

hy-gain[®]

83089



INSTRUCTION MANUAL

**Antennas, Towers and Accessories for
Commercial, Industrial, Military and
Private use.**

**MODEL TH7DX
BROADBAND
SUPER THUNDERBIRD
ORDER NO. 391S**

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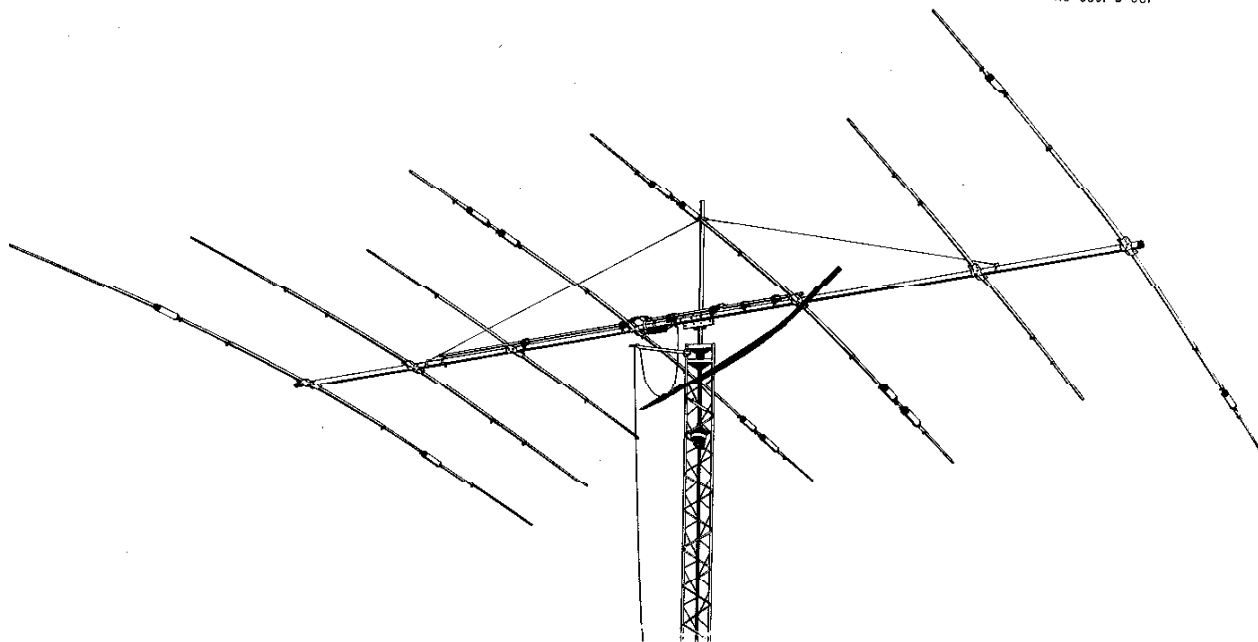
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CHAPTER 1

AO-0391-B-001



General Description

The Hy-Gain TH7DX is a 7-element, three band beam antenna designed for broadband, high performance operation on the Amateur 10, 15 and 20 meter bands. Broadbanding is accomplished through the use of two fully trapped driven elements. Stainless steel hardware and clamps are used on all electrical connections. Hy-Gain's 50 ohm BN-86 balun and preformed feed straps are supplied. The TH7DX also comes with a wire boom support for additional strength. The antenna is designed to fit masts from 1 7/8" to 2 1/2" in diameter and can be rotated with Hy-Gain's HDR-300, Ham IV or T²X rotators.

Specifications

| | <i>Electrical</i> | | |
|--|-------------------|---------------|-------------|
| Frequencies of operation | 20m | 15m | 10m |
| Under 2:1 VSWR (MHz) | 14.0 - 14.35 | 21.0 - 21.45 | 28.0 - 29.7 |
| Under 1.5:1 VSWR (MHz)..... | 14.07 - 14.33 | 21.18 - 21.45 | 28.6 - 29.6 |
| Front-to-back ratio (dB) | 22 ±5 | 22 ±5 | 18 ±5 |
| Average half-power beamwidth (deg) ... | 66 | 63 | 63 |
| Maximum gain (dBi) | 8.0 | 8.7 | 9.6 |
| Maximum power | Maximum Legal | | |
| Lightning protection | DC Ground | | |

| | <i>Mechanical</i> |
|---|---|
| Boom length | 24 feet (7.315 m) (guy support supplied) |
| Boom diameter | 2 inches (5.1 cm) |
| Longest element | 31 feet (9.45 m) |
| Longest driven element (one-half total length) | 20m — .185 wavelength 15m — .203 wavelength 10m — .225 wavelength |

**Specifications
(Cont.)**

| | |
|----------------------------------|--|
| Turning radius | 20 feet (6.10 m) |
| Accepts mast | 1 5/8" to 2 1/2" O.D. (4.13 cm to 6.35 cm) |
| Net weight | 75 lbs. (34.0 kg) |
| Maximum wind survival | 100 mph (161.0 kmph) |
| Wind surface area | 9.4 sq. ft. (0.87 m ²) |
| Wind load at 80 mph | 240 lbs. (108.8 kg) |
| Element compression clamps | T304 stainless steel, passivated |
| Hardware | stainless steel, except for boom to mast bolts |
| Suitable rotors | Hy-Gain HDR-300, Ham IV or T ² X |

CHAPTER 2

Preparation for Assembly

FOR OUR OVERSEAS CUSTOMERS: The United States uses English units of measurement. Please see pages 21-23 of this manual for assistance in identifying the hardware and components supplied with this product.

Choose a large, clear area to assemble the TH7DX. The area must be at least 24' x 31' (7.3m x 9.5m). You may wish to use sawhorses or chairs to support the boom during assembly. A concrete driveway is an excellent area for assembly. If you assemble this antenna over a grassy area, precautions should be taken so that hardware is not accidentally lost during assembly.

TOOLS: The following tools are required for easy assembly of the TH7DX:

| Qty | Type Tool |
|-----|--------------------------------|
| 1 | 12 Foot Tape Measure |
| 2 | 8 Inch Adjustable Wrench |
| 1 | $\frac{7}{16}$ Inch Nut Driver |
| 1 | $\frac{3}{8}$ Inch Nut Driver |
| 1 | $\frac{5}{16}$ Inch Nut Driver |

When unpacking your antenna, check inside of all tubing for parts (traps, smaller tubing, etc.). To conserve space, these smaller articles are sometimes put inside larger pieces. Check all parts against the parts list to make sure no parts are missing. The hardware supplied with this antenna is bagged by thread size for your convenience.

All tubing supplied with the TH7DX telescopes together. Make all measurements to the given dimensions, plus or minus, no more than $\frac{1}{8}$ inch.

The assembly of this antenna will be easier if you read this manual completely through at least three (3) times before beginning assembly. Allow at least 7 hours for assembly. Double and triple check ALL dimensions after assembly.

NOTE: An extra page 8, Figure 7 has been inserted in this manual for use when assembling the antenna.

CHAPTER 3

Assembly of the Boom-to-Mast Brackets and Boom

Select the boom-to-bracket clamp parts (Items 89 and 90). Loosely assemble them on the boom ends (Item 79), as shown in Figure 1. Line up the holes on both brackets and both boom ends. Secure the two brackets together with four $\frac{1}{4}$ "-20 x $\frac{3}{4}$ " bolts, nuts and lockwashers. Secure the brackets to the two boom ends using the $\frac{5}{16}$ "-18 x $2\frac{3}{4}$ " bolts, nuts and lockwashers. Tighten these six bolts securely.

Assemble the two cast aluminum brackets (Item 82) on the mast at the desired height above your tower. Secure the two brackets together using the two $\frac{5}{16}$ "-18 x $3\frac{1}{2}$ " bolts, nuts and lockwashers. You may wish to drill a hole through your mast so that the remaining $\frac{5}{16}$ "-18 x $3\frac{1}{2}$ " bolt may be inserted through the cast brackets and the mast and tightened. This bolt will prevent the antenna from twisting on the mast in high winds. See Figure 1. The four (4) 5 inch bolts will be installed when the antenna is installed on the mast.

Slip the two remaining boom sections (Item 88) over the two swaged ends of the assembled boom and secure using $\frac{1}{4}$ "-20 x $2\frac{1}{2}$ " bolt, nut and lockwasher as shown in Figure 2.

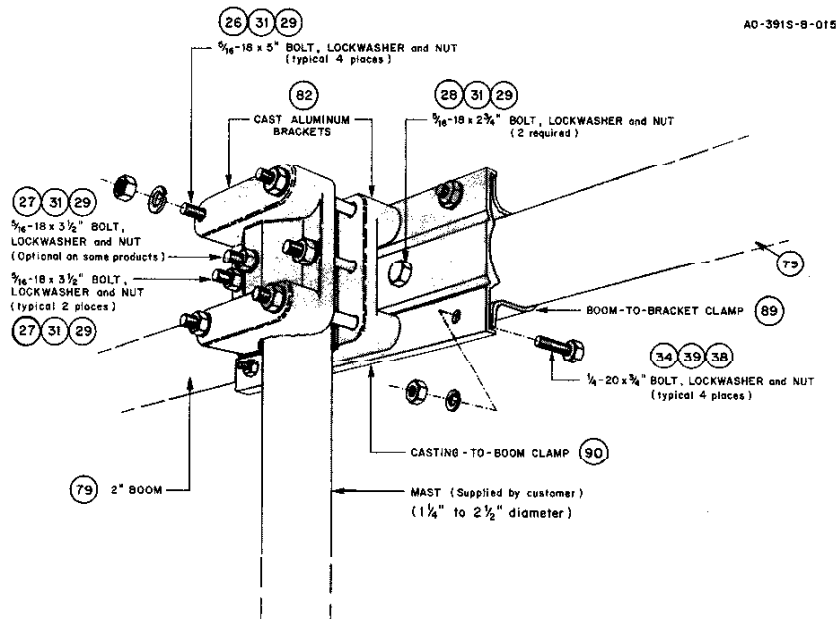


Figure 1

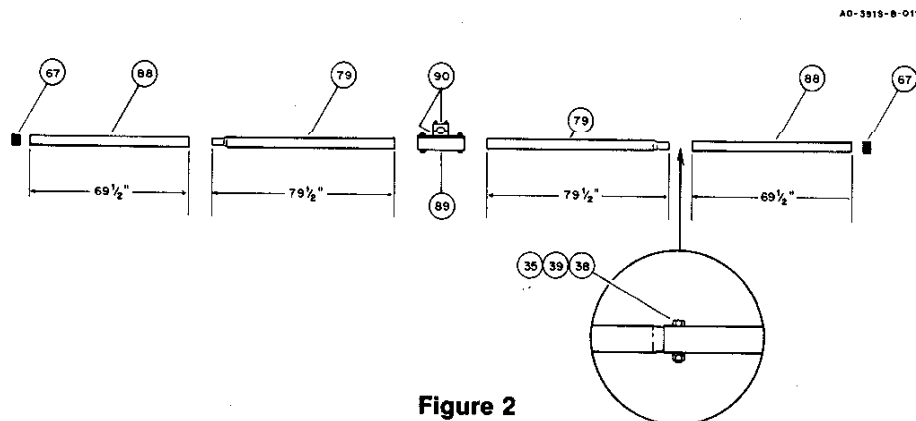


Figure 2

**Assembly of the
Element-to-Boom
Brackets on the Boom
Front Driven Element**

Select one pair of the largest element-to-boom brackets (Item 85). These are marked with a number 14. Assemble the brackets on the boom 20 inches to the left of the mast bracket (center-to-center). The curved side of the mast bracket must be facing you. Refer to Figure 3 for identification of hardware. **DO NOT** tighten the bolts at this time.

Rear Driven Element

Select another pair of the largest element-to-boom brackets (Item 85). Assemble these brackets on the boom 35 inches to the right of the center of the mast bracket. Refer to Figure 3. **DO NOT** tighten the bolts at this time.

10-Meter Reflector

Select a pair of the smallest element-to-boom brackets (Item 83). These are marked with a number 4. Assemble these brackets on the boom 58½ inches to the right of the rear driven element brackets. Refer to Figures 3 and 7. **DO NOT** tighten at this time.

10-Meter Director

Select another pair of the smallest element-to-boom brackets (Item 83). Assemble these 44½ inches to the left of the front driven element brackets. Refer to Figures 3 and 7. **DO NOT** tighten at this time.

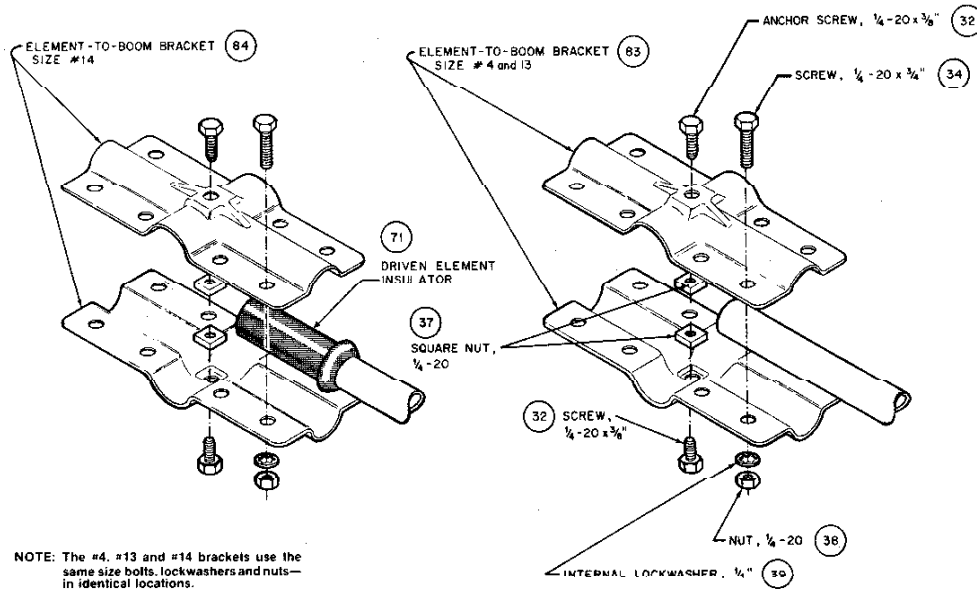
15-Meter Director

Select another pair of the smallest element-to-boom brackets (Item 83). Assemble these 37½ inches to the left of the 10-meter director brackets. Refer to Figures 3 and 7. **DO NOT** tighten at this time.

**10-20 Director and
15-20 Reflector**

Select two sets of medium sized element-to-boom brackets (Item 84) and loosely assemble these on the boom ends. The front set should be 39½ inches to the left of the 15-meter director brackets. The rear set should be 48 inches to the right of the 10-meter reflector brackets. Refer to Figures 3 and 7. **DO NOT** tighten now.

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NOTE: The #4, #13 and #14 brackets use the same size bolts, lockwashers and nuts—in identical locations.

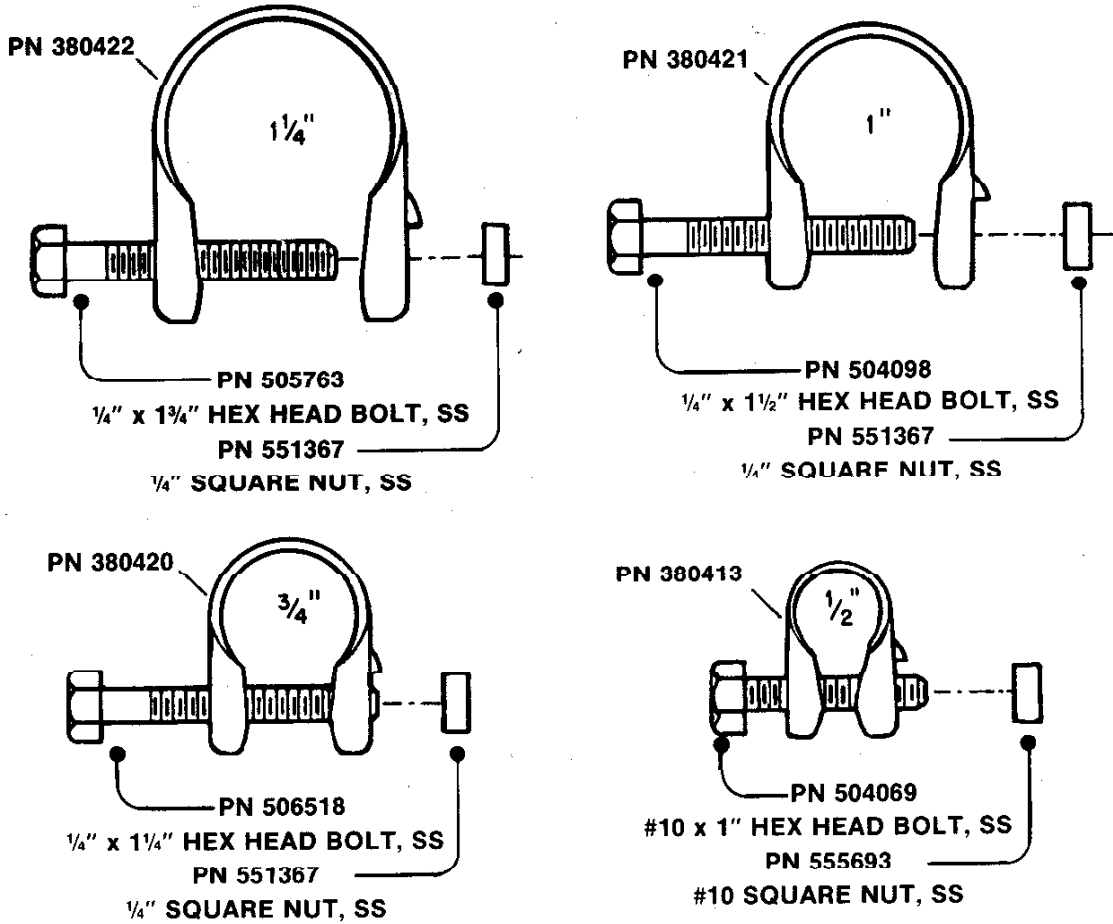
Figure 3

Remove the top anchor screw from the 10-meter director bracket. The beta tubes will be installed over this bracket in a later step.

Compression Clamps

To save time, loosely assemble all of the compression clamps and their appropriate hardware before beginning further installation of the antenna. See Figure 4. When installing the clamps, place the clamp near the tube end with the open side even with the slot in the tube. Tighten the clamp until the inner tube cannot be turned in the outer tube. *DO NOT* tighten the compression clamps until instructed to do so.

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MA-0000-A-002

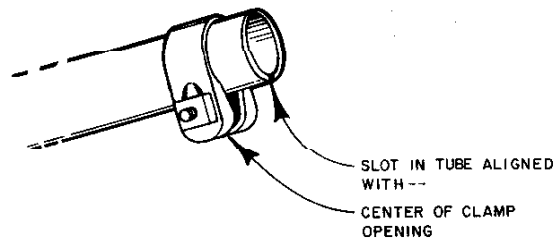


Figure 4

Element Assembly

Because of the broadband nature of the TH7DX, it is supplied with only one setting for use on all modes on all of the 20, 15 and 10 meter bands. If assembled correctly, the VSWR should be below 2:1 on any frequency on these bands.

The following steps will be in singular form. Do each element assembly step, first for one side of the boom and then for the other side. The dimensions shown in Figure 7 are in English units on the right side and metric on the left side. After each element is assembled to the boom, tighten the eight (8) $\frac{1}{4}$ "-20 x $\frac{3}{4}$ " bolts. After all elements are assembled, make sure that they all lie in a horizontal plane, then tighten the anchor screws securely.

Front Driven Element

Select the FDE-1 section ($1\frac{1}{4}$ " x 35") and a driven element insulator (see Figure 3). Slip the DE insulator on the unslotted end of FDE-1, then slip the insulated end of FDE-1 into the bracket which is 20 inches to the left of the mast bracket. Tighten the eight (8) screws to hold the element in place.

Install a $\frac{1}{4}$ " compression clamp on the slotted end of the FDE-1 and insert the unslotted end of the FDE-2 ($1\frac{1}{8}$ " x 48") to the dimension shown in Figure 7.

Tighten the $\frac{1}{4}$ " compression clamp securely and recheck the FDE-2 dimension.

Assemble the remainder of the Front Driven Element in the same manner using dimensions from Figure 7. Use Figures 5 and 6 as guides. Use 10 meter trap Part Number 878749 and 15 meter trap Part Number 878637 in this assembly. Make sure all insulators and trap caps are firmly seated.

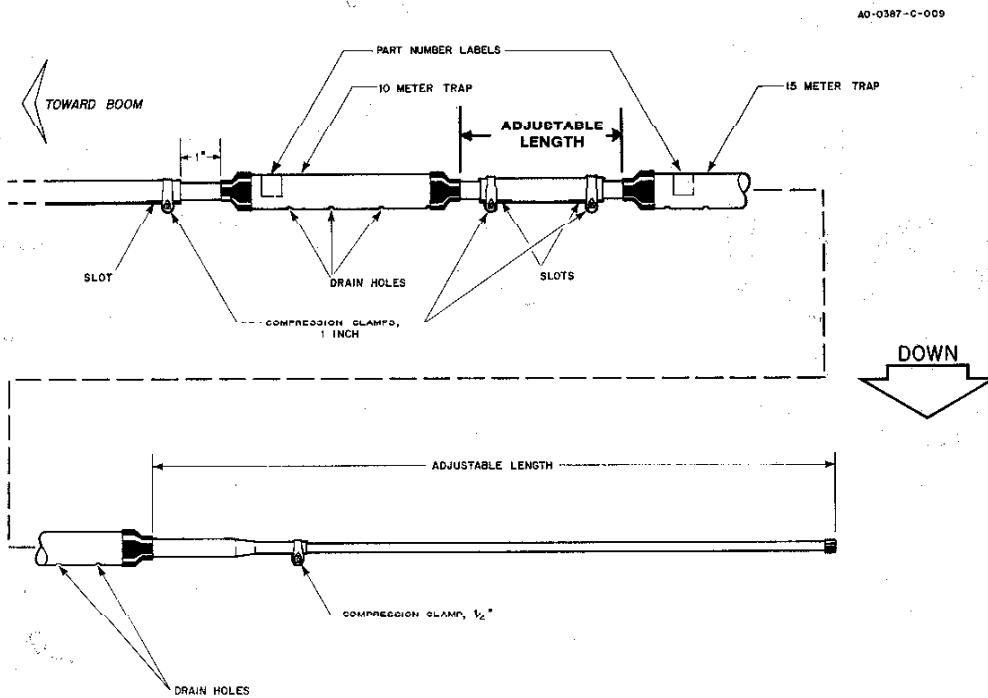
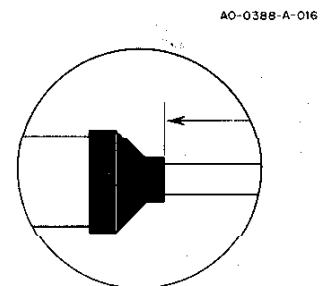
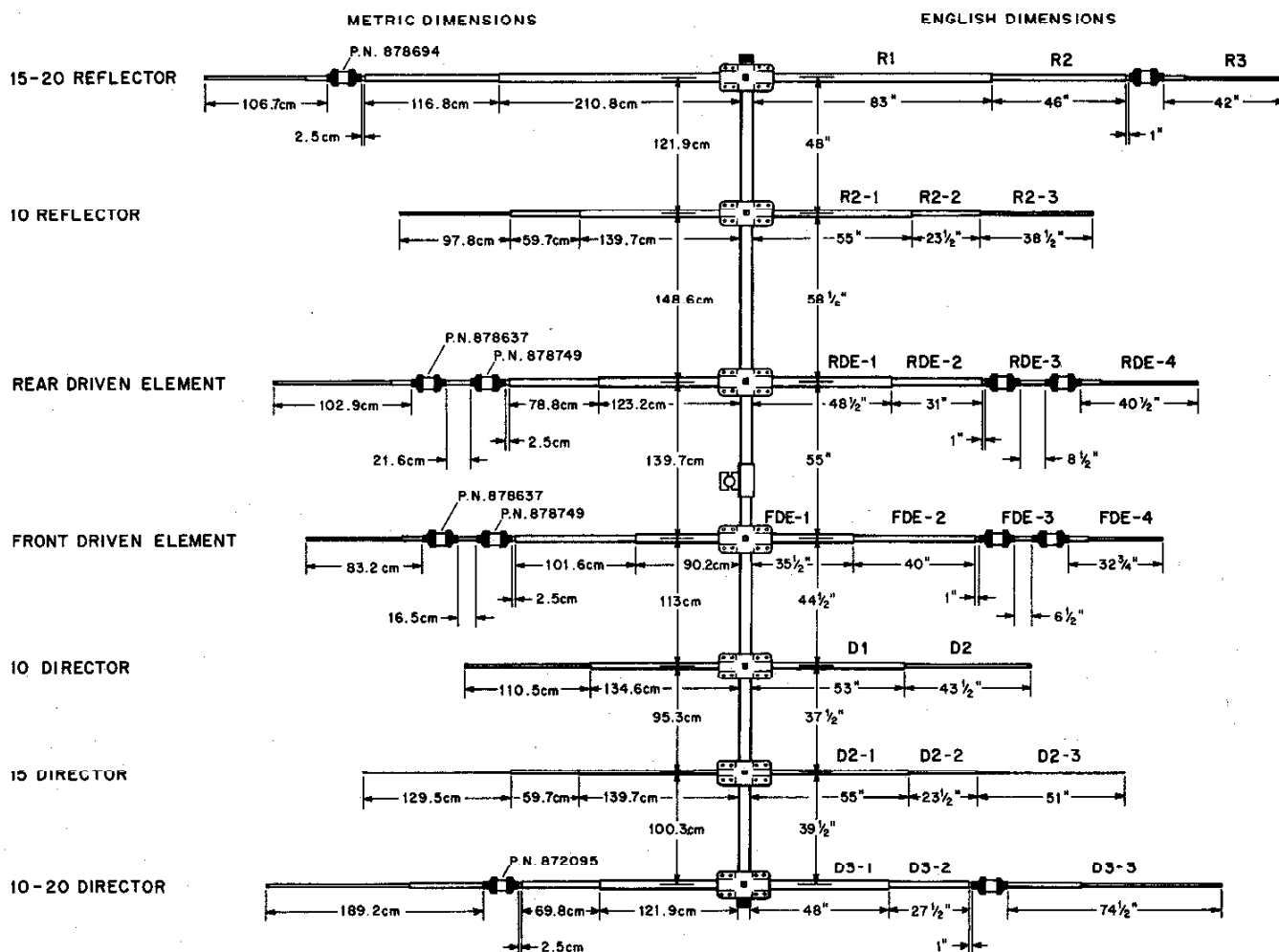


Figure 5
Trap Detail



Dimensions Measured as Shown.

Figure 6
Trap Detail



| Item No. | Designator | Part Number | Description | Item No. | Designator | Part Number | Description |
|----------|--------------|-------------|-----------------|----------|--------------------|-------------|--------------------|
| 1 | R1 | 871098 | 1 1/4" x 83" | 12 | FDE-3 | 190606 | 1" x 6" |
| 2 | R2 | 190303 | 1 1/8" x 52" | 13 | FDE-4 | 178558 | 7/16" x 28" |
| 3 | R3 & RDE-4 | 171153 | 7/16" x 37" | 14 | D1 | 174861 | 7/8" x 53" |
| 4 | R2-1 & D2-1 | 190200 | 7/8" x 55" | 15 | D2 | 174865 | 7/16" x 48" |
| 5 | R2-2 & D2-2 | 190006 | 5/8" x 26" | 16 | D2-3 & D3-3 | 175165 | 7/16" x 52" |
| 6 | R2-3 | 175512 | 7/16" x 42 3/4" | 17 | D3-2 | 190312 | 1 1/8" x 31 7/8" |
| 7 | RDE-1 & D3-1 | 190900 | 1 1/4" x 48" | 18 | 15 Meter Trap | 878694 | 15 Meter Trap |
| 8 | RDE-2 | 190311 | 1 1/8" x 36" | 19 | 10 Meter Trap | 878749 | 10 Meter Trap |
| 9 | RDE-3 | 190603 | 1" x 8" | 20 | 15 Meter DE Trap | 878637 | 15 Meter DE Trap |
| 10 | FDE-1 | 190908 | 1 1/4" x 35" | 21 | 10 Meter Dir. Trap | 872095 | 10 Meter Dir. Trap |
| 11 | FDE-2 | 190300 | 1 1/8" x 48" | | | | |

Figure 7

NOTE: The drain holes and slots should be facing the ground. Also, the trap labels should be on the boom side of the trap. See Figure 5.

**Rear Driven
Element**

Select the RDE-1 section (1¼" x 48") and a driven element insulator. Slip the DE insulator on the unslotted end of RDE-1, then slip the insulated end of the RDE-1 into the bracket which is 35 inches to the right of the mast bracket. Make sure the insulator seats completely onto the tube and into the bracket. Tighten the eight screws to hold the element in place.

Install a 1¼" compression clamp on the slotted end of the RDE-1 and insert the unslotted end of the RDE-2 (1½" x 38") to the dimension shown in Figure 7. Tighten the 1¼" compression clamp securely and recheck the RDE-2 dimension. Assemble the remainder of the Rear Driven Element in the same manner using dimensions from Figure 7. Use Figures 5 and 6 as guides. Use the same traps as on the Front Driven Element.

**10 Meter
Reflector Element**

Select the R2-1 section (7/8" x 55") and slip the unswaged end of the R2-1 completely into the bracket (Item 83) assembled on the boom 58½ inches to the right of RDC. Tighten the eight bolts to hold the element onto the boom.

Assemble the remainder of the 10 meter reflector as shown in Figure 7 using ¾" and ½" compression clamps. Tighten all element compression clamps with the slots facing the ground and recheck all dimensions.

**15-20 Meter
Reflector Element**

Select the R-1 section (1¼" x 83") and slip the unslotted end completely into the bracket (Item 84) assembled on the boom 48 inches to the right of the 10 meter reflector. Tighten the eight bolts to hold the element onto the boom.

Assemble the remainder of the 15-20 meter reflector as shown in Figure 7 using 1¼", 1" and ½" compression clamps. Use trap part number 878694 and install with the drain holes facing the ground. Use Figures 5 and 6 as guides. Tighten all element compression clamps and recheck all dimensions.

**10 Meter
Director Element**

Select the D1 section (7/8" x 53") and slip the unswaged end of the D1 completely into the bracket (Item 83) assembled on the boom 44½ inches to the left of the Front Driven Element. Tighten the eight bolts to hold the element onto the boom.

Assemble the remainder of the 10 meter director, as shown in Figure 7 using ½" compression clamps. Tighten all element compression clamps with the slots facing the ground and recheck all dimensions.

**15 Meter
Director Element**

Select the D2-1 section (7/8" x 55") and slip the unswaged end of the D2-1 completely into the bracket (Item 83) assembled on the boom 37½ inches to the left of the 10 meter director. Tighten the eight bolts to hold the element onto the boom.

Assemble the remainder of the 15 meter director as shown in Figure 7 using ¾" and ½" compression clamps. Tighten all element compression clamps with the slots facing the ground and recheck all dimensions.

**10-20 Meter
Director Element**

Select the D3-1 section (1¼" x 48") and slip the unslotted end completely into the bracket (Item 84) assembled on the boom 39½ inches to the left of the 15 meter director. Tighten the eight bolts to hold the element onto the boom.

Assemble the remainder of the 10-20 meter director as shown in Figure 7 using 1¼", 1" and ½" compression clamps. Use trap part number 872095 and install with the drain holes facing the ground. Use Figures 5 and 6 as guides. Tighten all element compression clamps and recheck all dimensions.

Final Element Assembly

After all elements have been installed, align all elements in the horizontal plane and tighten all anchor screws. You may wish to temporarily assemble the entire boom-to-mast assembly with a short length of mast material to ensure that all elements are assembled perpendicular (at 90°) to the mast. Select the dampener rope and cut it into six equal lengths of two feet each. Slip a rope into the end of each monoband element. With about a 1/2" of rope extending from the element end, separate the fibers and fold them back over the element end. Refer to Figure 8. Now slip a 7/16" caplug over the element and rope. The rope inside the element will dampen vibrations caused by low wind speeds. Place a 7/16" caplug on each end of the trapped elements, also. Select the 2" caplugs and place one on each boom end. Check all element spacings and dimensions and tighten all the bolts before continuing.

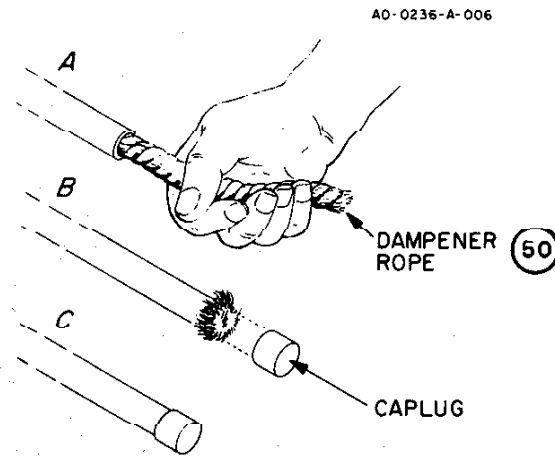


Figure 8
Rope Dampener

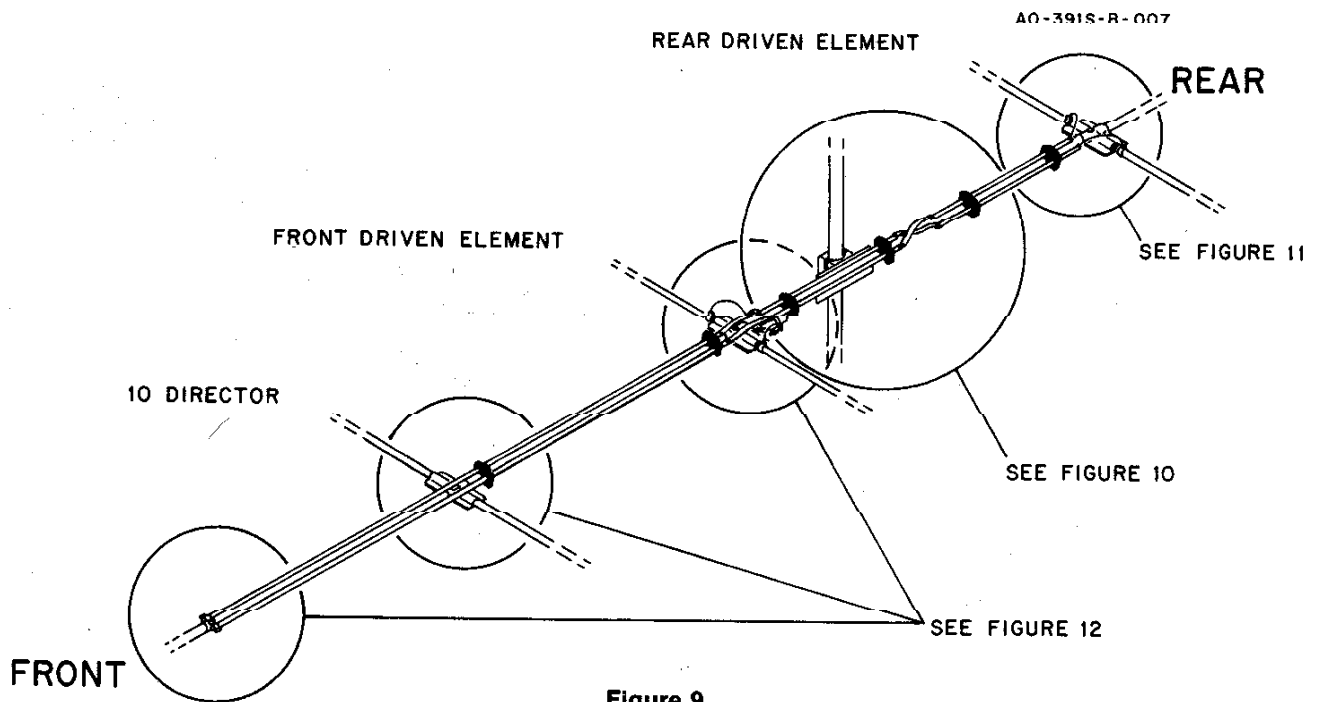


Figure 9
Overall View of Beta Match and Phasing Tubes

Phasing Line Assembly

Select the four $\frac{3}{4}$ " x 23" phasing tubes (Item 86), two crossover straps (Item 57), four beta support clamps (Item 63), four beta support insulators (Item 69), four beta top insulators (Item 70), and associated hardware as shown in Figure 10. Assemble the rear pair of phasing tubes to the boom as shown in Figure 10 and 11. Position the rear ends of the $\frac{3}{4}$ " x 23" tubes $2\frac{1}{2}$ inches from the center of the RDE bracket. Position the tubes so that the drilled holes are away from the boom. Rotate this assembly on the boom so that the front set of phasing tubes will just clear the mast bracket. Tighten the four #10-24 x 2" bolts which hold this assembly to the boom.

Select the two crossover straps and install on the previously installed phasing tubes with $\frac{1}{4}$ "-20 x $\frac{3}{4}$ " bolts, lockwashers and square nuts. *DO NOT* tighten completely at this time. See Figure 10.

Select the remaining two phasing tubes, two beta support clamps, two beta support insulators, two beta top insulators, and associated hardware as shown in Figure 10. Assemble the front pair of phasing tubes to the boom as shown in Figure 10. Rotate the tubes so that the drilled holes are away from the boom. Slide the assembly on the boom until the crossover straps can be attached. The ends of the phasing tubes should be about $3\frac{1}{8}$ inches apart. Attach the crossover straps to the front phasing tubes and tighten the $\frac{1}{4}$ "-20 x $\frac{3}{4}$ " bolts at this time. Loosen and rotate the two assemblies on the boom and install the top two mast bracket bolts ($\frac{5}{16}$ "-18 x 5") as shown in Figure 10. Rotate the two assemblies back into place and position them so that the phasing tubes are $\frac{3}{4}$ inch from the top flange of the mast bracket. You should be able to insert your fingers between the phasing tube and mast bracket and run them along the phasing tube. Tighten the #10-24 x 2" bolts which hold the assemblies to the boom.

Select two $1\frac{1}{4}$ " aluminum tubing clamps, two 7" pigtail assemblies and associated hardware as shown in Figure 11. Install as shown and tighten all bolts securely.

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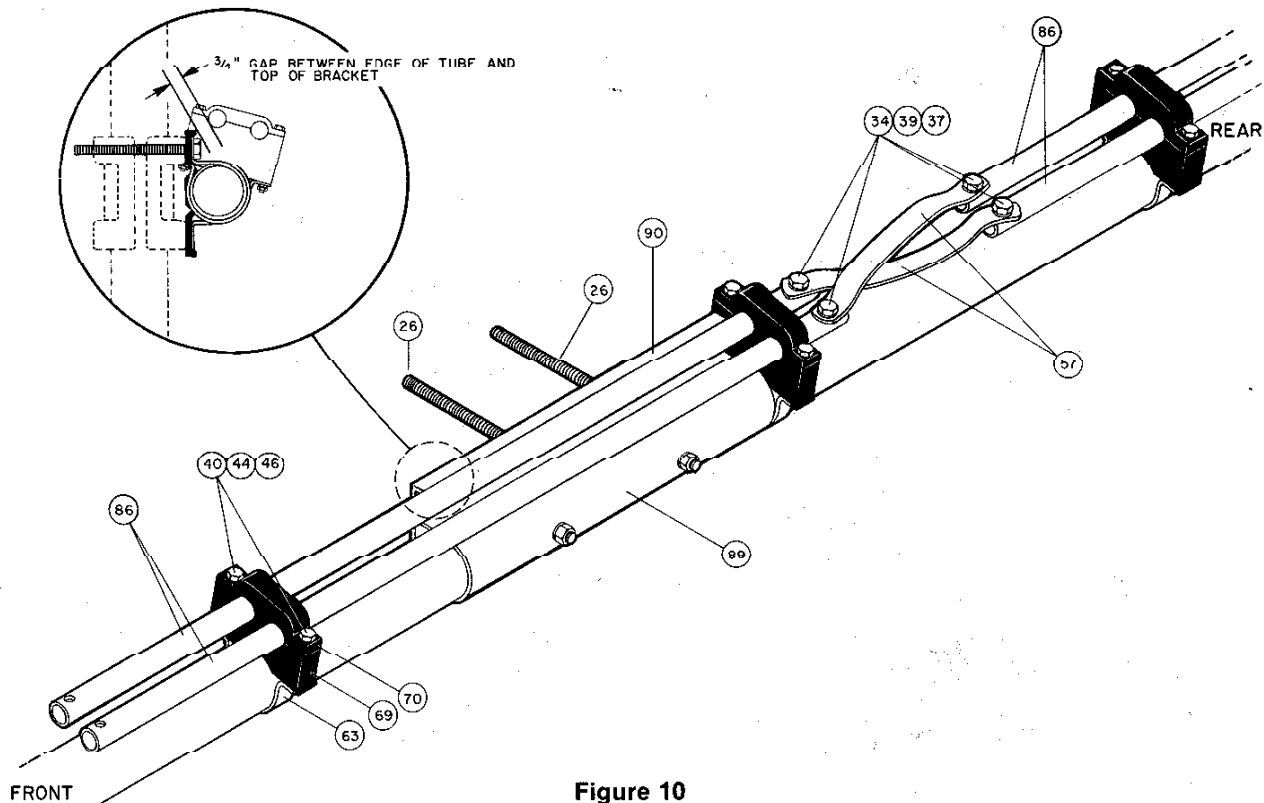


Figure 10

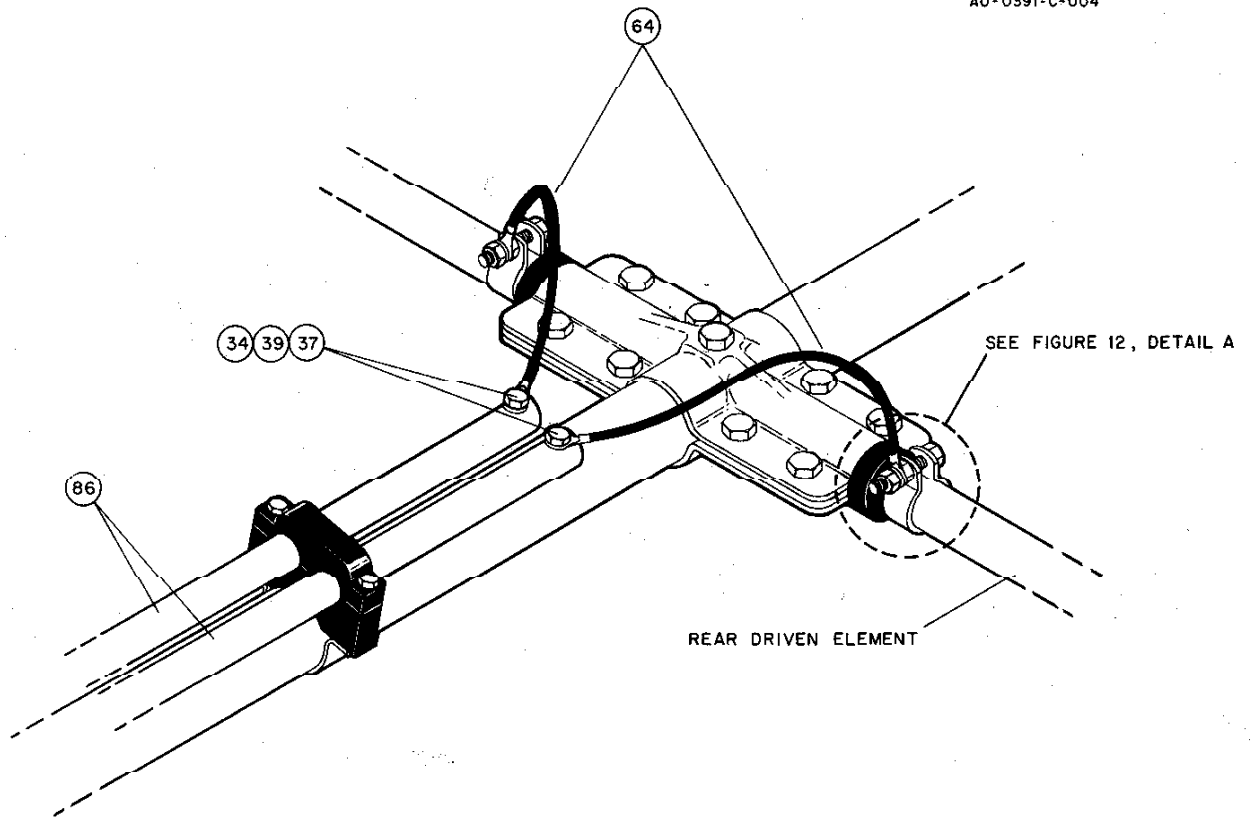


Figure 11

Beta Match Assembly

Select the two beta match tubes ($\frac{3}{4}$ " x 70"), two beta support clamps, two beta support insulators, two beta top insulators, and associated hardware and clamps as shown in Figure 12 and Details A and B. Assemble the beta match tubes and shorting clamp assembly as shown in Figure 12 and Details A and B. The shorting clamp should be flush with the ends of the beta match tubes. The opposite ends of the beta tubes should be approximately 2½ inches from the center of the FDE bracket. The final dimension will depend on the attachment of the beta tubes and the phasing tubes through the beta feed jumper straps.

Feedpoint Assembly

Select the beta feed jumper straps, feed straps and associated hardware as shown in Figure 12. Assemble the beta feed jumper straps and feed straps to the phasing tubes with two $\frac{1}{4}$ "-20 x $\frac{3}{4}$ " bolts, lockwashers and square nuts. See Detail A and Figure 12. Tighten these snugly. Slide the beta tube assembly on the boom until the beta feed jumper straps can be attached. Attach the jumper straps to the beta tubes with $\frac{1}{4}$ "-20 x $\frac{3}{4}$ " bolts, lockwashers and square nuts and tighten all bolts to hold the beta tubes in place.

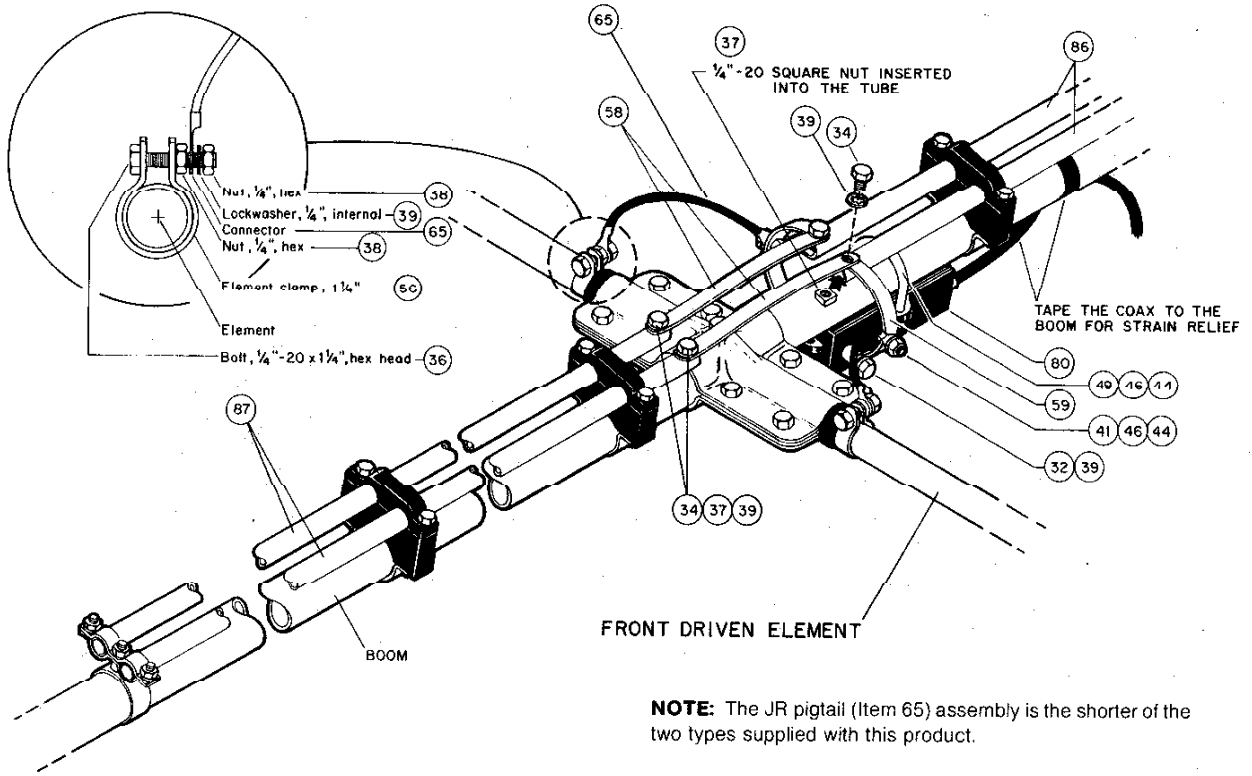
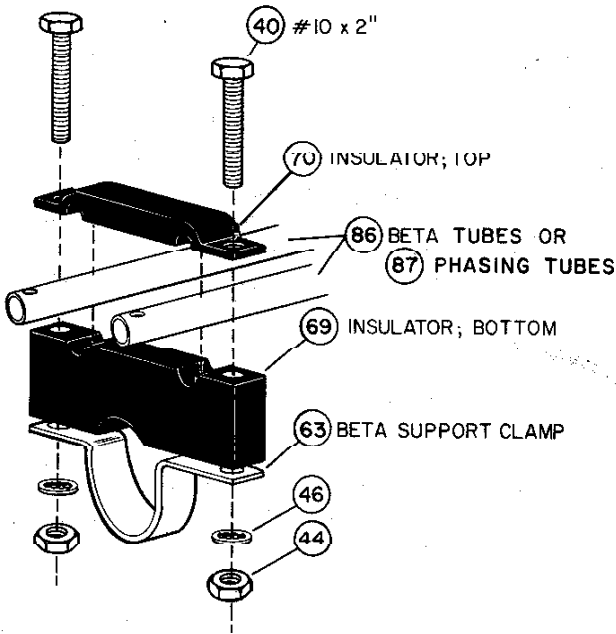
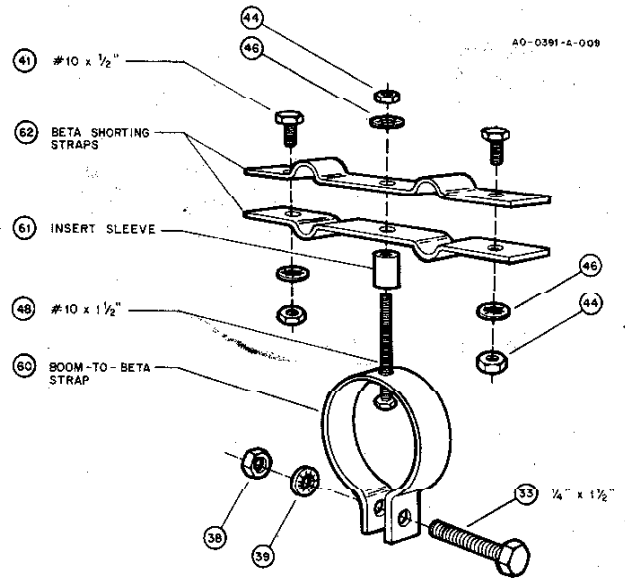


Figure 12



Detail A



Detail B

Select the JR (6½") pigtail assembly wires, 1¼" tubing clamps and associated hardware as shown in Figure 12. Expand the 1¼" clamps slightly and slip onto the 1¼" tubing near the FDE insulators. Position the tubing clamps flush with the insulators and secure to the tubing using ¼"-20 x 1¼" bolts, lockwashers and nuts. Slip one end of a pigtail assembly over each 1¼" bolt and secure using another lockwasher and nut. Route the pigtail up and over to the feed strap. Secure the pigtail wires to the feed strap using #10-24 x ½" screws, lockwashers and nuts.

Attach the BN-86 balun to the boom, as shown in Figure 12, using the U-bolt and #10-24 nuts and lockwashers. The balun will be tipped to one side in order to line up with both feed straps. Attach both feed straps to the balun using ¼"-20 x ⅝" screws and lockwashers. Tighten all screws securely.

Boom Support Assembly

Select the 2" ID boom support clamps (Item 78) and the boom support straps (Item 77) and assemble on the boom 100" from the center of the boom-to-mast clamp as shown in Figure 13. Tighten the bolts securely.

Select the 20 foot boom support cable and cut into two equal lengths with a large pair of wire cutters. Attach one end of each cable to the boom support straps using the thimbles (Item 75) provided. See Figure 13. Attach turnbuckles (Item 73) to the opposite ends of the cable as shown.

Measure the length of the assembled support cable and turnbuckle for each side. The lengths should be within ±½". Allow approximately 10-12 inches of wire to tie off the turnbuckle later, as shown in Figure 13. Attach the chain link (Item 74) and mast strap (Item 76) to each turnbuckle as shown. Install the ⅝" x 2" bolt, lockwasher and nut in each half so that they will be available after the antenna has been hoisted to the top of the tower. Also, tighten the turnbuckle so it will not vibrate loose. Route both cables above all elements and tape near the boom-to-mast bracket so they can be reached after the antenna has been mounted on the tower.

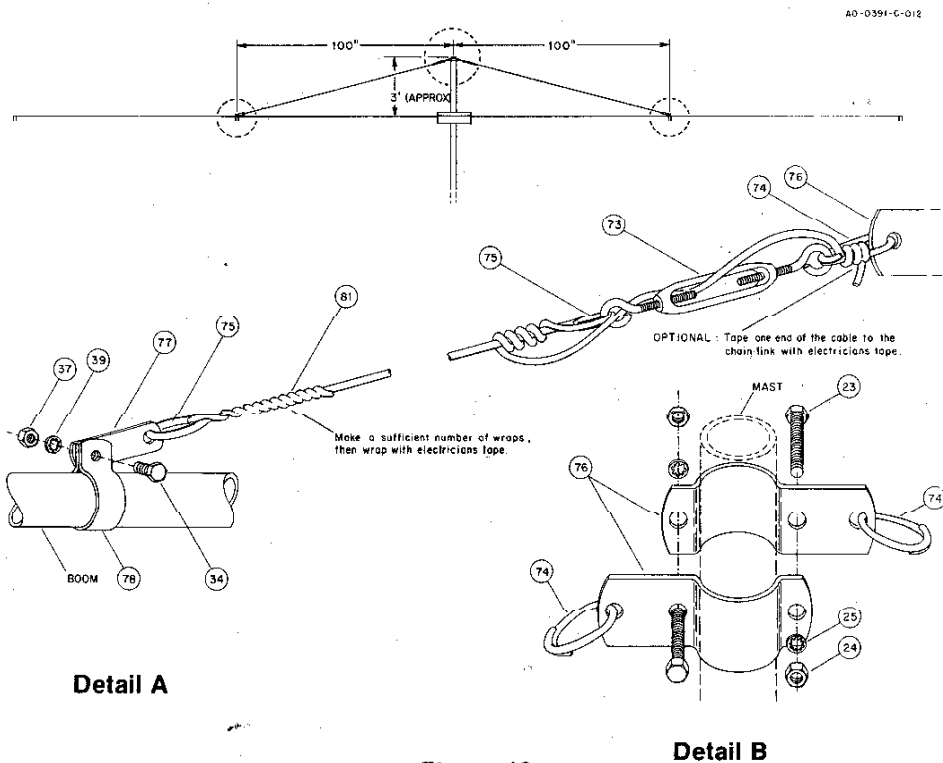


Figure 13

CHAPTER 4

Installation

Make sure all element compression clamps and anchor screws are securely tightened. Also, make sure all beta match and phasing tube hardware are tightened securely and free of corrosion. Ensure that all trap drain holes are facing the ground.

IMPORTANT: The TH7DX is a fairly large and heavy antenna and requires some consideration as to how you are going to get it to the top of the tower. Thoroughly read this section before beginning to install your antenna.

Installation On a Crank-Up Tower

Crank the tower down completely or as low as it will go, and block all sections from moving by using a 2" x 4" piece of wood or a solid iron bar for heavier towers. The block should be inserted through the lattice structure before the tower is completely down, then the tower can be cranked down until the block takes the weight off of the winch.

Use a ladder to reach the top of the tower. **NEVER CLIMB THE LATTICE STRUCTURE OF ANY CRANK-UP TOWER!** Attach the mast to the tower and rotator. (The cast aluminum boom-to-mast brackets should be installed on the mast as shown in Figure 1. See Chapter 3.) Attach a gin pole to the tower to assist in lifting the TH7DX.

Attach the lifting rope to the balance point of the antenna. Be careful not to damage the phasing line assembly next to the boom-to-mast clamp. The lifting rope should be fed through the gin pole or other pulley arrangement attached to the tower. The other end should be at ground level, available to the ground crew for lifting. Guide ropes may be loosely looped over the boom ends and used by the ground crew to guide the antenna away from the tower and ladder. The guide rope's two loose ends should be held by the ground crew, so that the guide rope can be retrieved. See Figure 14.

Attaching the Antenna to the Mast

When the antenna reaches the mast bracket, the two 5" bolts should be inserted through the top two holes in the mast bracket and secured using $\frac{5}{16}$ "-18 lockwashers and nuts. The other two remaining $\frac{5}{16}$ "-18 x 5" bolts should now be installed and secured with the same lockwashers and nuts. Tighten all bolts securely. You may wish to use a deep-well socket set to tighten these bolts. The bolt heads must be on the same side of the boom-to-mast bracket as the phasing tubes. See Figures 2 and 10.

The boom support cables may now be untaped from the boom and attached to the mast. Loosen the turnbuckles and slide the entire assembly up the mast until the boom support wires are straight. Tighten the $\frac{3}{8}$ "-16 x 2" bolts securely. Take up any slack in each wire with the turnbuckles, until the boom is level. When taut, tie off the turnbuckles as shown in Figure 13.

Other Types of Towers

When install the TH7DX on a guyed tower, you may wish to use a different guide system. If you have insulators on your guy wires, you will need to keep the antenna away from the guy wires as well as the tower. You may wish to use two ropes attached together at the top of the tower and attached to the ground about 15 feet apart. These two ropes can then be used to slide the antenna on as it is also being lifted. The two ropes will need to be far enough from the tower base to allow some sag and still support the antenna away from the guy wires.

WARNING

Installation of this product near powerlines is dangerous. For your safety follow the instructions.

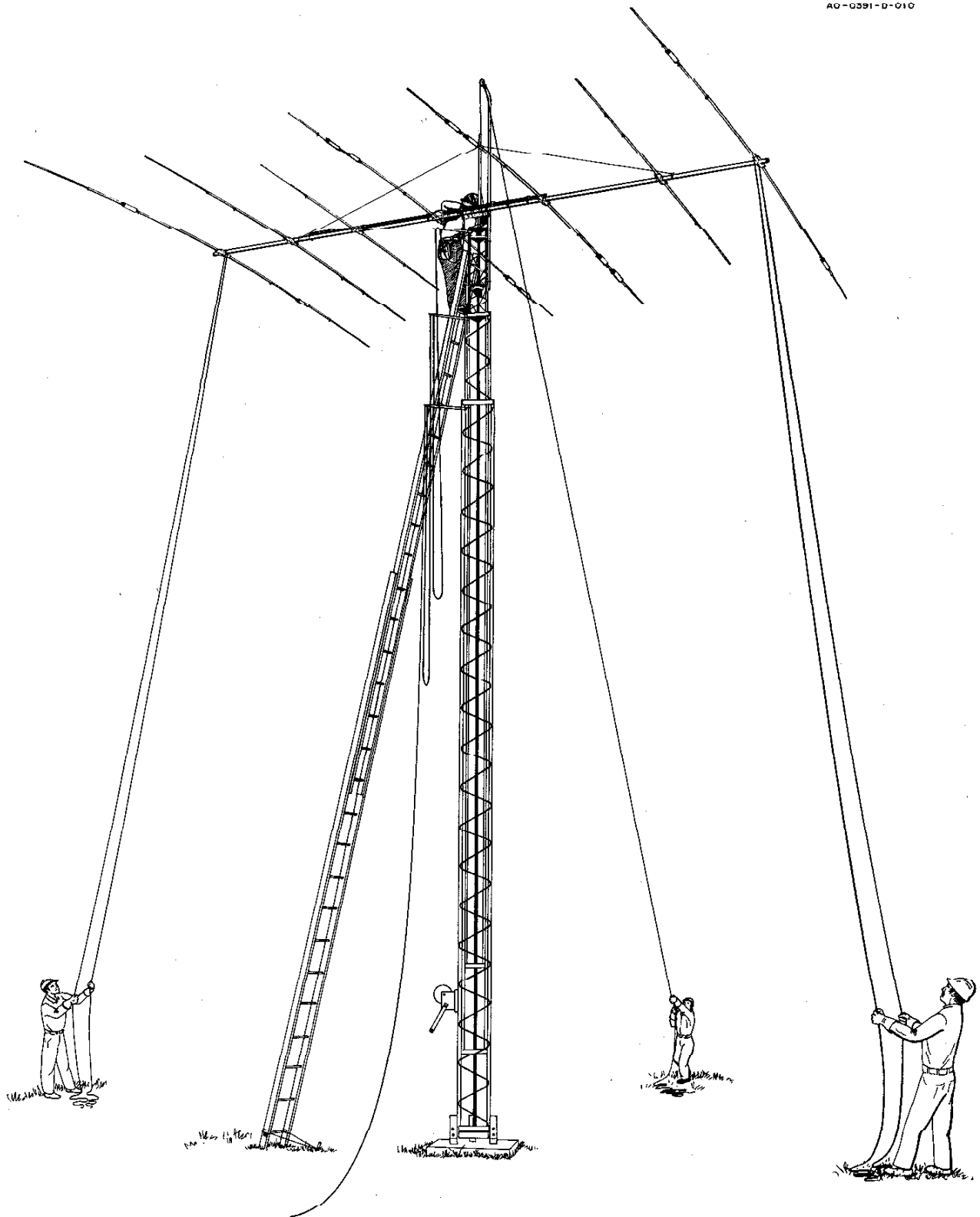


Figure 14
Raising Antenna to Top of Tower

Lightning Protection

For proper lightning protection, you must ground your antenna supporting structure. Grounding will ensure noise free operation and low SWR. A proper ground consist of a 1/2" x 8' copper clad steel ground rod driven into the ground approximately 12 inches away from the concrete tower base. Connect the tower to the ground rod using #8 copper wire and commercial non-corrosive ground clamps.

Attachment of Feedline

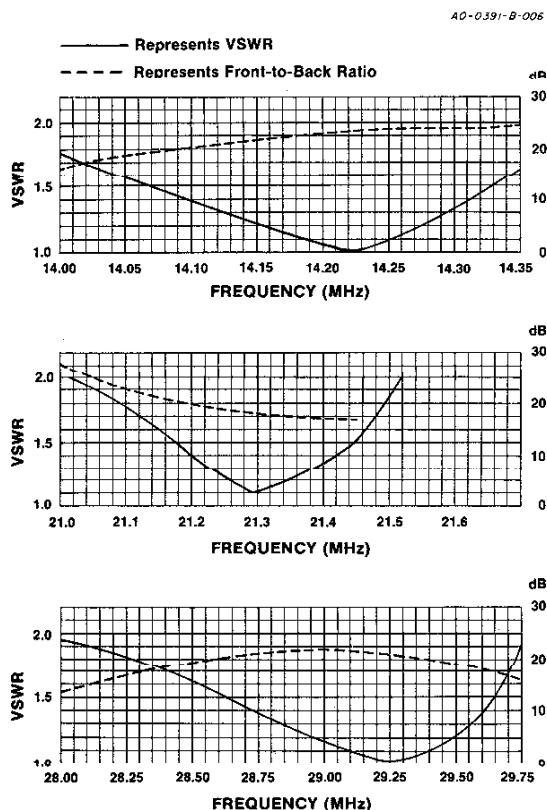
Use a good quality 50 ohm coaxial transmission line such as Belden 8214 (foam) or Belden 8237, 8267 or 9251 (solid). Take extra care when soldering connectors to foam dielectric coaxial cable. Weatherproof all connectors which will be exposed to rain or ice, with Coax-Seal® or another similar substance.

Attach the transmission line to the BN-86 balun and tighten the connector securely. Tape the coax to the boom and mast to ensure good strain relief.

For protection against lightning, it is highly recommended that you use a Hy-Gain Model LA-1 Lightning Arrestor. The Model LA-1 is available at your Hy-Gain dealer. The LA-1 should be installed near your ground rod and connected to the ground rod with #6 or #8 copper wire. Remember that lightning will take the most direct path to ground.

VSWR Curves

These VSWR Curves are typical for this antenna mounted 70 feet above the ground, horizontally polarized. Similar curves can be expected for this antenna mounted between 30 and 100 feet above the ground. **DO NOT TRY TO TUNE THIS ANTENNA FOR LOW VSWR AT GROUND LEVEL.** Higher VSWR can be expected if mounted at less than 30 feet or above a roof or large metallic structure.



VSWR/Front-to-Back Charts

CHAPTER 5

Operation

Connect the other end of your transmission line to a good quality SWR meter and then to your radio. While using low power (less than 200 watts output), check the VSWR across each band from 14.0 to 29.7 MHz. Record this information for future reference. See Table 1. Check the VSWR periodically to ensure proper operation.

The front-to-back ratio may be checked by using a steady carrier transmitted by a local station (at least a ½ mile away). The receiver AGC should be turned off when measuring. The front-to-back ratio may be affected by the proximity of metallic structures or guy wires less than 10 feet below the antenna.

This completes your installation of the TH7DX. Happy DX'ing!

VSWR RECORD

Type of VSWR Meter _____

| Frequency | Date _____ | Date _____ | Date _____ | Date _____ |
|-----------|------------|------------|------------|------------|
| | VSWR | VSWR | VSWR | VSWR |
| 14.00 | _____ | _____ | _____ | _____ |
| 14.10 | _____ | _____ | _____ | _____ |
| 14.20 | _____ | _____ | _____ | _____ |
| 14.30 | _____ | _____ | _____ | _____ |
| 14.35 | _____ | _____ | _____ | _____ |
| | | | | |
| 21.00 | _____ | _____ | _____ | _____ |
| 21.10 | _____ | _____ | _____ | _____ |
| 21.20 | _____ | _____ | _____ | _____ |
| 21.30 | _____ | _____ | _____ | _____ |
| 21.40 | _____ | _____ | _____ | _____ |
| 21.45 | _____ | _____ | _____ | _____ |
| | | | | |
| 28.00 | _____ | _____ | _____ | _____ |
| 28.25 | _____ | _____ | _____ | _____ |
| 28.50 | _____ | _____ | _____ | _____ |
| 28.75 | _____ | _____ | _____ | _____ |
| 29.00 | _____ | _____ | _____ | _____ |
| 29.25 | _____ | _____ | _____ | _____ |
| 29.50 | _____ | _____ | _____ | _____ |
| 29.70 | _____ | _____ | _____ | _____ |

Table 1

CHAPTER 6

Troubleshooting

If you encounter problems with the operation of your TH7DX, follow these steps to isolate the cause of your problem.

Usually you can isolate problems that occur in either your antenna or feedline/feedpoint. If you experience high VSWR on all bands, your problem is probably in the feedline or balun. If you experience high VSWR on some bands but not all bands, look for problems in the antenna element lengths or traps or nearby resonant structures.

| SYMPTOM | POSSIBLE CAUSES |
|--|---|
| Consistently high VSWR on all bands. | Balun damaged by lightning or excessive power. Shorted coaxial connector. Water inside of balun or transmission line. |
| High VSWR dependent upon direction of beam. | Resonant guy wires too close to antenna. Metallic structures or wiring too close to antenna. |
| Intermittent high VSWR not dependent on weather or power level or direction of beam or band selection. | Loose connection on feed system, matching system or transmission line |
| High VSWR when raining or with high humidity. | Trap(s) installed with drain holes up instead of down. Water inside of balun or coax cable. |
| High VSWR with High power, low VSWR with low power. | Balun damaged or defective. |
| Low VSWR, but only near band edge(s). | Loose coaxial connection on transmission line. |
| High VSWR on 10 meters only. | Feedpoint or phasing lines not assembled correctly. |
| High VSWR on only 20 meters or only 15 and 20 meters. | Trap(s) damaged or defective. Resonant guy wires or neaby metallic structure. Another HF antenna too close. Antenna not assembled correctly. |
| High VSWR at band edges | Inadequate tower grounding system. |

CHAPTER 7

Service Information

If you are unable to resolve your problem or if you need to order replacement parts, you should contact the Hy-Gain Customer Service Department in Lincoln, Nebraska.

You should fully research your problem by going through the Troubleshooting Guides in the preceding section before you contact the Customer Service Department. You should also record your VSWR across all three bands before calling.

You should retain your sales receipt or other proof of purchase for antennas that are still under warranty. (See separate sheet for Telex Warranty.)

All requests, inquiries or warranty claims should be made to:

Telex/Hy-Gain
Telex Communications, Inc.
8601 N.E. Highway 6
P.O. Box 5579
Lincoln, Nebraska 68505
ATTN: Customer Service Department
Phone: (402) 467-5321

For other information:

Amateur Department
Telex Communications, Inc.
9600 Aldrich Avenue South
Minneapolis, MN 55420
612-884-1371 or 612-884-4051

An Engineering Report detailing the design and specifications of the TH7DX Antenna is available free-of-charge from the Customer Service Department. Ask for Form No. 5314.

NOTES:

PARTS LIST

NOTE: Item numbers may not necessarily be in numerical sequence and may appear more than one time, depending on how often a part is used, or identical parts being placed in different parts packs.

| Item No. | Part No. | Description | Qty |
|----------|----------|---|--------------------------|
| 1 | 871098 | Tubing assembly, aluminum, 1 1/4" x 83", R1 | 2 ✓ |
| 2 | 190303 | Tube, aluminum, 1 1/8" x 52", R2 | 2 ✓ |
| 3 | 171153 | Tube, aluminum, 7/16" x 37", R3 & RDE-4 | 4 ✓ |
| 4 | 190206 | Tube, aluminum, 7/8" x 55", R2-1 & D2-1 | 4 ✓ |
| 5 | 190006 | Tube, aluminum, 5/8" x 26", R2-2 & D2-2 | 4 ✓ |
| 6 | 175512 | Tube, aluminum, 7/16" x 42 3/4", R2-3 | 2 ✓ |
| 7 | 190900 | Tubing assembly, aluminum, 1 1/4" x 18", RDE-1 & D3-1 | 1 ✓ |
| 8 | 190311 | Tube, aluminum, 1 1/8" x 36", RDE-2 | 2 ✓ |
| 9 | 190606 | Tube, aluminum, 1" x 6", RDE-3 | 2 ✓ |
| 10 | 190908 | Tube, aluminum, 1 1/4" x 35", FDE-1 | 2 ✓ |
| 11 | 190300 | Tubing assembly, aluminum, 1 1/8" x 48", FDE-2 | 2 ✓ |
| 12 | 190603 | Tube, aluminum, 1" x 8", FDE-3 | 2 ✓ |
| 13 | 178558 | Tube, aluminum, 7/16" x 28", FDE-4 | 2 ✓ |
| 14 | 174861 | Tube, aluminum, 5/8" x 53", D1 | 2 ✓ |
| 15 | 174865 | Tube, aluminum, 7/16" x 48", D2 | 2 ✓ |
| 16 | 175165 | Tube, aluminum, 7/16" x 52", D2-3 & D3-3 | 4 ✓ |
| 17 | 190312 | Tube, aluminum, 1 1/8" x 31 3/8", D3-2 | 2 ✓ |
| 18 | 878694 | Trap, 15-meter | 2 ✓ |
| 19 | 878749 | Trap, 10-meter | 4 ✓ |
| 20 | 878637 | Trap, 15-meter, driven element | 4 ✓ |
| 21 | 872095 | Trap, 10-meter, director | 2 ✓ |
| 871781 | 872199 | Parts Pack, TH7DX, 3/8" & 5/16" Hardware, Stainless Steel | 1 ✓ |
| 23 | 500152 | Bolt, 3/8"-16 x 2", hex head | 2 ✓ |
| 24 | 555694 | Nut, 3/8"-16, hex | 2 ✓ |
| 25 | 565696 | Lockwasher, 3/8", internal | 2 ✓ |
| 26 | 500153 | Bolt, 5/16"-18 x 5", hex head | 4 ✓ |
| 27 | 500154 | Bolt, 5/16"-18 x 3 1/2", hex head | 3 ✓ |
| 28 | 506968 | Bolt, 5/16"-18 x 2 3/4", hex head | 2 ✓ |
| 29 | 555747 | Nut, 5/16"-18, hex | 9 ✓ |
| 30 | | (Not Used) | |
| 31 | 564792 | Lockwasher, 5/16", split | 9 ✓ |
| | 872200 | Parts Pack, TH7DX, 1/4" Hardware, Stainless Steel | 7 ✓ <i>5/16 WAS HERE</i> |
| 32 | 500156 | Bolt, 1/4"-20 x 3/8", hex head | 18 ✓ |
| 33 | 504098 | Bolt, 1/4"-20 x 1 1/2", hex head | 17 ✓ |
| 34 | 505266 | Bolt, 1/4"-20 x 3/4", hex head | 74 ✓ |
| 35 | 505734 | Bolt, 1/4"-20 x 2 1/2", hex head | 2 ✓ |
| 36 | 506518 | Bolt, 1/4"-20 x 1 1/4", hex head | 8 ✓ |
| 22 | 505763 | Bolt, 1/4"-20 x 1 3/4", hex head | 8 ✓ |
| 37 | 551367 | Nut, 1/4"-20, square | 52 ✓ |
| 38 | 554099 | Nut, 1/4"-20, hex | 75 ✓ |
| 39 | 562961 | Lockwasher, 1/4", internal | 105 ✓ |
| ✓ | 872201 | Parts Pack, TH7DX, #10 Hardware, Stainless Steel | 1 ✓ |
| 40 | 500157 | Bolt, #10-24 x 2", hex head | 12 ✓ <i>16</i> |
| 41 | 500158 | Bolt, #10-24 x 1/2", hex head | 8 ✓ <i>14</i> |
| 42 | 504069 | Bolt, #10-24 x 1", hex head | 14 ✓ <i>26</i> |
| 43 | | (Not Used) | |
| 44 | 554071 | Nut, #10-24, hex | 26 ✓ <i>34</i> |
| 45 | 555693 | Nut, #10 24, square | 18 ✓ <i>34</i> |

PARTS LIST (Cont.)

| Item No. | Part No. | Description | Qty |
|----------------|---------------|--|-----|
| | 872201 | Parts Pack, TH7DX, #10 Hardware, Stainless Steel — Continued | |
| 46 | 565897 | Lockwasher, #10, internal | 30 |
| 48 | 500159 | Bolt, #10-24 x 1½", hex head | 1 |
| 49 | 541363 | U-bolt, #10-24 x 2½" x 2¾" | 1 |
| 871887? | 871888 | Parts Pack, TH7DX, Compression Clamps | 1 |
| 51 | 380413 | Compression clamp, ½" | 14 |
| 52 | 380420 | Compression clamp, ¾" | 4 |
| 53 | 380421 | Compression clamp, 1" | 16 |
| 54 | 380422 | Compression clamp, 1¼" | 8 |
| | 871889 | Parts Pack, TH7DX, Straps | 1 |
| 56 | 168695 | Clamp, 1¼", tubing | 4 |
| 57 | 170452 | Crossover strap, TH7DX | 2 |
| 58 | 170453 | Beta feed jumper, TH7DX | 2 |
| 59 | 170454 | Feed strap, TH7DX | 2 |
| 60 | 171077 | Strap, boom-to-beta, 2", I.D. | 1 |
| 61 | 171131 | Sleeve, beta shorting | 1 |
| 62 | 171162 | Strap, beta shorting, ¾" radius | 2 |
| 63 | 177888 | Clamp, beta support | 6 |
| 64 | 871508 | Pigtail wire, 7" | 2 |
| 65 | 878561 | Pigtail wire, Jr., 6½" | 2 |
| | 871890 | Parts Pack, TH7DX, Insulators | 1 |
| 67 | 455625 | Caplug, 2" | 2 |
| 68 | 455611 | Caplug, 7/16" | 14 |
| 69 | 465595 | Insulator, beta support (bottom) | 6 |
| 70 | 465600 | Insulator, beta support (top) | 6 |
| 71 | 465833 | Insulator, driven element | 4 |
| | 871886 | Parts Pack, Boom Support | 1 |
| 73 | 351243 | Turnbuckle, 7/32" x 2" | 2 |
| 74 | 351244 | Chain link, open end, 3/16" | 2 |
| 75 | 351700 | Thimble, wire rope, 5/32" | 4 |
| 76 | 381100 | Clamp, mast, 1½" I.D., boom support | 2 |
| 77 | 381253 | Strap, boom support | 2 |
| 78 | 388861 | Clamp, boom, 2" I.D., boom support | 2 |
| 79 | 872098 | Tube, boom, 2" x 79½" | 2 |
| 80 | 873424 | Dalun, BN-86, 50 ohm | 1 |
| 81 | 691081 | Cable, boom support, 1/8" x 20' | 1 |
| 82 | 102734 | Mast bracket, cast aluminum | 2 |
| 83 | 163764 | Bracket, element-to-boom, #1 | 6 |
| 84 | 165919 | Bracket, element-to-boom, #13 | 4 |
| 85 | 165920 | Bracket, element-to-boom, #14 | 4 |
| 86 | 170447 | Phasing tubes, 3/4" x 23" | 4 |
| 87 | 170456 | Beta tubes, 3/4" x 70" | 2 |
| 88 | 171166 | Tube, boom, 2" x 69½" | 2 |
| 89 | 172732 | Clamp, boom-to-bracket | 1 |
| 90 | 172735 | Bracket, casting-to-boom | 1 |
| 50 | 691138 | Rope, polyethylene, 5/32" x 12' | 1 |
| 91 | 850050 | Coax-Seal® | 1 |

Parts Identification Information

Item numbers 1 thru 17 indicate the aluminum tubes and tubing assemblies used as elements on the TH7DX. The description lists the outside diameter (O.D.) of the tube and the total length of the tube in inches.

Item numbers 18 thru 21 indicate the factory pretuned traps used on the TH7DX. The part number and type of trap is printed on each part.

The hardware packs are divided into smaller packs, most containing only one size of hardware. The size of the hardware is determined by the outside diameter (O.D.) of the threads, e.g. $\frac{3}{8}$ " , $\frac{5}{16}$ " , $\frac{1}{4}$ " , and #10. In the description the thread size is followed by the threads-per-inch and bolt length.

To identify the size of the element compression clamps, please refer to Figure 4, page 6.

To identify the straps, please refer to Figures 10-13, pages 11-14.

To identify the insulators, please refer to Figures 3 and 12.

Converting English Measurements to Metric

Use this scale to identify lengths of bolts, diameters of tubes, etc.. The English inch (") and foot (') can be converted to centimeters in this way.

1 inch (1") = 2.54 cm
1 foot (1') = 30.48 cm

Example: 42" x 2.54 = 106.7 cm



A0 - 391S - A - 017

BOLT and NUT SIZES



$\frac{3}{8}$ "



$\frac{5}{16}$ "



$\frac{1}{4}$ "



#10

To determine proper bolt diameter, place thread end of bolt over black circle. Repeat for nut.

| Item No. | Designator | Part Number | Description | Item No. | Designator | Part Number | Description |
|----------|--------------|-------------|-----------------|----------|--------------------|-------------|--------------------|
| 1 | F1 | 871098 | 1 1/4" x 83" | 12 | FDE-3 | 190306 | 1" x 6" |
| 2 | F2 | 190303 | 1 1/8" x 52" | 13 | FDE-4 | 178558 | 7/16" x 28" |
| 3 | F3 & RDE-4 | 171153 | 7/16" x 37" | 14 | D1 | 174361 | 7/8" x 53" |
| 4 | R2-1 & D2-1 | 190206 | 7/8" x 55" | 15 | D2 | 174365 | 7/16" x 48" |
| 5 | R2-2 & D2-2 | 190006 | 5/8" x 26" | 16 | D2-3 & D3-3 | 175165 | 7/16" x 52" |
| 6 | R2-3 | 175512 | 7/16" x 42 3/4" | 17 | D3-2 | 190312 | 1 1/8" x 31 7/8" |
| 7 | RDE-1 & D3-1 | 190900 | 1 1/4" x 48" | 18 | 15 Meter Trap | 878594 | 15 Meter Trap |
| 8 | RDE-2 | 190311 | 1 1/8" x 36" | 19 | 10 Meter Trap | 878749 | 10 Meter Trap |
| 9 | RDE-3 | 190603 | 1" x 8" | 20 | 15 Meter DE Trap | 878537 | 15 Meter DE Trap |
| 10 | FDE-1 | 190908 | 1 1/4" x 35" | 21 | 10 Meter Dir. Trap | 872095 | 10 Meter Dir. Trap |
| 11 | FDE-2 | 190300 | 1 1/8" x 48" | | | | |

METRIC DIMENSIONS

ENGLISH DIMENSIONS

