

GENERAL DYNAMICS

SATCOM Technologies

4096-356
REVISION E
April 21, 2016

Assembly Manual

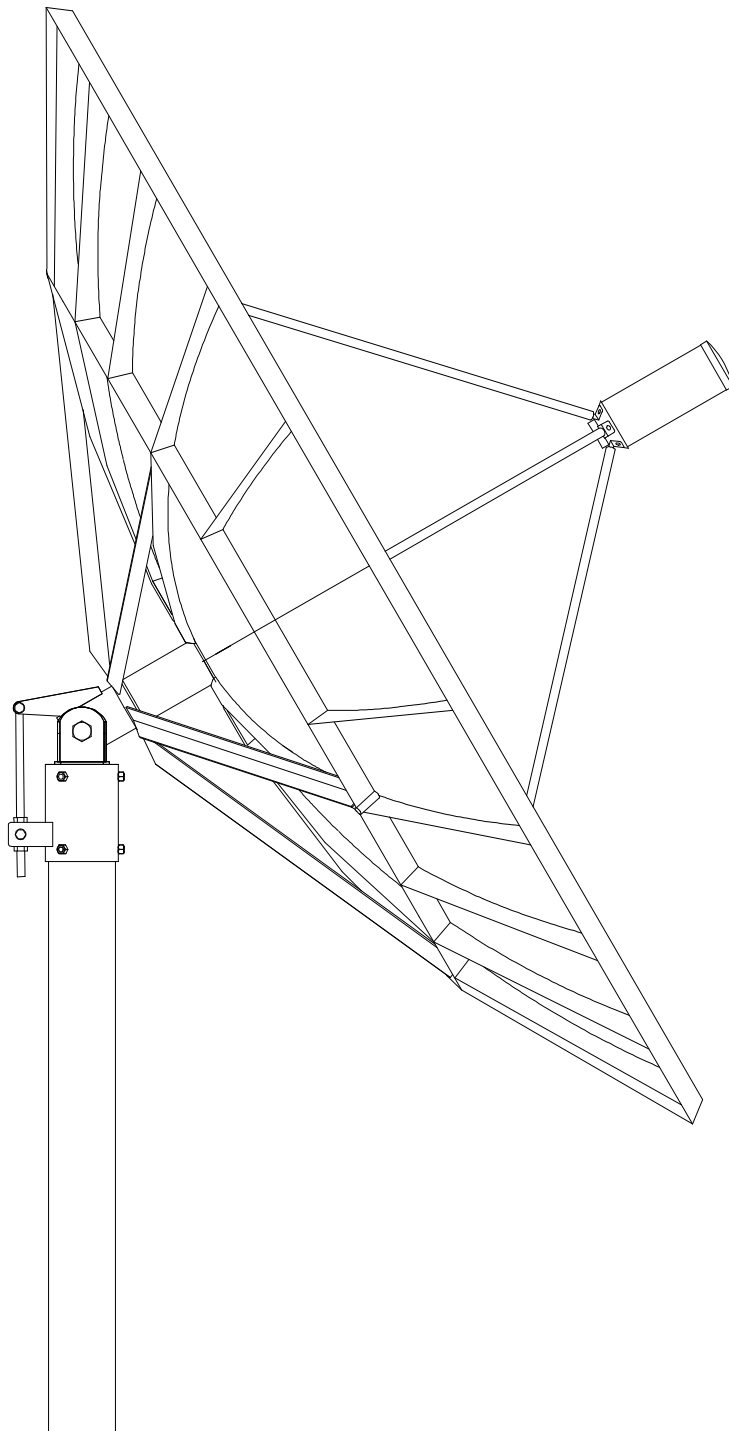
2.4Meter Series 1252

Az/EI Truss Mount

General Dynamics SATCOM Technologies
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Conover NC 28613 USA
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2.4M Series 1252 Az/EI Truss Mount

E	Add Conover Address	4/21/16	RAH
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C	Revised Address	1/11/02	RAH
B	Revised text on pages 22 & 23	04/06/99	RAH
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ASSEMBLY MANUAL

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SECTION 1 GENERAL INFORMATION

1.1 UNPACKING AND INSPECTION

1. **UNPACKING & INSPECTION** - The antenna containers should be unpacked and inspected at the earliest date to ensure that all material has been received and is in good condition. A complete packing list for each major component is supplied.

2. **FREIGHT DAMAGE** - Any damage to materials while in transit should be immediately directed to the freight carrier. He will instruct you on the matters regarding any freight damage claims.

3. **MATERIAL - MISSING OR DAMAGED** - Any questions regarding missing or damaged materials that is not due to freight carrier should be directed to General Dynamics' Customer Service Department at:

General Dynamics SATCOM Technologies
1700 Cable Drive NE
Conover NC 28613 USA
Phone 770-689-2040
www.gdsatcom.com

1.2 MECHANICAL INSTALLATION TOOLS

HARDWARE SIZE	SAE WRENCH SIZE	METRIC WRENCH SIZE	MAXIMUM REC. TORQUE
# 6 SCREW	5/16"	8 mm	8 in-lbs
1 / 4"	7 / 16"	11 mm	49 in-lbs
3 / 8"	9 / 16"	14 mm	15 ft-lbs
1 / 2"	3 / 4"	20 mm	35 ft-lbs
5 / 8"	15 / 16"	24 mm	70 ft-lbs
3 / 4"	1- 1 / 8"	28 mm	220 ft-lbs

Also recommended for installation:

Adjustable Wrench 10"
Ratchet (3 / 8" drive)
Inclinometer
Compass
8' ft Ladder
Gloves

1.3 SITE SELECTION

In order to achieve maximum performance of your antenna system, it is important to select the correct location for the antenna. The following guidelines should be observed when selecting a site for the installation.

1. The line of site to the satellite should be clear of any obstructions, such as trees or buildings.
2. The site should be relatively flat and level for ease of installation and access to the antenna.
3. The site should be checked for underground obstruction, such as buried cables or pipes.
4. All local building codes should be adhered to (i.e. grounding, foundation requirements, zoning rules, setbacks, etc.).

1.4 FOUNDATION REQUIREMENTS

General Dynamics' recommended foundation for the antenna system is shown in figure 1. however, each installation must be tailored to the specific requirements of the site. It may be necessary to contact a local engineer or building department for foundation design or approval at any particular site.

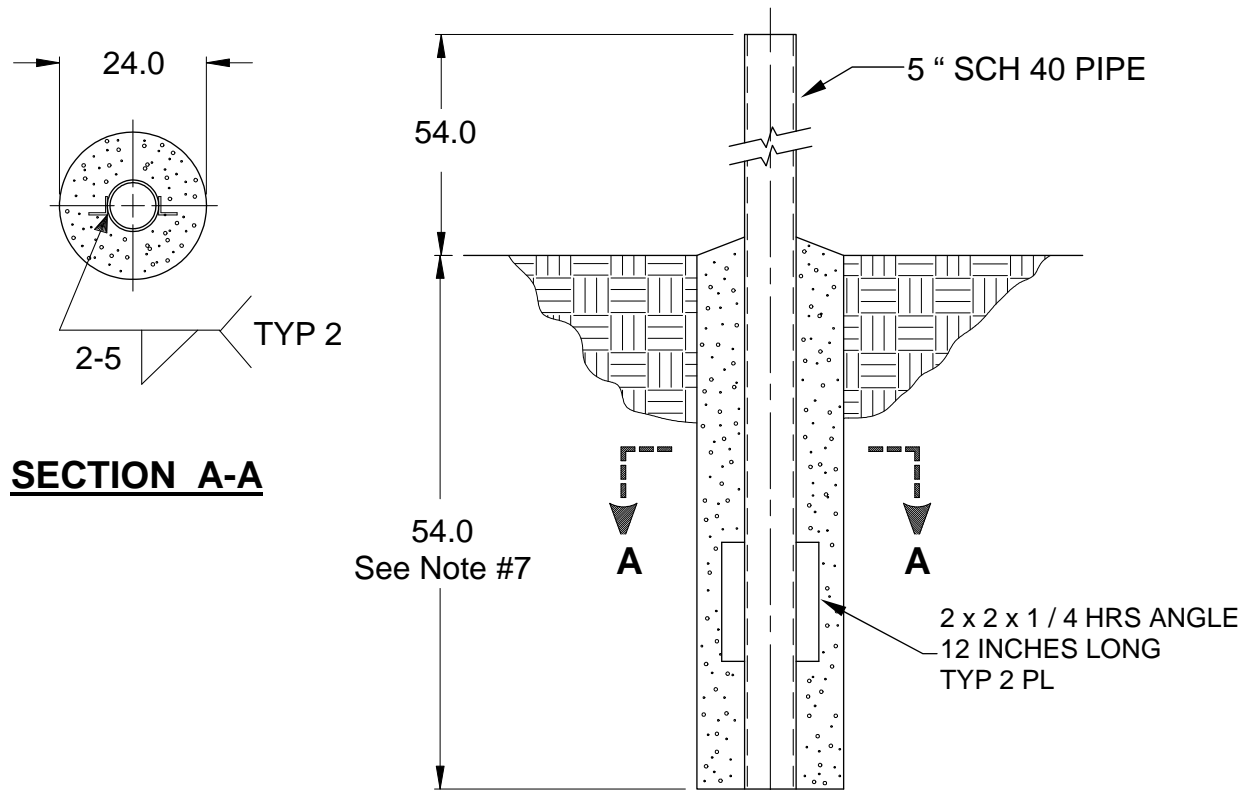


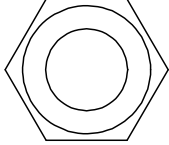
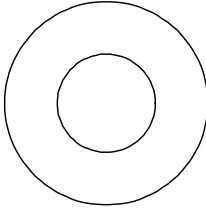
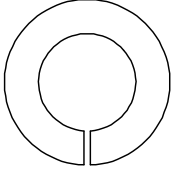
FIGURE 1.

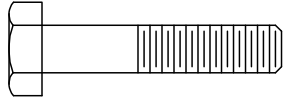
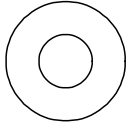

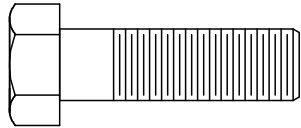
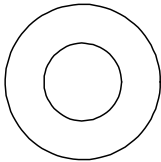
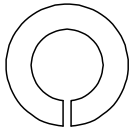
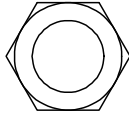
NOTES:

1. 2 x 2 x 1/4 HRS Angle and schedule 40 pipe should conform with ASTM A36 and ASTM A53 Type E and S Grade B.
2. All concrete should conform to building code standards and have a minimum compressive strength of 3000 PSI at 28 days. (Per ACI-318-77)
3. Soil bearing capacity should be no less than 2000 PSF.
4. Concrete should be poured against undisturbed soil.
5. Allow concrete 24 hours set time before installation of antenna.
6. The antenna should be properly grounded to meet applicable local codes.
7. Minimum depth as shown or extend to local frost line.

GENERAL DYNAMICS DOES NOT REPRESENT OR WARRANT THAT ANY PARTICULAR DESIGN OR SIZE OF FOUNDATION IS APPROPRIATE FOR ANY LOCALITY OR EARTH STATION INSTALLATION

SECTION 2 REFLECTOR AND SUPPORT STRUCTURE ASSEMBLY

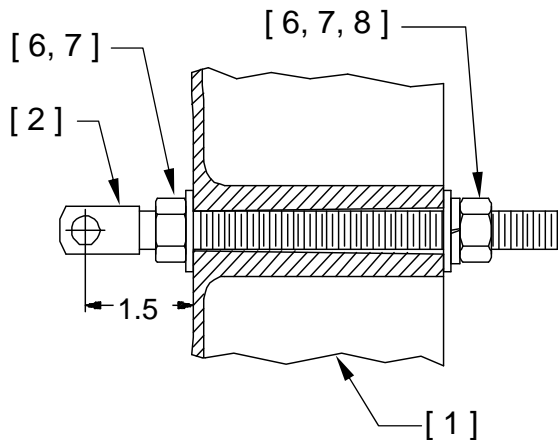
REFLECTOR AND SUPPORT STRUCTURE PARTS LIST TABLE 2.1			
ITEM	PART NO.	DESCRIPTION	QTY
1	0179-173	REFLECTOR PETAL	3
2	0217-072	FEED SUPPORT CLEVIS	3
3	0490-501	CENTER HUB	1
4	0156-808	CENTER PLATE	1
5	0225-553	ANGLE BRACE	6
6	8104-007	1 / 2" HEX NUT	6
			
7	8201-043	1 / 2" FLATWASHER	6
			
8	8202-043	1 / 2" LOCKWASHER	6
			

PARTS LIST - CONTINUED			
ITEM	PART NO.	DESCRIPTION	QTY
9	8030-010	1 / 4" - 20 x 1.25 BOLT 	6
10	8201-040	1 / 4" FLATWASHER 	6
11	8202-040	1 / 4" LOCKWASHER 	6
12	8032-010	3 / 8" -16 x 1.25 BOLT 	24
13	8201-042	3 / 8" FLATWASHER 	48
14	8202-042	3 / 8" LOCKWASHER 	24
15	8102-007	3 / 8" HEX NUT 	24

***NOTE:** Assembly of the reflector should be on as level a surface as possible to prevent warping or misalignment of the reflectors parabolic shape during assembly. Any loss of contour may affect the antennas signal quality. If a level surface is not available, refer to section 5.4 for tips on how to check the reflector shape and correct it if necessary.*

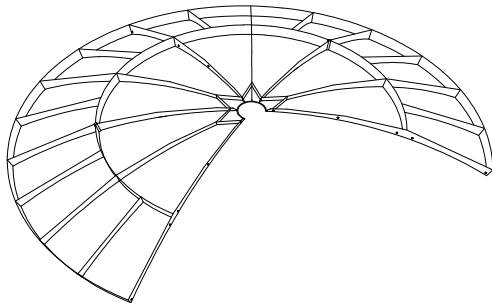
2.2 REFLECTOR PRE-ASSEMBLY

The reflector consists of three interchangeable petals of compression molded glass-fiber reinforced material. This material is very strong, yet lightweight and easy to handle. The reflector will possess a very accurate parabolic shape when properly assembled and will retain it's shape for years under harsh environmental conditions. The microwave reflective surface is provided by a fine mesh screen that lies just beneath the molded surface of the petals.



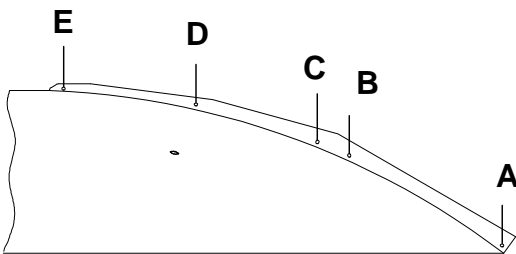
- A) Identify the reflector petals and parts of the reflector support structure according to the parts list.
- B) Note that the petals (item 1) have a 1 / 2" hole thru the center. These holes are for the feed clevises. Pre assemble these three petals as follows.
- C) Run the 1 / 2" nut (item 6) up the threads of the clevis (item 2), and place a 1 / 2" flatwasher (item 7) against the nut. Adjust the nut until the distance from the far side of the washer and the center of the clevis is 1.5" .
- D) From the face of the petal, insert the clevis assembly thru the hole in the center of the petal. Secure with 1 / 2" hardware. Tighten these nuts hand tight at this time.

2.3 REFLECTOR ASSEMBLY



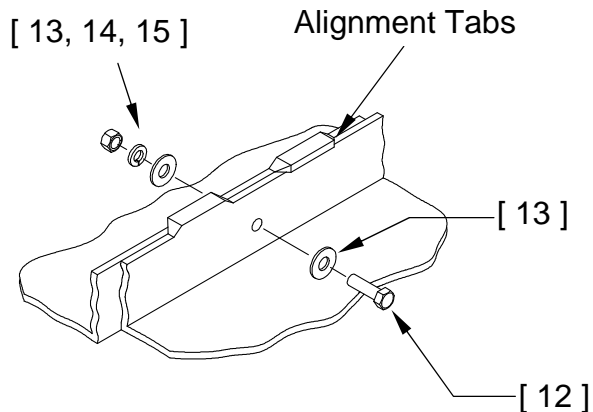
STEP 1:

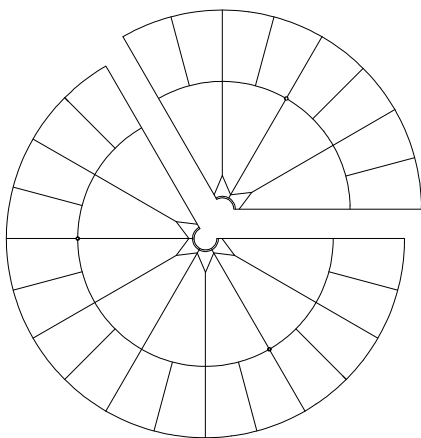
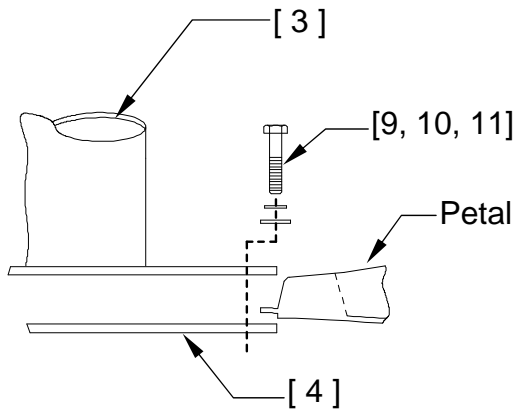
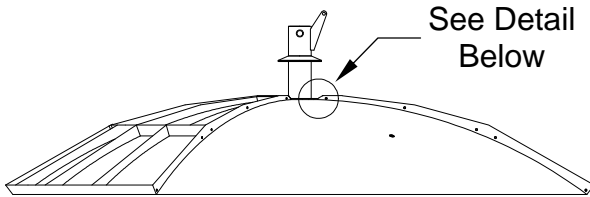
Place two petals rim down on a level surface with their flanges next to each other. The petals are free standing with the rim down and the center up.



STEP 2:

- A) Begin the assembly at the flange with 3 / 8" hardware (items 12, 13, 14, 15), in holes A, B, D, and E only.
- B) You may notice that the hardware fits snugly in the holes. This is to assure the accurate alignment of the petals. If necessary, gently tap or thread the bolts into the holes. The hardware may now be fully tightened at this point.

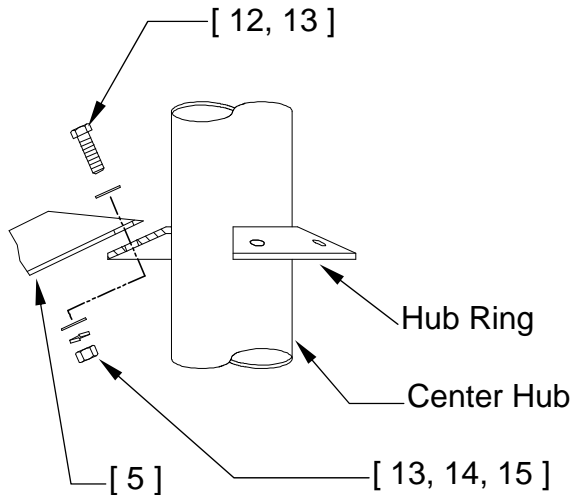




STEP 4:

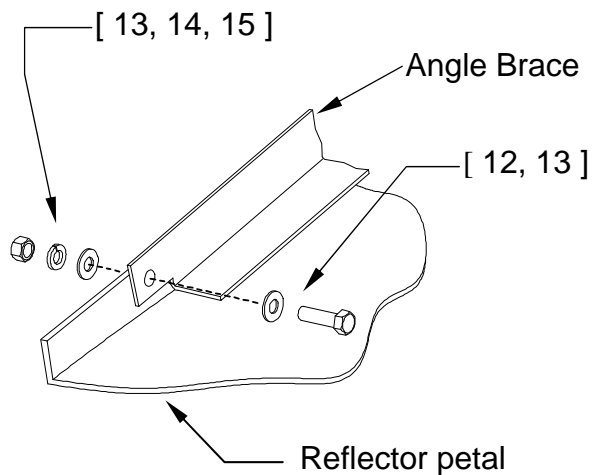
- A) Continue assembling the two petals as above. Before installing the last petal, place the center plate (item 4) beneath the center of the reflector and attach the center hub (item 3) on top with 1 / 4" hardware (items 9, 10, 11). Leave hardware loose enough to rotate hub.
- B) Place the last petal in position, insuring that the lip on its inner edge is located between the center hub and plate. Attach this petal to the adjacent petal at holes A and B. At this time, the reflector is strong enough to sustain the weight of the installer to place the bolts in holes D & E. Remember not to insert bolts in hole C as those will be taken care of in the next section. Be sure to step only on the ribs, not on the surface in between.
- C) Now tighten all reflector bolts. Before tightening, check to be sure that all the petals are aligned properly. It may be necessary to adjust one petal in or out (radially) until the rim is flush. Also check up and down alignment. It is possible to lift the reflector slightly to feel the front surface, making sure that it is flush. Tighten all A bolts first. Next tighten all B bolts, then D and E. Note: Before tightening the last set of reflector bolts, the ones closest to the hub, check to make sure that the lip on the inner edges of all petals are located between the center plate and the center hub plate.

2.4 SUPPORT STRUCTURE ASSEMBLY



STEP 1:

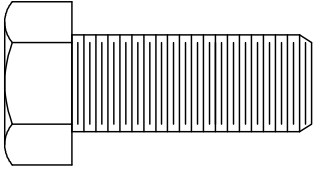

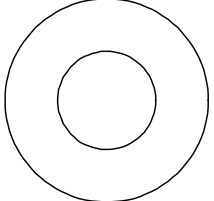
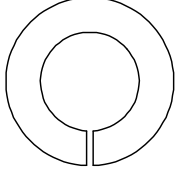
Attach one of the angle braces (item 5) to the top of the hub ring as shown. Note that the notched end of the angle goes towards the reflector rib. Secure the angle to the hub with 3/8" hardware (items 12, 13, 14, 15).

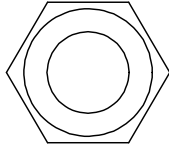
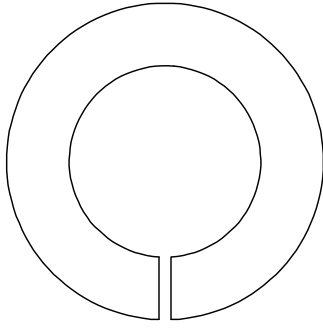
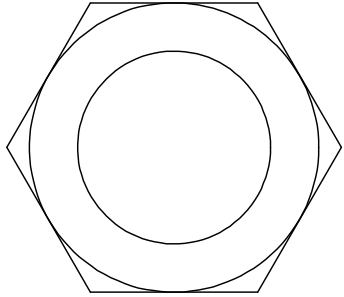
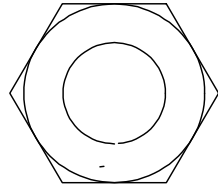
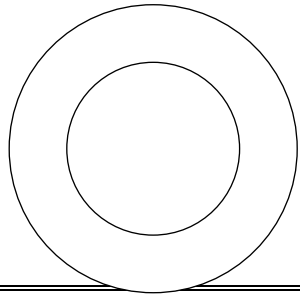


STEP 2:

- Rotate the hub if necessary to position the angle next to the reflector rib at hole location C as shown.
- Attach brace with 3 / 8" hardware (items 12, 13, 14, 15). Do not tighten until instructed.
- Attach the remaining 5 angle braces from the hub ring to the petal ribs in the same manner.
- Tighten all hardware completely, including the six 1/4" bolts at the base of the reflector center hub.

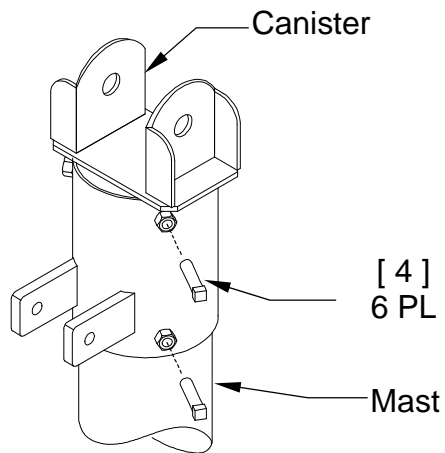
SECTION 3 REFLECTOR INSTALLATION

REFLECTOR MOUNT PARTS LIST TABLE 3.1			
ITEM	PART NO.	DESCRIPTION	QTY
1	0490-502	CANISTER	1
2	0168-085	ELEVATION ADJUSTMENT BLOCK	1
3	0490-476	ELEVATION ADJUSTMENT ROD	1
4	8317-105	5/8" x 2.00 SQ. HD BOLT	6
5	8033-010	1/2" x 1.25 BOLT 	2
6	8033-024	1/2" x 3.00 BOLT 	1
7	8201-030	1/2" FLATWASHER 	4
8	8202-043	1/2" LOCKWASHER 	3

PARTS LIST - CONTINUED			
ITEM	PART NO.	DESCRIPTION	QTY
9	8104-007	1/2" HEX NUT 	1
10	8036-048	1" X 6.00 BOLT	1
11	8202-046	1" LOCKWASHER 	1
12	8107-007	1" HEX NUT 	1
13	8105-007	5/8" HEX NUT 	2
14	8201-046	1" FLATWASHER 	2

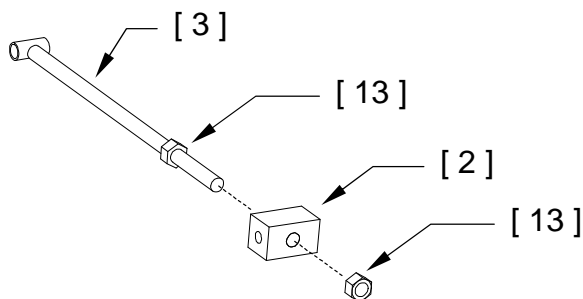
NOTE: At least three persons are required for the installation of the antenna on the mast. After the reflector is positioned on the canister, two can steady the reflector while the other secures it with the 1" bolt.

3.2 CANISTER & ELEVATION ASSEMBLY



STEP 1:

Insert each square head bolt (item 4) into the canister, only a few turns, so that the bolts do not extend into the canister. Position the canister on the mast and insure that it is seated all the way down on the mast pipe and that it can rotate freely.

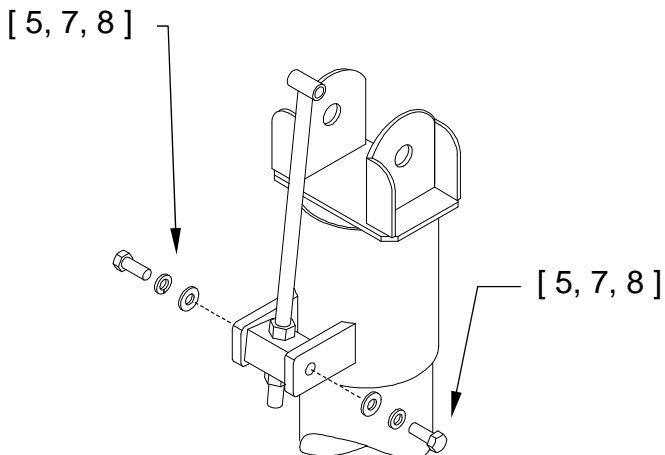


STEP 2:

Assemble the elevation rod by running 5/8" nut (item 13) well up onto the elevation rod (item 3). Slip the elevation block (item 2) onto the rod and secure with another 5/8" nut.

STEP3:

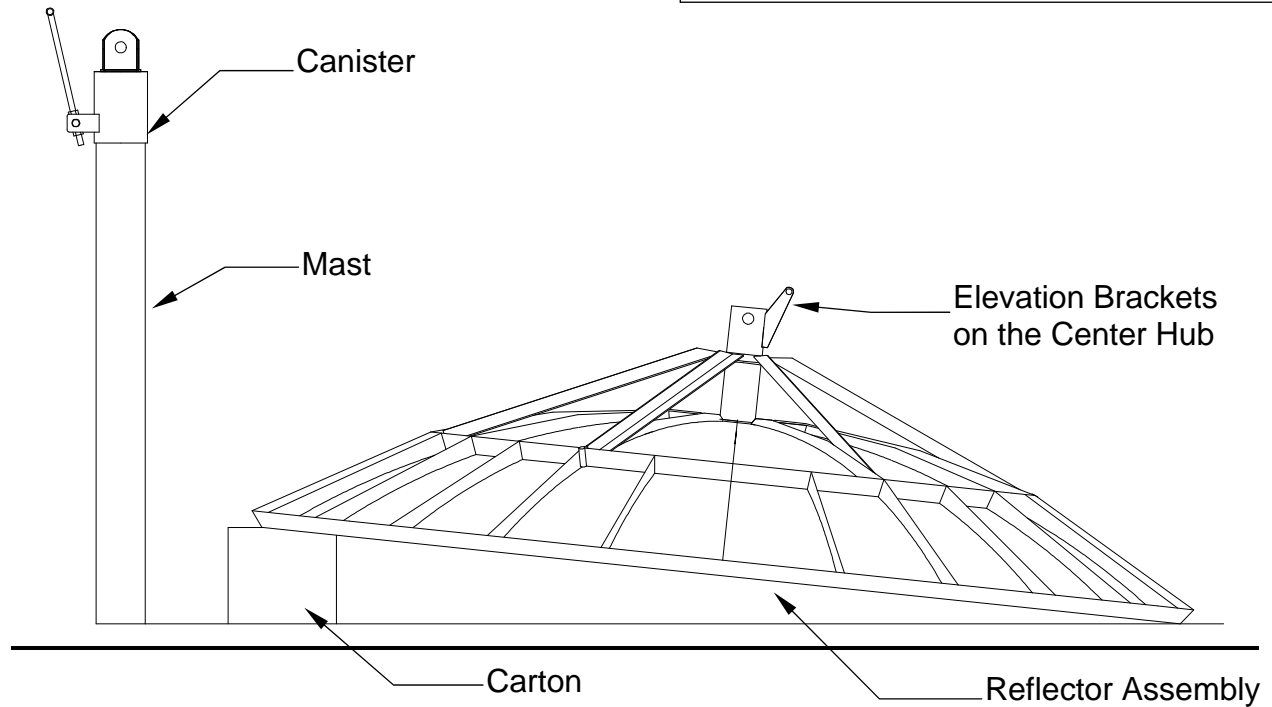
Place the elevation rod assembly in between the two tabs on the canister and secure with 3/8" hardware (items 5, 7, 8).

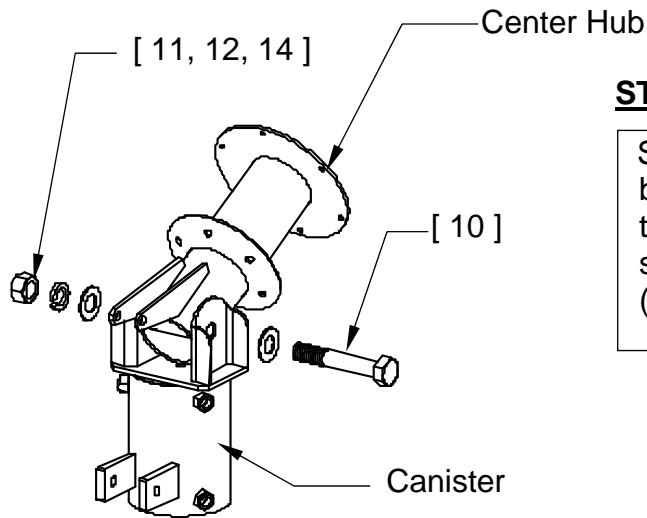


3.3 REFLECTOR POSITIONING

STEP 1:

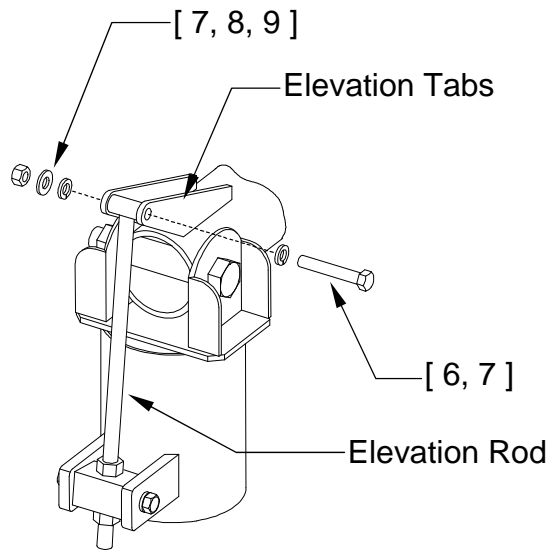
Bring the completed reflector assembly to the pedestal and locate it about 1-1/2 to 2 feet away from the mast. Make sure that the elevation brackets on the hub are pointing away from the mast. Use the reflector carton (or similar object) as a rest for under the edge of the reflector. Be sure to have the 1" hardware close at hand (items 10, 11, 12).





STEP 2:

Swing the reflector up until the hub can be placed in between the top brackets the canister. With the holes aligned, secure the reflector with 1" hardware (items 10, 11, 12).



STEP 3:

Raise or lower the reflector until you can place the tube of the elevation adjustment rod in between the two tabs on the center hub. Secure in place with 1/2" hardware (items 6, 7, 8, 9). Do not tighten these bolts until section 5.1.

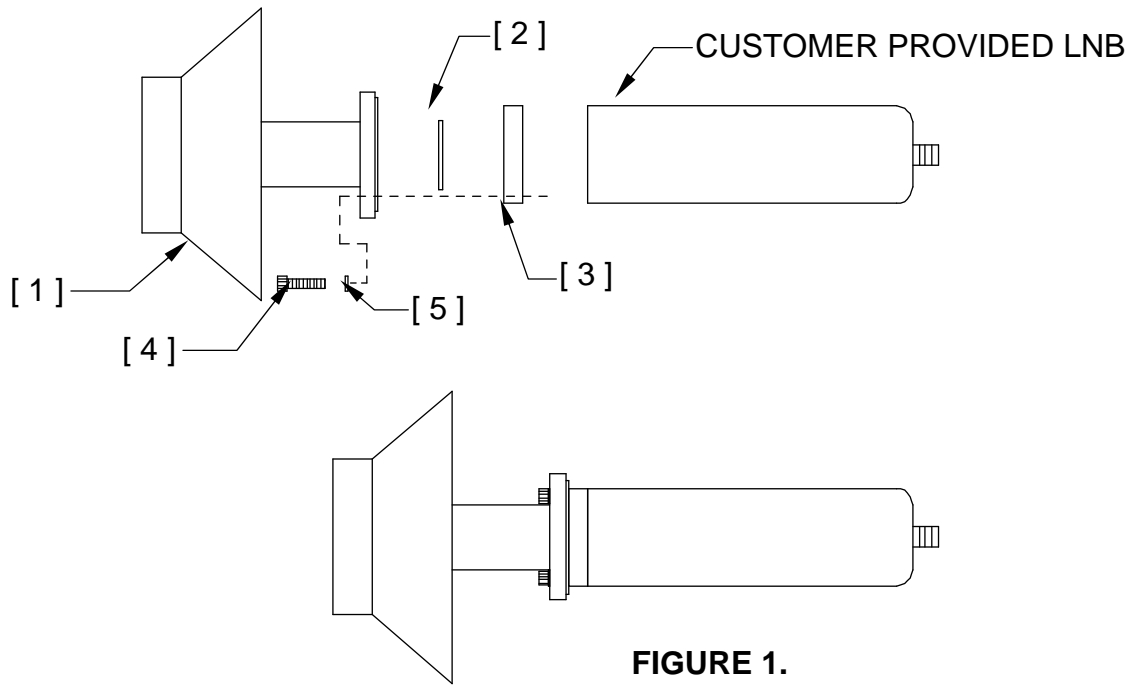
SECTION 4 FEED INSTALLATION

4.1 FEED HORN ASSEMBLY

Ku-BAND FEED

SINGLE POL - Coat the o-ring (item #2) with the silicone grease from the capsule provided and place it in the feed horn o-ring groove. Place the square adapter (item #3) on the feed horn flange and line up the four hole pattern in the adapter with four of the eight holes in the feed horn flange. (Note that the adapter will only line up one way.) Place the LNB (customer provided) on the adapter so that the holes in the LNB line up with the feed/adapter holes and secure with four screws (item #4). See figure 1. Tighten securely.

Ku-BAND - SINGLE POL - PARTS LIST			
ITEM #	PART #	DESCRIPTION	QUANTITY
1	0183-579	FEED HORN ASSEMBLY	1
2	0198-120	O-RING	1
3	0202-068	TRANSITION ADAPTER	1
4	8300-017	#6-32 x 7/8" SS STD	6
5	8200-010	#6 LOCKWASHER	6



Ku-BAND FEED

DUAL POL - Coat the o-ring (item #6) with the silicone grease from the capsule provided and place it in the feed horn o-ring groove. Attach the OMT (item #1) to the feed horn (item #2) with the #6 hardware (item #'s 3,4,& 5). Attach two LNB's (customer provided) to the OMT with the o-rings and hardware provided with the LNB's. See figure 2. Tighten securely.

Ku-BAND - DUAL POL - PARTS LIST			
ITEM #	PART #	DESCRIPTION	QUANTITY
1	4080-045	OMT, Ku-BAND - DUAL - RECEIVE	1
2	0183-276	FEED HORN ASSEMBLY	1
3	8300-012	#6-32 x 0.75 S.S. STD. SCREW	6
4	8200-010	#6 LOCKWASHER	6
5	8112-001	#6-32 S.S. STD. HEX NUT	6
6	0198-120	O-RING	1
7	8300-002	#6-32 x 0.50 S.S. STD. SCREW	6

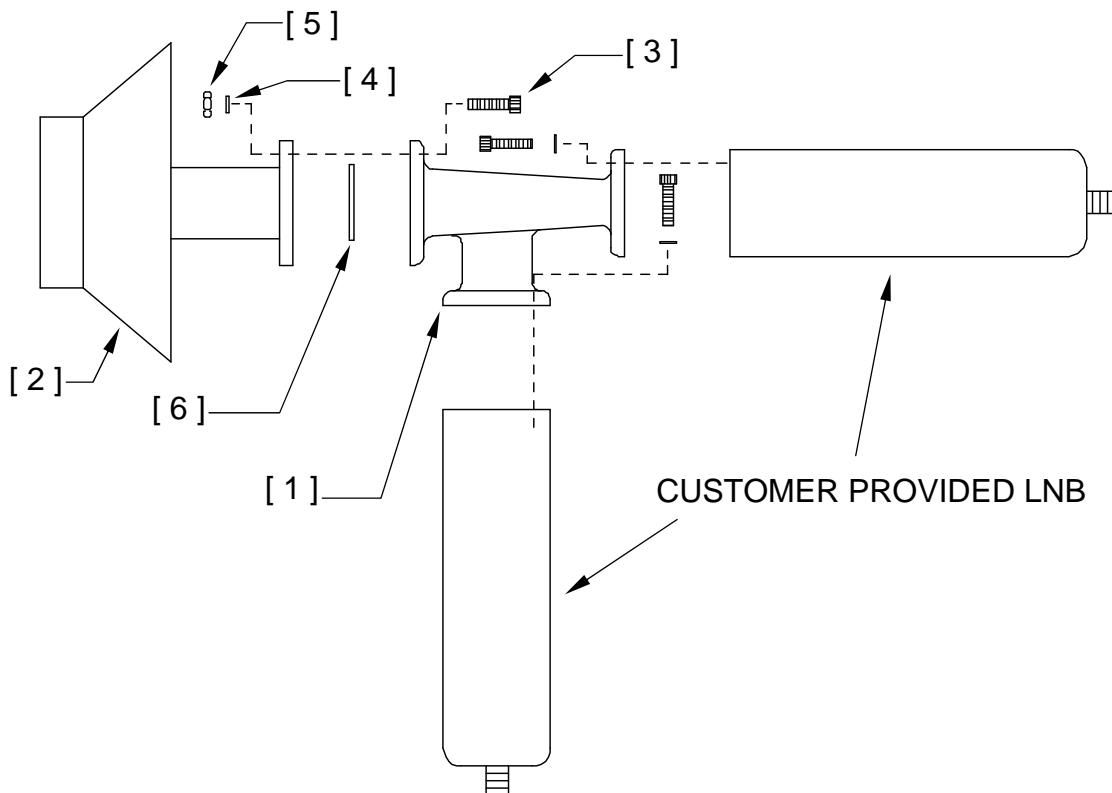


FIGURE 2.

C-BAND FEED

Attach the LNB's (customer supplied) to the feed horn flange with the 1/4" hardware and gaskets (item #'s 2 ,3,4,5,& 6) provided. See figure 3. **(SINGLE POL ONLY** - Attach the cover plate (item #7) and gasket (item #2) to the bottom of the feed horn as shown.) Tighten securely.

BAND - PARTS LIST			
ITEM #	PART #	DESCRIPTION	QUANTITY
1	0183-507	FEED HORN ASSEMBLY	1
2	0171-074	GASKET	2
3	8030-010	1/4-20 x 1.25 BOLT	20
4	8201-040	1/4" FLATWASHER	20
5	8202-040	1/4" LOCKWASHER	20
6	8100-007	1/4-20 HEX NUT	20
7	0156-576	COVER PLATE (SINGLE POL ONLY)	1

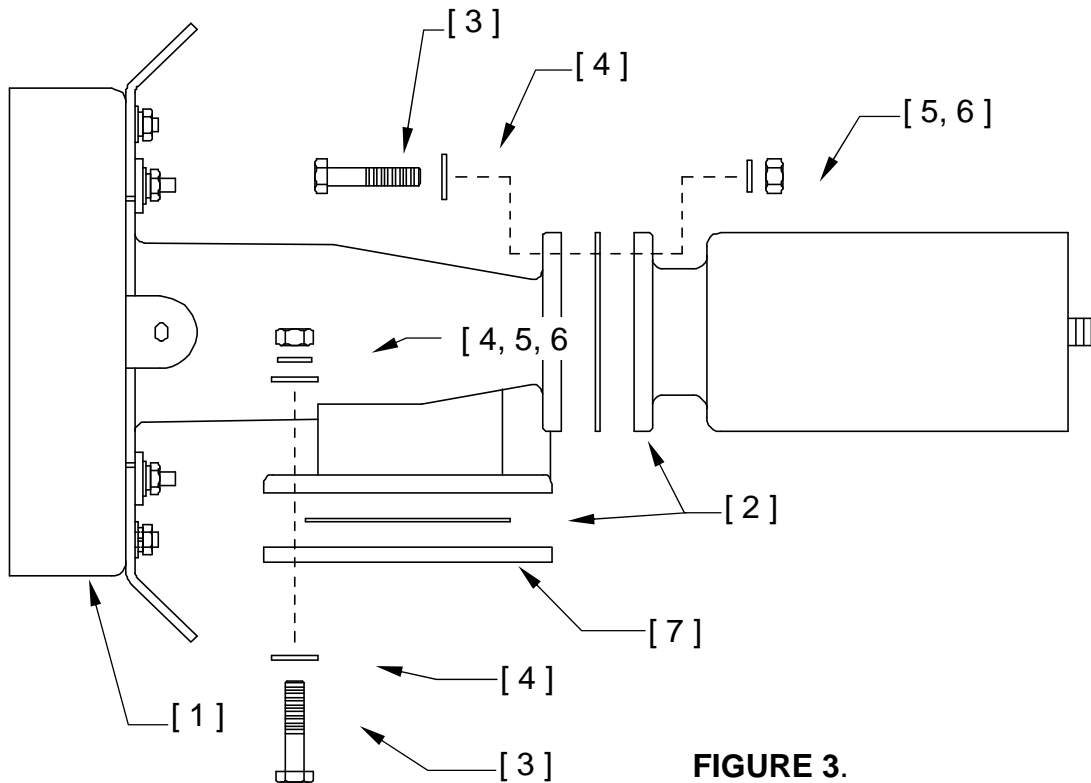


FIGURE 3.

C/Ku-BAND FEED

Attach the three feed mounting brackets to the scaler of the c/ku band feed (customer supplied) with the hardware provided. (Figure 4). Tighten securely.

C/Ku-BAND FEED PARTS LIST			
ITEM #	PART #	DESCRIPTION	QUANTITY
1	0211-405	BRACKET, FEED SUPPORT	3
2	8030-006	1/4-20 x .75 BOLT	3
3	8202-040	1/4" LOCKWASHER	3
4	8100-007	1/4-20 HEX NUT	3

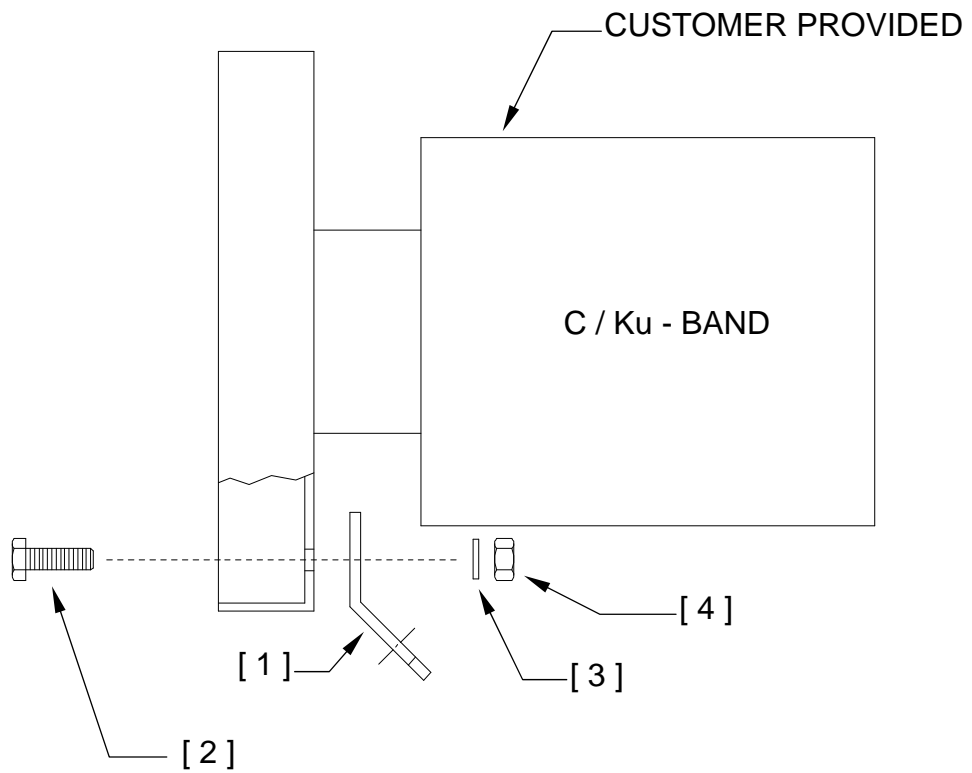
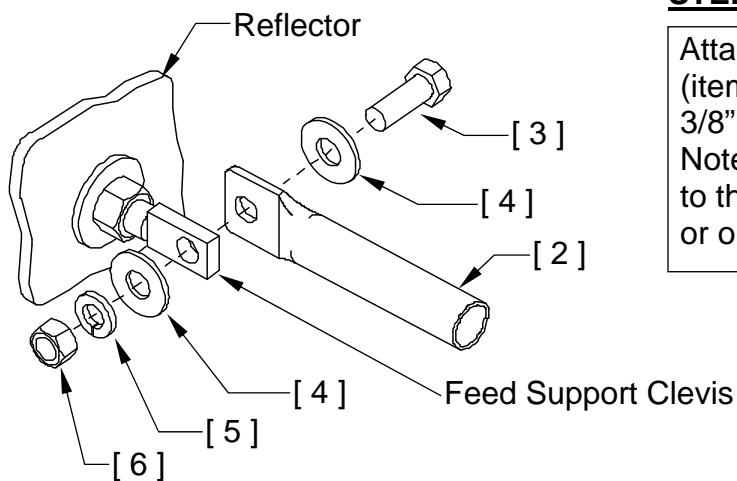


FIGURE 4.

FEED SYSTEM PARTS LIST TABLE 4.2			
ITEM NO.	PART NO.	DESCRIPTION	QUANTITY
1	VARIES	FEED HORN ASSEMBLY	1
2	VARIES	FEED SUPPORT ROD	3
3	8032-008	3/8-16 x 1.00 BOLT	6
4	8201-042	3/8" FLATWASHER	9
5	8202-042	3/8" LOCKWASHER	6
6	8102-007	3/8" HEX NUT	6
Ku-BAND SINGLE POL ONLY			
7	0156-819	FEED COVER TAB	4
8	0250-276	FEED COVER	1
9	8320-001	#8 x 1/2" TAPPING SCREW	4
10	4075-003	FEED COVER CAP	1

4.3 FEED SUPPORT ASSEMBLY



STEP 1:

Attach each of the feed support rods (item 2) to the feed support clevis with 3/8" hardware (items 3, 4, 5, 6). Note that each rod should be attached to the same side of the clevis - (inside or outside).

4.4 FEED INSTALLATION

- 1. FOCAL LENGTH** - As shown in figures 5 thru 7, attach the feed horn assembly to the three feed rods with the same 3/8" hardware as above. (For ku-band single pol only, insert the feed cover tab (item #7) between the feed horn and the 3/8" nut). Tighten the three bolts securely at this time. Check the focal length by measuring from the face of the feed horn to the reflector cover plate as shown in figure 8. If the focal length is incorrect, adjust the feed clevises in or out at the reflector surface as needed. Be sure that the clevises are adjusted equally. When the focal length is correct, tighten all feed support and clevis hardware securely. The focal length is 35.8 inches.

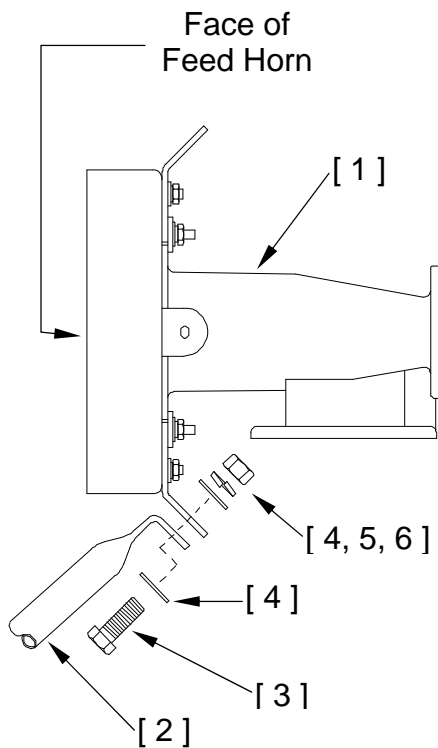


FIGURE 5.

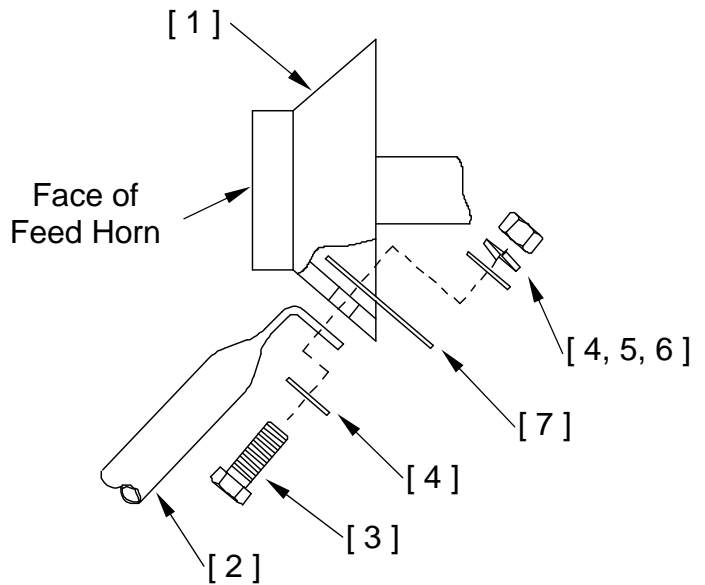
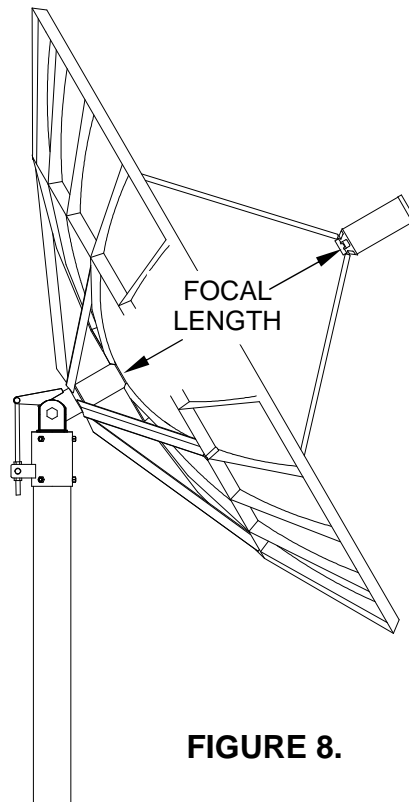
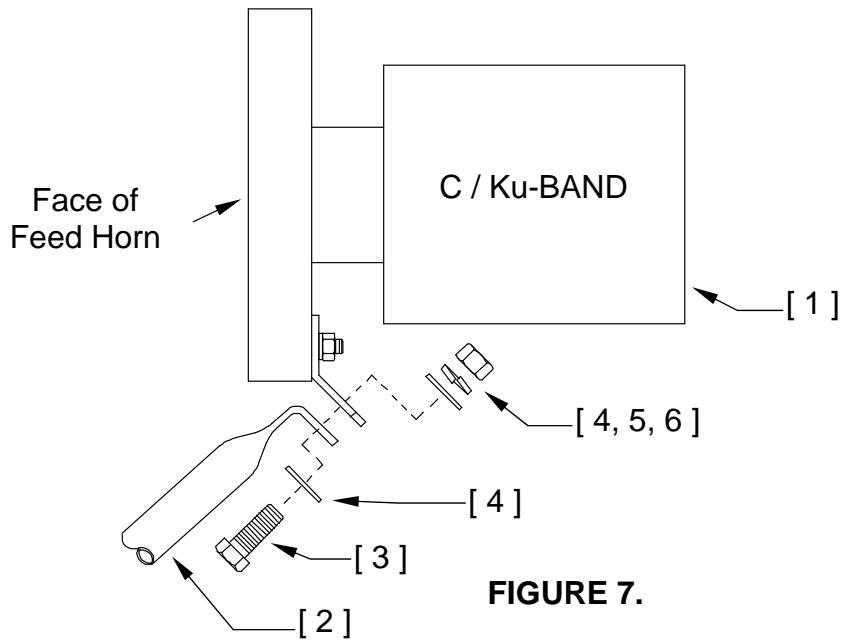


FIGURE 6.



2. **POLARITY ADJUSTMENT** - On C-band and ku-band feed systems, polarity is adjusted by loosening the feed horn bolts (see figures 9 and 10) and rotating the OMT or feed horn 90 degrees, then retighten the bolts.

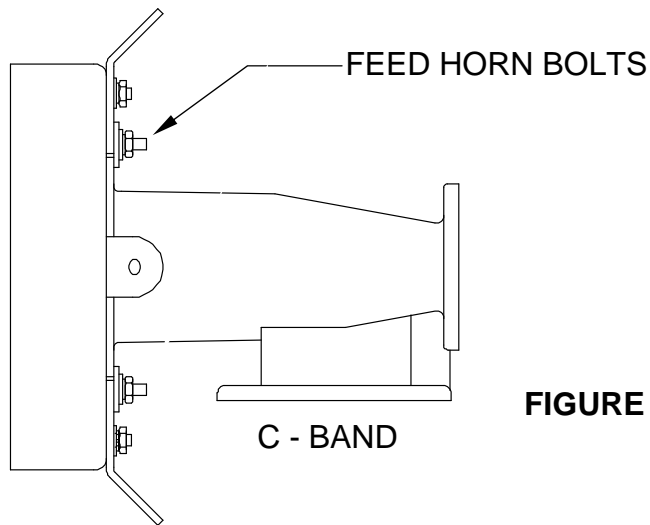


FIGURE 9.

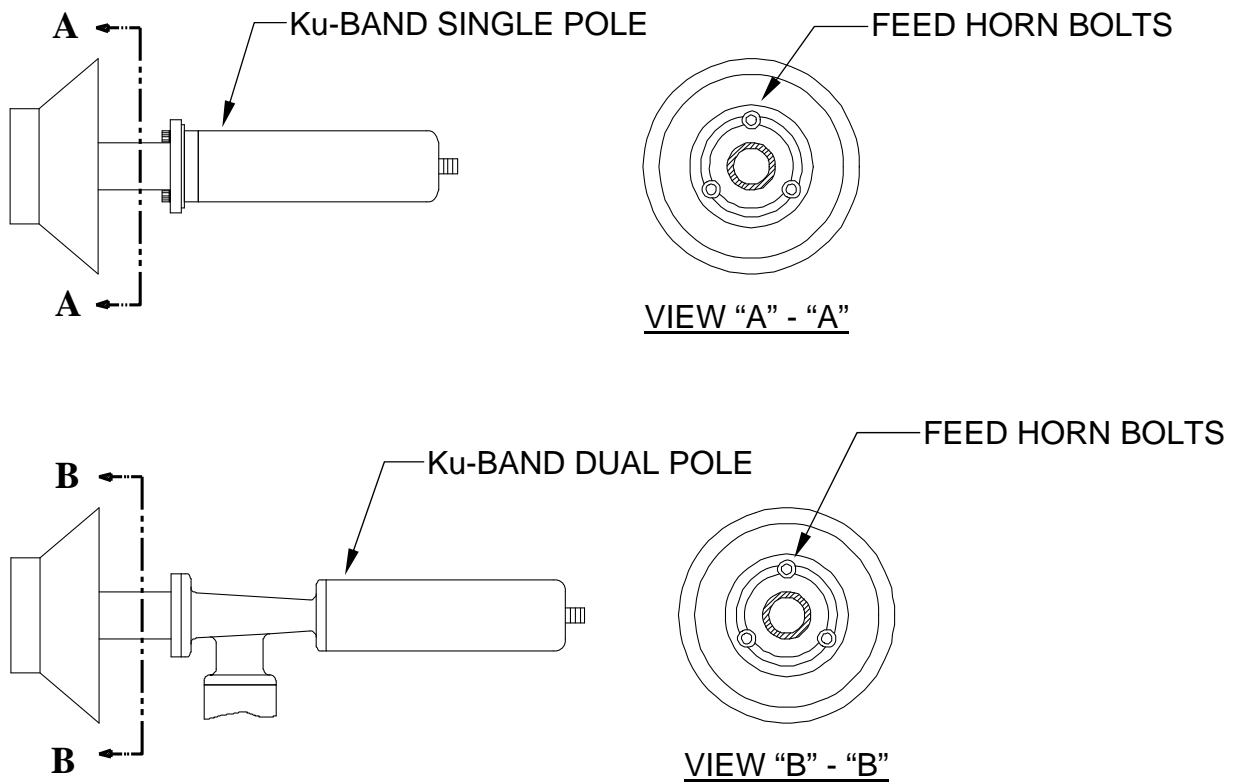
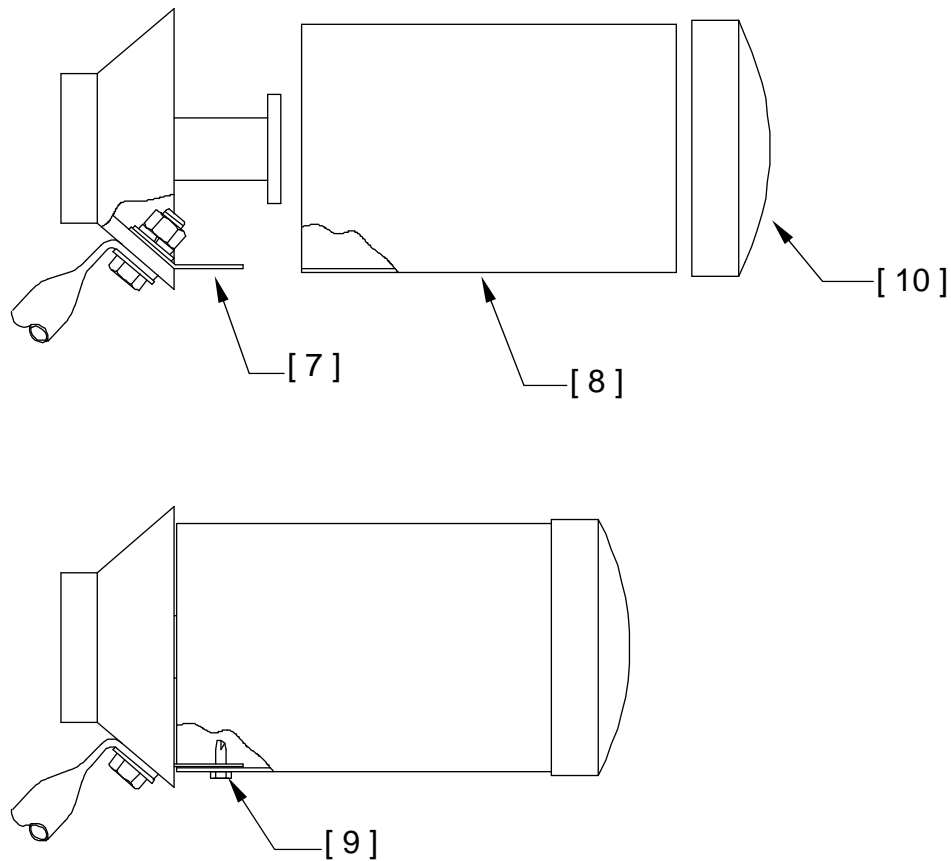


FIGURE 10.

4.5 FEED COVER INSTALLATION

1. **FOR SINGLE POL KU-BAND FEED ONLY** - After completion of the feed installation, connection of the cable and polarity adjustment, bend the feed cover tabs (item #7) in and then slide the feed cover (item #8) over the tabs. Attach the cover to the tabs with the tapping screws (item # 9) and slide the cap (item #10) over the cover as shown in figure 11.



SINGLE POLE KU-BAND FEED

FIGURE 11

SECTION 5 ANTENNA ALIGNMENT AND TUNING

5.1 ELEVATION ADJUSTMENT

1. Place an inclinometer on the hub as shown in figure 12.
2. Adjust the elevation by turning the 5/8" nuts on the elevation rod up or down until the correct angle is read on the inclinometer.

5.2 AZIMUTH ADJUSTMENT

1. Make sure that all the 5/8" bolts in the canister are loose. Sweep the antenna in the azimuth until the desired signal is found. If the desired signal is not found, it may be necessary to alter the elevation angle slightly. Rotate in azimuth slowly until loss of signal is observed. Rotate the antenna in the opposite direction until the signal strengthens, and then weakens again. Set the azimuth between these two points and snug the canister.

5.3 FINE TUNING

1. After setting the azimuth, return to the elevation adjustment and fine tune in the same way, splitting the difference between the two points where loss of signal is first observed. Check the azimuth adjustment once more, then tighten all canister and elevation rod hardware.

5.4 REFLECTOR FINE ADJUSTMENT

1. As discussed in section 2, a level surface is necessary for assembly of the reflector. If a level surface is not available, the reflector may be checked for accuracy by use of strings across the aperture.
2. Use thin cord across the reflector diameter from rim to rim, at four places. One end of each string should be taped to the rim just to one side of the seam between two petals. The other end should be fastened 180 degrees opposite. All four strings should lightly touch where they cross at the center. The distance from center of the reflector (hub to plate) to the strings should be 16.09.
3. If the reflector does not check out as described above within approximately a 1/4", reflector adjustment may be done. Identify the point on the rim that is either high or low. Loosen the four bolts on the long and short angle brace behind the radial line of the reflector. Gently push or pull on the reflector rim until it is brought into position. While one installer holds the rim, the other should tighten all the brace bolts fully. Repeat this process as required, loosening and tightening only one set of braces at a time.

