Satellite Dish Installation

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Contents

Section 1: **Getting Started…….....……1**

Introduction 1
Determining the Right Dish 1
Satellite Kit 2

Section 2: **Finding the Azimuth and Elevation…….....3**

Section 3: **Choosing the Satellite Dish Location…….……....4**

Section 4: **Satellite Dish Assembly (Round)..…….……...5**

Recommended Tools and Materials 5
Assembly Instructions 5

Section 5: **Satellite Dish Assembly (Elliptical)..…….……...8**

Recommended Tools and Materials 8
Assembly Instructions 8

Section 6: **Mounting Instructions……..…….……..…….12**

Wall Mount 12
Poll Mount 14
Roof Mount 15
Non-Penetrating Roof Mount 15

Section 7: **Satellite Dish and LNBF……..…….……..……16**

Setting up a 90 Degree LNBF 16
Setting up a Straight LNBF 17

Section 8: **Aligning the Satellite Dish……18**

Elliptical 18
Round 19
Using The B2C2 Software To Align The Dish 20

Section 9: **Coaxial Cable and Connectors……22**

Section 10: **Grounding the Satellite Dish……23**

1 GETTING STARTED

Introduction

This chapter provides step-by-step directions on how to properly install your satellite dish antenna. Before beginning the installation, verify with your ISP that you have the latest version of the installation software CD ROM and manual.

Determining the Right Dish

There are two styles of dishes, **round** and **elliptical**. The round dish will work everywhere within the continental United States.

The location of your property will determine the best satellite dish for optimum signal performance.

The elliptical dish will work in the central United States (Figure 2-1) a .65 x .75 elliptical dish can be used. The rest of the United States (Figure 2-1) must use a .75 x .90 elliptical dish, except the extreme northern states that border Canada where a .85 round dish is recommended. You may opt to use a dish that is larger than what is recommended without adversely affecting the signal.

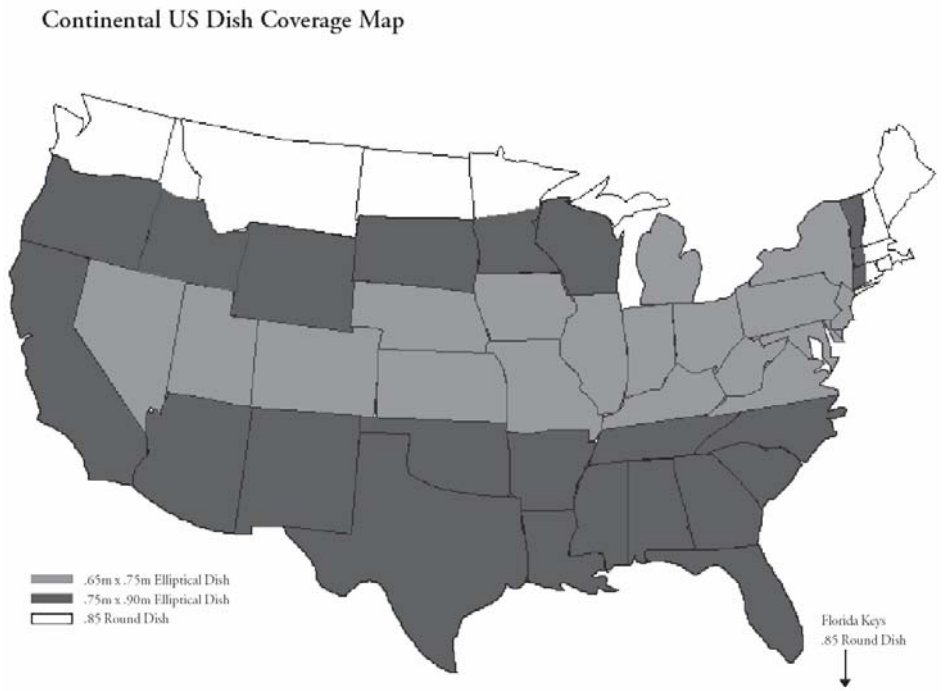


Figure 2-1

Satellite Kit

Before beginning any satellite installation verify that the following items have been included in the Satellite Reception Kit:

1. Satellite Dish shown as packed in shipping carton (Figure 2-2)
2. LNBF (Figure 2-3). It may look different than Figure 2-3 shown below
3. B2C2 satellite modem. (Figure 2-4), Internal PCI on left external USB on right.
4. Installation CD ROM (Figure 2-5)
5. Broadband Receiver Modem User's Guide (Figure 2-6)



Figure 2-2
Packed Satellite Dish



Figure 2-3
LNBF



PCI Card Modem

OR



External USB Modem

Figure 2-4



Figure 2-5
B2C2 Installation Disk



Figure 2-6
Modem Installation Guide

FINDING THE AZIMUTH AND ELEVATION

The first step is to determine the best location to install the satellite dish antenna. Begin by obtaining the proper Azimuth and Elevation settings as you will need these settings to properly direct your satellite antenna. Finding these settings is easy when you use the SatFinder program. The SatFinder software is available on the Installation CD ROM supplied with the Satellite Reception Kits.

To use the SatFinder software supplied on the Installation CD ROM simply:

1. Insert the Installation CD in your CD drive.
2. Find and double click on the SatFinder directory folder on the CD.
3. Double click on the satfinder.exe file to run the program.
4. Enter your Zip Code (US only. Outside of the US enter the longitude and latitude of the dish location under the **"Position – decimal degrees**" heading as shown in Figure 2-7).

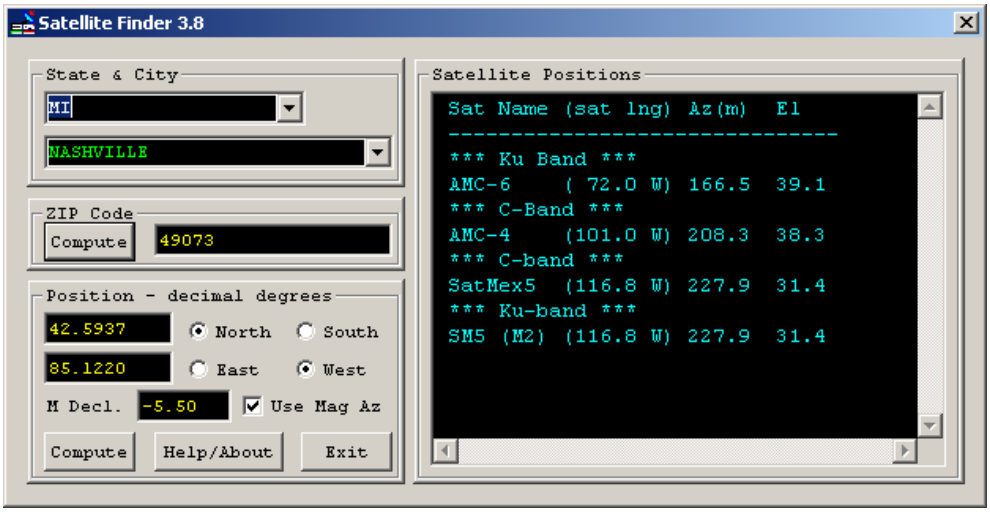


Figure 2-7

5. Click the "**Compute**" button. Make sure the "**Use Mag Az**" box is checked so results displayed will correct for magnetic North (the same as your compass) instead of using true North.
6. The "**Satellite Positions**" box will display the Azimuth and Elevation readings required for positioning the satellite dish (you will typically be using AMC-6).

3 CHOSING THE SATELLITE DISH LOCATION

The azimuth setting is the compass degree reading that you will use to aim the direction of the dish. The elevation is how high up the angle of the satellite dish should be pointed toward the sky.

Once you have the azimuth setting for the satellite, walk the property with a compass to determine the best placement of the dish with a CLEAR VIEW toward the satellite. This means that there can be no buildings, trees, power lines, etc. between your location on the property and the sky. Then determine the location of the computer that will have the satellite modem installed and the route that the cable will be run from this computer to the satellite dish.

4 SATELLITE DISH ASSEMBLY (Round)

Recommended Tools and Materials

The following installation tools and materials are **not** included with the satellite hardware kit. It is recommended that you have these materials available during the installation process.

- Compass
- Socket set to include 5/16” and 1/4”, nut drivers
- Drill (prefer hammer drill if your wall is brick)
- 5/16 wood or masonry bit
- 5/16 Lag Bolts for a wooden structure or 5/16 concrete anchors for a block or brick wall
- Torpedo level
- Phillips screwdriver
- Channel lock or pliers
- Coaxial Cable (RG-6 60%)
- Coaxial (‘F” Connectors)
- Coaxial cable stripper
- Coaxial cable crimper
- Feed through bushings
- Caulk
- Permanent marker

Assembly Instructions

First, lay out all the parts included in the antenna box. (Refer to Figure 2-8 through Figure 2-12 for pictures)



Figure 2-8



Figure 2-9



Figure 2-10

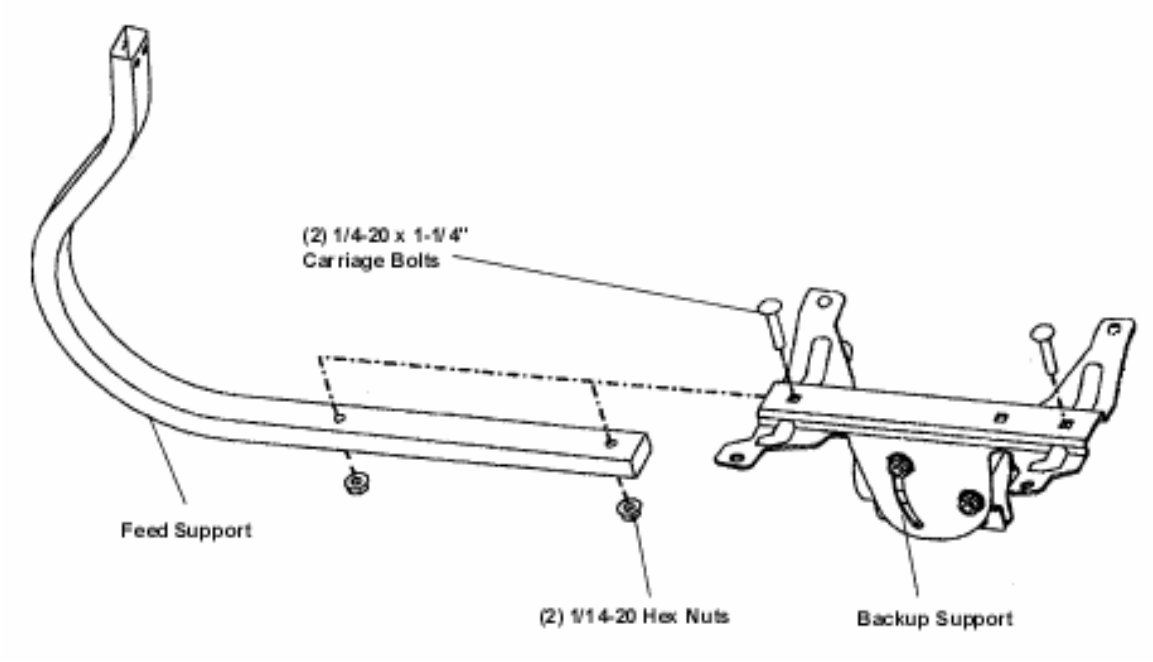


Figure 2-11



Figure2- 12

Assemble LNBF Feed Support to the Backup Support using 2 (¼" x 1 ¼" round head bolts and ¼" hex nuts) as shown in diagram below.



Lay the dish flat to ensure it is true and not out of shape. Then attach the Backup Support and hand tighten ONLY using 4 (5/16" x 5/8" round head bolts and 5/16 "hex nuts). (Refer to Figure 2- 13)



Figure 2-13

Attach the lower half of the Feed Clamp to the open end of the feed support using (2) 5/16 x 1" Slotted Head Screws and (2) 5/16' Hex Nuts. Attach the upper half Feed Clamp to the lower half of the Feed Clamp with (2) #8x1" screws.

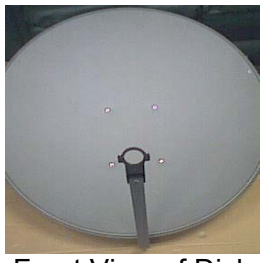


LNBF Clamp - Bracket



LNBF Clamp – Bracket

Then tighten all nuts and bolts with 5/16" ratchet wrench or socket. Insert the plastic covers at ends of LNBF Bracket and Set aside. Now let's work on installing the Mast Bracket.



Front View of Dish



Rear View of Dish

5 SATELLITE DISH ASSEMBLY (Elliptical)

Recommended Tools and Materials

The following installation tools and materials are **not** included with the satellite hardware kit. It is recommended that you have these materials available during the installation process.

- Compass
- Torpedo level or equivalent
- 1/2” open ended and/or box wrench
- Phillips screwdriver
- Drill (hammer drill if drilling through brick or concrete)
- 5/16 wood or masonry bit with pull string hole in end
- 5/16 Lag Bolts for a wooden structure or 5/16 concrete anchors for a block or brick wall
- Coaxial Cable (RG-6 60% or better braiding)
- “F” connectors for RG-6 cable
- Silicone caulk
- Permanent marker

Assembly Instructions

First, lay out all the parts included in the satellite dish box (Figure 2-14 and 2-15 below).



Figure 2-14
Packed Satellite Dish



Figure 2-15
Detail of Mounting Hardware

Lay the dish flat to ensure it is true and not out of shape. Then attach the reflector bracket (shown in Figure 2-16) using four ½” x 1” round head bolts and four ½” hex nuts.

Make sure the arrow is facing up as shown in Figure 2-16.

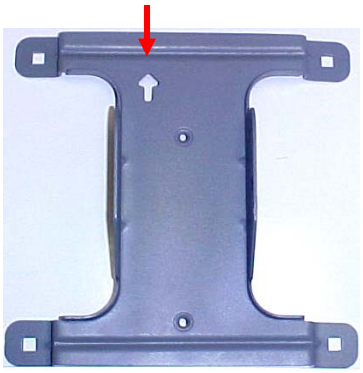


Figure 2-16
Reflector
Bracket

Attach the LNBF Arm (Figure 2--17) onto the reflector bracket (Figure 2-18) using two ½" x 1 1/8" Phillips head screws.

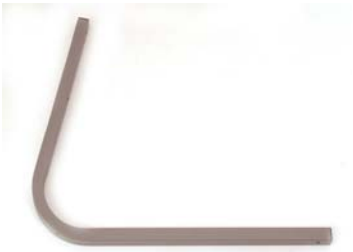


Figure 2-17
LNBF Arm



Figure 2-18
LNBF Arm Assembled LNBF
on Arm and Reflector Bracket

Attach the LNBF onto the clamp at the end of the LNBF arm as shown below in (Figure 2-19), using one 5/8" Phillips head screw at the end of the LNBF Bracket to secure the LNBF in place. Tighten all nuts and bolts with 1/2" wrench. Insert the plastic cover at the end of the LNBF bracket, and set aside. The assembled piece is below in (Figure 2-20). Details on positioning the LNBF, will be shown in Section 7.



Figure 2-19
LNBF Attached to Arm



Figure 2-20
Assembled LNBF, arm, reflector
brackets and dish.

Next, assemble the elevation bracket using the pieces displayed in (Figure 2-21). Place the two U-Bolts through the bracket as shown and attach the two clamps using 2 (1/2" bolts) on each clamp as shown in (Figure 2-22).



Figure 2-21
U Bolt parts



Figure 2-22
Bolt Assembled

Once assembled, you are ready to attach the elevation bracket to the mast bracket. There are two holes marked **A** and **B** on each side of the reflector bracket (shown in Figure 2-23). If your elevation is between 25 and 60 degrees either hole will work. However, if your elevation is lower than 25 degrees, you must use the hole marked "**A**", and if greater than 60 degrees, use the hole marked "**B**". (The "**B**" hole is closest to the antenna.)

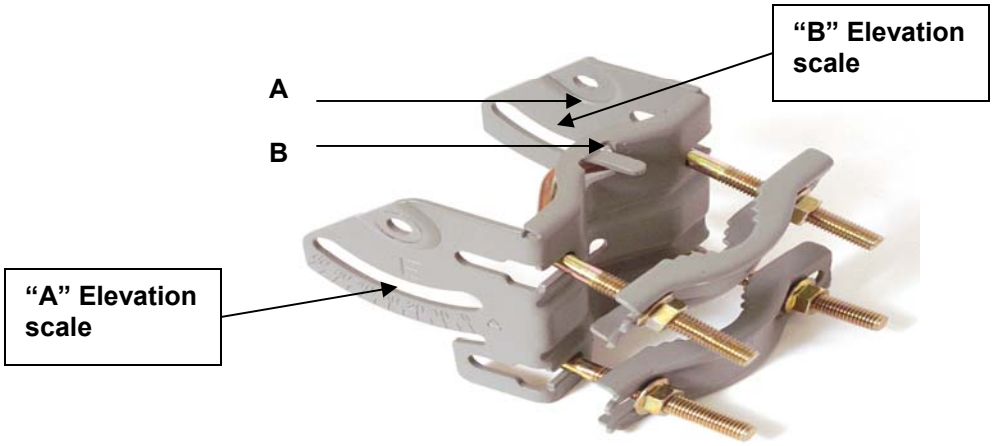


Figure 2-23
Reflector Bracket

Place two 1" bolts through the respective holes and attach the dish mast bracket to the bracket attached to the back of the dish. Place an additional two 1" bolts through each side of the elevation bracket and secure with a washer and nut. These bolts may cover the elevation scale. Do not set the dish angle at this time. Now your assembly is ready to be placed on the pole.

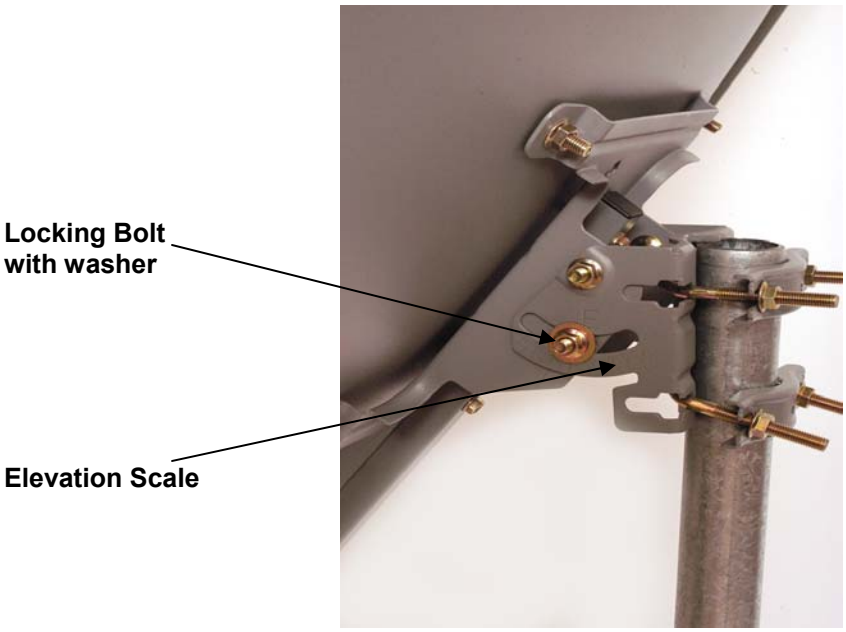


Figure 2- 24
Dish set on pole

This completes the assembly of the dish. After you have completed the wall, ground or roof mount, the dish can be placed onto the pipe and the elevation angle will be set. As shown in (Figure 2-24).

6 MOUNTING THE DISH

Wall Mount

First, find a smooth surface with a clear view of the satellite (for instructions see Section 3, “Choosing the Satellite Dish Location”).

MASONRY: Drill a 1/2” pilot hole through upper left hole in bracket with masonry bit. (Figure 2-25) Using a torpedo level, **MAKE SURE THE BRACKET IS PERFECTLY LEVEL AND PLUMB.** Drill holes and insert four 1/2” x 1 ½” red head anchors for masonry walls.



Figure 2-25
Wall Mount

WOOD: Drill a 1/2” pilot hole through upper left hole in bracket with wood bit (Figure 2-26). Using a torpedo level, **MAKE SURE THE BRACKET IS PERFECTLY LEVEL AND PLUMB**. Continue to drill holes, and insert four 1/2” x 1 ½” lag bolts (Figure 2-27).

NOTE: lag bolts and anchors are **NOT** supplied with the antenna



Figure 2-26
Wooden Wall Mount



Figure 2-27
Masonry Anchor

Attach the pole to the bracket you mounted using one 1/2” x 2 ¼” hex head bolt with 1/2” hex nut through the bracket and pole; hand-tighten only to allow for adjustments later. Using the torpedo level or an equivalent, adjust pole so that the vertical section is **level and plumb** as shown in (Figure 2-28).

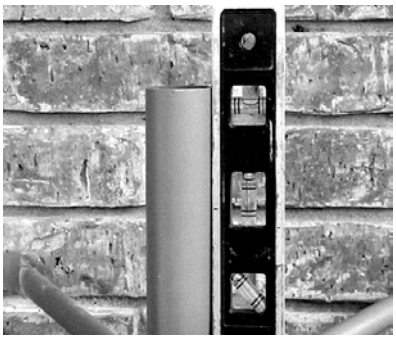


Figure 2-28
Leveling / Plumbing pole

Attach clamp and side brackets using one 1/2” x 3” hex screw with 1/2” hex nut and two lag bolts for either wood or concrete as required. Then make sure the pole is **LEVEL and PLUMB** and tighten all bolts.



Figure 2-29
Mounting Pole on Brick

Please continue to section 7 “Satellite Dish and LNBF Placement” to complete the installation process.

Pole Mount

Recommended tools and materials for installing a satellite dish on a pole mount only:

- Post hole digger
- Shovel
- Concrete
- Wheelbarrow or large pail for mixing concrete
- Six foot Steel Pipe or alternatively a top rail to a chain link fence will also work well. (It is recommended that you bring your mast bracket with you to ensure you have the right diameter pipe).
- Flange
- Four bolts with nuts ¼”
- Cinder Block, 8” square (to fit over pole on ground)

Find a place on the property, preferably close to where the RG-6 coaxial cable from the computer will penetrate the wall and where there is also a clear view of the satellite (see section 3 “Choosing the Satellite Dish Location”). Screw the flange (Figure 2-30) onto the pipe and insert the four bolts looking up from the bottom and attach the nuts as shown in (Figure 2-31). This will prevent the pipe from spinning in the hole. Set aside until the hole is readied.



Figure 2-30 Flange



Figure 2-31 attached to ground pole

Using the post hole-digger, make a hole in the ground approximately 3 feet deep and 8” around. Insert the pipe with the flange on the bottom and fill the hole with concrete. When the hole is filled to the ground level, insert the cinder block over the pipe and fill cinder block holes with concrete. This will stabilize the pole. Using a level, **make sure the pipe is perfectly plumb and level.**

Check the pipe occasionally while the concrete is drying to make sure that it is still level and plumb. Once the concrete hardens, the pole is now ready for the satellite dish. Please continue to section 7 “Satellite Dish and LNBF Placement” to complete the installation process.

Roof Mount

NOTE: PENETRATING A ROOF TO MOUNT THE DISH IS NOT RECOMMENDED. Installing the dish on a flat roof can be dangerous and cause damage to the roof if not done properly. It is recommended that you contact a structural engineer to calculate wind load and stress factors and purchase an approved non-penetrating roof mount with the appropriate number of blocks.

Non-Penetrating Roof Mount

A non-penetrating roof mount can be purchased from your ISP. The mount is made of structural steel and is held in place with cinder blocks. The size of the mount and number of blocks should be calculated by a certified engineer. (Figure 2-32)



Figure 2-32

ONCE THE NON-PEN MOUNT IS ASSEMBLED, MAKE SURE THE POLE IS PERFECTLY LEVEL AND PLUMB and then continue with the installation.

7 SATELLITE DISH AND LNBF PLACEMENT

Carefully lift the satellite dish you assembled earlier in section 4 “Satellite Dish Assembly” and slip it onto the pole as shown in (Figure 2-33). Slightly tighten the bolts to stabilize the dish on the pole.



Figure 2-33
Assembled dish on pole

The next step is to attach the LNBF to the LNBF bracket located at the end of the LNBF arm if not already completed in an earlier section. There are two types of LNBF’s, the 90 degree LNBF (Figure 2-34) and the straight LNBF (Figure 2-35). Each type is set up differently.



F Connector

Figure 2-34
90° LNBF with F Connector



Figure 2-35
Straight LNBF

Setting up the 90 Degree LNBF

Place the LNBF in the middle of the bracket and position the LNBF’s “F” connector at 7 o’clock position (when looking at the front of the dish) for AMC-6 as shown in (Figure 2-36). To optimize the signal quality slide the LNBF forward and back as shown in (Figure

2-38). Much like tuning a radio station, this action will help 'tune-into' the strongest or peak signal.



Figure 2-36
When facing the front of the dish the F Connector is positioned at 7 o'clock when aiming AMC-6 on U.S. east coast

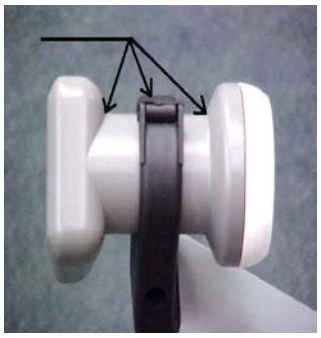


Figure 2-37
To begin the LNBF is placed in the middle of the bracket.

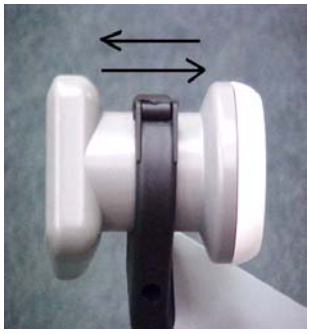


Figure 2-38
Slide the LNBF forward and back to tune in the peak signal.

Setting Up a Straight LNBF

The straight LNBF has special marks that act as guides for the bracket. Align the bracket with the guidelines on the straight LNBF as shown in (Figure 2-39). The special marks must stay aligned with center of the LNBF holding bracket as shown in (Figure 2-39 and 2-40). To optimize the signal quality slide the LNBF in forward and back as shown in (Figure 2-40). Then rotate the LNBF in both directions to peak the signal.

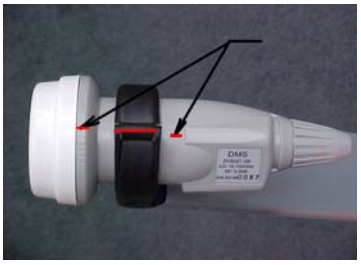


Figure 2-39
Use the guides on the bracket to properly line up the LNBF



Figure 2-40
Slide the LNBF forward and back to tune in the peak signal.

8 ALIGNING THE SATELLITE DISH

Elliptical

Refer to your elevation settings obtained earlier (details in section “2. Finding the Azimuth and Elevation.” Set the elevation scale (Figure 2-41) by aligning the mark on the mount with the correct number on the scale. This should be exact, and there should not be any adjustment needed to the elevation to peak the signal.



Figure 2-41

Standing in front of the antenna, look out in the distance for a stationary focal point that is exactly where the compass is pointing towards the azimuth setting.

Tighten the nuts on the U-bolts so the dish won’t slip and you can still move it from side to side for fine-tuning.

Now, connect the coaxial cable from the LNBF to a Signal Level Meter or the modem. If you use the modem, you may want assistance from someone to tell you the meter signal readings unless the computer is visible from the dish. Again, standing at the dish, move it towards the correct compass setting. **VERY SLOWLY**, move it in both directions until you receive a signal on your meter. Then turn the LNBF very slowly and move it in and out of the bracket. These steps should be done repeatedly, until the maximum signal is received. Once you are satisfied with your signal strength, tighten all the bolts. Using a permanent marker, draw a line on the elevation bracket where the bolts are and also 3 lines on the mast bracket to the pole for a reference should the dish ever move. Confirm the elevation setting on the bracket.

Having one person view the meter, while another moves the dish for optimum signal strength is advised. Once these steps are completed and maximum signal strength is achieved, tighten all bolts. Using a meter will allow you to properly align the dish, however the final measure of success will be determined by the signal strength bar that can be found within the Setup4PC menu that is part of the B2C2 application.

If you wish to use the B2C2 satellite modem and software that is to be installed on your PC to monitor signal strength during dish installation; simply follow the installation instructions for the B2C2 satellite modem as described in the accompanying B2C2 manual and follow the instructions at the end of this section entitled “Using the B2C2 Software to Align the Dish.

Round

Refer to your settings earlier in the first section for your Azimuth and Elevation. Lightly tighten all the bolts on the elevation bracket and mast bracket to allow for slight movement and adjustment.

Standing at the rear of the dish, carefully set the elevation by adjusting the bolt to the respective setting (Refer to Figure 2-42 and 2-43).

Again, tighten the bolts so the dish won't slip, but you can still move it for fine-tuning.

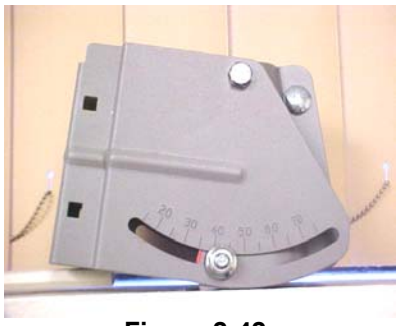


Figure 2-42

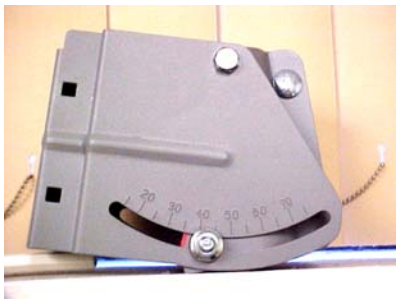


Figure 2-43

Now, connect the coaxial cable from the LNBF to a Signal Level Meter or the modem. If you use the modem, you may want assistance from someone to tell you the meter signal readings unless the computer is visible from the dish. Again, standing behind the dish, move it towards the correct compass setting. VERY SLOWLY, move it in both directions until you receive a signal on your meter. Then move the dish VERY SLOWLY up and down to peak the signal. Then turn the LNBF very slowly and move it in and out of the bracket. These steps should be done repeatedly, until the maximum signal is received. Once you are satisfied with your signal strength, tighten all the bolts. Using a permanent marker, draw a line on the elevation bracket where the bolts are and also 3 lines on the mast bracket to the pole for a reference should the dish ever move. Confirm the elevation setting on the bracket.

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Using The B2C2 Software To Align The Dish

Once the B2C2 hardware has been successfully installed, a round, red satellite icon will be displayed in the Windows System Tray. Double-click on this icon to run the **Setup4PC** satellite modem application. You may also run the software by clicking on the **START** button, then **PROGRAMS**, then **BROADBAND4PC**, then **SETUP4PC** or you may right-click on the round satellite icon in the system tray and then click on **Setup4PC**. Once the **Setup4PC** screen is displayed (Figure 2-43), click on the **Status** button located on the lower left of the window to open the **Transponder Status** window (Figure 2-44)

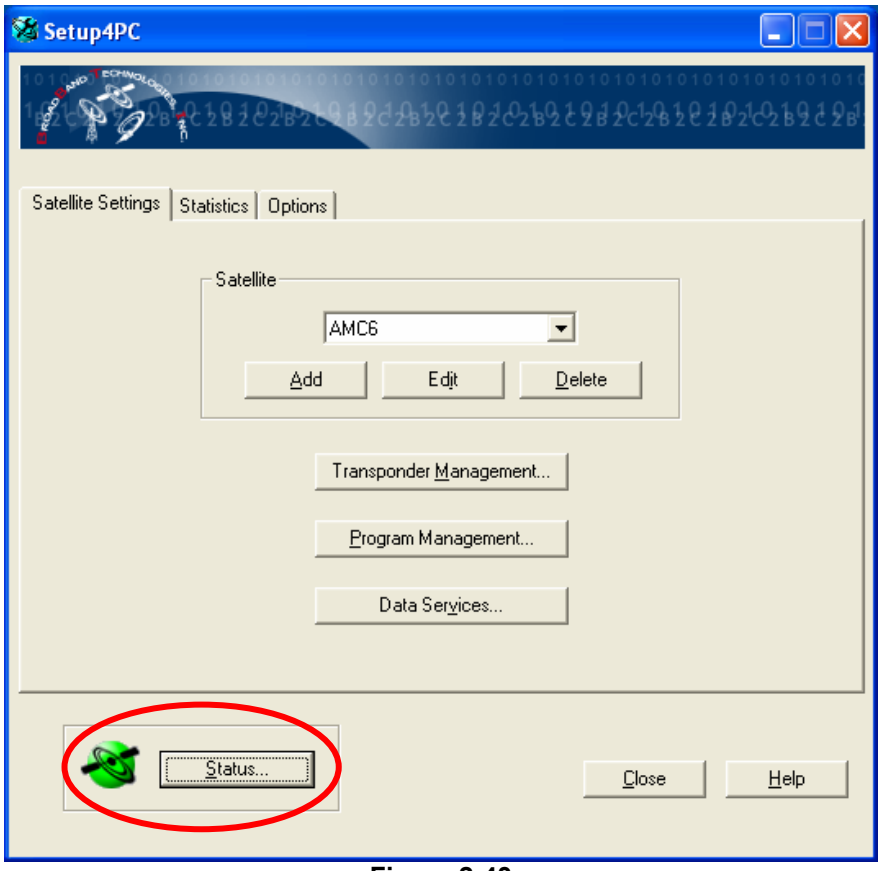


Figure 2-43

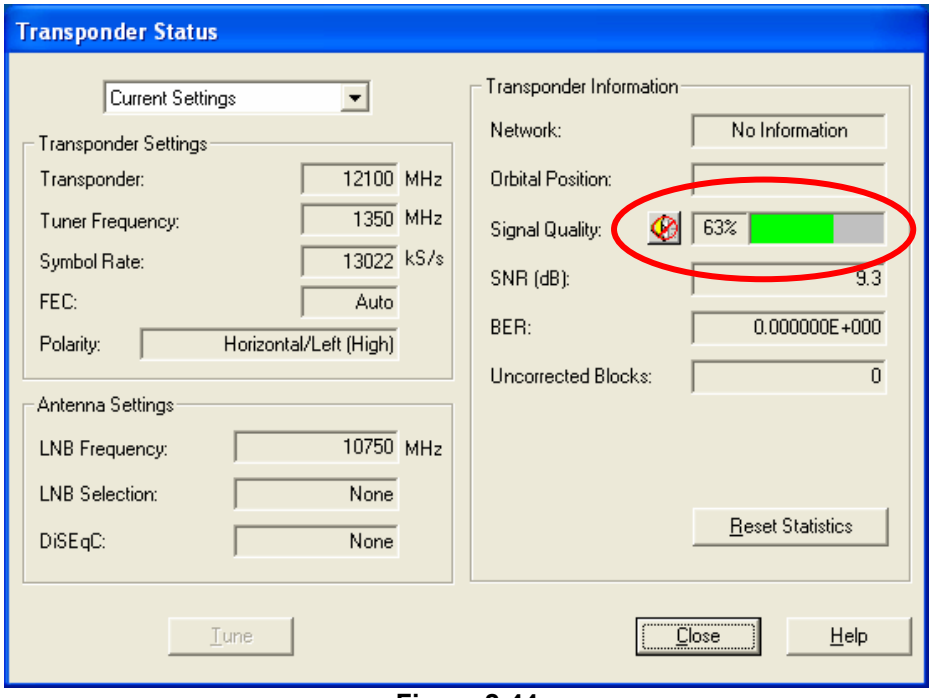


Figure 2-44

Once the **Transponder Status** window is displayed, locate the **Signal Quality** meter bar to the right of the window. As the dish is more accurately aligned, the percentage of signal quality will increase and the signal bar will turn from red to yellow and then to green as it displays a stronger signal. If you wish to activate an audio tone to assist with aligning the dish, you may click on the button to the left of the signal bar that is displayed with a speaker icon. A “beep” tone will play through your PC speakers which will increase in speed, volume and pitch as a stronger signal is acquired. This feature is convenient if you need to aim the dish without someone assisting you. Once the dish is aligned to the strongest signal that it can acquire, the tone may be turned off by clicking on the speaker icon button again.

9 COAXIAL CABLE AND CONNECTORS

The RG-6 cable should be manufactured with 60% or better braiding, copper clad and no longer than 150 feet from the antenna to the computer.

There are many approved manufactures of “F” connectors. F56-324T connectors by Holland Electronics or similar as manufactured by Gilbert and LRC are recommended. These connectors should be crimped with an approved hex connector tool (Figure 2-45 and 2-46).



Figure 2-45 “F” connector



Figure 2-46 “F” connector

These outdoor connectors have a ring and sealant that is used for weather protection. We also recommend using a weather boot for additional protection from the elements, specifically humidity. When installing the connectors, strip the coaxial cable with a cable stripper 9/16” to expose the white dielectric. Then strip the white dielectric to expose 5/16” of the copper center conductor (Figure 2-47). Be careful not to score the center conductor since the signal travels on the outside of the wire.

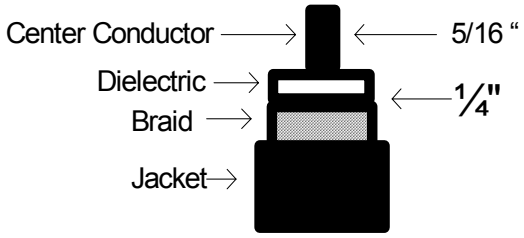


Figure 2-47 Coaxial Cable

NOTE: Make sure the center conductor is clean of all materials and that none of the braiding is touching it. If the braid or shielding touches the center conductor, it can short out the LNBF and attenuate the signal.

Carefully slip the stripped cable into the connector. Again, make sure **ONLY** the center conductor fits through the hole. Push the cable into the connector until the white dielectric is level with the bottom of the nut. Crimp the connector with a hex type RG-6 crimping tool.

The RG-6 cable should not be longer than 150 feet from the dish antenna to the computer. Also, make sure the connectors were installed and crimped properly.

10 GROUNDING THE SATELLITE DISH

The satellite installation should be grounded to prevent any damage to your computer from lightning or other electrical spikes. Refer to NEC codes in your area for specific rules and regulations.

The following is suggested if there is no conflict with the local NEC codes:

- Install an approved ground block before the point where the cable penetrates the building.
- Make sure you install weather boots and the correct outdoor connectors.
- There are ground blocks with lightning arrestors for additional protection available.
- Use a surge protector for protection where you plug your computer into the wall outlet.