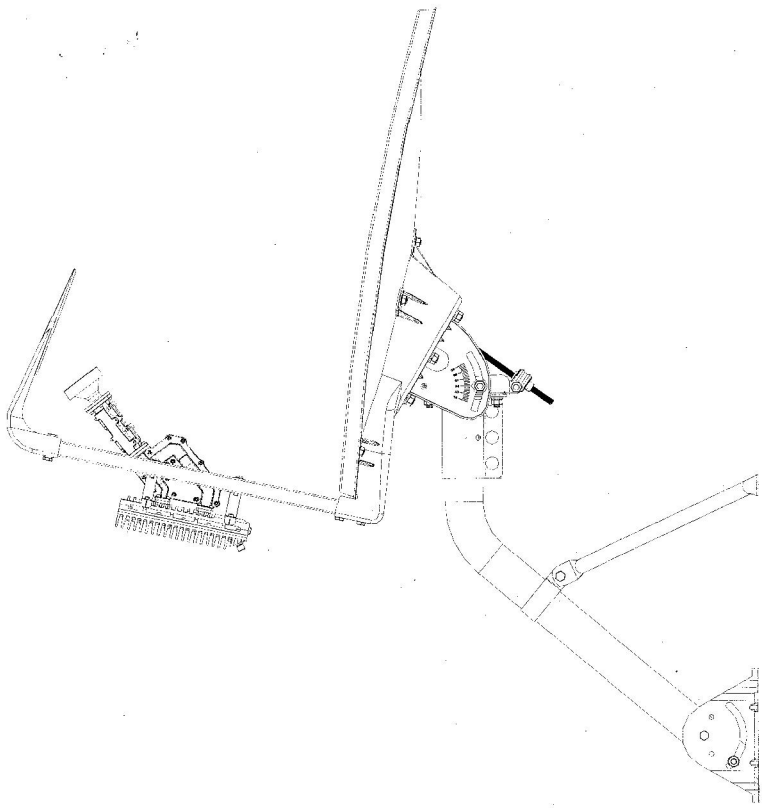
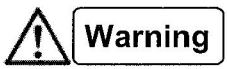
RAVEN

Instruction Manual For 65cm x 75cm Elliptical Ka Antenna



RMPAC102 rev 9

This instruction leaflet will assist you in the correct installation of the product. Read it prior to starting any installation work. Due to the nature of the method of manufacture, there may be sharp edges on metal components. Be cautious when un-packing and handling antenna parts.



Assembling dish antennas on windy days can be dangerous. The antenna surface, even in slight winds, creates strong forces. For example, a 1.0m antenna facing a wind of 32km/h (20 mph) can undergo forces of 269 N (60 lbs). Be prepared to handle those forces safely at unexpected moments. Do not attempt to assemble, move, or mount a dish on high wind days or serious, even fatal, accidents may occur. The Vendor is not responsible or liable for damage or injury resulting from antenna installations.

Antenna improperly installed or installed to an inadequate structure are very susceptive to wind damage. This damage can be very serious or even life threatening. The owner and installer assume full responsibility that the installation is structurally sound to support all loads (weight, wind and ice) and properly sealed against leaks. The Vendor is not responsible for any damage caused by an antenna due to installations that do not follow this instruction leaflet.

WATCH OUT FOR WIRES! Installation of this product near power lines is dangerous. For your own safety, follow these important safety rules.

1. Perform as many functions as possible on the ground.
2. Watch out for overhead power lines. Check the distance to the power lines before starting installation. We recommend you stay a minimum of 6 meters (20 feet) from all power lines.
3. Do not install the antenna or mount assembly on a windy day.
4. If you start to drop the antenna or mount assembly, get away from it and let it fall.
5. If any part of the antenna or mount assembly comes into contact with a power line, call your local power company. **DO NOT TRY TO REMOVE IT YOURSELF!** They will remove it safely.
6. Properly ground the antenna assembly according to all federal and local electrically codes.

When this antenna is connected to a transceiver (TRIA), and powered on through interconnection to a satellite modem, a radiation source can be present. The transmitter will turn on only once a proper receive signal is obtained. Caution must be used upon completion of alignment to the satellite, and once the installation of the system has been completed. When the transmitter is operational, keep away a distance of 60 cm (2 feet). For use in Canada, refer to Health Canada Safety Code 6 - "Limits of Exposure to Radiofrequency Fields at Frequencies from 10 kHz to 300 GHz". For use in the United States of America see FCC rules (47 C.F.R.1.1310) and OET Bulletin No. 65. For additional information, contact your service provider.

SITE SELECTION

The first and most important consideration when choosing a prospective antenna site is whether or not the area can provide an acceptable "look angle" or Line-of-Sight (LOS) at the satellites. A site with a clear, unobstructed view of the southern sky is necessary. Also, consider obstruction that may occur in the future, such as the growth of trees. Using a Site Survey, select your antenna site in advance of the installation, so that you will be able to receive the strongest signal available.

As with any other type of construction, a local building permit may be required before installing an antenna. It is the property owner's responsibility to obtain all permits. If necessary, modify the installation directions in this document to align with local building codes.

If the system requires a pole mount installation, obtain information about the underground utilities in the proposed pole location. Have the appropriate utility company mark the location of any underground telephone wires, storm drains, etc... In addition; because soils vary widely in composition and load capacity, it may be necessary to consult a local professional engineer to determine the appropriate foundation design. The pole must be vertical prior to the installation of the antenna. Use a Spirit Level, measuring the pole in two places 90^0 apart, or a Pole Level, to verify the pole is vertical. **Caution:** *If the pole is not vertical, compound angles will make it difficult to align the antenna to the satellite.*

All antennas must be installed 5' above the walking surface or placed in a locked, fenced area!

REQUIRED TOOLS

The installation will require the use of the following tools,

- 7/16" Open-ended Wrench
- 1/2" Socket/ 1/2" drive
- 7/16" Socket/ 1/2" drive
- 1/2" Open-ended Wrench x2
- T10 Torx Driver
- No2 Posi-drive Screw Driver
- Compass
- Pointing Aid
- Pointing Meter
- Torque Wrench (40-180 lbf/in)

Figure 22

Additional Materials

- Weather grade silicon sealant
- RG6 Cable
- Lag screws and washers
- Cable ties

PACKAGE CONTENTS

To avoid potential damage, the WildBlue elliptical KA antenna should remain in its protective packaging until it is required. Pages one and two contain a list of package components.

All the packaging is recyclable please dispose of it in a responsible manner.

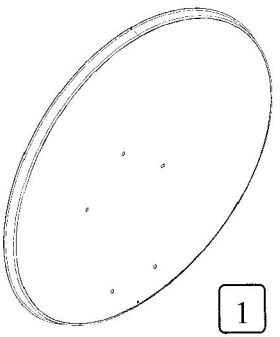
Table of Contents

Key Components

Main Outer Box		
Number	**Description**	**QTY**
1	Elliptical Dish	1
2	Antenna Back Bracket	1
3	Sub Reflector	1
4	Boom Arm	2
5	Mount Tube	1
6	Mount Bracket	1
7	Stay	2

Az/El Box		
Number	**Description**	**QTY**
8	Az/El Assembly (Canister, Az Plate, Az Base, Elevation Bracket)	1
9	Tube Collar	1
10	Fine Elevation Assembly (Fine Elevation Rod, Housing & Fine Elevation Adjuster)	1
11	Antenna Hardware	1
12	Instruction Leaflet	1
13	Skew Plate	1

TRIA Box		
Number	**Description**	**QTY**
14	TRIA Assembly	1
15	TRIA Mounting Hardware	1



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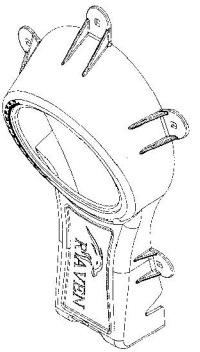

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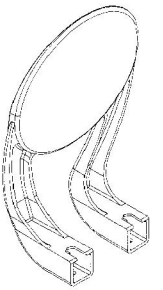

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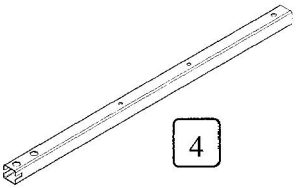

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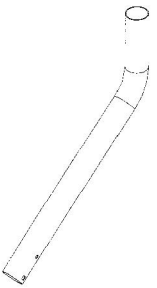

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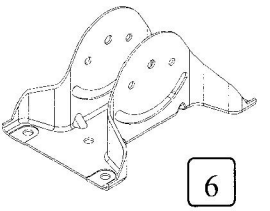

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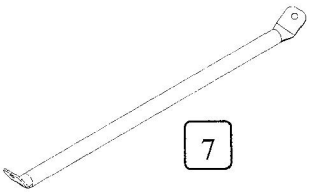

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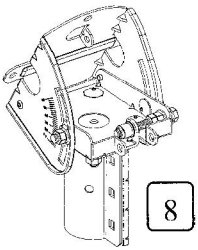

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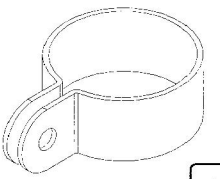

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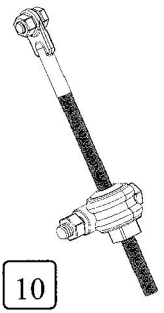

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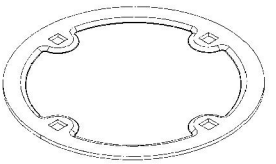

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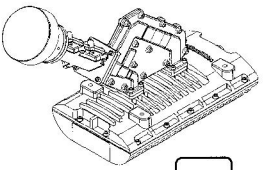

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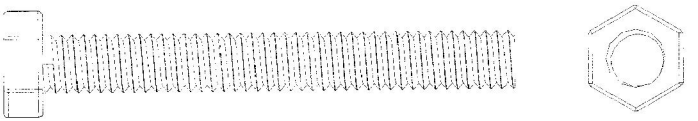
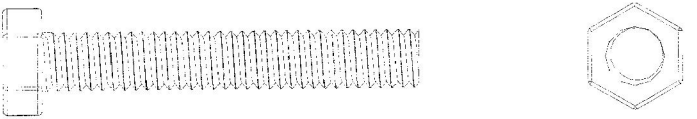
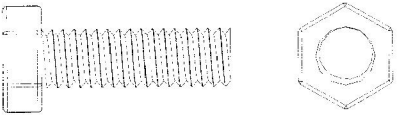
Hardware List



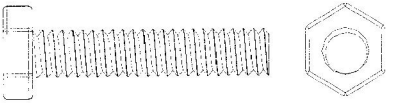
5/16 UNC x 2 1/2" hex hd tap bolt



5/16 UNC x 2" hex hd tap bolt

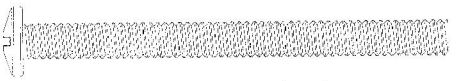


5/16 UNC x 1" hex hd tap bolt



1/4 UNC x 1 1/4" hex hd tap bolt

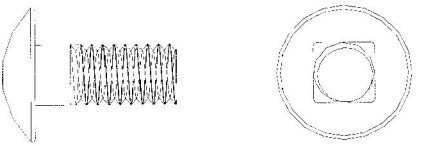
1/4 UNC x 1/2" carriage bolt



#10-32 UNF x 2 1/4" pozi pan head

1/4 UNC x 3/4" hex hd tap bolt

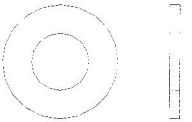
1/4 UNC x 1/2" hex hd tap bolt



5/16 UNC x 3/4" carriage bolt

Transceiver Spacer

5/16 serrated flange nut



5/16 UNC washer

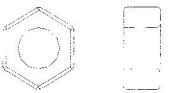
5/16 spring washer

1/4 serrated flange nut

1/4 UNC washer

1/4 spring washer

5/16 hex nut



1/4 hex nut

Anti Loss washer

Antenna Assembly Hardware

QTY	Description
6	5/16 UNC x 3/4" carriage bolt
1	5/16 UNC x 2 1/2" hex head tap bolt
4	5/16 UNC serrated flange nut
1	5/16 UNC x 1" hex head tap bolt
5	5/16 UNC hex nut
4	5/16 UNC Lock Washer
4	5/16 UNC Washer
1	5/16 UNC x 2" hex head tap bolt
2	1/4 UNC Washer
2	1/4 UNC Lock Washer
5	1/4 UNC x 1/2" carriage bolt
7	1/4 UNC Serrated Flange Nut
4	1/4 UNC x 3/4" hex head tap bolt
2	1/4 UNC x 1 1/4" hex head tap bolt
1	1/4 UNC x 1/2" hex head tap bolt
1	1/4 UNC hex nut

TRIA Mounting Hardware

QTY	Description
4	#10-32 UNF x 2 1/4" pozi pan head
4	Transceiver Spacer
4	Anti Loss Washer

Antenna Assembly

Complete the antenna assembly on the ground, before mounting it on the Mount Tube. This assembly has five steps.

Step 1: The ***Fine Elevation Assembly*** consists of the Fine Elevation Rod, Housing, and a Fine Elevation Adjuster. To form the Fine Elevation Assembly, screw the Fine Elevation Rod into the Fine Elevation Adjuster and position the Housing around the Fine Elevation Adjuster **(fig 1).**

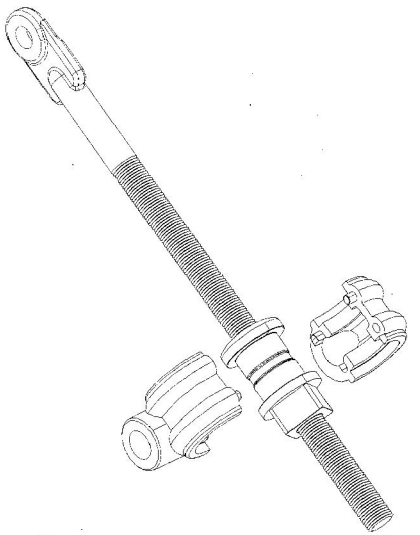


Figure 1

Position the Fine Elevation Assembly in between the two flanges on the back of the Azimuth Base. Pass a 5/16" X 2" UNC Hex Head Tap Bolt through the Azimuth Base right flange, through the Fine Elevation Assembly, and

through the Azimuth Base left flange, then hand-tighten with a 5/16" UNC Hex Nut. Place the top of Adjustment Rod on left side of the flange at the top of the Elevation Bracket, aligning the holes. Pass a 1/4" X 1/2" UNC Hex Head Tap Bolt through the Elevation Bracket hole, then the Adjustment Rod hole (from right to left). Secure this Tap Bolt with a 1/4" UNC Hex Nut, then hand-tighten. **(fig 2)**.

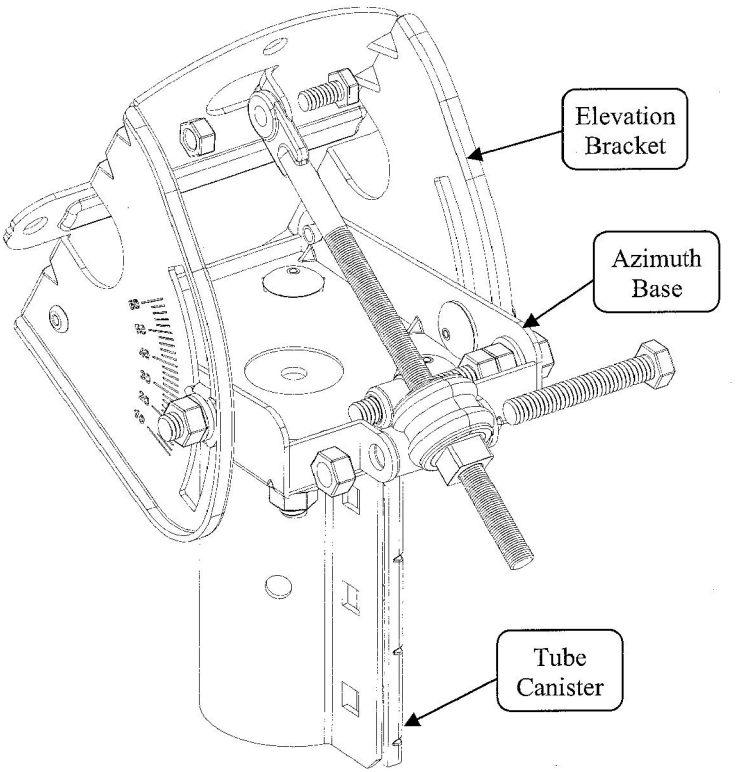


Figure 2

Step 2: Construct the ***Skew Adjustment Assembly*** by fastening the Skew Plate to the front of the Elevation Bracket, through the Antenna Back Bracket. Pass four 5/16" x 3/4" UNC Carriage Bolts through the skew plate, then the Antenna Back Bracket, and, finally, through the front of the Elevation Bracket. Secure the Skew Plate using a 5/16" UNC Washer, Spring Washer, and a Hex Nut on each Carriage Bolt, as in **(fig 3)**.

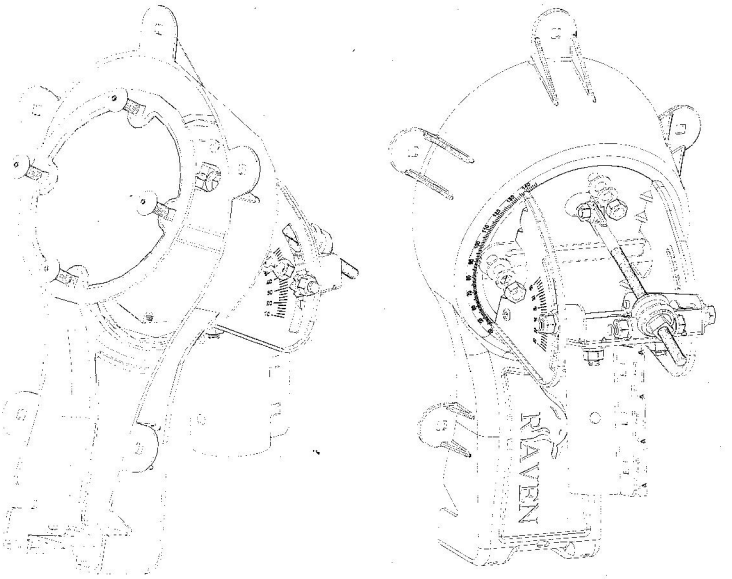
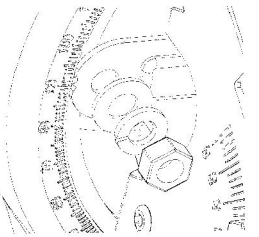


Figure 3



Step 3: ***Antenna Arm Assembly*** Slide the Sub-reflector feet over the ends of the Boom arms. Slide a 1/4" UNC Serrated Flange Nut into the encapsulation cutout on top face of the Sub-reflector foot (as shown). For each foot, place a 1/4" UNC Washer and Spring Washer onto a 1/4" x 1 1/4" UNC Hex Head Tap Bolt. Next, pass the Tap Bolt through the bottom of the Sub-reflector foot and Boom arm, then fasten into the encapsulated Flange Nut. Tighten the bolts to 20Nm (177 in.lbf) **(fig 4).**

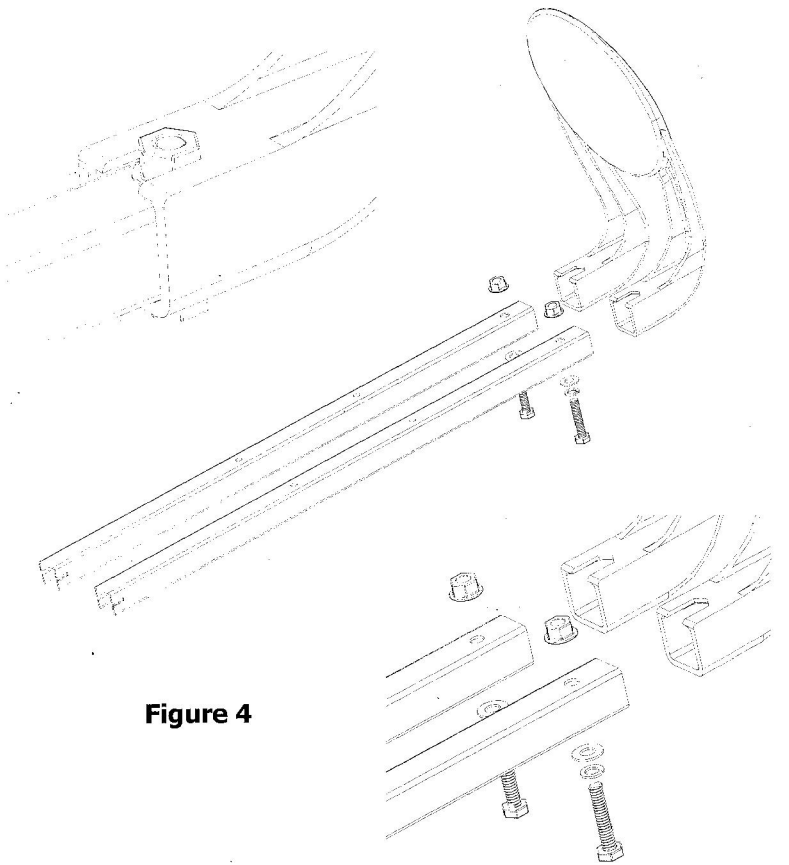


Figure 4

Slide the Boom arms into the slots at the bottom of the Antenna Back Bracket, aligning the screw holes. To fasten the Boom arm to the Antenna Back Bracket, insert one 1/4" x 3/4" UNC Hex Head Tap Bolt into each of the four screw holes in the slot and tighten to 20Nm (177 in.lbf) **(fig 5).**

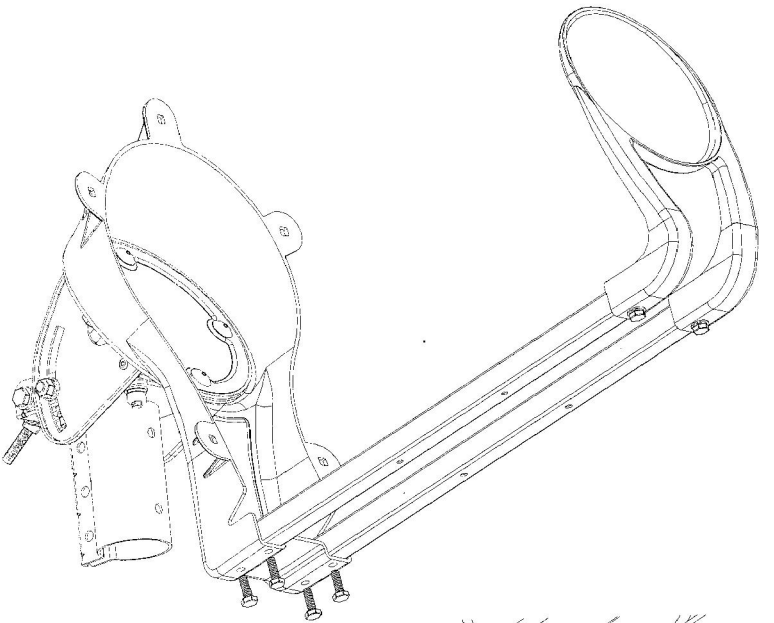


Figure 5

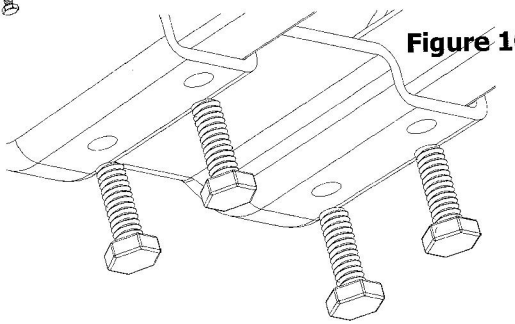


Figure 10

Step 4: ***TRIA Installation*** start by removing the TRIA & the mounting hardware kit from its box **(fig 6)**.

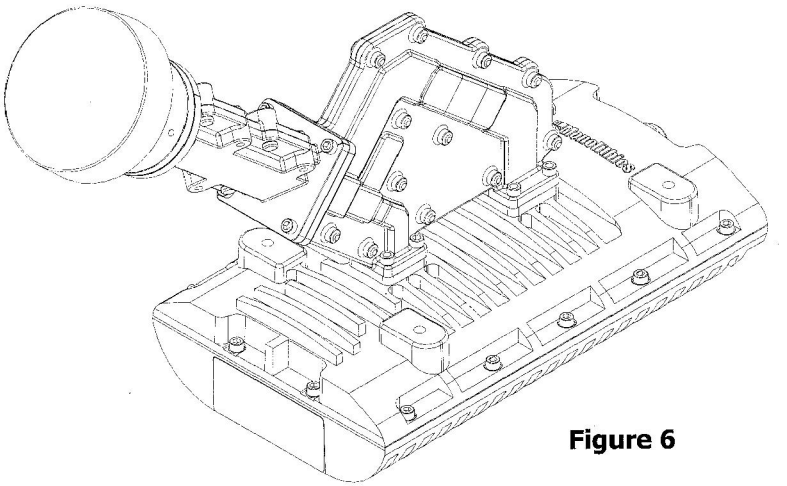


Figure 6

Insert four #10-32 x 2 1/4" UNF Pozi Pan Head Bolts into the holes in the boom arms. Attach the Transceiver Spacer to the boom arms using an Anti Loss Washer. Ensure the Anti Loss Washer is in the correct position **(fig 6a).**

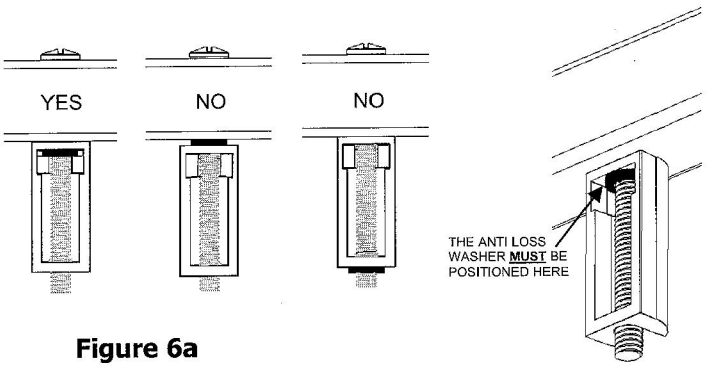


Figure 6a

Position the TRIA under the spacers ensuring the mounting holes on the TRIA line up with the #10-32 x 2 1/4" UNF screws & hand tighten each screw using a Pozi-drive screwdriver **(fig 7).**

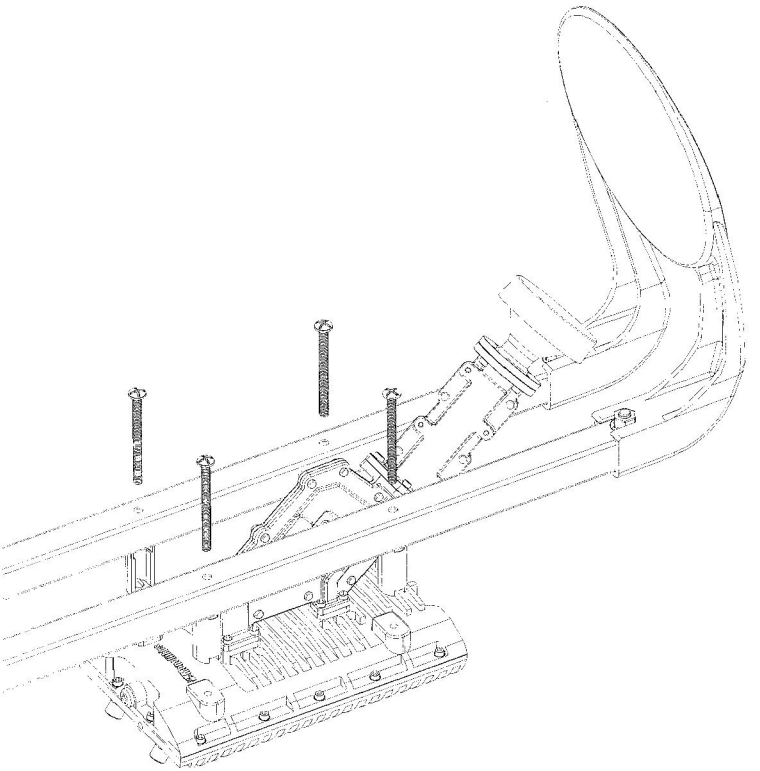


Figure 7

Step 5: ***Fasten the Elliptical Dish*** to Antenna Back Bracket using five 1/4" x 1/2" UNC Carriage Bolts inserted through the front of the Dish and through the five tabs located on the rim of the Antenna Back Bracket. Secure the Dish to the Antenna Back Bracket using a 1/4" UNC Serrated Flange Nut on each Carriage Bolt and tighten to12Nm **(fig 8).**

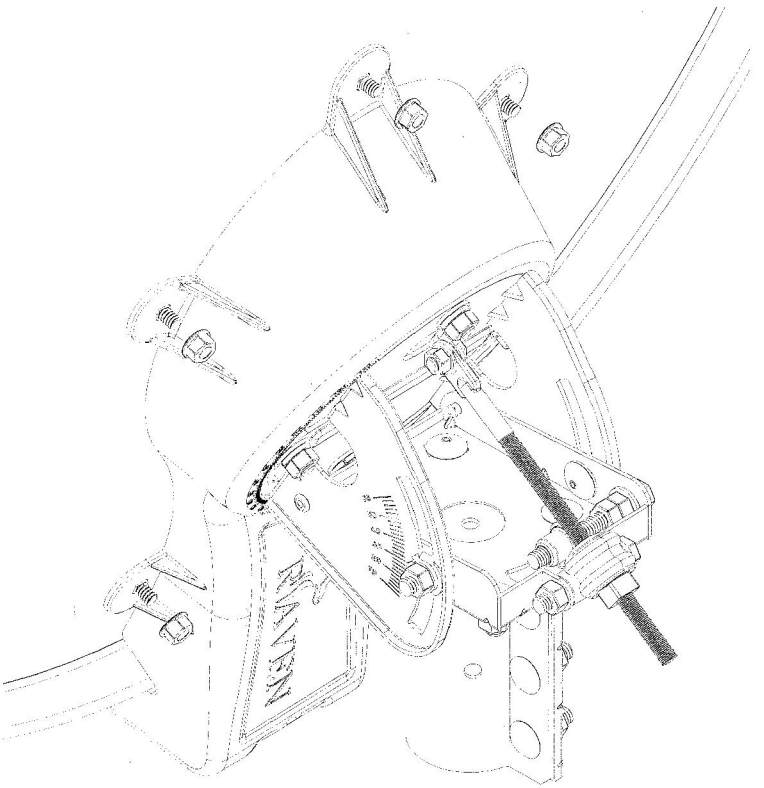


Figure 8

Mounting the Antenna

After the pre-assembly is complete, use the following steps to mount the antenna to the predetermined location. The mount location should be of a sturdy construction i.e. solid wall or wall studding.

Wall Mount

Step 1: Locate the wall stud in the area of installation. Align the holes of the Mounting Bracket with the center of the stud. Mark the upper hole in the center of the bracket with a pencil and drill a 1/8" hole. Attach the Mounting Bracket to the wall with a 1/4" X 3" lag screw* and washer, but do not tighten. Use a Spirit Level to ensure that the bracket is horizontally and vertically level. Drill an 1/8" hole for the bottom hole in the center of the bracket and insert a 1/4' X 3" lag screw and washer*. Tighten both lag screws. Drill a 1/8" hole in each of the holes in the four corners of the Mounting Bracket. Insert and tighten a 5/16" X 1 1/2" and washer* in each corner hole **(fig 9)**.

Attention: ***Fill all holes with weather-grade silicon sealer before inserting bolts or screws.***

****Note: The lag screws and washers are not included in the package.***

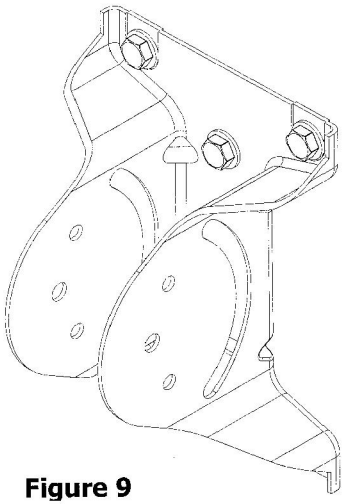


Figure 9

Step 2: To attach the Mount Tube to the Mount Bracket, align the bottom hole at the base of the Mount Tube to the arched slot at the bottom of the Mount Bracket right side flange. Insert a 5/16" X 3/4" UNC Carriage Bolt through the right flange and wall of the Mount Tube. Secure the Carriage Bolt using a 5/16" UNC Serrated Flange Nut inside the Mount Tube. Repeat this procedure to attach the Mount Bracket left flange to the bottom hole at the base of the Mount Tube. Next, swing the Mount Tube up to align the top hole at the base of the Mount Tube with the center hole in the side flange of the Mount Bracket. Pass a 5/16" X 2 1/2" UNC Hex Head Tap Bolt through the hole in the right side flange, the Mount Tube, and the left side flange & secure using a 5/16" UNC Serrated Flange Nut **(fig 10).**

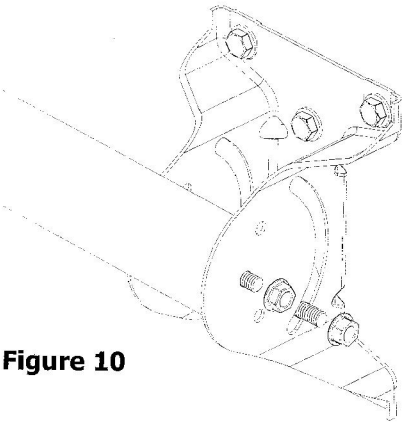


Figure 10

Step 3: Position the Tube Collar around the Mount Tube below the vertical bend. Before attaching the stays to the collar, note that there is an indicator at the end of each stay (F1, F2). The end of the stay with the indicator is the end that fixes to the wall/floor depending on the configuration. Place a Stay on each side of the Tube Collar flanges and align the holes. Pass a 5/16" x 1" UNC Hex Head Tap Bolt through the hole on the Stay on the right, both Tube Collar flange holes, and the hole in the Stay on the left. Secure with a 5/16" UNC Serrated Flange Nut as in **(fig 11).**

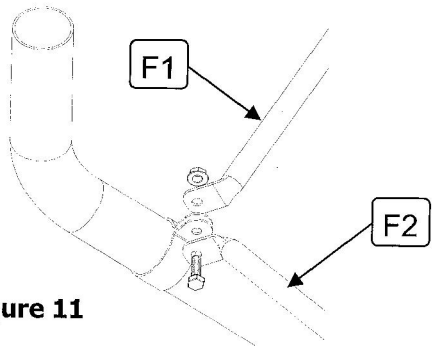


Figure 11

Use a Spirit Level to verify the horizontal and vertical level of the Mount Tube above the vertical bend. Mark the holes at the bottom of the Stays and drill a 1/8" for each. Use a 5/16" x 1 1/2" lag screw and washer* to attach each Stay to the wall. Do this procedure for both horizontal and vertical mounts.

Attention: ***For vertical mounts, fill all holes with weather-grade silicon sealer before inserting bolts or screws*** **(fig 12).** ***For horizontal mounts, fill all holes with the appropriate asphalt-based, synthetic-rubber, or acrylic co-polymer roof sealant*** **(fig 12A).**

Note:** **The lag screws and washers are not included ODU in the package.

Figure 12

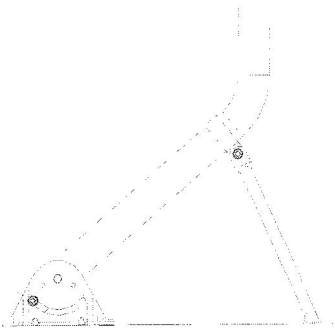


Figure 12 A

Step 4: Taking heed of the safety instructions mentioned at the start of this instruction manual, carry the Antenna pre-assembly to the Mount Tube location. Slide the Tube Canister onto the top of the Mount Tube **(fig 13).** Secure in place using three 5/16" x 1" UNC Carriage Bolts and three 5/16" UNC Serrated Flange Nuts in each of the holes in the Tube Canister flanges, then hand-tighten the Flange Nuts.

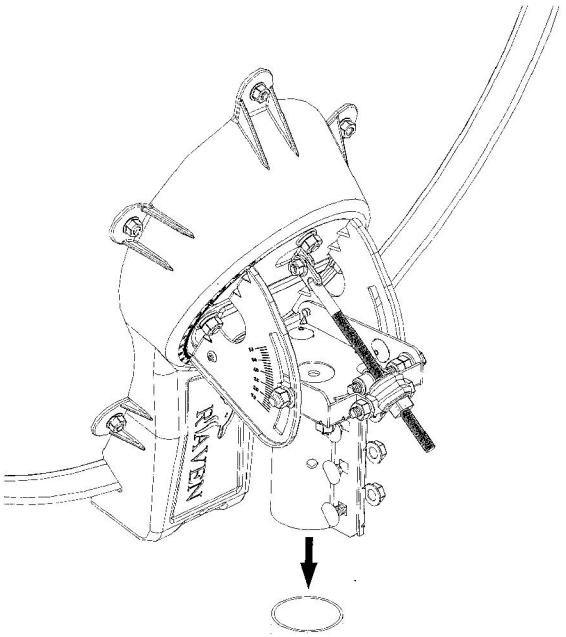


Figure 13

Line of Sight (LOS) Adjustment

The following section describes the processes to adjust the antenna to the correct Line of Sight (LOS). It includes both coarse and fine adjustment of the Azimuth and Elevation settings, along with the skew adjustment process.

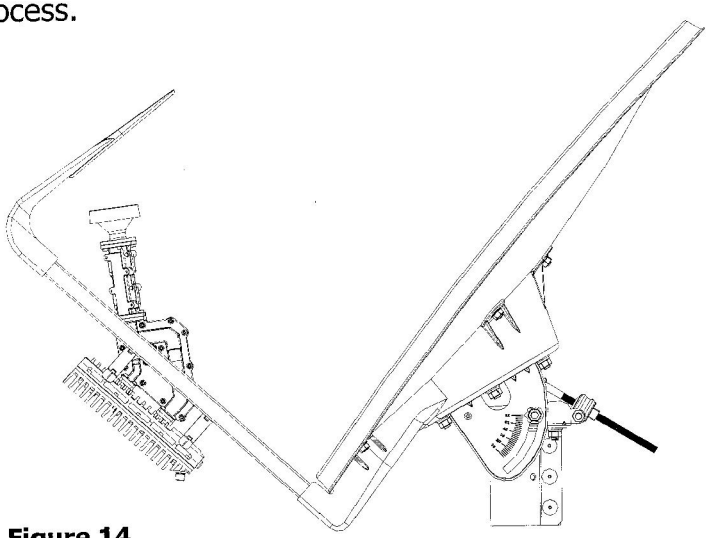


Figure 14

Elevation Course Adjustment: Slightly loosen the 5/16" X 3/4" UNC Carriage Bolts in the arched slots at the bottom sides of the Elevation Bracket, also unfasten the 1/4" x 1/2" UNC Hex Head Tap Bolt fastening the Elevation Rod to the Elevation Bracket. The dish should move freely. Adjust the angle of the dish as close to the desired angle as possible. Use the markings on the side of the Elevation Bracket and the Angle Finder to position the dish **(fig 14).**

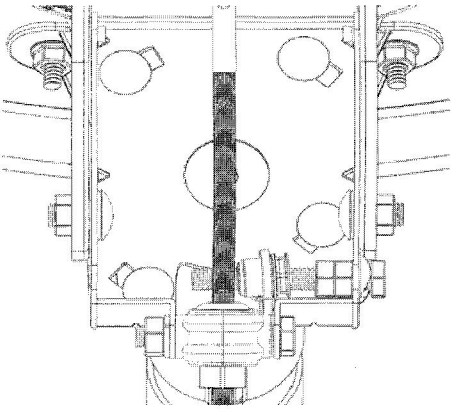


Figure 15

Azimuth Coarse Adjustment: Align the Antenna Arm Assembly to as close to the Azimuth as possible. Secure this position by tightening the three 5/16" serrated flange nuts on the three 5/16" x 3/4" UNC Carriage Bolts in each of the holes in the Tube Canister flanges.

Azimuth Fine Adjustment: To fine adjust the Azimuth slacken the four 5/16" x 3/4" UNC Carriage Bolts in the bottom of the Azimuth Base. Next, turn the 2 1/2" x 5/16" UNC Hex Cap Bolt through the hole on the right side of the Azimuth Base to give you the azimuth angle you require. After verifying the Azimuth with a compass and a meter, lock down the four 5/16" x 3/4" Carriage Bolts in the bottom of the Azimuth Base to 20Nm (177 in.lbf) using the Torque Wrench, tightening opposing corners uniformly **(fig 15).**

Elevation Fine Adjustment: Make final adjustments to the elevation by fastening the fine elevation rod back onto the Elevation Bracket and turning the Elevation Adjuster in the Fine Elevation Assembly. This will raise or lower the Elevation Rod fastened to the Elevation Bracket. Use an Angle Finder and meter to verify the elevation. After achieving the correct elevation, tighten the 5/16" x 3/4" Carriage Bolts in the arched slots at the bottom sides of the Elevation Bracket to 20 (177 in.lbf)Nm to lockdown using the Torque Wrench.

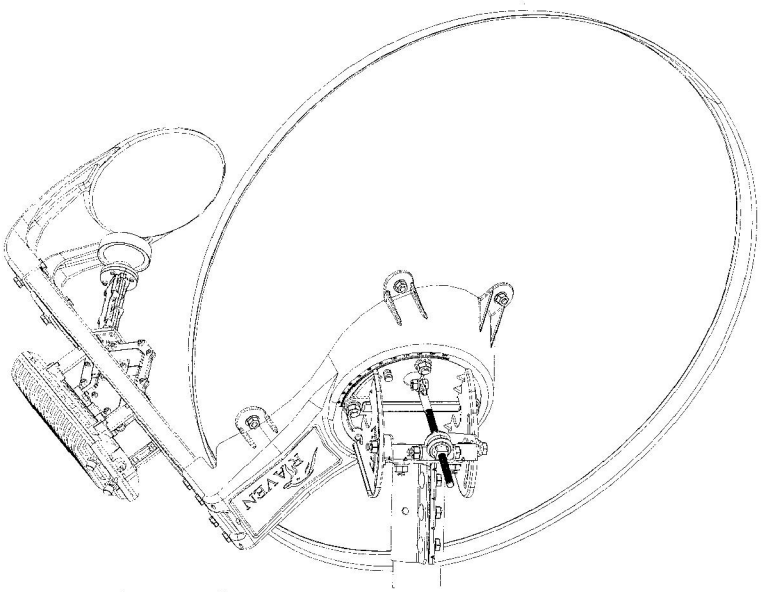


Figure 16

Skew Adjustment: Slightly loosen the four 5/16" x 3/4" UNC Carriage Bolts fastening the Elevation Bracket to the Skew Plate through the Antenna Back Bracket. It should take pressure to move the dish; the dish should move freely. Manually rotate the dish to the required skew using markings on back of Antenna Back Bracket as a guide. Once aligned correctly, use a meter to verify the Skew. Then tighten the four 5/16" x 3/4" Carriage Bolts to 20Nm (177 in.lbf) using the Torque Wrench **(fig 16).**

Recommended Cabling and Grounding

Connect the Transmit Coax RG6 Cable to the left connector on the TRIA, labelled "TX". Connect the Receive Coax RG6 Cable to the right connector on the TRIA, labelled "RX". Connect the Ground Wire under the Ground Screw located on the side of the TRIA **(fig 17).**

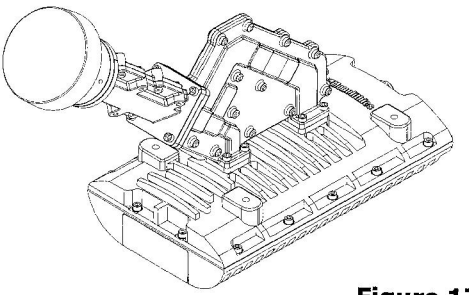


Figure 17

After attaching the coax RG6 Cabling to the TRIA combine the two cables using a small cable-tie, and then attach the combined cables to the Boom arm with a large cable-tie. Using small cable-ties, attach the TX and RX Cables together every 18 inches. Next attach the cables to the Mount Tube right below the vertical bend with a large cable-tie. Run the cables down the Mount Tube to the Mount Bracket maintaining a straight line and attaching them to the Bracket every 18 inches with large cable-ties.

The National Electric Code (NEC) and local code require grounding the Antenna. Grounding also protects system components against static voltage build up and lightning strikes. Ground all systems with a WildBlue Communications approved F-type grounding block and screws* **(fig 18).**

Note: The ODU package does not provide the grounding block.

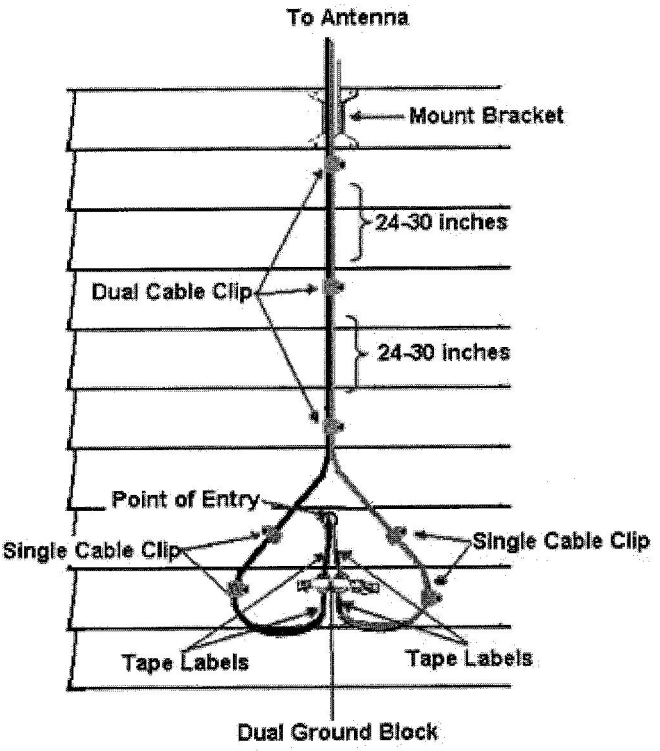


Figure 18

UPGRADES

Available upgrades for WildBlue Elliptical Ka Antenna

- ***Pole Mount Adaptor***
  A pole mount adaptor is available for mounting the system to a galvanized 2 3/8" O.D. pole **(fig 19).**

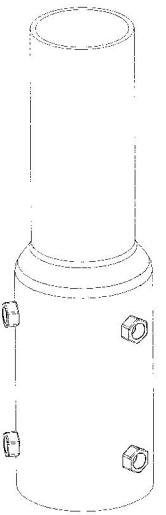


Figure 19

- ***Upgrade Kit to add Ku-band Transceiver***
  A Direct Broadcast System (DBS) Upgrade Kit (DUK)* allows the antenna to receive Ku-band transmissions from either DirecTV or Dish Network.

*Future enhancement.

Appendix I
Az / El Bracket Assembly

Step 1: The ***Elevation Assembly*** consists of the Azimuth Base and Elevation Bracket. These parts are pre-joined at the pivot point **(fig 20).** Ensure that the Azimuth base is free moving around the pivot point.

Insert one 5/16" x 3/4 UNC Carriage Bolt through arched slot in the Elevation Bracket on the side with the scale and secure this bolt with the pointer washer a 5/16" UNC Spring Washer & a 5/16" Hex Nut. Insert a 5/16" x 3/4" UNC Carriage Bolt through the opposite side of the Elevation Bracket & secure using a 5/16" UNC Serrated Flange Nut **(fig 21).**

Figure 20

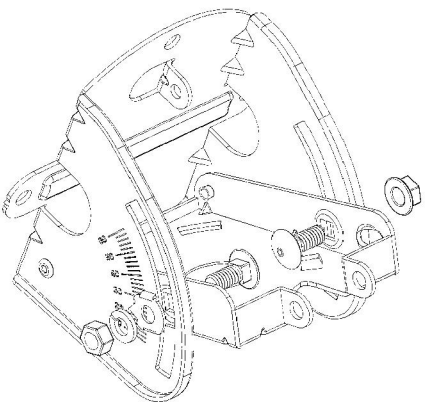


Figure 21

Step 2: The ***Canister Assembly*** consists of the Tube Canister and the Azimuth Plate. Attach the Azimuth Plate to the bottom of the Azimuth Base in the Elevation Assembly **(fig 22).** Fasten the two assemblies together using four 5/16" x 3/4" UNC Carriage Bolts, inserted from the top through the Azimuth Base then through the Azimuth Plate. Secure each bolt using a 5/16 UNC Washer, Spring Washer, and Hex Nut. Again only hand-tighten the nuts at this point.

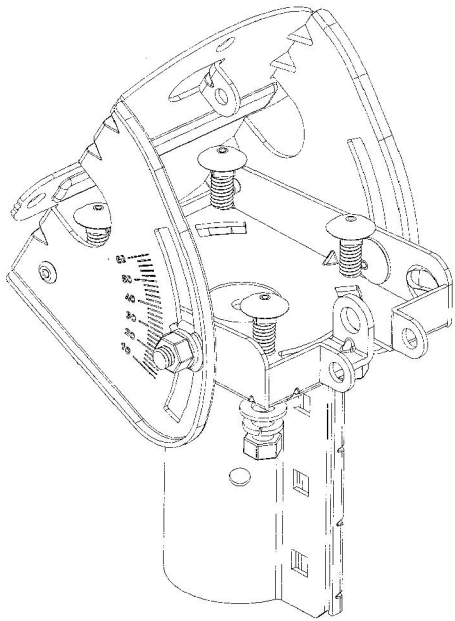


Figure 22

Step 3: Begin construction of the ***Fine Azimuth Adjustment*** by inserting the 5/16" X 2 1/2" UNC Hex Head Tap Bolt through the back hole on the right side Azimuth Base. Next, fasten two 5/16" UNC Hex Nuts & washers on the Tap Bolt from the inside of the base. fasten the Hex Nuts onto the Tap Bolt to about a 1/3 of its length. Fasten the Tap Bolt to the Rivnut on the Tube Canister. Once the Tap Bolt has been fastened through the Rivnut, tighten the two Hex Nuts to each other and to the inside wall of the Azimuth base to create a lock **(fig 23)**.

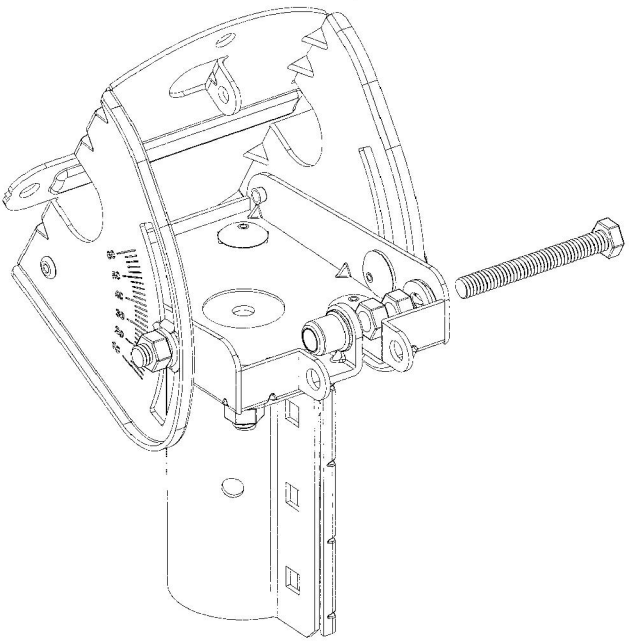
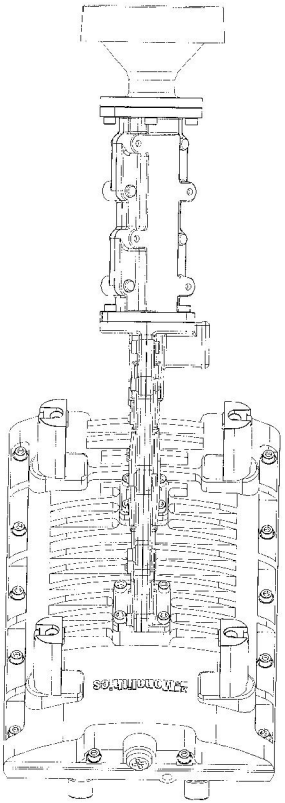
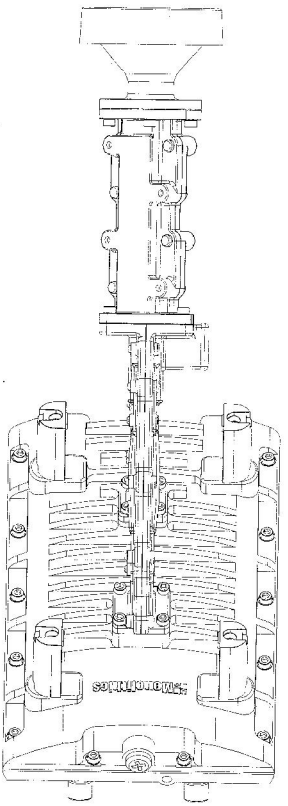


Figure 23

Appendix II
Polarization Configurations



CONFIGURATION #1



CONFIGURATION #2

Configuration #1; Tx RHCP, Rx LHCP
Configuration #2; Tx LHCP, Rx RHCP

Definition of CP used is denoted as looking into the Feed Horn.