

GAP

EAGLE DX ANTENNA

Installation and Assembly Instructions



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WARRANTY

GAP Antenna Products, Inc. Provides a limited warranty on its' products against any defects in material and workmanship for a period of 90 days after date of purchase/shipment. This warranty applies to the original purchaser only. Purchaser should return defective product freight prepaid. GAP reserves the right to repair or replace product at its' discretion. Repaired or replaced product will be shipped freight prepaid within 30 days of customer return. This warranty is provided in lieu of any other warranty expressed or implied. The warranty is void, if the product is subject to misuse, improper installation, accident, neglect, modification, repairs, or act of God.

GAP Antenna Products, Inc. Shall assume no liability for incidental or consequential damages resulting from the purchaser's ownership of its' products.

REPLACEMENT PARTS

Replacement parts are available for any portion of the antenna.
Contact factory for details.

DESIGN BASELINE

GAP Antenna Products, Inc. Reserves the right to incorporate improvements and changes in the design without obligation to update previously manufactured units.



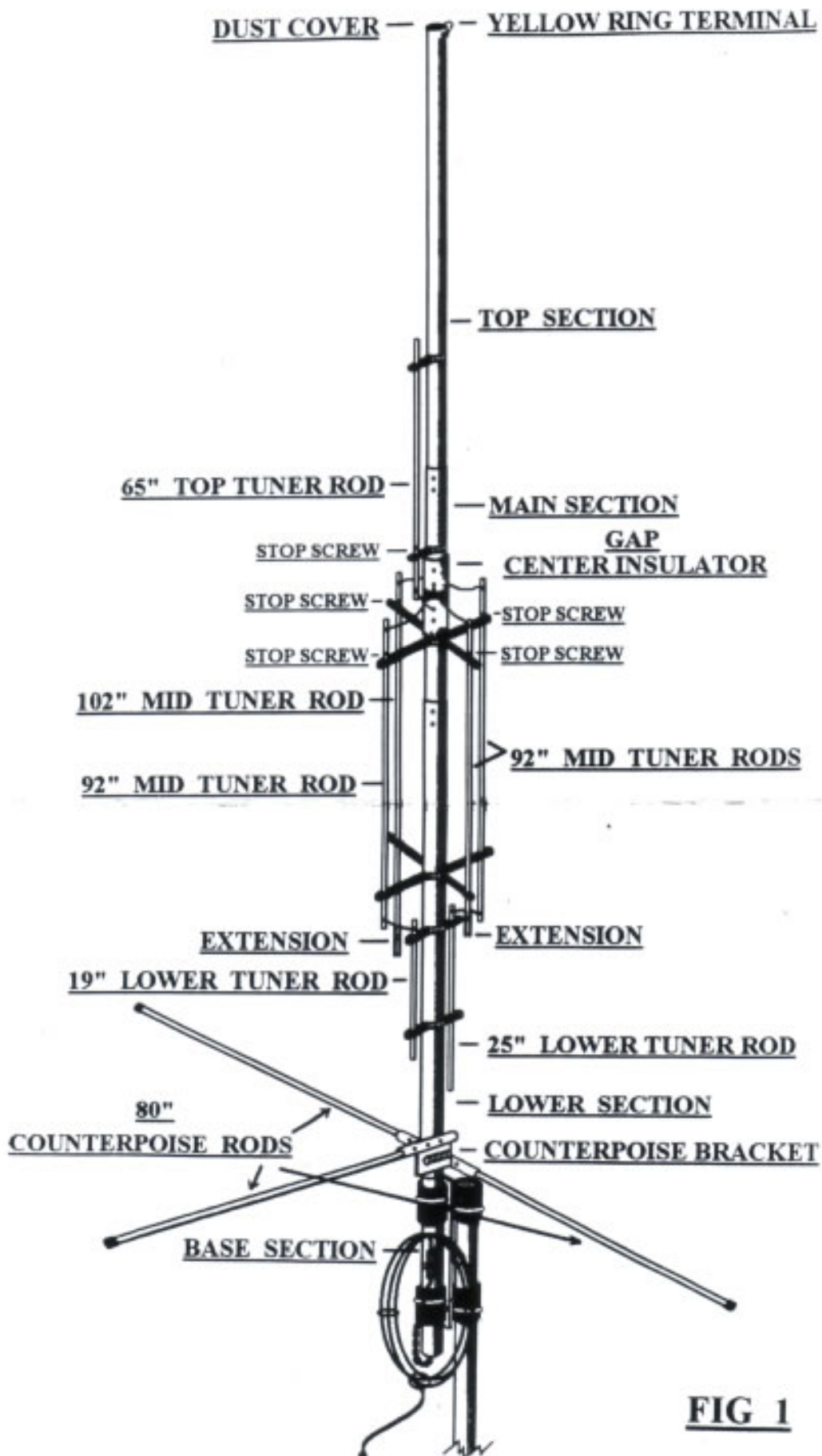
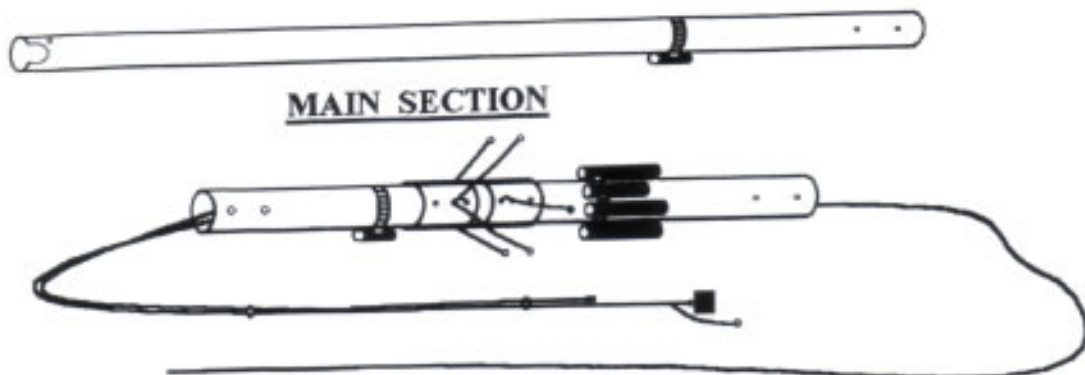


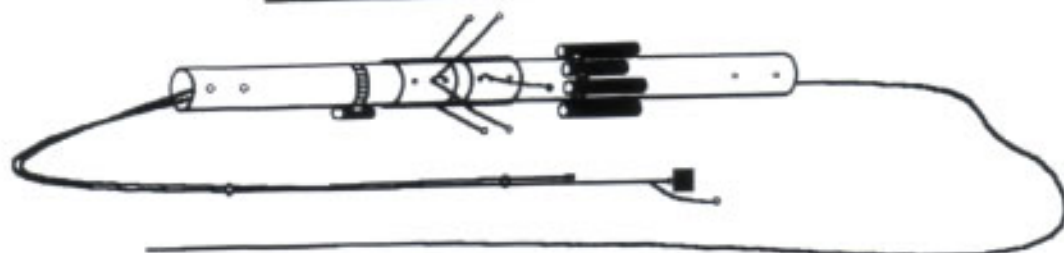
FIG 1

TOP SECTION

FIG 2



MAIN SECTION



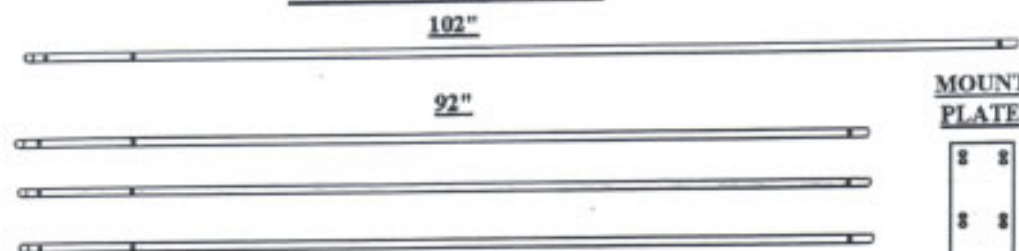
LOWER SECTION



BASE SECTION



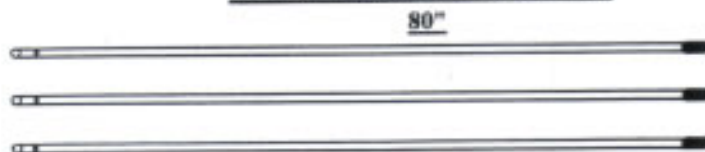
MID TUNER RODS



MOUNT
PLATE



COUNTERPOISE RODS



COUNTERPOISE
BRACKET



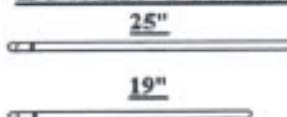
TOP TUNER ROD



U-BOLTS W/NUTS



LOWER TUNER RODS



PVC RINGS



STAINLESS
CLAMPS



TYWRAPS



EXTENSIONS



32
SCREWS
WASHERS



JUMPERS



FERRITE BEADS



PL259
CONNECTOR



DUST
COVER



NUT DRIVER



SAFETY NOTICE

WARNING! POWER LINES CAN KILL YOU

DO NOT ERECT THIS ANTENNA NEAR ANY OVERHEAD WIRES, UNDER ANY CIRCUMSTANCES. READ AND FOLLOW THESE INSTRUCTIONS CAREFULLY

- 1) Do not erect this antenna near any overhead wires. Assume all such wires to be power lines and deadly.
- 2) Do not transport this antenna from an assembly location to the installation site if you must travel near or under overhead wires.
- 3) Request advice from your local power company if power wires are anywhere near the proposed location.
- 4) If the antenna falls, DO NOT try and stop it. Get out of the way.
- 5) If any part of the antenna should touch overhead wiring, DO NOT TOUCH IT OR ATTEMPT TO MOVE IT. Call the power company immediately for help.
- 6) In the event of an accident involving power wiring DO NOT TOUCH THE VICTIM DIRECTLY. Send someone for help.
- 7) Select a site which limits public access to the antenna. During operation the antenna has a high RF potential. If any possibility exists that people or pets could touch the antenna, place a wooden fence around it.
- 8) Choose a calm, dry day to erect the antenna.
- 9) Always enlist the aid of at least one competent person in erecting the antenna.
- 10) Do not use a ladder in the process of erecting your GAP Antenna. A ladder is not needed and could be dangerous.
- 11) Do not connect the coax until the antenna is firmly mounted.

Congratulations on your purchase of the GAP **EAGLE** antenna. You soon will enjoy the ultimate in vertical antenna technology. Your GAP antenna has been designed and manufactured to provide superior performance, and a long trouble free life.

GAP technology produces highly efficient, wide bandwidth performance. As a result, no tuning is required in most amateur installations. This manual is organized to minimize the amount of time necessary to assemble and install your GAP vertical. It is recommended that you follow the instructions and use the figures as a guide.

Before beginning assembly, take a few minutes to read through the site selection chapter and to review the SAFETY notices. Please refer to Figure 1, the EAGLE Antenna, as you proceed with the assembly. Locate the parts from Figure 2.

The EAGLE has been designed to operate efficiently on six bands. The EAGLE will run 1500 PEP on 10m thru 20m, but cannot be run continuously ie Amtor, RTTY at maximum power on 40 meters, with more than 300 watts.

The use of an antenna tuner is not required. Tuners will not improve the performance of the EAGLE, however they may permit a solid state transmitter to put out increased power. Operation of an antenna tuner when the VSWR without the tuner is 2:1 or less is permitted. High power operation outside the specified bands using a tuner can damage the antenna and should not occur.

CHAPTER 1: **SITE CONSIDERATIONS**

SAFETY, nearby structures, buildings, guying

CHAPTER 2: **ANTENNA MOUNTING**

Pole, tower, or chimney

CHAPTER 3: **MAST ASSEMBLY**

Space required, Mast Assembly, Step by Step

CHAPTER 4: **TUNER ROD AND STANDOFF ASSEMBLY**

Top, Mid, Lower and Extensions

CHAPTER 5: **COUNTERPOISE AND MOUNT ASSEMBLY**

CHAPTER 6: **INITIAL TEST**

First operation...a place to record VSWR data

CHAPTER 7: **TIPS AND TROUBLE SHOOTING**

READ THE SAFETY NOTICE ON PAGE 1 BEFORE CONTINUING

1.0 General

Ideally, it is best to locate the EAGLE in a clear area, away from wires, metal buildings, fences and trees. As a practical matter, many amateurs must compromise in locating their antennas. This section contains specific guidelines to assist in making those compromises.

1.1 Site Safety

A) If you have not read the safety notice, do so now. Stay away from power lines, they are life threatening.

B) Choose a site that it is not easily accessible to people or pets.

CONTACT WITH THE ANTENNA IS DANGEROUS AND CAN BE FATAL.

The counterpoise rods and the rest of the EAGLE may be at high RF potential during operation. If it not possible to site the EAGLE to prevent access, then it should be placed high enough such that people cannot reach it or surround it with a fence.

1.2 Nearby Wires and Antennas

A) In general, any vertical antenna can exhibit mutual coupling with any other vertical metal structure or wire if placed within a few wavelengths or the structure approaches resonance at the operating frequency.

B) Try to avoid metal objects which may be within 30' of the proposed GAP installation site. These may include wires, towers, downspouts, screened porches, feedlines from other amateur antennas or TV antennas, metal pipes on your property or adjoining properties. Naturally, if these metal objects are short you can get closer than 30'.

C) Nearby horizontal wires or structures may affect the performance of a vertical antenna, but they are not as likely to, as a vertical structure is.

1.3 Buildings

A) It is best to locate the antenna as far from the home as possible, to minimize interaction with house wiring, and RFI to consumer electronics.

B) Metal walled or roofed buildings can affect antenna operation. If you have no choice, your GAP should be located at a corner of the building, rather than broadside. In any case, the EAGLE should be tested first away from the building. See Section 6.0.

C) Stucco buildings may have metal mesh in their walls and should be viewed as a metal structures, until proven otherwise.

D) Mobile homes or RV's are a special case, which involve individual experimentation. Test the antenna on the ground before attempting installation near or on the RV. Mounting above the roofline is preferred.

1.4 Guying

The EAGLE is designed to withstand substantial winds unguyed. Guys are a form of insurance, however, which we recommend. Four nonconductive guy ropes should be fastened above the center insulator. Use a stainless clamp or optional guy clamp available from GAP. Leave some slack to allow for temperature changes. Guys should be used for roof mounting. Do not rely on a chimney mount or tripod to support the EAGLE, even moderate winds can produce enough force to damage the mount or the chimney.

CHAPTER 2: ANTENNA MOUNTING**2.0 General**

The EAGLE will accommodate a variety of mounting situations, some of which are described below. The preferred mount is a pole mount. It is simple and avoids the hazards of a roof top installation. Electing to roof mount the antenna is solely your decision and extreme caution should be exercised.

If you elect to elevate the antenna, always pre-test the antenna on the ground first. See Section 6.0 Locating a loose connection when the antenna is on top of a 40' mast is not easy!!

2.1 Pole Mounting

The EAGLE is designed to be pole mounted. A mount plate assembly has been provided to attach the EAGLE to a pole of your choice. It is recommended that you select a very heavy gauge steel pipe. The outside diameter of which should be 1.25" with a typical length of 10'. This pole may be attached to the side of a structure ie house or garage for additional support. If you elect to side mount, be certain your pole extends above the roof line to allow clearance for the Counterpoise. Three foot clearance is typical.

If you elect to mount the EAGLE on a pole in the yard, the pole should be mounted in an 18" diameter hole 3 feet deep or more and filled with concrete. It is far easier to erect the antenna with your support pole attached, rather than trying to lift the EAGLE onto your support pipe. Thus your support pole should be such that it is removable from the concrete. To achieve this, procure a 3' length of 1.25" schedule 40 PVC. Make sure it will sleeve over your support pipe, if it is not large enough slit the pipe lengthwise and slide it over your pipe. Cover the slit with tape and place the PVC covered pipe in the 3' hole and fill with concrete. When the concrete has set remove your support pipe. You can now drop your support pipe into the hole you created by your PVC form.

2.2 TOWER MOUNTING

The EAGLE may be mounted to a tower. Do not clamp directly to the tower. Use the Mount Plate Assembly to insulate the EAGLE from the tower itself or the support. The EAGLE must be placed at the top of the tower and not parallel with it. You may experience reduced bandwidth on a band if you tower mount the EAGLE. This is generally a result of the tower exhibiting a resonance for that frequency.

2.3 TRIPOD/CHIMNEY MOUNT

The EAGLE may be mounted in a tripod or to a chimney mount. Use the mount plate assembly to insulate the EAGLE from the tripod or chimney mount.

CAUTION The EAGLE and mount are in excess of 29' tall. Under no circumstances should a tripod or chimney mount exist without guy ropes. Guy the antenna!

3.0 General

Assembly of the GAP EAGLE requires no special tools and a nut driver has been supplied for your convenience. Plastic stand-offs that support the tuner rods are attached to the mast at their approximate proper positions to simplify assembly. Do not move these at this time. Before starting assembly, check the parts in the shipping container against the pictorial parts list in figure 2 to establish all parts are present. Next review the assembled Eagle in Figure 1. As you assemble your EAGLE, refer to this drawing.

NOTE: That in the assembly instructions, when a single hole is identified on a tuner rod it is thru drilled. Thru drilled holes provide you with a backup should you accidentally strip a hole by over tightening. We found that telling you to insert a screw and washer gets repetitive, therefore whenever a screw is called for include a washer as well. When attaching jumpers and transitions, the washer should be placed between the ring terminal and the tube. Not between the screw head and ring terminal. When we refer to the "GAP" we are referencing the center insulator with the yellow band.

3.1 Space Required

To get started with the assembly, you will need a flat space approximately 30' in length. A driveway or patio surface is ideal. The key to an easy assembly is room to move, a surface which allows you to find the screws you drop and careful attention to the directions. Extra screws have been provided because we know how lawns like to eat screws!

3.2 Mast Assembly See Fig 1 & 3

Standoffs are positioned on the various mast sections at their approximate final positions. Do not loosen the clamps.

A) Locate the Main Section. Place the Main Section on a flat surface. Stretch out the coax that protrudes from each end. **NOTE:** The coax going to the top of the Eagle is actually two pieces, these are tywrapped together and should be treated as one unit. This lead has a CAP unit attached.

B) Locate the Top Section. Place the end without the notch over the tywrapped coax and slide.

C) Slide the Top Section into the Main Section. Gently push the Top Section into the Main Section beyond the matching holes, until the yellow ring terminal is exposed.

D) While holding the yellow ring terminal, slide the Top Section back out and align it's four small screw holes with the four large holes in the Main Mast Section. Insert 4 screws and tighten securely.

E) Place the yellow ring terminal at the top of the antenna through the notch and over the nearby drill hole. Insert a screw and tighten securely.

WARNING: Make sure the potted CAP unit inside the Top Section is pushed down below the screw, so it does not crack the CAP unit when you insert it.

F) Locate the black dust cover and place it over the Top Section.

G) Locate the Lower Section. It has 8 standoffs attached to one end. Slide the end furthest from the 8 standoffs over the coax tail protruding from the Main Section.

H) Align the big holes on the Lower Section with the little holes in the Main Section. Insert 4 screws and tighten. Leave the standoffs as is for the moment.

I) Locate the Base Section. It is a double wall section for added strength.

J) Slide the end that is stepped over the coax tail and into the Lower Section. Align the 4 big holes on the Lower with the 4 little holes in the Base Section. Insert 4 screws and tighten.

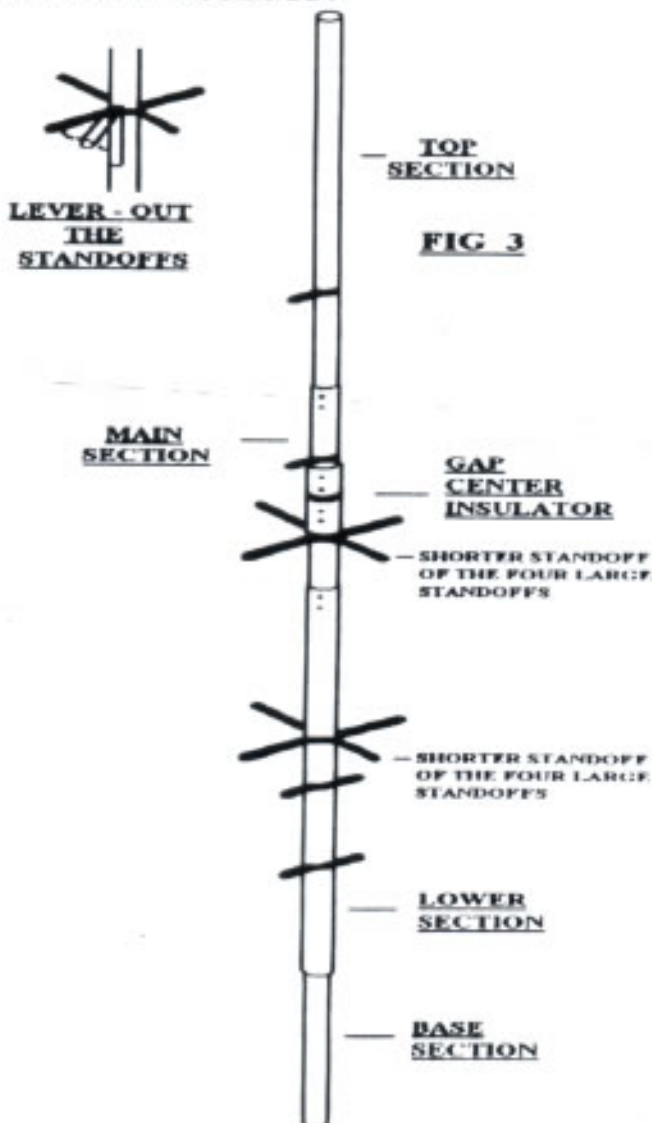
CHAPTER 4: TUNER ROD AND STANDOFF ASSEMBLY

4.0 GENERAL

There are three 92" and one 102" Mid tuner rods, two Lower tuner rods 25" and 19" and one 65" Top tuner rod. Two extensions complete the tuner rod package. The standoffs have been positioned at the factory for your convenience. When orienting these standoffs you should not have to move them along the mast, but simply twist them in their shipped position. If you should slightly shift their relative position along the mast don't despair. Slight movement is not critical.

A) Locate the two short standoffs on the Main Section. Loosen the clamp holding these standoffs and lever them out so they are now perpendicular to the mast. Snug the clamp. Slide the 65" Top tuner rod thru these standoffs so the screw holes in the tuner rod are closest to the center insulator. Adjust the standoffs so the tuner rod is parallel to the mast, now tighten the clamps.

B) Locate the drill hole 10" from the end of this tuner



rod. Position this hole between the two standoffs and insert a screw and tighten. This is a stop screw

C) Slide the tuner rod toward the GAP. Locate the lower transition wire. With a screw, attach the ring terminal of the lower transition to the remaining hole on the Top tuner rod and tighten.

D) Locate the four standoffs on the Main Section just below the GAP. Loosen their clamp. Form these four into a cross, perpendicular and immediately below the GAP. Rotate this assembly so the top tuner rod aligns with the middle of one of the V's this assembly creates. Tighten the clamp securely.

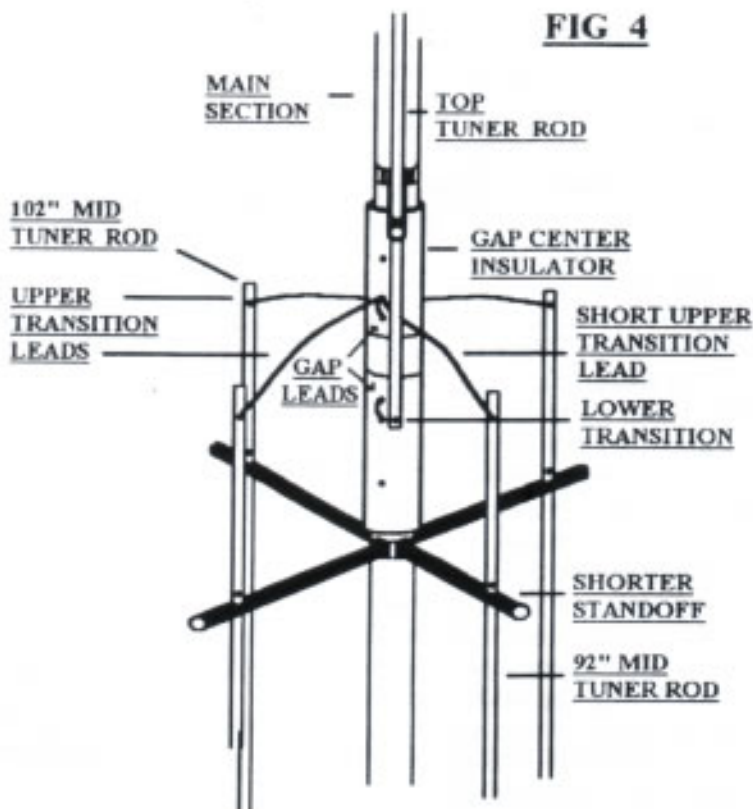
E) Locate the four standoff assembly on the Lower Section. Form these four into a cross perpendicular to the mast. Tighten the clamp **lightly**. Now locate the shortest standoff on the upper cross assembly and noting it's position

rotate the lower cross assembly until it's shortest standoff is in line with the one on the upper unit. Tighten the clamp.

F) Take the three 92" and the one 102" Mid tuner rods and insert a screw in the hole 10" from the end of each rod and tighten. No matter which end you counted from, this could also be thought of as the second hole. This is a stop screw.

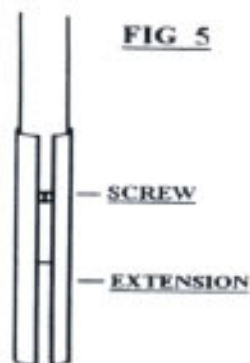
G) Slide a 92" rod down thru each standoff in the top cross, starting with the end opposite the screw just inserted and then down into the corresponding bottom standoffs, utilizing the shortest standoff of the four first. Slide the 102" Mid tuner rod into the standoff directly opposite the short standoff holding the 92" Mid tuner, using the same procedure outlined above. Each rod should be parallel to the Main mast. You may have to adjust the clamp controlling the lower cross unit to achieve parallel rods. Each stop screw should rest on a top standoff.

H) There are four yellow transition wires at the GAP, one shorter than the other three. Attach the ring terminal from each transition with a screw to the holes at the end of the mid tuners and tighten. These holes are closest



to the stop screw just installed. The shortest transition wire attaches to the 92" tuner rod on the shorter standoff in the same fashion. All wires should be loose. If you find a wire is taut it may be necessary to rotate the two cross units to relieve any tension on the transition wires.

I) Locate the two slotted extensions. Slide one on to the bottom of the 102" Mid tuner rod. Rotate the extender until the hole in the Mid tuner rod lines up with the slot in the extender. Insert a screw into this hole and slot. Position this extension so the bottom of the Mid tuner rod is in the middle of the slot. Tighten the screw. See figure 5.



J) Locate the remaining extender and slide it over the end of the Mid tuner rod opposite the tuner rod just installed. Align the slot in the extender with the hole on the bottom of the tuner rod and secure as in I).

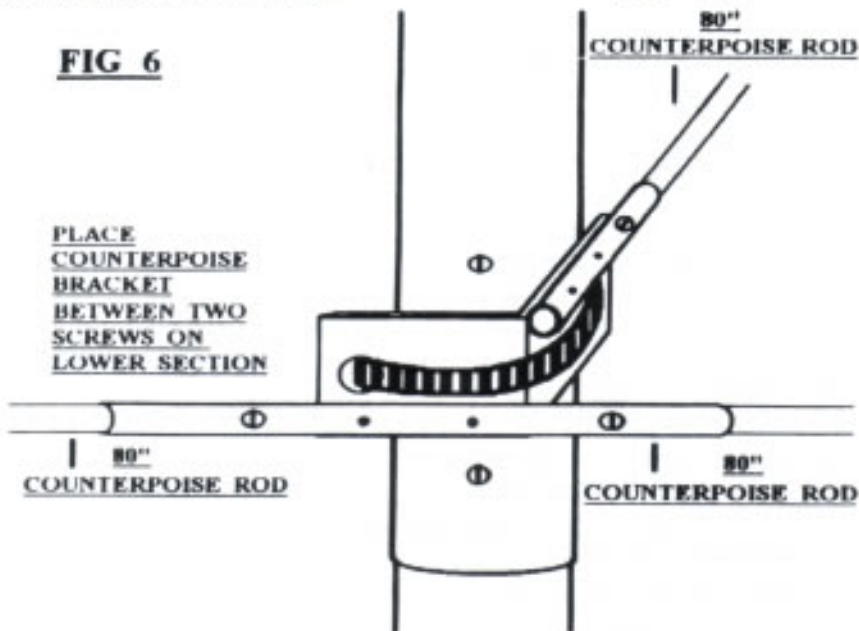
K) Loosen the clamp on the top short pair of standoffs on the Lower section. Lever this pair perpendicular to the mast and rotate them until they line up with the longer standoffs holding the Mid tuner rods without the extenders.

L) Take the bottom pair of short standoffs on the Lower section and loosen each clamp and orient these so they are in line with the short pair above it. Tighten the clamps.

M) Slide the shortest 19" Lower tuner rod through one of the short sets of standoffs so the drill hole is closest to the GAP or towards the top of the antenna. Locate a black jumper and attach one end to the top of the short tuner rod with a screw and tighten.

N) Slide the longer, 25", Lower tuner rod thru the remaining short standoffs, again, so the screw hole is closest to the GAP. Take the remaining black jumper and attach it to the top of this rod with a screw and tighten.

O) Take the other end of each black jumper and attach it to the bottom of Mid Tuner rod directly above with a screw and tighten. These jumpers should be loose. If they are taut, you can raise or lower the position of the clamp holding the top pair of short standoffs to remove any tension. Proper positioning can be achieved by making sure the bottom of the two Mid tuner rods are in the same plane as the tops of your Lower tuner rods.

FIG 6**5.0 GENERAL**

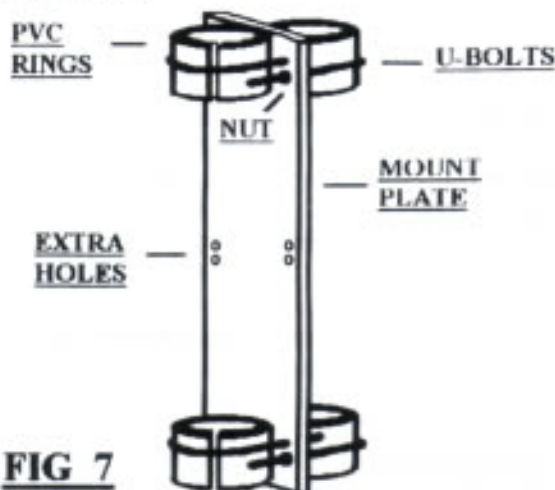
The Counterpoise assembly includes a Counterpoise support bracket and 3 80" rods with yellow end caps. The Counterpoise replaces the conventional radials of a ground mounted vertical.

5.1 Counterpoise Bracket Assembly see figure 6.

A) Locate the Counterpoise bracket. Undo the stainless clamp and place it on the assembled Counterpoise bracket. Place the bracket against the Lower Section in between the two sets of screws at the base.

B) Reconnect the clamp and tighten securely

It is recommended that the Counterpoise rods be inserted after the EAGLE has been installed in it's final position. RAISING the antenna with the rods installed is cumbersome and can damage the antenna. The following section is easier to complete after the antenna has been mounted. Check section 6.0 before continuing.

**FIG 7**

- A) Locate the 3"x12" aluminum plate, the four U-bolts and eight nuts.
- B) Insert the U-bolts into the plate as shown in figure 7
- C) Finger tighten the nuts on the ends of all the U-bolts.
- D) Locate the four collar insulators. Place each under a U- bolt.
- E) Using a 7/16" wrench tighten the U-bolts until the collars are just held in place.
- F) Take this assembled unit and slide it over the base of the antenna. It should slide freely. If not, the U bolts are overtightened and need to be loosened.
- G) Continue to slide this unit up the base, until the collar on the first unit butts against the lower portion of the antenna. Tighten the nuts securely on the top U-bolt. See Fig 1
- H) Now tighten the nuts on the lower U-bolt that holds the Lower section to the mount plate.
- I) Locate your 1 1/4" mast. Carefully slide your mast thru the 2 vacant insulating collars until your mast pipe is flush with the top of the mount plate assembly. Tighten the nuts on these remaining U-bolts with a 7/16" wrench.
- J) Now with the help of at least one other person walk the antenna up and drop it into the mount described in section 2.1

5.5 COAX TAIL

- A) Take the six ferrite beads and slide them over the coax tail. Locate the PL259 connector with adapter and attach the connector to the coax. See the ARRL Handbook if you are unsure of the procedure.
- B) Locate your feedline and it's PL259 connector. Obtain a PL258 (female to female) adapter. Screw the Eagle PL259 into one side of the PL258 adapter and your feedline into the other side.
- C) Locate the stainless clamp provided. Place the dual PL259's parallel to the Eagle base between the PVC insulator rings and secure to the Eagle base with the stainless clamp. Tighten the clamp. see fig 1

- D) Using your feedline form a coil 6" in diameter of 4 turns. Use 3 tywraps provided to secure the coil.
- E) If properly connected, an ohm meter will read "open" when placed from centerpin to shell on your PL259 connector.
- F) Take the three 80" counterpoise rods with the yellow end caps. Insert one into the ends of each of the counterpoise support tubes found on the counterpoise bracket. Align the hole at the end of the counterpoise rod with the hole in the counterpoise support tube insert a screw and tighten.

6.0 PRETEST PROCEDURE

It is always best to test the Eagle at ground level if you elect to mount the antenna in a manner than otherwise previously outlined. Pretesting is not difficult and may save time and effort in the total process. This is particularly true if the antenna is to be significantly elevated.

- A) Locate an open space.
- B) Obtain an 1 1/4" pipe 5' long.
- C) Attach this pipe to the Eagle see section 5.4.
- D) Obtain 3 lengths of rope 25-30' long, to use as temporary guys.
- E) Attach ropes just above the GAP.
- F) Insert a screw driver or small diameter tube in the ground.
- G) With help raise the antenna until it is vertical.
- H) Place your 5' pipe over the screwdriver or tube, this will keep the base in place.
- I) Secure the temporary guy ropes
- J) Complete the Coax Tail and counterpoise assembly. For this test it is not necessary to put screws into the Counterpoise rods.

6.1 GENERAL

A ham band transceiver and SWR meter are required for these tests. It is recommended that you use the minimum necessary power for the measurement. If possible, use an SWR bridge separate from that provided in your transceiver. Using a pencil, record your data in the space provided on the following page.

A) If the EAGLE has been assembled properly it will yield VSWR under 2:1 for the specified bands. Using minimal power, determine the resonate frequency on 40 meters.

Minimum VSWR

2:1 Hi frequency

2:1 Low frequency

D) 20 meters

14.00

14.175

14.350

E) 17 meters

18.068

18.118

18.168

F) 15 meters

21.00

21.225

21.450

G) 12 meters

24.890

24.990

H) 10 meters

28.00

28.50

29.00

7.0 GENERAL

The EAGLE has been designed to operate on the 6 bands specified. Operation outside the specified bands may damage the antenna.

Use of an antenna tuner is not required nor recommended. Tuners will not improve the performance of the antenna, although they may permit a solid state transmitter to put out more power.

Operation of the antenna using a tuner on any frequency where the VSWR exceeds 2:1 may damage the antenna. Use when VSWR is less than 2:1 is acceptable.

7.1 MALFUNCTION

A) If all your standing waves are high, double check the PL259 connector at the base of the antenna and make sure it is open from center pin to shield.

B) If only a couple of bands are high eliminate the following possibilities;

1) Bad coaxial feedline. If the coax has been in use for some time, it may be contaminated. Place a 50 ohm dummy load at the far end of your feedline, in place of the antenna. Any indication of varying VSWR or a standing wave greater than 1:1 suggest defective coax.

2) Mutual coupling with nearby vertical metal objects may detune the EAGLE. Check to see if any of the items suggested in section 1.2 & 1.3 apply.

3) Transceivers with built in SWR bridges may not correctly indicate when their power reduction circuits take over. Retest with a separate VSWR meter.

4) The transceiver or transmitter may be emitting a spurious signal in addition to the desired signal. Retest using the lowest possible power level. If possible try another rig.

If you are unable to solve the problem, contact the factory for assistance. Please have section 6.2 filled in and handy when you call. We do not charge for assistance and our phone number is (772) 571-9922.