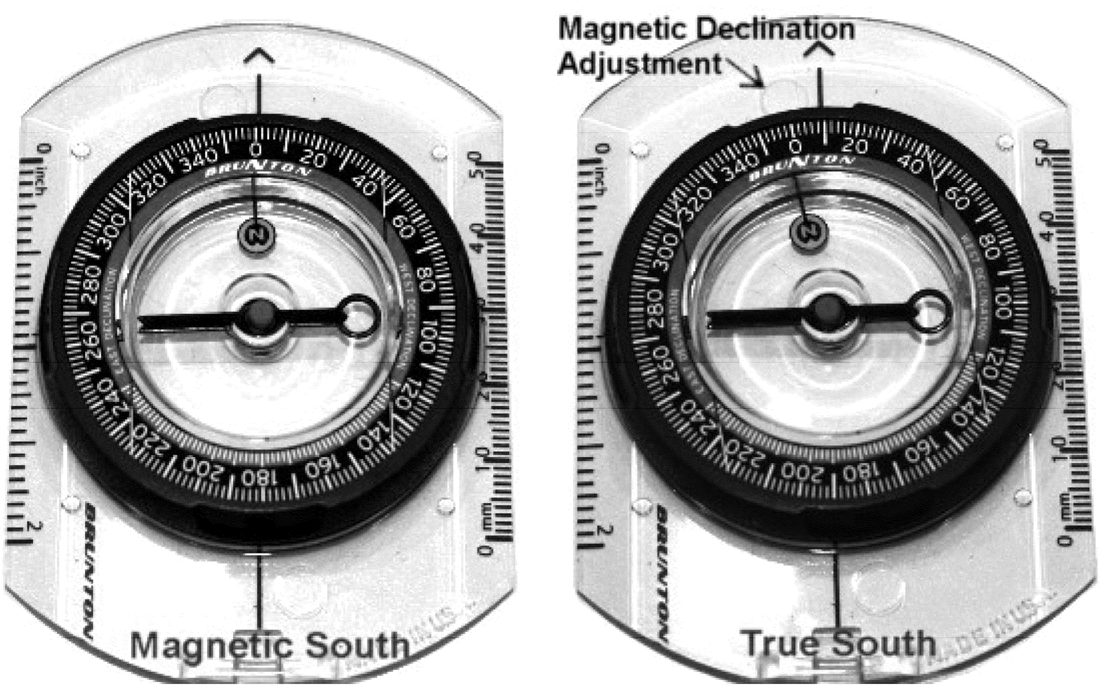
Mesh Dish Setup http://www.SatelliteDish.com 954-941-8883

As the saying goes, a picture is worth a thousand wordsand we recommend that you carefully study the pictures below to assemble yourTVRO dish.

4.1: Saddle Mount and True South

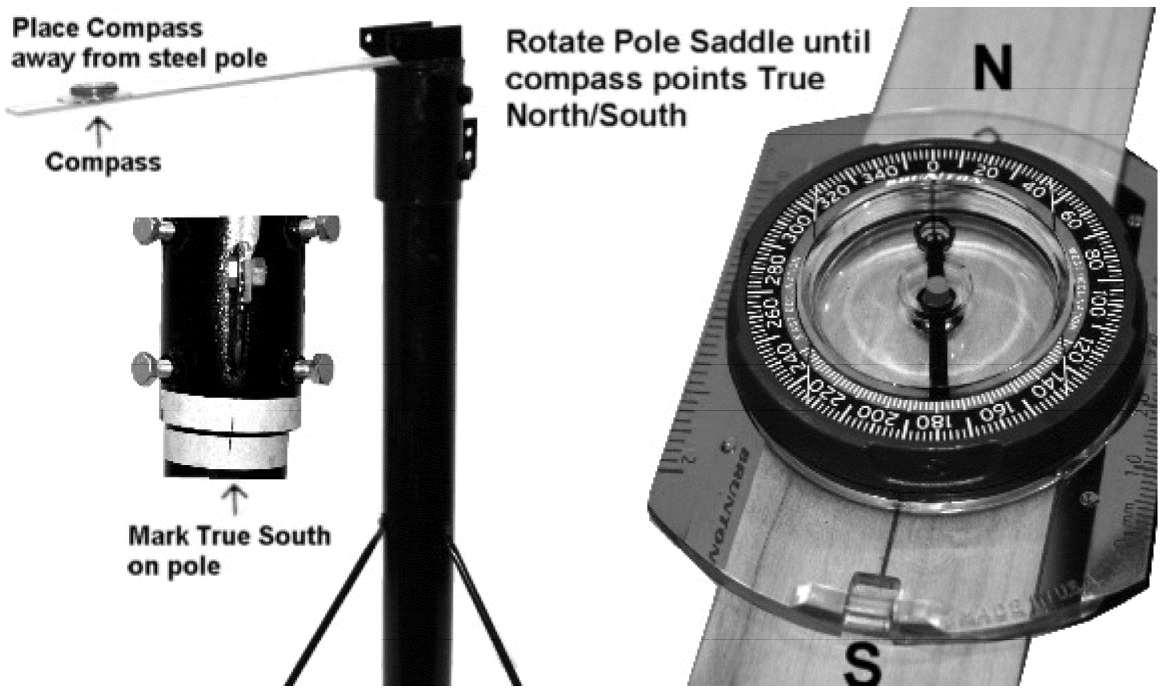
The first thing you need to do is to roughly determine true geographic south (not magnetic south) for your location. Your dish MUST be pointed exactly due south in order to track the satellite arc properly. At this time you only need to be pointed roughly due south and you will fine tune the direction later when aligning the dish.

You can do this by using a simple magnetic compass. Before using the compass however, you must adjust the magnetic declination so that it points true south and not magnetic south. Follow the instructions that came with your compass or use the link below to find your magnetic declination:



Place the dish saddle on the pole and tape a long, flat stick to the saddle and put the compass on the end of the stick. (If you place the compass directly on the steel saddle, it will distort the magnetic field and your compass will not give you a reliable reading). Make sure the stick is level and gently start rotating the saddle until your compass points due south. Mark this position on both the saddle and pole.

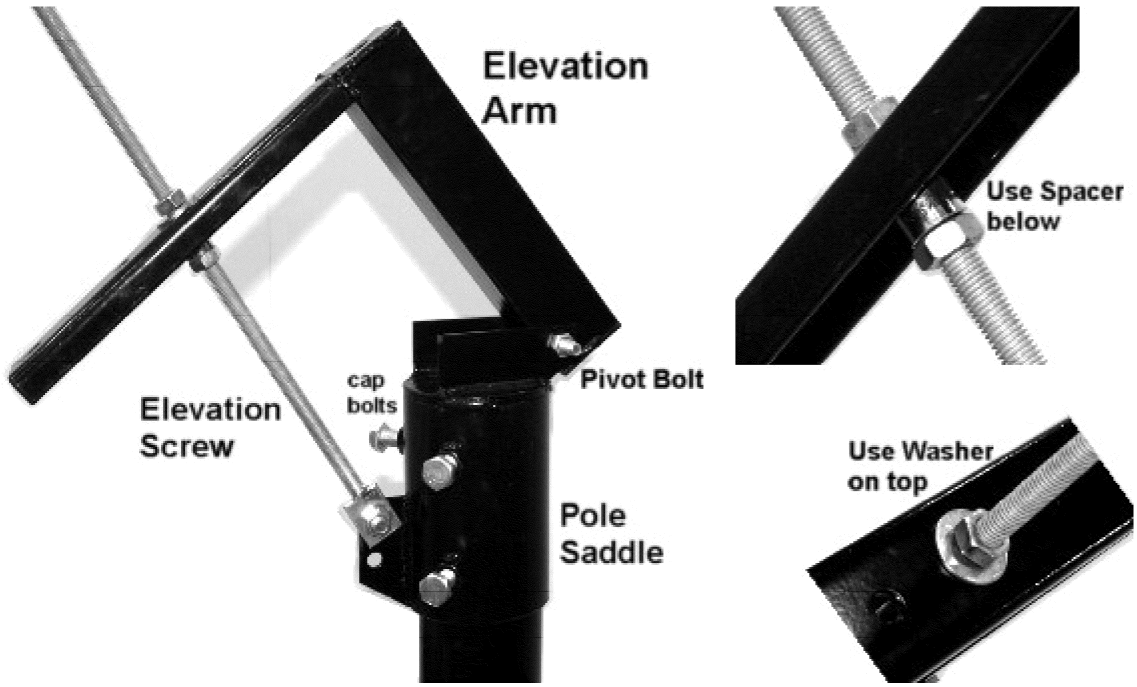
We strongly recommend that you either chalk the pole or use masking tape to mark the position. When you fine tune the alignment later on, you will need to move the dish a few degrees to the left or right of this point to peak the signal. If you don't mark it, you will found yourself guessing and becoming very frustrated indeed!



4.2: Assembly of Elevation Arm and Screw

Assemble the elevation arm and elevation screw as shown in the picture below. Use a spacer below the arm to make elevation screw adjustments easier. Tighten the pivot bolt just enough so that the elevation arm doesn't wiggle back and forth on the saddle.

Step 4



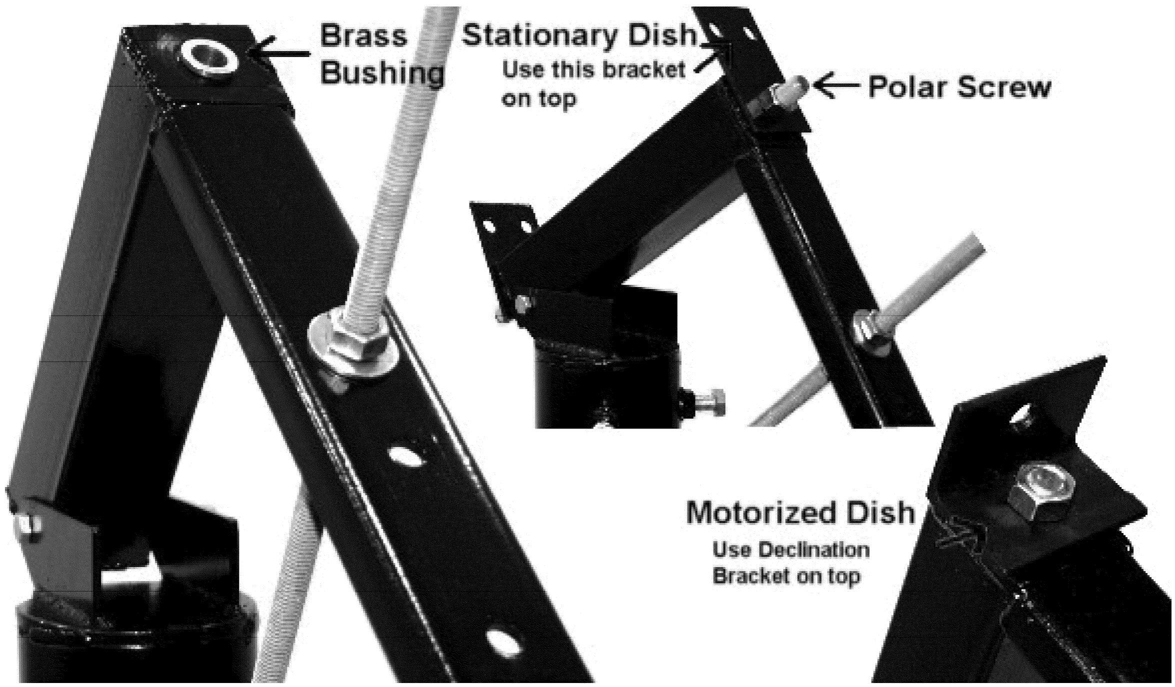
4.3: Assembly of Polar Mount Pivot Screw

Assemble the polar mount pivot screw as shown in the picture below. Be sure to add the brass bushings on the top and bottom of the elevation arm. The purpose of the brass bushings is to ensure a snug fit with the pivot screw and at the same time allow the dish to pivot about this axis. If the bushings are the wrong size or you do not use them at all, the pivot axis will move around (due to the weight of the dish) as you move the dish and signal reception along the satellite arc will become erratic. Even a little play between the bushings and the pivot screw will cause slight misalignment problems when you swing the dish from horizon to horizon.

4.4: Assembly of Declination Bracket and Screw

Assemble the declination bracket and screw for your dish. The declination design varies by dish model and may be located at the top (like in the illustration) or at the bottom of the elevation arm. The declination screw allows you to move the dish frame a few degrees (0– 10 degrees) away from the elevation arm. This setting is extremely important for tracking the satellite arc and will be discussed in more detail later.

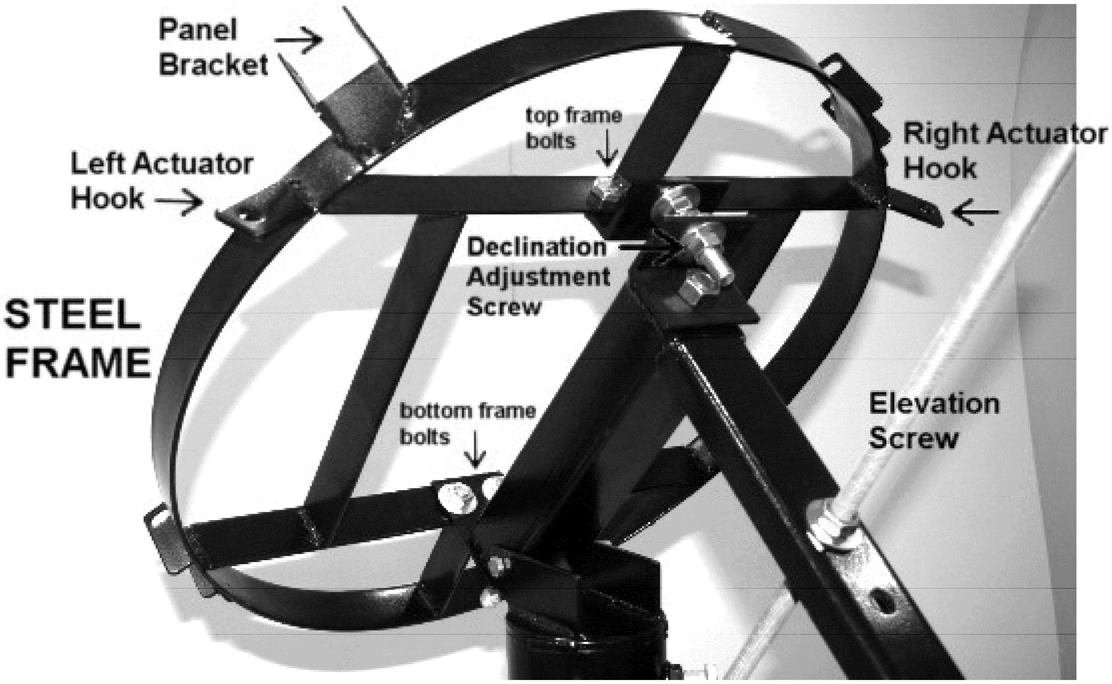
If you are installing a stationaryTVRO satellite, you do not need the declination bracket and screw (for most models).



4.5: Assembly of Dish Frame

Bolt the frame on to the elevation arm and declination bracket. Tighten the pivot screw bolts (top and bottom) enough so that a force of 15– 20 lbs is required to swivel the frame about the pivot screw. DO NOT over tighten these bolts because your actuator will struggle to push and pull the frame. If your actuator can't move the dish, loosen the bolts.

The reason for tightening so that a 15– 20 lbs force is required to move the frame is to prevent high winds from rocking your dish back and forth. Even though your dish will have the actuator attached, even the best actuators will have a little play (1-2mm) and the wind will move it back and forth. Although 1-2mm doesn't sound like much, it could cause the signal quality to fluctuate by 10-15%, especially with Ku band signals.



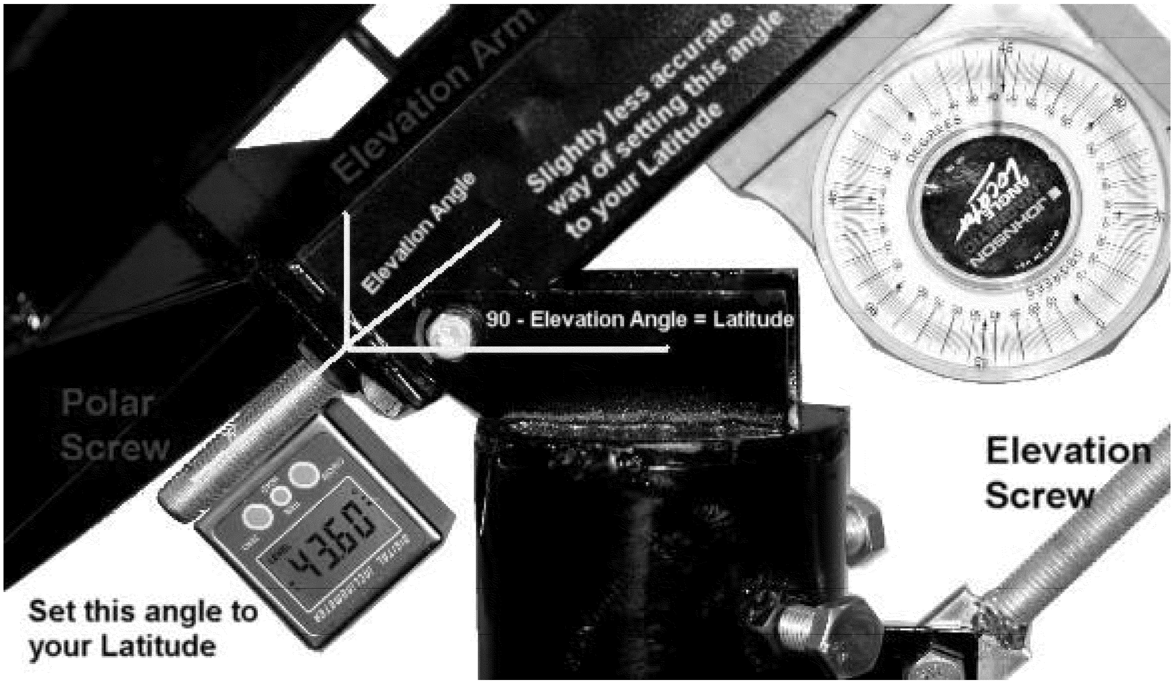
4.6: Set Elevation Angle

Consult the chart below to set your elevation angle. Your elevation angle is approximately equal to your geographical latitude. It is slightly modified from your precise latitude in order to better track the satellite arc a the ends. It turns out that the satellite arc cannot be tracked perfectly with one degree of freedom of motion. It can be tracked perfectly at the top of the arc (zenith) but will be off by 1-2 degrees at the horizon ends. We can get around this problem by using a modified elevation angle and modified declination offset angle to improve tracking at the arc ends.

Find your modified elevation angle from the chart below and place your inclinometer on the pivot screw axis as shown in the picture below. Avoid measuring the elevation angle against the steel elevation arm because imprecise machining of the arm may have resulted in a surface that is not exactly parallel to the pivot screw axis. Adjust the elevation screw settings until you get the desired modified elevation angle.

For our setup, we used **Buffalo, NY** as the geographical location with a latitude of 43 degrees North. According to the chart below, our modified elevation angle should be **43.65 degrees**. With a digital inclinometer we were able to set the modified elevation angle to 43.60 degrees!

Once you set your modified elevation angle, we strongly recommend that you mark the elevation screw with a black felt tip pen so you know this setting. In theory, you should never have to change this setting unless you want to fine tune your dish alignment (described later).



4.7: Set Declination Offset Angle

Consult the chart below to set your modified declination offset angle. This adjustment will 'tilt' your dish frame slightly forward by a few degrees.

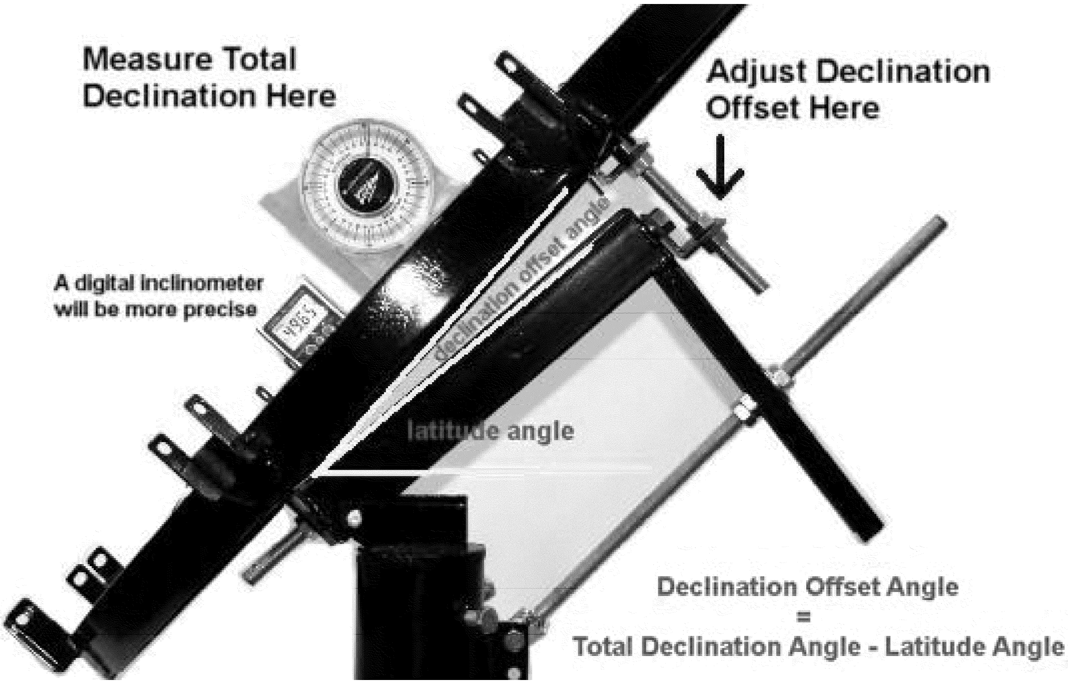
It is easier to measure your total declination angle which equals your modified elevation angle plus your modified declination offset angle. To do this, place your inclinometer on the front or back surface of the dish frame as shown. If you have the panels already assembled, you will have to either take the measurement on the back of the frame if possible or across the panel rims from the front. You MUST make this adjustment while the dish frame points true south (zenith). Adjust the declination screw until you are satisfied with your setting. At this point it is not critical that this adjustment be perfectly accurate as we will fine-tune it later on.

For our **Buffalo, NY** example, the modified declination offset from the chart below was 5.96 degrees so:

Total Declination = 43.65 + 5.96 = 49.61 degrees

In the picture below were able to set it to 49.65 degrees!

Step 4


Measure Total
Declination Here
Adjust Declination
Offset Here
A digital inclinometer
will be more precise
declination offset angle
latitude angle
Declination Offset Angle
=
Total Declination Angle - Latitude Angle

Step 4

Latitude (Degrees)	Elevation Angle (Degrees)	Declination Angle (Degrees)	Latitude (Degrees)	Elevation Angle (Degrees)	Declination Angle (Degrees)
1.0°	1.02°	0.15°	32.0°	32.60°	4.66°
2.0°	2.05°	0.30°	33.0°	33.60°	4.79°
3.0°	3.07°	0.46°	34.0°	34.61°	4.91°
4.0°	4.10°	0.61°	35.0°	35.62°	5.04°
5.0°	5.12°	0.77°	36.0°	36.63°	5.16°
6.0°	6.15°	0.91°	37.0°	37.63°	5.28°
7.0°	7.17°	1.06°	38.0°	38.64°	5.40°
8.0°	8.20°	1.21°	39.0°	39.64°	5.51°
9.0°	9.22°	1.36°	40.0°	40.65°	5.63°
10.0°	10.23°	1.54°	41.0°	41.65°	5.74°
11.0°	11.27°	1.66°	42.0°	42.65°	5.85°
12.0°	12.29°	1.81°	43.0°	43.65°	5.96°
13.0°	13.31°	1.96°	44.0°	44.66°	6.07°
14.0°	14.33°	2.11°	45.0°	45.66°	6.18°
15.0°	15.33°	2.29°	46.0°	46.65°	6.28°
16.0°	16.38°	2.40°	47.0°	47.65°	6.38°
17.0°	17.40°	2.55°	48.0°	48.65°	6.48°
18.0°	18.42°	2.69°	49.0°	49.65°	6.58°
19.0°	19.44°	2.84°	50.0°	50.64°	6.67°
20.0°	20.43°	3.02°	51.0°	51.67°	6.70°
21.0°	21.47°	3.12°	52.0°	52.66°	6.79°
22.0°	22.49°	3.26°	53.0°	53.65°	6.88°
23.0°	23.51°	3.40°	54.0°	54.65°	6.97°
24.0°	24.52°	3.54°	55.0°	55.61°	7.11°
25.0°	25.51°	3.73°	60.0°	60.56°	7.51°
26.0°	26.56°	3.81°	65.0°	65.49°	7.84°
27.0°	27.57°	3.95°	70.0°	70.41°	8.11°
28.0°	28.58°	4.08°	75.0°	75.32°	8.33°
29.0°	29.60°	4.21°	80.0°	80.22°	8.48°
30.0°	30.57°	4.40°	85.0°	85.11°	8.57°
31.0°	31.59°	4.53°			

Step 5: Adding a Dish Actuator

A linear actuator (or jack) is simply a motorized arm that telescopes in and out of a fixed tube and moves your dish across the satellite arc. If you want to track multiple satellites and receive many more channels than a typically stationary dish is capable of receiving, then you need to install an actuator.

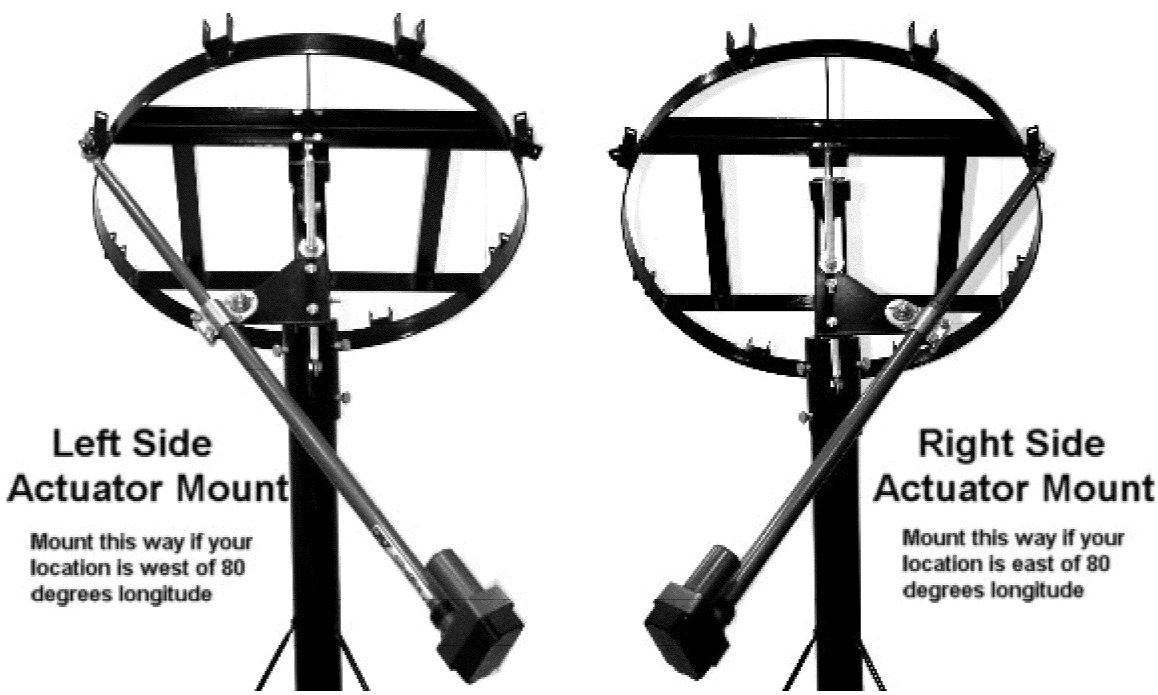
5.1: Determining Actuator Mount Side

Before mounting the actuator you need to determine which side to mount it on. Knowing the satellite arc at your geographical location will help you make this determination. The general rule of thumb is this:

Left Side Mount
Mount the actuator on the left side if your location is west of 80 degrees longitude.

Right Side Mount
Mount the actuator on the right side if your location is east of 80 degrees longitude.

The reasoning behind this 'actuator mount rule' is simply that the average 24 inch actuator can track about 100 degrees of the arc altogether (a 36 inch actuator can track about 120 degrees). In North America geostationary satellites are positioned from **11W to 139W** along the arc and the idea is to track as much of this arc as possible by mounting the actuator intelligently. For example, if you are located at 120W, there are only a few satellites west of your zenith but many more east of your location and near the horizon. In this case, you would mount the actuator on the left side and adjust it so it starts 'pushing' the dish away from 45W because this satellite is the lowest on the arc that is NOT below the horizon and is visible from 120W. By mounting the actuator on the left side, you would be able to track the arc from 45W to 139W. If you mounted it on the right side, the actuator arm would extend quite a bit already before encountering the first satellite at 139W and would not be able to make it all the way to 45W. Instead, you would only be able to track from 139W to 70W.

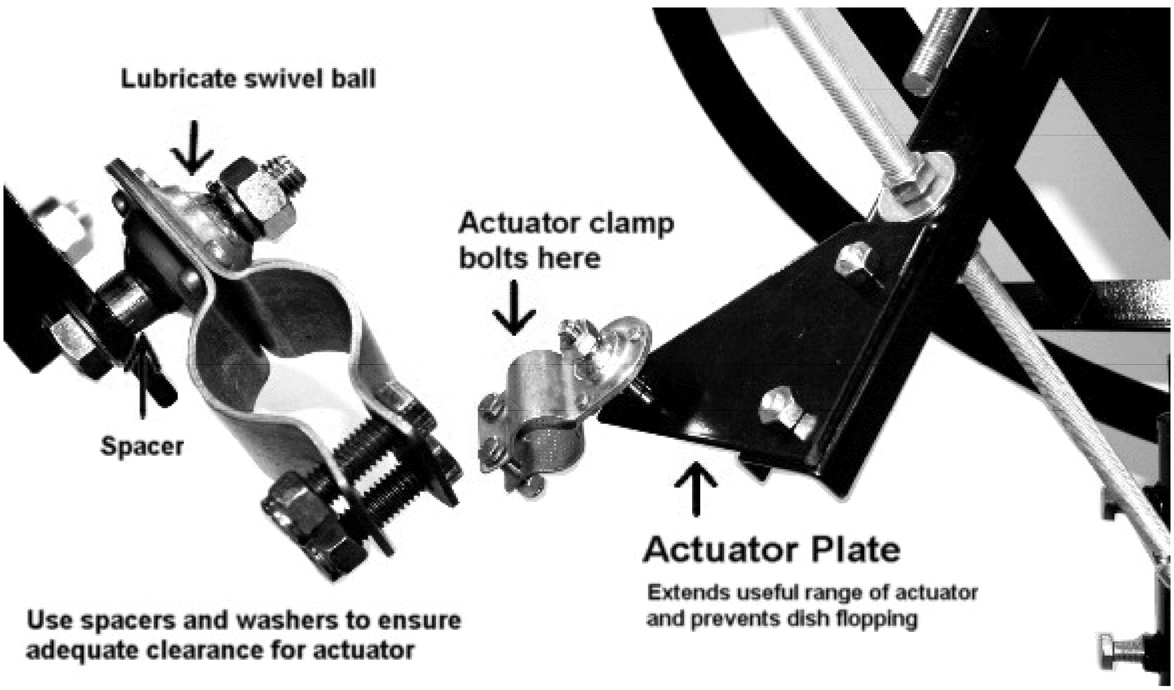


5.2: Actuator Plate

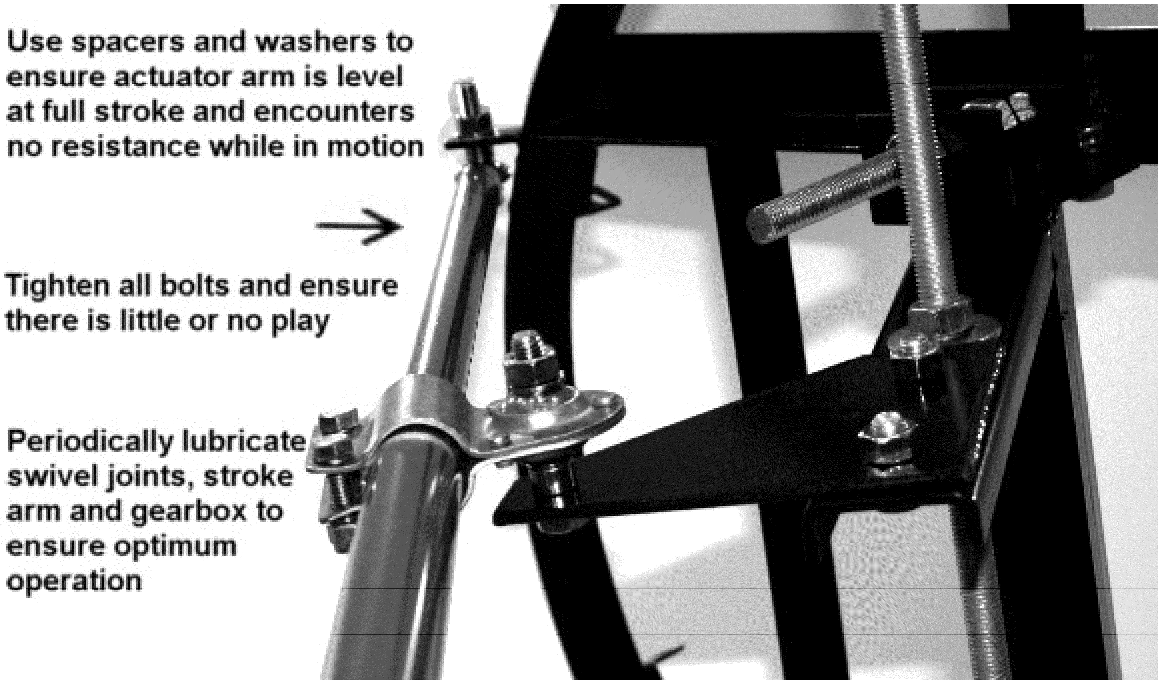
The purpose of the actuator plate is to optimize the clamp position of the actuator in order to maximize the useful range of the satellite arc that can be tracked. Bolt it on the left or right side depending on where you plan to mount the actuator.

5.3: Actuator Clamp Assembly

Attach the actuator clamp to the actuator plate as shown in the picture below and use spacers and washers as needed to ensure the clamp clears the plate when it swivels around. Mount the actuator through the clamp but DO NOT tighten the clamp yet because you will need to move the actuator back and forth to find the right place to clamp it. Bolt the end of the actuator arm to the frame hook as shown below and add spacers and washers to ensure proper clearance. Ensure that the actuator arm moves freely and doesn't encounter any resistance or friction when being extended or retracted in the actuator tube. If it does encounter resistance, you must add washers and spaces at the clamp and frame hook until the actuator arm telescopes in and out smoothly. You should test for smooth operation by wiring the actuator to the controller and moving it across the arc.



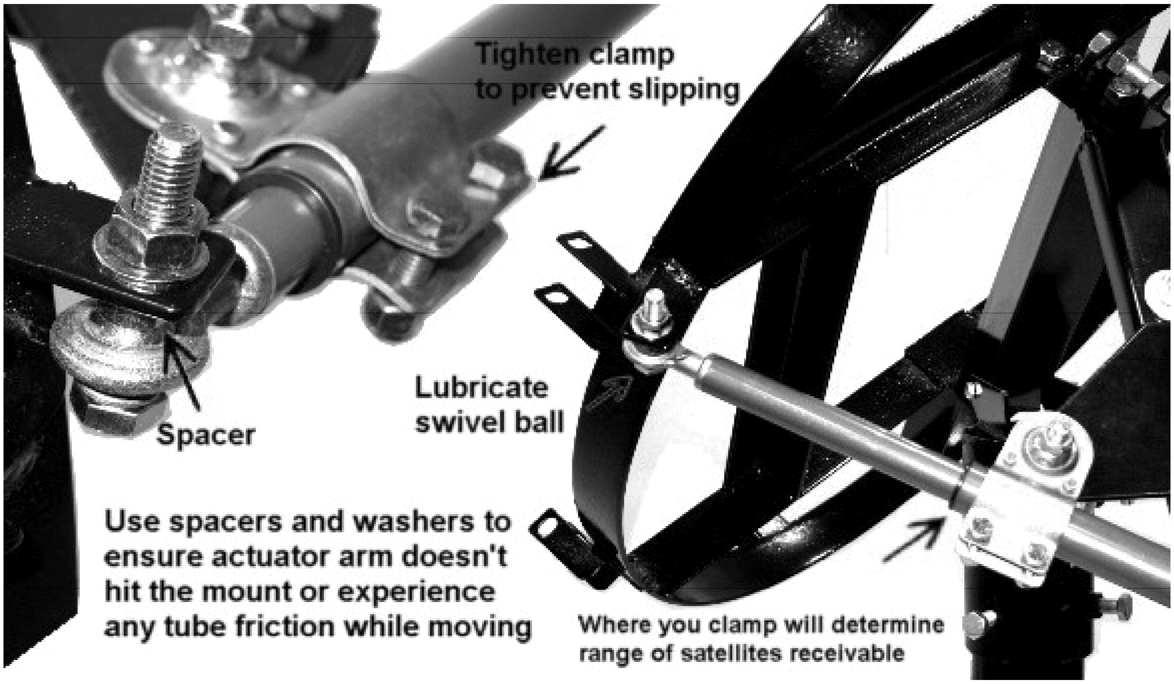
Step 4



5.4: Optimum Actuator Clamp Location

In order to optimize the useful range of the actuator over the satellite arc, you need to retract the actuator arm completely and clamp the actuator in place when the dish is aimed at the lowest satellite above the horizon that is visible from your location or the lowest satellite above the horizon that you wish to track. When you have found this satellite, tighten the clamp and ensure the actuator tube doesn't slip when moving the dish.

Step 4



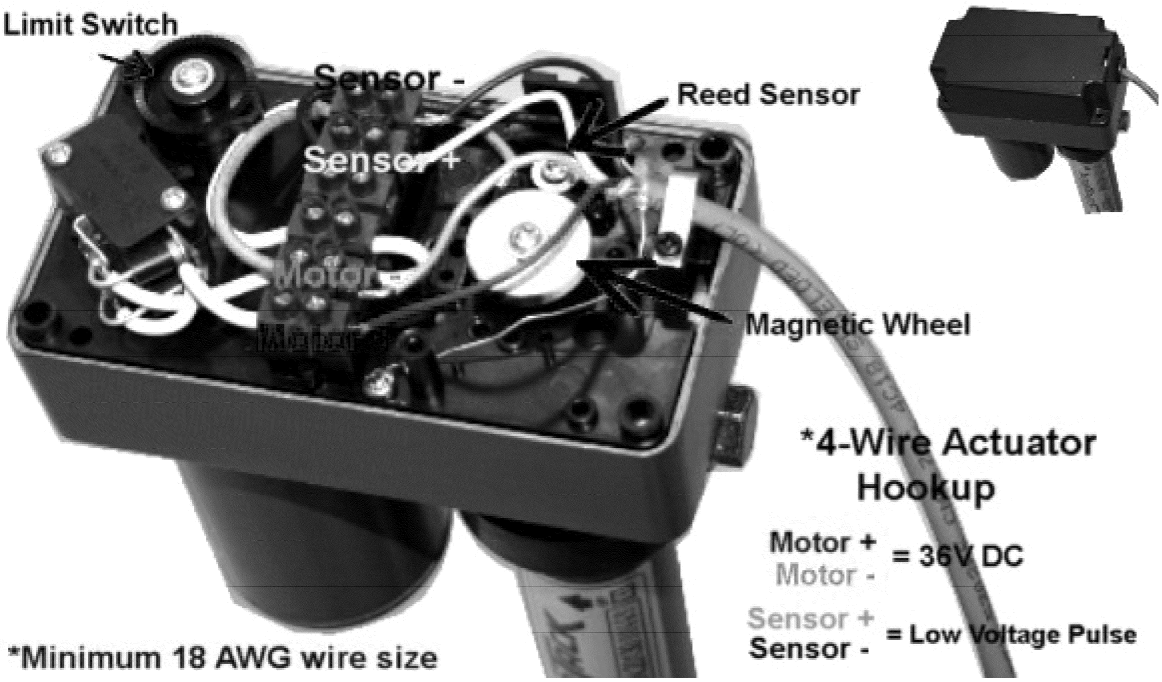
5.5: Wiring the Actuator and Controller

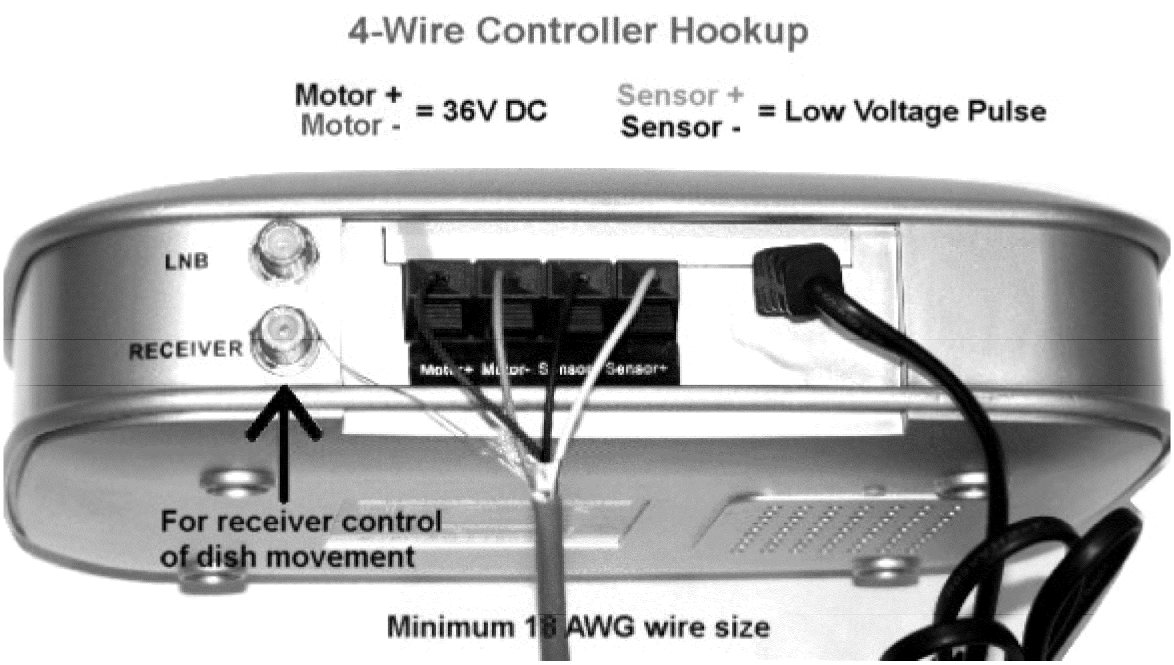
Wire the actuator and controller as shown in the pictures below. The red and green wires provide 36 DC power to the motor and the black and white wires relay sensor information. **DO NOT** mix up the power wires with the sensor wire or you may damage the sensor.

If you reverse the red and green wires on the controller, your dish will simply move in the opposite direction in response to the polarity change. Reversing the black and white wires will have no effect because the sensor signal is differential and not referenced to ground.

It is worth repeating once more: **DO NOT** mix up the red/green power wires with the black/white sensor wires or your actuator sensor may be damaged.

Step 4





5.6: Setting Actuator Mechanical Limits

It is strongly recommended that you set the mechanical limits inside the actuator motor housing in case your receiver or controller malfunctions and overdrives the dish possibly causing it to flop or hit an obstacle.

The mechanical limit switch consists of a plastic cam that trips a microswitch that cuts power to the actuator motor. Set the cam to trip the switch just past the point of the last satellite on the arc that you want to receive o just before the dish encounters any kind of physical obstacle.

5.7: Lock-down Bar for Stationary Installation

If you don't plan to use your dish to track multiple satellites across the arc, then use the lock-down bar to park the dish in the zenith position. You only need to adjust the elevation angle and azimuth angle to align your dish for a stationary installation (leave the declination angle at zero degrees). Note that the elevation angle in a stationary installation is completely different from the elevation angle in a tracking installation. The elevation angle in a stationary installation is the actual elevation angle to the satellite and will vary depending on the satellite you are aiming at.

Use the lock-down bar for stationary dish installations where an actuator is not required

Step 6: Assembly of Dish Panels

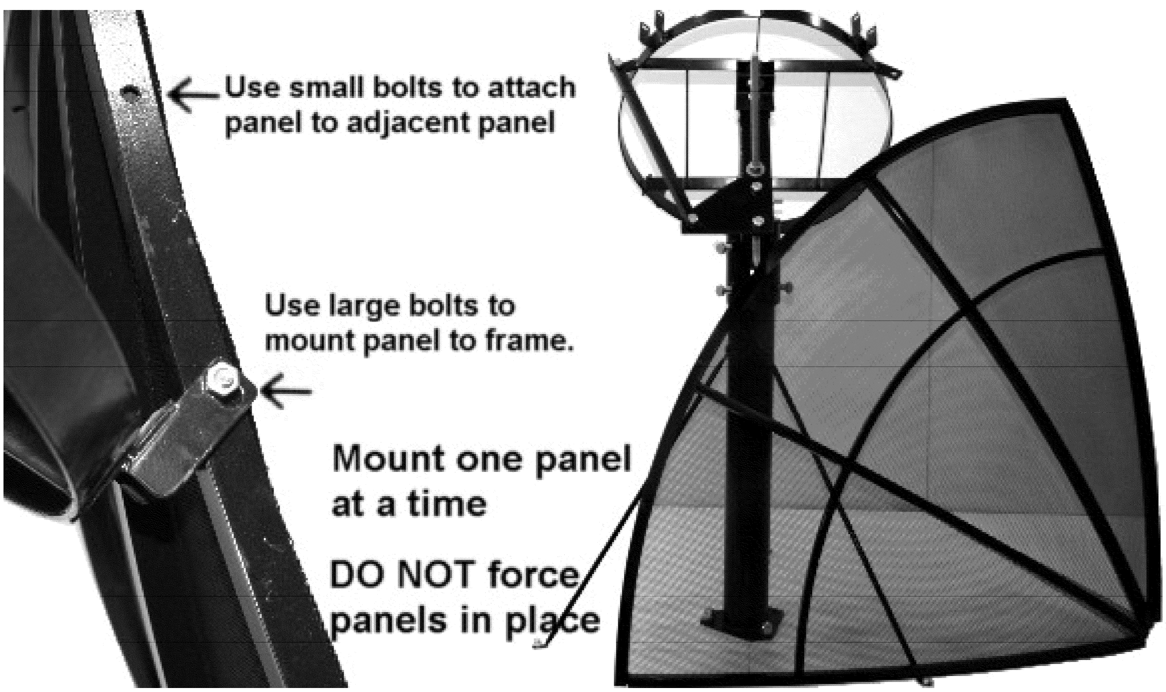
Step 6: Assembly of Dish Panels

Assembly of the dish panels is fairly straight forward and probably the easiest part of a TVRO satellite installation. Some people prefer to assemble the panels on the ground and then mount the whole thing on the frame. We strongly recommend against such an approach, especially for larger antennas where the panels bolted together could weigh more than 50 lbs and make it difficult to manoeuvre in place on the frame. Instead, we suggest you mount one panel at a time.

The smallest C band antennas (8 ft) usually consist of 4 panels, whereas mid-size antennas (10 ft and 12 ft) are constructed with 6 or 8 panels. Even 16 panel antennas are not unheard of for 16 ft diameter dishes.

Large antennas consist of many panels in order to facilitate shipping of the antenna but if the assembly of these panels is not done properly during installation, the surface of the parabolic dish might be distorted leading to less than optimum performance.

When bolting together adjacent panels, you **MUST** ensure that there is a seamless fit between panel edges and that the panel rims line up perfectly. Even a surface mismatch of 5mm between two adjacent panels could result in enough C band distortion to lower your signal quality by more than 15%. In the case of Ku band signals, the distortion would be even more severe.



6.2: Bolting panels together

Bolt the panels to the frame using the large bolts and bolt them to each other using the smaller bolts. **NEVER** force or hammer any panels in place. If one panel is really tight or won't fit, try using another one. If you can't get a seamless fit with two adjacent panels, try opening up the pre-drilled holes by drilling them a little bit larger.

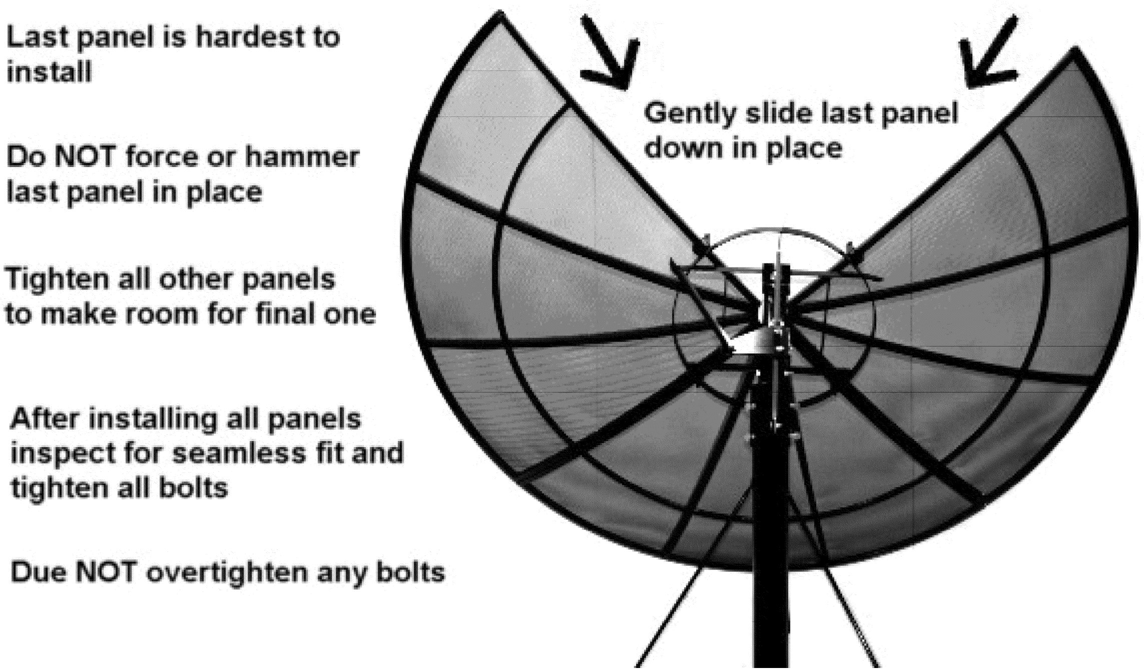
As you add more panels, you may find it easier to rotate the frame about the pole and adjust the elevation in order to allow some panels to lean against the ground for support.

6.3: Adding final panel

The last panel is always the hardest to add in place. Before attaching the last panel, make sure all other panels have been installed properly and make a seamless fit. Tighten down all the panels before installing the last one

Slide the last panel into place from the rim towards the center of the dish. Do NOT hammer the last panel in place. If you encounter too much friction pushing it into place, have someone push/pull on the lips of the assembled panels in order to make some extra room to slide the last panel in place. If you can't get the bolts through this last panel, you might consider opening up the pre-drilled holes on the last panel by drilling them 15% - 20% larger in order to facilitate the installation of this final panel.

Once the last panel is in place, tighten them all down but DO NOT over tighten and damage the aluminium panel frames. Inspect the parabolic surface of the finished dish and ensure there are no distortions caused by a misaligned panel.



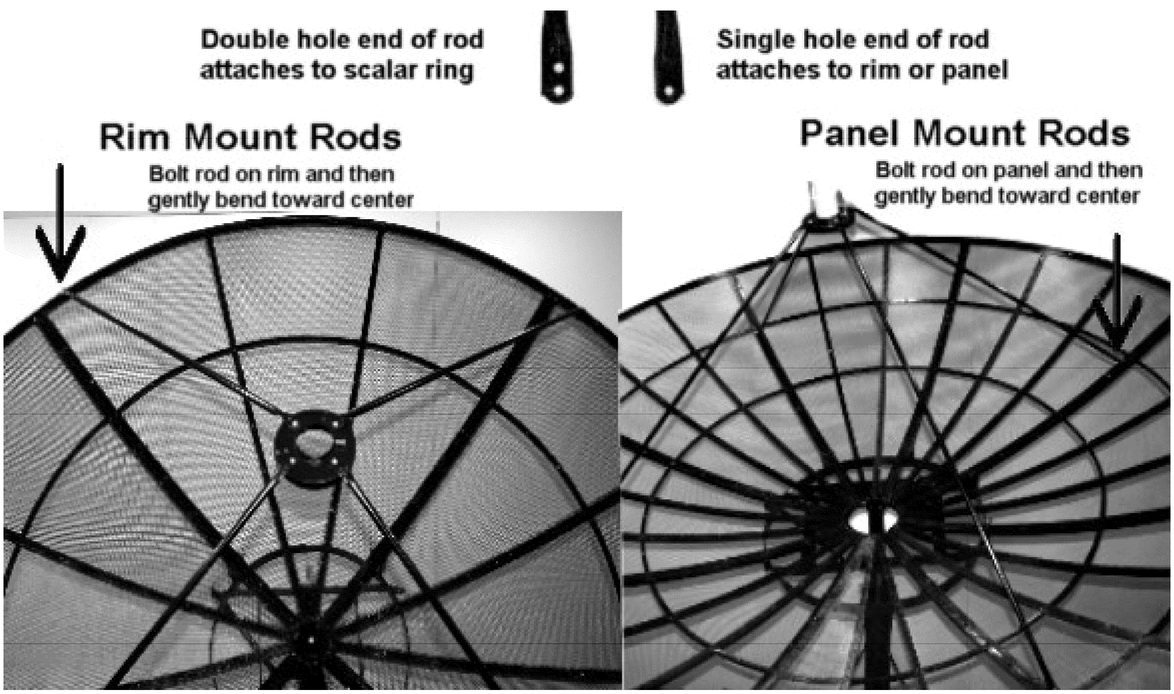
Step 7: Assembly of Rods and Scalar Ring

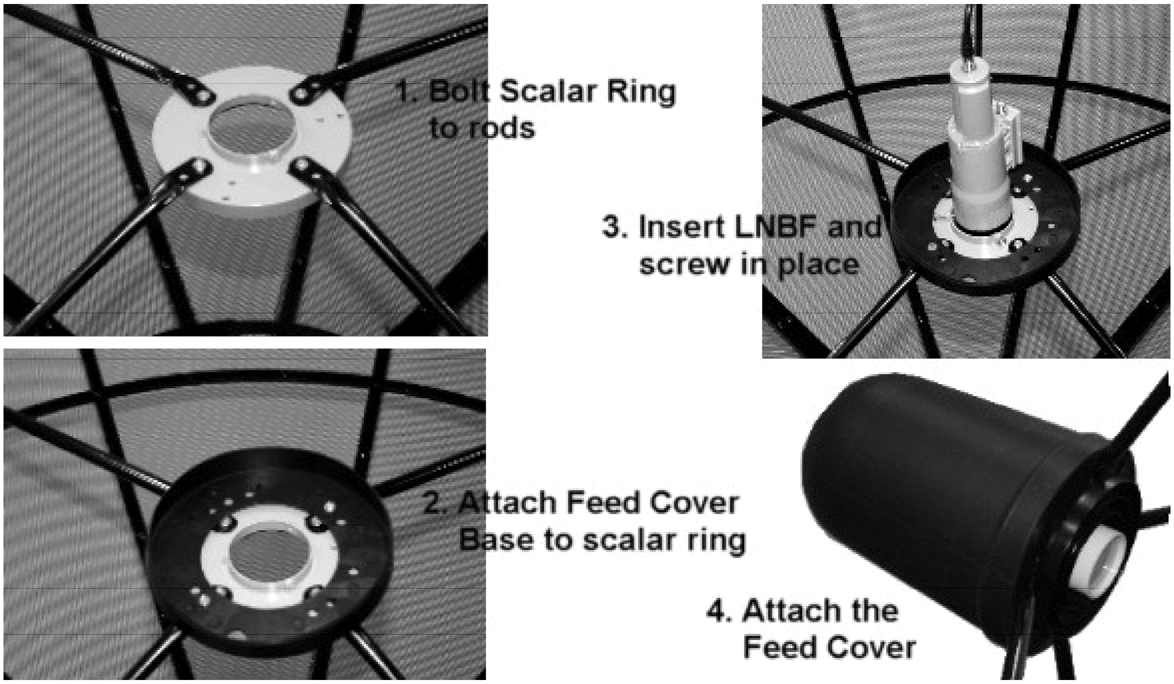
The purpose of the dish rods is to hold the scalar ring which in turn holds the LNBF at the focal point of the parabolic dish. The vast majority of C band antennas use 3 or 4 dish rods.

7.1: Rim or Panel Mount Rods

Some rods mount on the rim of the panels while others are designed to mount on the surface of the panels. Usually there are pre-drilled holes on the panels where the rods are supposed to mount. If there are pre-drilled holes on both the rim and surface of the panels, you will have to determine if your dish rods are rim mount or panel mount. You can ask your dish supplier or if you know the focal length of the dish, try and rim mount and if that falls too short, do a panel mount.

When mounting the rods, the end with the two holes bolts to the scalar ring while the single hole end bolts to the panel. You will need to gently bend the ends of the rods in order to bring them to the focal point of the dish so they can be bolted to the scalar ring.





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