

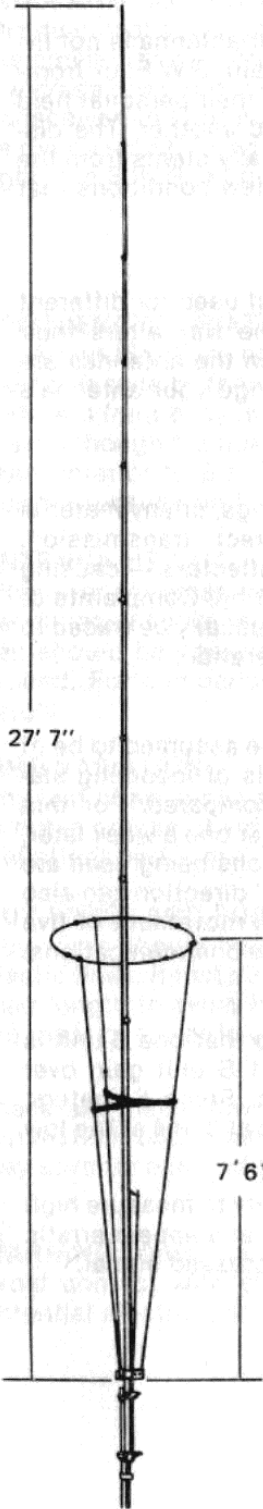
# MODEL AV-174

## SIGMA IV ANTENNA

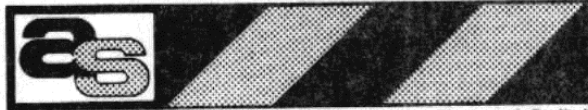
**YOU, YOUR ANTENNA AND SAFETY**

### **WARNING**

**INSTALLATION OF THIS PRODUCT  
NEAR POWER LINES IS DANGEROUS  
FOR YOUR SAFETY, FOLLOW THE  
INSTALLATION DIRECTIONS**



**avanti antennas**



"Stripes of Quality"

**the antenna specialists co.**  
a member of The Allen Group Inc.

12435 Euclid Avenue · Cleveland, Ohio 44106 · 216 791-7878

## **FACTS YOU SHOULD KNOW ABOUT CB BASE ANTENNAS**

Occasionally users are heard to remark that a particular antenna is not living up to the advertised performance figures such as gain, S.W.R. or front-to-back ratio. These statements are usually founded on their personal field tests based on comparisons between one antenna and another. The disparity between the tests of the user and the factory usually stems from the conditions under which the tests were run. Here are a few conditions that can affect performance.

### **EFFECT OF OTHER ANTENNAS**

When two antennas are mounted near each other (even if used for different frequencies), a coupling usually results which in some way alters their operation. This coupling is even more pronounced when the antennas are mounted less than one wavelength apart and may change your antenna's performance in some way.

### **THE EFFECT OF METAL STRUCTURES**

Not only antennas, but water towers, power lines, buildings, or any material of a conductive nature has the ability to mis-direct transmission. Sometimes these obstacles may act as directors or as reflectors — causing the signal to increase or decrease in the intended direction. Complaints of poor front-to-back ratio or lower than expected gain can usually be traced to this above circumstance — especially in beam-type operation.

### **SIGNAL INTENSITY**

The signal strength of a transmitting station can never be assumed to be of the same strength as in previous transmissions. Signals of incoming stations should be recalibrated to the antennas being compared. For this reason, you cannot take down one antenna, put up another one a week later, and expect to make accurate measurements. If the stations being used are using beam type antennas, a slight change in the beams' direction can also be critical. Contacts with mobiles are even less valid. A movement of five feet sometimes makes measureable differences in mobile communications.

### **S METER CALIBRATION**

Depending upon the CB set, an S meter is calibrated so that one S unit is equal to 6 dB. Therefore, an antenna responsible for 1 S unit gain over another has also about 6 dB over that other antenna. Some S meters, however, are calibrated at only 3 dB per S unit and others at 3 or 4 at the low end, and 6 or 7 at the top of the scale.

Another problem encountered with S meters is the inability to measure high strength inputs. Some bounce back at a powerful signal and appear erratic in operation even reading lower on the scale with an increased signal.

### **COAX AND CONNECTORS**

The quality of a coax, connectors and especially the soldering of the coax to the connector can affect S.W.R. and gain. An unsuspecting user may buy a low grade coax and lose 2 or 3 dB after paying good money for an expensive transceiver and antenna. A quick check for good coax and connectors can be run by substituting a dummy load on the antenna end of the coax. If all is right, the S.W.R. with the dummy load should be 1 to 1 match.

### **FREQUENCY VARIATIONS**

Mr. A and Mr. B are neighbors and they are comparing the performance of their antennas by their ability to transmit to Mr. C about 20 to 30 miles away. If Mr. A's frequency is slightly higher, he might show a weaker signal to Mr. C even though his operation has more power. This would make A's antenna seem inferior to B's. This problem can be eliminated by Mr. C's having a tunable receiver on his transceiver to match A's variation.

### **ANTENNA HEIGHT**

Whenever antennas are being compared, they should be installed at the proper distance above the ground and preferably in an open field. Ideally antennas should be one wave length (36' at CB frequency) or more above the ground. For comparison testing always install test antennas at the same height.

### **TIME VARIATION**

Any test of antennas should be performed with a time variation of about 15 minutes or less or variations due to tropospheric shifts and other changes will affect performance.

### **GUY WIRES AND SUPPORTING STRUCTURES**

Guy wires should be of the non-mettalic type using ski tow rope or other plastic lines. If metallic, they should be broken up at uneven intervals along their length to avoid interference and possible high S.W.R. In many cases, the mast or tower is used as a radiating element.

These are just a few of the important variations to consider in antenna installation; understanding them will certainly be to the user's benefit and may save time in finding a trouble source.

**WARNING:** Great care should be exercised in installing any antenna to avoid contact with electrical wires. Assume any overhead lines to be a potential electrocution hazard!

## SIGMA IV — AV-174 REPLACEMENT PARTS LIST

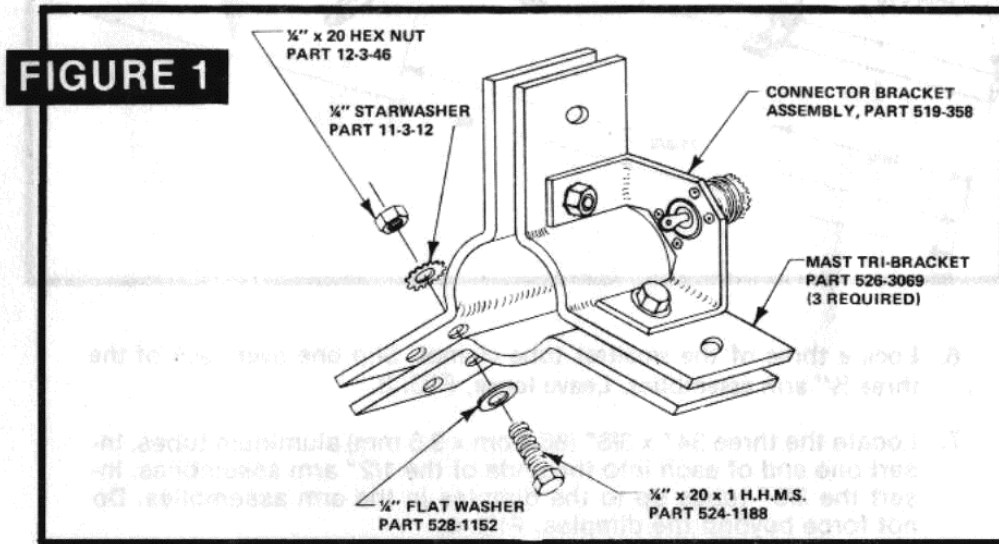
| PART #   | QTY. | DESCRIPTION                                      |
|----------|------|--|
| 526-3069 | 3    | 1/3 of Tri bracket (3 required for full bracket) |
| 519-358  | 1    | Connector Bracket Assembly                       |
| 520-3074 | 2    | Gamma Bracket (2 required)                       |
| 519-360  | 1    | Gamma Match Assembly                             |
| 503-3080 | 4    | Loop Section — 3/8" Diameter                     |
| 520-2556 | 4    | 3/4" High Loop Clamp                             |
| 520-3138 | 3    | 1-1/8" High Spreader Clamp                       |
| 506-1783 | 2    | 5/16" "U" Bolt                                   |
| 526-2541 | 2    | "H" Bracket                                      |
| 520-2540 | 2    | Bar Clamps                                       |
| 509-1010 | 3    | 3/8" Plastic Cap                                 |
| 509-1519 | 1    | 1/2" Plastic Cap                                 |
| 20-33-17 | 4    | 5/8" Hose Clamp                                  |
| 20-33-16 | 1    | 3/4" Hose Clamp                                  |
| 20-33-20 | 2    | 1" Hose Clamp                                    |
| 20-33-19 | 2    | 1-1/4" Hose Clamps                               |
| 20-33-18 | 2    | 1-1/2" Hose Clamps                               |
| 519-359  | 3    | 1/2" Arm Assembly                                |
| 503-9154 | 3    | 3/8 x 34" Alum. Tube                             |
| 503-9156 | 1    | 1/2 x 45" Alum. Tube                             |
| 503-1749 | 1    | 5/8 x 36" Alum. Tube                             |
| 503-3084 | 1    | 3/4 x 30" Alum. Tube                             |
| 503-3083 | 1    | 7/8 x 30" Alum. Tube                             |
| 503-1524 | 1    | 1" x 36" Alum. Tube                              |
| 503-1523 | 1    | 1-1/8" x 36" Alum. Tube                          |
| 503-3078 | 1    | 1-1/4" x 36" Alum. Tube                          |
| 503-3082 | 1    | 1-3/8" x 35" Alum. Tube                          |
| 519-362  | 1    | 1-1/2" x 88" Alum. Tube                          |
| 511-1156 | 4    | 5/16" Star washer                                |
| 512-1092 | 4    | 5/16" x 18 Hex Nut                               |
| 524-1188 | 6    | 1/4-20 x 1" Hex Head Bolt                        |
| 528-1152 | 6    | 1/4" Flatwasher                                  |
| 11-3-12  | 6    | 1/4" Starwasher                                  |
| 12-3-46  | 6    | 1/4" Hex Nut                                     |
| 24-3-87  | 7    | 10-32 x 1/2" Screw                               |
| 512-1099 | 12   | 10-32 Square Nut                                 |
| 11-3-29  | 2    | #10 Starwasher                                   |
| 20-33-15 | 1    | Hose Clamp                                       |
| 522-3097 | 1    | Cardboard Spacer                                 |
| 524-1196 | 5    | 10-32 x 3/4" Screw                               |
| 519-399  | 3    | Spreader Assembly                                |

# HOW TO ASSEMBLE

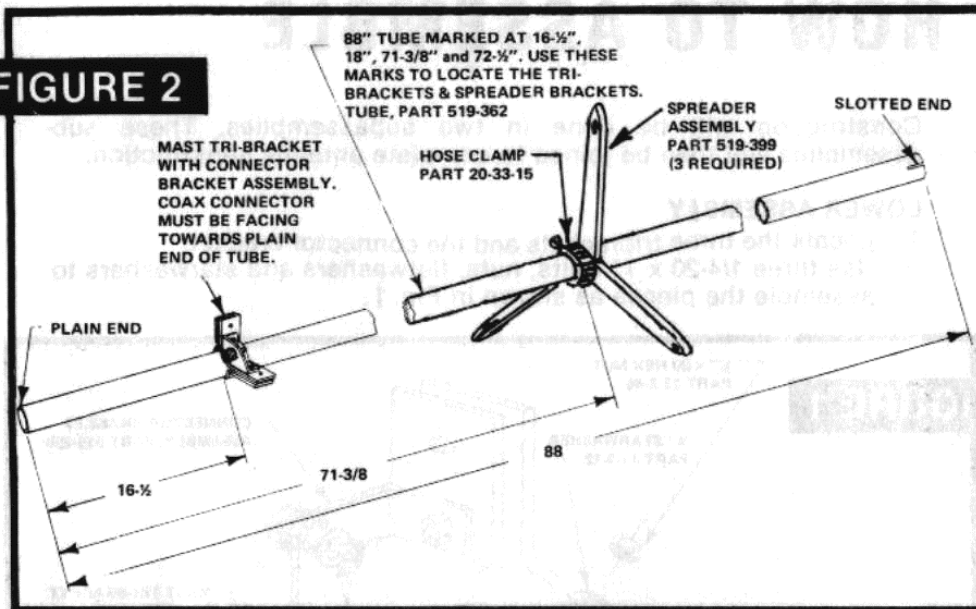
Construction will be done in two subassemblies. These subassemblies will then be joined to complete antenna construction.

## LOWER ASSEMBLY

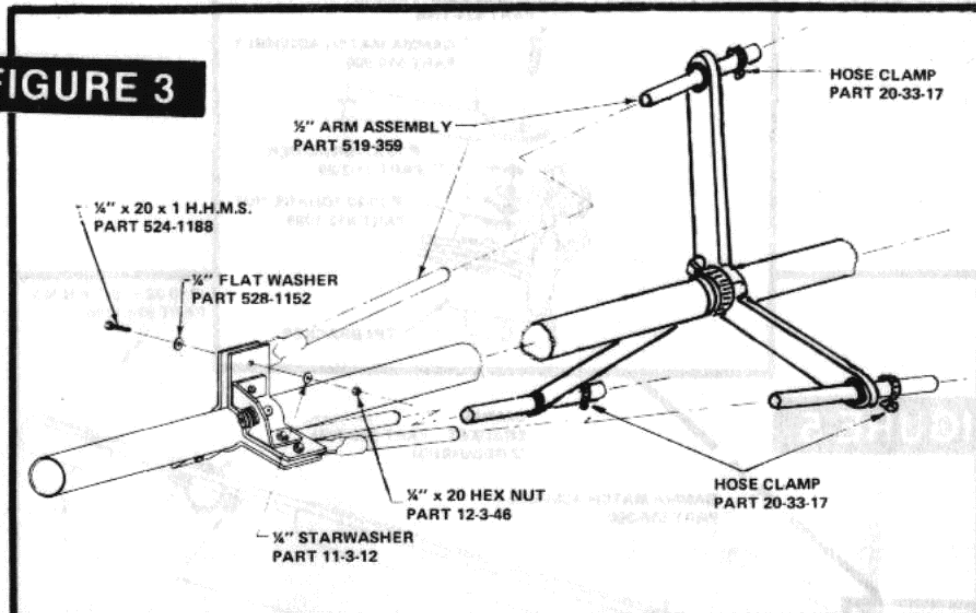
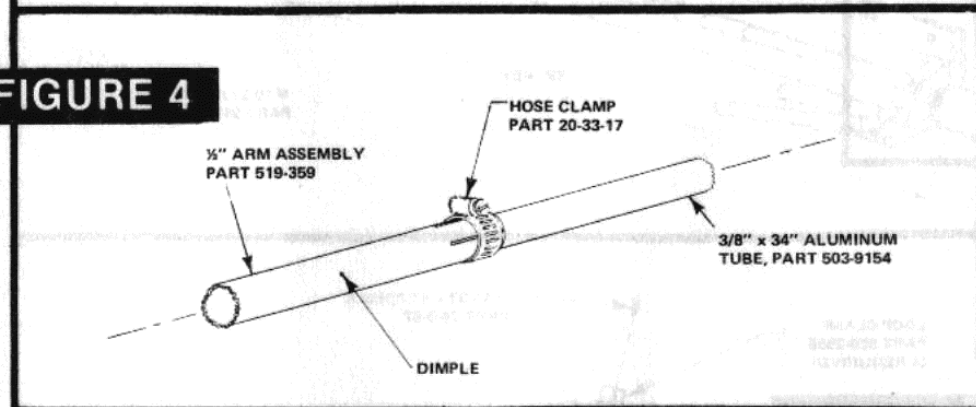
1. Locate the three tribrackets and the connector bracket. Use three 1/4-20 x 1" bolts, nuts, flatwashers and starwashers to assemble the pieces as shown in Fig. 1.



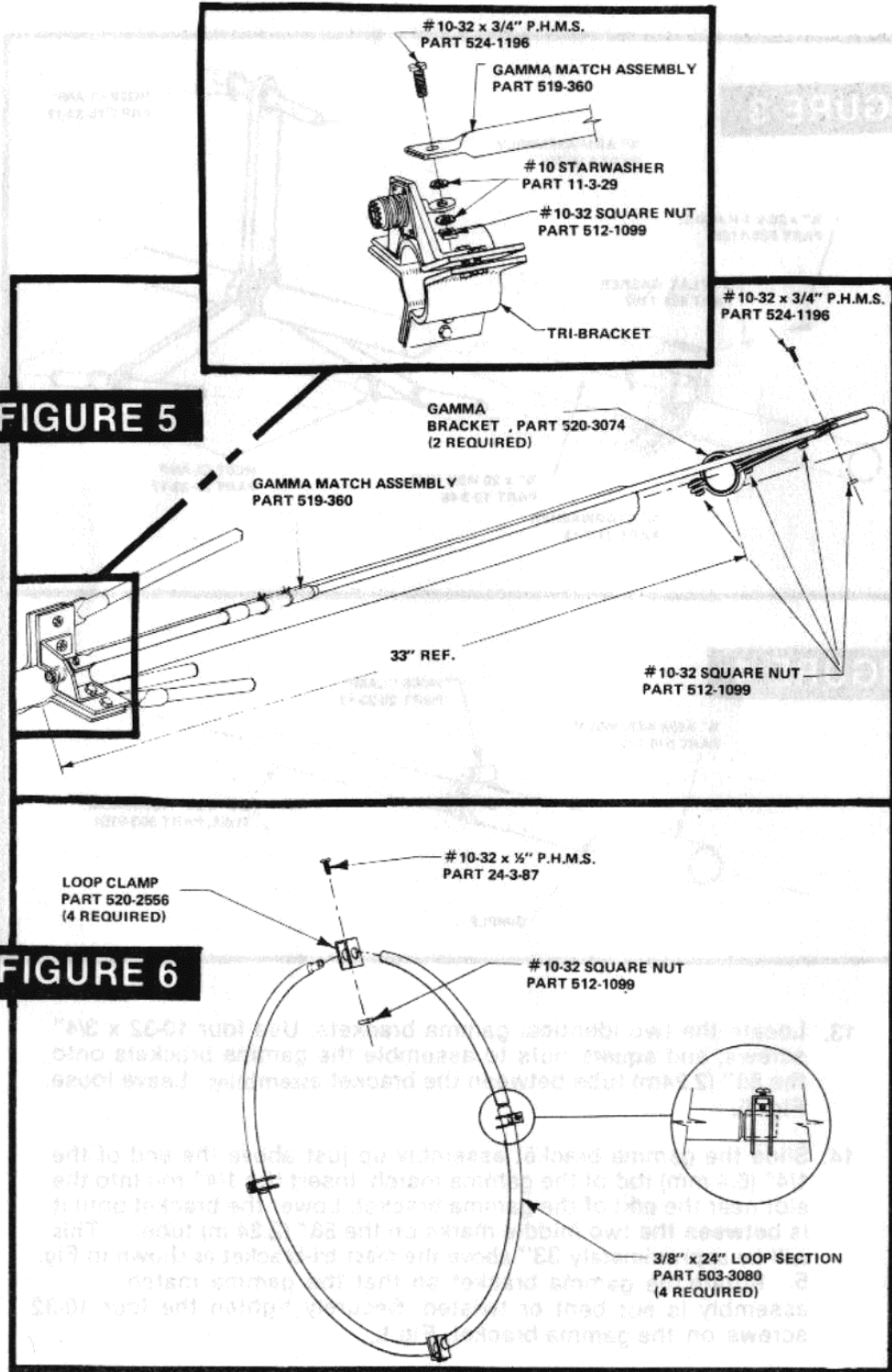
2. Locate the 88" x 1-1/2" (2.24 m x 3.8 cm) aluminum tube. Slide the tribracket assembly **with the connector bracket** over the plain end. The threaded end of the connector should point towards plain end of tube as shown in Fig. 3. Position the bracket **between** the set of marks nearest the plain end. Tighten the hardware just enough to hold the bracket in position.
3. Locate the 3 black Spreader Brackets along with the 2" hose clamp, shown in FIG. 2.
4. Position this assembly between the two marks nearest the slotted end of the tube. Secure spreader brackets with hose clamp. Tighten the clamp just enough to hold the assembly in position. Rotate the assembly so that the "ears" line up with the "ears" of the lower tribracket.
5. Locate three identical 60" X 1/2" (1.52 MX 1.27 CM) arm assemblies with one end flattened. FIG. 3. Place one arm assembly through the hole on the spreader bracket, making sure the rubber grommet stays in place and sandwich the flattened end between the "ears" on the lower tribracket assembly. Align the hole in the arm assembly with the holes in the "ear". Attach with a 1/4-20X1" bolt and nut. Use a flatwasher under the head of the bolt and a starwasher under each nut. Leave loose. Repeat for the remaining two arm assemblies. Tighten hose clamp and all tribracket nuts and bolts.

**FIGURE 2**

6. Locate three of the smallest tube clamps. Slip one over each of the three 1/2" arm assemblies. Leave loose, FIG. 3.
7. Locate the three 34" x 3/8" (86.4 cm x 9.5 mm) aluminum tubes. Insert one end of each into the ends of the 1/2" arm assemblies. Insert the 3/8" tubes up to the dimples in the arm assemblies. Do not force beyond the dimples. FIG. 4.
8. Position the three tube clamps even with the ends of the 1/2" arm assemblies. Securely tighten the three tube clamps. (Fig. 4)
9. Check to make sure the two assemblies are:
  - a) At their proper locations along the 88" tube. Fig. 2.
  - b) Aligned so that the 1/2" arm assemblies will not be bent or twisted when step 12 is performed.
10. Tighten the six 1/4" bolts on the lower tribracket. Draw down on each bolt a little at a time in succession until all six are securely tightened.
11. Make sure hose clamp is securely tightened.
12. Locate gamma match assembly. FIG. 5. Connect flattened end to the solder lug on the coaxial connector. Use a 10-32 x 3/4" screw and square nut. Place a #10 starwasher between the flattened end of gamma and solder lug on connector. Also use a #10 starwasher underneath the square nut. Leave loose. Refer to Fig. 5.

**FIGURE 3****FIGURE 4**

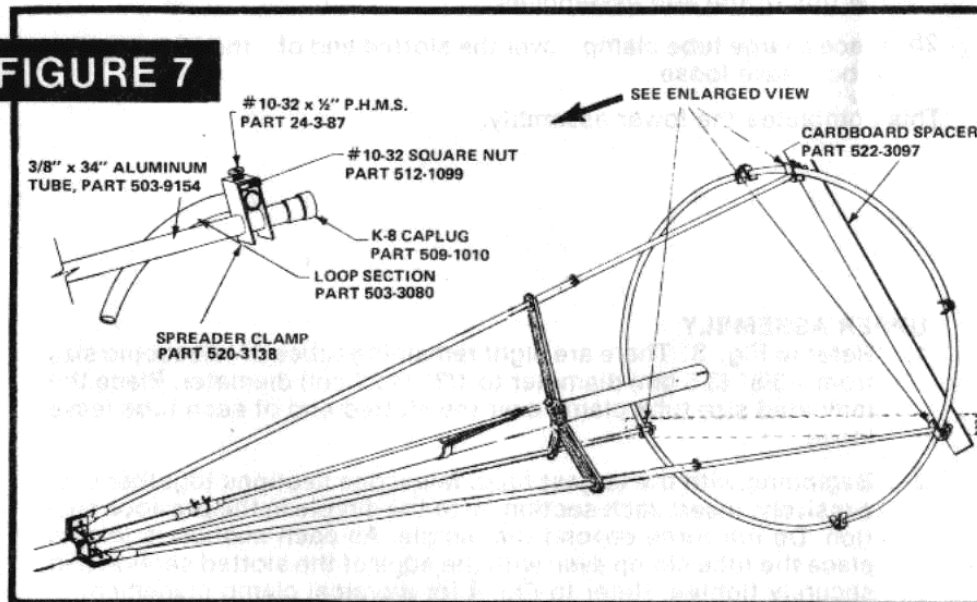
13. Locate the two identical gamma brackets. Use four 10-32 x 3/4" screws, and **square** nuts to assemble the gamma brackets onto the 88" (2.24m) tube between the bracket assemblies. Leave loose. Fig. 5.
14. Slide the gamma bracket assembly up just above the end of the 1/4" (6.4 mm) rod of the gamma match. Insert the 1/4" rod into the slot near the end of the gamma bracket. Lower the bracket until it is **between** the two middle marks on the 88" (2.24 m) tube. This will be approximately 33" above the mast tri-bracket as shown in Fig. 5. Rotate the gamma bracket so that the gamma match assembly is not bent or twisted. Securely tighten the four 10-32 screws on the gamma bracket. Fig.5.





15. Tighten the 10-32 screw on the connector bracket. Fig. 5 inset.
16. There are seven "U" shaped steel clamps. FIG. 6. Four are 3/4" (1.9 cm) high and three are 1.125" (2.86 cm) high. Separate the clamps by height into two piles. Bend the "legs" of each clamp so they are parallel to each other. Install a 10-32 x 1/2" screw and square nut on each of the seven clamps (Fig. 6). Leave loose.
17. There are four identical curved loop sections. Place a 3/4" (1.9 cm) loop clamp onto each section. Join the four sections as shown in Fig. 6.
18. Place the loop on a flat surface. Position each loop clamp over a joint as shown in the blow up of Fig. 6. Note that the "legs" of each clamp are placed on the non-reduced section of each joint. Orient all four loops as shown in Fig. 6. Securely tighten the 10-32 screws on the clamps. As the screws dimple the other aluminum tube they will securely fasten the sections together.

**FIGURE 7**



19. Locate the cardboard spacer. It will serve two purposes. The first is to check the loop just constructed for roundness. Place the loop on a flat surface. Hold the spacer on edge and place it inside the loop. The ends should just clear the inside of the loop. Check the loop in 3 or 4 different directions. If the loop is found to be slightly "egg shaped," grasp opposite sides and exert gentle pressure to shape the loop as desired. Recheck with the spacer.
20. Select the three 1-1/8" (2.86 cm) high spreader clamps. Place the completed loop over the tips of the three arm assemblies so that the arm tips lie inside the loop (Fig. 7). Rotate the loop so that none of the four loop clamps are against the arm assembly tips.

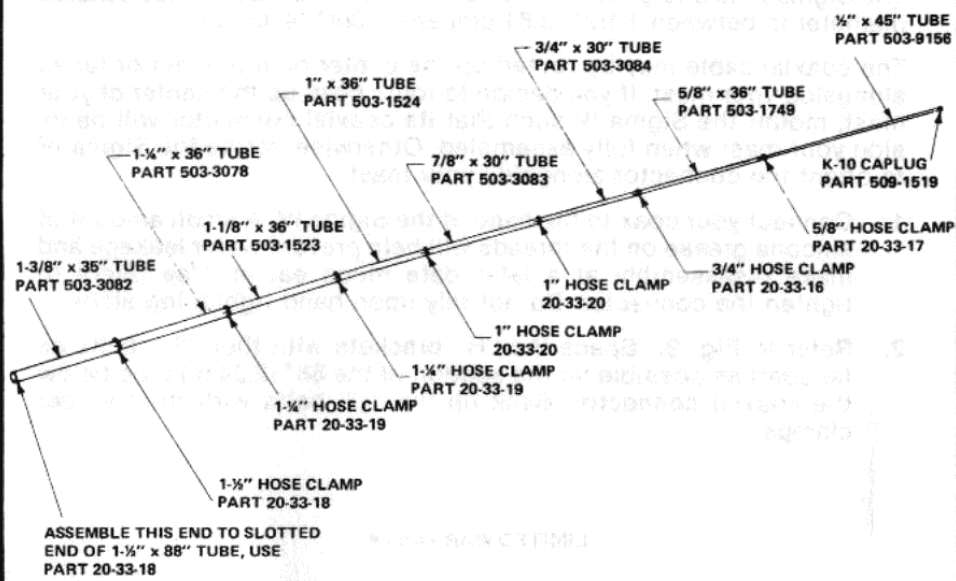
21. Position one of the 1-1/8" spreader clamps against the loop as shown in Fig. 7 and the blow up in Fig. 7. Pass the tip of the arm assembly through both holes in the clamp until approximately 1/2" (1.27 cm) extends above the clamp. Securely tighten the 10-32 screw on this clamp.
22. Repeat this procedure for a second arm assembly but do not tighten the clamp screw. Place one hole of the cardboard spacer over the tip of the arm assembly of Step 21. Place the hole on the other end of the cardboard spacer over the tip of the second arm (Fig. 9). You may have to slide the arm assembly along the loop in order to get the arm to fit into the hole. Do not bend the spacer. When this is done, securely tighten the 10-32 screw on the spreader clamp.
23. Repeat step 22 for the third arm assembly. When finished the spreader should fit over any two arm assemblies.
24. There are four plastic end caps. Place the three smaller caps on the tips of the arm assemblies.
25. Place a large tube clamp over the slotted end of the 88" x 1-1/2" tube. Leave loose.

This completes the lower assembly.

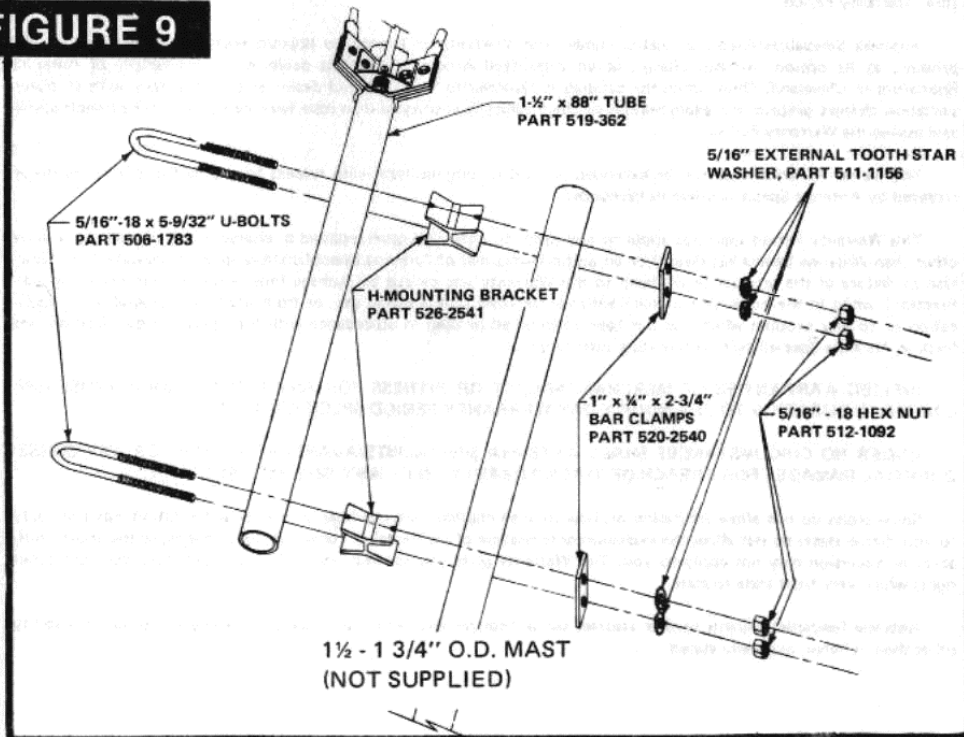
#### UPPER ASSEMBLY

1. Refer to Fig. 8. There are eight remaining tubes of telescopic size from 1-3/8" (3.5 cm) diameter to 1/2" (1.27 cm) diameter. Place the indicated size tube clamp over the slotted end of each tube leave loose.
2. Beginning with the largest tube, telescope sections together successively. Insert each section up to the dimple in the previous section. Do not force beyond the dimple. As each section is joined, place the tube clamp even with the edge of the slotted section and securely tighten. Refer to Fig. 4 for a typical clamp placement.
3. Place the large plastic cap over the tip of the top section.
4. Take this telescoping section just completed and slide it into the slotted end of the 88" (2.24m) tube of the lower assembly. Insert up to the dimple.
5. Position the edge of the tube clamp on the 88" tube at the edge. (Fig. 4 typical) and securely tighten.

**FIGURE 8**



**FIGURE 9**



## **MOUNTING**

The Sigma IV is designed to be side mounted to a mast whose **outside diameter** is between 1-1/2" (3.81 cm) and 1-3/4" (4.45 cm).

The coaxial cable may be routed up the center of your mast or taped alongside your mast. If you decide to route coax up the center of your mast, mount the Sigma IV such that its coaxial connector will be inside your mast when fully assembled. Otherwise, rotate the Sigma IV to orient the connector alongside your mast.

1. Connect your coax to the base of the Sigma IV. A small amount of silicone grease on the threads will help prevent water leakage and make disassembly at a later date much easier. Use pliers to tighten the connector. Do not rely upon hand tightening alone.
2. Refer to Fig. 9. Space the "H" brackets with their "U" bolts as far apart as possible on the section of the 88" (2.24 m) tube below the coaxial connector. Back up the "U" bolts with the two bar clamps.

## **LIMITED WARRANTY**

The Antenna Specialists Co./Avanti a Division of Orion Industries, Inc. ("Antenna Specialists") warrants, on the terms and conditions herein set forth, all products manufactured by it to be free under normal use and service from defects in materials and workmanship for a period of ninety (90) days from the date of delivery to the first consumer (the "Warranty Period").

Antenna Specialists/Avanti obligation under this Warranty is limited to prompt repair or replacement of the product, at its option, without charge, at an authorized Antenna Specialists dealer or at the factory of Antenna Specialists in Cleveland, Ohio, when the product is returned to an authorized dealer or to the factory with all transportation charges prepaid and examination of the product shall disclose it to have been defective in the respects aforesaid during the Warranty Period.

The Warranty Period shall not be extended beyond its original term with respect to any part or parts repaired or replaced by Antenna Specialists/Avanti hereunder.

This Warranty Period shall not apply to any product which has been repaired or altered in any manner, by anyone other than Antenna Specialists/Avanti or an authorized outlet of Antenna Specialists/Avanti, or if the defect, malfunction or failure of the product to conform to this Warranty was caused by damage (not resulting from defect or malfunction) while in the possession of the consumer, or from unreasonable use, or from improper installation or application or to any product which has not been maintained or used in accordance with the operating specifications set forth in Antenna Specialists/Avanti written instructions.

IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE ARE LIMITED IN DURATION TO THE NINETY DAY WARRANTY PERIOD SPECIFIED ABOVE.

UNDER NO CIRCUMSTANCES SHALL ANTENNA SPECIALISTS/AVANTI BE LIABLE FOR ANY CONSEQUENTIAL DAMAGES FOR BREACH OF THIS WARRANTY OR OF ANY IMPLIED WARRANTY.

Some states do not allow limitation on how long an implied warranty lasts, so the above limitation may not apply to you. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you. This Warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

Antenna Specialists/Avanti neither assumes nor authorizes any person to assume for it any obligation or liability other than as herein expressly stated.