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YOUR SATELLITE DISH KIT SHOULD INCLUDE THE FOLLOWING ITEMS:

Satellite Dish (rear view)  Mast and Base Plate  Feed Arm

Azimuth/Elevation Cap  Shroud  LNB/Waveguide Assembly

Also included are the indoor items that are necessary to connect the satellite dish and your computer. See the installation guide that comes with the software and indoor components (packaged separately in the antenna box) for a complete list.

PARTS LIST

Your kit also contains assorted hardware. Depending on how you install and ground your system, you may have some hardware left over when you are done. You will have to supply other items. Go to page 4 to view a table that lists what you will need to supply.

- M4 Allen screws, Qty: 4
- Red O-ring, Qty: 1
- Galvanized washers, 3/8-inch Qty: 6
- Allen wrench, 3mm, Qty: 1
- Lag screws, 1/4-inch x 4-inch, Qty: 4
- Lag screws, 3/8-inch x 2-inch, Qty: 4
- Lag screws, 3/8-inch x 4-inch, Qty: 6
- 5/16-inch Nylock nuts, Qty: 4
- 5/16-inch Lock washer, Qty: 1
- 1/4-20 Hex-Head Nut, Qty: 1
- 5/16-18 x 2-inch Hex screw, Qty: 1
- 5/16-18 Wedge nut, Qty: 1
- 5/16-inch Flat washer, Qty: 5
- Galvanized washers, 1/4-inch, Qty: 4
- 1/4-20 x 1/2-inch Hex-Head Bolt, Qty: 1
- 1/4-inch Lock washer (star washer for grounding), Qty: 1
CONVENTIONS USED IN THIS GUIDE

The following conventions are used throughout this guide to help you become familiar with possible safety and equipment hazards.

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="danger.png" alt="Alert Symbol" /></td>
<td>This safety alert symbol is used to alert you to hazards or hazardous situations that can result in personal injury. A signal word, <strong>DANGER</strong>, <strong>WARNING</strong>, or <strong>CAUTION</strong>, is used with the alert symbol to indicate the likelihood and potential severity of injury.</td>
</tr>
<tr>
<td><img src="danger.png" alt="DANGER" /></td>
<td>Indicates an imminent hazard or unsafe practice which, if not avoided, will result in death or severe personal injury.</td>
</tr>
<tr>
<td><img src="warning.png" alt="WARNING" /></td>
<td>Indicates a hazard or unsafe practice which, if not avoided, could result in death or severe personal injury.</td>
</tr>
<tr>
<td><img src="caution.png" alt="CAUTION" /></td>
<td>Indicates a hazard or unsafe practice which, if not avoided, might result in moderate or minor personal injury.</td>
</tr>
<tr>
<td><img src="caution.png" alt="CAUTION" /></td>
<td>When used without the alert symbol, indicates a hazard or unsafe practice that might result in property damage.</td>
</tr>
</tbody>
</table>

*Note: A note presents additional information.*
A WORD TO THE DO-IT-YOURSELFER

We recommend you ask a professional satellite installer to mount your satellite dish and run your cables, but we recognize that some people will elect to do their own installation. If you are one of these people, or if you are undecided about whether or not to perform your own installation, please consider the following.

- Mounting the satellite dish to a concrete or masonry foundation, exposed deck timber, or metal pole are the best options for the homeowner because you can see that the fasteners are properly installed.
- Mounting the satellite dish to the house roof is a desirable mounting method only if you are positive that you can drill the holes for lag screws within 1/16-inch of the center of the rafters or trusses. This requires special tools and expertise. If you must mount to a roof, pick a location where the roof is unfinished and accessible from the inside so that you can reinforce it if necessary and assure yourself that the fasteners penetrated the rafters or trusses without splintering them.
- Do not depend on consumer quality stud finders to locate rafters underneath asphalt shingles because they may give false positive readings or miss rafters entirely.
- Given a choice, it is always best not to penetrate a roof.
- If a lag screw misses the rafter or truss but is securely fastened in the sheathing, the satellite dish could pull the lag screws out of the sheathing or peel the sheathing away from the rafter or truss during high wind loads.
- If you plan to upgrade to a Two-Way System, which requires that the satellite dish be installed by a professional installer, we suggest you review the copy of its satellite dish installation manual, HNS part number 1031362-0201, on your software installation CD. The manual can help you understand the Two-Way System installation requirements.
- When cabling, if there is even a remote possibility that you will upgrade to either a DIRECTV® system or a Two-Way System, run extra cables to save yourself future effort.
- If you plan to or think you may upgrade to a Two-Way System, be sure to install your base plate so that its center is 5 feet above ground.
- Best grounding results are achieved with quad shielded RG6 coaxial cable with a shield resistance of less than 0.6 ohms per 100 feet.

*If you install the satellite dish yourself, you must supply a number of items. See the following table.*
<table>
<thead>
<tr>
<th>Type of installation</th>
<th>Parts you must supply</th>
<th>Tools you must supply</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALL INSTALLATIONS</td>
<td>• Coaxial cable (see “Cable specifications” on page 9)</td>
<td>• Compass</td>
</tr>
<tr>
<td></td>
<td>• Weatherproof 360° cable connectors</td>
<td>• Angle finder or protractor</td>
</tr>
<tr>
<td></td>
<td>• Cable ties</td>
<td>• Carpenter’s level</td>
</tr>
<tr>
<td></td>
<td>• Insulated U-shaped tacks</td>
<td>• Pencil or chalk</td>
</tr>
<tr>
<td></td>
<td>• F-type ground block and screws</td>
<td>• Ladder or stepladder</td>
</tr>
<tr>
<td></td>
<td>• 1/4-inch washer (for grounding if not using RG-6 quad shielded cable)</td>
<td>• Electric drill</td>
</tr>
<tr>
<td></td>
<td>• #6 washer (to help with drilling)</td>
<td>• Ruler and tape measure</td>
</tr>
<tr>
<td></td>
<td>• Silicone sealant</td>
<td>• Adjustable wrench (socket preferred)</td>
</tr>
<tr>
<td></td>
<td>• 8AWG aluminum and/or 14AWG copper ground wire, as required for installation or grounding scheme</td>
<td>• Torque wrench (up to 18 ft.-lbs.)</td>
</tr>
<tr>
<td></td>
<td>• If not using RG-6 quad shield coaxial cable, one split bolt with nut for connections at the ground block</td>
<td>• Open-end or socket wrenches: 3/16, 1/2, 5/16, 7/16, 9/16-inch</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Needle-nose pliers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Lineman pliers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• String</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• #2 Phillips or similar screwdriver</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Flat-blade screwdriver</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Hammer</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Permanent marker</td>
</tr>
<tr>
<td>Wood post</td>
<td>All parts supplied</td>
<td>• Drill bits: 3/8, 1/4, and 1/8-inch</td>
</tr>
<tr>
<td>Wood frame roof</td>
<td>• If you decide to use 5/16-inch x 4-inch lag screws for this installation, you must provide them and the 5/16-inch galvanized washers</td>
<td>• Drill bits: 3/8, 1/4, 1/8, and 5/32-inch</td>
</tr>
<tr>
<td>Concrete masonry or concrete wall</td>
<td>• 3/8-inch x 3-inch Hilti sleeve anchor, Qty: 6</td>
<td>• Hammer drill</td>
</tr>
<tr>
<td></td>
<td>• If also installing optional brace kit, 1/4-inch x 2-1/4-inch Hilti sleeve anchor, Qty: 4</td>
<td>• Masonry drill bits: 3/8-inch</td>
</tr>
<tr>
<td>Metal pole</td>
<td>• Metal pole, 2-3/8-inch diameter, 9 feet long, schedule 40 galvanized</td>
<td>• Hole-digging tools</td>
</tr>
<tr>
<td></td>
<td>• 1-inch x 2-3/8-inch ground clamp for metal pole</td>
<td>• Wheelbarrow or concrete mixing box</td>
</tr>
<tr>
<td></td>
<td>• 40-lb. bags quick-setting concrete, Qty: 3</td>
<td>• Hacksaw</td>
</tr>
<tr>
<td></td>
<td>• If not using RG-6 quad-shielded cable, one 5/8-inch by 10-foot ground rod and ground rod clamp</td>
<td></td>
</tr>
</tbody>
</table>
**INTRODUCTION**

This *Satellite Dish Installation Guide Model: DW 3000 One-Way* provides information required to assemble your satellite dish and establish contact with the satellite.

**OTHER USEFUL GUIDES**

The installation guide included with the software and indoor equipment gives an overview of the entire installation process, including the modem and software installation.

**WHAT IS INCLUDED IN THE SATELLITE BROADBAND SYSTEM**

The satellite broadband system consists of several major components:

- The receive modem
- The satellite dish assembly that is installed outside
- Cables for connecting the receive modem and your computer
- Software
- This guide and the installation guide included with the software and indoor equipment

This guide is intended for an installer experienced in performing the various installation tasks. Depending on how you will install the satellite dish, you may be required to:

- Use a power drill to drill holes into your house.
- Locate rafters or trusses and drill holes in the exact center of them.
- Determine whether there are water pipes, electrical wiring, or gas lines hidden in the walls near where you will be drilling.
- Route coaxial cable through the foundation wall, under floors, and through interior walls.
- Ground the satellite dish and coaxial cable as recommended in the National Electrical Code (published by the National Fire Protection Association, Batterymarch Park, Quincy, MA 02269).

If you do not feel comfortable performing these tasks or complying with installation requirements, contact your dealer, or call 1-866-347-3292 for information on having your system installed by an authorized professional installer.

**INSTALLATION AND YOUR HOME**

The Federal Communications Commission (FCC) has a rule that generally forbids local governments and homeowners associations from preventing installation of DBS dishes one meter or smaller in size (in Alaska, the dish size limit does not apply). For more information, please visit the FCC’s Web site at www.fcc.gov. Use the site search engine to find the FCC *Fact Sheet on Placement of Antennas.*

**BASIC STEPS OF SATELLITE DISH INSTALLATION**

To install your satellite dish, follow these basic steps:

1. Install the software and receive modem so that you can determine pointing values for your satellite dish
2. Choose an installation site
3. Select a mounting method
4. Install the mount
5. Assemble the satellite dish
6. Install the satellite dish on the mount
7. Run cable and ground wire to connect and ground the entire assembly
8. Aim the satellite dish

*Note: if you think you may later upgrade to the two-way option (both receive and transmit signals via satellite), you should at this time install the antenna assembly in a location or manner not readily accessible to children and at least 5 feet above ground.*
INSTALLING SOFTWARE AND LOCATING THE SATELLITE

Before you can install the satellite dish, you must select an installation site. Before you can select an installation site, you must determine the direction you will aim the satellite dish. You determine that direction by installing the system software, which will tell you the direction.

The satellite is located approximately 22,300 miles in geostationary orbit above the equator. The satellite travels above Earth’s equator from west to east at a speed matching that of Earth’s rotation, thus appearing stationary in relation to the Earth’s surface. To aim the satellite dish at the satellite, you need to know the azimuth, elevation, and polarization angles. As shown in the figures below, you set the satellite dish to the correct azimuth angle by turning it from side to side, and set the elevation by tilting the dish up or down. You set the polarization by rotating the satellite dish. The polarization setting rotates the satellite dish to the correct orientation for your geographic location. This varies from one part of the country to another and is different for different satellites. Polarization is positive in the eastern United States and negative in the western United States. Remember that it is important to pay attention to positive (+) and negative (-) signs when recording and using pointing values.

Before you install the satellite dish, the receive modem and software must be installed. To install the software, see the installation guide that came with your software and indoor equipment for specific instructions. After you install the modem and software, run the software program. It will take you to an Antenna Pointing screen, where you will be asked to enter your location or zip code. The software will provide the azimuth, elevation, and polarization angles. Write them below. The pictures below will help you visualize these terms.

<table>
<thead>
<tr>
<th>Elevation:</th>
<th>Azimuth:</th>
<th>Polarization:</th>
</tr>
</thead>
</table>

Elevation Down

Azimuth Right

Polarization Positive

Elevation Up

Azimuth Left

Polarization Negative
CHOOSING WHERE TO INSTALL THE SATELLITE DISH

TOOLS NEEDED

- Hand-held magnetic compass
- Angle finder or protractor
- Carpenter’s level or straight edge

Perform the following steps to select the best site to install the satellite dish.

1. Go to the location where you plan to install the satellite dish. It should be as close as possible to the computer, to minimize the length of the cable run. If the total cable length required is more than 150 feet see the cable specifications on page 9.

2. Face south and hold the compass level so the needle can rotate freely. When the needle stops rotating, it will be pointing north. Carefully, so as not to disturb the needle, rotate the body of the compass so that the 0° or N mark printed on the compass aligns with the painted end of the needle. The compass is now aligned with magnetic north.

   Note: Metal near the compass may affect your reading. If you are standing near a metal structure, such as a shed or air conditioning unit, move several feet away and repeat the measurement. Holding the compass too close to a large metal belt buckle can have the same effect.

3. Draw an imaginary line from the center of the compass to the azimuth value you recorded on page 6. This is the direction to point the satellite dish. 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 other way.

CAUTION

- People can trip, fall into or otherwise bump into the satellite dish.
- Lacerations, bruises, or other impact injuries could occur.
- Choose an installation site away from where people are likely to work, ride, or play.

Figure 1

Example 1
225° Azimuth

Example 2
160° Azimuth
CHOOSING WHERE TO INSTALL THE SATELLITE DISH

4. Using the angle finder and a carpenter’s level or straight edge, verify that there is an unobstructed line-of-sight toward the satellite as shown in the diagram below. To do this, align the level along the azimuth bearing. Then, using the angle finder, lift the front end of the straight edge to correspond to the elevation angle you recorded on page 6. Sight along the straight edge to verify that there are no obstructions (such as buildings or trees) blocking the view. Take into account future tree growth; if you are installing during the fall or winter, take into account spring and summer leaf growth. Also, avoid installing the satellite dish next to electrical equipment such as air-conditioning units, because they can cause signal interference.

Figure 2
CABLE SPECIFICATIONS

Note: Coaxial cables with copper clad steel center conductor are not recommended.

Note: Do not use splitters.

Note: Line amplifiers are required for Receive cable runs of more than 150 ft.

You must use plenum grade cable if the cable is to be run in plenum space which is carrying return air for the air circulation system. Check local laws to see if plenum grade cable is required in other locations.

If the Receive cable run length is less than 150 ft., then no line amplifier is required. If the Receive cable run length is greater than 150 ft., but less than 300 ft., then install a line amplifier in the Receive cable only, a minimum of 25 ft. and up to 30 ft. from the LNB.

A line amplifier, if needed, can be installed only in the Receive cable, not in the Transmit cable. (There is no Transmit cable in the one-way product.)

Line amplifier specification: Channel Master 5113 IFD or equivalent.

<table>
<thead>
<tr>
<th>Grounding and Cable Choice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Your choice of grounding scheme may affect your choice of cable; see “Overview of Grounding the Satellite System” on page 31 for information about grounding. Note that meeting the National Electrical Code grounding requirements is easier if you use RG-6 with solid copper center conductor and quad shield. However, you can also meet the requirements by using RG-6 with solid copper center conductor only and grounding the mast as described in the Overview.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Recommended cable specifications for Two-Way and One-Way Systems</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cable length from satellite dish to computer</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Up to 300 ft.</td>
</tr>
<tr>
<td>300 ft. to 420 ft.</td>
</tr>
</tbody>
</table>

**Important:** A higher grade of cable can be used for an installation where a lower grade is specified. For example, an RG6 cable with solid copper center conductor and quad shield can be used for installations where the cable length is less than 300 ft. Never use a lower grade of cable than specified. Be sure to record the grade of the cable used for your installation. The grade is printed on the cable every few feet. Never use a cable which does not have the manufacturers name and its grade clearly printed on it!
SELECTING A MOUNTING OPTION

Based on the satellite dish installation site, decide on the best surface for mounting your satellite dish. The base plate and mast assembly that came with your satellite dish is called a universal mount. Some mounting options require only the universal mount. Other mounting options require that you also use the two struts (called a brace kit) that came assembled with your satellite dish kit. The struts slip over the mast and provide addition support.

<table>
<thead>
<tr>
<th>CAUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Before installing the universal mount brace kit, you should obtain an analysis from a structural engineer to confirm that the installation site is suitable for mounting your satellite dish using the brace kit.</td>
</tr>
<tr>
<td>• Failure to ensure that the installation site is capable of supporting the weight of the satellite dish could result in personal injury or property damage.</td>
</tr>
</tbody>
</table>

Note: If you plan to later upgrade your system to two-way (both receive and transmit signals via satellite), you must install the satellite dish in a location not readily accessible to children and at least 5 feet above ground to avoid any risk of harm from radio frequency energy emitted when transmitting signals to the satellite.

Note: Professional installation of your one-way satellite dish is strongly recommended. If you do install the satellite dish yourself, you must:

• Follow the instructions in this manual precisely
• Install the satellite dish no higher than 30 feet above grade
• Install the satellite dish only on approved surfaces, and NOT on any other surfaces
• If necessary, be able to locate wood members from behind the roof
• If necessary, install lag screws in the center of wood members

INSTALLING THE SATELLITE DISH ON A WOOD DECK POST

You can use the universal mount to install the satellite dish on a 6-inch x 6-inch Southern Pine wood deck post.

See “Installing The Mount on a Wooden Deck Post” on page 12.

INSTALLING THE SATELLITE DISH ON TYPICAL WOOD ROOF CONSTRUCTION

You can use the universal mount and brace kit to install the satellite dish on typical wood roof construction.

See “Installing the Mount on a Wood Framed Roof” on page 15.
SELECTING A MOUNTING OPTION

INSTALLING THE SATELLITE DISH ON CONCRETE OR CONCRETE MASONRY WALLS

You can use the universal mount to install the satellite dish on concrete masonry or concrete walls. The brace kit can also be installed for greater stability, but is not required. See “Installing the Mount on Concrete or Concrete Masonry walls” on page 20.

INSTALLING THE SATELLITE DISH ON A METAL POLE

You can install the satellite dish directly on a 9-foot metal pole. If you choose this mount option you will not need the universal mount or universal mount brace kit. Store them for possible future use. See “Installing the Mount Onto a Metal Pole” on page 22.
INSTALLING THE MOUNT ON A WOODEN DECK POST

The satellite dish can be installed on a 6-inch x 6-inch Southern Pine wood deck support post. The post can be no more than 8 feet tall. It must be adequately attached at top and bottom. Posts made of other species of wood may be used as long as their material properties match or exceed those of Southern Pine. Posts made of other species of wood whose material properties do not match or exceed those of Southern Pine require engineering evaluation and approval before being used. The satellite dish may not be installed on an unsupported wooden post.

PARTS NEEDED
- Lag screws, 3/8-inch x 4-inch, Qty: 6
- Washers, 3/8-inch, Qty: 6
- Silicone sealant

TOOLS NEEDED
- Carpenter’s level
- Pencil
- Ruler
- 9/16 and 1/2-inch socket wrench
- Electric drill
- Drill bits, 3/8, 1/4, and 1/8-inch
- Torque wrench (capable of torquing up to 18 ft-lbs)
- Ladder

Notes:
Attach using six 3/8 x 4-inch (102 mm) long lag screws in darkened holes.

Figure 7
INSTALLING THE MAST ONTO A WOODEN DECK POST

INSTALLATION PROCEDURE

⚠️ DANGER
- If the satellite dish contacts electric power lines, you will be killed or seriously injured.
- Before starting the installation procedure, make sure there are no power lines nearby.

⚠️ CAUTION
- The satellite dish cannot be installed on an unsupported wood post of any size.
- Install the satellite dish only on a wooden deck post.
- Install the satellite dish only as described in this manual.

Note: for an installation to be successful, the mast must be plumb. Re-plumb the mast whenever instructed to do so, and re-plumb it whenever you feel it is necessary.

1. Orient the universal mount so the square hole in the base plate is at the top as in Figure 8 before installation.
2. Use a 1/2-inch socket wrench to loosen the adjustment nuts and swing the mast so that it is oriented as in Figure 9.
3. Mark the centerline of the deck post.
4. With an assistant place the base plate on the centerline at the spot you plan to install it (see Figure 8).
5. Loosen the pivot bolt and adjustment nuts and plumb the mast in two perpendicular directions (see Figure 9). If you successfully plumb the mast proceed to step 6. If you cannot plumb the mast find another location to install the satellite dish.
   Note: it is essential that the mast be plumb. If you cannot make the mast plumb at this point, find another installation site.
6. Mark the center of the base plate’s top center hole.
7. Drill a hole on the center mark in the manner described below. Note: to avoid drilling too deeply, wrap a piece of masking tape around the drill bit shank at the proper depth so that you can see when you should stop drilling.
   Drill a 1/8-inch pilot hole 2 inches deep.
   Going into the pilot hole, drill a 1/4-inch hole 4 inches deep.
   Going into the 1/4-inch hole, drill a 3/8-inch hole to a depth equal to the unthreaded portion of the 3/8-inch x 4-inch lag screw.
8. Fill the holes with silicone sealant and apply silicone sealant to the entire back side of the base plate. Apply enough so that it will press out around the edges when it is fastened down (see Figure 10). Doing this will help prevent water from seeping into the wood.

10. Use a 9/16-inch socket wrench to screw the lag screw into the top center hole of the base plate (see Figure 11). You may need to swing the mast out of the way temporarily. Tighten the screw snugly so that the base plate can barely move.

*Do not pound the lag screws into the post with a hammer or mallet. Doing so may split the wood and render the post unusable.*

11. Re-plumb the mast in two perpendicular directions as you did in step 5. You may need to make adjustments to the mast and/or the base plate.

12. Tighten the lag screw snugly so that the base cannot move.

13. Use a 1/2-inch socket wrench to tighten the adjustment nuts.

14. Re-plumb the mast. (Tightening the nuts can move the mast off plumb.) *Note: the mast must be plumb before proceeding.*

15. Repeat step 6 and step 8 to drill holes for the top left center, top right center, bottom left center, and bottom right center holes. See Figure 11.

*Note: You must mark the center of all remaining screw holes accurately. A Stanley Jumbo Self Centering Nail Set or similar product will produce the best results. A #6 washer can also be used to guide your pencil as it marks the hole center*

*Note: the base plate must not move when you drill the holes.*

16. Fill the holes with silicone sealant.

17. Install a 3/8-inch washer on each of the 3/8-inch x 4-inch lag screws.

18. Use a 9/16-inch socket wrench to screw the lag screw into the four holes. Do not tighten the screws fully.

19. Re-plumb the mast and snug down the four screws firmly.

20. Use a 1/2-inch socket wrench to loosen the mast adjustment nuts and swing the mast down so you have access to the bottom center hole.

21. Repeat steps 6 and 7 to drill holes for the bottom center hole.

*Note: the base plate must not move when you drill the hole.*

22. Fill the hole with silicone sealant.


24. Use a 9/16-inch socket wrench to screw the lag screw into the lower center hole. Do not tighten the screw fully.

25. Re-plumb the mast and snug down the lag screw.

26. Use a torque wrench to snug down the mast adjustment nuts to 18 ft.-lbs. Confirm the mast is plumb after torquing.

*Note: The mast must be plumb before you can proceed. If you cannot plumb the mast, repeat the installation or find another installation site.*

Continue with section “Installing the Cap Onto the Satellite Dish” on page 23.
INSTALLING THE MOUNT ON A WOOD FRAMED ROOF

You can install the satellite dish onto a wood framed roof. You must use the brace kit. The minimum size for roof truss members is 2 inches x 4 inches. Roof rafters must be nominal 2x material (2x4, 2x6, etc.) Either size roof rafters or trusses must be 16 to 24 inches on center. The roof surface must consist of relatively thin, resilient materials, such as asphalt or composite shingles, sheet metal, or similar materials, over wood sheathing with a thickness of 3/4 inch or less. Satellite dishes cannot be installed on flat roofs, slate roofs, or Spanish tile roofing made of clay or other brittle materials. The roof pitch (or slope) must be between 3:12 and 12:12.

All center hole lag screws must be centered in the rafter or truss to which they are attached. For this reason, you must be able to locate rafters and trusses and the center of rafters and trusses with a high degree of accuracy, which can be difficult to do. Home construction varies a great deal. Construction styles, materials, and dimensions can all vary widely. In addition, stud finders give false readings on multilayered surfaces, such as a roof. Also, you need experience in home construction to be able to determine the exact location of rafters and trusses and their centers. The satellite dish should not be installed on a wood frame roof unless the interior of the roof is unfinished so that placement of lag screws can be verified and the rafters or trusses reinforced if necessary.

If you do not have the knowledge and experience to accurately locate rafters and trusses and the center of rafters and trusses with a high degree of reliability, you should contact a professional satellite dish installer for installation.

Large-timber roofs with frequent spacing of members are also permitted. These are constructed of wood members larger than the nominal 2x sizes, and include post and beam structures with members from 4 inches x 4 inches and larger. The members cannot be spaced more than 24 inches on center. Their physical properties must match or exceed those of Spruce-Pine-Fir #2.

PARTS NEEDED

- Lag screws, 3/8-inch x 4-inch, Qty: 2
- Lag screws, 1/4-inch x 4-inch, Qty: 4 (5/16-inch x 4-inch recommended if available)
- Lag screws, 3/8-inch x 2-inch, Qty: 4
- Washers, 3/8-inch, Qty: 6
- Washers, 1/4-inch, Qty: 4 (5/16-inch if needed)
- Silicone sealant

TOOLS NEEDED

- Carpenter’s level
- Pencil or chalk
- Ruler
- Socket wrenches, 7/16, 1/2, and 9/16-inch
- Electric drill
- Drill bits, 3/8-, 1/4-, 1/8, and 5/32-inch
- Torque wrench (can torque up to 18 ft-lbs)
- Ladder

Notes:
Success of attachment relies on installation of all lag screws in center of wood wall studs (±1/16 inch or 1.6 mm).

Figure 12
INSTALLING THE MOUNT ON A WOOD FRAMED ROOF

INSTALLATION INSTRUCTIONS

DANGER

- If the satellite dish contacts electric power lines, you will be killed or seriously injured.
- Before starting the installation procedure, make sure there are no power lines nearby.

CAUTION

- Rafters or trusses must be located 16 to 24 inches apart on center, except for large-timber roofs, which can be located no more than 16 inches apart on center.
- The roof surface must consist of relatively thin, resilient materials, such as asphalt or composite shingles, sheet metal, or similar materials, over wood sheathing with a thickness that must not exceed 3/4 inch.
- Satellite dishes cannot be installed on slate roofs or Spanish tile roofing made of clay or other brittle materials.
- The roof pitch (also called slope) must be between 3:12 and 12:12.
- The satellite dish cannot be installed on a flat roof.
- Center hole lag screws **must** be centered in the rafter or truss.
- The satellite dish should not be installed on a wood frame roof unless the interior is unfinished so that placement of lag screws can be verified and the roof reinforced if necessary.
- Install the satellite dish only as described in this manual.

CAUTION

If you do not have the knowledge and experience to accurately locate rafters and the center of rafters with a high degree of reliability, you should contact a professional satellite dish installer for installation.

Before you begin, make sure the rafters or trusses (called **members**) in your house are located 16 to 24 inches on center. Remember that 2 x 4 and 2 x 6 inch members are actually 1-1/2 inches thick.

*Note: for an installation to be successful, the mast must be plumb. Re-plumb the mast whenever instructed to do so, and re-plumb it whenever you feel it is necessary.*

1. Orient the universal mount so the square hole in the base plate is at the top as in Figure 13 before installation.
2. Use a 1/2-inch socket wrench to loosen the adjustment nuts and swing the mast so that it is oriented as in Figure 14.
3. Mark the centerline of the rafter or truss.
4. With an assistant place the base plate on the centerline at the spot you plan to install it (see Figure 15).

5. Plumb the mast in two perpendicular directions (Figure 16). If you successfully plumb the mast proceed to step 6. If you cannot plumb the mast find another location to install the satellite dish. Note: it is essential that the mast be plumb. If you cannot make the mast plumb at this point, find another installation site.

6. Mark the center of the base plate’s top center hole (Figure 15).

7. Drill a hole on the center mark in the manner described below.

   Note: to avoid drilling too deeply, wrap a piece of masking tape around the drill bit shank at the proper depth so that you can see when you should stop drilling.

   Drill a 1/8-inch pilot hole 2 inches deep.
   Going into the pilot hole, drill a 1/4-inch hole 4 inches deep.
   Going into the 1/4-inch hole, drill a 3/8-inch hole to a depth equal to the unthreaded portion of the 3/8-inch x 4-inch lag screw.

   Note: You must mark the center of all screw holes accurately. A Stanley Jumbo Self Centering Nail Set or similar product will produce the best results. A #6 washer can also be used to guide your pencil as it marks the hole center.

8. Apply silicone sealant in the holes and to the entire back side of the base plate. Apply enough so that it will press out around the edges when the plate is fastened down.


10. Use a 9/16-inch socket wrench to screw the lag screw into the top center hole of the base plate (see Figure 15). You may need to swing the mast out of the way temporarily. Tighten the screw snugly so that the base plate can barely move.

   Note: Do not pound the lag screws into the rafter or truss with a hammer or mallet. Doing so may split the wood and render the rafter or truss unusable.

11. Re-plumb the mast in two perpendicular directions as you did in step 5. You may need to make adjustments to the mast and/or the base plate. If you adjust the base plate, do not move the center of the bottom center hole off the centerline more than 1/16-inch.

12. Tighten the lag screw snugly so the base plate cannot move.

13. Use a 1/2-inch socket wrench to tighten the adjustment nuts.

14. Re-plumb the mast. (Tightening the nuts can move the mast off plumb.) Note: the mast must be plumb before proceeding.

15. Adjusting the drilling depth for the 3/8-inch by 2-inch lag screws, repeat steps 6 and 7 to drill holes for the four corner holes. See Figure 15.

   Note: the base plate must not move when you drill the holes.
16. Fill the holes with silicone sealant.
17. Install a 3/8-inch washer on each of the 3/8-inch x 2-inch lag screws.
18. Use a 9/16-inch socket wrench to screw the lag screw into the four holes. Note: do not overtighten the screws. You may strip the screw threads.
19. Re-plumb the mast and snug down the four screws firmly.
20. Use a 1/2-inch socket wrench to loosen the mast adjustment nuts and swing the mast down so you have access to the bottom center hole.
21. Repeat steps 6 and 7 to drill holes for the bottom center hole. Note: the base plate must not move when you drill the hole.
22. Fill the holes with silicone sealant.
23. Install a 3/8-inch washer on each of the 3/8-inch x 2-inch lag screws.
24. Use a 9/16-inch socket wrench to screw the lag screw into the lower center hole. Do not tighten the screw fully.
25. Re-plumb the mast and snug down the lag screw.
26. Use a torque wrench to snug down the mast adjustment nuts to 18 ft.-lbs. Confirm the mast is plumb after torquing.

Note: The mast must be plumb before you can proceed. If you cannot plumb the mast, repeat the installation or find another installation site.

INSTALLING THE MOUNT ON A WOOD FRAMED ROOF

INSTALLING THE BRACE KIT

1. Slip the short 18-inch strut collar onto the mast as shown in Figure 17.
2. Secure the collar to the mast by using a 7/16-inch socket wrench to tighten the Nylock nut installed on the bolt.
3. Position the strut mounting plate below the mast and base plate so the two screw holes are exactly in line vertically with the mast base plate center holes (see Figure 18).
4. Mark the center of the mounting plate top center hole (see Figure 17).
5. Drill a hole on the center mark in the manner described below. Note: to avoid drilling too deeply, wrap a piece of masking tape around the drill bit shank at the proper depth so that you can see when you should stop drilling.
   Drill a 5/32-inch hole 4 inches deep.
   Going into the 5/32-inch hole, drill a 1/4-inch hole to a depth equal to the unthreaded portion of the 1/4-inch x 4-inch lag screw.
6. Fill the holes with silicone sealant, and apply silicone sealant to the bottom of the mounting plate.
7. Install a 1/4-inch washer on the 1/4-inch x 4-inch lag screw.
8. Use a 7/16-inch socket wrench to screw the lag screw into the mounting plate hole. Note: Do not pound the lag screws into the rafter with a hammer or mallet. Doing so may split the wood and damage the rafter or truss.

Note: to avoid drilling too deeply, wrap a piece of masking tape around the drill bit shank at the proper depth so that you can see when you should stop drilling.

Drill a 5/32-inch hole 4 inches deep.
Going into the 5/32-inch hole, drill a 1/4-inch hole to a depth equal to the unthreaded portion of the 1/4-inch x 4-inch lag screw.
9. Detach the strut from the mounting plate and repeat step 5 through step 9 for the lower center hole. Reattach the strut when done.

10. Secure the collar to the mast by using a 7/16-inch socket wrench to tighten the Nylock nut installed on the bolt.

11. Re-plumb the mast.

12. Slip the long 25-inch strut collar over the mast until it fits as shown in Figure 19.

13. Position the strut so that its mounting plate center holes are on center of the rafter immediately to the left (or to the right if you prefer). The 25-inch strut should be at approximately a 90° angle to the 18-inch strut. At the same time, minimize any angle formed between the 25-inch strut and the center-line of the mast base plate (see Figure 19).


15. Re-plumb the mast. If you had to loosen the adjustment nuts to plumb the mast, snug them again to 18 ft.-lbs.

Note: The mast must be plumb before you can proceed. If you cannot plumb the mast, repeat the steps above or find another installation site.

Continue with section “Installing the Cap Onto the Satellite Dish” on page 23.
INSTALLING THE MOUNT ON CONCRETE OR CONCRETE MASONRY WALLS

The satellite dish can be attached to concrete masonry (cinder blocks) or concrete walls. The concrete masonry (cinder block) or concrete walls must be a minimum of 8 inches thick. Attachment anchors can be placed no closer than 12 inches from any discontinuous surface, such as a window, door, or edge of a wall. Anchors can not be installed in mortar joints or within 2 inches of mortar joints. You must use the specified Hilti sleeve anchors. Install only the six anchors specified; do not install additional anchors.

The satellite dish cannot be installed on masonry veneered wall construction or on any synthetic stucco wall surface (also called Exterior Insulation and Finish Systems (EIFS)).

Note that you can use the brace kit to improve the mount’s stability if you wish. If you use the brace kit, do not install the strut mounting plates within 12 inches of any discontinuous surface, such as a window, door, or edge of a wall. Its anchors must be tightened to 5 ft.-lbs.

**PARTS NEEDED**

- 3/8-inch x 3-inch Hilti sleeve anchors, Qty: 6
- If installing the optional brace kit, 1/4-inch by 2-1/4-inch Hilti sleeve anchors, Qty: 4

**TOOLS NEEDED**

- Ladder
- Carpenter’s level
- Pencil
- Tape measure
- Hammer

**Notes:**

Universal mount brace shall be spaced a minimum of 12 inches (305 mm) from edges of wall and discontinuous edges (such as at windows, doors, etc.)

Attach using six Hilti sleeve anchors HX3/8 x 3 inch, minimum 1-1/2-inch (38 mm) embedment, in darkened holes only. Do not install additional sleeve anchors in other holes. Do not install anchors in mortar joints.

**Figure 20**

Universal mount base

5 foot (1524 mm) minimum

12 inch (305 mm) minimum

Plumb mast

Universal mount base

Solid concrete or concrete masonry unit wall - 8 inch (203 mm) thick, minimum
INSTALLING THE MOUNT ON CONCRETE OR CONCRETE MASONRY WALLS

INSTALLATION PROCEDURE

⚠️ DANGER

- If the satellite dish contacts electric power lines, you will be killed or seriously injured.
- Before starting the installation procedure, make sure there are no power lines nearby.

⚠️ CAUTION

- Attach the satellite dish only to concrete masonry (cinder blocks) or concrete walls at least 8 inches thick.
- Do not attach the satellite dish to stucco or to masonry veneered surfaces.
- Do not install anchors within 12 inches from any discontinuous surface, such as a window, door, or edge of a wall.
- Anchors can not be installed in mortar joints or within 2 inches of mortar joints.
- Install the satellite dish only as described in this manual.

Do not drill holes within 12 inches of any discontinuous surface such as a window, door, or edge of a wall. Note: for an installation to be successful, the mast must be plumb. Re-plumb the mast whenever instructed to do so, and re-plumb it whenever you feel it is necessary.

1. Orient the base plate as in Figure 21.
2. Place the base plate so that no anchor will be placed closer than 12 inches from any discontinuous surface, such as a window, door, or edge of a wall. If you are installing on a cinder block surface, place it so the outside holes are positioned over the block surfaces. Do not drill into the mortar between the blocks or closer than 2 inches to any mortar joints. If you plan to install the brace kit, consider placement of the strut mounting plates at this time also.
3. Have a helper hold the mast and base plate in place. Using a carpenter’s level, plumb the mast in at least two different locations on the side of the mast (see Figure 21). These two measurements should be at right angles to each other. If the mast is plumb, go to step 5. Otherwise, use a 1/2-inch socket wrench to loosen the adjustment nuts.
4. Swing the mast until it is plumb with the level. If you are still unable to plumb the mast, find another site to install the satellite dish.

Note: It is essential that the mast be plumb. If you cannot make the mast plumb at this point, find another installation site.

Note: If you loosen the adjustment nuts at any point during installation so that you can move or plumb the mast, be sure to tighten them snugly after re-plumbing the mast.
5. Mark the location of the top center, bottom center, and four corner holes of the base plate onto the concrete surface (Figure 22). Remove the mount from the wall.
6. Use a 3/8-inch masonry drill bill and drill 3/8-inch x 3-inch holes where you made the pencil marks. Clean out the holes with a blow out bulb.
7. With the bolts flush to the top of the nuts, tap the sleeve anchors to drive them into the holes.
8. Using a 9/16-inch wrench, remove the bolts from the anchors.
9. Place the mount back on the wall, carefully centering the base plate holes over the holes you just drilled.
10. Plumb the mast.
11. Using a torque wrench, reinstall the anchors, tightening them to 10 ft. lbs.
12. Verify the mast is still plumb and tighten the two adjustment nuts to 18 ft.-lbs.
INSTALLING THE MOUNT ONTO A METAL POLE

The satellite dish can be installed on a metal pole that you place in the ground. With this option, you will attach the dish and cap mount directly to the pole. Note: With a metal pole installation, you will not need the mast and base plate included in your satellite dish kit. Store it for possible future use.

PARTS NEEDED

- Metal pole, 2-3/8 inch outside diameter, schedule 40 galvanized water pipe, 9 feet long
- Three 40-pound bags of quick-setting concrete

TOOLS NEEDED

- Hole digging tools
- Wheelbarrow or concrete mixing box
- Carpenter’s level
- Pencil
- Hacksaw

<table>
<thead>
<tr>
<th>DANGER</th>
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<tbody>
<tr>
<td>• If the satellite dish contacts electric power lines, you will be killed or seriously injured.</td>
</tr>
<tr>
<td>• Before starting the installation procedure, make sure there are no power lines nearby.</td>
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</table>

1. Use the hacksaw to cut the bottom edge of the pole at a 45-degree angle (see Figure 23). This will prevent the pole from rotating over time.

2. Dig a hole at least 8 inches in diameter and at least 36 inches deep (see Figure 24). If you live in an area where the frost line goes below 30 inches, dig the hole at least 6 inches deeper than the frost line.

3. Place the bottom 3 feet of the pole in the hole and use rocks or similar objects to stabilize the pole vertically.

4. With the carpenter’s level, plumb the pole along its side. Use at least two different locations at right angles to each other (see Figure 25).

5. When the pole is plumb, use rocks or guy wires and stakes to hold it in place.

Note: In order for the installation to be successful, the pole must be plumb. Make sure the pole is securely held in place while the concrete is drying.

6. Confirm the pole is still plumb and adjust if necessary.

7. Prepare the quick-drying concrete according to directions on the package and fill the hole. Slope the top of the concrete downward away from the pole to improve drainage.

8. Let the concrete dry for 24 hours.

Continue with section “Installing the Cap Onto the Satellite Dish” on page 23.
You will set the satellite dish elevation and polarization, which you wrote down in this manual on page 6, before attaching the azimuth/elevation (AZ/EL) cap to the satellite dish. As you set them, refer to Figure 26. Note the cap has an arrow, labeled “Top,” to show you how to orient the cap vertically. See Figure 29 on page 24.

1. Use a 1/2-inch socket wrench or open-end wrench to loosen the four polarization nuts.
2. Refer to page 6 of this manual to find the elevation value.
3. Orient the cap assembly so that the “TOP” label is at the upper right. The elevation bolt will also be on the right.
4. Use a 1/2-inch socket wrench or open-end wrench to loosen the AZ/EL bracket bolt nut and elevation nuts.
5. Using your fingers, retighten the three nuts until you cannot tighten them further.
6. Still using your fingers, loosen each of the nuts one revolution.
7. Locate the red elevation reference mark on the elevation scale on the left side of the cap assembly. See Figure 27 and Figure 28 on the next page to help you locate the mark. The leading edge of the metal plate is the elevation reference mark.
8. Use a 1/2-inch socket wrench or open-end wrench to turn the elevation bolt head until the leading edge of the red mark is at the correct value. **You may need to turn the bolt head a number of times until the leading edge of the red mark reaches the correct value.**
9. When the leading edge of the red mark is at the correct elevation value, tighten the bracket bolt nut and the two elevation nuts. **Do not tighten the elevation pivot nut.**
10. Refer to page 6 to find the polarization value.
11. Locate the polarization scale. It is at the top of the AZ/EL cap (Figure 29).
12. Turn the AZ/EL to the correct polarization value. Align the mark on the top of the AZ/EL with the correct value on the polarization scale. Figure 29 shows a setting of positive 3 degrees.
13. When the polarization is at the correct value, tighten the four polarization nuts. As you tighten, make sure the polarization remains at the proper value.
14. Place the AZ/EL cap over the studs sticking out from the back of the satellite dish (see Figure 30). Make sure the AZ/EL cap mount bolt holes are properly aligned with the studs. The elevation bolt should be on the right, and that the arrow labeled “TOP” should point to the top of the satellite dish. Make sure the satellite dish is oriented so that the section that has a hole in its rim is on the bottom.

15. Install four 5/16-inch Nylock nuts and 5/16-inch flat washers on the studs. Use a torque wrench with 1/2-inch socket to torque to 12 ft.-lbs.
INSTALLING THE LNB/WAVEGUIDE

PARTS NEEDED

- LNB/Waveguide assembly
- M4 Allen screws, Qty: 4
- M4 Lock washers, Qty: 4

FINISH ARM
- Feed arm
- O-ring

1. Facing the front of the feed arm, locate the red mark on the right side of the rectangular section with four holes (see Figure 31).

2. Install the O-ring in the circular depression in the feed arm (see Figure 32.) Note that the circular depression contains four small depressions at 12, 3, 6, and 9 o’clock. These are pinch points. Be sure to push the O-ring in at these points to achieve a better seal.

3. Orient the LNB/waveguide so that the flat side of the LNB faces your body, and the red mark is on the right (see Figure 33).

4. Line up the feed arm rectangular section with the waveguide so that the four screw holes align. The two red marks should be on the same side but may or may not align exactly. Use the red marks as guides. What is important is that the four screw holes align (see Figure 34).

5. Install the M4 Allen screws and lock washers with the Allen wrench that is provided.

TOOLS NEEDED

- Allen wrench (supplied)

FIGURES

Figure 31

Figure 32

Figure 33

Figure 34
CONNECTING THE FEED ARM TO THE SATELLITE DISH

PARTS NEEDED
- Feed arm with feed assembly (LNB and waveguide) attached
- Satellite dish
- 5/16-18 wedge nut
- 5/16-18 hex bolt
- 5/16-inch flat washer
- 5/16-inch lock washer

TOOLS NEEDED
- 1/2-inch open-end wrench or socket wrench
- Torque wrench (with 1/2-inch socket capable of torquing to 10 ft-lbs.)

Note: Be sure that the feed arm and feed assembly are positioned as shown in Figure 35.

Note: If you are installing the satellite dish assembly on a metal pole mount, it is probably easiest to attach the feed arm after you have installed the satellite dish on the pole. See “Installing the satellite dish/cap assembly onto the mast” on page 27. However, if you are using a ladder, it may be easier to attach the feed arm to the satellite dish before installing it on the mast or metal pole.

1. Insert the 5/16-18 wedge nut thin end first into the slot provided on the back of the satellite dish. The wedge nut is keyed so that it will fit properly in its slot in the dish in only one way. Make sure the hole in the wedge nut is aligned with the hole in the dish so the bolt can be installed (see Figure 35).

2. Install the feed arm into the feed support socket on the underside of the satellite dish. Since you may have the satellite dish turned upside down in order to insert the feed arm, take care to remember that your orientation is currently the opposite of that shown in Figure 35.

3. Secure the feed arm with a 5/16-inch flat washer, 5/16-inch lock washer, and 5/16-18 hex bolt. Use a torque wrench to tighten the hex bolt 8 to 10 ft-lbs.
INSTALLING THE SATELLITE DISH/CAP ASSEMBLY ONTO THE MAST

PARTS NEEDED
- Satellite dish/cap assembly
- Mast

1. Lightly grease the area at the end of the mast or metal pole that will be covered by the AZ/EL cap. Doing this ensures it will be easy to adjust the azimuth. Any grease will do. You can use automotive grease, or household grease such as Vaseline or lard.

2. Use a 1/2-inch open-end wrench to loosen the three clamp nuts so the collar will be able to slide over the mast or metal pole.

3. Lift the satellite dish/cap assembly and slide the AZ/EL cap collar onto the mast tube or metal pole (see Figure 36). The satellite dish should be facing toward the satellite.

4. Tighten the three mast clamp nuts all the way; then loosen them just enough to move the satellite dish side to side and adjust the azimuth. The clamp bolts should be as snug as possible, but still allow the satellite dish to be moved from side to side.

TOOLS NEEDED
- 1/2-inch open-end wrench
- Grease

![Image](image.jpg)
INSTALLING AND ROUTING INTERIOR CABLE

This section consists of routing a coaxial cable from the outside wall into your house to the receive modem connected to your computer. In most installations, there is more than one way to get the cable to its inside destination. If the receive modem is located near an inside wall, you can use the crawl, basement, or attic spaces. Use cable ties where necessary. When routing the cable to the receive modem, take the shortest possible path and always protect it from physical damage. You may need to feed a length of string through tight access hole(s) and then pull the cable through.

It is important to remember that each cable is actually installed in two sections. One section runs from your receive modem to the ground block, which is installed where the cable exits the house. The other section runs from the ground block to the LNB.

Cable is usually sold in lengths of 100, 75, 50, and 25 feet. If the distances between your receiver and ground block, or ground block and antenna, are not approximately those lengths, you may have to cut and strip the cable and install the weatherproof connectors.

Select your grounding scheme at this time (see “Overview of Grounding the Satellite System” on page 31). When the grounding scheme requires access to the internal building ground, feed the 14 AWG copper/8 AWG aluminum wire from the ground block with the RG6 coaxial cable. Connect the 14 AWG copper/8 AWG aluminum ground wire to the grounding scheme you select or as specified by NEC or local code requirements.

1. Choose a spot on the outside wall where you will drill a hole. It should be near the satellite dish.
2. After verifying that there are no wires or pipes blocking the location where you want to feed the coaxial cable into the building, drill a 1/2-inch hole through the outside wall.
3. Feed the cable into the access hole and route it to the receive modem. Depending on the installation site, cable could be routed through a floor or wall, or directly to the rear of the computer. If the cable comes out of a wall, you can use a wall plate for a more professional look.
If your grounding scheme requires, also feed the ground wire at this time. Remember to use copper wire if your ground scheme requires it, or if the cable will come within 12 inches of masonry or soil.
4. Connect the cable to the receive modem.
5. Seal the outside access hole with silicone sealant.
6. Estimate the total length of cable used thus far. Then estimate how much more cable is needed to reach the LNB. You will need this information to determine if a line amplifier may be required.
7. If you plan to later convert to a Two-Way System, or install any DIRECTV® upgrade kits, consider installing the additional cable at this time. You may install that cable through a separate hole to avoid drilling a large hole in your wall.

<table>
<thead>
<tr>
<th>PARTS NEEDED</th>
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<tbody>
<tr>
<td>• RG-6 coaxial cable</td>
</tr>
<tr>
<td>• Cable ties</td>
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<tr>
<td>• Silicone sealant</td>
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<tr>
<td>• 14 AWG copper/8 AWG aluminum grounding wire</td>
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<th>TOOLS NEEDED</th>
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<tr>
<td>• Electric drill and 1/2-inch bit</td>
</tr>
<tr>
<td>• String</td>
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<td>• Screwdriver (if install wall plate)</td>
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</table>

WARNING

• Verify before you drill that there are no electrical wires in the wall near where you will be drilling.
• You may be killed or seriously injured if you contact wiring while drilling.

CAUTION

• Verify before you drill that there are no pipes in the wall near where you will be drilling.
• Damaging pipes may cause property damage.
• Never use a staple gun to attach coaxial cable to a wall.
INSTALLING EXTERIOR CABLES AND CONNECTING TO GROUND BLOCK

**INSTALLATION PROCEDURE**

This section describes routing and installing the coaxial cable between the low-noise block (LNB) on the dish and the ground block. You may have to bury the coaxial cable, particularly if you use a metal pole install. Use only quality burial specified cables. When normal coaxial cable is buried, its useful life is shortened. The outer cover decays in the soil, absorbs moisture, and corrodes. Cables suitable for burial use a special outer cover that resists breakdown. Some of these cables use flooded gel and treated shields. This coating resists corrosion if water gets into the cable. By using quality burial specified cables, you avoid 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 other stable surfaces with cable ties. 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, and 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.

Remember that the grounding wire must be 14 AWG copper if it passes within 12 inches of masonry or soil.

**CAUTION**

- Verify before you drill that there are no pipes in the wall near where you will be drilling.
- Damaging pipes may cause property damage.

**WARNING**

- Verify before you drill that there are no electrical wires in the wall near where you will be drilling.
- You may be killed or seriously injured if you contact wiring while drilling.

1. Determine where you will install the ground block. It must be near where the coaxial cable enters the building. Plan a short and straight path for the ground wire from the ground block to the grounding scheme.

2. Secure the ground block to a stable mounting surface with two screws (see Figure 37).

3. Connect one end of the 14 AWG copper/ 8AWG aluminum ground wire to the ground terminal of the ground block.

4. Connect the other end of the ground wire to the grounding scheme. If necessary, secure the ground wire with cable ties or insulated U-shaped tacks.

5. Select a length of cable that can be routed easily between the LNB on the feed assembly and the ground block.

6. Connect the coaxial cable to the ground block (see Figure 38). Form a drip loop and secure the cable with cable ties. A drip loop 2 or 3 inches in diameter is large enough; the diameter can be no more than 14 inches.

7. Connect the interior cable (coming out of the access hole in the wall) to the opposite side of the ground block (see Figure 37). Form a drip loop and secure with cable ties.

8. Tighten the cable connections with a 7/16-inch wrench.

**PARTS NEEDED**

- Type RG-6 coaxial cable
- 14 AWG copper/ 8 AWG ground wire
- F-type ground block and screws
- Cable ties or U-shaped tacks
- If needed, split bolt and clamp nut

**TOOLS NEEDED**

- Flat-blade screwdriver
- Phillips-head screwdriver
- 7/16-inch open-end wrench
- Hammer
- 14/8 AWG wire cutters
CONNECTING THE COAXIAL CABLE TO THE LNB

Connect the cable and the LNB so as to achieve a configuration like that in the illustrations below. Remember that it may require some patience to work all the cable through the feed arm.

<table>
<thead>
<tr>
<th>CAUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Coaxial cable can corrode if exposed to moisture.</td>
</tr>
<tr>
<td>- Use weatherproof connectors.</td>
</tr>
</tbody>
</table>

1. Work the cable through the feed arm (see Figure 39.)
2. Connect the cable to the LNB connection (see Figure 40).
3. Tighten the cable connection with a 7/16-inch wrench.
4. Apply silicone gel to the cable connection.
5. Secure with cable ties.
6. Add up all the cable lengths for the Receive cable and consult the cable specifications on page 9 to determine whether you need to install a line amplifier.

CAUTION
Coaxial cable can corrode if exposed to moisture.
Use weatherproof connectors.

Figure 39
Coaxial cable connector

Figure 40
Coaxial cable
OVERVIEW OF GROUNDING THE SATELLITE SYSTEM

The two basic methods for mounting the satellite dish (universal mount with or without brace kit and pole mount) require different grounding procedures, as specified in National Electrical Code (NEC) Articles 250, 800, 810, and 820. Both methods use the RG6 quad-shielded coaxial cable shield, ground block, and ground wire for the system and protective ground. The RG6 quad-shielded coaxial cable is connected to the ground block and serves as the system and protective ground. The ground block is located at the point the coaxial cable enters the building. The ground wire is connected to the ground block and routed to the earth ground using one of the three ground schemes in Figure 41. The cable shield must be less than .6 ohms per 100 ft; if it is not, a 14 AWG copper or 8 AWG aluminum ground wire must be run from the satellite dish base ground to the ground block. The connectors must be waterproof 360-degree compression type connectors. The specified RG6 cable and connector must be used to meet NEC requirements. These items are available through your local electronics supply store.

POLE MOUNT GROUNDING

The mast (which is the metal pole in this mount method) is grounded to the satellite dish via an NEC-approved ground wire and clamp. The mast clamp must have a good electrical connection to the mast pole. The RG6 coaxial cable shield connects the satellite dish to the ground block. An NEC-approved ground wire is used to connect the ground block to earth ground using one of the three schemes shown in Figure 41. When the mast requires a separate ground rod the NEC requires that a 6 AWG copper wire must connect the mast ground rod to the building earth ground.

UNIVERSAL MOUNT GROUNDING

The mast is grounded to the satellite dish via an NEC-approved ground wire. The RG6 coaxial cable connects the satellite dish to the ground block. The RG6 shield is used for system and protective ground. An NEC-approved 8 AWG aluminum ground wire is used to connect the ground block to the earth ground using one of the three schemes shown in Figure 41.

Three Ground Schemes for Ground (GND) Block Wire

- **GND Rod**
  - 1. AC GND
  - 2. GND Block

- **Water Pipe**
  - 1. AC GND
  - 2. GND Block

- **AC GND Wire**
  - 1. GND Rod
  - 2. Water Pipe

Spilt Bolt Tap

GND Block

Figure 41
GROUNDING THE MAST

Remember the metal pole grounding procedure is different. See “Grounding the Metal Pole Mount” on page 35.

Note: if you do not use RG6 quad shielded cable (CommScope 5781 or equivalent) you must run a ground wire from the mast base plate to the ground block and install it and the ground block ground wire onto a split bolt and clamp nut.

<table>
<thead>
<tr>
<th>PARTS NEEDED</th>
<th>TOOLS NEEDED</th>
</tr>
</thead>
<tbody>
<tr>
<td>• 1/4-20 x 1/2-inch hex-head grounding bolt</td>
<td>• Adjustible wrench</td>
</tr>
<tr>
<td>• 1/4-inch star washer</td>
<td>• Needle nose pliers</td>
</tr>
<tr>
<td>• 1/4-inch washer</td>
<td>• Lineman pliers</td>
</tr>
<tr>
<td>• 1/4-inch Nylock nut</td>
<td>• 14/8 AWG wire cutters</td>
</tr>
<tr>
<td>• 5/8-inch x 8-foot ground rod and ground rod clamp</td>
<td>• 8 AWG aluminum ground wire (14 AWG copper ground wire if you come within 12 inches of masonry)</td>
</tr>
<tr>
<td>• Cable ties</td>
<td>• U-shaped tacks</td>
</tr>
<tr>
<td>• 3/8-inch hose clamp</td>
<td>• 14/8 AWG wire cutters</td>
</tr>
</tbody>
</table>

DANGER

• Failure to properly ground the antenna dish may result in severe personal injury or death.
• Do not attempt to ground the antenna dish unless you have the skills to do so in accordance with NEC code.

CAUTION

• The National Electric Code (NEC) and local codes require the antenna dish to be grounded to the alternating current main earth ground point.
• Grounding the system helps protect against damage caused by static voltage buildup, nearby lightning strikes, and power line crossings.
• Failure to ground the system will void your warranty.
GROUNDING THE MAST

GROUNDING USING RG-6 QUAD-SHIELDED CABLE

1. Run 8 AWG aluminum ground wire (14 AWG copper ground wire if the wire comes within 12 inches of masonry) from the base plate to the LNB. Route through the inside of the mast and feed arm. Leave 6 inches of slack at the base plate in case you ever need to remove the wire.

2. Lay the end of the ground wire parallel to the coaxial cable connector.

3. Install the 3/8-inch hose clamp on the crimped part of the F-connector below the F-connector nut. Make sure it goes around both the coaxial cable and the ground wire.

4. Insert the 1/4-20 x 1/2-inch hex-head grounding bolt through the grounding hole on the mast base plate (see Figure 43).

5. Install the 1/4-inch star washer, 1/4-inch washer, and 1/4-inch Nylock nut onto the bolt.

6. Wrap the 8 AWG aluminum ground wire (or 14 AWG copper wire if you pass within 12 inches of masonry) around the bolt between the start washer and 1/4-inch washer, then use a wrench to tighten the nut.

7. If necessary, secure the ground wire using the cable ties or insulated U-shaped tacks. The final configuration should match Figure 42.

Figure 42
GROUNDING THE MAST

GROUNDING USING RG-6 NON-QUAD SHIELDED CABLE

Optional, or if not using RG-6 quad-shielded cable, or as required by local codes

1. Insert the 1/4-20 x 1/2-inch hex-head grounding bolt through the grounding hole on the mast base plate (see Figure 43).
2. Install the 1/4-inch star washer, 1/4-inch washer, and 1/4-inch Nylock nut onto the bolt.
3. Wrap the 8 AWG aluminum ground wire (or 14 AWG copper wire if you pass within 12 inches of masonry or soil) around the bolt between the start washer and 1/4-inch washer, then use a wrench to tighten the nut.
4. Run the ground wire from the base plate to the ground block.
5. Install the split bolt and clamp nut.
6. Install that ground wire and the ground block ground wire on the split bolt and clamp nut.
7. If necessary, secure the ground wire using the cable ties or insulated U-shaped tacks, depending on the mounting surface. The final configuration should match Figure 44.

---

Figure 43

Figure 44
GROUNDING THE METAL POLE MOUNT

Remember that if you determine you want to install the optional ground rod to earth main ground, that you must call your local utility companies and have them mark a safe spot for you to pound the ground rod into the ground near the metal pole. This will prevent you from contacting pipes or electrical wires or cables with the ground rod.

*Note: if you do not use RG6 quad shielded cable (CommScope 5781 or equivalent) you MUST use the optional method of grounding.*

**PARTS NEEDED**
- 5/8-inch x 10-foot ground rod
- Ground rod clamp
- 1/4-inch x 2-3/8-inch ground clamp for metal pole (available at local hardware store)

**TOOLS NEEDED**
- Cable ties
- 8 AWG aluminum ground wire
- 14 AWG copper ground wire (optional)
- 6 AWG copper ground wire (optional)
- 3/8-inch hose clamp
- Adjustable wrench
- Lineman pliers
- Ladder or step ladder
- Sledge hammer
- 14/8/6 AWG wire cutters

**DANGER**
- Failure to properly ground the antenna dish may result in severe personal injury or death.
- Do not attempt to ground the antenna dish unless you have the skills to do so in accordance with NEC code.

**DANGER**
- Call local utility companies before installing the optional ground rod to avoid striking underground cables, pipes, or lines.
- Striking or cutting underground cables, pipes, or lines can cause personal injury or property damage.

**CAUTION**
- The National Electric Code (NEC) and local codes require the two-way antenna dish to be grounded to the alternating current main earth ground point.
- Grounding the system helps protect against damage caused by static voltage buildup, nearby lightning strikes, and power line crossings.
- Failure to ground the antenna dish will void your warranty.
GROUNDING THE METAL POLE MOUNT

GROUNDING USING RG-6 QUAD-SHIELDED CABLE
1. Install the 2-3/8-inch pole ground clamp on the metal pole. Install it 13 inches above the soil or the concrete base.
2. Bend one end of the 8 AWG aluminum ground wire in a 1-1/2-inch loop.
3. Attach the loop to the pole ground clamp.
4. Route the wire up the pole to the coaxial cable connector.
5. Lay the end of the ground wire parallel to the coaxial cable connector.
6. Install the 3/8-inch hose clamp on the crimped part of the F-connector below the F-connector nut. Make sure it goes around both the coaxial cable and the ground wire.
7. Use tie wraps to hold the coaxial cable and ground wire to the mast. The final configuration should match Figure 45.

Figure 45
GROUNDING THE METAL POLE

GROUNDING USING RG-6 NON-QUAD SHIELDED CABLE
Optional, or if not using RG-6 quad-shielded cable, or as required by local codes

1. Pick a spot on the ground near where you installed the satellite dish for the ground rod installation. Call the utility company and ask them to mark the ground around the spot for buried utility lines. Make sure that there are no underground pipes or cables there.

2. Use a sledge hammer to drive the ground rod into the ground at the spot marked as safe by the utility company. Six to 10 inches of the rod should remain exposed.

3. Attach the 2-3/8-inch ground clamp about one foot from the base of the metal pole mount.

4. Attach the ground rod clamp to the ground rod.

5. Bend one end of the 14 AWG copper ground wire in a 1-1/2-inch loop. Attach the loop to the ground clamp or grounding lug on the metal pole and the other end of the grounding wire to the clamp on the ground rod.

6. Bend one end of the 6 AWG copper ground wire in a 1-1/2-inch loop. Attach the loop to the ground rod ground clamp. Attach the other end to the building earth ground. The final configuration should match Figure 46.

Figure 46
ATTACHING THE SHROUD

The shroud helps protect the feed assembly and improves its appearance. Note that one side of the shroud is wider than the other. You place the wider side on the right side of the feed assembly, as you face the satellite dish. The shroud screws are pre-installed. Do not remove them.

Before placing the shroud over the feed assembly, be sure the cables are positioned so that when the shroud is placed it does not interfere with or cause sharp bends in the cables, especially at the connectors.

1. Facing the satellite dish, place the shroud over the feed assembly so that the broad side is on the right. Align the edge of the shroud with the groove in the feedhorn and insert it in the groove (see Figure 47). Align the triangular sections also.

   Note: the shroud contains four hole plugs (see see Figure 48). Make sure all the plugs stay in place and over the holes. Doing so will prevent direct rain and snow from getting into the feed assembly.

2. Tighten all five screws, which are already in position, with a #2 Phillips-head screwdriver. There are four on the narrow side and one on the broad side. The final assembly will look like see Figure 49.

PARTS NEEDED

- Shroud

TOOLS NEEDED

- #2 Phillips-head screwdriver

Figure 47

Figure 48

Figure 49
POINTING THE SATELLITE DISH

TOOLS NEEDED
- Compass
- 1/2-inch open-end or socket wrench
- 7/16 open-end wrench
- Torque wrench (can accept 1/2-inch socket and exert 12 ft-lbs. of torque)
- Wrench
- Permanent marker
- Pencil

This section describes how to point the satellite dish at the satellite. Correct alignment is critical to the operation of the system. When the satellite dish is pointed directly at the satellite, it receives a strong signal. If it is not positioned properly, the signal may be weak, and errors may result during data transfers.

The values calculated by the satellite dish pointing software are accurate enough to allow you to acquire the satellite signal on the first try if the satellite dish mast is plumb.

THE ITERATIVE PROCESS OF POINTING THE DISH

You will be making three adjustments on your satellite dish: polarization (rotation of the satellite dish), azimuth (pointing side to side), and elevation (pointing up or down). These terms are defined on page 6.

Pointing the satellite dish is an iterative process. That is, you go through cycles of making small adjustments to the satellite dish until you are satisfied you cannot get a stronger satellite signal. When you have achieved the strongest possible signal, you have peaked the signal.

Begin by peaking the azimuth setting; then peak the elevation setting; and then readjust the azimuth setting if necessary. After you have optimized the azimuth and elevation settings, you may find that making adjustments in the polarization setting affects the optimum azimuth and elevation settings, and you must go back and adjust them again.

You may achieve the strongest signal strength after just a few adjustments, or you may find that several adjustments are needed. Remember that by getting the strongest possible signal you ensure that you can use all your system’s capacity.

Figure 50
1. Check to see if the elevation reference and polarization settings are still at their correct values. If not, return to page 23 and follow the instructions to align them at their correct values.

2. If you have not already done so, tighten the three mast clamp nuts all the way; then loosen them just enough to move the satellite dish side to side and adjust the azimuth. The clamp bolts should be as snug as possible, such that the satellite dish can still be moved from side to side.

Figure 51
3. Obtain the azimuth value from page 6 of this manual.
4. Use a compass to locate and line up the azimuth bearing. Rotate the satellite dish in azimuth (sideways) until the satellite dish is pointed at the magnetic bearing. Use a pencil to mark the location onto the mast, and label this mark “1.”
Mark the location on the AZ-EL cap, directly above Mark 1. This will be the azimuth alignment mark. (See Figure 52.)
Make another mark on the mast 3/4-inch to the right of Mark 1 and label it “2.” Make another mark on the mast 3/4-inch to the left of Mark 1 and label it “3.”

5. Stand behind the satellite dish and point the front of the satellite dish to the left of the estimated bearing to the satellite so the azimuth alignment mark lines up with Mark 2.

Figure 52
POINTING THE SATELLITE DISH

THE ALIGNMENT PROCEDURE

Aligning the satellite dish is usually a two-person task. If, however, the satellite dish is close enough to the computer for the person aiming the satellite dish to hear the computer speaker (or if you can connect a speaker to the computer and place the speaker next to the satellite dish), one person can do the alignment using the tones generated by the computer as a reference. Otherwise, one person watches the signal strength display on the computer and relays the readings to the person aiming the satellite dish. A portable telephone or walkie-talkie is helpful for this.

6. Start the software that came with your satellite modems. Select Start → Programs → DIRECWAY → Antenna Pointing to go to the Antenna Pointing-Receiver screen.

7. The screen will display your azimuth, elevation, and polarization pointing values. The signal strength program starts and the computer beeps steadily.

8. Stand behind the satellite dish, grasp the outer edges of the satellite dish and, while looking at the Azimuth Alignment Mark, adjust the azimuth 1/8-inch towards the center pencil mark, Mark 1. Let go of the satellite dish and count slowly to 5 while listening for a change in tone from the computer. You must allow the receive modem enough time to track and register the signal strength.

Note: You are aiming at a satellite 22,300 miles away. The key to success is to make small adjustments (never more than 1/8-inch of azimuth as measured on the mast) and to wait 5 seconds between adjustments to give the receive modem the time it needs to lock on to the satellite signal.

9. If you are receiving a signal and the tone has changed, go to step 11. If no signal is present and the azimuth alignment mark has not yet moved to Mark 3 on the mast, return to step 8 and adjust it again. You will keep moving the satellite dish a little at a time until you get a signal.

10. If there is no signal after the satellite dish has been moved 1-1/2 inches from Mark 2 to the Mark 3, there may be an error. Perform the following quick checks.

- Verify coaxial cable connections at the LNB, the receive modem, and all the connections in between.
- Verify that there are no obstructions blocking the signal (for example, trees).
- Verify that you copied and properly set the azimuth, elevation, and polarization values correctly.
- Verify the azimuth by moving 15 feet in front or behind the satellite dish and take another compass reading. Metal near the compass, such as a car or even a belt buckle, can give a false reading.
- Point the front of the satellite dish to the left of the estimated bearing to the satellite so the alignment mark on the AZ/EL cap mount lines up with the rightmost pencil mark you made on the mast.
- Return to step 8 and try again.

After successfully establishing contact with the satellite, proceed to the next section.
POINTING THE SATELLITE DISH

AFTER THE SATELLITE IS DETECTED

The following steps make use of the iterative process described on page 39.

You may achieve optimum signal strength after just a few adjustments, or you may find that additional adjustments are necessary. In any case, remember that by achieving the best possible signal strength, you ensure that you can best take advantage of your system's speed and reliability.

11. Mark the mast so you can find this azimuth bearing again.

12. After the satellite is detected, continue turning the satellite dish a small amount in the same direction you were turning it when you began receiving the satellite signal. Pause for five seconds each time after moving the satellite dish. Turn the satellite dish in this fashion until the signal strength numbers displayed by the satellite dish pointing software begin to fall. When that happens, slowly turn the satellite dish in the opposite direction until you regain the highest number that was previously achieved. Achieving this maximum signal strength is called “peaking the signal.”

13. You will now further adjust the elevation. Loosen the two elevation nuts (see Figure 54). Do not confuse the elevation nuts with the elevation pivot nut. Notice the elevation nuts are called out at the bottom of Figure 54.

14. While watching the signal strength display to ensure that the signal strength number stays at maximum, adjust the elevation bolt head by turning it a few turns clockwise and counterclockwise, until you peak the signal again (see Figure 54).

Note: It may be necessary to pull back on the dish to take pressure off of the elevation bolt when making adjustments.

15. When the signal is peaked, tighten the two elevation nuts.

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Figure 54
POINTING THE SATELLITE DISH

16. Repeat at least one iteration of the sequence beginning at step 12 to be sure that you have acquired the strongest possible signal. Adjust azimuth, then elevation, then azimuth again and continue until there is no improvement in signal strength.

17. The three satellite dish mast clamp bolts must be tightened to complete the alignment process, but the act of tightening them can cause loss of signal strength. Monitor the signal strength while tightening the clamp bolts in the following sequence:
   a. Tighten the top nut until the signal strength begins to degrade then back off until you have regained the peak signal.
   b. Tighten the bottom nut until the signal strength begins to degrade then back off until you have regained the peak signal.
   c. If you cannot tighten either the top or bottom nuts without losing signal strength then go to step f.
   d. If the top and bottom nuts are fully tightened then also tighten the middle nut and go to step 18. You have completed step 17.
   e. Go to step a to repeat the sequence.
   f. If the top and bottom nuts cannot be completely tightened without loss of signal, further elevation adjustment is necessary. Go back to step 13 and begin the sequence again.

18. While watching the signal strength number to ensure that it stays at maximum, tighten the elevation nuts in the following sequence:
   a) Snug the left-hand nut but do not completely tighten it.
   b) Snug the right-hand nut but do not completely tighten it.
   c) Fully tighten the left-hand nut (torque to 12 ft.-lbs.).
   d) Fully tighten the right-hand nut (torque to 12 ft.-lbs.).

19. Fine-tune the polarization setting by loosening the polarization nuts just enough to enable you to rotate the satellite dish a few degrees slowly in each direction. If the signal strength does not change, set the polarization to the value you obtained from page 6. Otherwise, set the polarization at the setting where you peaked the signal.

20. While monitoring the signal strength number to ensure that it stays at maximum, tighten the polarization nuts.

21. After fine-tuning the satellite dish, erase all marks previously made on the mast. Mark the present position with a permanent marker.

22. On your computer, click to close the Antenna Pointing screen.

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FCC ID: K3Y1021938

This device complies with Part 15 of the FCC Rules. Operation is subject to the following 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.

This product is the subject of one or more U.S. or foreign patents pending.

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