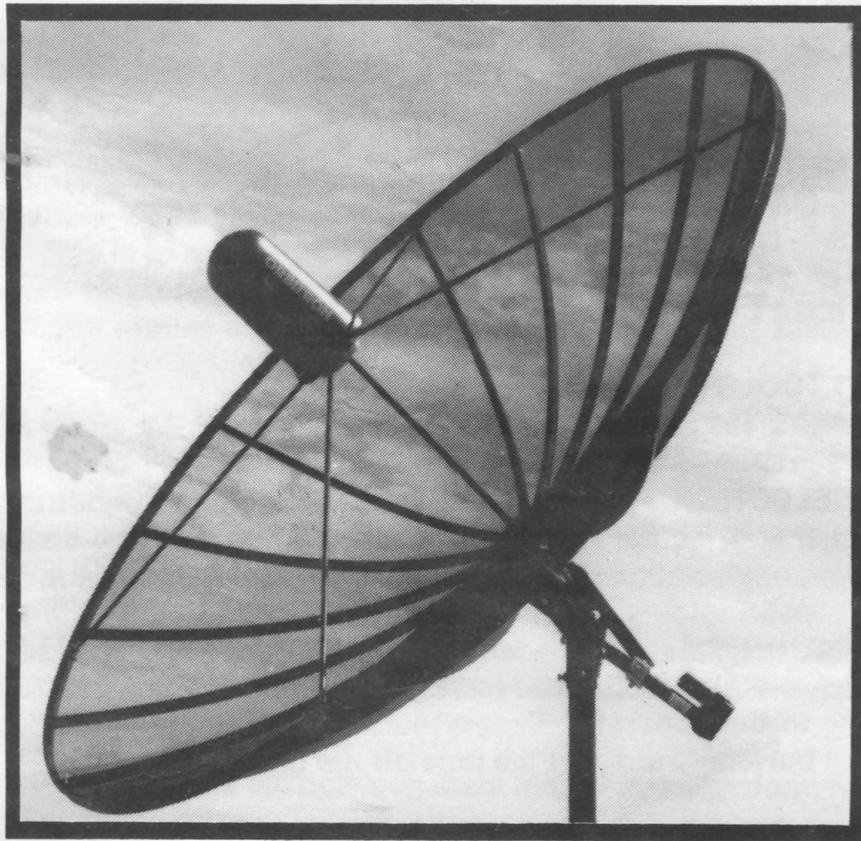


# ORBITRON

## the SX

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# Versatility

**ORBITRON** 351 S. Peterson St., Spring Green, WI 53588  
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## S AND SX SERIES INSTRUCTION MANUAL

SPECIFICATIONS:	S-7	S-8.5	S-10E	SX-10	SX-12
Diameter	80"	100"	112"	120"	140"
F/D Ratio.	.36	.36	.36	.30	.36
Focal Distance	28 1/2"	35 3/4"	40 3/8"	35 3/4"	50 1/8"

Actuator required (S2 to F5)

18"

Materials:

Reflector and mesh  
Mount and buttonhook  
Finish

Aluminum  
Steel  
Powder coat

### REQUIRED TOOLS -

- (2) 1 1/8" Wrenches - (3/4" Bolts)
- (2) 15/16" Wrenches - (5/8" Bolts)
- (2) 3/4" Wrenches - (1/2" Bolts)
- (1) 9/16" Wrench - (3/8" Bolts)
- (2) 7/16" Wrenches - (1/4" Bolts - LNA and Cover Bolts)
- (1) 5/32" Allen Wrench (Buttonhook Set Screw)
- (1) Screwdriver - (LNA Cover Bolts)

### RECOMMENDED TOOLS -

Torque Wrench with 9/16" Socket. (See STEP #15)

**STEP #1 - SITE SELECTION** - Choose a site that has a clear, unobstructed view of the satellite belt. In general, a clear view of the Southern horizon. The dish should point at least 5 degrees over any solid obstruction such as trees, buildings or mountains.

**STEP #2 - MOUNTING POLE** - Pole should be 3" schedule 40 pipe ( 3 1/2" outside diameter) 8' long, projecting 4'8" above level ground, with a welded or bolted attachment to prevent turning in the concrete. Excavate a hole 42" deep and 18" in diameter and place a rock in the bottom to support the pole off the ground.

Fill hole with concrete and place pole in center. Check the pole for plumb and fill it to the top with concrete. (A total of 1/3 to 1/2 cubic yard of concrete will be needed). Check again for plumb and brace if necessary. Allow a minimum of 12 hours before mounting dish on pole.

**NOTE: YOU CAN MAKE THE ANTENNA TRACK IF THE POLE IS NOT PLUMB, BUT IT WILL PROBABLY TAKE MORE TIME. IT IS WORTH THE EFFORT TO MAKE THE POLE PLUMB.**

**STEP #3 - INVENTORY** - Open all the boxes, check the contents for freight damage and contact the freight company immediately if any parts are damaged. Read through the manual to identify the various parts.

**STEP#4 - ASSEMBLED MOUNT** - The mount, with the exception of the actuator extension plate, is assembled before shipment. Unless your antenna has been shipped

from a distant distributor, you should receive it in the proper configuration for your location. Read through STEP #5 to determine if that is the case, and if not reverse the polar tube.

**STEP #5 - POLAR TUBE** - The polar tube has an actuator arm welded on one side. If you are east of longitude 104 the arm will point west, as shown in Photo #1. If you are west of longitude 104 the actuator arm will point east.

If the polar tube does have to be reversed, first note the position of the flat bushing on each of the  $\frac{3}{4}$ " x  $2\frac{3}{4}$ " pivot bolts. Remove the bolts and flip the polar tube so the actuator arm is on the opposite side. Reposition the bushings and then reinstall the pivot bolts. Tighten them until the threads bottom out (approximately 50 ft/lbs of torque).

**STEP #6 - SETTING THE MOUNT** - There are three  $\frac{5}{8}$ " bolts that secure the mount to your  $3\frac{1}{2}$ " O.D. pole. Unscrew them so they do not protrude into the tube. Then slide the tube over the pole and rotate the mount to a convenient position for completing the assembly.

**STEP #7 - ACTUATOR EXTENSION PLATE** - The actuator extension plate is the  $\frac{3}{8}$ " x 3" x  $13\frac{1}{2}$ " steel plate with three  $\frac{1}{2}$ " holes. The offset holes permit the plate to be mounted in three different positions, by flipping it over. The  $\frac{1}{2}$ " x  $1\frac{1}{2}$ " bolts are shipped installed in the mount.

If you adjust the elevation as low as possible you will be able to reach inside to hold the washer and nut. This is shown in Photo #2.

Determine the longitude of your site from the north and south edges of a road map and set the extension plate according to the following. If you are standing behind the antenna, and your longitude is:

67 to 90 degrees, the plate will point straight back.

91 to 104 degrees, the plate will point to the right.

105 to 118 degrees, the plate will point to the left.

118 degrees or more, the plate will point straight back.

Photo #1 shows the plate pointing straight back.

Photo #2 shows the plate pointing to the right.

**NOTE:** You can track the entire satellite belt from 143 degrees (Satcom 5) to 69 degrees (Spacenet 2) with 18" of actuator travel.

**STEP #8 - ACTUATOR ATTACHMENT** - Use either the hardware that comes with your actuator or Orbitron's optional actuator hardware to attach your actuator to the actuator extension plate.

Swing the actuator and rotate the polar tube so the hole in the end of the actuator arm, welded to the polar tube, lines up with the hole in the end of the actuator. **BE CAREFUL TO USE ENOUGH SPACERS AND/OR WASHERS AT THE END OF THE ACTUATOR TO PREVENT CONTACT BETWEEN THE ACTUATOR ARM AND THE ACTUATOR THROUGH THE ENTIRE RANGE OF MOVEMENT.** (Photo #3)

**STEP #9 - PERIMETER ANGLES** - Examine the perimeter angles. The intermediate holes are for attaching the angles to the rib ends and the holes closest to both ends are for attaching adjoining angles with splice plates.

In the area where you plan to assemble the antenna, position the perimeter angles in a circle. Place each of the angles so the holes are in the upper surface.

**STEP #10 - SPLICE PLATES** - The splice plates are the 1/8" thick by 3" long black aluminum plates with two 5/16" holes. They bolt to the upper surface of the perimeter angles, against the extruded lip. (Photo #4)

On the S-7 and S-8.5 the splice plates are 3/4" wide and have a distinct bend at the center. As the antenna is assembled face down, the arch of this bend should be up to match the curvature of the perimeter angles. (Photo #5)

On the S-10E, SX-10 and SX-12 the splice plates are 1" wide and the holes are off center. There is only one way they can be bolted on and be tight against the lip. If they are bolted on the other way there will be a gap between the plate and the lip, and the antenna will not be as rigid. Use the 5/16" x 5/8" black bolts and nylock nuts to attach them.

**STEP #11 - FRONT AND REAR HUB PLATES** - The 12" diameter front plate has a 1 1/2" x 4" welded-on tube which will hold the buttonhook. Once assembled this will point toward the front of the antenna and during assembly will point toward the ground.

The other 12" diameter plate is the rear hub plate and has a 3 1/2" x 5" declination tube welded on at an angle. The rear plate for the 12' also has six spokes and a 30" diameter ring for added strength, but installation is unchanged.

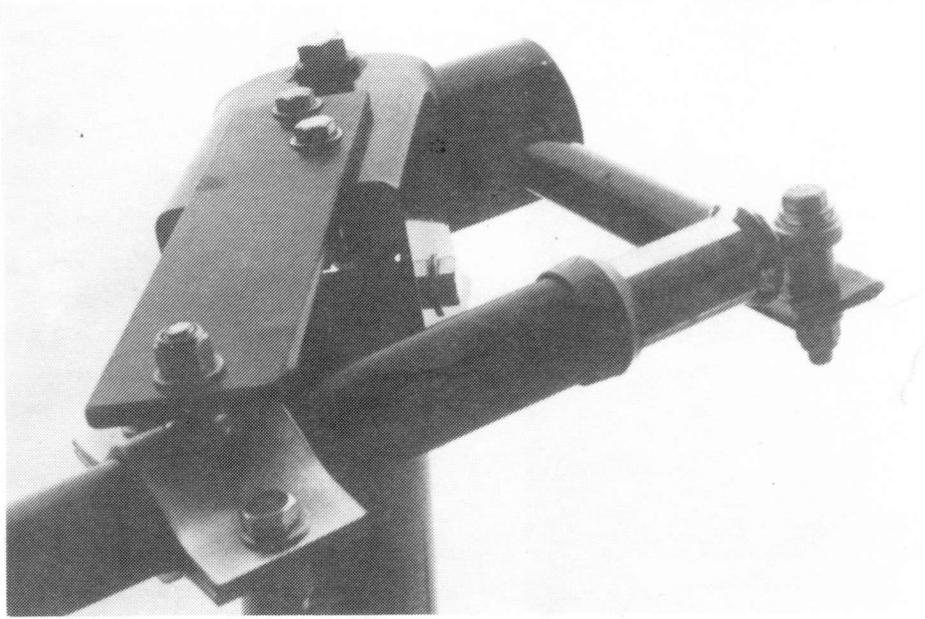
Both of these plates for the 7' and 8.5' have six bolt holes and the plates for the 10' and 12' have nine holes.

There is also a thinner 10 1/2" diameter silver plate. This is the intermediate plate which locates the inner ends of the ribs.

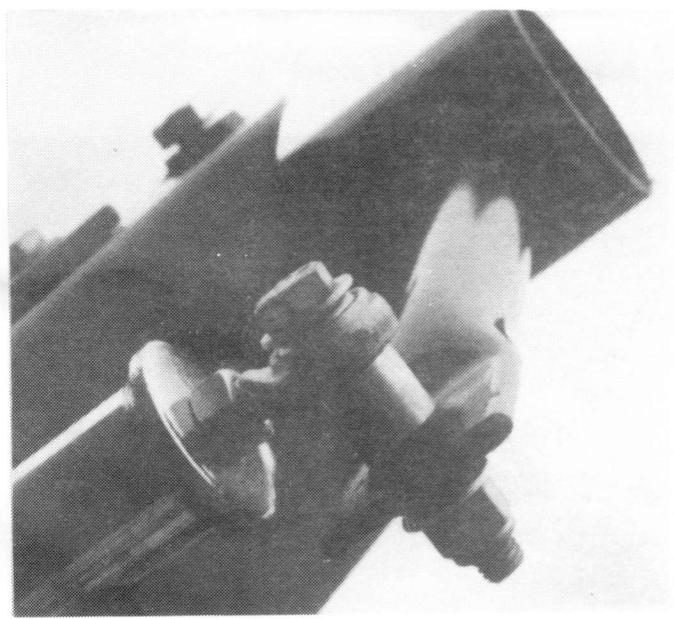
**STEP #12A - S-7, S-8.5, and S-10E INTERMEDIATE HUB PLATE** - The intermediate plate for the S-7, S-8.5, and S-10E antennas has twelve 3/16" x 2 1/4" slots around the perimeter and the areas between the slots have been formed. Depending on which side of the plate is up, the slots will be at the highest or lowest points of the plate. For assembling the antenna face down, the slots should be at the lowest points. Each rib will engage the intermediate plate by sliding the "tee" section, between the mesh grooves, into a slot. (Photo #6)

**STEP #12B - 10' and 12' INTERMEDIATE HUB PLATE** - The intermediate plate for the 10' and 12' has eighteen 9/16" x 2 1/4" raised "fingers" around the edge. Position the intermediate plate with the fingers down. Each finger will then engage a rib by inserting into the square rib cavity. (This is the opposite end of the same cavity that the square nut is crimped into.) The body of the plate rests on the back surface of the ribs. (Photo #7)

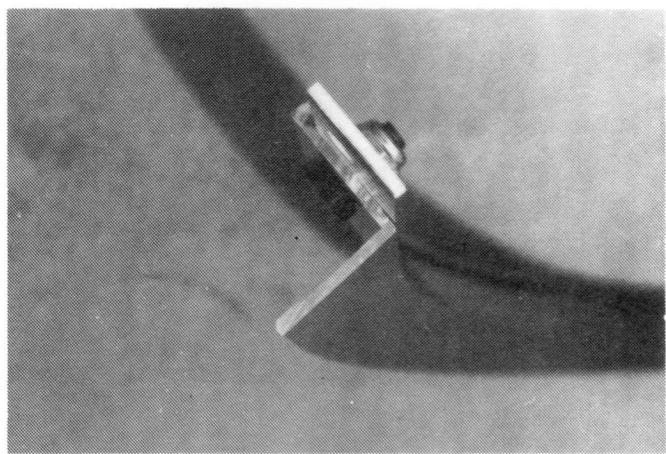
**Photo #1 - Assembled mount with the actuator arm to the west and the actuator extension plate pointing straight back. This is how the mount would be assembled if your longitude is between 67 and 90 degrees or more than 118 degrees.**



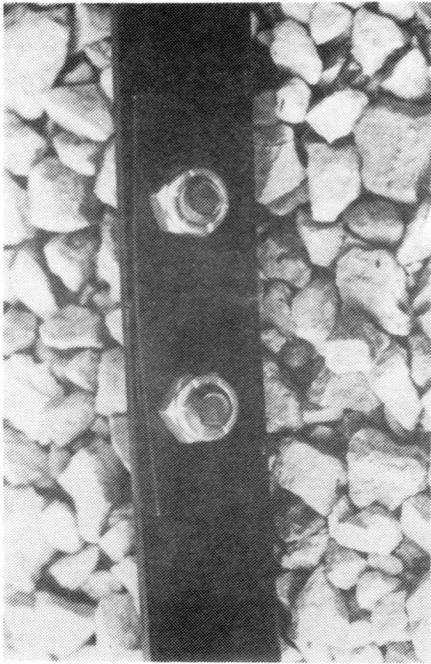
**Photo #2 Tightening the bolts in the extension plate. Here the plate points to the right.**



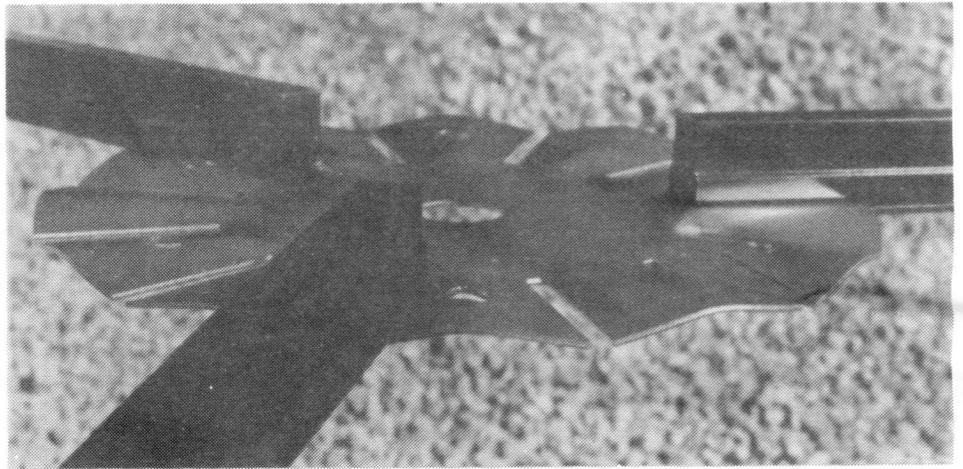
**Photo #3 - Actuator spaced away from the actuator arm.**



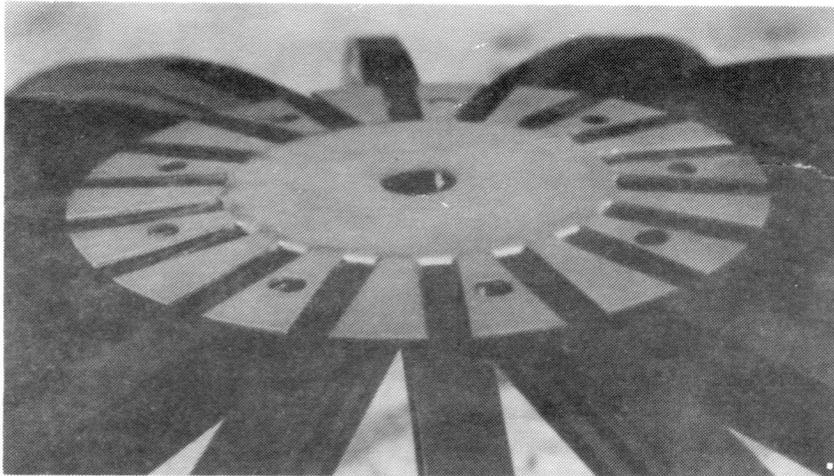
**Photo #4 - Splice plate bolted to perimeter angle.**



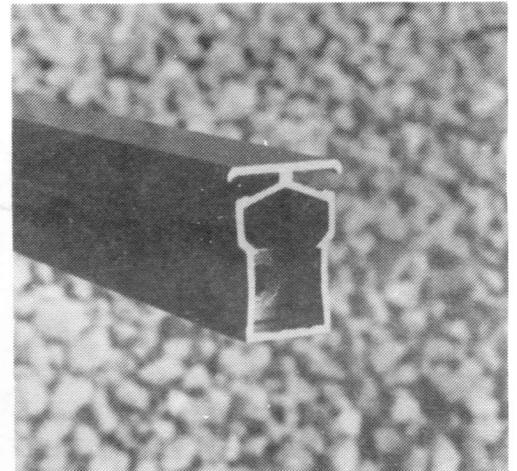
**Photo #5 - Splice plate for the S-7 and S-8.5. Notice how the curvature of the plate matches the curvature of the perimeter.**



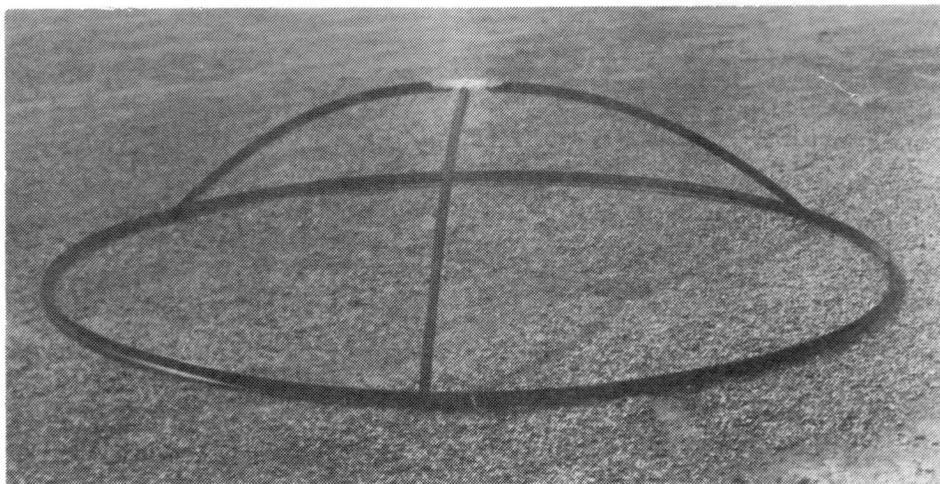
**Photo #6 - Twelve slot intermediate plate for the S-7, S-8.5 and S-10E.**



**Photo #7 - Eighteen finger intermediate plate for the SX-10 and SX-12. The main body of the plate rests on the back of the ribs.**



**Photo #8 - Nut in rib end.**



**S-6**

**Photo #9 - Rib and perimeter tripod. This structure will support itself while the other ribs are installed.**

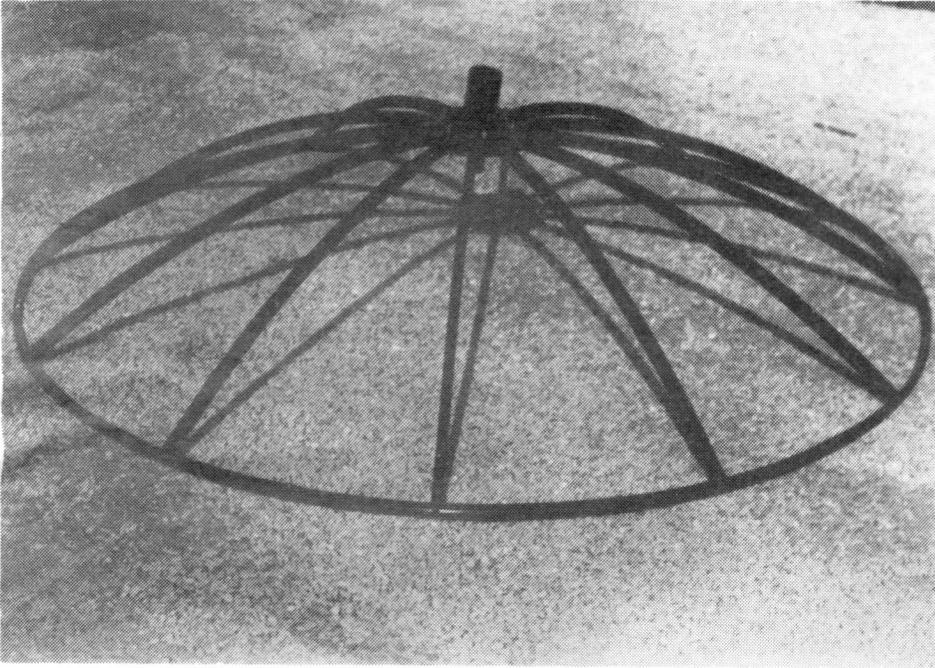


Photo #10 - Assembled frame for an S-8.5.

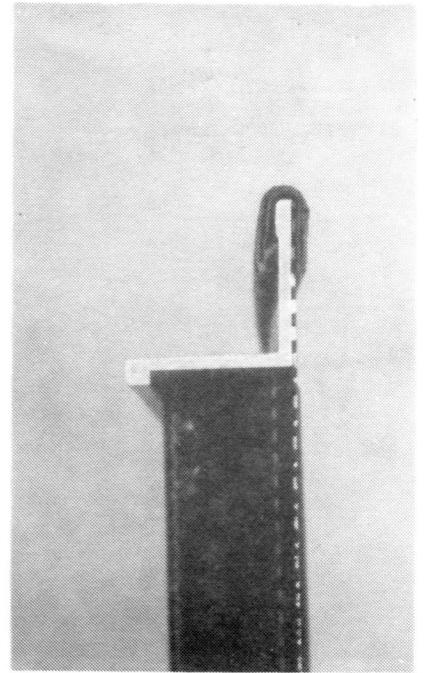


Photo #11 - Edge trim detail.

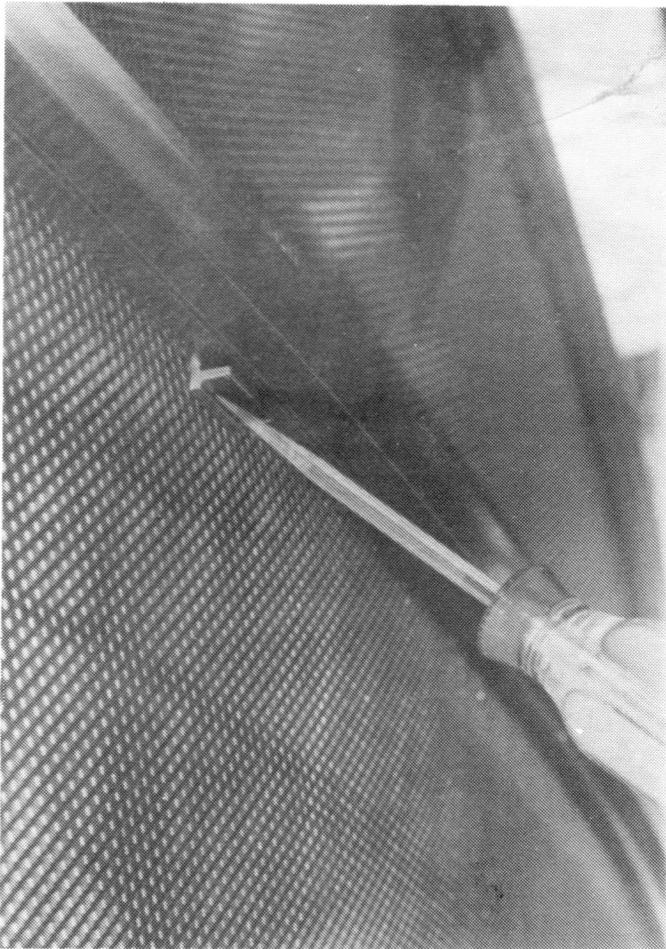


Photo #12 - Using a screwdriver to seat a mesh clip.

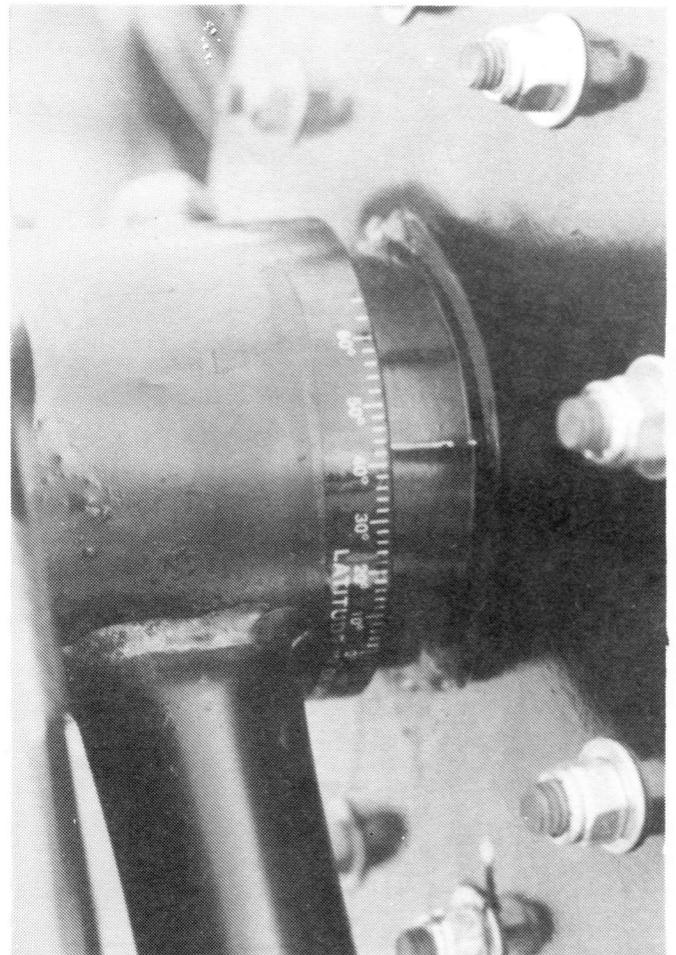
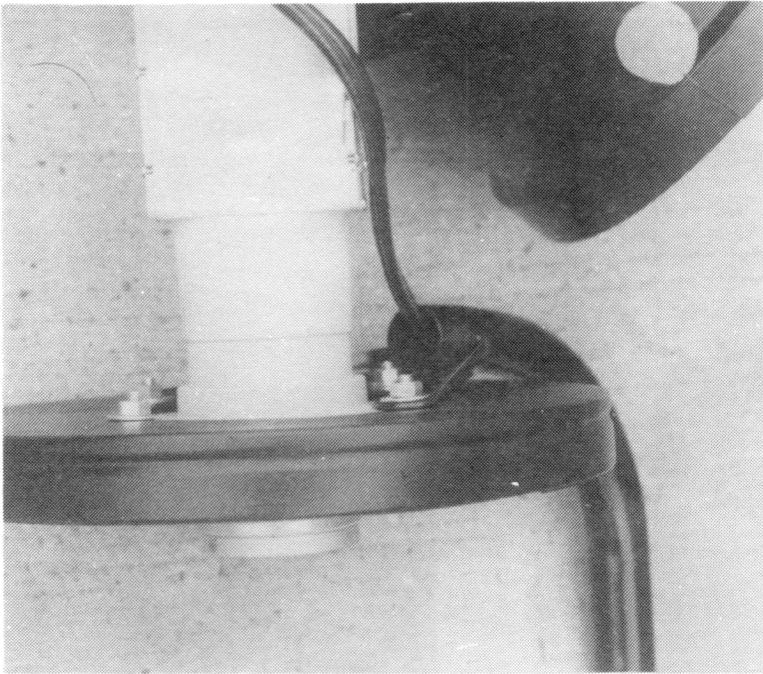


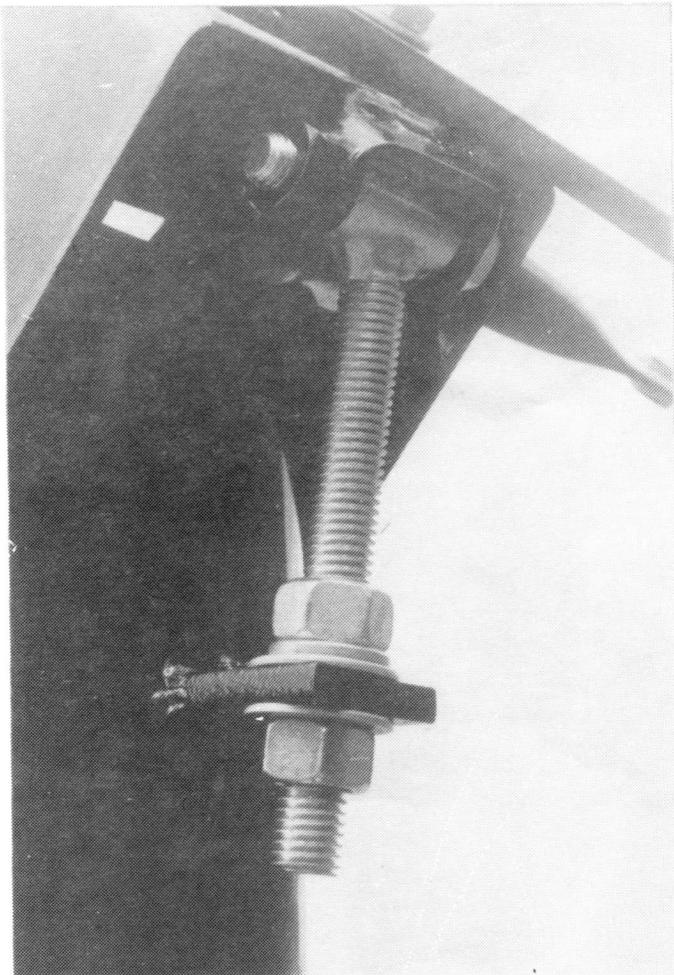
Photo #13 - Declination set at 43 degrees.



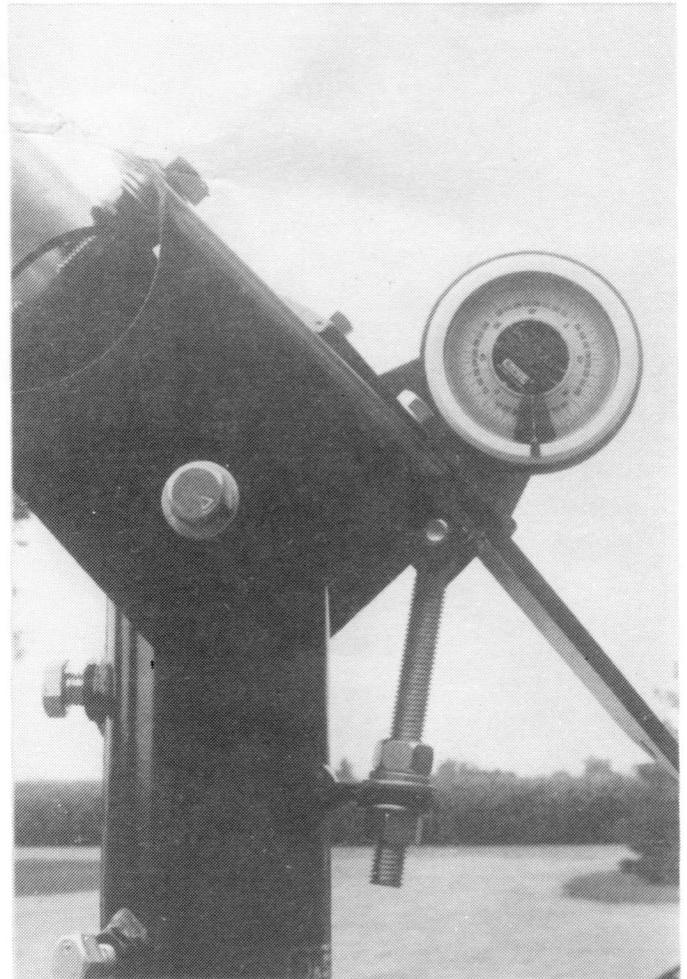
**Photo #14 - LNA cover end plate assembled between the buttonhook and the scalar rings of the feed.**



**Photo #15 - Wires through the mount and into the buttonhook.**



**Photo #16 - Elevation adjusting nuts.**



**Photo #17 - Inclinometer in place.**

**STEP #13 - RIB INSTALLATION** - Notice that each rib has a square nut crimped in one end (Photo #8). This end attaches to the perimeter angle and the end without the nut engages the intermediate plate.

Stand at the center of the circle formed by the perimeter angles and hold the intermediate plate as explained above.

Then, with a rib positioned as it will be in the assembled antenna, engage the rib onto the intermediate plate. Place the outer end of the rib against the perimeter and then engage two more ribs equally spaced on the intermediate plate. Make sure the outer ends line up with the correct perimeter holes and install three 5/16" x 1" black bolts through the perimeter into the rib ends.

This structure, of the intermediate plate and three ribs bolted to the perimeter, will support itself (Photo #9). Install the remaining ribs by engaging the inner ends with the intermediate plate and positioning the outer ends inside the perimeter. Once they are in place, insert and tighten the remaining rib bolts.

**STEP #14 - POSITIONING THE FRONT AND REAR HUB PLATES** - TO ASSURE PROPER ANTENNA SHAPE, IT IS EXTREMELY IMPORTANT THAT THE RIBS BE FULLY ENGAGED WITH THE INTERMEDIATE PLATE. INSPECT THIS CAREFULLY BEFORE ADDING THE FRONT AND BACK PLATES. PUSH DOWN ON THE CENTER OF THE ANTENNA OR PULL THE INDIVIDUAL RIBS INTO PLACE IF NEEDED.

Hold the front plate in position and rotate it so that its bolt holes line up with those of the intermediate plate. Notice where the set screw is, in the tube on the front plate, and orient the back plate so that the angled declination tube points in the same direction. This will make the set screw easier to reach once the antenna is in place. Insert the 3/8" carriage bolts up through all three plates and use 3/8" nylocks nuts with washers to assemble loosely.

**STEP #15 - TIGHTENING HUB BOLTS** - As the hub bolts are tightened, the rib ends are forced against the rim channel. To evenly distribute this force and optimize antenna shape, work around the bolt pattern several times as you gradually tighten the bolts. Before tightening the hub bolts look down through the declination tube and move the plates around, if needed, to line up the center holes in all three plates. (Recommended torque is 20 foot pounds.)

**STEP #16 - SETTING ANTENNA** - Pick up the antenna frame, (Photo #9) and insert the declination tube into the polar tube.

**STEP #17 - MESH INSTALLATION** - Starting with one of the horizontal mesh openings, slide a mesh panel into the groove of the lower rib until it contacts the upper rib. With one hand maintain slight pressure on the mesh, towards the center of the antenna, to slightly bow the mesh towards the back of the rib. Slide your other hand along the back of the upper rib, pushing the mesh forward into the groove. When the mesh is engaged in both grooves, push it towards the center of the antenna to make sure it is fully seated in both ribs. Grasping the mesh between both palms and pushing toward the center of the antenna will work well.

**STEP #18 - PERIMETER EDGE TRIM** - Notice that the edge trim strip has a small flap on the inside. Start with the correct end, so that the flap locks into the groove in the perimeter angle, and press the trim strip over the perimeter flange and the mesh (Photo #11). Once you have enough trim strip on to hold the mesh panel rotate the antenna to place an adjacent panel opening in the same position.

Install another mesh panel and more trim strip and then rotate the antenna again to install the next panel. Continue until all the mesh is installed. To ensure a tight fit at the trim strip joint, cut the trim strip about  $\frac{1}{4}$ " long and leave the last foot or so free. Push the end on first leaving a bulge in the trim strip and then remove the bulge by pressing the trim strip into place.

**STEP #19 - MESH CLIPS** - After the mesh is installed, you should put in the mesh clips to provide added resistance to panel blowout. They are 1" long "L" shaped anodized extrusions. The leg of the "L" that is rounded will slide into the mesh groove, behind the mesh, and the tooth on that leg will snap into a groove, within the mesh groove, to hold it in place. The other leg of the "L" will rest against the side of the rib when installed.

On the eighteen rib antennas, use two clips on each side of each rib, one close to the center and the other between it and the perimeter. On the twelve rib antennas, use three clips on each side of each rib. Push them in as far as you can with your fingers and then use a screwdriver, against the notch on the back, and hammer to seat them. (Photo #12)

**STEP #20 - DECLINATION** - Determine the latitude of your location. It will range from 25 degrees at Key West, Florida to 49 degrees at the Canadian border and can be found on the east and west edges of road maps. Notice that the polar tube has a declination scale attached and the declination tube has a painted indicator. Rotate the antenna until the indicator matches your latitude on the declination scale (Photo #13) and tighten both  $\frac{5}{8}$ " x 1" set bolts to lock the antenna in place.

The indicator should always be on the upper half of the polar tube. In clock terminology this would be between the nine and three o'clock positions. If the indicator is on the lower half, the antenna will point higher in the sky than the mount. Proper declination and accurate tracking require that the antenna point lower in the sky than the mount.

**USE ONLY THE PART OF THE DECLINATION SCALE THAT IS ABOVE THE ACTUATOR ARM.**

**STEP #21 - FEED SUPPORT** - The buttonhook has a flat plate which bolts to the back of the scalar ring. Three of the holes will fit the standard Chapparral, ADL pattern and all five can be used on the Seavey pattern.

Use the  $\frac{1}{4}$ " x  $\frac{3}{4}$ " round head bolts with hex nuts and assemble the parts so the Orbitron LNA cover end cap is sandwiched between the feed scalar ring and the buttonhook plate (Photo #14).

The buttonhook is short enough to allow for differences in various brands of polarizers. Follow the polarizer manufacturers recommendations for F/D and measure from the front plate to set the focal length.

Rotate the buttonhook so the arch is up and then align the polarizer to the manufacturer's recommendations before tightening the set screws.

The buttonhook for the SX-12 is shipped in two pieces and has a slip-together connector with two set screws. The part without the connector has a small hole close to one end. Insert this end into the tube on the front plate, rotate the part so the offset is in an up position, in line with the pivot bolts, and tighten the two set screws that hold it in place. Attach your feed to the bracket on the other buttonhook part and engage the slip joint to join both buttonhook parts. Measure perpendicular with the buttonhook bend, to both sides of the antenna, and center the feed.

Measure from the feed to the bottom of the antenna and duplicate the measurement you had from side to side. If the feed is too high or too low, the re-inforced front plate is strong enough that the buttonhook can be forced into position. If you are using a heavy feed or doing a Ku band installation, you should consider using the optional Orbitron guy wire kit.

**NOTE: ONCE THE ANTENNA IS SET TO TRACK THE SATELLITES DO NOT ROTATE THE BUTTONHOOK. IF THE BUTTONHOOK IS NOT PERFECTLY CENTERED ROTATING IT WILL RESULT IN DECREASED SIGNAL STRENGTH.**

**STEP #22 - ELECTRONICS HOOKUP** - Run the wires to the antenna. Separate the actuator wires and attach them according to the actuator instructions. Insert the receiver and polarizer wires through the mount and on through the buttonhook. The easiest way to do this is to run the antenna down with the actuator, pointing close to the horizon, so you can see through the polar tube into the end of the buttonhook. Pull the wires up through the mount and then push them into the polar tube and buttonhook (Photo #15).

It will help if the wires are taped together, or you may need to run another wire down through the buttonhook to pull them up. Make all the polarizer and receiver connections according to their manufacturers.

**STEP #23 - ELEVATION** - Allowing for magnetic variation, turn the mount on the pole so it points true south and tighten the 5/8" x 1" bolts in the mast head. Tighten them so they are snug, but loose enough that the mount can still be turned on the pole. If they are too loose the weight of the antenna will tilt the mount and make tracking difficult.

Adjust the two nuts on the elevation tee (photo #16) to set the mount for your latitude. As you initially tighten the nuts, the tab between them may bend to conform to the angle of the tee. This will slightly throw off your initial setting, so you will have to re-adjust it.

Use an inclinometer, on top of the actuator extension plate (Photo #17), to accurately set the mount.

First, check the inclinometer by placing it on a horizontal surface. If it reads 0 degrees, as most inclinometers will, you should set the elevation at 90 degrees minus your latitude.

**EXAMPLE:** If your latitude is 43 degrees, adjust the mount so the inclinometer reads 47 degrees (90 degrees minus 43 degrees).

This setting should be close enough to locate the southernmost satellite, but further fine tuning will probably be required.

If you do have an inclinometer that reads 90 degrees when placed on a horizontal surface, you should adjust the mount so the inclinometer reads the same degrees as the latitude of your location.

**STEP #24 - ACTUATOR ADJUSTMENT** - Adjust the actuator clamp so the antenna will move far enough to each side of south to point to all the usable satellites.

**BE ESPECIALLY CAREFUL, WHEN THE BEAM EXTENSION PLATE IS STRAIGHT BACK, THAT THE ACTUATOR DOES NOT HIT THE REAR CORNER OF THE BOX BEAM AS IT APPROACHES FULL EXTENSION.**

On actuators with more than 18" of travel, limit switches should be set to prevent actuator or antenna damage if the actuator extends too far.

**ORBITRON WILL NOT BE RESPONSIBLE FOR ANY DAMAGE DUE TO IMPROPER ACTUATOR TRAVEL OR FAILURE OF LIMIT SWITCHES.**

**STEP #25 - ALIGNMENT** - Recalling the degrees of longitude of your location, select the satellite with active channels whose longitude designation is the closest to it. Calculate the difference between those figures and set your antenna, with the actuator, at that difference. This will allow the north/south orientation, or azimuth, to be approximated at the same time the elevation is being fine tuned.

**EXAMPLE:** The Orbitron factory is located at 90 degrees longitude and the closest active satellite is Spacenet 3 at 87 degrees, 3 degrees to the east. We would therefore set our antenna to point 3 degrees to the east of south.

**STEP #26 - FINE TUNING** - If the mount points south accurately, you may have reception when you turn your receiver on. If not, make sure that all the electronic components are hooked up correctly and the receiver is tuned to an active transponder on the satellite you are seeking. Then rotate the mount on the pole until you find that satellite.

Do not adjust the actuator while doing this. Be aware that you can receive more than one satellite in this manner so verify that you have located the correct one. Set your receiver on a transponder with horizontal polarity and fine tune the elevation with the elevation tee. Once that is done, tighten the bolts through the sides of the box beam.

Notice which part of the antenna is closest to the ground. This is where you will grasp the antenna for fine tuning, so you may want to mark it with something.

Use the actuator to rotate the antenna to the satellite closest to the horizon. If you cannot track all the way to that satellite, use the procedure explained below to fine tune the farthest satellite you can receive. You should then be able to track closer to the horizon and repeat the procedure for final adjustments.

Again set your receiver on a transponder with horizontal polarity and check for maximum signal strength. A good way to do this is to grasp the lower edge of the antenna, mentioned above, and gently rock the antenna up and down. If the signal increases when you raise the antenna, the mount will have to be rotated towards the horizon. If the signal increases when you lower the antenna, the mount will have to be rotated away from the horizon. When the antenna is pointed accurately, the signal strength will decrease as you rock the antenna either way.

Adjust for maximum signal by fine tuning the actuator and double check the mount orientation, as outlined above, before re-tightening the mount on the pole.

In summary, adjust elevation only when tuned to a satellite located as close as possible to straight south and fine tune the satellite closest to the horizon by rotating the mount on the pole.