installing feed assembly and feed leg onto antenna reflector

Feed assembly and feed support tube installation

Perform the following steps to install the feed assembly and feed support tube onto the antenna reflector. The feed support tube is keyed to assure that it will seat properly in the feed support socket.

1. Install the feed leg into the feed support socket on the antenna reflector (see figure 4-29).
2. Secure the feed leg with a 5/16 flat washer and 5/16-18 hex screw as shown in figure 4-29). Use a torque wrench to tighten the hex screw to 8 to 10 ft-lbs.

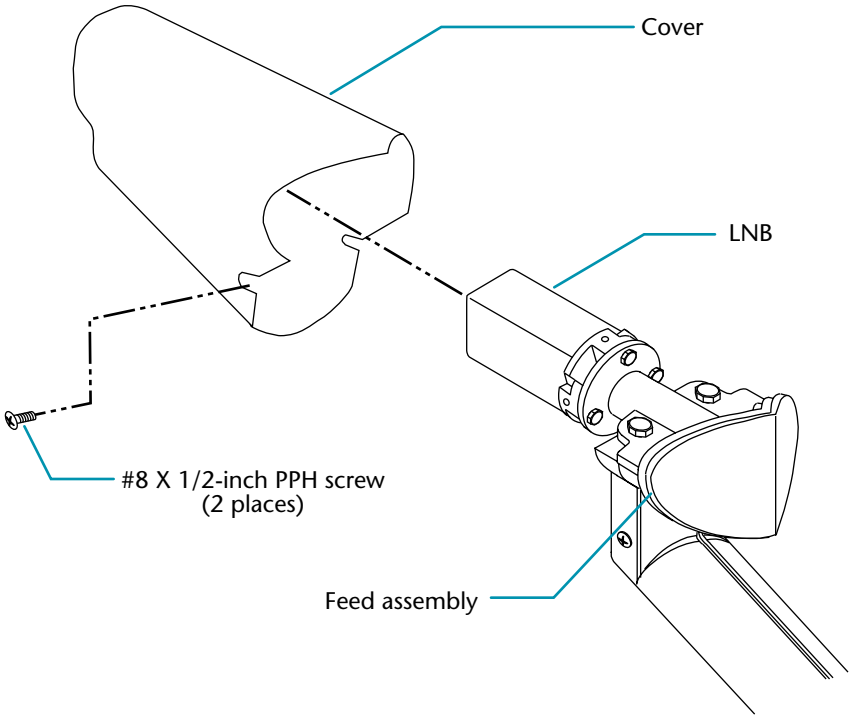


Figure 4-30. Removing cover from feed assembly

Installing the LNB cable onto the LNB

Perform the following steps to install the LNB cable onto the LNB.

1. Using a Phillips screwdriver, remove the two #8 X 1/2-inch PPH screws from the feed assembly cover (see figure 4-30).
2. Remove the feed assembly cover.
3. Route one end of the RG-6 coaxial cable from the back of the antenna reflector along the inside of the feed support tube until approximately 12 inches (30.5 cm) of cable extends from the top of the support tube.

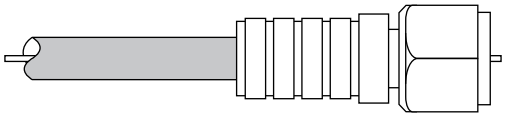


Figure 4-31. Weatherproof F-type connector

4. If the cable already has an F-type connector on it, go to step 5. Otherwise, install an F-type connector (see figure 4-31) onto the end of the cable.

Note: If the F-type connector you are using is not weatherproof, you need to use a coaxial cable sealant (COAX-SEAL or equivalent) to prevent moisture from seeping into the LNB from the coaxial connector. The copper-plated center conductor in the RG-6 cable can experience electrolytic corrosion at the LNB connector. Moisture and DC current cause this type of corrosion.

5. Install the coaxial cable onto the LNB connector (see figure 4-32).

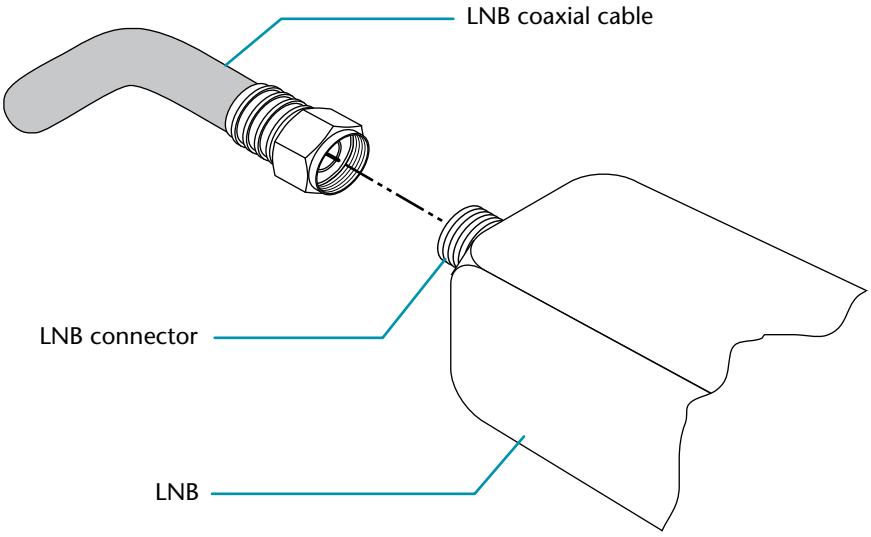
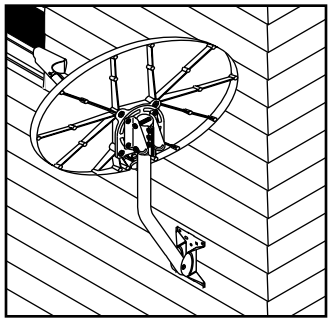
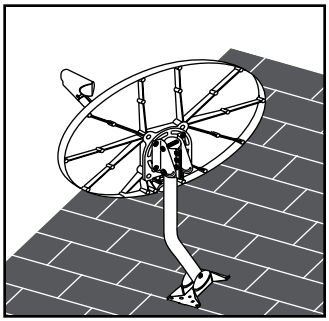


Figure 4-32. Installing LNB cable onto LNB connector

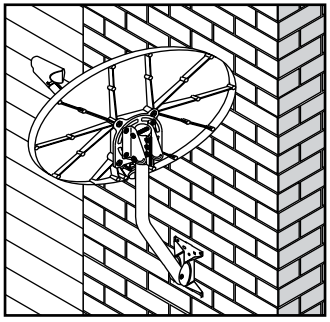
6. Install the feed assembly cover using the two M4 X 10-mm PPH screws removed in step 1.



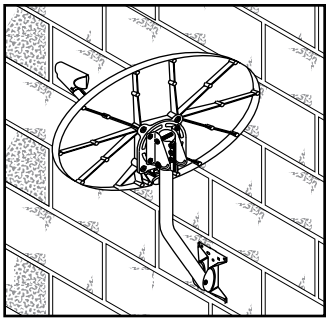
Installing the antenna on siding
(Do not install on vinyl or aluminum siding.)



Installing the antenna on a roof
(Do not mount the antenna on slate or shake shingles.)



Installing the antenna on a brick surface



Installing the antenna on a concrete block or masonry surface

Figure 4-33. Universal mount installation options

4.5 Installing the antenna using the universal mount

This section describes installing the antenna assembly onto a universal mount in a variety of mounting configurations as shown in figure 4-33.

- If you will be installing the antenna on siding, see sections “Assembly tools recommended,” and “Materials recommended” to prepare for the installation, then refer to section “Installing on wooden siding” to install the antenna.
- If you will be installing the antenna on a rooftop, see sections “Assembly tools recommended,” and “Materials recommended” to prepare for the installation, then refer to section “Installing on an asphalt-shingled wooden roof” to install the antenna.

- If you will be installing the antenna on a brick, concrete block, or masonry surface, see sections “Assembly tools recommended,” and “Materials recommended” to prepare for the installation, then refer to section “Installing on a brick or masonry surface” to install the antenna.

Read this section thoroughly before beginning system assembly. For best results in the assembly process, perform each step in the same sequence as listed in this manual.

WARNING

You can be seriously injured or *killed* if the antenna comes into contact with electric power lines. Verify that there are none nearby before performing the following procedure. Watch out for overhead power lines. Check the distance to the power lines before starting installation. We recommend that you stay a minimum of 20 feet (6 meters) from all power lines.

If any part of the antenna or mast assembly comes into contact with a power line, call your local power company. *Do not try to remove it yourself!* They will remove it safely.

WARNING

Before drilling into any wall, make sure that you locate and avoid hidden wiring, ducts, and plumbing pipes. Do not drill near electrical outlets.

WARNING

Local electrical codes and the National Electrical Code require the dish to be connected to a grounding electrode, even if the dish is mounted on a pole mount system does not satisfy the requirements of a grounding electrode. Therefore, always connect the dish to a proper ground electrode.

WARNING

For your own safety, follow these important safety rules:

- **Perform as many functions as possible on the ground.**
- **Do not use metal ladders.**
- **Do not install the antenna on a windy day.**
- **If you start to drop the antenna or mast assembly, get away from it and let it fall.**

WARNING

Assembling the dish antenna on a windy day can be dangerous. Because of the antenna surface, even slight winds create strong forces. For example, a 1.0-meter antenna facing a wind of 20 MPH (32 km/h) can undergo forces of 60 lbs. (269 N). Be prepared to safely handle these forces at unexpected moments.

Do not attempt to assemble, move, or mount a dish on windy days or serious, even fatal accidents may occur.

Assembly tools recommended

Have on hand the following tools:

- 3/8-inch electric drill
- 3/16-inch drill bit
- 7/16-inch open-end wrench
- 1/2-inch open-end wrench
- Ratchet wrench, 3/8-inch drive
- 1/2-inch socket, 3/8-inch drive (for 5/16-inch bolts)
- 7/16-inch socket, 3/8-inch drive (for 1/4-inch bolts)
- 3/8-inch masonry drill bit
- 3/4-inch masonry drill bit
- Bubble level
- Caulking gun
- Phillips screwdriver
- Torque wrench (up to 18 ft.-lbs.)

Materials recommended

Have on hand the following materials:

- RG-6 coaxial cable with F-type connectors, impedance: 75 ohms, shielding: minimum double shield (requires a minimum 100% foil shield covered with a 40% woven braid), outer cover: PVC (must be suitable for both indoor and outdoor use, length as required).
- Coaxial cable sealant (COAX-SEAL or equivalent) to prevent moisture from seeping into the LNB from the coaxial connector.
- Silicone sealant (Dow Corning 739 RTV Sealant, or equivalent) for sealing the cable where it enters the wall.
- A grounding rod and clamp (as required by the National Electrical Code and applicable local codes; refer to Appendix A "Electrical Grounding").

Installing on wooden siding

WARNING

Do not install the antenna near power lines.

Caution

Do not mount the antenna onto composite (also called particleboard or fiberboard) surfaces unless there is a wall stud located where you will be installing the mounting hardware. Composite materials are not strong enough to support the antenna during strong winds and other violent weather conditions.

1. Locate a wall stud onto which you can install the antenna base plate as shown in figure 4-34. Wall studs can most easily be found by looking for the line of nails that shows where the siding is attached to the building by using a stud finder (see figure 4-34).

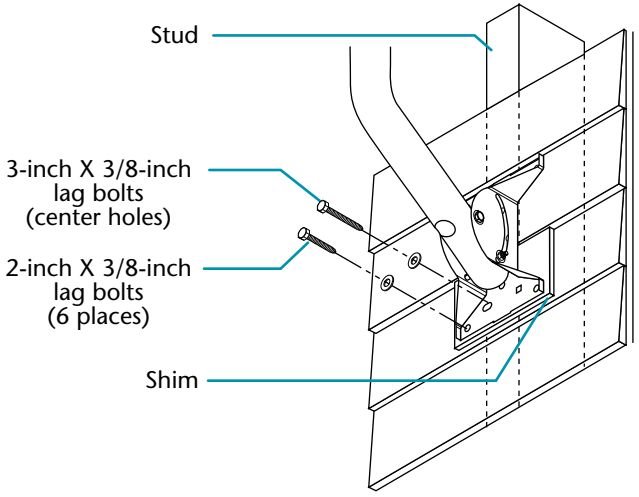


Figure 4-34. Using siding as the mounting surface

2. Place the base plate so the center holes align with the centerline of the stud (see figure 4-35). While holding the base plate in place, use a pencil to mark the location of the top center hole onto the mounting surface. This mark indicates where you will be drilling later.

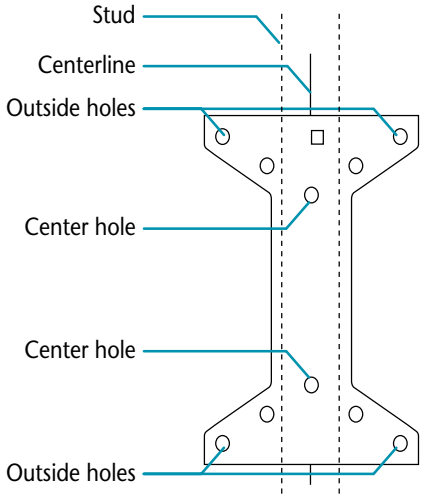


Figure 4-35. Base plate hole locations

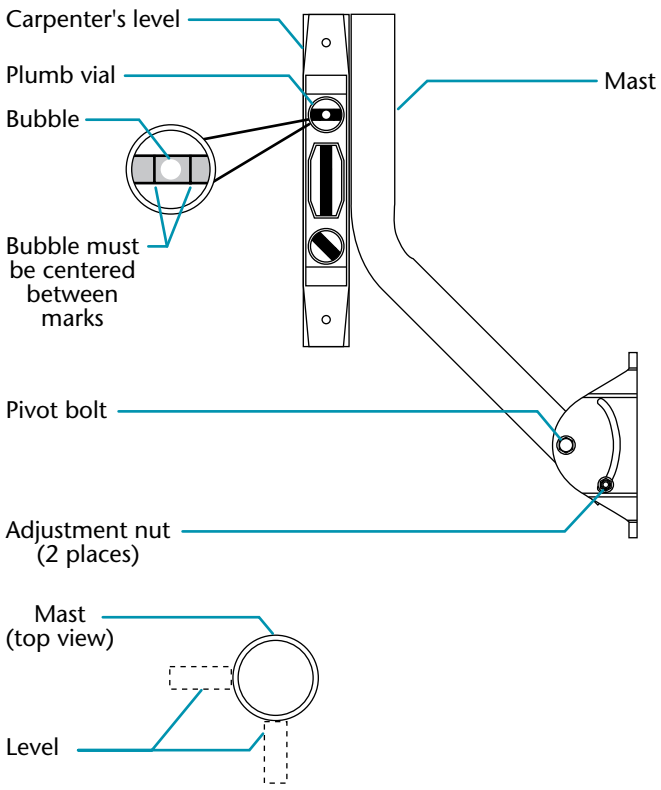


Figure 4-36. Verifying the mast is plumb

3. Using a carpenter's level, plumb the antenna mast in at least two different locations on the side of the mast, as shown in figure 4-36. These two measurements should be at right angles to each other.

   If the mast is plumb (aligned vertically with the bubble level), go to step 5. Otherwise, loosen the adjustment nuts (see figure 4-36).

4. Rotate the mast until it is plumb with the level, then use a torque wrench to tighten the adjustment nuts to 15 ft-lbs. If you are still unable to align the mast with the level, try using wooden shims. If they do not correct the problem, you will need to find another site to install the antenna.

5. Set the mast aside and drill a 3/16-inch X 3-inch pilot hole where you made the pencil mark.

6. Install the mast onto the mounting surface using a 3-inch X 3/8-inch lag bolt in the top center hole (see figure 4-37). Tighten the bolt enough to secure the base plate, but leave it loose enough to enable you to adjust the base plate.

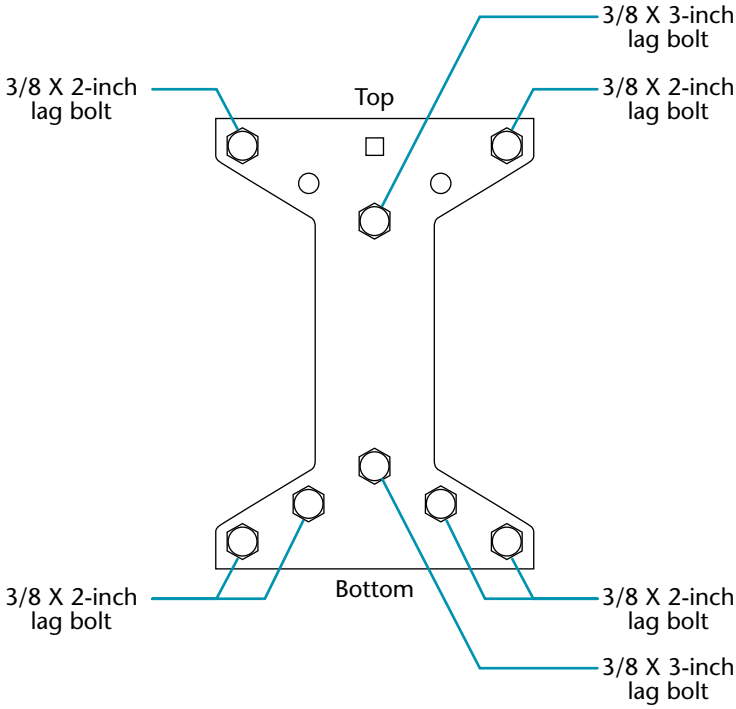


Figure 4-37. Installing the mounting lag bolts

7. Verify that the mast is still plumb and adjust if necessary.
8. Mark the locations of the outside holes and remaining center hole on the mounting surface.
9. Remove the base plate from the mounting surface.
10. Drill a 3/16-inch X 3-inch pilot hole for the lower center hole.
11. Drill four 3/16-inch X 2-inch pilot holes for the outside holes.

12. While holding the base plate in place, apply silicon sealant onto the six pilot holes and around the bottom edge of the base where it contacts the mounting surface (see figure 4-38). Doing so will prevent water from seeping into your house.

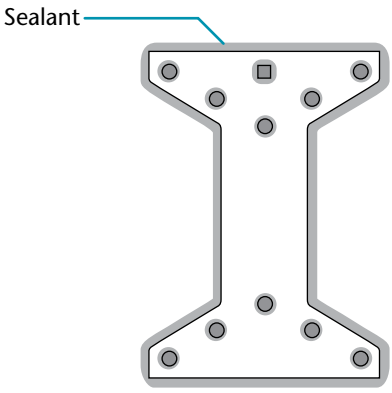


Figure 4-38. Applying sealant onto base plate

13. Install six 2-inch x 3/8-inch lag bolts into the outside holes on the base plate.
14. Install a 3-inch x 3/8-inch lag bolt into the bottom center hole on the base plate.
15. Tighten all bolts.
16. Apply additional silicon sealant to cover the tops of the lag bolts.

The base plate and mast are installed, go to section "Assembling and installing the reflector assembly"

Installing on an asphalt-shingled wooden roof

WARNING

Do not install the antenna near power lines.

1. At the location where you will be installing the universal mount, install two 2-inch X 6-inch pine boards between rafters underneath the plywood sheathing (see figures 4-39 and 4-40). Use 12 16d cement-coated nails as shown in figure 4-40.

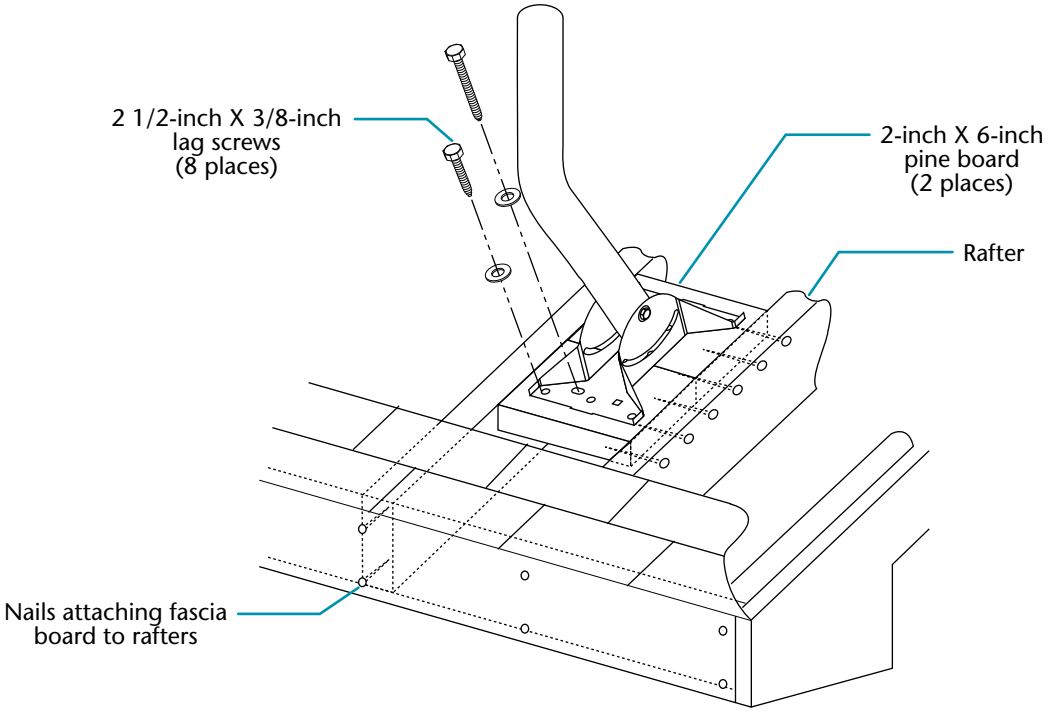


Figure 4-39. Using a roof as the mounting surface

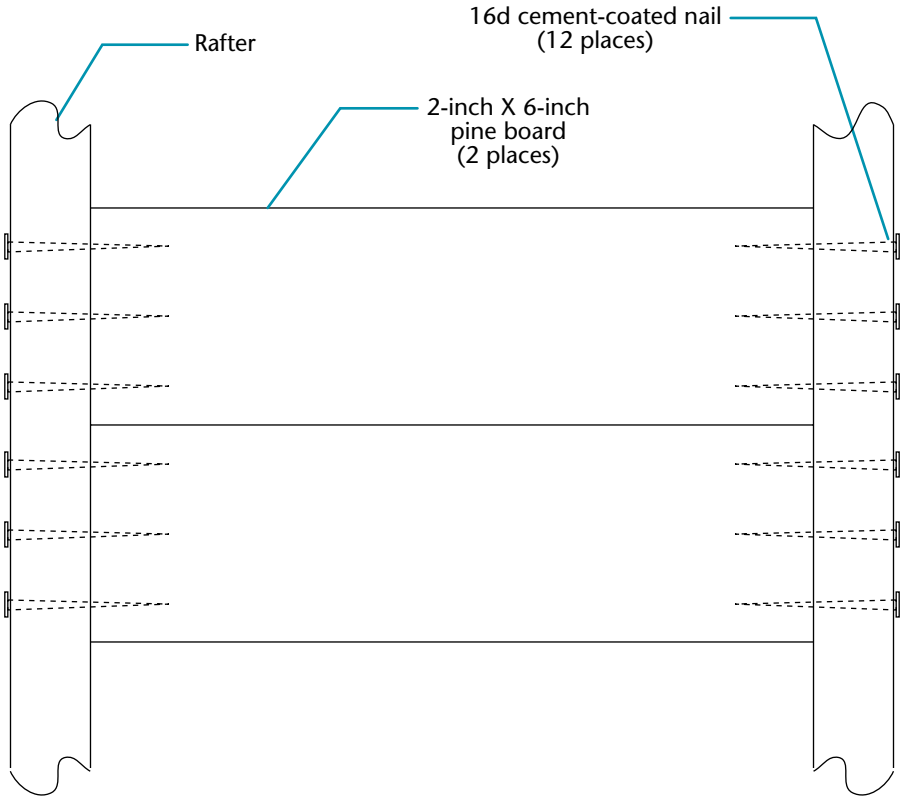


Figure 4-40. Installing the reinforcing boards

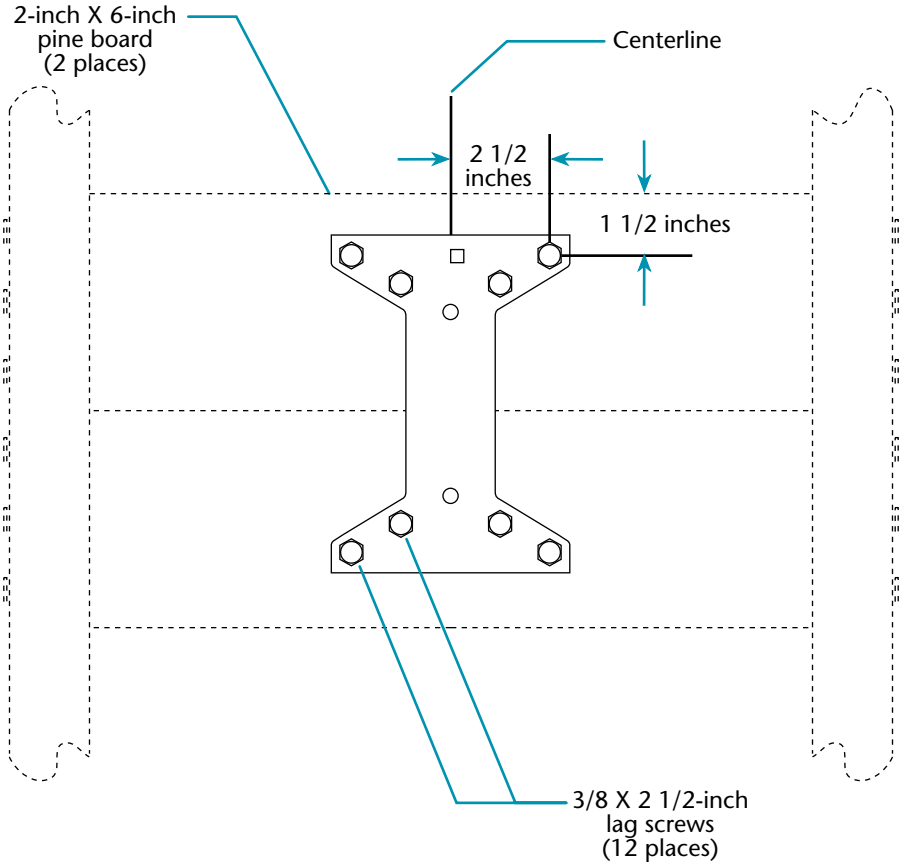


Figure 4-41. Installing the mounting lag screws

2. Find the centerline of the top reinforcing pine board (see figure 4-41). Mark a location that is approximately 2 1/2 inches over from the centerline and 1 1/2 inches down from the top of the board (see figure 4-41). This mark indicates where you will be drilling later.

3. Using a carpenter's level, plumb the antenna mast in at least two different locations on the side of the mast, as shown in figure 4-42. These two measurements should be at right angles to each other.

   If the mast is plumb (aligned vertically with the bubble level), go to step 5. Otherwise, loosen the adjustment nuts (see figure 4-42).

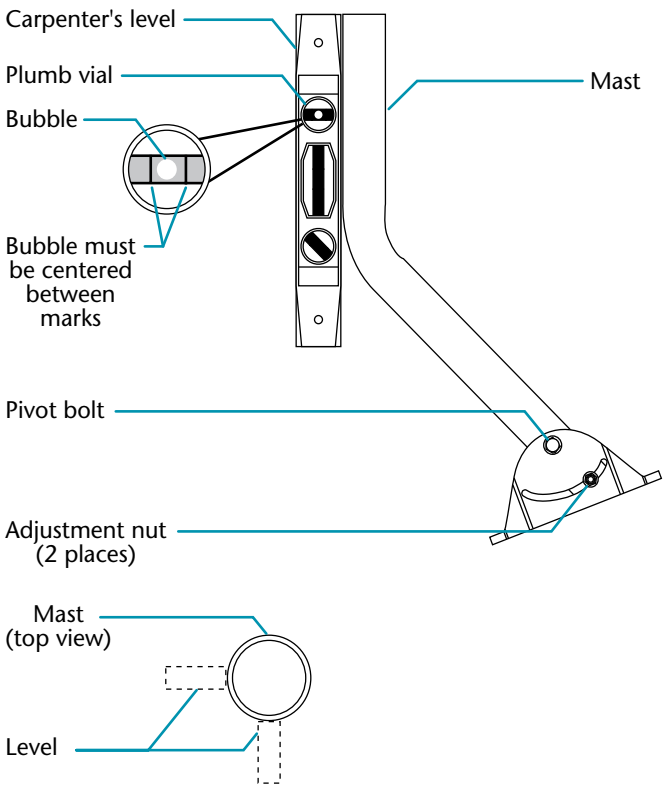


Figure 4-42. Verifying the mast is plumb

4. Rotate the mast until it is plumb with the level, then use a torque wrench to tighten the adjustment nuts to 15 ft-lbs. If you are still unable to align the mast with the level, try using wooden shims. If they do not correct the problem, you will need to find another site to install the antenna.
5. From underneath the roof, drill a 3/16-inch X 2 1/2-inch pilot hole where you made the pencil mark.
6. Install the mast onto the mounting surface using a 2 1/2-inch X 3/8-inch lag screw in the top right hole (see figure 4-42). Tighten the screw enough to secure the base plate, but leave it loose enough to enable you to adjust the base plate.
7. Verify that the mast is still plumb and adjust if necessary.
8. Using the base plate as a template, drill seven 3/16-inch X 2 1/2-inch pilot holes through the top

surface of the roof into the reinforcing boards (see figure 4-42).

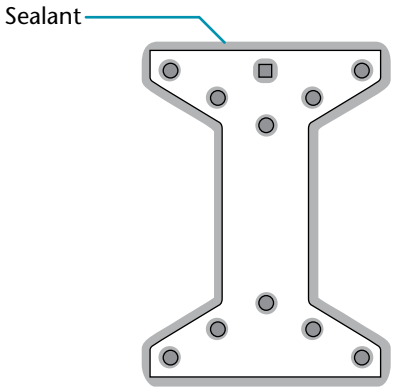


Figure 4-43. Applying sealant onto base plate

9. While holding the base plate in place on the roof, apply silicon sealant onto the eight pilot holes and around the bottom edge of the base where it contacts the mounting surface (see figure 4-43). Doing so will prevent water from seeping into your house.
10. Install seven 2 1/2-inch x 3/8-inch lag screws into the holes on the base plate.
11. Tighten all screws.
12. Apply additional silicon sealant to cover the tops of the lag screws.

The base plate and mast are installed, go to section "Assembling and installing the reflector assembly"

Installing on a brick or masonry surface

WARNING

Do not install the antenna near power lines.

1. Select a flat and secure site to install the antenna base plate.
2. Place the base plate so the outside holes are positioned over the surface.

Note: If you are installing the mast onto a brick surface, do not drill into the mortar between the bricks.

3. Using a carpenter's level, plumb the antenna mast in at least two different locations on the side of the mast, as shown in figure 4-44. These two measurements should be at right angles to each other.

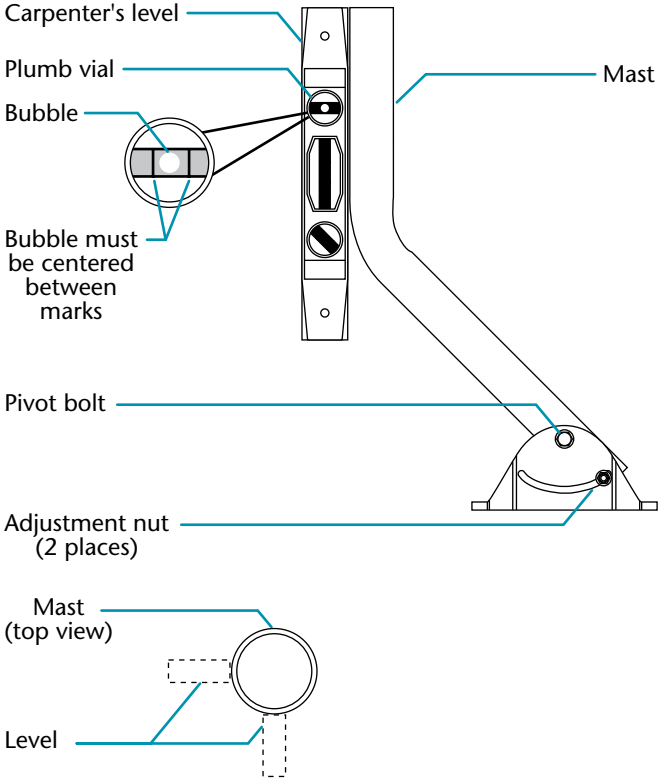


Figure 4-44. Verifying the mast is plumb

If the mast is plumb (aligned vertically with the bubble level), go to step 5. Otherwise, loosen the alignment nuts (see figure 4-44).

4. Rotate the mast until it is plumb with the level, then use a torque wrench to tighten the adjustment nuts to 15 ft-lbs. If you are still unable to align the mast with the level, try using wooden shims. If they do not correct the problem, you will need to find another site to install the antenna.

5. Use a pencil to mark the location of the top left outside hole of the base plate (see figure 4-45) onto the surface.

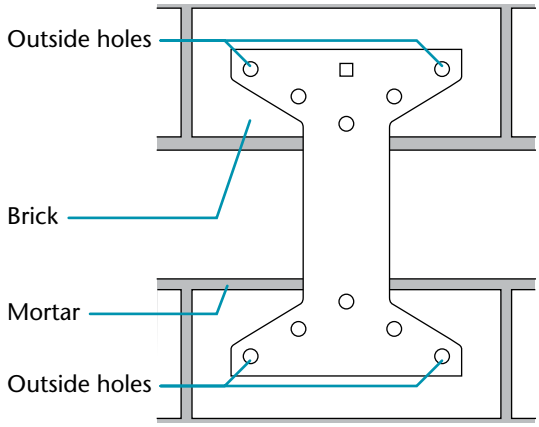


Figure 4-45. Base plate hole locations

6. Set the mast aside and use a masonry bit to drill a 3/8-inch X 2 1/2-inch pilot hole where you made the pencil mark.
7. Drill a 3/4-inch X 2 1/2-inch hole where you made the pilot hole.
8. Clean out the hole and insert a 3/8-16 double-expansion anchor. The anchor should fit snugly, so you may have to use a hammer to gently tap the anchor until it is flush with the brick surface (see figure 4-46).

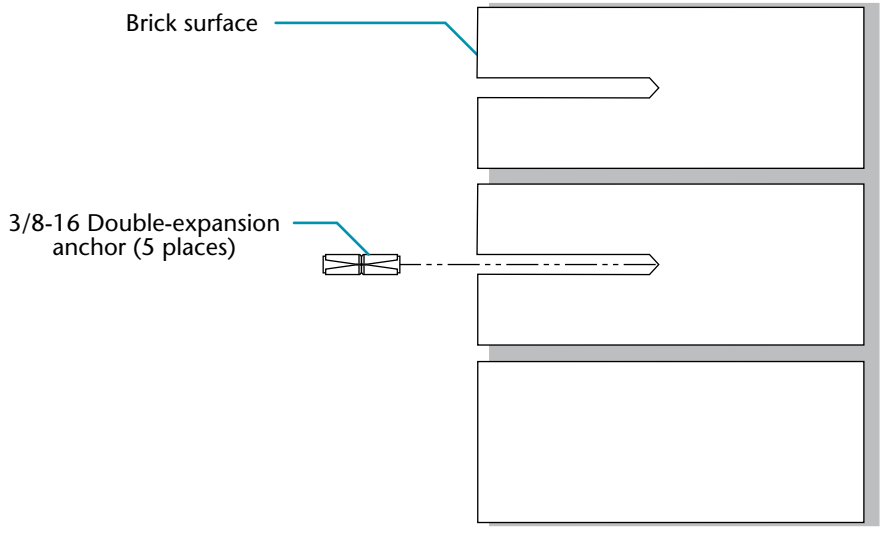


Figure 4-46. Installing an expansion anchor

9. Install the mast onto the mounting surface using a 2 1/4 inch X 3/8-16 machine screw (see figure 4-47). Tighten the screw enough to secure the base plate, but leave it loose enough to enable you to adjust the base plate.

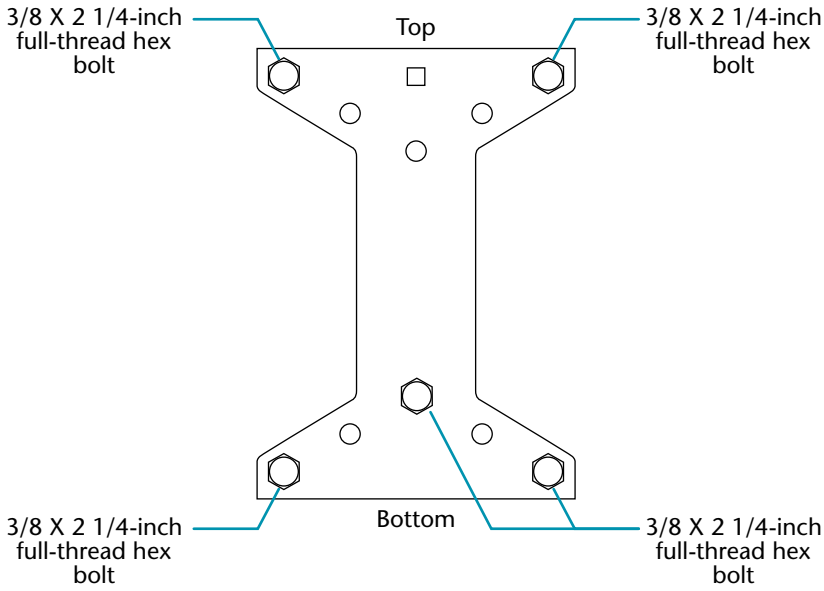


Figure 4-47. Installing the mounting lag bolts

10. Verify that the mast is still plumb and adjust if necessary.
11. Mark the locations of other three outside holes on the mounting surface.
12. Remove the base plate from the mounting surface.
13. Drill three 1/2-inch X 3-inch holes for the outside holes.
14. Install the base plate using the 2 1/4-inch X 3/8-16 full thread hex bolts.
15. Tighten the bolts.

The base plate and mast are installed, go to section "Assembling and installing the reflector assembly"

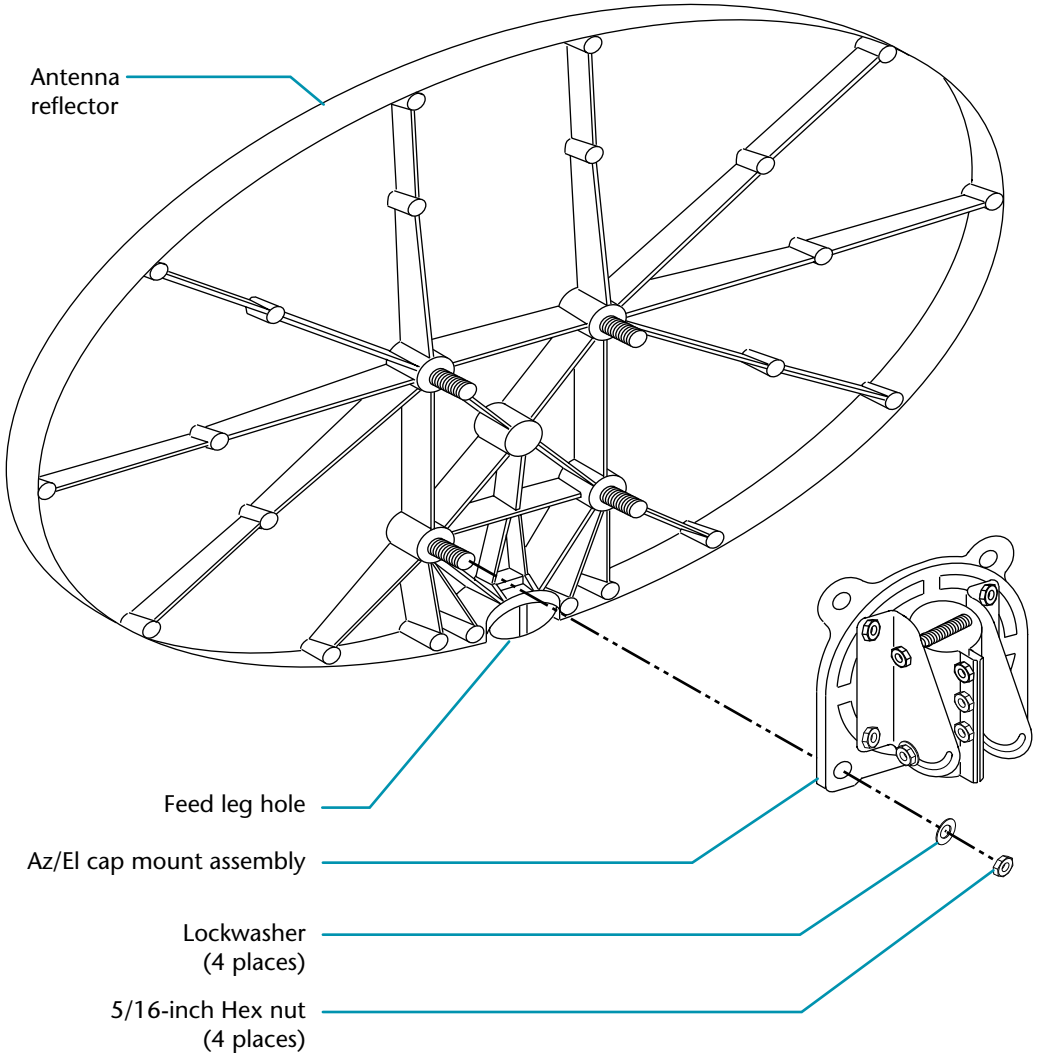


Figure 4-48. Assembling antenna reflector onto AZ/EL cap mount

Assembling antenna reflector to AZ/EL cap mount

Perform the following steps to assemble the antenna reflector onto the azimuth/elevation (AZ/EL) cap mount.

1. Insert the four threaded studs on back of antenna reflector through corresponding holes on AZ/EL cap mount assembly (see figure 4-48).

Caution

Verify that feed leg hole is oriented downward as shown in figure 4-48.

2. Install four lock washers and M8 hex nuts onto threaded studs. Tighten and torque hex nuts to 18 ft.-lbs. (24 N-m).

Assembling antenna/cap mount onto mast

Perform the following steps to assemble the antenna/cap mount onto the NPM mast.

Note: Do not remove the abrasive pad from inside the cap mount assembly; it remains as a part of the assembly.

1. Lift antenna/cap mount assembly and slide AZ/EL cap mount onto mast tube (see figure 4-49). Face of antenna should be parallel to front of base.

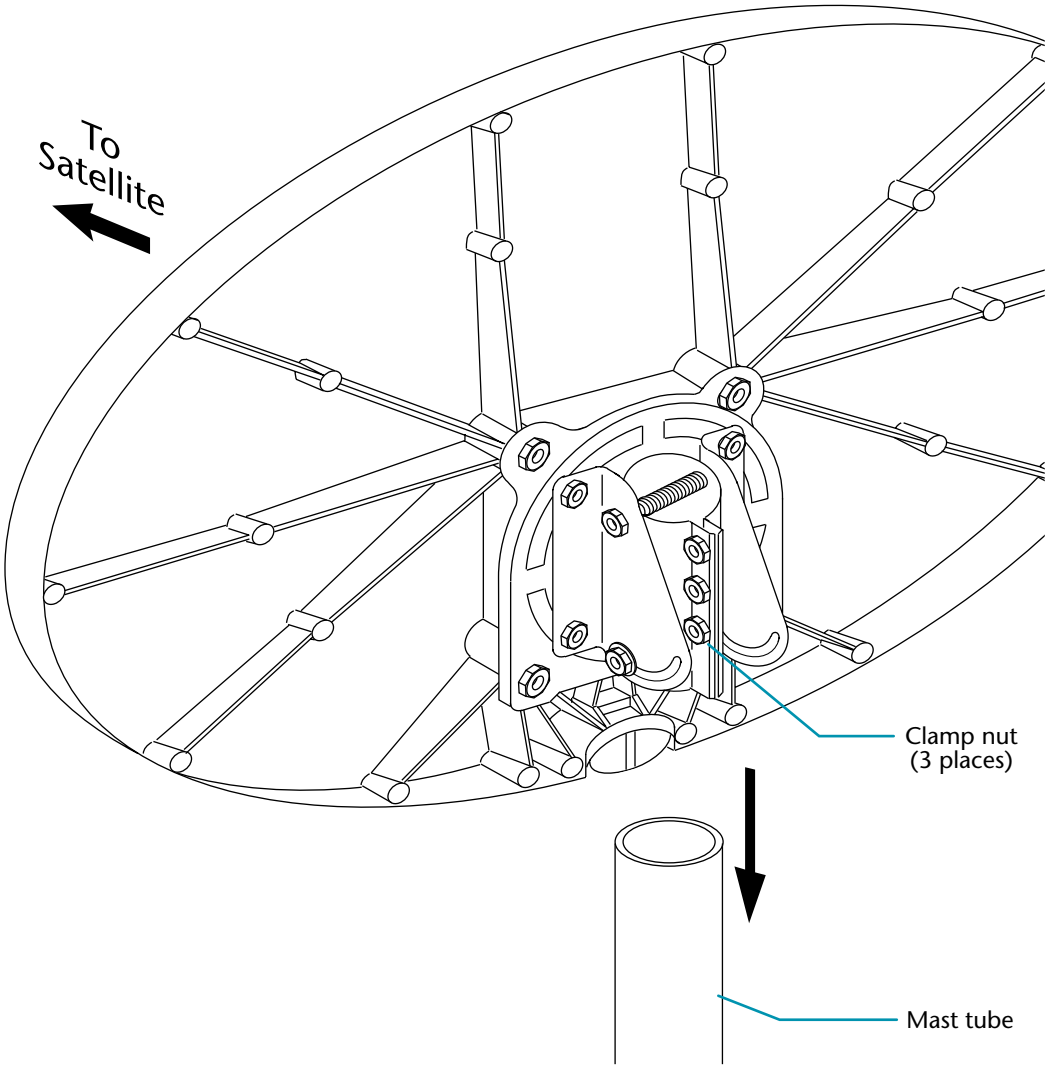


Figure 4-49. Installing antenna/cap mount assembly onto mast

2. Tighten M8 clamp nuts so that the antenna/cap mount assembly is held stationary on mast but can be swiveled with slight pressure.

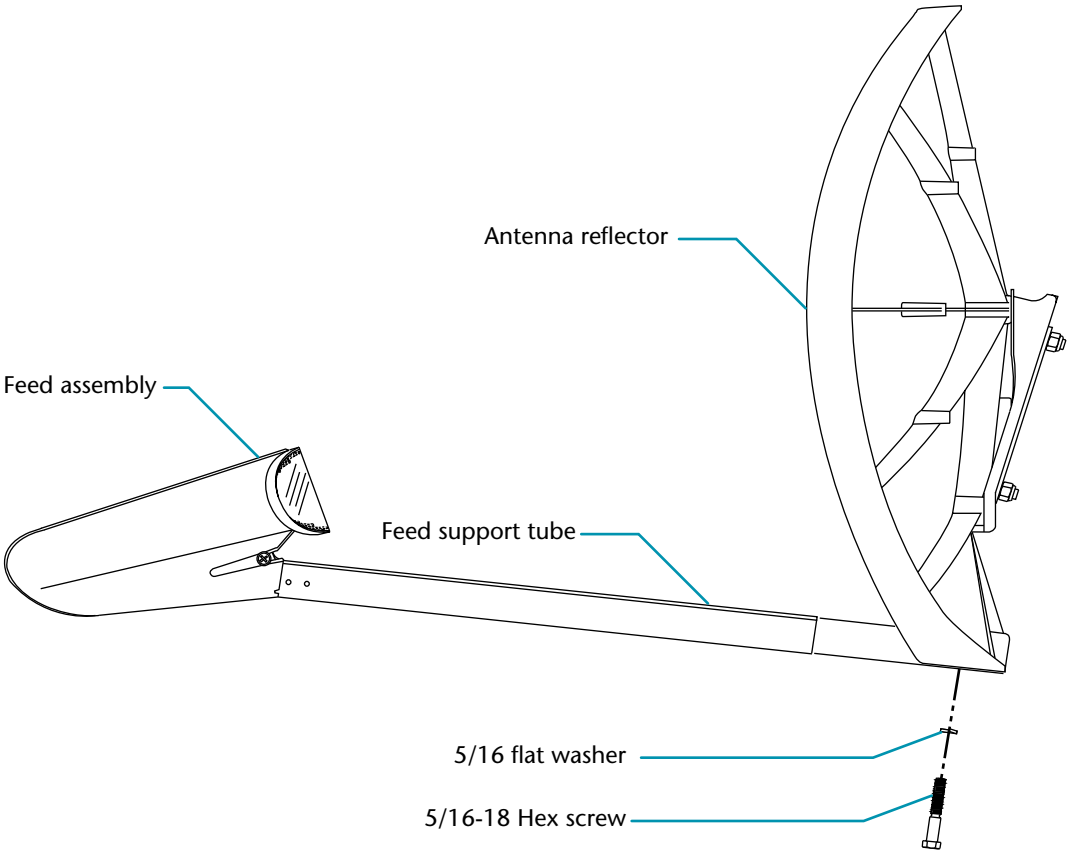


Figure 4-50. Installing feed assembly and feed support tube onto antenna reflector

Feed assembly and feed support tube installation

Perform the following steps to install the feed assembly and feed support tube onto the antenna reflector. The feed support tube is keyed to assure that it will seat properly in the feed support socket.

1. Install the feed leg into the feed support socket on the antenna reflector (see figure 4-50).
2. Secure the feed leg with a 5/16 flat washer and 5/16-18 hex screw as shown in figure 4-50). Use a torque wrench to tighten the hex screw to 8 to 10 ft-lbs.

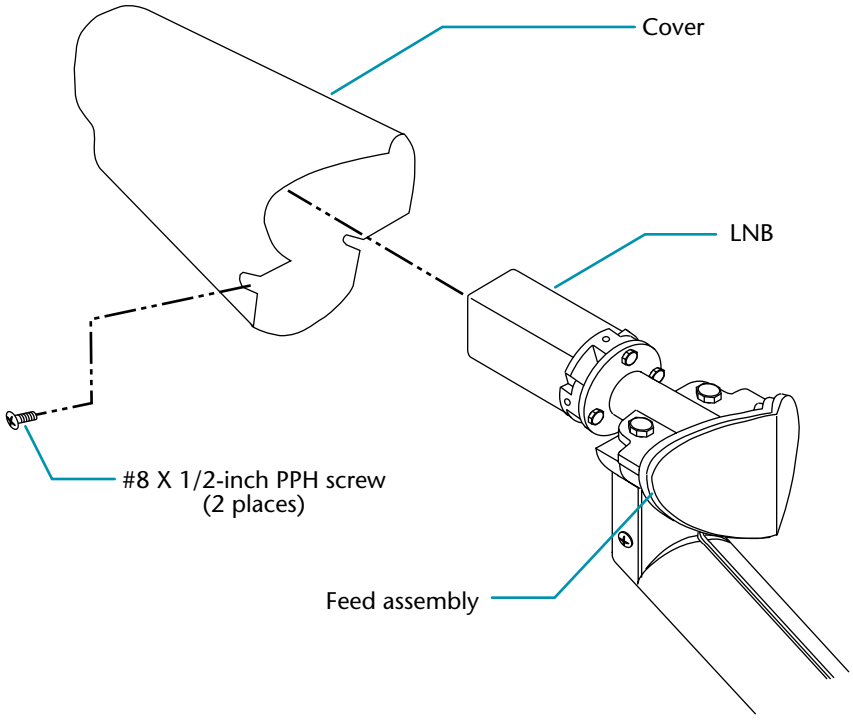


Figure 4-51. Removing cover from feed assembly

Installing the LNB cable onto the LNB

Perform the following steps to install the LNB cable to the LNB.

1. Using a Phillips screwdriver, remove the two #8 X 1/2-inch PPH screws from the feed assembly cover (see figure 4-51).
2. Remove the feed assembly cover.
3. Route one end of the RG-6 coaxial cable from the back of the antenna reflector along the feed leg until approximately 12 inches (30.5 cm) of cable extends from the top of the leg. Tie the cable in place.

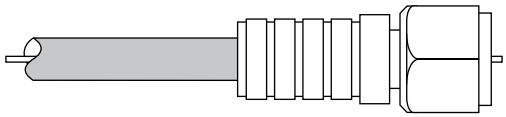


Figure 4-52. Weatherproof F-type connector

4. If the cable already has an F-type connector on it, go to step 5. Otherwise, install an F-type connector (see figure 4-52) onto the end of the cable.

Note: If the F-type connector you are using is not weatherproof, you need to use a coaxial cable sealant (COAX-SEAL or equivalent) to prevent moisture from seeping into the LNB from the coaxial connector. The copper-plated center conductor in the RG-6 cable can experience electrolytic corrosion at the LNB connector. Moisture and DC current cause this type of corrosion.

5. Install the coaxial cable onto the LNB connector (see figure 4-53).

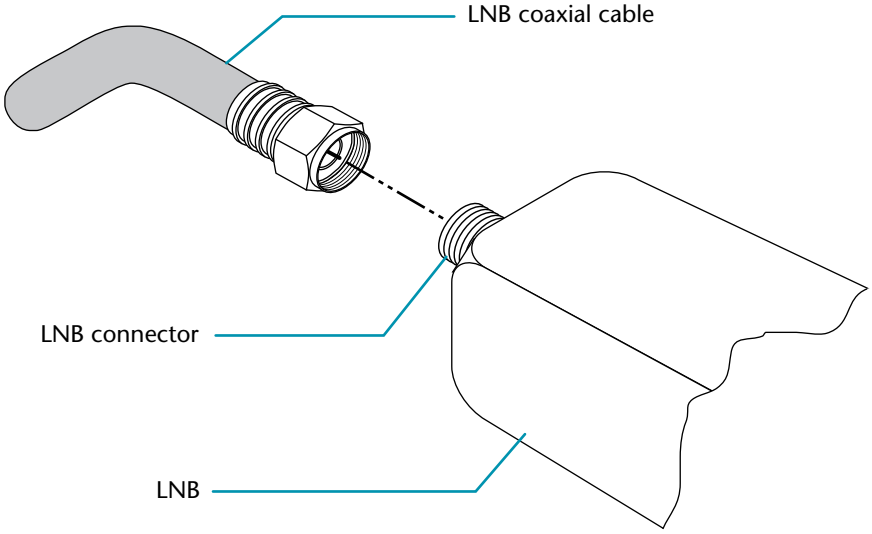


Figure 4-53. Installing LNB cable onto LNB connector

6. Install the feed assembly cover using the two #8 X 1/2-inch PPH screws removed in step 1.
7. Verify that the feed cover is positioned with the two drain holes facing the ground.

The antenna is installed. Refer to section 4.6, “Installing the LNB cable,” for information on routing the LNB cable to the building and installing it.

4.6
Installing the LNB cable

This section describes routing and installing the LNB cable. Depending on the routing of the LNB cable, you may choose to use a cable that can be buried. When normal coaxial cable is buried, its outer cover decays in the soil, and the cable's life is shortened. Cables that are suitable for burial use a special outer cover that resists breakdown. Some of these cables also have a special coating on their ground shields. This coating resists corrosion if water gets into the cable. Anytime the LNB cable is buried, use cable that is suitable for burial. It will prevent problems in the future.

An important goal of your cable installation is to protect the cable from physical damage and moisture penetration. To protect the cable from physical damage, secure it to walls or another stable surface with cable clamps. This prevents the cable from sagging and being damaged by people stepping on it or running over it with yard equipment. Prevent moisture penetration by using weatherproof connectors, or by sealing any connection that is exposed to the elements. Drip loops provide a connection with additional protection by preventing moisture from traveling down the cable and entering the connection, as shown in figure 4-54.

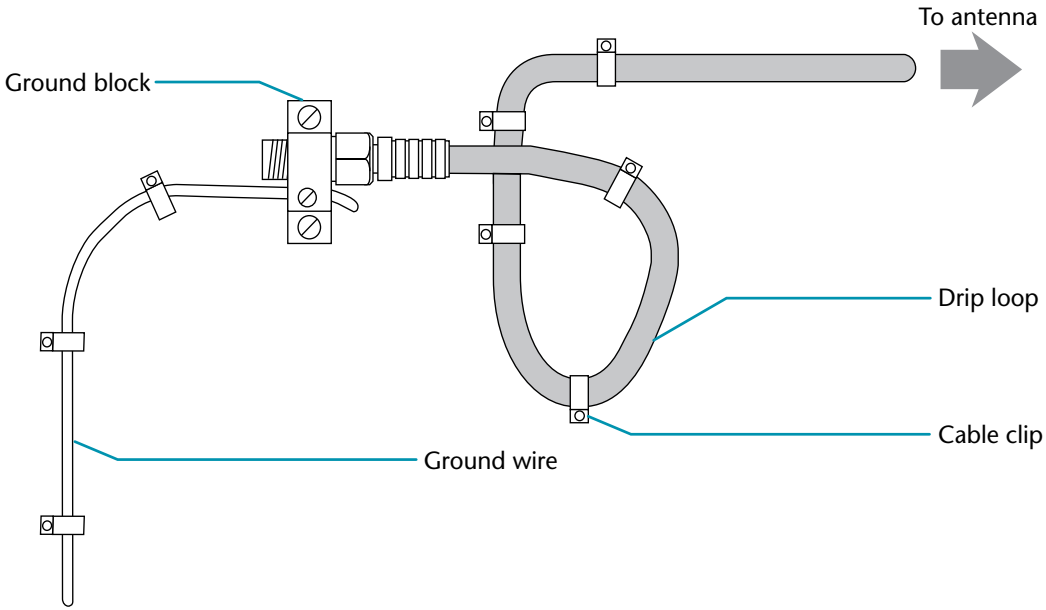


Figure 4-54. Installing the LNB cable

1. Select the location of the ground block. Remember to allow a short and straight route for the ground conductor to the grounding electrode.

WARNING

Verify before you drill that there are no wires or pipes near where you will be drilling

2. Secure the grounding block to a stable mounting surface with two screws.

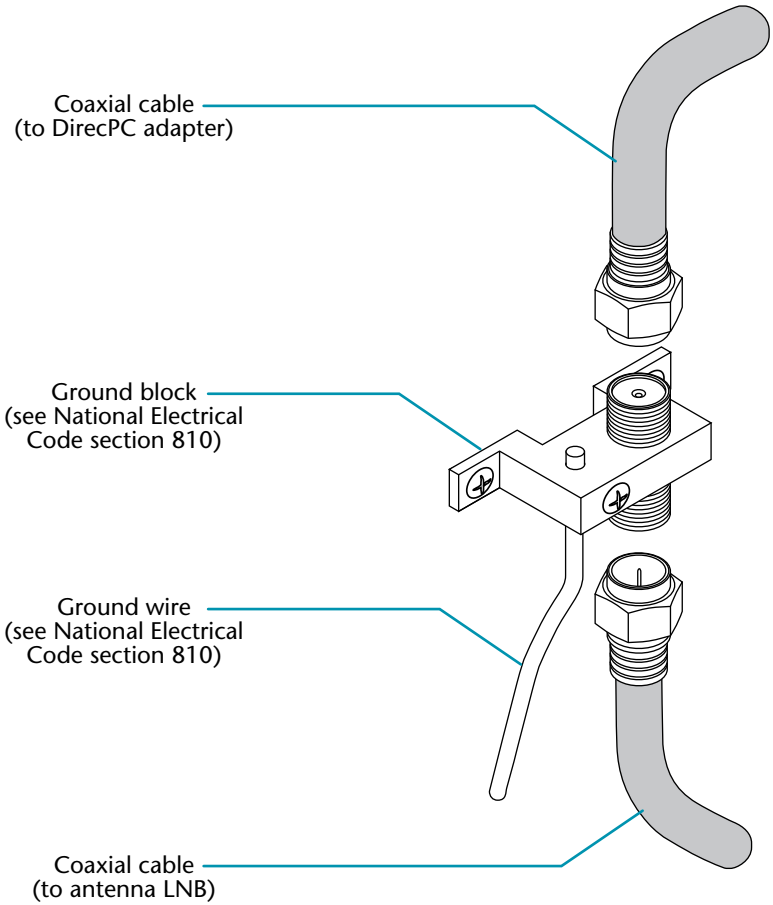


Figure 4-55. Installing cables onto the grounding block

3. Connect the remaining end of the LNB cable to the grounding block (see figure 4-55).

4. Secure the cable with cable clips. Do not forget to form the drip loop and secure it with cable clips.
5. Install the ground conductor on the ground terminal of the ground block.
6. Route the ground conductor to one of the following grounding electrodes:
   - Grounded interior metal water piping (cold water)
   - Ground rod (must be driven at least 8 feet into the ground)
   - Grounded metallic service raceway
   - Grounded electrical service equipment enclosure

   Refer to appendix A, "Electrical Grounding," for grounding information
7. Connect the ground conductor to the grounding electrode. Use a copper grounding conductor if it is routed under ground. Remember to secure the cable to a wall or some surface to protect it.

4.7 Attaching the LNB cable to the DirecPC adapter

During this step of the installation, route the LNB cable from the ground block to the DirecPC adapter. In most installations, there is more than one way to get the LNB cable to the adapter from the grounding block. If the adapter is located near an inside wall, use the crawl, basement, or attic spaces. When routing the LNB cable to the adapter, take the shortest possible path and always protect it from physical damage.

WARNING

Verify that there are no wires or pipes in the area of the hole where you plan to drill to enter the building

1. After verifying that there are no wires or pipes blocking the location you want to feed the coax into the building, drill a 1/2 inch hole.

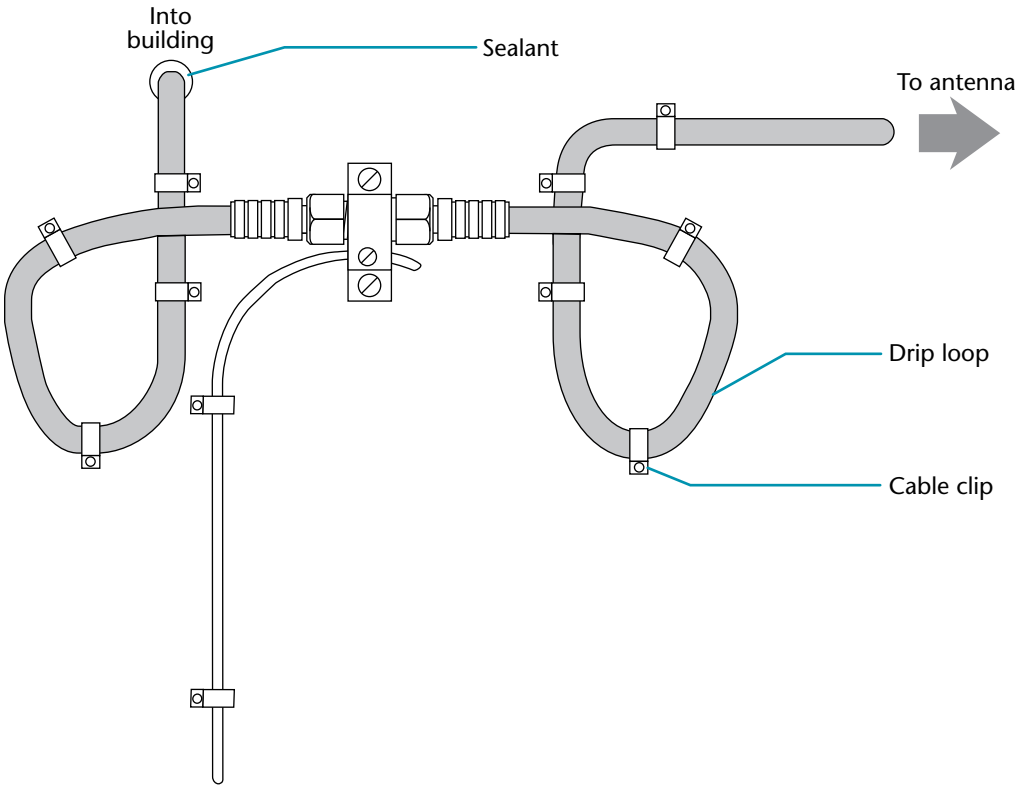


Figure 4-56. LNB cable installation

2. Connect one end of the cable to the ground block (see figure 4-56).
3. Form a 3-inch to 5-inch drip loop in the cable before inserting it in the access hole.
4. Secure the drip loop and cable to the wall with cable clips.
5. Inside the building, route the cable to the computer. Depending on the installation site, this could be through a floor or wall, directly to the rear of the computer. If the cable goes straight through a wall, you can use a wall plate at the access point.
6. Install the cable onto the adapter cable connector.
7. Seal the access point into the building with silicone sealant.

CHAPTER

5

Registering your system and fine-aligning the antenna

This chapter provides instructions for registering your system with the DirecPC operations center and describes how to accurately point the antenna reflector at the satellite. Alignment is critical to the operation of the DirecPC system. When the reflector is pointed directly at the satellite, the adapter receives a strong signal. If the reflector is not positioned properly, the signal may be weak with errors resulting during data transfers. This signal quality would become worse on cloudy, windy, or rainy days.

5.1 Registering your system

To receive the DirecPC service, contact the DirecPC Operations Center at **1-800-DIRECPC** (**1-800-347-3272**) to register your system and open an account. The Customer Care Center engineers will provide you with the information required to configure the Turbo Internet, Package Explorer, and Multimedia DataPipe services.

Have the DirecPC adapter serial number available when you contact the assistance center. After you have registered, refer to section 5.2, "Determining your site's azimuth, elevation, and polarization."

5.2 Determining your site's azimuth, elevation, and polarization

During this procedure, we use a hypothetical site in Germantown, Maryland as an example. You should change the data used in this example for the data that matches your location.

For Germantown, Maryland, the following data applies:

- Satellite longitude: 99 degrees West
- Site Longitude: 77.16 West
- Site Latitude: 39.11 North

The calculated results are:

- Elevation: 39.4 degrees, rounded off to 39 degrees
- Azimuth: 220.4 degrees (magnetic azimuth), rounded off to 220 degrees
- Polarization: 24.5 degrees, rounded off to 25 degrees

Use the magnetic azimuth value when reading your compass while establishing the antenna target.

Tools for the alignment procedure

A variety of tools are always handy but the essential tools for alignment are:

- 13-mm wrench

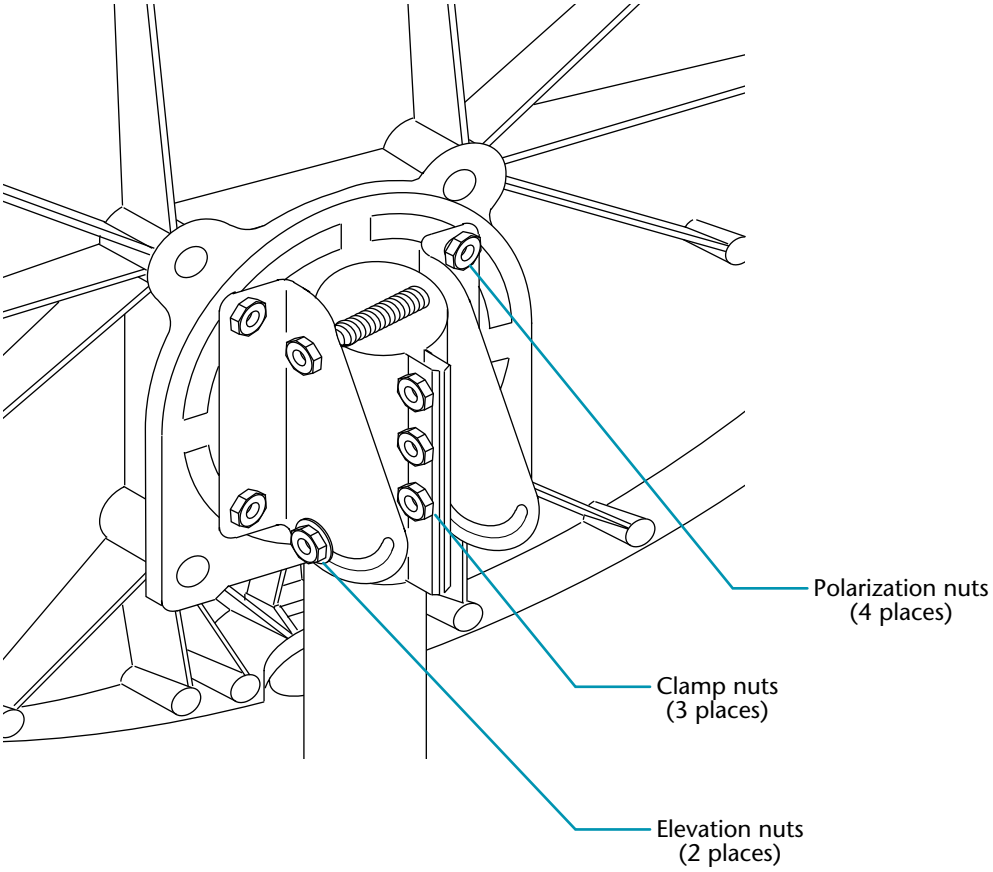


Figure 5-1. Reflector alignment hardware

Preparing the antenna for alignment

1. Loosen the four polarization nuts (see figure 5-1) so the antenna can be turned with slight pressure, (a loose, wobbly reflector affects proper pointing of the antenna).

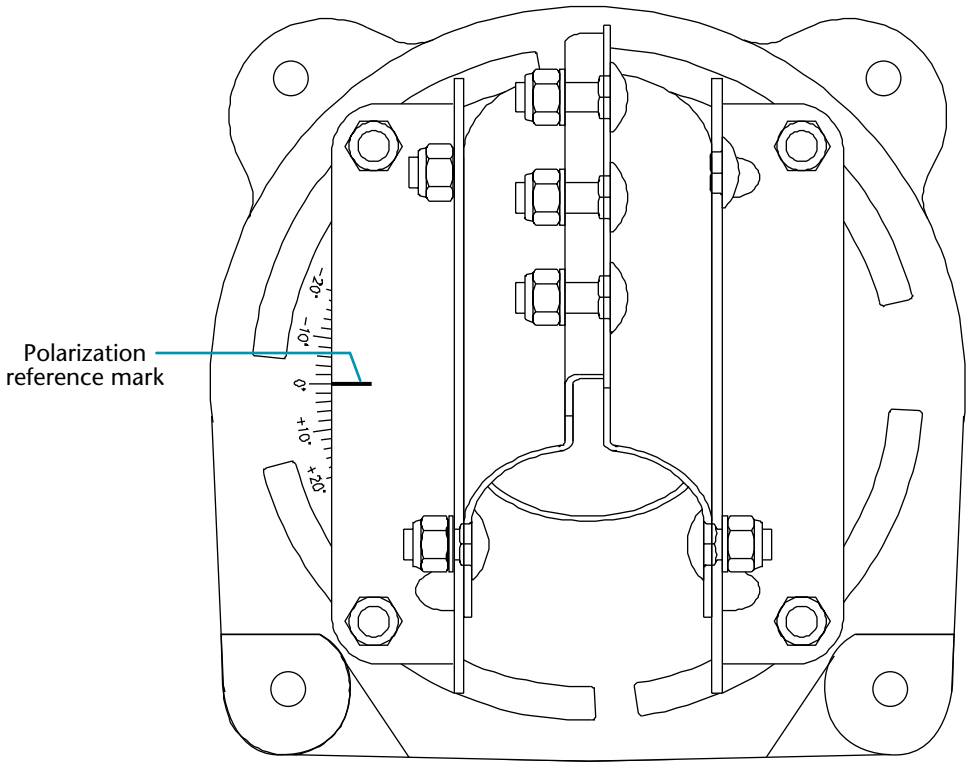


Figure 5-2. Polarization adjustment

2. Rotate the antenna reflector until the appropriate polarization value on the polarization scale is aligned with the polarization reference mark (see figure 5-1). (In our example the setting would be 25 degrees). Tighten the polarization nuts.
3. Loosen the clamp bolts on the AZ/EL cap mount assembly that secure it to the mast tube (see figure 5-1). Loosen these bolts just enough to allow the antenna to move smoothly on the mast.

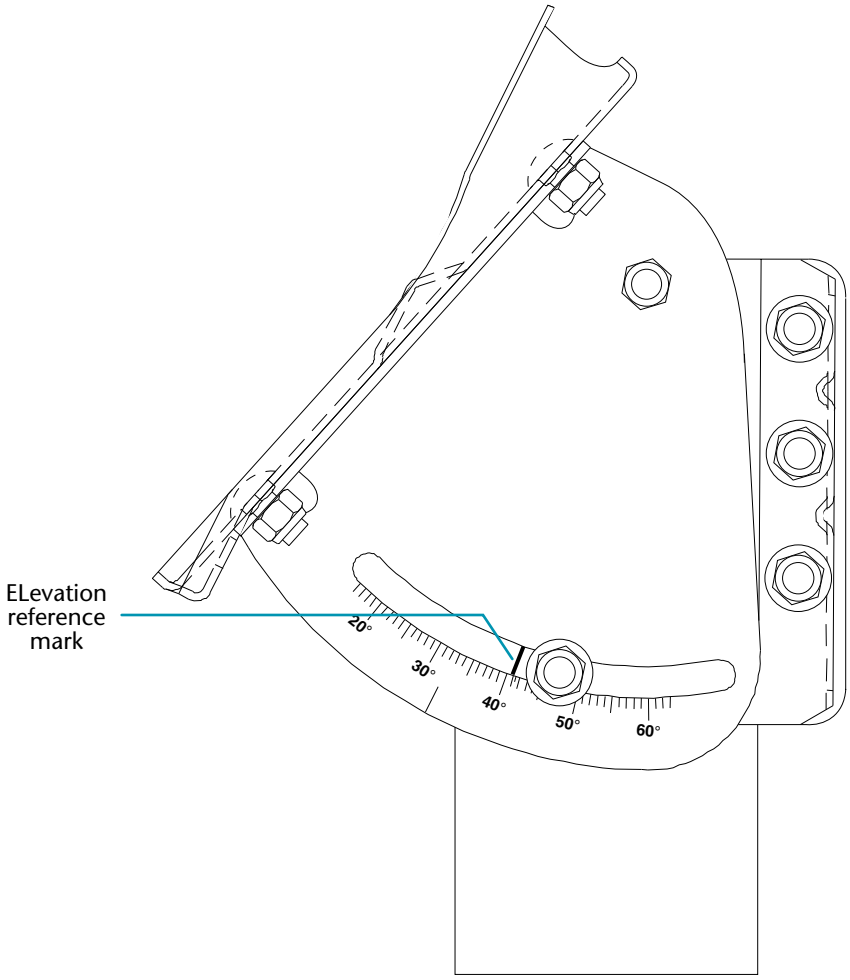


Figure 5-3. Elevation adjustment

4. Loosen the two elevation pivot bolts and the two elevation locking bolts on either side of the AZ/EL cap mount assembly. Loosen these bolts enough to allow smooth movement of the mount assembly during the elevation adjustment.

Establish the antenna elevation target

The azimuth and elevation values calculated by the Antenna Pointing software are accurate enough to allow you to acquire the satellite on the first try if your alignment tools are precise enough. Unfortunately, a variety of factors (such

as, compass errors caused by nearby metal, the antenna mast not being completely plumb, etc.) reduce the likelihood that you will find the satellite when you set the antenna to the calculated values. To take this into account, the following procedure describes using the elevation scale stamped in the AZ/EL cap mount to establish an elevation window 10 degrees wide, within which you will find the satellite.

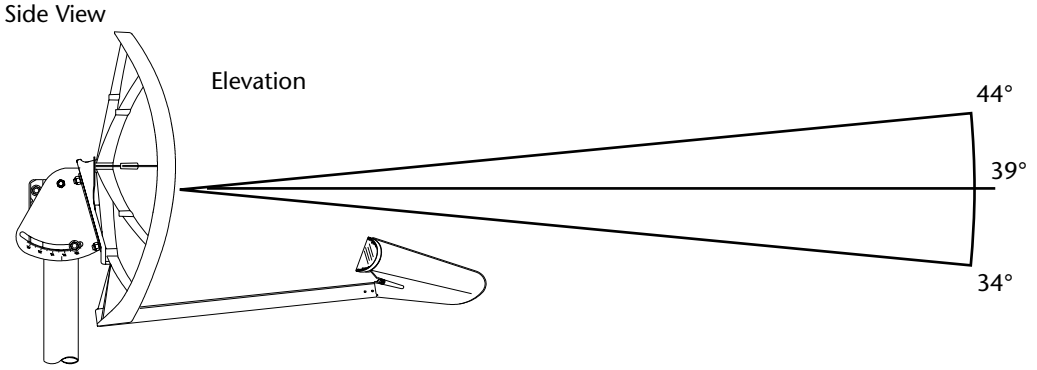


Figure 5-4. Elevation and azimuth pointing windows

1. Determine the azimuth and elevation window ranges. In our example, magnetic azimuth is 220 degrees and elevation is 39 degrees. The azimuth window is within 215 to 225 (220 ± 5) degrees and the elevation window is within 34 to 44 (39 ± 5) degrees (see figure 5-4).
2. Rotate the antenna in elevation until the elevation scale pointer reaches 5 degrees below the calculated elevation that the software provided. In our example (see figure 5-4), this value is 34 degrees (5 degrees below the calculated value of 39 degrees). Tighten the elevation nuts.
3. Rotate the antenna in azimuth until the antenna is pointed at the calculated magnetic azimuth bearing (in our example, this value would be 220 degrees). Use a pencil to mark the location of alignment mark (see figure 5-5) onto the mast. This mark will be referred to as the *center mark* (see figure 5-6).

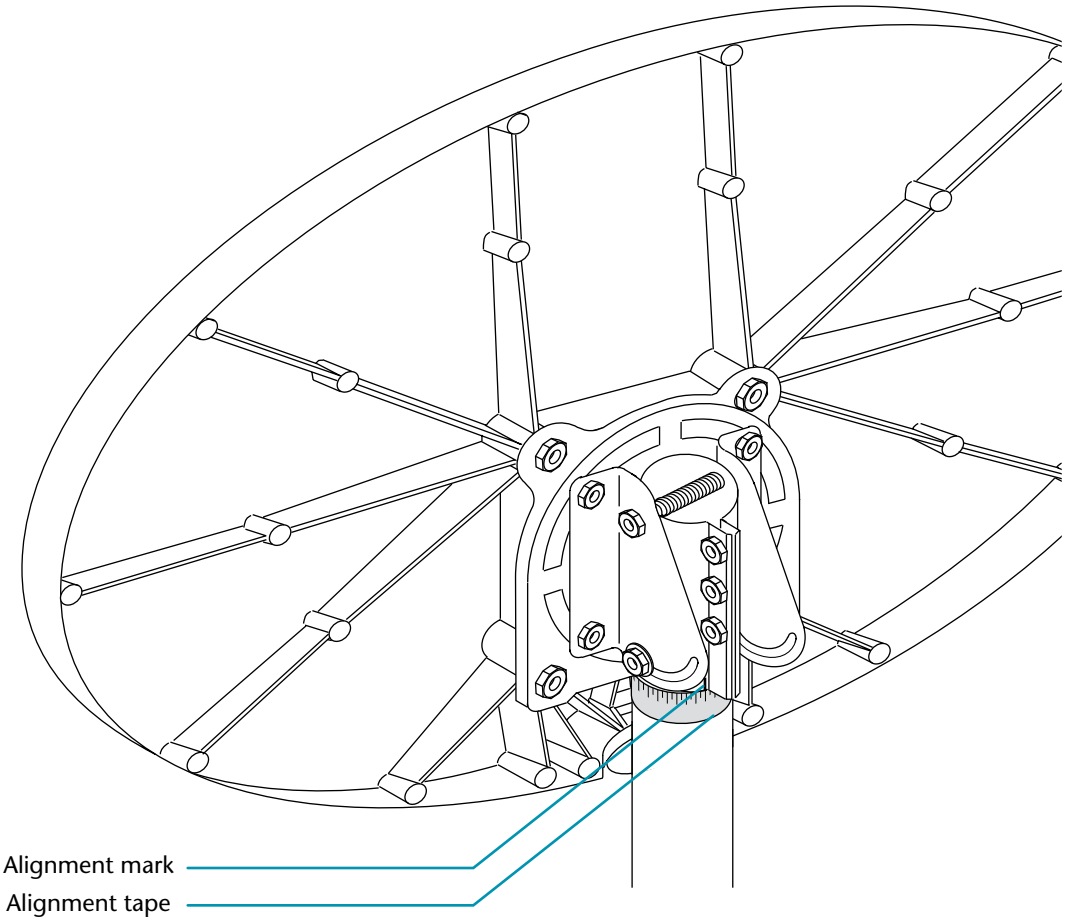


Figure 5-5. Alignment mark and alignment tape locations

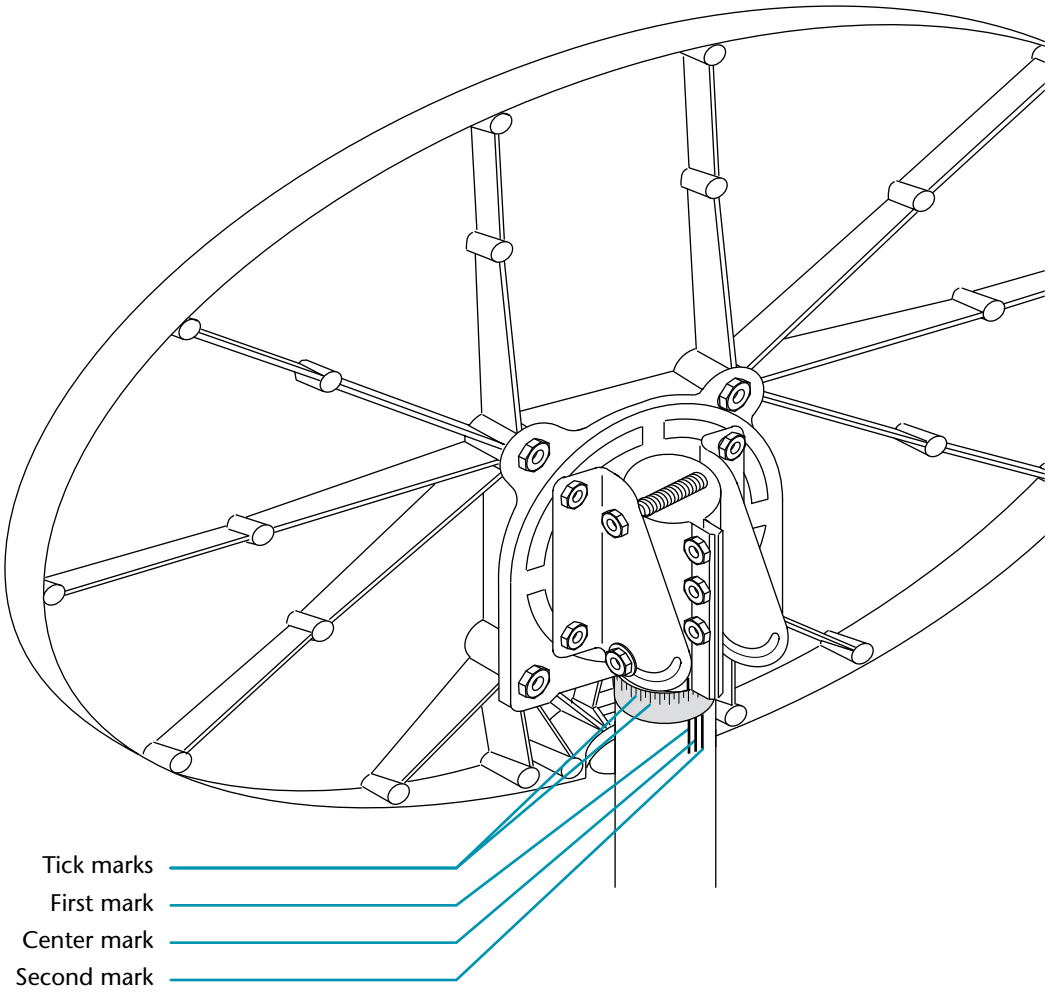


Figure 5-6. Marking the azimuth locations on the mast

Begin the alignment procedure

Performing the fine-alignment procedure can be a one- or a two-person task depending on how far the PC is from the antenna. If the antenna is close enough for the person aiming the antenna to hear the computer speaker (or if you can connect a remote speaker to the PC and place the speaker next to the antenna), you can use the tones generated by the PC as a reference. Otherwise, it is probably best to have a second person watch the computer monitor as it displays the average SQF readout, signal quality readout, and signal strength meter information.

If two people are performing the procedure, one person can view the computer monitor and use a walkie-talkie or a cordless phone, shout through a window (or what ever it takes), to provide feedback to the person aiming the antenna as to how well the signal is being received.

Refer to section "Using the Antenna Pointing screen" in the DirecPC help file, then go to step 1 below.

1. To begin the antenna alignment procedure, stand behind the antenna reflector, grasp the outer edges of the reflector (do not lean on the reflector as that would affect the alignment). Place a mark on the mast that is two tick marks to the left of the center mark. That mark is the *first mark* (see figure 5-6). Then place another mark that is two tick marks to the right of the center mark. That mark is the *second mark*.
2. While monitoring the received signal quality, rotate the reflector, very slowly, from the first mark to the second mark.

   Note: You need to take at least 45 seconds to sweep the reflector from the first mark to the second mark. Count out loud as you rotate the reflector; if you reach the second mark in less than 45 seconds, you are not providing the DirecPC adapter enough time to track and register the signal strength, and you must repeat the sweep.

3. Loosen the elevation nuts and increase the elevation 1 degree. (In our example the setting was 34 degrees; the new setting would now be 35 degrees. Tighten the elevation nuts.
4. Slowly sweep the antenna reflector from the second mark to the first mark.
5. Repeat steps 1 through 4 until the signal quality numbers reach the highest numbers possible for your site (at least 85% signal quality) and then begin to fall. Once the numbers drop, rotate the antenna reflector back in the opposite direction until you regain the highest number that was previously achieved.

   To obtain maximum signal strength after a strong signal has been detected, rotate the antenna reflector through the strong signal range slowly (left and right as neces-

sary) and position the reflector direction in the center of the strong range.

Note: If you are unable to achieve an acceptable signal strength—and are certain that you are not sweeping the reflector too quickly—recheck your azimuth landmarks to verify their accuracy, and that there are no obstacles in the antenna line-of-sight.

6. While observing the signal quality display to ensure that it stays the same, tighten the three clamp bolts that secure the AZ/EL cap mount assembly to the tube in the following sequence:
    a) Snug the top nut but do not completely tighten it
    b) Snug the bottom nut but do not completely tighten it
    c) Snug the middle nut but do not completely tighten it
    d) Fully tighten the top nut (torque to 12 ft. pounds)
    e) Fully tighten the bottom nut (torque to 12 ft. pounds)
    f) Fully tighten the middle nut (torque to 12 ft. pounds)
7. Fine-tune the signal strength by adjusting (raising or lowering) the elevation adjusting screw to point the antenna reflector to the middle of the signal strength range.
8. While watching the signal quality display to ensure that it stays at maximum, tighten the elevation pivot bolts on either side of the AZ/EL cap mount in the following sequence:
    a) Snug one nut but do not completely tighten it
    b) Snug the other nut but do not completely tighten it
    c) Fully tighten the first nut (torque to 12 ft. pounds)
    d) Fully tighten the second nut (torque to 12 ft. pounds)

9. While watching the signal quality display to ensure that it stays at maximum, tighten the elevation pointer/ elevation locking bolt on either side of the AZ/EL cap mount in the following sequence:

    a) Snug one nut but do not completely tighten it

    b) Snug the other nut but do not completely tighten it

    c) Fully tighten the first nut (torque to 12 ft. pounds)

    d) Fully tighten the second nut (torque to 18 ft. pounds)

10. While watching the signal quality display to ensure that it stays at maximum, crouch near and to the side of the feed horn in such a way that you are not putting pressure on the feed horn and are not blocking the signals coming to the antenna reflector.

    Fine-tune the polarization setting by loosening the polarization nuts and rotating the reflector a few degrees slowly in each direction. Select a setting in the middle of the maximum signal strength range.

11. While watching the signal quality display to ensure that it stays at maximum, tighten the polarization nuts.

The antenna is now aligned with the satellite and is ready for use. Refer to the DirecPC help files for information about the three DirecPC services: Turbo Internet, Package Explorer digital package delivery, and Multimedia data pipe.

CHAPTER

6

Troubleshooting

If you encounter a problem, refer to the Troubleshooting topic in the DirecPC system help files. If you require further assistance, call the DirecPC Customer Care Center at **1-800-DIRECPC** (**1-800-347-3272**).

CHAPTER

7

Maintenance

This chapter describes replacing a failed DirecPC adapter.

WARNING

Before removing the DirecPC adapter from the personal computer, disconnect the power cord plug from the outlet. Failure to do so could result in severe personal injury.

1. Switch off your PC and all peripheral devices, and unplug the power cord from the outlet.
2. Touch a metal surface on your computer to ground yourself, thereby discharging any static electricity.
3. Remove the cover from your computer (refer to the documentation that came with your computer for the procedure).
4. Disconnect the LNB cable from the DirecPC adapter cable connector.
5. Remove the cover plate screw from the adapter.
6. Remove the adapter from the expansion slot.
7. Compare the S1 settings on the failed adapter with the replacement adapter. If they are different, set S1 on the replacement adapter to be the same as the failed adapter.

   Note: If you need to change an S1 switch setting, use the tip of a pencil or pen to slide the switch to its new position—either ON or OFF.

8. Place the defective adapter in its original shipping container and return it for repair.

9. Install the DirecPC adapter into the slot that the defective adapter was removed from as follows: while being careful not to damage the cable connector, align your adapter's 16-bit slot connector with the expansion slot and firmly press on the adapter until it is fully seated into the slot.
10. Secure the adapter to the expansion slot with the screw you removed in step 5.
11. Reconnect the LNB cable to the DirecPC adapter cable connector.
12. Install the computer cover and switch the system on.

Adapter replacement is complete.

APPENDIX

A

Electrical grounding

This appendix provides information on grounding the DirecPC system.

A.1

Grounding the DirecPC system

Two components of the DirecPC installation must be grounded: 1) the antenna structure and 2) the coaxial cable connecting the LNB feed assembly to the DirecPC adapter. You need to tailor your grounding procedures to satisfy both local codes and the National Electrical Code which is published by the National Fire Protection Association in Batterymarch Park, Quincy, MA 02269.

For your reference, the following information relating to the DirecPC installation can be found in the National Electrical Code 1993 reference manual. Article 810—*Radio and Television Equipment,* covers most of the grounding and bonding information, but it also refers to other parts (articles) of the Code where needed.

- Article 810-2 refers coaxial cable requirements to article 820; grounding the outer conductive shield of a coaxial cable is found in article 820-33.
- Article 810-21 *Grounding Conductors—Receiving Stations* contains topics (a) through (j) as follows:
  - (a) **material**, copper, aluminum, etc.
  - (b) **insulation**, not required (see article 250-118 *Clean Surfaces*)
  - (c) **supports**
  - (d) **mechanical protection**
  - (e) **run in straight line**
  - (f) **electrode**, grounding conductor shall be connected as follows:
    1) to nearest accessible location on:
       - building or structure as described in article 250-81
       - grounded interior water pipe as described in article 250-80(a)
       - external to enclosures as described in article 250-71(b)
       - metallic power service raceway
       - service equipment enclosure
       - grounding electrode conductor or grounding electrode conductor metal enclosure, or

2) if the building or structure has no grounding means, as described in (f) 1), attach to individual electrodes as described in article 250-81, or

3) if the building or structure has no grounding means, as described in (f) 1) or (f) 2), attach to an effectively grounded metal structure, or to individual electrodes as described in article 250-83.

(g) **inside or outside building**, the ground conductor is permitted to be run inside or outside.

(h) **size**, the grounding conductor shall not be smaller than no. 10 copper or no. 8 aluminum, or no. 17 copper-clad steel or bronze.

(i) **common ground** is a single grounding conductor that shall be permitted for both protective and operating purposes.

(j) **bonding of electrodes** is a bonding jumper not smaller than no. 6 copper or equivalent, and shall be connected between the radio and television equipment grounding electrode and the power grounding electrode system at the building or structure served where separate electrodes are used.

- Article 250-115 describes using a ground clamp, lug, and other methods of connecting to the electrode.

Refer to chapter 5 of the Code manual to see if any special occupancies (environments) apply, and to chapter 1 for a list of definitions.

Note: Copper wire should be used for underground installation as aluminum wire is unsuitable for underground installation.

APPENDIX

B

DirecPC distribution system design information

This appendix contains the following information:

- Distribution system design specifications. Contains data on system signal levels, power requirements, coaxial cable loss data, and amplifiers.
- Examples of medium-sized distribution systems, a tapped-trunk distribution system, and a remote LNB feed system.

B.1

Distribution system design

System levels

The nominal signal output level from the LNB is -36 dBm. The nominal signal input level into the DirecPC adapter must remain within the dynamic range of -70 to -20 dBm. For the most reliable operation, the signal level at the adapter should remain above -60 dBm to prevent excessive carrier-to-noise (C/N) degradation and slope across the 950 to 1450 MHz IF range. All DirecPC system expansion applications described in this guide assume a minimum input level into the DirecPC adapter -50 dB.

> Note: Although -50 dB is defined as the minimum input in the tables and applications in this appendix that quote maximum cable lengths, you can add an additional 55 feet to each length (and still maintain reliable reception) by allowing DirecPC adapter input levels to drop to -55 dBm.

LNB powering considerations

The DirecPC adapter provides +20 VDC to +21 VDC (250 mA max.) power to the LNB power through the coaxial cable. The minimum input voltage to the LNB is +15 VDC. The maximum input current is 170 mA. Use this information to calculate the current available for accessories such as line amplifiers.

Include in your calculations the voltage drops between the DirecPC adapter and the LNB that occur along the coaxial cable and the 0.8-VDC drop each time a diode-steered signal splitter is placed in the line. RG6 coaxial cable carrying a current of 200 mA DC will drop about 0.9 VDC per 100 feet.

In large, multi-output systems, it is preferable to use a separate LNB power supply such as the model 8002IFD, which operates from 117 VAC instead of using the DirecPC adapters to supply LNB power.

Cable loss data

Refer to table B-1 for typical cable loss data as calculated for RG59U, RG6U, and RG11U cable over a range of 100 to 2050 MHz.

Table B-1. Typical coaxial cable loss data

Cable type	Loss in dB per 100-foot length						
	100 MHz	200 MHz	500 MHz	900 MHz	1450 MHz	1750 MHz	2050 MHz
RG59U	2.6 dB	4.0 dB	6.5 dB	9.0 dB	11.9 dB	13.6 dB	15.3 dB
RG6U	2.1 dB	3.1 dB	5.0 dB	6.9 dB	9.1 dB	10.4 dB	11.7 dB
RG11U	1.5 dB	2.2 dB	3.7 dB	5.2 dB	6.9 dB	7.9 dB	8.9 dB

Note: For new installations, we recommend RG6U coaxial cable that has been sweep-tested to the maximum frequency in use, as the minimum cable type for use in the DirecPC system. For longer cable runs, use RG11U coaxial cable or its equivalent.

Maximum cable runs (without amplifiers)

Refer to table B-2 for maximum cable lengths based on the following:

- Using RG6 cable
- A -36 dBm signal level output from LNB
- A -50 dBm signal input level to the DirecPC adapter

Note: Allowing a minimum signal input level of -55 dBm into the DirecPC adapter enables cable lengths to be increased by 55 feet beyond the lengths specified in table B-2.

Table B-2. Maximum cable runs

Number of outputs	Maximum cable lengths	Signal splitter used
1	153 feet	None required
2	110 feet	2212IFD
4	66 feet	2414IFD
8	22 feet	2818IFD
16		two 2818IFDs + one 2212IFD

Maximum cable runs using line amplifiers

Maximum cable lengths can be extended by approximately 143 feet by using a 5113IFD line amplifier before splitting the signal. The line amplifier must be installed indoors and must be a minimum of 25 feet away from the LNB to avoid overloading the line amplifier. The cable lengths shown in table B-3 are based on using a single 5113IFD line amplifier.

Table B-3. Maximum cable runs using line amplifiers

Number of outputs	Maximum cable lengths	Signal splitter used
1	296 feet	None required
2	252 feet	2212IFD
4	209 feet	2414IFD
8	165 feet	2818IFD
16	121 feet	two 2818IFDs + one 2212IFD

Note: The cable lengths specified in table B-3 can be extended a further 143 feet by using another 5114IFD line amplifier in series cascade with the first amplifier. To avoid overloading the second amplifier, there must be at least 143 feet of RG6 coaxial cable between the line amplifiers.

Maximum cable runs using amplified splitters

Amplified splitters can be used to provide signals to two or four DirecPC adapters interconnected with medium to long cable runs (see table B-4).

Table B-4. Maximum cable runs using amplified splitters

Number of outputs	Maximum cable lengths	Signal splitter used
2	198 feet	2252IFD
4	154 feet	2454IFD

Very long cable runs

For very long cable runs, such as in a shopping mall or office building, refer to section C.5, “950 to 1450 MHz Model 5115IFD 15 dB high-level line extender” in appendix C, “DirecPC accessories.”

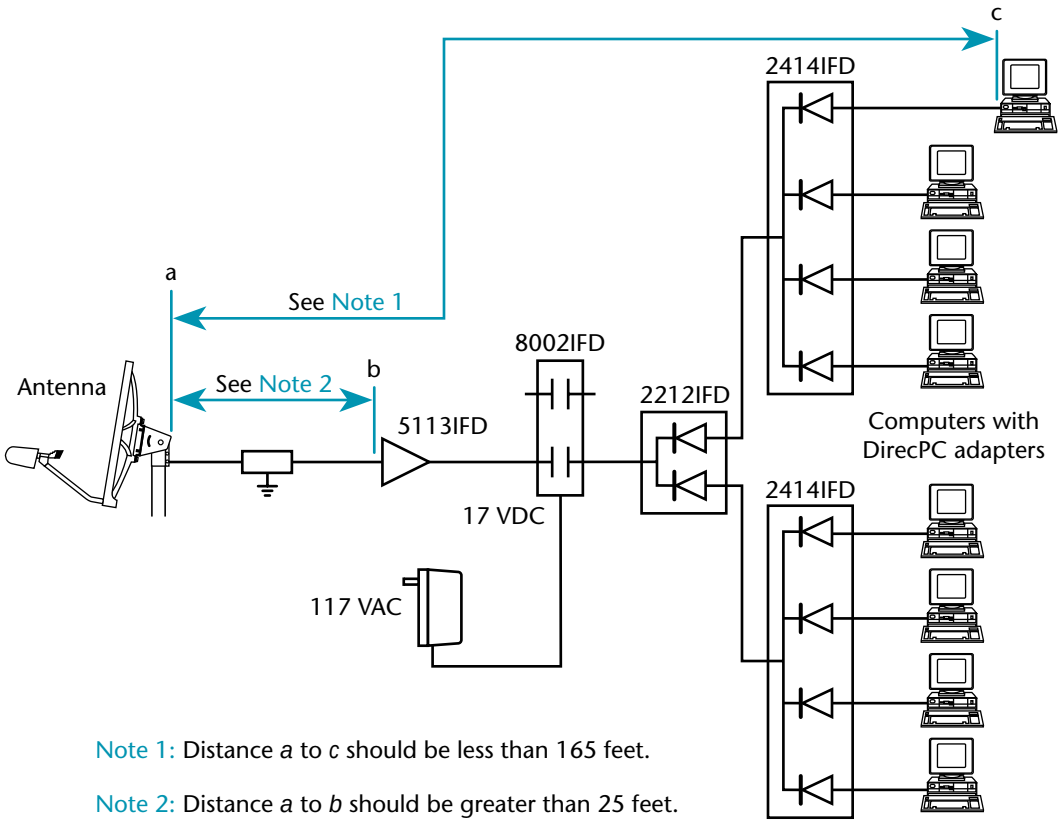
B.2

DirecPC system applications

Examples of medium-sized distribution systems

Figures B-1 and B-2 show some typical office networks of eight PCs. These can be expanded to offer far more outlets.

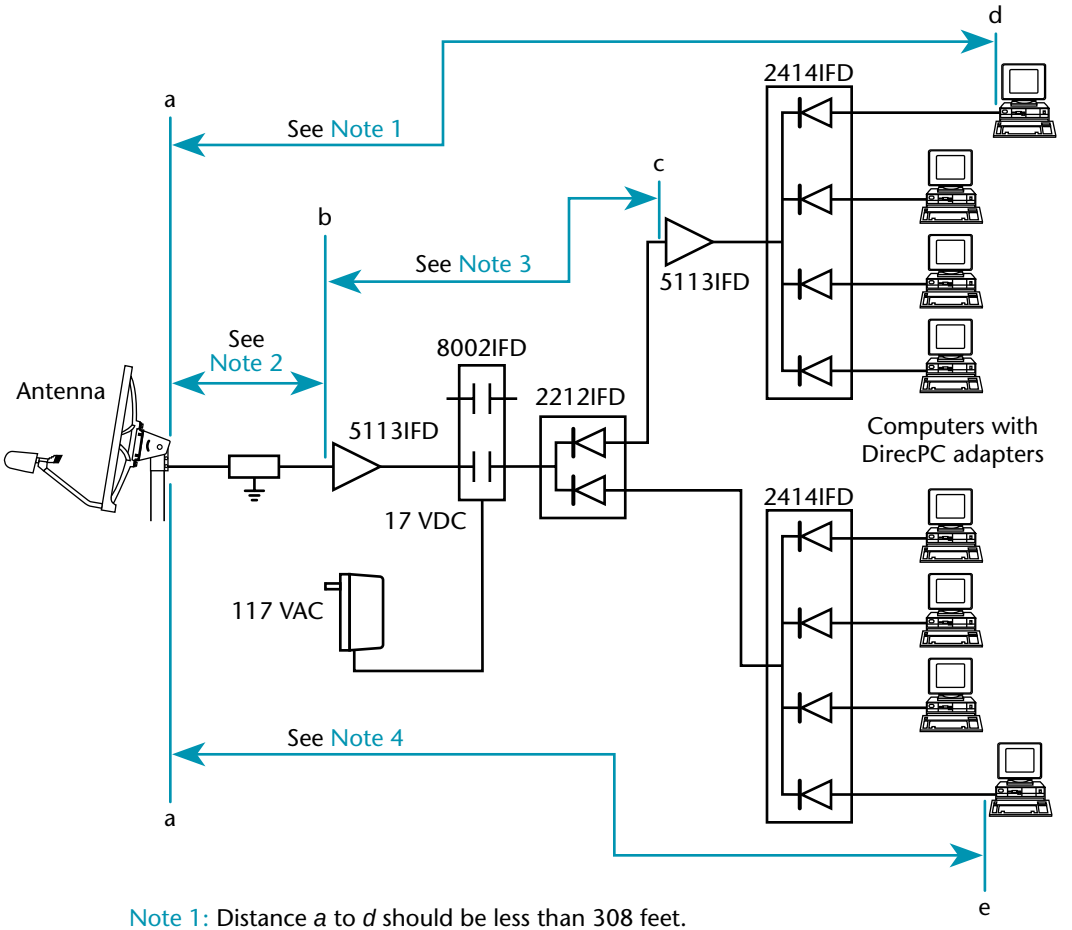
Note: In figures B-1 and B-2, cable lengths are based on RG6 coaxial cable specifications.



Note 1: Distance *a* to *c* should be less than 165 feet.

Note 2: Distance *a* to *b* should be greater than 25 feet.

Figure B-1. Example of a medium-sized distribution system # 1



Note 1: Distance *a* to *d* should be less than 308 feet.

Note 2: Distance *a* to *b* should be greater than 25 feet.

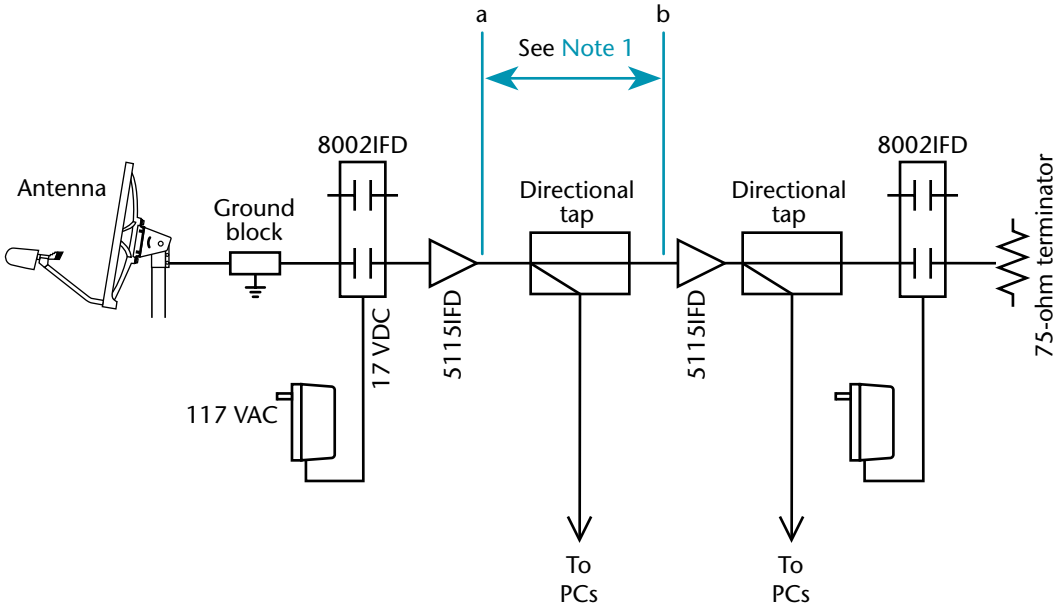
Note 3: Distance *b* to *c* should be greater than 100 feet.

Note 4: Distance *a* to *e* should be less than 165 feet.

Figure B-2. Example of a medium-sized distribution system # 2

Example of a tapped-trunk distribution system

Figure B-3 shows a typical distribution system where directional taps are used to split the signal from the trunk line.

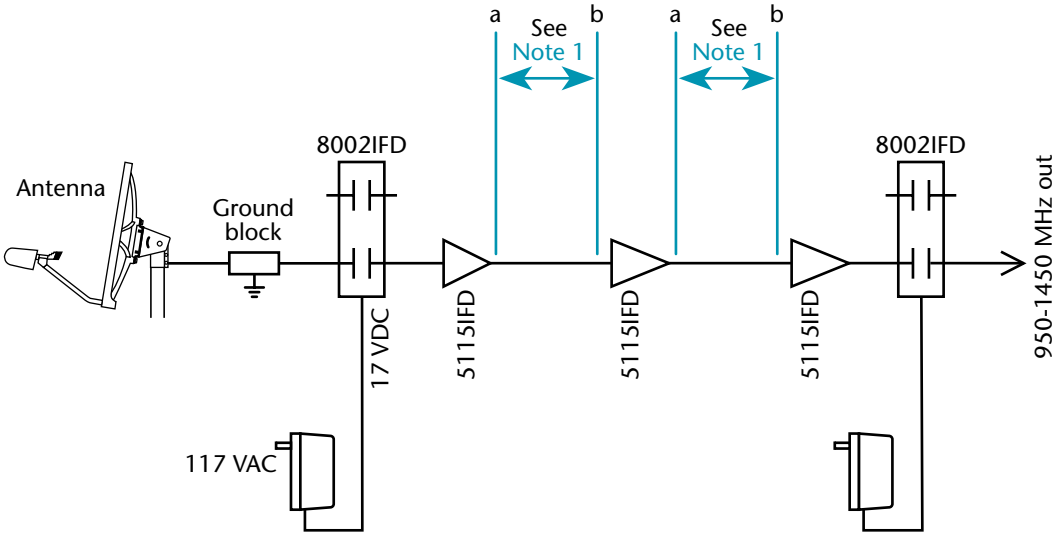


Note 1: Distance *a* to *b* is the length of cable that results in 15 dB of loss at 1450 MHz. For RG6 cable, the distance would be approximately 165 feet; for RG11 cable the distance would be approximately 217 feet.

Figure B-3. Example of a tapped-trunk distribution system

Example of a remote LNB feed

The configuration shown in figure B-4 would be for a site where the LNB is located a long distance from the DirecPC adapter.



Note 1: Distance *a* to *b* is the length of cable that results in 15 dB of loss at 1450 MHz. For RG6 cable, the distance would be approximately 165 feet; for RG11 cable the distance would be approximately 217 feet.

Figure B-4. Example of a remote LNB feed

APPENDIX

C

DirecPC accessories

This appendix describes the accessories that have been approved for use with the DirecPC system. The following types of accessories are included:

- Directional taps
- Power dividers
- Line amplifiers
- Satellite signal level meters
- Crimping tools
- LNB power supply/injector
- Connectors
- Cables

To purchase these accessories, call 919-989-2205 for the name of your nearest Channel Master distributor or dealer.

C.1

950 to 2050 MHz power dividers

The following sections describe recommended DirecPC satellite IF (950 to 2050 MHz) power dividers. These low cost, yet high performance units have many applications in satellite IF distribution systems.

Model 2201IFD 2-way power divider, 1-port DC pass

The 2201IFD power divider (see figure C-1) passes DC power from one output to the input (or in the opposite direction). Thus only one DirecPC adapter supplies LNB power.

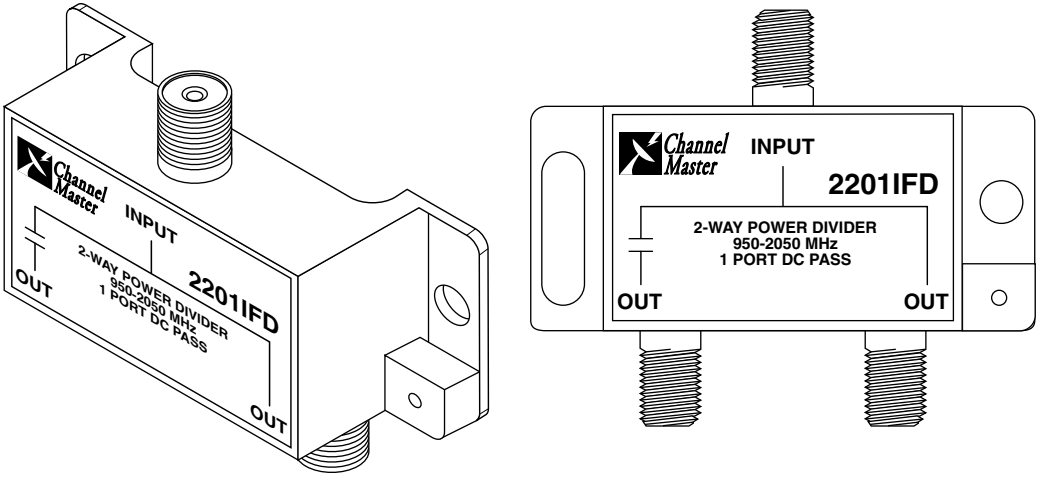


Figure C-1. Model 2201IFD 2-way power divider

Unused outputs must be terminated to achieve optimum flatness, return loss, and isolation. Terminators, model 7184 (DC blocked) or model 7190 (not DC blocked), are recommended.

Figure C-2 is the functional diagram.

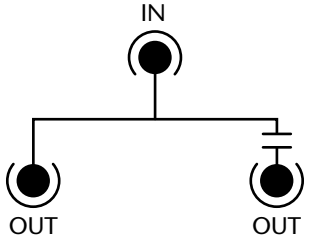


Figure C-2. Model 2201IFD functional diagram

Performance specifications:

- Frequency range: 950 to 2050 MHz
- Impedance: 75 ohms
- Connectors: F-type female
- Through loss (dB): 3.5 (see Note 1)
- Return loss (dB): 15
- Isolation (dB): 20 (see Note 2)
- DC Pass (ports): 1
- Dimensions (HxWxD): 2.0 x 2.2 x 0.8 inches (50 x 57 x 22 mm)
- Weight: 1.9 oz. (55 g)

Note 1: Through loss figures are typical between 950 and 1450 MHz. At 2050 MHz, through loss is approximately 1 dB higher.

Note 2: Isolation is between closest outputs.

Model 2202IFD 2-way power divider, 2-port DC pass

The 2202IFD power divider (see figure C-3) passes DC power from all outputs to the input (or in the opposite direction). Verify than any equipment connected to the model 2202IFD will not be damaged by reverse-powering before installing the model 2202IFD into the DirecPC system.

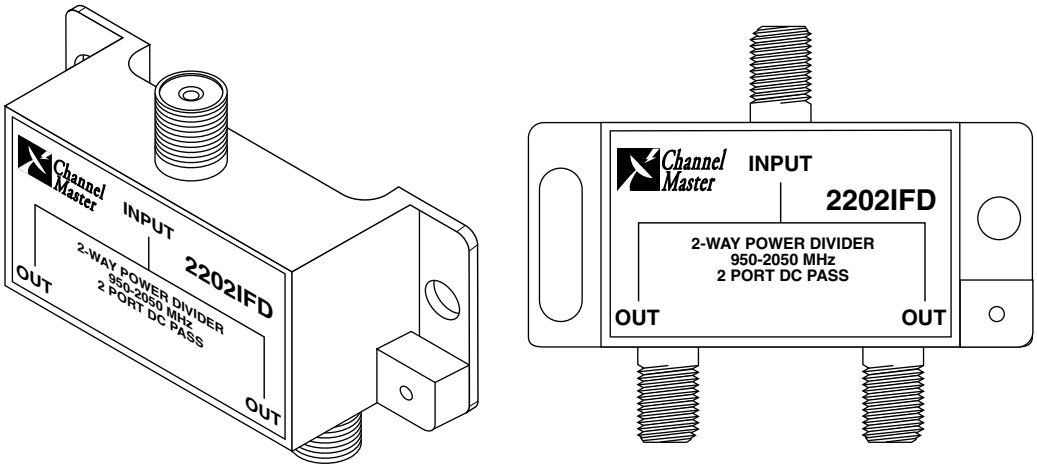


Figure C-3. Model 2202IFD 2-way power divider

Unused outputs must be terminated to achieve optimum flatness, return loss, and isolation. Terminators, model 7184 (DC blocked) or model 7190 (not DC blocked), are recommended.

Figure C-4 is the functional diagram.

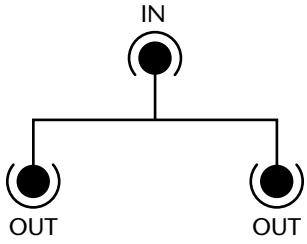


Figure C-4. Model 2202IFD functional diagram

Performance specifications:

- Frequency range: 950 to 2050 MHz
- Impedance: 75 ohms
- Connectors: F-type female
- Through loss (dB): 3.5 (see Note 1)
- Return loss (dB): 15
- Isolation (dB): 20 (see Note 2)
- DC Pass (ports): 2
- Dimensions (HxWxD): 2.0 x 2.2 x 0.8 inches (50 x 57 x 22 mm)
- Weight: 1.9 oz. (55 g)

Note 1: Through loss figures are typical between 950 and 1450 MHz. At 2050 MHz, through loss is approximately 1 dB higher.

Note 2: Isolation is between closest outputs.

Model 2212IFD 2-way power divider, 2-port DC pass (diode steered)

The 2212IFD power divider (see figure C-5) is particularly recommended for DirecPC applications. It will pass power from any output to the input. There is a 0.8V drop across the diodes which are included to prevent one DirecPC adapter from passing power back to another. The model 2212IFD is especially useful because the capability to provide power to the LNB from any of several DirecPC adapters provides redundancy, thereby avoiding lost LNB signals due to an adapter failure.

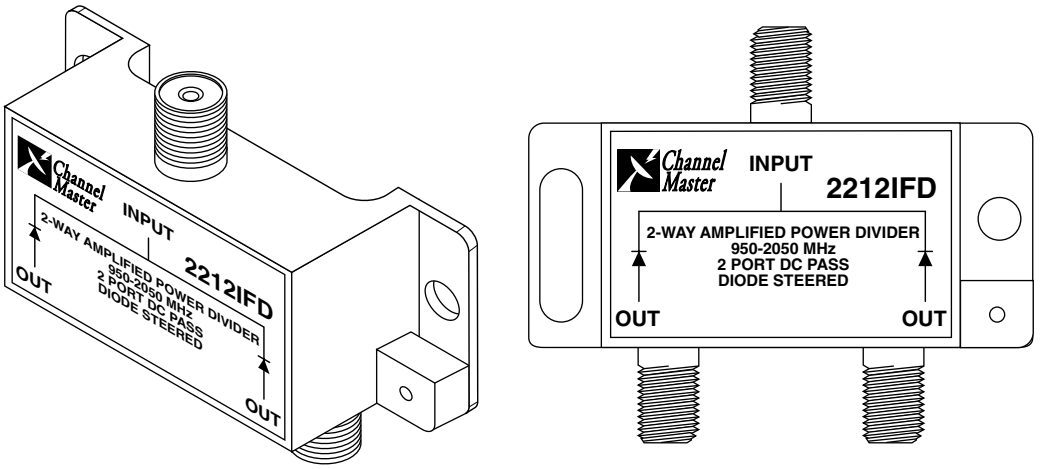


Figure C-5. Model 2212IFD 2-way power divider

Unused outputs must be terminated to achieve optimum flatness, return loss, and isolation. Terminators, model 7184 (DC blocked) or model 7190 (not DC blocked), are recommended.

Figure C-6 is the functional diagram.

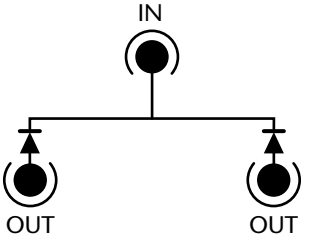


Figure C-6. Model 2212IFD functional diagram

Performance specifications:

- Frequency range: 950 to 2050 MHz
- Impedance: 75 ohms
- Connectors: F-type female
- Through loss (dB): 4.0 (see Note 1)
- Return loss (dB): 15
- Isolation (dB): 20 (see Note 2)
- DC Pass (ports): 2D (see Note 3)
- Dimensions (HxWxD): 2.0 x 2.2 x 0.8 inches (50 x 57 x 22 mm)
- Weight: 1.9 oz. (55 g)

Note 1: Through loss figures are typical between 950 and 1450 MHz. At 2050 MHz, through loss is approximately 1 dB higher.

Note 2: Isolation is between closest outputs.

Note 3: *D* indicates a series diode.

Model 2401IFD 4-way power divider, 1-port DC pass

The 2401IFD power divider (see figure C-7) passes DC power from one output to the input (or in the opposite direction). Thus only one DirecPC adapter supplies LNB power.

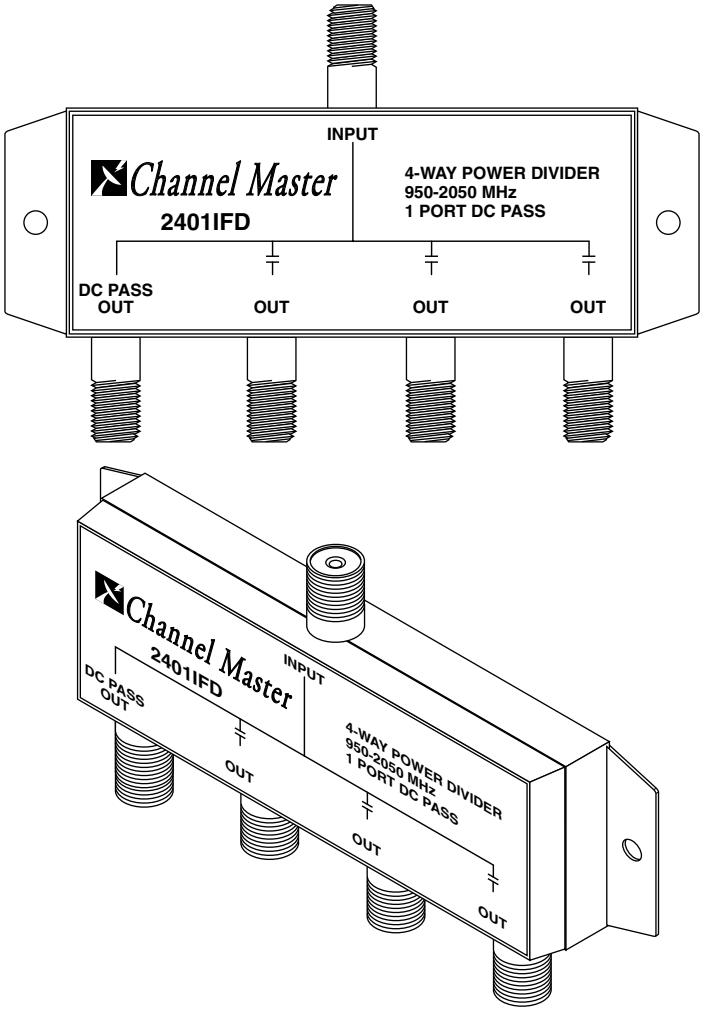


Figure C-7. Model 2401IFD 4-way power divider

Unused outputs must be terminated to achieve optimum flatness, return loss, and isolation. Terminators, model 7184 (DC blocked) or model 7190 (not DC blocked), are recommended.

Figure C-8 is the functional diagram.

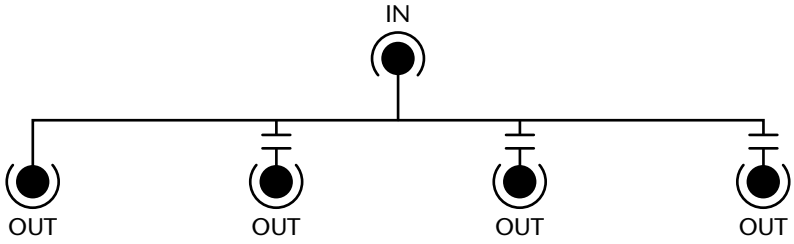


Figure C-8. Model 2401IFD functional diagram

Performance specifications:

- Frequency range: 950 to 2050 MHz
- Impedance: 75 ohms
- Connectors: F-type female
- Through loss (dB): 8.0 (see Note 1)
- Return loss (dB): 15
- Isolation (dB): 20 (see Note 2)
- DC Pass (ports): 1
- Dimensions (HxWxD): 2.9 x 4.6 x 0.7 inches (74 x 118 x 18 mm)
- Weight: 4.0 oz. (112 g)

Note 1: Through loss figures are typical between 950 and 1450 MHz. At 2050 MHz, through loss is approximately 1 dB higher.

Note 2: Isolation is between closest outputs.

Model 2404IFD 4-way power divider, 4-port DC pass

The 2404IFD power divider (see figure C-9) passes DC power from all outputs to the input (or in the opposite direction). Verify than any equipment connected to the model 2404IFD will not be damaged by reverse-powering before installing the model 2404IFD into the DirecPC system.

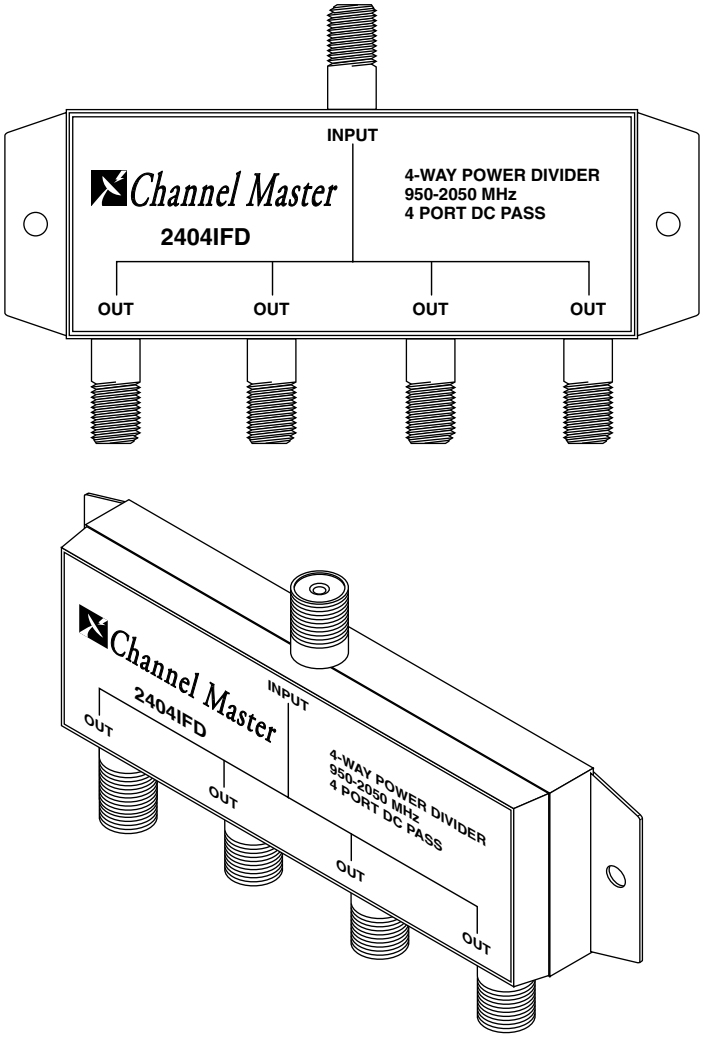


Figure C-9. Model 2202IFD 4-way power divider

Unused outputs must be terminated to achieve optimum flatness, return loss, and isolation. Terminators, model 7184 (DC blocked) or model 7190 (not DC blocked), are recommended.

Figure C-10 is the functional diagram.

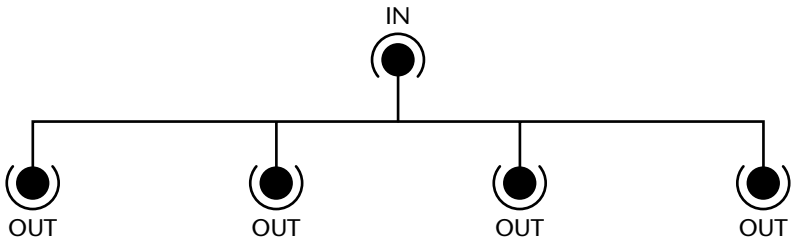


Figure C-10. Model 2404IFD functional diagram

Performance specifications:

- Frequency range: 950 to 2050 MHz
- Impedance: 75 ohms
- Connectors: F-type female
- Through loss (dB): 8.0 (see Note 1)
- Return loss (dB): 15
- Isolation (dB): 20 (see Note 2)
- DC Pass (ports): 4
- Dimensions (HxWxD): 2.9 x 4.6 x 0.7 inches (74 x 118 x 18 mm)
- Weight: 4.0 oz. (112 g)

Note 1: Through loss figures are typical between 950 and 1450 MHz. At 2050 MHz, through loss is approximately 1 dB higher.

Note 2: Isolation is between closest outputs.

Model 2414IFD 4-way power divider, 4-port DC pass (diode steered)

The 2414IFD power divider (see figure C-11) is particularly recommended for DirecPC applications. It will pass power from any output to the input. There is a 0.8V drop across the diodes which are included to prevent one DirecPC adapter from passing power back to another. The model 2414IFD is especially useful because the capability to provide power to the LNB from any of several DirecPC adapters provides redundancy, thereby avoiding lost LNB signals due to an adapter failure.

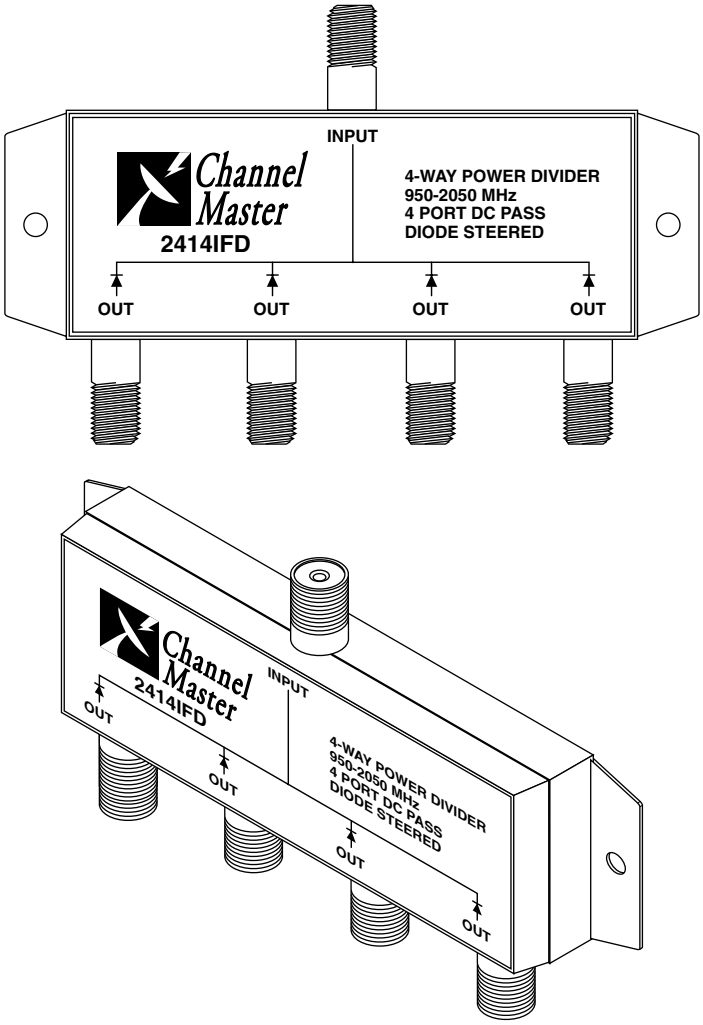


Figure C-11. Model 2414IFD 4-way power divider

Unused outputs must be terminated to achieve optimum flatness, return loss, and isolation. Terminators, model 7184 (DC blocked) or model 7190 (not DC blocked), are recommended.

Figure C-12 is the functional diagram.

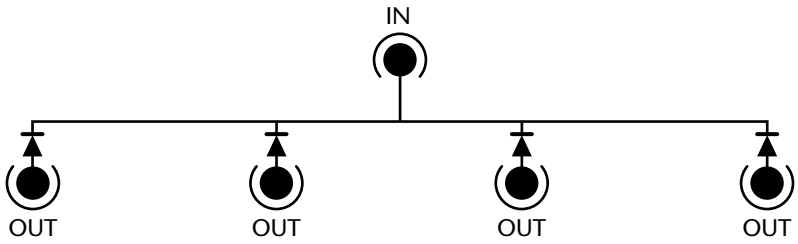


Figure C-12. Model 2414IFD functional diagram

Performance specifications:

- Frequency range: 950 to 2050 MHz
- Impedance: 75 ohms
- Connectors: F-type female
- Through loss (dB): 8.5 (see Note 1)
- Return loss (dB): 15
- Isolation (dB): 20 (see Note 2)
- DC Pass (ports): 4D (see Note 3)
- Dimensions (HxWxD): 2.9 x 4.6 x 0.7 inches (74 x 118 x 18 mm)
- Weight: 4.0 oz. (112 g)

Note 1: Through loss figures are typical between 950 and 1450 MHz. At 2050 MHz, through loss is approximately 1 dB higher.

Note 2: Isolation is between closest outputs.

Note 3: *D* indicates a series diode.

Model 2801IFD 8-way power divider, 1-port DC pass

The 2801IFD power divider (see figure C-13) passes DC power from one output to the input (or in the opposite direction). Thus only one DirecPC adapter supplies LNB power.

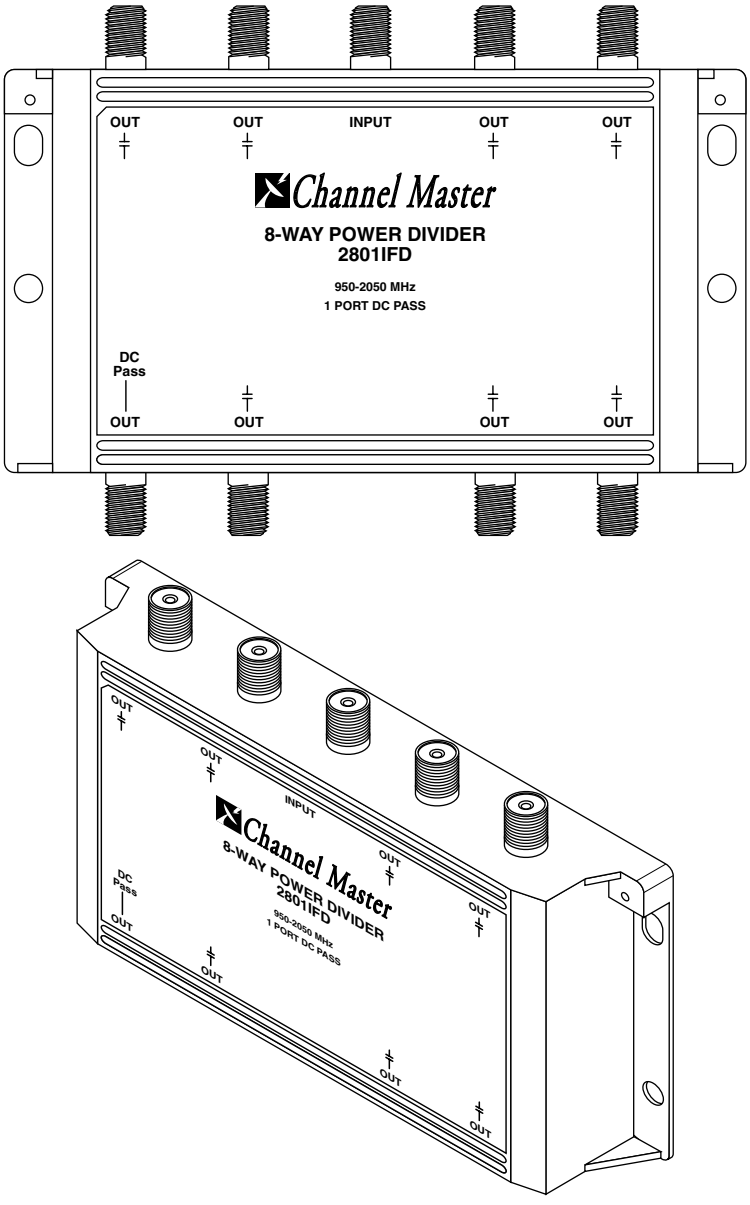


Figure C-13. Model 2801IFD 8-way power divider

Unused outputs must be terminated to achieve optimum flatness, return loss, and isolation. Terminators, model 7184 (DC blocked) or model 7190 (not DC blocked), are recommended.

Figure C-14 is the functional diagram.

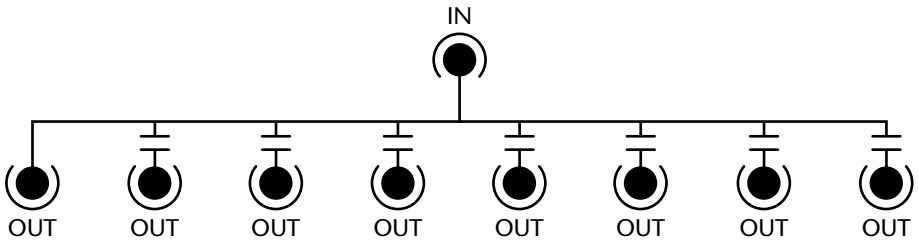


Figure C-14. Model 2801IFD functional diagram

Performance specifications:

- Frequency range: 950 to 2050 MHz
- Impedance: 75 ohms
- Connectors: F-type female
- Through loss (dB): 11.5 (see Note 1)
- Return loss (dB): 15
- Isolation (dB): 20 (see Note 2)
- DC Pass (ports): 1
- Dimensions (HxWxD): 4.3 x 5.9 x 1.1 inches (110 x 150 x 20 mm)
- Weight: 13.6 oz. (386 g)

Note 1: Through loss figures are typical between 950 and 1450 MHz. At 2050 MHz, through loss is approximately 1 dB higher.

Note 2: Isolation is between closest outputs.

Model 2818IFD 8-way power divider, 8-port DC pass (diode steered)

The 2818IFD power divider (see figure C-15) is particularly recommended for DirecPC applications. It will pass power from any output to the input. There is a 0.8V drop across the diodes which are included to prevent one DirecPC adapter from passing power back to another. The model 2818IFD is especially useful because the capability to provide power to the LNB from any of several DirecPC adapters provides redundancy, thereby avoiding lost LNB signals due to an adapter failure.

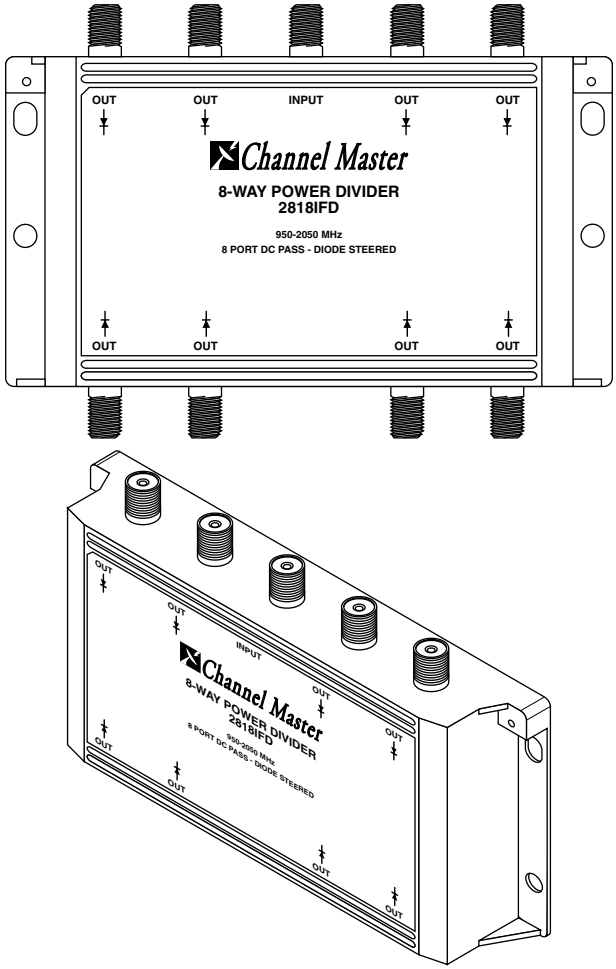


Figure C-15. Model 2818IFD 8-way power divider

Unused outputs must be terminated to achieve optimum flatness, return loss, and isolation. Terminators, model 7184 (DC blocked) or model 7190 (not DC blocked), are recommended.

Figure C-16 is the functional diagram.

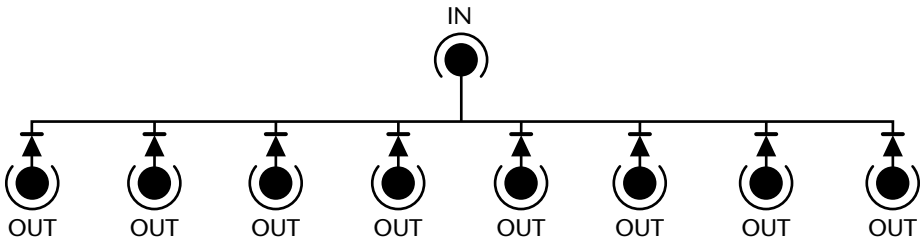


Figure C-16. Model 2818IFD functional diagram

Performance specifications:

- Frequency range: 950 to 2050 MHz
- Impedance: 75 ohms
- Connectors: F-type female
- Through loss (dB): 12.0 (see Note 1)
- Return loss (dB): 15
- Isolation (dB): 20 (see Note 2)
- DC Pass (ports): 8D (see Note 3)
- Dimensions (HxWxD): 4.3 x 5.9 x 1.1 inches (110 x 150 x 20 mm)
- Weight: 13.6 oz. (386 g)

Note 1: Through loss figures are typical between 950 and 1450 MHz. At 2050 MHz, through loss is approximately 1 dB higher.

Note 2: Isolation is between closest outputs.

Note 3: *D* indicates a series diode.

C.2

950 to 1750 MHz amplified power dividers

The following sections describe recommended DirecPC satellite IF (950 to 2050 MHz) amplified power dividers. These low cost, yet high performance units have many applications in satellite IF distribution systems. The dividers pass power from any output back to the input (with 0.8 VDC drop due to the steering diodes). This diode steering arrangement means any output can be used to power the LNB. The diodes also prevent one DirecPC adapter from passing power back to another. The amplified power dividers are especially useful because the capability to provide power to the LNB from any of several DirecPC adapters provides redundancy, thereby avoiding lost LNB signals due to an adapter failure.

The moderate gain of these units means input signal handling is particularly good. Unused outputs must be terminated to achieve optimum flatness, return loss, and isolation. Terminators, model 7184 (DC blocked) or model 7190 (not DC blocked), are recommended.

Applications include:

- Enabling long (greater than 100 feet) runs of coaxial cable from the DirecPC adapter to the LNB.
- Strengthening signal levels in a satellite IF distribution system where the levels may have become marginal towards the end of the system farthest from the LNB.

Note 1: DirecPC adapter cards operate with input signal levels between -60 and -30 dBm per channel. HNS recommends that IF distribution systems be designed to give no less than -50 dBm per channel at the customer outlet.

Note 2: Because a buildup of 0.8V-drops through cascaded amplifiers is likely to cause a system malfunction due to low signal levels, do not cascade the amplified power dividers.

Model 2252IFD 2-way amplified power divider, 2-port DC pass

This section contains the performance specifications for the 2252IFD amplified power divider (see figure C-17).

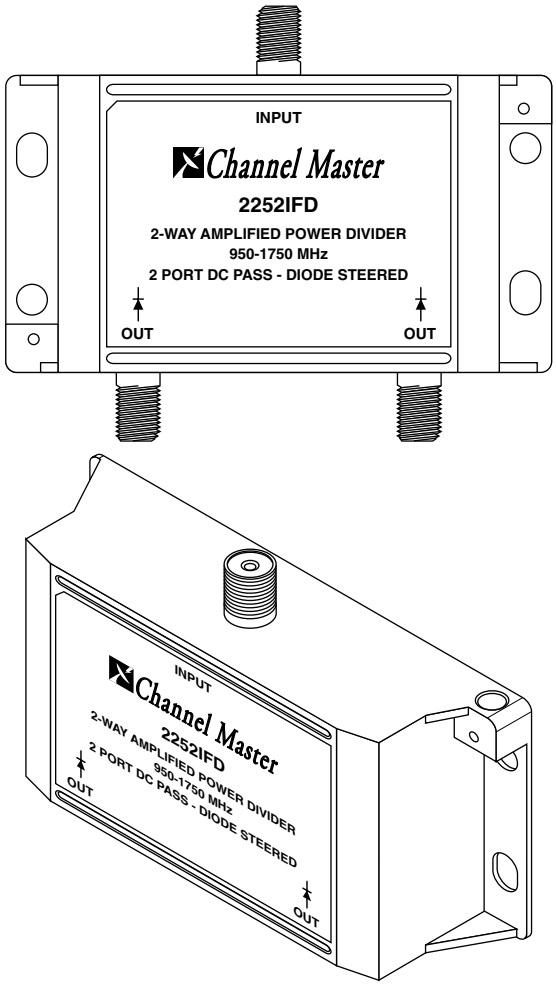


Figure C-17. Model 2252IFD 2-way amplified power divider

Figure C-18 is the functional diagram.

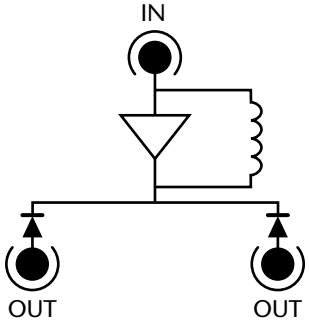


Figure C-18. Model 2252IFD functional diagram

Performance specifications:

- Frequency range: 950 to 1750 MHz
- Impedance: 75 ohms
- Connectors: F-type female
- Input capability: Output capability minus gain
- Power requirements: 13 to 21 VDC at 35 mA
- Gain (dB): 4.0
- Return loss (dB): 15
- Isolation (dB): 25 (see Note 1)
- Noise figure (dB): 5
- Output capability 13-V operation (dBm per channel): -24 (see Note 2)
- Output capability 17-V operation (dBm per channel): -20 (see Note 2)
- DC Pass (ports): 2D (see Note 3)
- Dimensions (HxWxD): 3.1 x 3.9 x 1.1 inches (80 x 100 x 29 mm)
- Weight: 8.6 oz. (245 g)

Note 1: Isolation is between closest outputs.

Note 2: Output capability is for 16 channels at -40 dBc IMD.

Note 3: *D* indicates a series diode.

Note 4: To avoid overloading the amplifier contained in the model 2252IFD, leave a minimum distance of 50 feet of RG6U between the LNB and the 2252IFD.

Model 2454IFD 4-way power divider, 4-port DC pass (diode steered)

This section contains the performance specifications for the 2454IFD amplified power divider (see figure C-19).

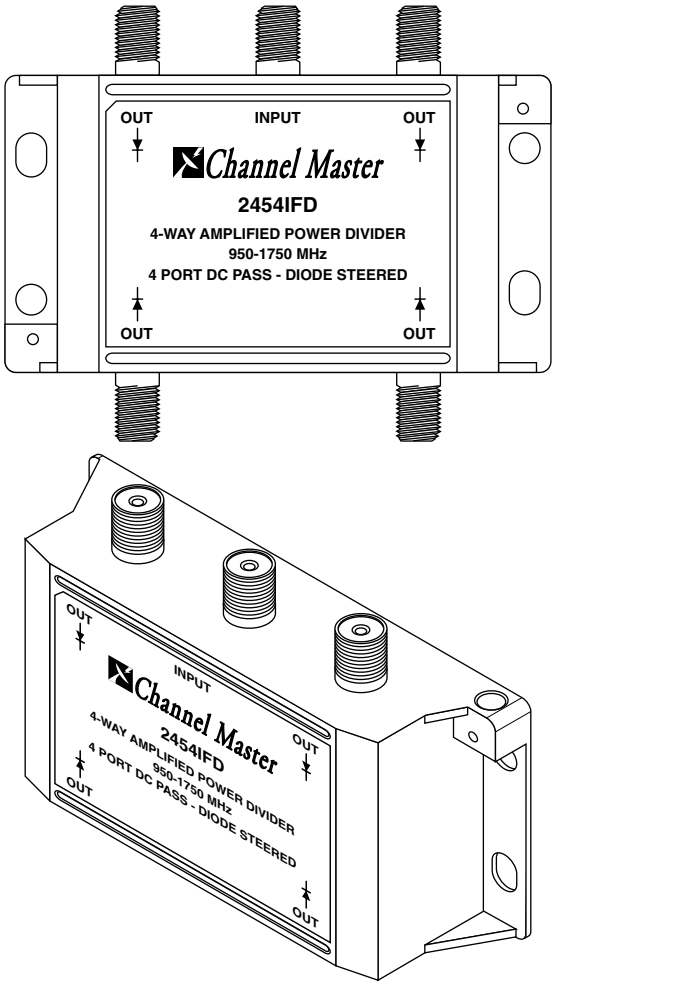


Figure C-19. Model 2454IFD 4-way amplified power divider

Figure C-20 is the functional diagram.

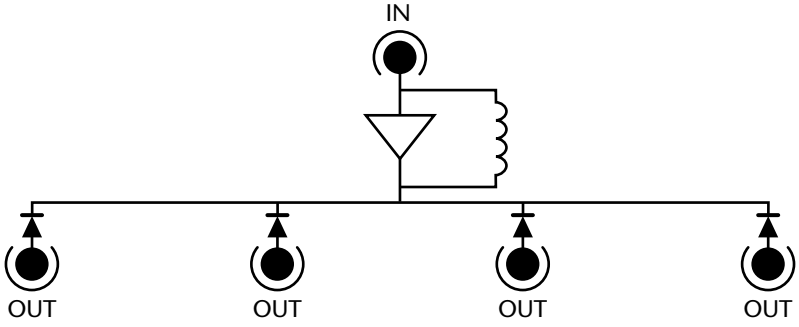


Figure C-20. Model 2454IFD functional diagram

Performance specifications:

- Frequency range: 950 to 1750 MHz
- Impedance: 75 ohms
- Connectors: F-type female
- Input capability: Output capability minus gain
- Power requirements: 13 to 21 VDC at 35 mA
- Gain (dB): 0.0
- Return loss (dB): 15
- Isolation (dB): 25 (see Note 1)
- Noise figure (dB): 8
- Output capability 13-V operation (dBm per channel): -29 (see Note 2)
- Output capability 17-V operation (dBm per channel): -26 (see Note 2)
- DC Pass (ports): 4D (see Note 3)
- Dimensions (HxWxD): 3.1 x 3.9 x 1.1 inches (80 x 100 x 29 mm)
- Weight: 9.0 oz. (255 g)

Note 1: Isolation is between closest outputs.

Note 2: Output capability is for 16 channels at -40 dBc IMD.

Note 3: *D* indicates a series diode.

Note 4: To avoid overloading the amplifier contained in the model 2252IFD, leave a minimum distance of 50 feet of RG6U between the LNB and the 2252IFD.

C.3 40 to 2050 MHz directional taps

The following sections describe the recommended DirecPC range of ultra-wideband (40 to 2050 MHz) directional taps. In all models, the trunk path will pass DC power and the tap is DC blocked. Directional taps are mainly used in medium to large distribution systems carrying satellite IF and/or VHF/UHF signals.

A typical directional tap application is using it in tapped-trunk systems using the 5115IFD line extender. At locations along the trunk where a signal is required, a tap of appropriate value is inserted. Refer to appendix A, "Additional expansion kit applications," for information on satellite distribution system design applications.

Because the internal construction of the 2 and 4-way taps is a 1-way tap followed by a 2-way or 4-way splitter, unused outputs must be terminated to achieve optimum flatness, return loss, and isolation. Terminators, model 7184 (DC blocked) or model 7190 (not DC blocked), are recommended.

Model 1012IFD 1-way 12-dB tap

This section contains the performance specifications for the 1012IFD directional tap (see figure C-21).

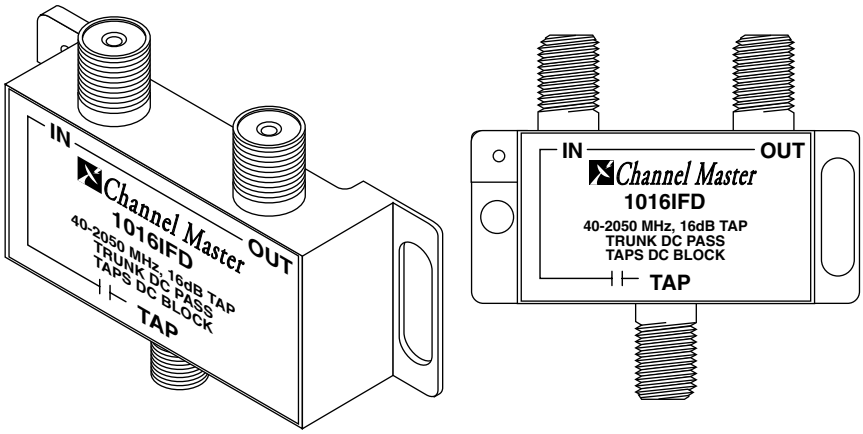


Figure C-21. Model 1012IFD 1-way 12-dB tap

Figure C-22 is the functional diagram.

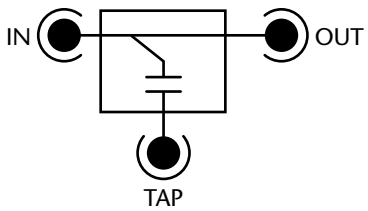


Figure C-22. Model 1012IFD functional diagram

Performance specifications:

- Frequency range: 40 to 2050 MHz
- Impedance: 75 ohms
- Connectors: F-type female
- DC Pass: Trunk DC pass, tap DC block
- Number tap outputs: 1
- Tap loss (dB): 12 (see Note 1)
- Through loss (dB): 1.8 (see Note 1)
- Return loss (dB): 10
- Isolation–tap to out (dB): 25 (see Note 2)
- Dimensions (HxWxD): 2.0 x 2.2 x 0.8 inches (50 x 57 x 22 mm)
- Weight: 2.0 oz. (57 g)

Note 1: Through loss and tap loss figures are typical 40 to 1450 MHz. At 2050 MHz, the losses are approximately 1 dB higher.

Note 2: Isolation is between closest outputs.

Model 1016IFD 1-way 16-dB tap

This section contains the performance specifications for the 1016IFD directional tap (see figure C-23).

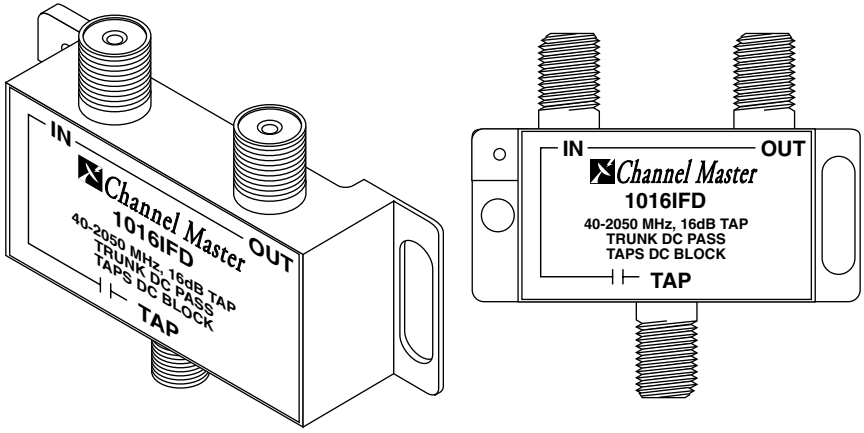


Figure C-23. Model 1016IFD 1-way 16-dB tap

Figure C-24 is the functional diagram.

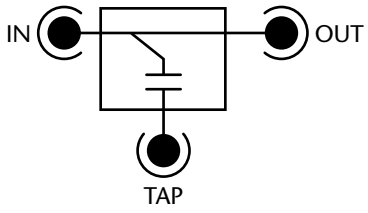


Figure C-24. Model 1016IFD functional diagram

Performance specifications:

- Frequency range: 40 to 2050 MHz
- Impedance: 75 ohms
- Connectors: F-type female
- DC Pass: Trunk DC pass, tap DC block
- Number tap outputs: 1
- Tap loss (dB): 16 (see Note 1)
- Through loss (dB): 1.6 (see Note 1)
- Return loss (dB): 10
- Isolation–tap to out (dB): 25 (see Note 2)
- Dimensions (HxWxD): 2.0 x 2.2 x 0.8 inches (50 x 57 x 22 mm)
- Weight: 2.0 oz. (57 g)

Note 1: Through loss and tap loss figures are typical 40- to 1450-MHz. At 2050 MHz, the losses are approximately 1 dB higher.

Note 2: Isolation is between closest outputs.

Model 1020IFD 1-way 20-dB tap

This section contains the performance specifications for the 1020IFD directional tap (see figure C-25).

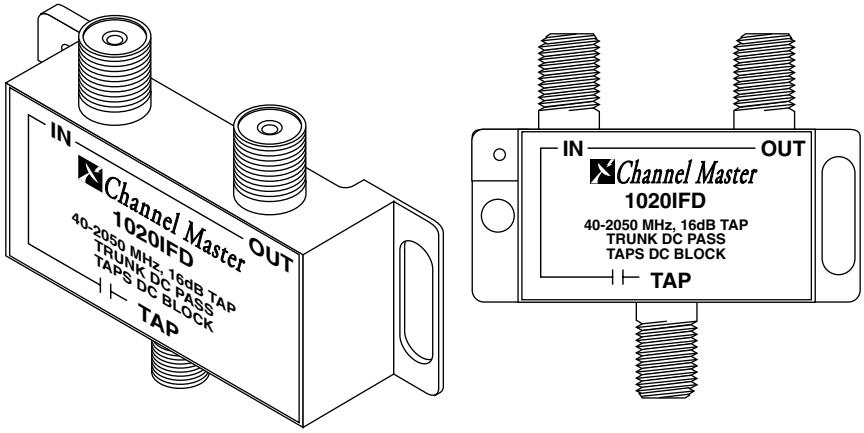


Figure C-25. Model 1020IFD 1-way 20-dB tap

Figure C-26 is the functional diagram.

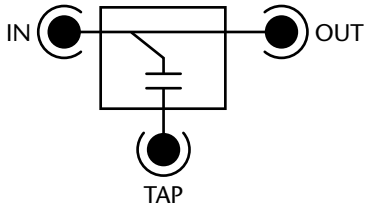


Figure C-26. Model 1020IFD functional diagram

Performance specifications:

- Frequency range: 40 to 2050 MHz
- Impedance: 75 ohms
- Connectors: F-type female
- DC Pass: Trunk DC pass, tap DC block
- Number tap outputs: 1
- Tap loss (dB): 20 (see Note 1)
- Through loss (dB): 1.4 (see Note 1)
- Return loss (dB): 10
- Isolation–tap to out (dB): 25 (see Note 2)
- Dimensions (HxWxD): 2.0 x 2.2 x 0.8 inches (50 x 57 x 22 mm)
- Weight: 2.0 oz. (57 g)

Note 1: Through loss and tap loss figures are typical 40- to 1450-MHz. At 2050 MHz, the losses are approximately 1 dB higher.

Note 2: Isolation is between closest outputs.

Model 1212IFD 2-way 12-dB tap

This section contains the performance specifications for the 1212IFD directional tap (see figure C-27).

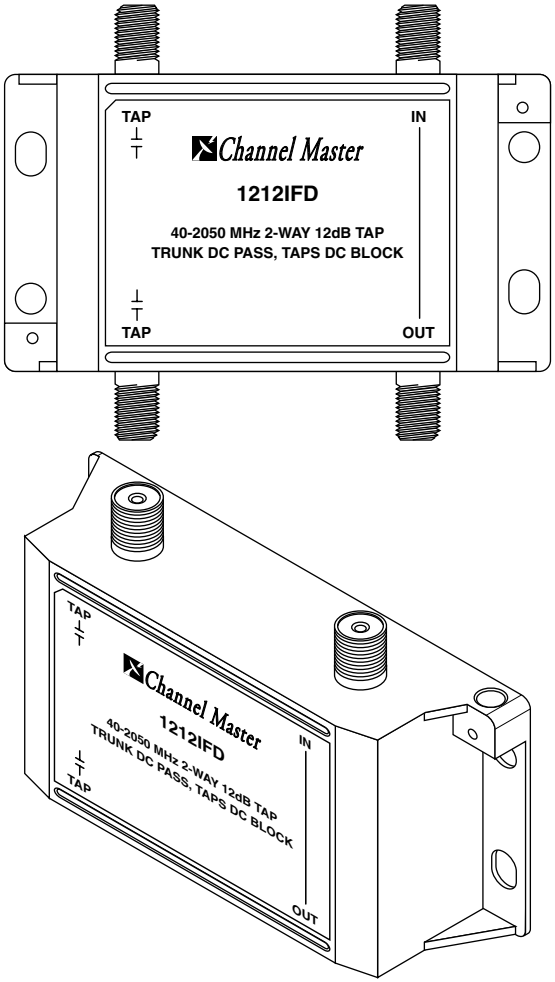


Figure C-27. Model 1212IFD 2-way 12-dB tap

Figure C-28 is the functional diagram.

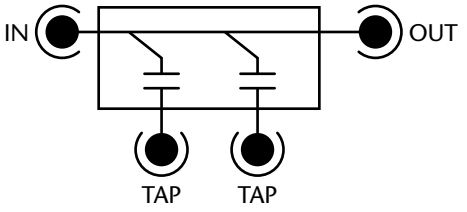


Figure C-28. Model 1212IFD functional diagram

Performance specifications:

- Frequency range: 40 to 2050 MHz
- Impedance: 75 ohms
- Connectors: F-type female
- DC Pass: Trunk DC pass, tap DC block
- Number tap outputs: 2
- Tap loss (dB): 12 (see Note 1)
- Through loss (dB): 3.0 (see Note 1)
- Return loss (dB): 10
- Isolation–tap to out (dB): 25 (see Note 2)
- Isolation–tap to tap (dB): 20 (see Note 2)
- Dimensions (HxWxD): 3.1 x 3.9 x 1.1 inches (80 x 100 x 29 mm)
- Weight: 8.0 oz. (227 g)

Note 1: Through loss and tap loss figures are typical 40- to 1450-MHz. At 2050 MHz, the losses are approximately 1 dB higher.

Note 2: Isolation is between closest outputs.

Model 1216IFD 2-way 16-dB tap

This section contains the performance specifications for the 1216IFD directional tap (see figure C-29).

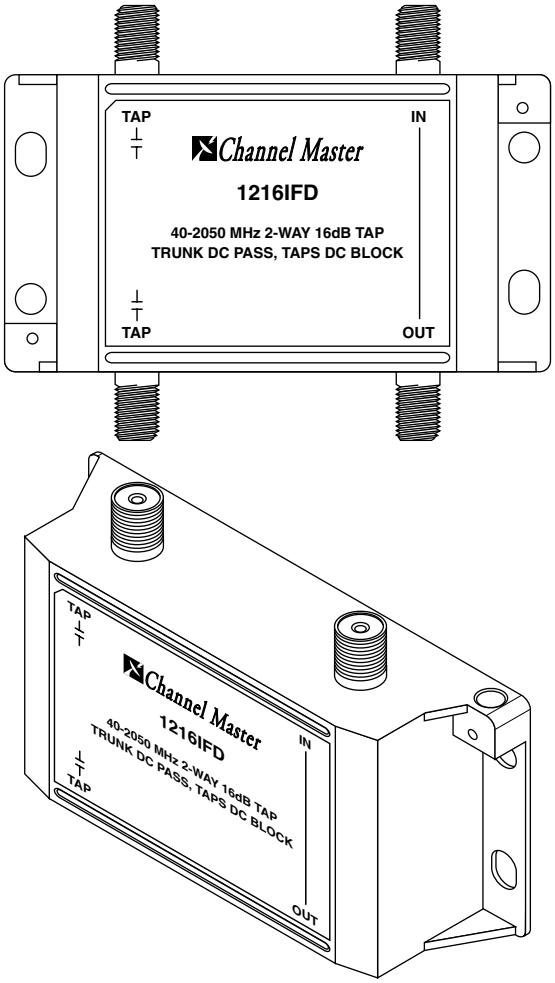


Figure C-29. Model 1216IFD 2-way 16-dB tap

Figure C-30 is the functional diagram.

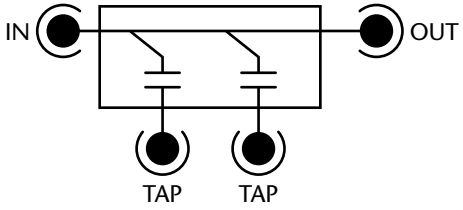


Figure C-30. Model 1216IFD functional diagram

Performance specifications:

- Frequency range: 40 to 2050 MHz
- Impedance: 75 ohms
- Connectors: F-type female
- DC Pass: Trunk DC pass, tap DC block
- Number tap outputs: 2
- Tap loss (dB): 16 (see Note 1)
- Through loss (dB): 1.8 (see Note 1)
- Return loss (dB): 10
- Isolation–tap to out (dB): 25 (see Note 2)
- Isolation–tap to tap (dB): 20 (see Note 2)
- Dimensions (HxWxD): 3.1 x 3.9 x 1.1 inches (80 x 100 x 29 mm)
- Weight: 8.0 oz. (227 g)

Note 1: Through loss and tap loss figures are typical 40- to 1450-MHz. At 2050 MHz, the losses are approximately 1 dB higher.

Note 2: Isolation is between closest outputs.

Model 1220IFD 2-way 20-dB tap

This section contains the performance specifications for the 1220IFD directional tap (see figure C-31).

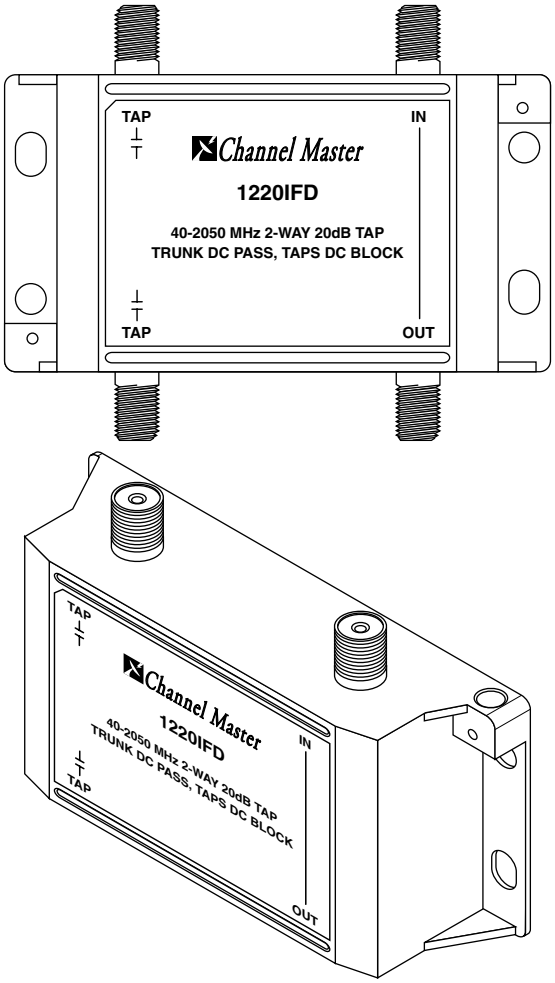


Figure C-31. Model 1220IFD 2-way 20-dB tap

Figure C-32 is the functional diagram.

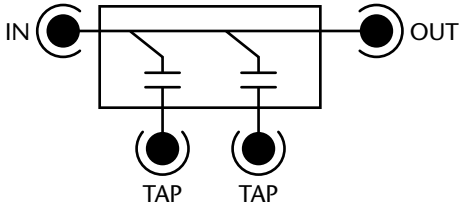


Figure C-32. Model 1220IFD functional diagram

Performance specifications:

- Frequency range: 40 to 2050 MHz
- Impedance: 75 ohms
- Connectors: F-type female
- DC Pass: Trunk DC pass, tap DC block
- Number tap outputs: 2
- Tap loss (dB): 20 (see Note 1)
- Through loss (dB): 1.6 (see Note 1)
- Return loss (dB): 10
- Isolation–tap to out (dB): 25 (see Note 2)
- Isolation–tap to tap (dB): 20 (see Note 2)
- Dimensions (HxWxD): 3.1 x 3.9 x 1.1 inches (80 x 100 x 29 mm)
- Weight: 8.0 oz. (227 g)

Note 1: Through loss and tap loss figures are typical 40- to 1450-MHz. At 2050 MHz, the losses are approximately 1 dB higher.

Note 2: Isolation is between closest outputs.

Model 6416IFD 4-way 16-dB tap

This section contains the performance specifications for the 6416IFD directional tap (see figure C-33).

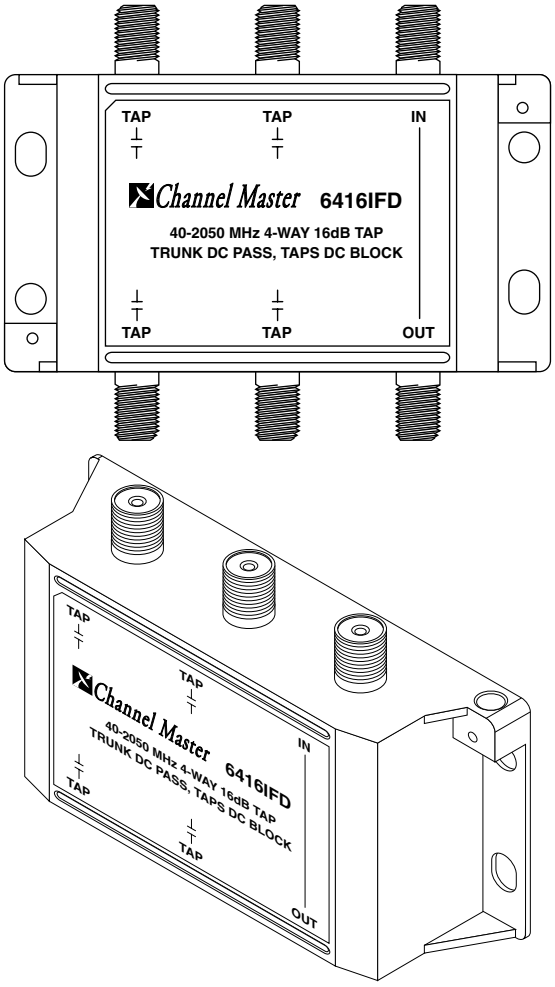


Figure C-33. Model 6416IFD 4-way 16-dB tap

Figure C-34 is the functional diagram.

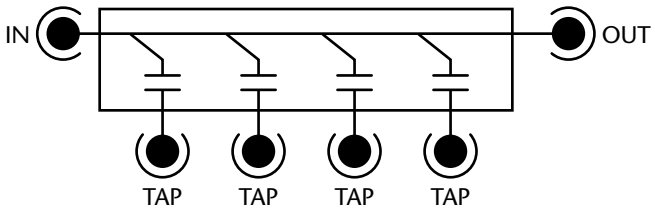


Figure C-34. Model 6416IFD functional diagram

Performance specifications:

- Frequency range: 40 to 2050 MHz
- Impedance: 75 ohms
- Connectors: F-type female
- DC Pass: Trunk DC pass, tap DC block
- Number tap outputs: 4
- Tap loss (dB): 16 (see Note 1)
- Through loss (dB): 2.8 (see Note 1)
- Return loss (dB): 10
- Isolation–tap to out (dB): 25 (see Note 2)
- Isolation–tap to tap (dB): 20 (see Note 2)
- Dimensions (HxWxD): 3.1 x 3.9 x 1.1 inches (80 x 100 x 29 mm)
- Weight: 9.1 oz. (258 g)

Note 1: Through loss and tap loss figures are typical 40- to 1450-MHz. At 2050 MHz, the losses are approximately 1 dB higher.

Note 2: Isolation is between closest outputs.

Model 6420IFD 4-way 20-dB tap

This section contains the performance specifications for the 6420IFD directional tap (see figure C-35).

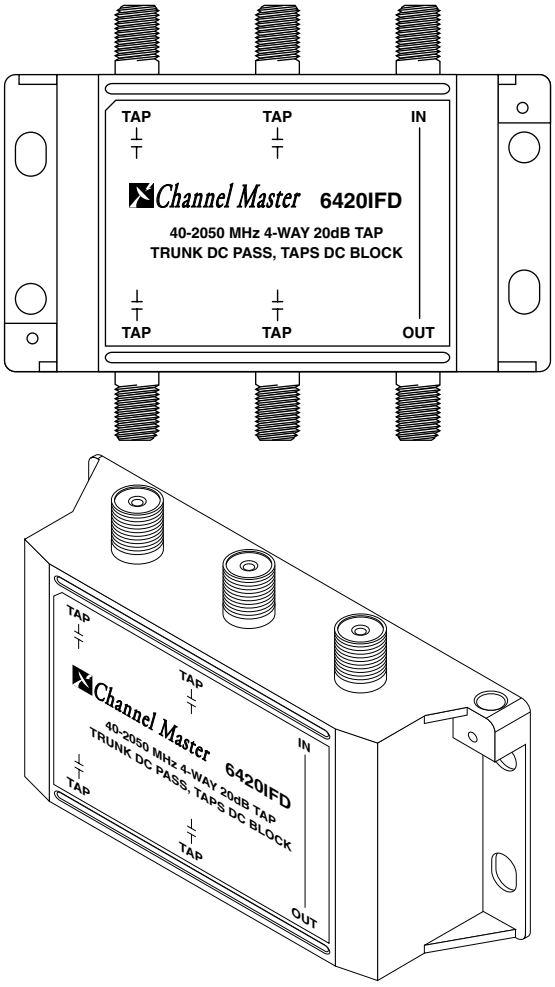


Figure C-35. Model 6420IFD 4-way 20-dB tap

Figure C-36 is the functional diagram.

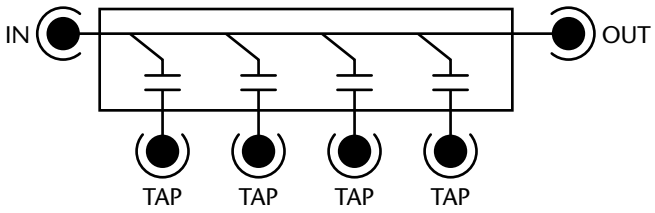


Figure C-36. Model 6420IFD functional diagram

Performance specifications:

- Frequency range: 40 to 2050 MHz
- Impedance: 75 ohms
- Connectors: F-type female
- DC Pass: Trunk DC pass, tap DC block
- Number tap outputs: 4
- Tap loss (dB): 20 (see Note 1)
- Through loss (dB): 2.0 (see Note 1)
- Return loss (dB): 10
- Isolation–tap to out (dB): 25 (see Note 2)
- Isolation–tap to tap (dB): 20 (see Note 2)
- Dimensions (HxWxD): 3.1 x 3.9 x 1.1 inches (80 x 100 x 29 mm)
- Weight: 9.1 oz. (258 g)

Note 1: Through loss and tap loss figures are typical 40- to 1450-MHz. At 2050 MHz, the losses are approximately 1 dB higher.

Note 2: Isolation is between closest outputs.

Model 6424IFD 4-way 24-dB tap

This section contains the performance specifications for the 6424IFD directional tap (see figure C-37).

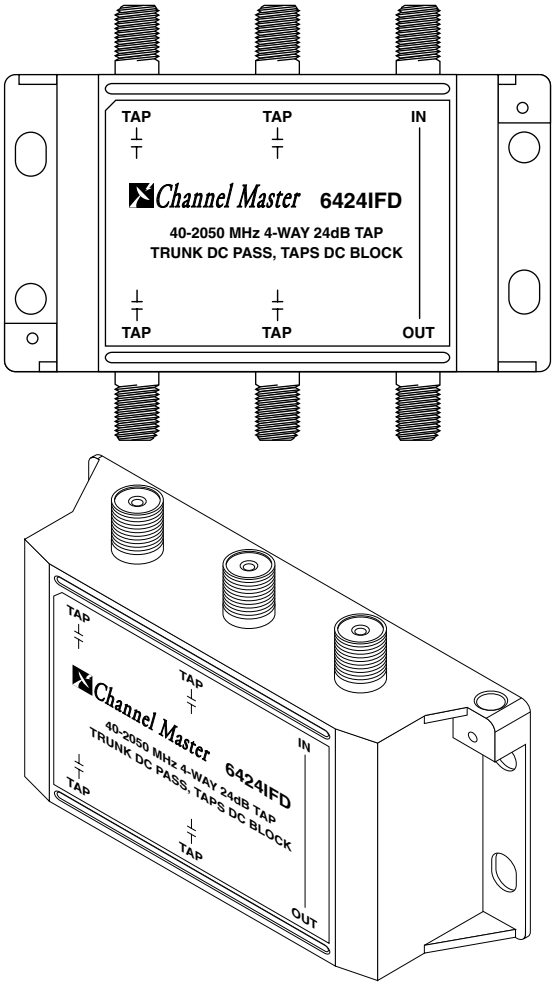


Figure C-37. Model 6424IFD 4-way 24-dB tap

Figure C-38 is the functional diagram.

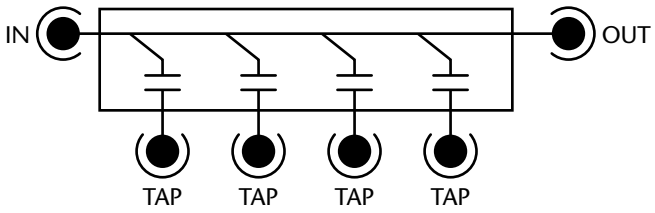


Figure C-38. Model 6424IFD functional diagram

Performance specifications:

- Frequency range: 40 to 2050 MHz
- Impedance: 75 ohms
- Connectors: F-type female
- DC Pass: Trunk DC pass, tap DC block
- Number tap outputs: 4
- Tap loss (dB): 24 (see Note 1)
- Through loss (dB): 1.6 (see Note 1)
- Return loss (dB): 10
- Isolation–tap to out (dB): 25 (see Note 2)
- Isolation–tap to tap (dB): 20 (see Note 2)
- Dimensions (HxWxD): 3.1 x 3.9 x 1.1 inches (80 x 100 x 29 mm)
- Weight: 9.1 oz. (258 g)

Note 1: Through loss and tap loss figures are typical 40- to 1450-MHz. At 2050 MHz, the losses are approximately 1 dB higher.

Note 2: Isolation is between closest outputs.

C.4 950 to 2050 MHz Model 5113IFD 13-dB line amplifier

This section describes the DirecPC model 5113IFD satellite IF general purpose 13-dB line amplifier (see figure C-39). The amplifier provides 13-dB gain at 1450 MHz and appropriate gain between 950 and 2050 MHz to give cable slope compensation. A functional diagram of the unit is shown in figure C-40.

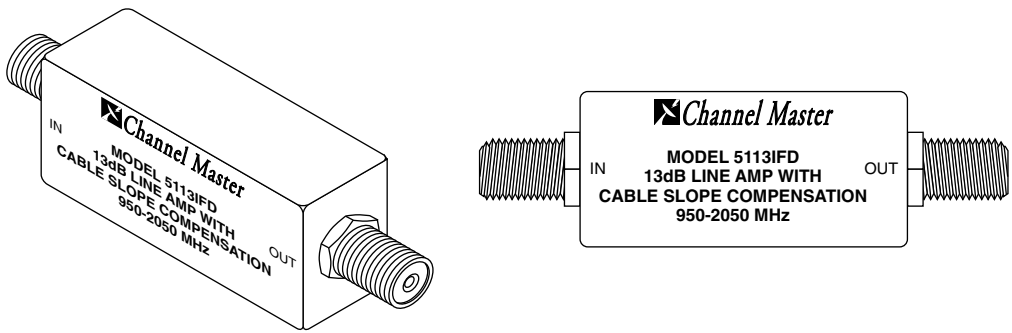


Figure C-39. Model 5113IFD 13-dB line amplifier

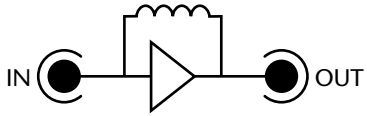


Figure C-40. Model 5113IFD functional diagram

Applications include:

- Enabling long (greater than 100 feet) runs of coaxial cable from the DirecPC adapter to the LNB.
- Strengthening signal levels in a satellite IF distribution system where the levels may have become marginal towards the end of the system farthest from the LNB.

Note 1: DirecPC adapter cards operate with input signal levels between -60 and -30 dBm per channel. HNS recommends that IF distribution systems be designed to give no less than -50 dBm per channel at the customer outlet.

Note 2: Because a buildup of 0.8V-drops through cascaded amplifiers is likely to cause a system malfunction due to low signal levels, do not cascade the amplified power dividers.

Note 3: Model 5113IFD amplifiers may only be cascaded up to two deep and there should be approximately 13-dB of cable loss at 1450 MHz between the two amplifiers.

Performance specifications:

- Passband: 950 to 2050 MHz
- Impedance: 75 ohms
- Connectors: F-type female
- Gain: 950 MHz = 10.0 dB
  1200 MHz = 11.5 dB
  1450 MHz = 13.0 dB
  1750 MHz = 14.0 dB
  2050 MHz = 15.0 dB
- Input return loss (dB): 6
- Output return loss (dB): 6
- Noise figure (dB): 5
- Output capability
  13-V operation
  (dBm per channel): -25 (see Note 1)

- Output capability
  17-V operation
  (dBm per channel): -22 (see Note 1)
- Input capability: Output capability minus gain
- Voltage requirements: 11 to 20 VDC
- Current requirements: 20 mA with 13-V supply
  35 mA with 20-V supply
- DC power pass: Both directions
- Dimensions (HxWxD): 0.8 x 2.8 x 0.6 inches
  (22 x 71 x 15 mm)
- Weight: 1 oz. (27 g)

Note 1: Output capability is for 16 channels at -40 dBc IMD.

Note 2: To avoid overloading the amplifier contained in the model 2252IFD, leave a minimum distance of 25 feet of RG6U between the LNB and the 2252IFD.

C.5
950 to 1450 MHz Model 5115IFD 15-dB high-level line extender

This section describes the DirecPC model 5115IFD satellite IF high-level line extender with general purpose 15-dB line amplifier (see figure C-40). The amplifier provides 15-dB gain between 950 and 1450 MHz to give cable slope compensation. It is intended for use with long runs of cable such as in an office or shopping complex. It includes a GaAs FET (GASFET) amplifier and has very high signal handling.

Its primary application is in the construction of large tapped trunk IF distribution systems. These amplifiers are intended to be cascaded. The amplifiers should be placed after approximately 15 dB of cable loss at 1450 MHz. As the loss per cable section is equal to the amplifier gain, this is known as a unity gain system. Cascades of up to four amplifiers deep are feasible. In some cases two cable trunks will be run in order to carry both polarizations of the satellite signals. When a source of signal is required at a point along the cable run, a directional tap from DirecPC's recommended range of ultra wideband directional taps should be inserted in the trunk line.

The unit includes a voltage-stabilized power supply with internal 8-V regulator, thus operation from a trunk line carrying 11 V or 20 V is acceptable. The model 8002IFD 13-

and 17-V LNB power supply and dual power injector is ideal for powering these units. Its 600mA current capability means a cascade of four line extenders or a dual trunk cascade of two line extenders each is possible with this power supply. Additional 8002IFD power supplies can be used as required.

Depending upon the signal levels out of the LNB, it may be necessary to space the first amplifier some distance from the LNB or use a power passing attenuator such as the model 2803IFD, 2806IFD, or 2810IFD which are 3, 6, and 10 dB power passing attenuators.

When the units are used only with directional taps and no signal is required out of the end of the trunk, then the end of the trunk should be terminated with a blocking terminator such as model 7184.

Refer to appendix A, "Additional expansion kit applications," for information on satellite distribution system design applications.

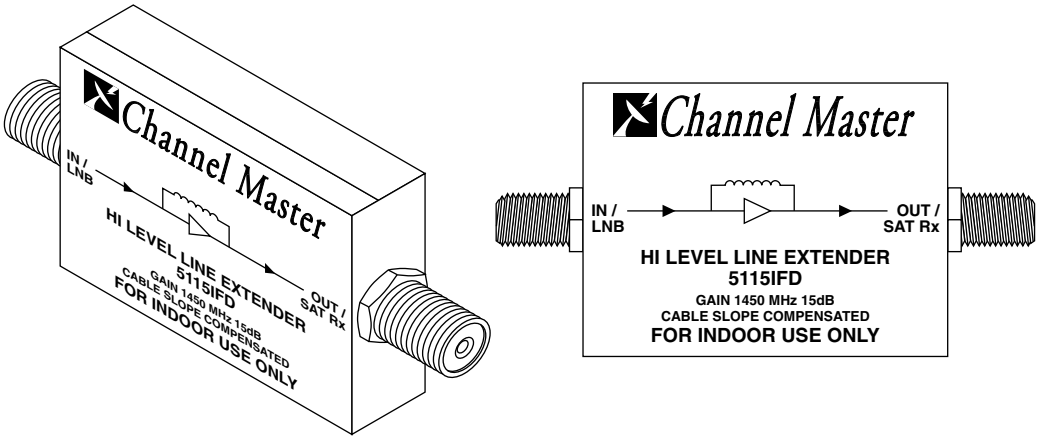


Figure C-41. Model 5115IFD 15-dB line amplifier

Performance specifications:

- Passband: 950 to 1450 MHz
- Impedance: 75 ohms
- Connectors: F-type female
- Gain: 950 MHz = 12.0 dB
  1200 MHz = 13.5 dB
  1450 MHz = 15.0 dB
- Input return loss (dB): 10

- Output return loss (dB): 8
- Noise figure (dB): 8
- Output capability: -10 dBm per channel (see Note 1)
- Third order intercept point (dBm): +22
- Input capability: Output capability minus gain
- Voltage requirements: 11 to 21 VDC at 105 mA
- DC power pass: Both directions
- Dimensions (HxWxD): 1.7 x 3.5 x 0.6 inches (43 x 88 x 14 mm)
- Weight: 1.9 oz. (55 g)

Note 1: Output capability is for 16 channels at -40 dBc IMD.

Cascade performance

In all cases, it is assumed that the input level to each amplifier is the same (amplifier gain at 1450 MHz is equal to cable loss at 1450 MHz). It is further assumed that there are 16 channels into each amplifier. The performance quoted is third-order intermodulation distortion at the output of the final amplifier. Systems should be designed such that the third-order distortion products at the output of the final amplifier does not exceed -40 dBc.

Third-order IMD at the output of the final amplifier

- 16 channels at -25 dBm per channel: 1 amp = -40 dBc, 2 amps = -34 dBc, 4 amps = -28 dBc
- 16 channels at -30 dBm per channel: 1 amp = -40 dBc, 2 amps = -44 dBc, 4 amps = -38 dBc
- 16 channels at -35 dBm per channel: 1 amp = -60 dBc, 2 amps = -54 dBc, 4 amps = -48 dBc
- 16 channels at -40 dBm per channel: 1 amp = -70 dBc, 2 amps = -64 dBc, 4 amps = -58 dBc

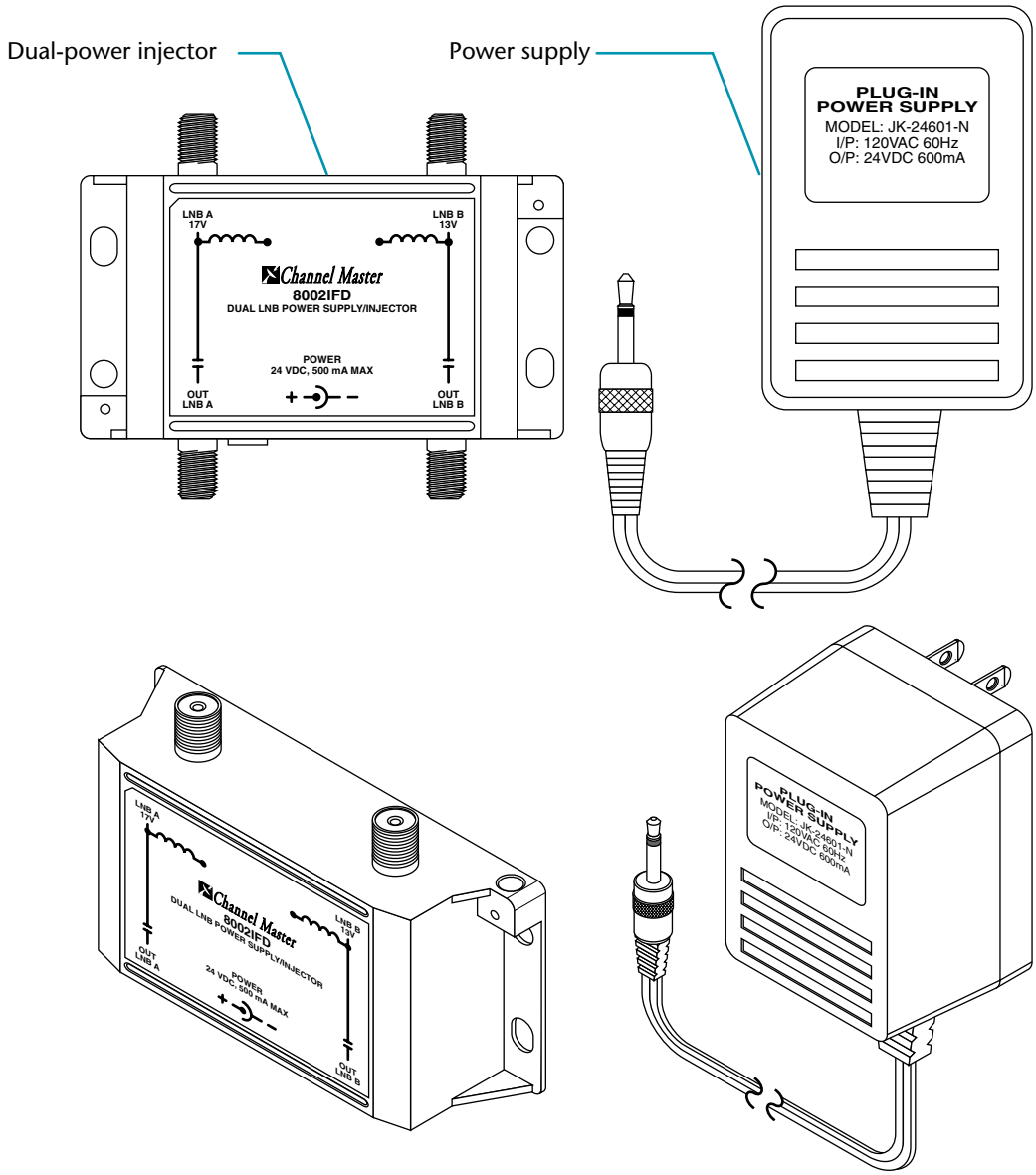


Figure C-42. Model 8002IFD dual-LNB power supply/injector

C.6
950 to 1450 MHz Model 8002IFD dual-LNB power supply/injector 13 and 17 volts

The 8002IFD (see figure C-42) is a dual-LNB power supply for use with one or two LNBs. It supplies 13 volts regulated to one LNB output and 17 volts regulated to the other. It is constructed in two parts. The first part is a standard wall plug power supply, which has an output of approximately 24 VDC unregulated. This is connected to the dual power injector

section. Here, the 24 V is regulated down to 13 V and 17 V. These voltages are added to the LNB input lines. The output lines are DC blocked. The total current draw by both LNB inputs should not exceed 600 mA. A block diagram of the unit is shown in figure C-43.

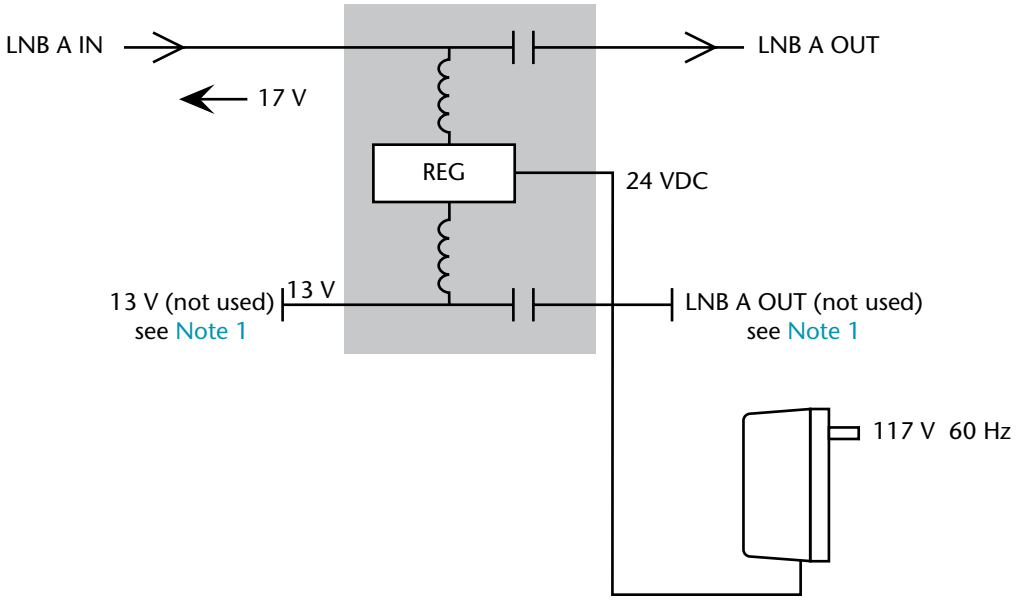


Figure C-43. Model 8002IFD functional diagram

Note 1: For DirecPC applications, only the 17-VDC terminals are used. Do not install terminators on the unused ports.

The unit is intended for use in DirecPC systems where it is not desirable to power the LNB from the satellite DirecPC adapter. It is also ideal for powering line amplifiers.

Performance specifications:

- Passband: 950 to 2050 MHz
- Impedance: 75 ohms
- Connectors, RF: F-type female
- Connector, power: 3.5 mm jack
- Insertion loss (dB) 0.5
- Return loss (dB): 17
- Cross-polar isolation: 50 dB at 1450 MHz
- LNB A voltage: 17.2 V regulated
- LNB B voltage: 13.4 V regulated
- Maximum current: 500 mA LNB A + LNB B
- Wall plug input: 117 VAC, 60 Hz
- Wall plug output: 24 VDC unregulated at 500 mA max.
- Dimensions, wall plug (HxWxD): 3.3 x 2.2 x 1.9 inches (84 x 56 x 49 mm)
- Dimensions, injector (HxWxD): 3.1 x 3.9 x 1.1 inches (80 x 100 x 29 mm) including connectors
- Weight, wall plug: 14.1 oz. (400 g)
- Weight, injector: 8.3 oz. (235 g)

C.7 Satellite signal level meters

The following sections describe satellite signal level meters that will help you align a DirecPC antenna. All satellite signal level meters include satellite IF (950 to 2050 MHz) amplification and a broadband detector. The detector drives a signal strength meter. Some models have a built-in speaker that emits a variable-frequency audio tone. The installer can then choose to align the antenna based on the maximum meter deflection or highest pitched tone.

Model 1001IFD satellite signal level meter–standard model

The model 1001IFD satellite signal level meter (see figure C-44) includes satellite IF (950-2050 MHz) amplification and a broadband detector. The detector drives a meter and a variable frequency audio tone. The installer can choose to align the antenna based on the maximum meter deflection or highest pitched tone. A gain control allows a wide range of input signal levels.

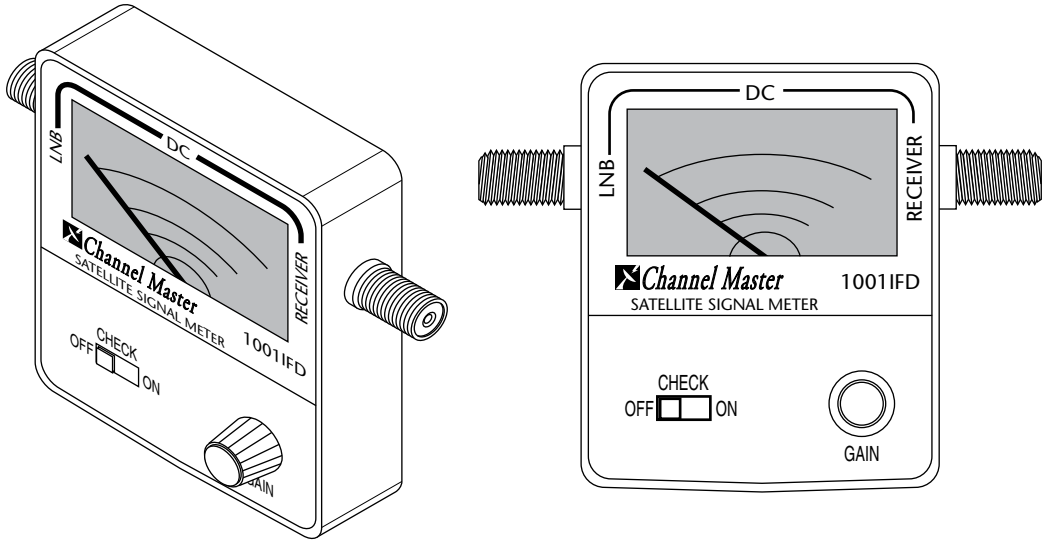


Figure C-44. Model 1001IFD satellite signal level meter

The unit is connected to the low-noise block (LNB) via a short coaxial cable (see figure C-45). The 1001IFD output must be connected to the DirecPC adapter to supply power. The unit operates from the 12- to 24-VDC power received through the coaxial cable.

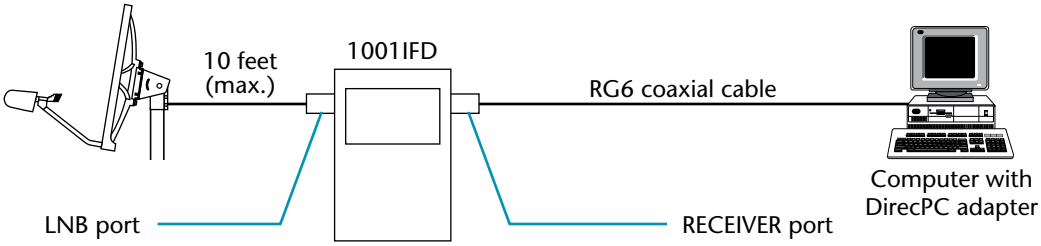


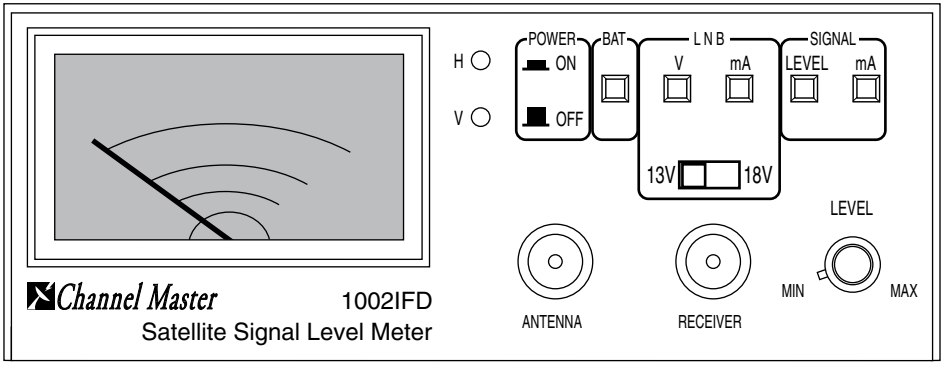
Figure C-45. Connection diagram

Performance specifications:

- Frequency range: 950 to 2050 MHz
- Impedance: 75 ohms
- Connectors: F-type female
- Audio tone: Yes
- Insertion loss (dB): 2
- Input level range (dBm): 1 channel = -30 to +4
8 channels = -39 to -5
16 channels = -42 to -8
- Dimensions (HxWxD): 2.8 x 2.3 x 1.1 inches
(71 x 58 x 28 mm)
- Weight: 5.3 oz. (150 g)

Model 1002IFD satellite signal level meter, deluxe model with 12/17 V battery pack and carrying case

The model 1002IFD satellite signal level meter (see figure C-46) includes satellite IF (950 to 2050 MHz) amplification and a broadband detector. The detector drives a meter and a variable frequency audio tone. The installer can choose to align the antenna based on the maximum meter deflection or highest pitched tone. A gain control allows a wide range of input signal levels.



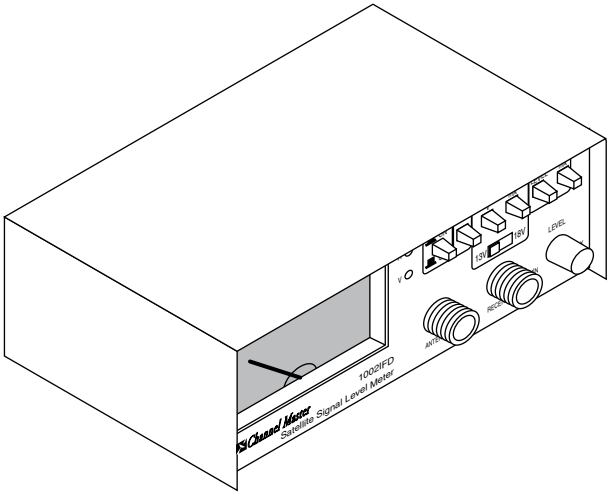


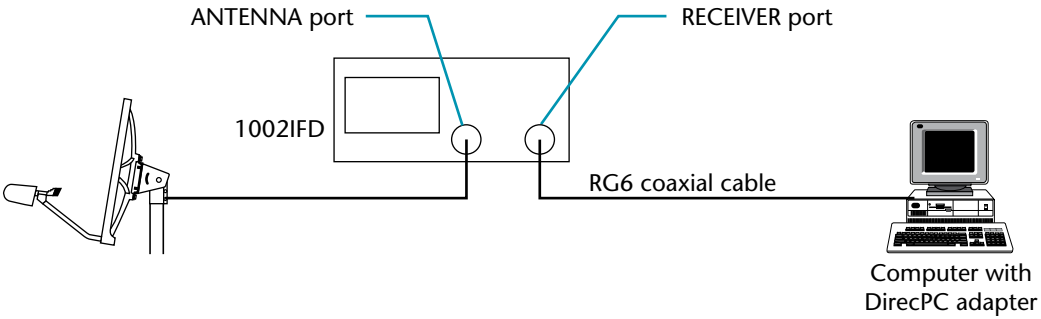
Figure C-46. Model 1002IFD satellite signal level meter

The 1002IFD includes a deluxe carrying case, a rechargeable NICAD battery pack, and a wall plug recharging unit. This allows an antenna to be aligned before it is connected to the DirecPC adapter (See configuration #2 in figure C-47). The

battery pack is switchable between 13- and 17-V output allowing either polarization to be selected when used with a voltage-switched LNB.

The 1002IFD can also be connected to the DirecPC adapter to supply power (see configuration #1 in figure C-47). Doing so extends the life of the 1002IFD's batteries between recharges. The unit then operates from the 12- to 24-VDC power received through the coaxial cable.

Configuration #1: Powered by DirecPC adapter



Configuration #2: Powered by rechargeable NICAD batteries

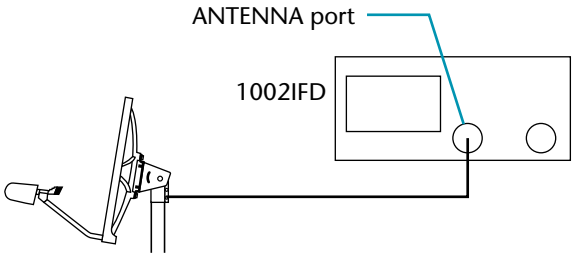


Figure C-47. Connection diagram

Performance specifications:

- Frequency range: 950 to 2050 MHz
- Impedance: 75 ohms
- Connectors: F-type female
- Audio tone: Yes
- Insertion loss (dB): 6
- Input level range (dBm): 1 channel = -30 to +4
8 channels = -39 to -5
16 channels = -42 to -8
- Wall plug charging voltage (VDC): 24

- Battery life (hours between charges): 2.5
- Dimensions (HxWxD): 2.2 x 5.9 x 4.7 inches (56 x 150 x 120 mm)
- Weight: 34.9 oz. (990 g)

Model 1003IFD satellite signal level meter

The model 1003IFD satellite signal level meter (see figure C-48) includes satellite IF (950-2050 MHz) amplification and a broadband detector. The detector drives a meter and a variable frequency audio tone. The installer can choose to align the antenna based on the maximum meter deflection or highest pitched tone. A gain control allows a wide range of input signal levels.

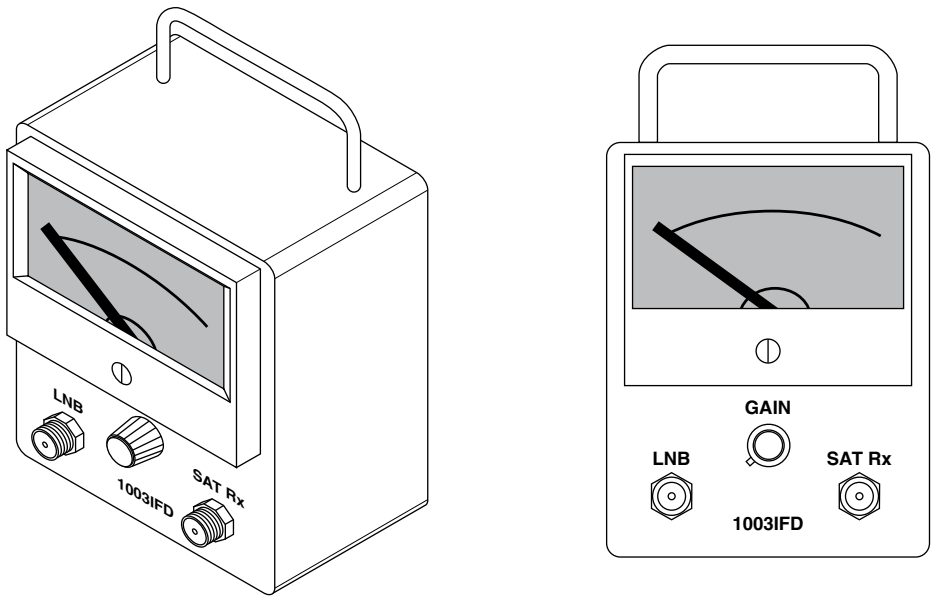


Figure C-48. Model 1003IFD satellite signal level meter

The unit is connected to the low-noise block (LNB) via a short coaxial cable (see figure C-49). The 1003IFD output must be connected to the DirecPC adapter to supply power. The unit operates from the 12- to 24-VDC power received through the coaxial cable.

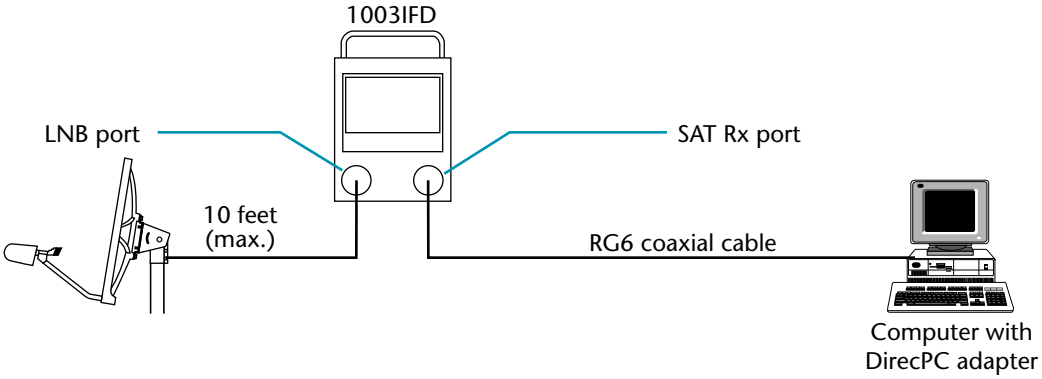


Figure C-49. Connection diagram

Performance specifications:

- Frequency range: 950 to 2050 MHz
- Impedance: 75 ohms
- Connectors: F-type female
- Audio tone: Yes
- Insertion loss (dB): 5
- Input level range (dBm): 1 channel = -30 to +4
8 channels = -39 to -5
16 channels = -42 to -8
- Dimensions (HxWxD): 5.8 x 3.6 x 2.8 inches
(147 x 92 x 72 mm)
- Weight: 32 oz. (907 g)

C.8

Connectors and other hardware

The following sections describe grounding blocks, connectors, connector crimping tools, and other hardware for customizing the DirecPC system.

Model 7184 AC/DC blocked F-type terminator

The model 7184 AC/DC blocked F-type terminator (see figure C-50) is a 75-ohm resistive termination for use with line equipment when using line-powered equipment.

Standard package quantity: 24.

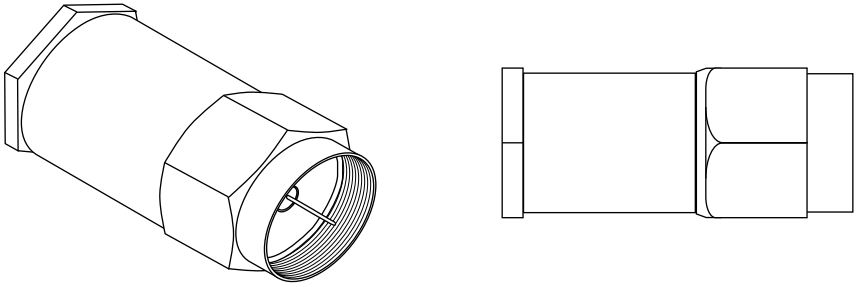


Figure C-50. Model 7184 AC/DC blocked F-type terminator

Model 7199 coaxial grounding block

The model 7199 coaxial grounding block (see figure C-51) is intended for wall mounting and includes an easy-to-use ground wire connection.

Standard package quantity: 50.

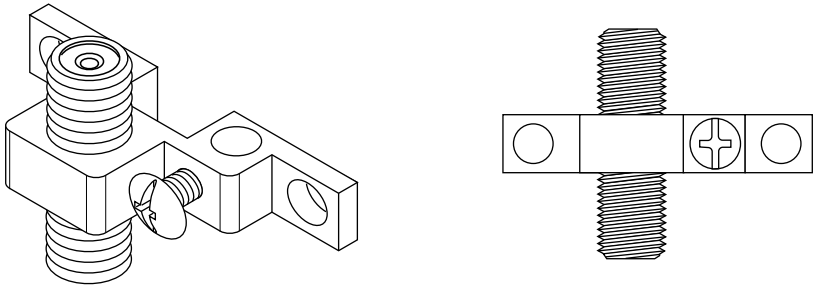


Figure C-51. Model 7199 coaxial grounding block

Model 7180 dual-coaxial grounding block

The model 7180 dual-coaxial grounding block (see figure C-52) is intended for wall mounting and includes an easy-to-use ground wire connection.

Standard package quantity: 50.

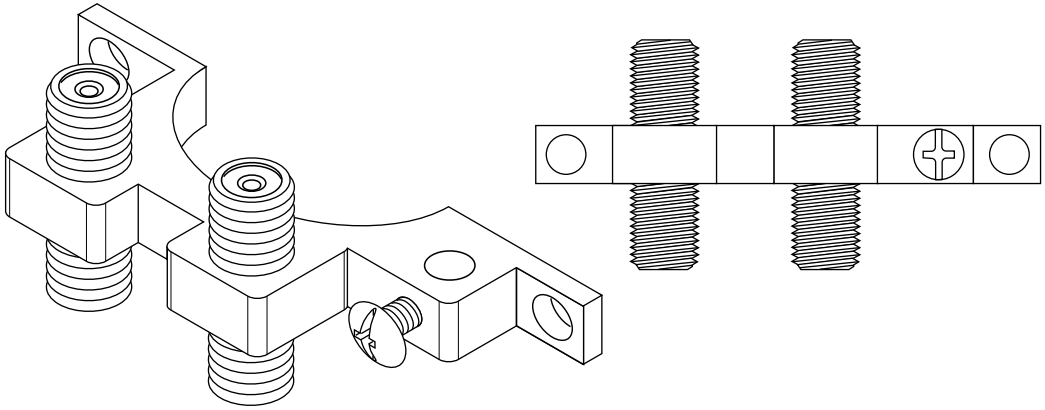


Figure C-52. Model 7180 dual-coaxial grounding block

Model 7163 weatherproof F-type connector

The model 7163 weatherproof F-type connector (see figure C-53) can be used indoors with standard RG6 coaxial cable or outdoors with direct-burial-type RG6 cable.

Standard package quantity: 100.

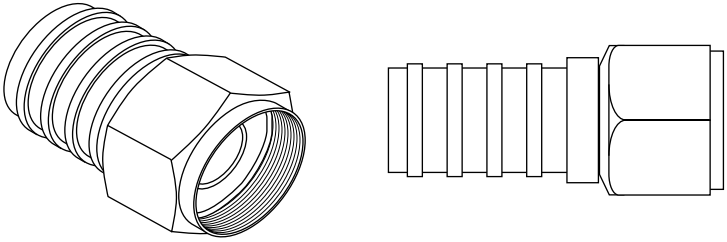


Figure C-53. Model 7163 weatherproof F-type connector

Model 7161 RG6U coaxial cable F-type connector

The model 7161 RG6U coaxial cable F-type connector (see figure C-54) is intended for indoor use.

Standard package quantity: 100.

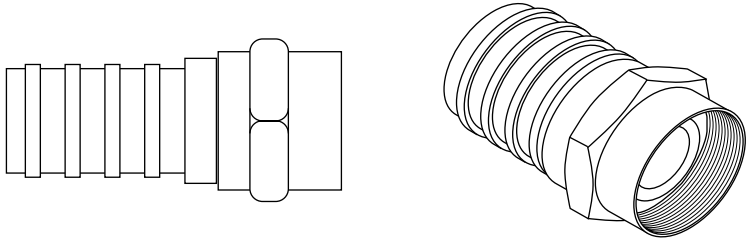


Figure C-54. Model 7161 RG6U coaxial cable F-type connector

Model 7165 in-line connector coupler

The model 7165 in-line connector coupler (see figure C-55) connects F-type connector equipped coaxial cables. Hex-nut and washer hardware are not included.

Standard package quantity: 100.

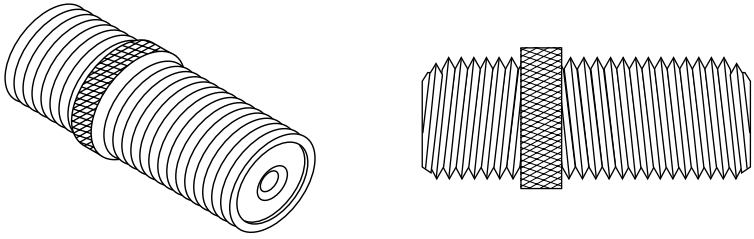


Figure C-55. Model 7165 in-line connector coupler

Model 7190 F-type terminator

The model 7190 F-type 75-ohm resistive terminator (see figure C-56) terminates unused ports on line equipment.

Standard package quantity: 10.

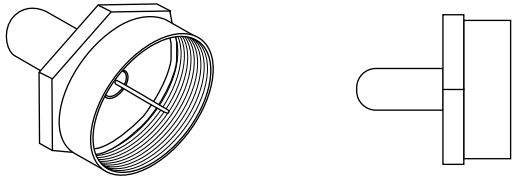


Figure C-56. Model 7190 F-type terminator

Model 2620 right-angle connector

The model 2620 right-angle connector (see figure C-57) provides F-type plug to F-type jack conversion.

Standard package quantity: 50.

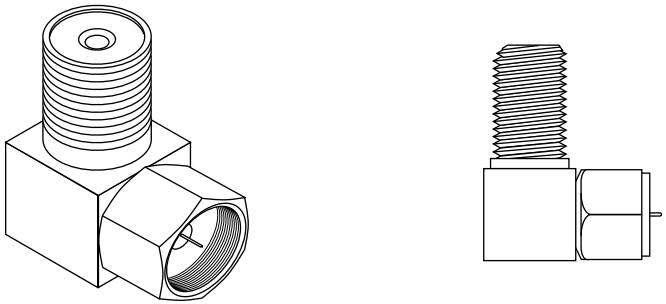


Figure C-57. Model 2620 right-angle connector

Model 7195 in-line connector coupler

The model 7195 in-line connector coupler (see figure C-58) connects F-type connector equipped coaxial cables. Hex-nut and washer hardware are included.

Standard package quantity: 100.

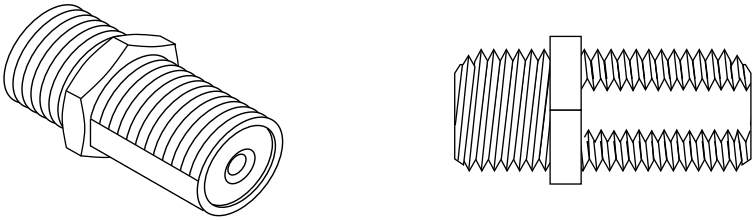


Figure C-58. Model 7195 in-line connector coupler

Model 7186 hex crimping tool

The model 7186 hex crimping tool (see figure C-59) can be used for both RG6U and RG59U F connectors that have 1/2-inch crimp rings. (Crimp cavity size: 0.360, 0.324 hex.)

Standard package quantity: 1.

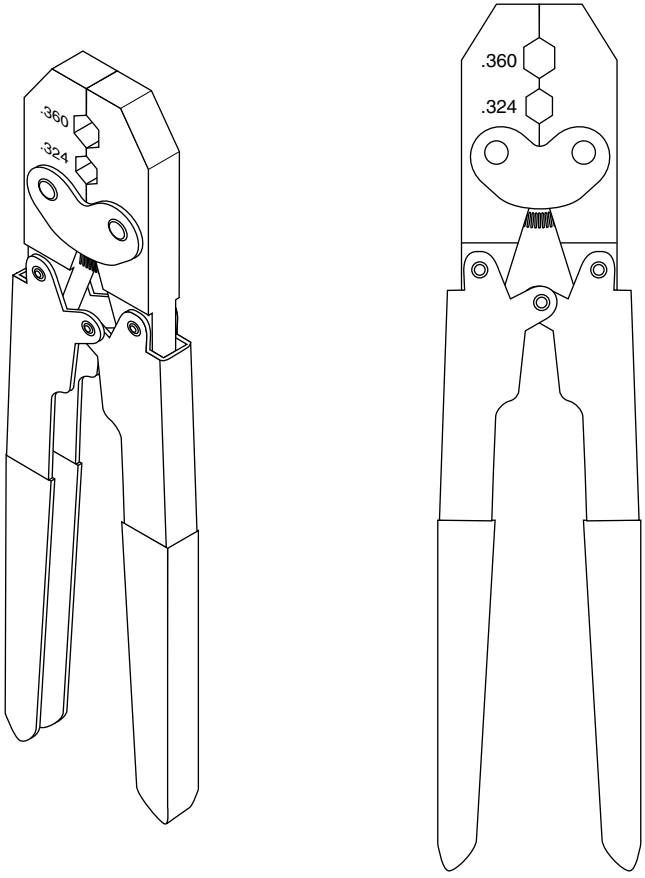


Figure C-59. Model 7186 hex crimping tool

Model 7187 hex crimping tool

The model 7187 hex crimping tool (see figure C-60) crimps both attached and separate ferrules of RG59U and RG6U connectors with 1/2-inch crimp rings. (Crimp cavity size: 0.262, 0.324 hex.)

Standard package quantity: 1.

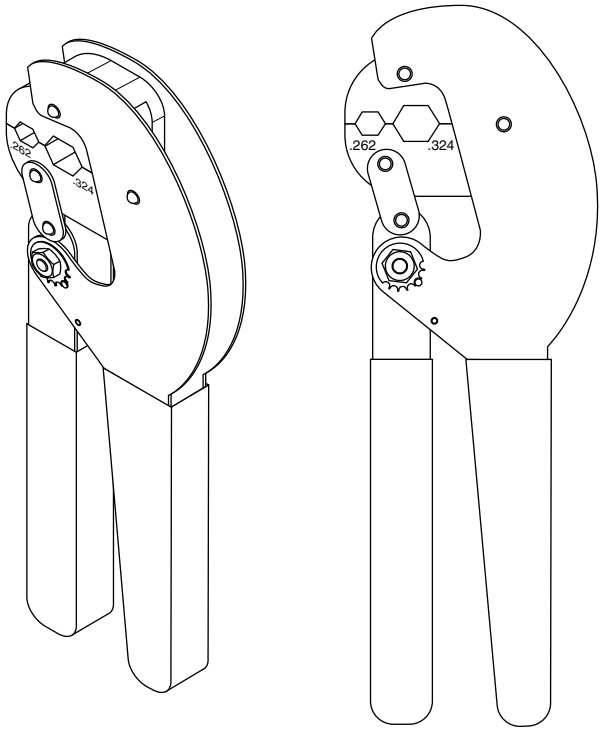


Figure C-60. Model 7187 hex crimping tool

Model 7197 weatherboot

The model 7197 weatherboot–flexible (see figure C-61) and weatherproof–protects outdoor F-type connections.

Standard package quantity: 50.

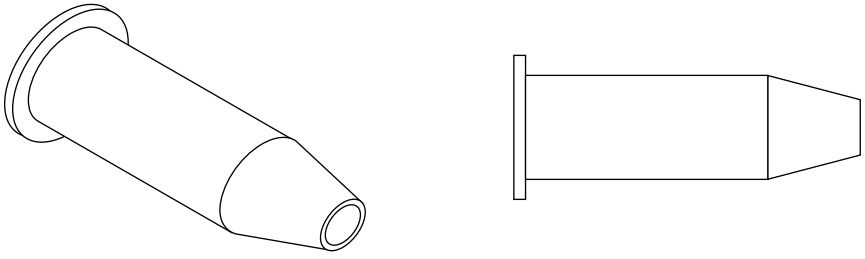


Figure C-61. Model 7197 weatherboot

Model 2610 F-type male-to-male coupler

The model 2610 F-type male-to-male coupler (see figure C-62) is intended for interconnecting distribution components.

Standard package quantity: 50.

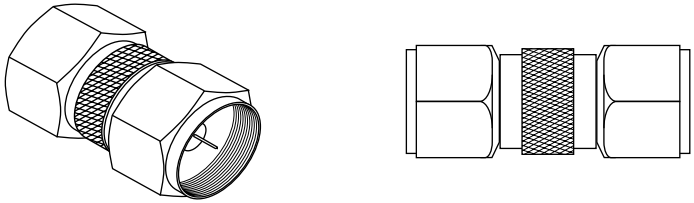


Figure C-62. Model 2610 F-type male-to-male coupler

Model 7264 F-type male-to-female coupler with AC/DC voltage block

The model 7264 type-F male-to-female coupler with AC/DC voltage block (see figure C-63) is for use with line equipment when using line-powered equipment.

Standard package quantity: 1.

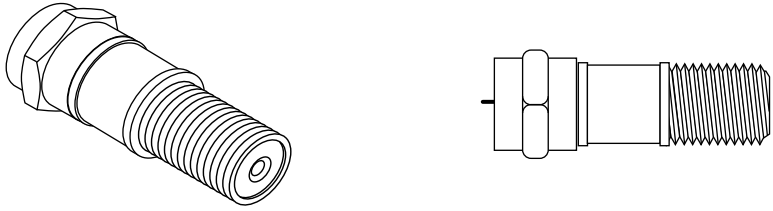


Figure C-63. Model 7264 type-F male-to-female coupler with AC/DC voltage block

Model 2607 F-type male twist-on fitting

The model 2607 type-F male twist-on fitting (see figure C-64) is for use with indoor RG6 coaxial cables.

Standard package quantity: 100.

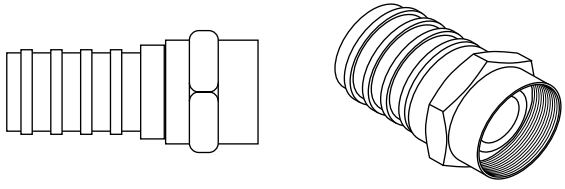


Figure C-64. Model 2607 type-F male twist-on fitting

C.9

Coaxial cables

The following sections describe assembled coaxial cables and bulk cable recommended for use with the DirecPC system.

Model 3110 12-foot RG6 coaxial cable

Consists of a 12-foot length of RG6 75-ohm direct-burial coaxial cable with weatherproof F-type connectors.

Standard package quantity: 16.

Model 3140 25-foot RG6 coaxial cable

Consists of a 25-foot length of RG6 75-ohm direct-burial coaxial cable with weatherproof F-type connectors.

Standard package quantity: 10.

Model 3141 50-foot RG6 coaxial cable

Consists of a 50-foot length of RG6 75-ohm direct-burial coaxial cable with weatherproof F-type connectors.

Standard package quantity: 10.

Model 3142 75-foot RG6 coaxial cable

Consists of a 75-foot length of RG6 75-ohm direct-burial coaxial cable with weatherproof F-type connectors.

Standard package quantity: 10.

Model 3143 100-foot RG6 coaxial cable

Consists of a 100-foot length of RG6 75-ohm direct-burial coaxial cable with weatherproof F-type connectors.

Standard package quantity: 8.

Model 9548-800 800-foot bulk RG6 coaxial cable

Consists of an 800-foot coil of RG6 75-ohm direct-burial coaxial cable in a 15.5 x 9.3 x 16-inch dispenser.

Standard package quantity: 1.

APPENDIX

D

Software license and warranty information

D.1

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D.2

Hughes Network Systems limited warranty

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Purchase Date: _____ DirecPC Adapter Serial Number: _____

Note: For warranty assistance (to return a failed item of hardware, for instance) contact 1-800-DIRECPC.

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1021516-0001, Rev. A

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