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TH-3JRS

Tri-band HF 3 Elements Beam
 Covers 10, 15 and 20 Meters

INSTRUCTION MANUAL

WARNING

Installation of this product near power lines is dangerous. For your safety, follow the installation directions.

General Description

The TH3JR-S antenna was designed for the Ham who has space limitations but still wants top performance on 10, 15 and 20 meters.

The TH3JR-S is constructed of taper-swaged aluminum tubing which offers low wind resistance. It can be rotated with a heavy-duty TV rotator. The light weight is ideal for rooftop or lightweight tower installations. The antenna features super strength stainless steel hardware and a boom-to-mast bracket that will fit masts up to 2 inches in diameter.

Specifications	
<i>Electrical</i>	
Forward Gain	Up to 8 dBi
Front-To-Back Ratio	25 dB
VSWR at Resonance	Less than 1.5:1
Nominal Impedance	50 ohms
Power Capability (Transmitter Output)	600 Watt PEP, 300 Watt AM
Lightning Protection	DC ground
<i>Mechanical</i>	
Net Weight	21 lbs. (11.7 kg)
Boom Length	12 ft. (3.65 m)
Longest Element	27'3" (8.30m)
Turning Radius	14'9" (4.49m)
Wind Survival	80 mph (128 kmph)
Accepts Mast	1 1/4" to 2" (32 mm to 51mm)
Surface Area	3.35 sq. ft. (0.32 sq. m)
Effective Moment*	310 ft. lb. (53 kg-m)
Wind Load at 80 MPH	87 lbs. (39.4 kg)
Hardware	Stainless Steel (except for U-Bolts and some small parts)
Suitable Rotators	Hy-Gain AR-40 or CD-45II
*Effective Moment is defined as the product of the antenna weight and turning radius.	

Step-By-Step Assembly

NOTE: When unpacking your antenna, check the inside of all tubing for parts (clamps, insulators, smaller tubing, etc.). To conserve space during packing, these smaller articles are put inside large pieces.

Select the two boom sections (1 1/4" x 72") and boom-to-mast brackets.

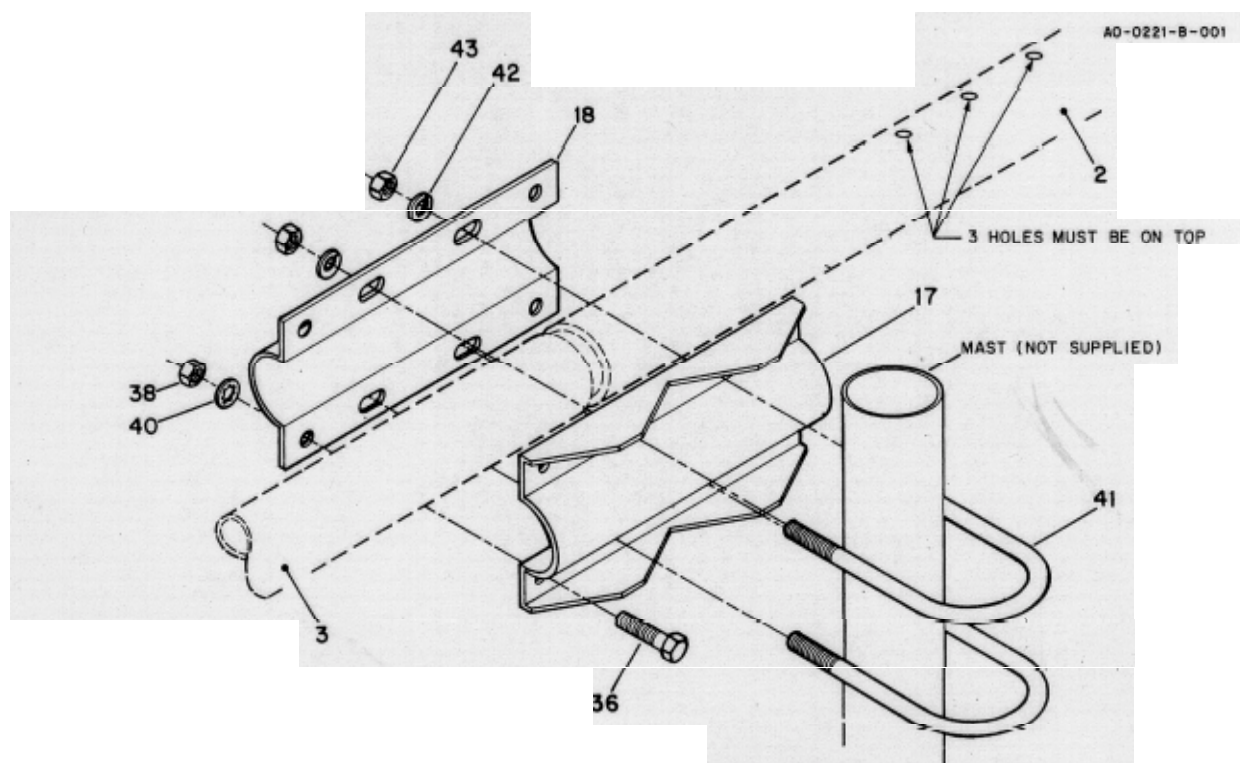
NOTE: The reflector portion of the boom has holes drilled in it for the beta match. Make sure they are on top when you tighten the boom-to-mast bracket. See illustration in this manual.

Assemble the two halves of the boom-to-mast bracket by placing the 1/4" x 3/4" screws in the four outside holes as shown in Figure 1. *DO NOT tighten at this time.*

Slip the boom sections into the boom-to-mast bracket until they meet in the middle. Make certain the drilled holes on the reflector end are on top and close to the boom-to-mast bracket, then tighten the bolts securely.

Place a 1 1/4" capplug on each end of the

Insert the two U-bolts into the boom-to-mast bracket and start the 5/16" nuts and lockwashers. *DO NOT tighten at this time.*



Item No.	Description
2	Boom (Reflector), drilled, 1 1/4" x 72"
3	Boom (Director), 1 1/4" x 72"
17	Boom-to-Mast Bracket
18	Clamp, Boom-to-Bracket
36	Bolt, hex head, 1/4"-20 x 3/4"
38	Nut, 1/4"-20, hex
40	Lockwasher, 1/4" internal
41	U-bolt, 5/16"-18 x 3 5/8"
42	Lockwasher, split, 5/16"
43	Nut, hex, 5/16"-18

Figure 1
Boom-to-Mast Bracket Assembly

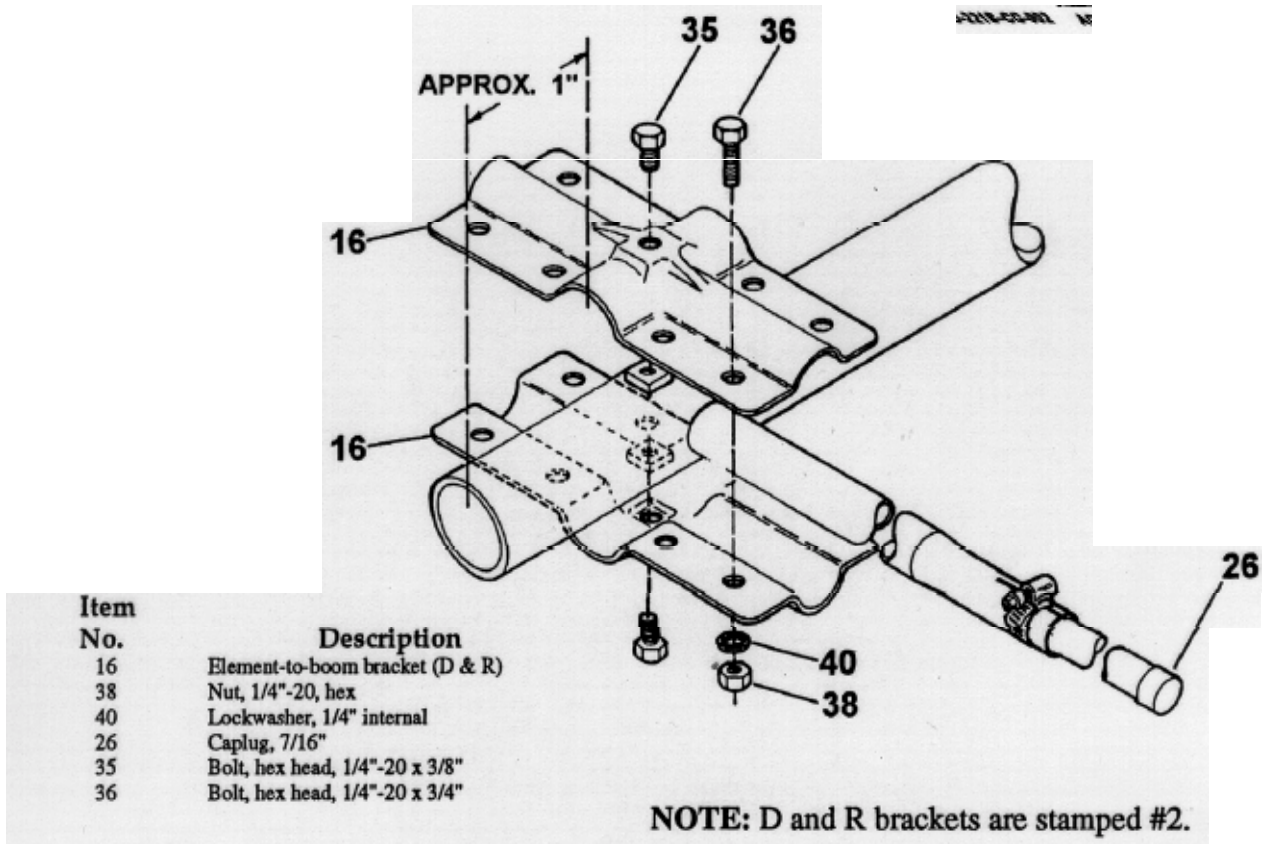


Figure 2
Reflector/Director Detail

Start at the reflector end (boom section that has the hole drilled in it) and measure approximately 1" from the end of the boom and install the elementboom bracket as shown in Figure 2. Only tighten the hardware enough to keep the bracket in place. Final positioning of this element will depend upon placement of the driven element and the dimensions from Figure 4.

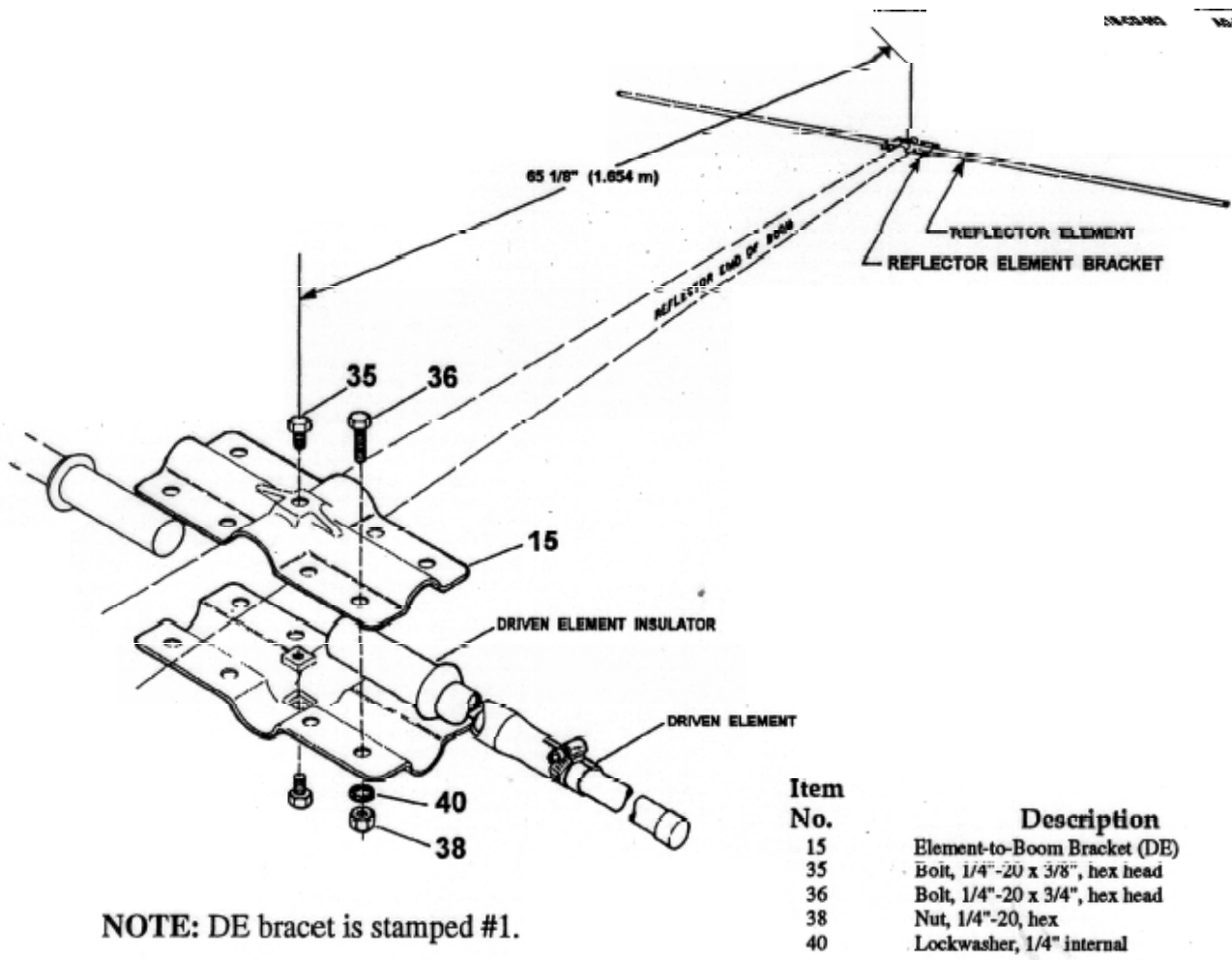
Select the R1 sections (7/8" x 72") of tubing and slip one end of each in each side of the bracket and tighten the bracket securely with the exception of the two anchor screws. *DO NOT tighten at this time*

Measure along the boom 65 1/8" from the center of the reflector element-to-boom bracket and install the driven element-to-boom bracket. Select the DE sections and slip the driven element insulators onto one end of the DE1 sections (7/8" x 72").

Slip the insulated end of the DE1 section into the driven element bracket and tighten securely. See Figure 3 for proper installation. *DO NOT tighten the anchor screws at this time.*

Measure 74" from the center of the driven element bracket to the center of the director and install the director element-to-boom bracket. Select and install the D1 sections (7/8" x 72") by slipping one into each side of the bracket and tighten securely. *DO NOT tighten the anchor screws at this time.*

Now recheck the measurement and make certain all the elements are aligned evenly.



NOTE: DE bracet is stamped #1.

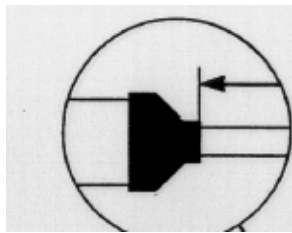
Item No.	Description
15	Element-to-Boom Bracket (DE)
35	Bolt, 1/4"-20 x 3/8", hex head
36	Bolt, 1/4"-20 x 3/4", hex head
38	Nut, 1/4"-20, hex
40	Lockwasher, 1/4" internal

Figure 3
Driven Element Bracket Assembly

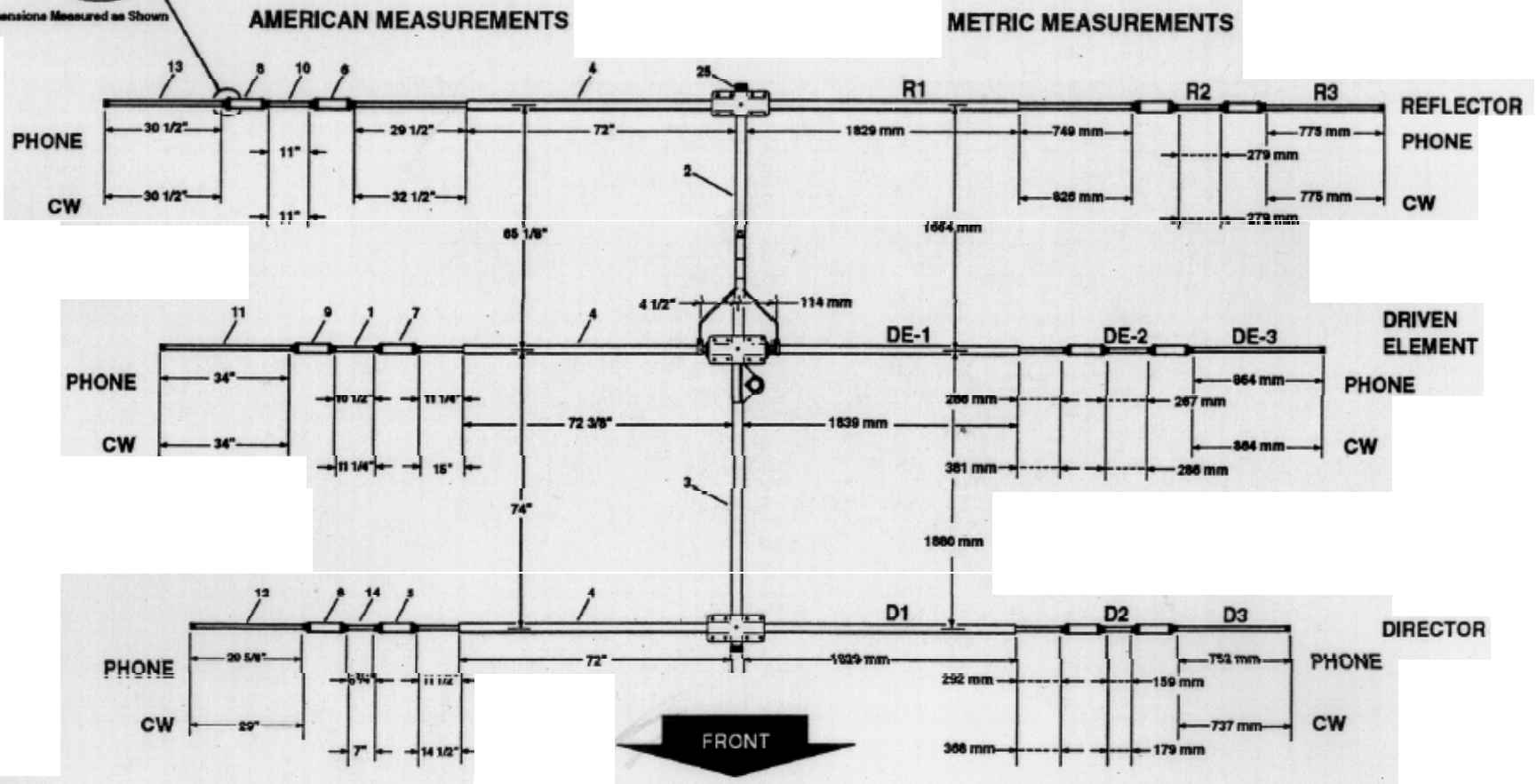
NOTE: At this time select your **mode** of transmission - either Phone or Continuous Wave (CW). Refer to the dimensions for your mode of transmission. Use the same mode for all dimensions.

Select R2 (3/4" x 10 1/2") and slip it onto the 10-meter trap assembly. Slip one #6 tubing clamp on each end of R2. Tighten slightly.

Select the 10-meter reflector trap (marked REF) and a #6 tubing clamp and slip it on the end of R1. Slip the longest end of the 10-meter trap into the R1 section to the dimensions given for your mode of transmission. Tighten the tubing clamp slightly. See Figure 4.



Dimensions Measured as Shown



Item No.	Description
1	DE2, 3/4" x 9 1/2"
2	Boom (Reflector), 1 1/4" x 72", drilled
3	Boom (Director), 1 1/4" x 72"
4	Tube, swaged, 7/8" x 72"
5	10-Meter Trap assembly (Director)
6	10-Meter Trap Assembly (Reflector)
7	10-Meter Trap Assembly (Driven Element)
8	15-Meter Trap Assembly (Director & Reflector)

Figure 4
Element Layout and Dimensions

Item No.	Description
9	15-Meter Trap Assembly (Driven Element)
10	R2, 3/4" x 10 1/2"
11	DE3, 7/16" x 34 1/2"
12	D3, 7/16" x 31 1/2"
13	R3, 7/16" x 32"
14	D2, 3/4" x 5 7/8"
25	Caplug, 1 1/4"

VSWR Charts

These VSWR curves are typical for this antenna mounted 70 feet above ground, horizontally polarized. Similar curves can be expected for this antenna mounted at least 30 feet above ground. DO NOT try to tune this antenna for low VSWR at ground level.

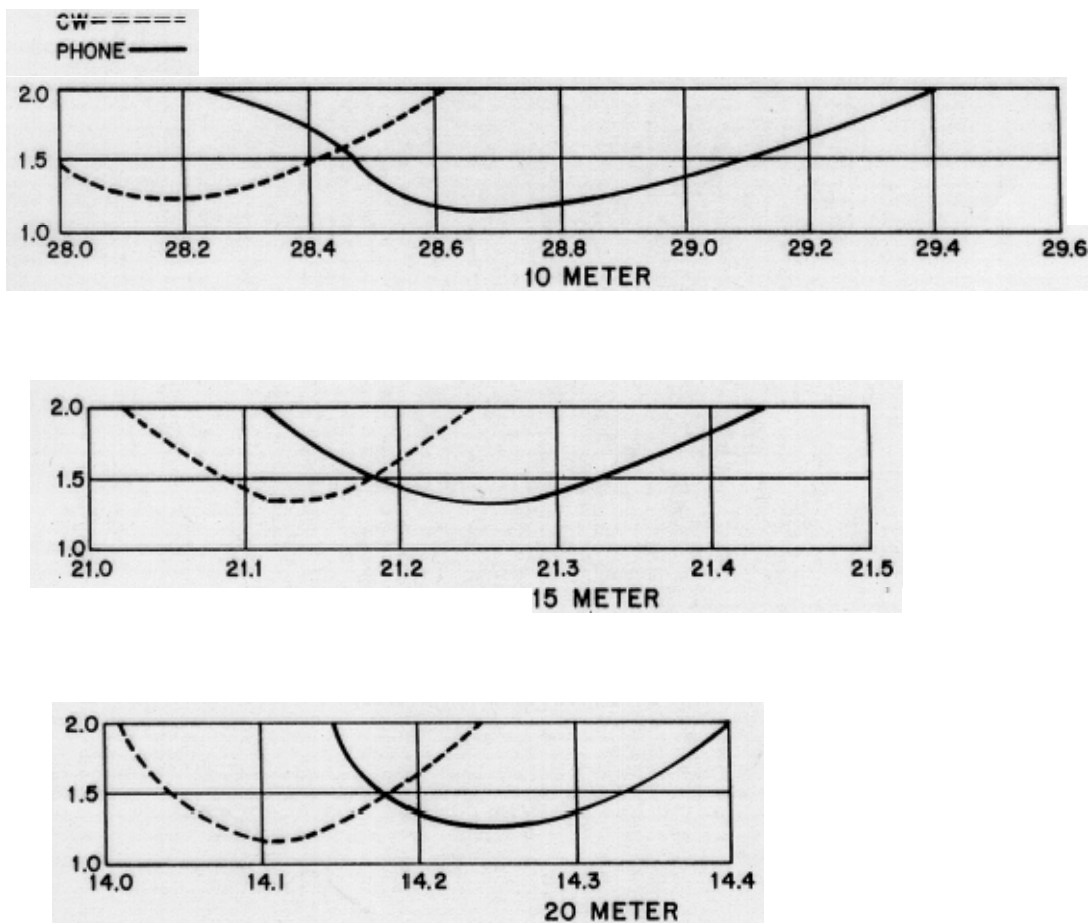
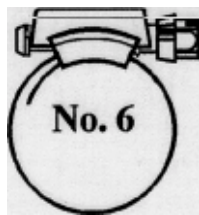
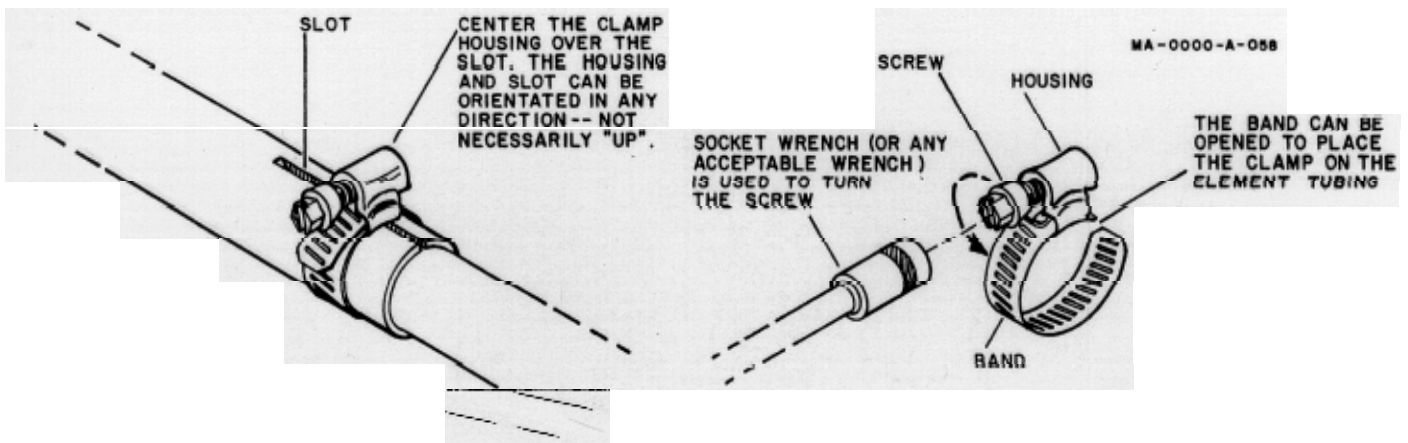


Figure 5
VSWR Charts

Installation of Tubing Clamp

Select the proper size tubing clamp as shown in the chart. (See Figure 6). When installing the clamps, place the clamp near the tube end with the top of the clamp over the slot in the tube as shown in Figure 6.

After adjustment of the tubing lengths, tighten the clamp with a 5/16 inch nut driver, socket, or open end wrench until the tubing will not twist or telescope.



Part No.	Description	Fits Tubing Sizes
358756	Clamp, Size #6 all stainless steel 5/16" hex head screw	1/2" and 3/4"

Figure 6
Tubing Clamps

Select the R3 sections (7/16" x 32") and slip it into the 15-meter trap assembly to the dimensions shown for your mode of transmission. Slip on #6 tubing clamp, and tighten slightly.

Place a 7/16" caplug on each end of the element.

NOTE: The remaining elements will be installed in the same manner as above with the exception of using the trap designated for that particular element. The traps are marked as follows:

10-Meter Traps

- Director - 10 DIR
- Driven Element - 10 DE
- Reflector - 10 REF

15-Meter Traps

- Director - 15 DIR/REF
- Driven Element - 15 DE
- Reflector - 15 DIR/REF

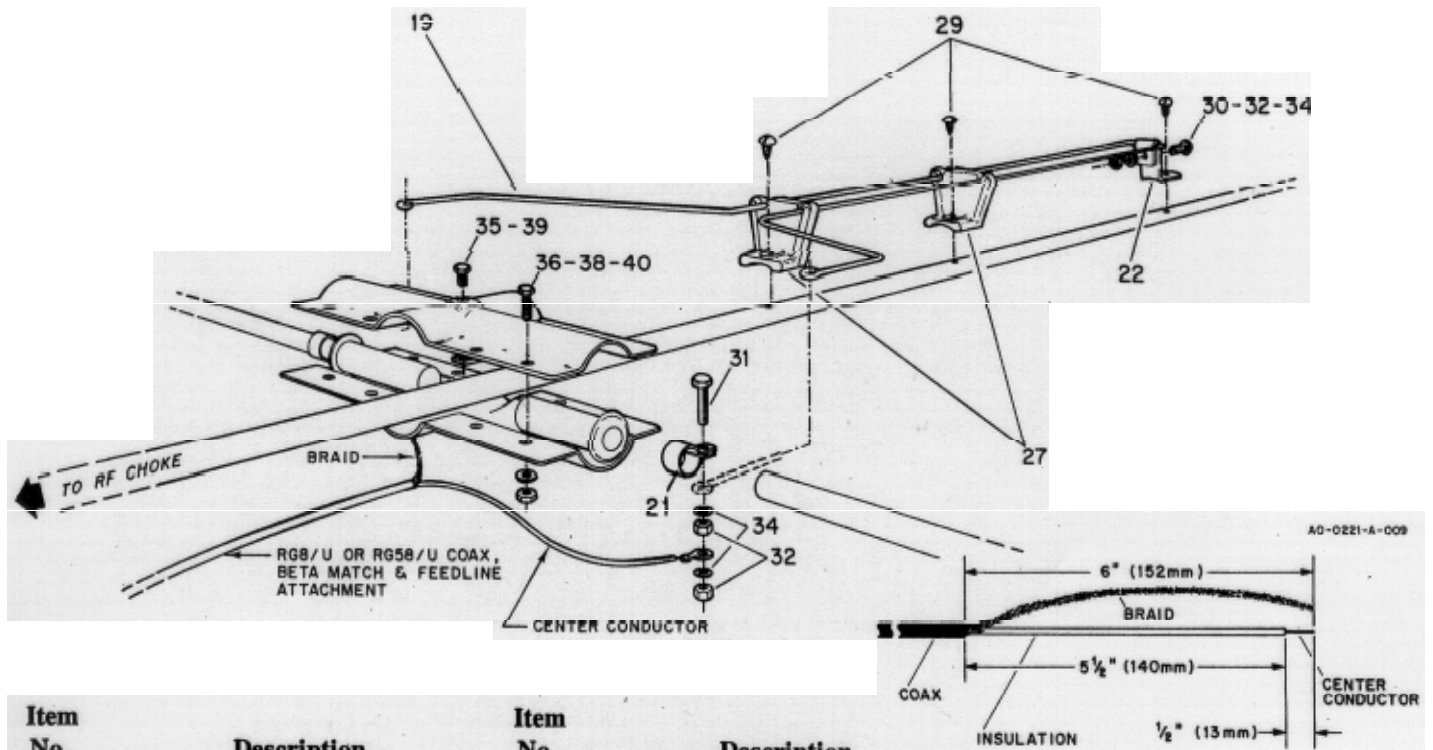
Select the remaining DE tube sections and install as before.

Select the remaining director tube sections and install as before.

Select the beta match support insulators as shown in Figure 7.

Select the beta shorting strap and install as shown in Figure 7. Tighten all hardware used with the beta match, shorting strap and driven element. Remeasure the dimensions between elements as shown in Figure 4. Tighten all hardware including the anchor screws at this time.

A balun is not required for normal operation of this antenna. However, there are three recommended feedpoint configurations, one of which utilizes the Hy-Gain Model BN-86 balun for increased performance and convenience.



Item No.	Description	Item No.	Description
19	Beta Match	32	Nut, hex, #10-24
21	Tubing Clamp, 7/8"	34	Lockwasher, internal, #10
22	Beta Shorting Clamp	35	Bolt, hex head, 1/4"-20 x 3/8"
27	Insulator, Beta Match	36	Bolt, hex head, 1/4"-20 x 3/4"
29	Screw, Type T, #6-32 x 1/2", rh	38	Nut, hex, 1/4"-20
30	Bolt, hex head, #10-24 x 5/8"	39	Nut, square, 1/4"-20
31	Bolt, hex head, #10-24 x 1"	40	Lockwasher, internal, 1/4"

Figure 7
Beta Match/Feedline Attachment

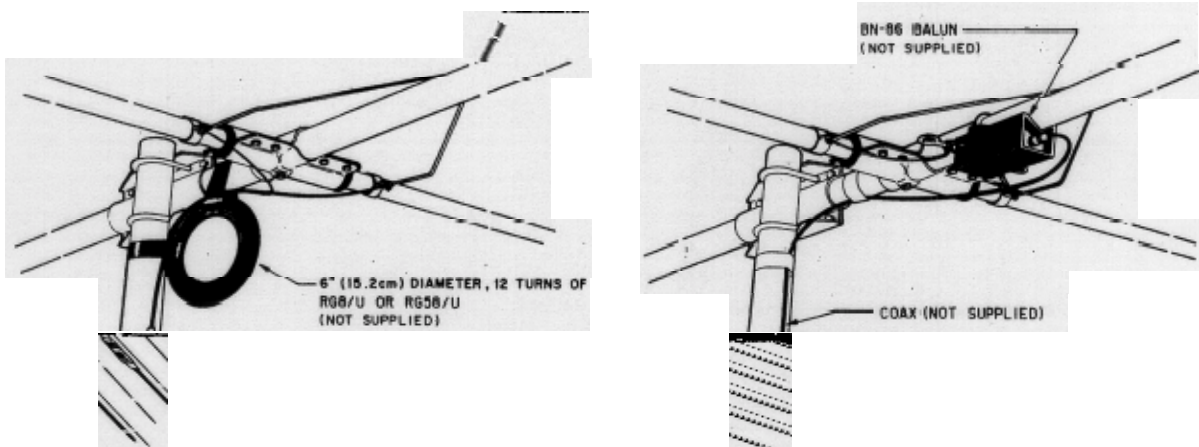


Figure 8
RF Choke

The first feedline configuration involves connection of the coaxial feedline directly to the driven element. The recommended feedline is RG-213/U (such as Belden 8267). Other types of coaxial cable may be used if proper selection and careful assembly are utilized. The feedline should be stripped as shown in Figure 7. Attach solder lugs (not supplied) to the center conductor and shield for easy connection to the driven element. Weatherproof all connections.

The second feedpoint configuration involves construction and installation of a homemade RF choke. The RF choke will prevent RF from flowing on the outside of the coaxial shield. This will block radiation from the coaxial feedline; thereby reducing the risk of TVI and preventing radiation pattern degradation.

Wind the RF choke from RG-213/U (or equivalent) coaxial cable. The choke should consist of 12 turns with an inside coil diameter of six inches. Allow enough cable at the end to reach from the mast to the driven element. Strip the coaxial cable as shown in Figure 7. Attach solder lugs (not supplied) to the center conductor and shield for easy connections to the driven element. Weatherproof all connections.

The third feedpoint configuration involves using a 50 ohm 1:1 balun to connect the feedline to the driven element. (Hy-Gain Model BN-86 is recommended.) A balun will act as an RF choke and will balance the flow of current on the driven element, resulting in a symmetrical radiation pattern. A balun will also have a coaxial connector, providing more convenience than a coax splice. Follow the instructions supplied with the balun for connection to the antenna.

NOTE: Use caution when selecting a balun to use with this antenna. Some baluns are designed for 50-75 ohm impedance and may result in a higher SWR when used with this antenna. For best results, use the Hy-Gain BN-86, 50 ohm balun. The Model BN-86 is available at your local Hy-Gain dealer.

Carefully recheck all measurements, make certain the drain holes in the traps are facing down and then tighten all compression clamps securely.

Make certain all electrical connections are tight. Weatherproof your coaxial connection using Coax-Seal (R) or some similar substance.

Slip the boom-to-mast clamp over your mast and tighten securely.

This completes your installation.

WARNING

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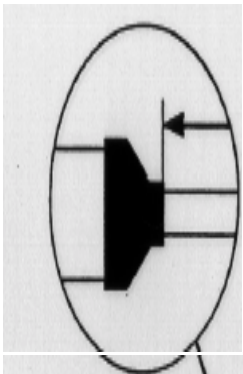
PARTS LIST

Item No.	Part No.	Description	Qty
1	190500	DE2, 3/4" x 9 1/2"	2
2	176211	Boom (Reflector), drilled, 1 1/4" x 72"	1
3	174992	Boom (Director), 1 1/4" x 72"	1
4	190202	Tube, swaged, 7/8" x 72"	6
5	871732	10-Meter Trap Assembly (Director)	2
6	871733	10-Meter Trap Assembly (Reflector).....	2
7	871819	10-Meter Trap Assembly (Driven Element)	2
8	871734	15-Meter Trap Assembly (Director & Reflector)	4
9	871820	15-Meter Trap Assembly (Driven Element)	2
10	190501	R2, 3/4" x 10 1/2"	2
11	176212	DE3, 7/16" x 34 1/2".....	2
12	176214	D3, 7/16" x 31 1/2 ".....	2
13	176216	R3, 7/16" x 32"	2
14	190502	D2, 3/4" x 5 7/8"	2
15	165138	Element-to-Boom Bracket (DE)	2
16	165141	Element-to-Boom Bracket (D & R)	4
17	385142-1	Boom-to-Mast Bracket.....	1
18	385144-1	Boom-to-Bracket Clamp.....	1
19	176232	Beta Match.....	1
	878685	Parts Pack 221S-1, stainless steel	1
21	169339	Tubing Clamp, 7/8"	2
22	173370	Beta Shorting Clamp	1
23	358756	Clamp, #6 Tubing.....	24
24		(Not Used)	
25	455630	Caplug, 1 1/4"	2
26	455644	Caplug, 7/16".....	6
27	463642	Insulator, Beta Match.....	2
28	463767	Insulator, Driven Element.....	2
29	520034	Screw, Type T, #6-32 x 11T, rh	3
30	500160	Bolt, hex head, #10-24 x 5/8".....	1
31	504069	Bolt, hex head, #10-24 x 1".....	2
32	554071	Nut, hex, #10-24.....	5
33		(Not Used)	
34	565697	Lockwasher, internal, #10.....	31
35	500156	Bolt, hex head, 1/4"-20 x 3/8"	6
36	505266	Bolt, hex head, 1/4"-20 x 3/4"	28
37		(Not Used)	
38	554099	Nut, hex, 1/4"-20	28
39	551367	Nut, square, 1/4"-20.....	6
40	562961	Lockwasher, internal, 1/4".....	30
41	540067	U-bolt, 5/16"-18 x 3 5/8".....	2
42	564792	Lockwasher, split, 5/16".....	4
43	555747	Nut, hex, 5/16"-18	4

hy-gain® LIMITED WARRANTY

Hy-Gain Warrants to the original owner of this product, if manufactured by **Hy-Gain** and purchased from an authorized dealer or directly from **Hy-Gain** to be free from defects in material and workmanship for a period of 12 months for rotator products and 24 months for antenna products from date of purchase provided the following terms of this warranty are satisfied.

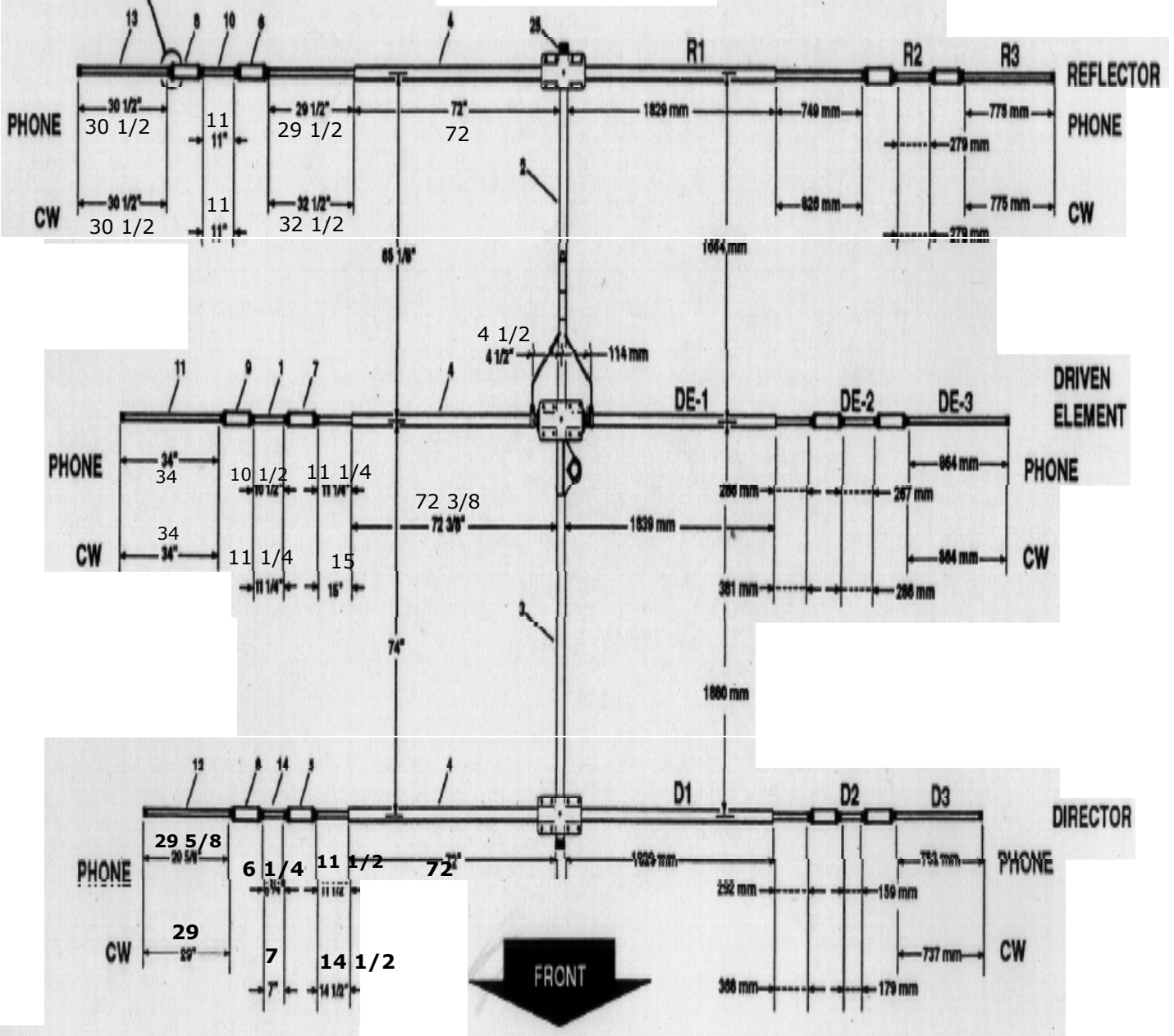
1. The purchaser must retain the dated proof-of-purchase (bill of sale, canceled check, credit card or money order receipt, etc.) describing the product to establish the validity of the warranty claim and submit the original or machine reproduction of such proof of-purchase to **Hy-Gain** at the time of warranty service. **Hy-Gain** shall have the discretion to deny warranty without dated proof-of-purchase. Any evidence of alteration, erasure, or forgery shall be cause to void any and all warranty terms immediately.
2. **Hy-Gain** agrees to repair or replace at **Hy-Gain's** option without charge to the original owner any defective product under warranty, provided the product is returned postage prepaid to **Hy-Gain** with a personal check, cashiers check, or money order for \$8.00 covering postage and handling.
3. Under no circumstances is **Hy-Gain** liable for consequential damages to person or property by the use of any **Hy-Gain** products.
4. Out-of-warranty Service: **Hy-Gain** will repair any out-of-warranty product provided the unit is shipped prepaid. All repaired units will be shipped COD to the owner. Repair charges will be added to the COD fee unless other arrangements are made.
5. This warranty is given in lieu of any other warranty expressed or implied.
6. **Hy-Gain** reserves the right to make changes or improvements in design or manufacture without incurring any obligation to install such changes upon any of the products previously manufactured.
7. All **Hy-Gain** products to be serviced in-warranty or out-of-warranty should be addressed to **hy-gain, 308 Industrial Park Road, Mississippi 39759, USA** and must be accompanied by a letter describing the problem in detail along with a copy of your dated proof-of-purchase.
8. This warranty gives you specific rights, and you may also have other rights which vary from state to state.



Dimensions Measured as Shown

AMERICAN MEASUREMENTS

METRIC MEASUREMENTS



Item No.	Description
1	DE2, 3/4" x 9 1/2"
2	Boom (Reflector), 1 1/4" x 72", drilled
3	Boom (Director), 1 1/4" x 72"
4	Tube, swaged, 7/8" x 72"
5	10-Meter Trap assembly (Director)
6	10-Meter Trap Assembly (Reflector)
7	10-Meter Trap Assembly (Driven Element)
8	15-Meter Trap Assembly (Director & Reflector)

Figure 4
Element Layout and Dimensions

Item No.	Description
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10	R2, 3/4" x 10 1/2"
11	DE3, 7/16" x 34 1/2"
12	D3, 7/16" x 31 1/2"
13	R3, 7/16" x 32"
14	D2, 3/4" x 5 7/8"
25	Caplug, 1 1/4"