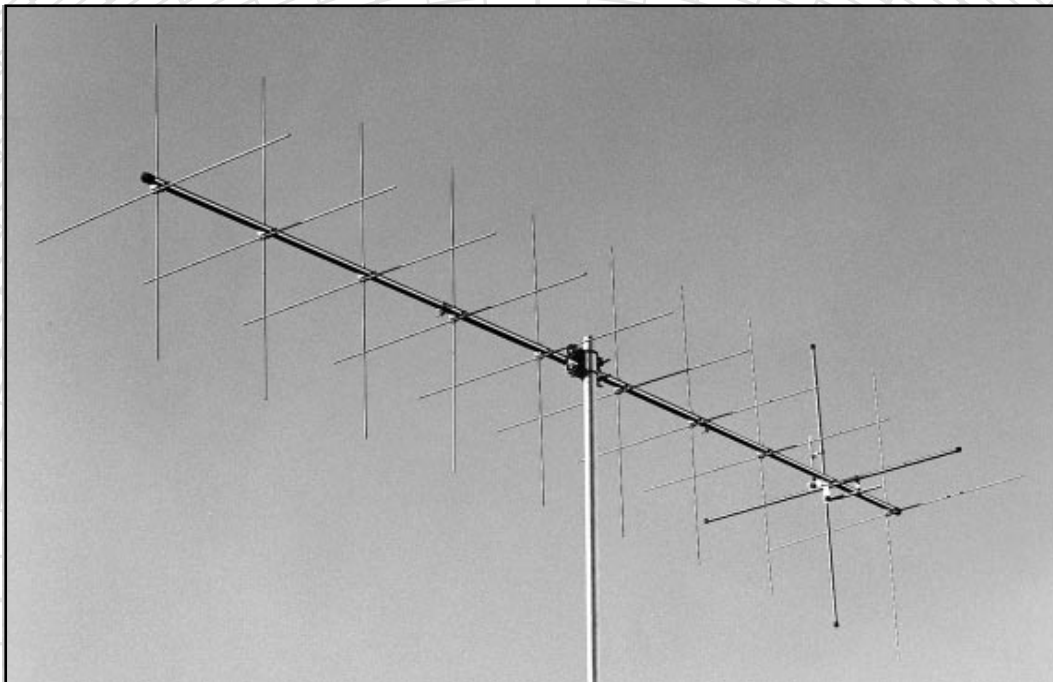


## ASSEMBLY AND INSTALLATION



# A144-20T

2 METER TWIST YAGI ANTENNA  
144-148 MHz



951452 (5/97)

**WARNING**

THIS ANTENNA IS AN ELECTRICAL CONDUCTOR. CONTACT WITH POWER LINES CAN RESULT IN DEATH, OR SERIOUS INJURY. DO NOT INSTALL THIS ANTENNA WHERE THERE IS ANY POSSIBILITY OF CONTACT WITH OR HIGH VOLTAGE ARC-OVER FROM POWER CABLES OR SERVICE DROPS TO BUILDINGS. THE ANTENNA, SUPPORTING MAST AND/OR TOWER MUST NOT BE CLOSE TO ANY POWER LINES DURING INSTALLATION, REMOVAL OR IN THE EVENT PART OF THE SYSTEM SHOULD ACCIDENTALLY FALL. FOLLOW THE GUIDELINES FOR ANTENNA INSTALLATIONS RECOMMENDED BY THE U.S. CONSUMER PRODUCT SAFETY COMMISSION AND LISTED IN THE ENCLOSED PAMPHLET.

Your Cushcraft VHF antenna is designed and manufactured to give top performance and trouble free service. The antenna will perform as specified if the instructions and suggestions are followed and care is used in assembly and installation. When checking the components received in your antenna package use the parts lists in each section. It is easiest to identify the various dimensions of tubing by separating them into groups of the same diameter and length. If you are unable to locate any tube or component, check the inside of all tubing. *IMPORTANT: save the weight label from the outside of the carton. Each antenna is weighed at the factory to verify the parts count. If you claim a missing part, you will be asked for the weight verification label.* There is a master parts list on page 2.

**LOCATION**

Location of the antenna is very important. Surrounding objects such as trees, power lines, other antennas, etc. will seriously reduce efficiency. To minimize the effects of surrounding objects, mount the antenna as high and in the clear as possible. If metal guy wires are used, they should be broken with strain insulators. YOU MUST INSURE THAT NEITHER PEOPLE NOR PETS CAN COME IN CONTACT WITH YOUR ANTENNA WHILE IT IS IN OPERATION. DEADLY VOLTAGES AND CURRENTS MAY EXIST. ALSO, SINCE THE EFFECTS OF EXPOSURE TO RF ARE NOT FULLY UNDERSTOOD, LONG TERM EXPOSURE TO INTENSE RF FIELDS IS NOT RECOMMENDED. THERE IS A WARNING STICKER WHICH MUST BE ATTACHED TO THE BOOM AS SHOWN IN FIGURE E.

Plan your installation carefully. If you use volunteer helpers be sure that they are qualified to assist you. Make certain that everyone involved understands that you are in charge and that they must follow your instructions. If you have any doubts at all employ a professional antenna installation company to install your antenna.

**MOUNTING**

The A144-20T mast mount bracket will take up to a 2" (5.1 cm) O.D. mast. A 1-1/4" (3.17 cm) television type tubing is satisfactory for any of the *single* beams. A good heavy-duty antenna rotator will provide the best service and longest life. Often it is desirable to mount several antennas on one mast. To keep possible interaction to minimum, place your antennas as far apart as you can. The A144-20T transmits and receives horizontal and vertical polarization. Vertical polarization is normally for FM and packet, while horizontal polarization is normally for SSB and CW.

**SYSTEM GROUNDING**

Direct grounding of the antenna, mast and tower is very important. This serves as protection from lightning strikes, static buildup and high voltage which is present in the radio equipment connected to the antenna. A good electrical connection should be made to one or more ground rods (or other extensive ground system) directly at the base of the tower or mast, using at least #10AWG ground wire and non-corrosive hardware. For details and safety standards, consult the National Electrical Code. You should also use a coaxial lightning arrester. Cushcraft offers several different models, such as LAC-1, LAC-2 and the LAC-4 series.

**ASSEMBLY**

Assemble your antenna by following the directions and illustrations in steps 1 through 4. After the antenna is completely assembled, verify dimensions and element spacings for accuracy. Then, return to the section below for final tuning.

**TUNING PROCEDURE**

The A144-20T does not normally require tuning after assembly. However, if you wish to check the VSWR before installation, please observe the following procedures. To prevent detuning the antenna, it should be tuned in place or at least 7 feet (2.1 m) above ground and clear of surrounding objects. Keep all metal obstructions such as guy wires and other antennas at least 7 feet (2.1 m) away since they will nullify any adjustment and degraded performance will result.

Run the coax cable from your transmitter to the area in which the antenna is going to be tested. The length of this cable is not critical. Connect a good quality VSWR bridge to the end of this cable. Connect a short length of cable [10 ft (3 m) or less] from the VSWR bridge to the antenna. Set the transmitter to your center operating frequency. When you read VSWR, be sure you move far enough away from the antenna so that your body does not effect the reading.

Measure the VSWR. If it is high, move the tuning strap by 1/4" (.6 cm) in one direction and check the VSWR. If the VSWR improves, then continue moving the tuning strap in the same direction. If the VSWR deteriorates then move the tuning strap in the opposite direction. Repeat this procedure until no further improvement can be made. There may be some interaction between the horizontal and vertical Reddi-Match settings. You have matched your antenna to 50 Ohms. Tighten all connections making sure to keep the Reddi-Match assembly parallel to the driven elements (V2, H2). Tape the feedlines to the boom and mast (figure F).

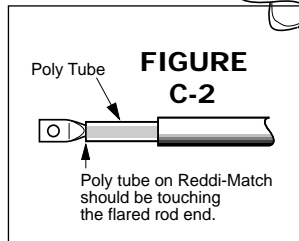
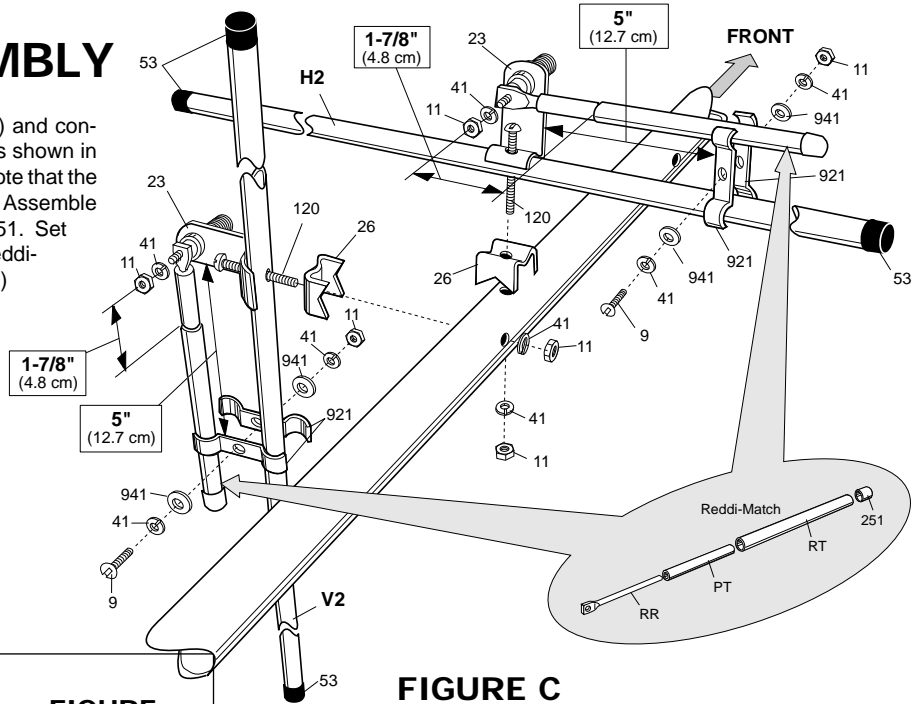
## MASTER PARTS LIST

| KEY | PART # | DESCRIPTION  | QUANTITY | KEY            | PART # | DESCRIPTION   | QUANTITY |
|-----|--------|--|----------|----------------|--------|---|----------|
| 9   | 010009 | 8-32 x 5/8" (1.6 cm) stainless steel machine screw   | 2        | 404            | 010404 | 3-1/4 x 2-7/16 (8.3 x 6.2 cm) stainless steel U-bolt      | 2        |
| 11  | 010011 | 8-32 stainless steel hex nut                         | 24       | 410            | 030410 | 1" (2.5 cm) stainless steel worm clamp                    | 2        |
| 23  | 190023 | Connector bracket                                    | 2        | 921            | 200921 | Reddi-Match clamp   | 4        |
| 26  | 190026 | 7/8" x 1-1/2" (2.2 x 3.8 cm) mounting bracket        | 20       | 941            | 360941 | #8 aluminum flat washer                                   | 4        |
| 28  | 190028 | Aluminum half washer                                 | 18       |                |        |   |          |
| 41  | 011941 | #8 stainless steel lock washer                       | 26       | BA             |        | 1" x 48" (2.5 x 122 cm) aluminum tubing slotted both ends | 1        |
| 45  | 321045 | 1/2" x 1/2" (1.3 x 1.3 cm) aluminum spacer           | 4        | BB             |        | 7/8" x 50" (2.2 x 127 cm) aluminum tubing                 | 1        |
|     |        |  |          | BC             |        | 7/8" x 50" (2.2 x 127 cm) aluminum tubing                 | 1        |
| 53  | 050053 | 1/2" (1.3 cm) black plastic cap                      | 4        | H1, V1         |        | 40-5/8" (103.2 cm) aluminum rod                           | 2        |
| 61  | 050061 | 7/8" (2.2 cm) black plastic cap                      | 2        | H2, V2         |        | 39-1/4" x 1/2" (99.7 x 1.3 cm) tubing drilled in center   | 2        |
| 70  | 190070 | 4" x 6" (10.2 x 15.2 cm) formed mast plate           | 1        | H3, V3         |        | 37-3/4" (95.9 cm) aluminum rod                            | 2        |
| 84  | 010084 | 1/4" (.63 cm) stainless steel split lock washer      | 4        | H4, V4         |        | 36-1/2" (92.7 cm) aluminum rod                            | 2        |
| 85  | 010085 | 1/4" (.63 cm) stainless steel hex nut                | 4        | H5, V5         |        | 35-3/8" (89.9 cm) aluminum rod                            | 2        |
| 104 | 010104 | 1/4" (.63 cm) stainless steel flat washer            | 4        | H6, V6         |        | 34-3/8" (87.3 cm) aluminum rod                            | 2        |
| 115 | 050115 | Connector boot                                       | 2        | H7, V7         |        | 33-3/4" (85.7 cm) aluminum rod                            | 2        |
| 116 | 240116 | Silicone package                                     | 2        | H8, H9, V8, V9 |        | 32-3/4" (83.2 cm) aluminum rod                            | 4        |
| 118 | 010118 | 5/16" (.8 cm) stainless steel hex nut                | 4        | H10, V10       |        | 31-1/8" (79.1 cm) aluminum rod                            | 2        |
|     |        |  |          | HN1            |        | RG59 phasing harness                                      | 2        |
| 119 | 010119 | 5/16" (.8 cm) stainless lock washer                  | 4        | HN2            |        | RG58 phasing harness                                      |          |
| 120 | 010120 | 8-32 x 2" (5.1 cm) stainless steel machine screw     | 2        | PT             |        | 3/16" x 4-1/2" (.48 x 11.4 cm) poly tube                  | 2        |
| 231 | 010231 | 8-32 x 1-3/4" (4.4 cm) stainless steel machine screw | 18       | RR             |        | 3/16" x 4" (.48 x 10.2 cm) Reddi Match rod                | 2        |
| 251 | 050251 | 3/8" (1 cm) white plastic cap                        | 2        | RT             |        | 3/8" x 6-1/2" (.9 x 16.5 cm) aluminum tube                | 2        |
| 326 | 290326 | Danger label   | 1        | HN1            |        | RG59 phasing harness                                      | 2        |
| 401 | 010401 | 3" x 1-3/4" (7.6 x 4.4 cm) stainless steel U-bolt    | 2        | HN2            |        | RG58 phasing harness                                      | 2        |

# #2-ELEMENT ASSEMBLY

Assemble the two driven element tubes (H2,V2) and connector brackets (23) to the boom at the positions shown in figure B using the hardware shown in figure C. Note that the connectors point toward the center of the boom. Assemble the Reddi-Match components RR, PT, RT and 251. Set them aside for the moment. Loosely attach the Reddi-Match straps (921) to the driven elements (H2,V2) as shown. Slide the Reddi-Match assembly through the Reddi-Match straps and secure the rod (RR) to the connector. Use washer (41) and nut (11). Next, slide the poly tube (PT) to the flattened end of the rod (Figure C-2). Set the dimensions shown in figure C and tighten the hardware. Note: Reddi-Match settings are different for H2 and V2.

Two sets of elements are provided with the antenna. Each set is mounted 90 degrees to the other. Lengths are shown in Table A. Using Figure B for positioning, attach the elements using the hardware shown in Figure D. Element lengths within 1/16" (.16 cm) of the stated length are acceptable. Check elements again to assure that they are in the correct position and tighten the hardware.



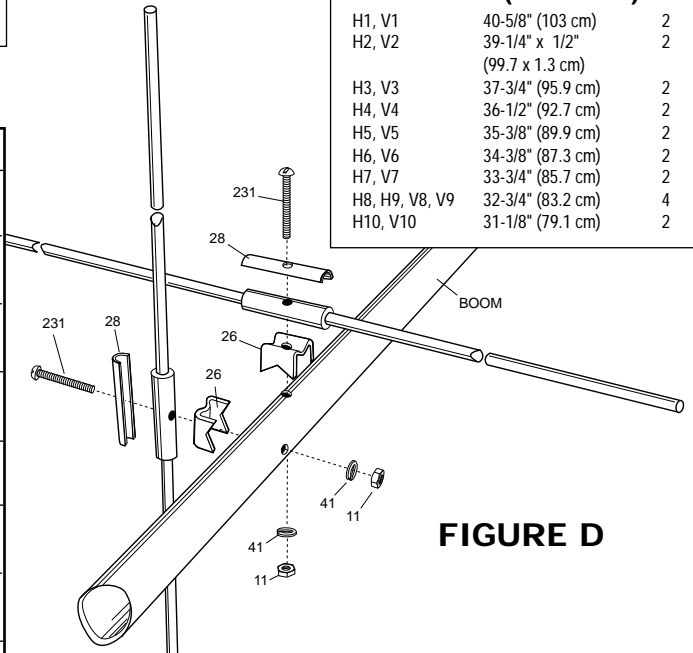
**FIGURE C**

NOTE: Figure C is rotated 180 degrees for clarity.

**TABLE A (Elements)**

|                |                                |   |
|----------------|--------------------------------|---|
| H1, V1         | 40-5/8" (103 cm)               | 2 |
| H2, V2         | 39-1/4" x 1/2" (99.7 x 1.3 cm) | 2 |
| H3, V3         | 37-3/4" (95.9 cm)              | 2 |
| H4, V4         | 36-1/2" (92.7 cm)              | 2 |
| H5, V5         | 35-3/8" (89.9 cm)              | 2 |
| H6, V6         | 34-3/8" (87.3 cm)              | 2 |
| H7, V7         | 33-3/4" (85.7 cm)              | 2 |
| H8, H9, V8, V9 | 32-3/4" (83.2 cm)              | 4 |
| H10, V10       | 31-1/8" (79.1 cm)              | 2 |

| KEY | P/N    | DISPLAY | DESC                 | SIZE                   | QTY |
|-----|--------|---------|----------------------|------------------------|-----|
| 9   | 010009 |         | SS MACHINE SCREW     | 8-32 x 5/8" (1.6 cm)   | 2   |
| 11  | 010011 |         | SS HEX NUT           | 8-32                   | 24  |
| 23  | 190023 |         | CONNECTOR BRACKET    |                        | 2   |
| 26  | 190026 |         | ALUMINUM BRACKET     | 7/8" (2.2 cm)          | 20  |
| 28  | 190028 |         | ALUMINUM HALF WASHER |                        | 18  |
| 41  | 011941 |         | SS LOCK WASHER       | #8                     | 26  |
| 53  | 050053 |         | PLASTIC CAP          | 1/2" (1.3 cm)          | 4   |
| 120 | 010120 |         | SS MACHINE SCREW     | 8-32 x 2" (5.1 cm)     | 2   |
| 231 | 010231 |         | SS MACHINE SCREW     | 8-32 x 1-3/4" (4.4 cm) | 18  |
| 251 | 050251 |         | PLASTIC CAP          | 3/8" (1 cm)            | 2   |
| 921 | 200921 |         | TUNING STRAP         |                        | 4   |
| 941 | 360941 |         | FLAT WASHER          | #8                     | 4   |



**FIGURE D**

| KEY   | P/N | DISPLAY | DESC            | SIZE                           | QTY |
|-------|-----|---------|-----------------|--------------------------------|-----|
| H2/V2 |     |         | ALUMINUM TUBE   | 1/2" x 39-1/4" (1.3 x 99.7 cm) | 2   |
| PT    |     |         | POLY TUBE       | 3/16" x 4-1/2" (.5 x 11.4 cm)  | 2   |
| RR    |     |         | REDDI-MATCH ROD | 3/16" x 4" (.5 x 10.2 cm)      | 2   |
| RT    |     |         | ALUMINUM TUBE   | 3/8" x 6-1/2" (.9 x 16.5 cm)   | 2   |

# #1 - BOOM ASSEMBLY

Assemble the boom as shown in figure A. Make a mark 11" (27.9 cm) in from the end of the BB and 5" (12.7 cm) from the end of the BC tube as shown. Be sure to mark the correct end of each tube by referring to the dimensions of the hole locations. Slide worm clamps (410) onto the slotted ends of tube BA. Insert the BB and BC tubes up to the marks you made. Align the element holes on all three sections and tighten the worm clamps. Push the end caps (61) onto the ends of the boom.

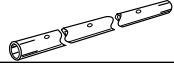
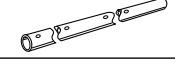
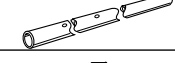


| KEY | P/N    | DISPLAY   | DESC        | SIZE                         | QTY |
|-----|--------|---|-------------|------------------------------|-----|
| BA  |        |  | ALUM TUBE   | 1" x 48"<br>(2.5 x 122 cm)   | 1   |
| BB  |        |  | ALUM TUBE   | 7/8" x 50"<br>(2.2 x 127 cm) | 1   |
| BC  |        |  | ALUM TUBE   | 7/8" x 50"<br>(2.2 x 127 cm) | 1   |
| 61  | 050061 |  | PLASTIC CAP | 7/8"<br>(2.2 cm)             | 2   |
| 410 | 030410 |  | WORM CLAMP  | 1"<br>(2.5 cm)               | 2   |

FIGURE A

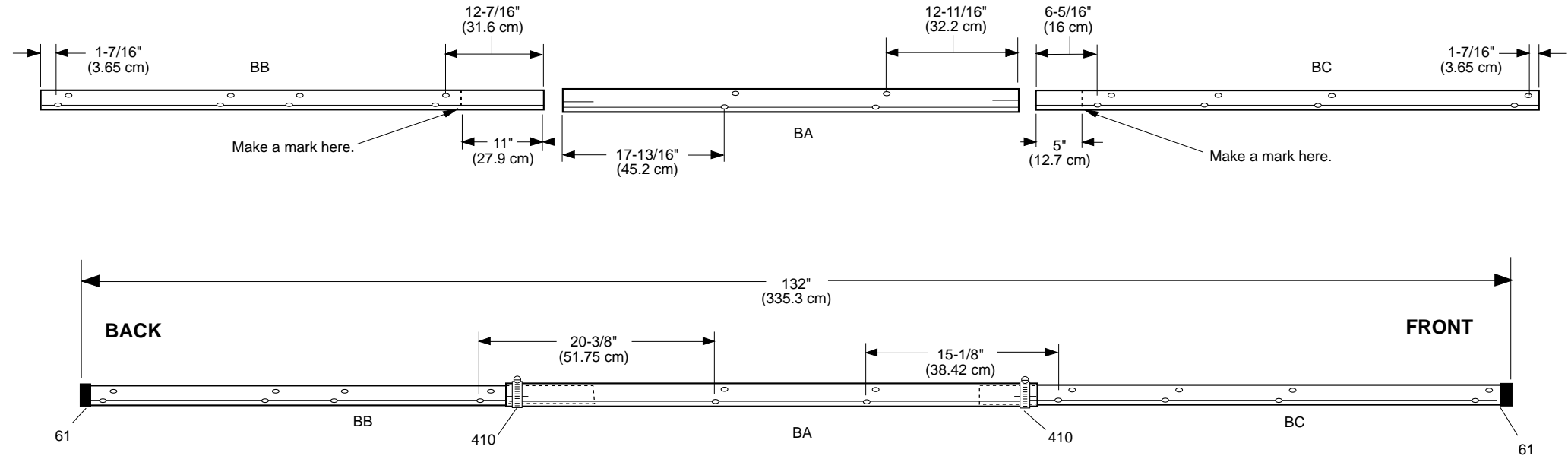
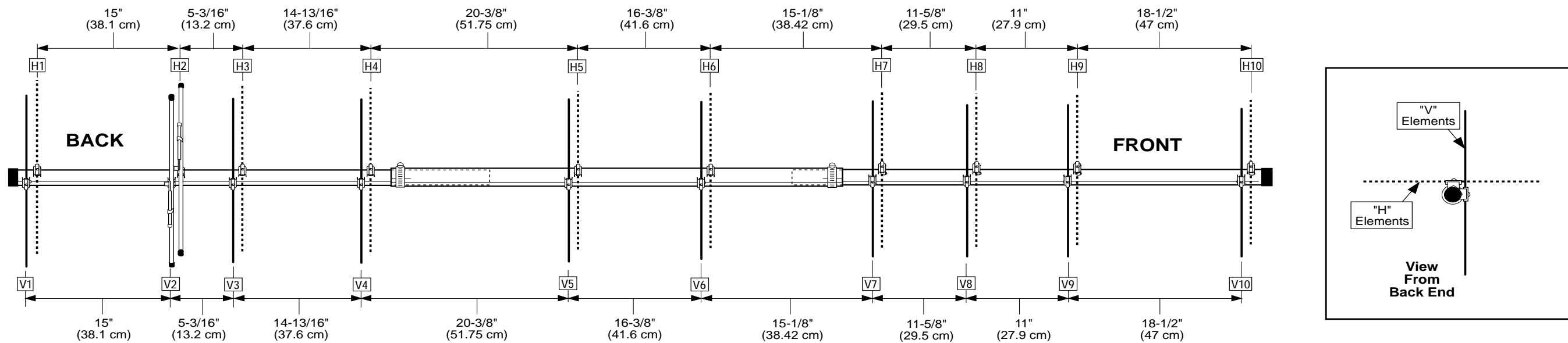

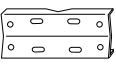










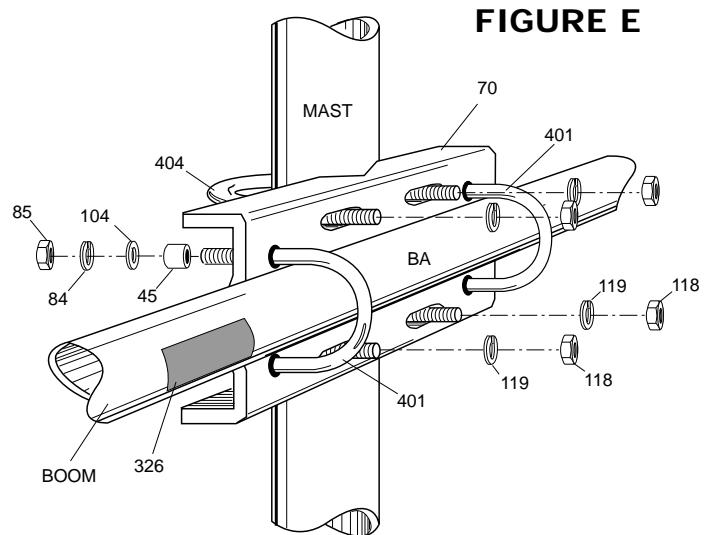
FIGURE B



| KEY | P/N    | DISPLAY   | DESC              | SIZE                               | QTY |
|-----|--------|---|-------------------|------------------------------------|-----|
| 45  | 321045 |  | ALUMINUM SPACER   | 1/2" x 1/2"<br>(1.3 x 1.3 cm)      | 4   |
| 70  | 190070 |  | FORMED MAST PLATE | 4" x 6"<br>(10.1 x 15.2 cm)        | 1   |
| 84  | 010084 |  | SS LOCK WASHER    | 1/4"<br>(.63 cm)                   | 4   |
| 85  | 010085 |  | SS HEX NUT        | 1/4"<br>(.63 cm)                   | 4   |
| 104 | 010104 |  | SS FLAT WASHER    | 1/4"<br>(.63 cm)                   | 4   |
| 118 | 010118 |  | SS HEX NUT        | 5/16"<br>(.8 cm)                   | 4   |
| 119 | 010119 |  | SS LOCK WASHER    | 5/16"<br>(.8 cm)                   | 4   |
| 326 | 290326 |  | DANGER LABEL      |                                    | 1   |
| 401 | 010401 |  | SS U-BOLT         | 3" x 1-3/4"<br>(7.6 x 4.4 cm)      | 2   |
| 404 | 010404 |  | SS U-BOLT         | 3-1/4" x 2-7/16"<br>(8.3 x 6.2 cm) | 2   |

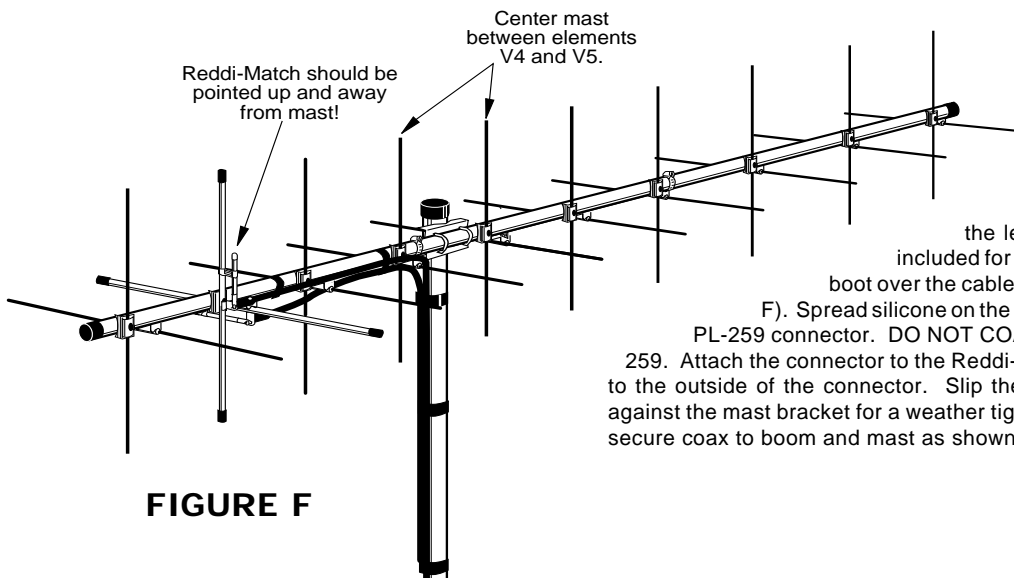
### #3 - MAST MOUNT

Mount the antenna to your mast using the mounting plate (70) and the hardware provided per figure E. Refer to figure F for the mounting point. Tighten the U-bolts taking care not to crush the boom. See "MOUNTING" on page 1 concerning orientation of mast mount, elements and Reddi-Match.





**FIGURE E**

### #4 - FEEDLINE



This antenna is designed for use with 50 Ohm coaxial cable terminated with a PL-259 connector. Any length of feedline can be used with your A144-20T. The shortest length of cable will have the least loss. Two connector boots are included for use with your new antenna. Slide the boot over the cable before attaching your PL-259 (figure F). Spread silicone on the outer threads of the Reddi-Match and PL-259 connector. **DO NOT COAT THE CENTER PINS OF THE PL-259.** Attach the connector to the Reddi-Match. Apply the remaining silicone to the outside of the connector. Slip the vinyl boot over the connector and against the mast bracket for a weather tight connection. Use electrical tape to secure coax to boom and mast as shown in Figure F.

| KEY | P/N    | DISPLAY   | DESC            | SIZE | QTY |
|-----|--------|---|-----------------|------|-----|
| 115 | 050115 |  | CONN BOOT       |      | 2   |
| 116 | 240116 |  | SILICONE GREASE |      | 2   |



**SPECIFICATIONS**

|                                |                 |  |                       |
|--------------------------------|-----------------|--|-----------------------|
| <b>MODEL</b>                   | <b>A144-20T</b> | <b>Boom Length, ft (m)</b>                       | 11 (3.4)              |
| <b>Frequency, MHz</b>          | 144-148         | <b>Longest Element, in(cm)</b>                   | 40.6 (103)            |
| <b>No. Elements</b>            | 20              | <b>Turning Radius, ft (m)</b>                    | 7.5 (2.3)             |
| <b>Forward Gain, dBd</b>       | 11.1            | <b>Mast Size Range, in (cm)</b>                  | 1.25-2.0<br>(3.2-5.1) |
| <b>Front to Back Ratio, dB</b> | 24              | <b>Wind Load, ft<sup>2</sup> (m<sup>2</sup>)</b> | 1.21 (0.11)           |
| <b>SWR 1.2:1 Typical</b>       |                 | <b>Weight, lb (kg)</b>                           | 7 (3.15)              |
| <b>2:1 Bandwidth MHz</b>       | ≥4              | <b>Hardware</b>                                  | Stainless steel       |
| <b>Power Rating, Watts PEP</b> | 1000            |  |                       |
| <b>3 dB Beamwidth, Degrees</b> |                 |  |                       |
| E Plane                        | 45              |  |                       |
| H Plane                        | 50              |  |                       |

**LIMITED WARRANTY**

Cushcraft Corporation, P.O. Box 4680, Manchester, New Hampshire 03108, warrants to the original consumer purchaser for one year from date of purchase that each Cushcraft antenna is free of defects in material or workmanship. If, in the judgement of Cushcraft, any such antenna is defective, then Cushcraft Corporation will, at its option, repair or replace the antenna at its expense within thirty days of the date the antenna is returned (at purchasers expense) to Cushcraft or one of its authorized representatives. This warranty is in lieu of all other expressed warranties, any implied warranty is limited in duration to one year. Cushcraft Corporation shall not be liable for any incidental or consequential damages which may result from a defect. Some states do not allow limitations on how long an implied warranty lasts or exclusions or limitations of incidental or consequential damages, so the above limitation and 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. This warranty does not extend to any products which have been subject to misuse, neglect, accident or improper installation. Any repairs or alterations outside of the Cushcraft factory will nullify this warranty.



**48 PERIMETER ROAD, MANCHESTER, NH 03108**  
**603-627-7877 / TELEX 4949472 / FAX 603-627-1764**

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE