



**ORDER NO.  
389**

# INSTALLATION & OPERATION INSTRUCTIONS

## TH6-DXX "THUNDERBIRD"

**HY-GAIN ELECTRONICS CORPORATION**  
Rural Route 3 Lincoln, Nebraska 68505

### GENERAL DESCRIPTION:

The Hy-Gain TH6-DXX "Thunderbird" is a 6 element beam designed to operate on 10, 15 and 20 meters. It has 4 active elements on 10 meters and 3 active elements on 15 and 20 meters. The "Thunderbird" has optimum spaced elements on a 24 foot boom giving you the best gain while maintaining a high front-to-back ratio.

### ELECTRICAL SPECIFICATIONS:

Input Impedance .....	52 ohms
Forward Gain .....	10 M - 9.5 db
	15M - 8.5 db
	20 M - 8.0 db
Front-to-Back Ratio .....	.25db
Maximum Power Input .....	1 KW AM
VSWR (at Resonance) .....	1.2:1
Lightning Protection .....	DC Ground

### MECHANICAL SPECIFICATIONS:

Boom Length .....	24 ft.
Boom Diameter .....	2 in.
Longest Element .....	31 ft.
Accepts Mast .....	1 1/4 to 2 1/2 O.D.
Maximum Wind .....	100 mph
Wind Surface Area .....	6.25 sq. ft.
Wind Load (80 mph) .....	156.5 lbs.
Turning Radius .....	20 ft.

### ASSEMBLY AND INSTALLATION:

Before leaping headlong into the assembly of this antenna, take a moment to read this paragraph. This antenna is a fairly large antenna and requires some consideration as to how you are going to get it to the top of your tower. To help you with this problem we have furnished you with three methods and it is best that you consider which you are going to use now, as it will determine how you put the antenna together.

Method No. 1: Completely assemble the antenna on the ground then hoist it into position using a set-up as shown in Figure No. 1.

Method No. 2: The last method is to assemble the antenna on the ground in halves, then hoist each half up the tower and assemble in the boom-to-mast bracket on the tower.

All slotted tubing supplied with the TH6-DXX is designed to telescope together. It is held in place with full circumference

compression clamps. Make all measurements as accurate as possible using the dimensions given in this manual. If this is done you will gain optimum results from your antenna.

#### NOTE

*When unpacking your antenna, check the inside of all tubing for parts (clamps, insulator, smaller tubing etc.) to conserve space., these smaller articles are sometimes put inside larger pieces. The compression clamps used in this antenna are a universal device and are used in many varied applications. Depending upon the application, the screw head may or may not contact the lockwasher or clamp body. DO NOT OVER TIGHTEN the clamps in an attempt to contact the clamp body with the screw head. To do so may result in clamp failure or tube failure caused by puncture. Place the compression clamp on the end of the tubing with the screw head 180 degrees from the slot.*

### ASSEMBLY OF THE BOOM:

( ) Select the two halves of the boom brackets, and the two cast aluminum mast clamps and loosely assemble as shown in Figure 4.

( ) Select the four boom sections (2" diameter tubing). Slip the unswaged end of each long boom section into the boom-to-mast bracket and line up the holes. Secure the boom sections to the bracket using the two 5/16-18 x 2 3/4" bolts, nuts and lockwashers provided. Do not tighten at this time. The bracket must be loose to facilitate mounting the antenna on the mast.

#### NOTE

*One end of the boom has a small hole drilled in it (71 1/8" measured from center of boom to hole) near the boom-to-mast bracket. This hole must be positioned so it is facing up (skyward) when the boom is assembled. The hole will be used for attaching the beta match in a later step. This end of the boom will be known as the reflector end, refer to figure 4.*

( ) Slip the remaining boom sections over the swaged ends of the assembled boom section and secure using the 1/4-20 x 2 1/2" bolt, nut and lockwasher as shown in Figure 4.

### ASSEMBLY OF THE 15-20 METER REFLECTOR

( ) Select a set of medium sized element-to-boom brackets (marked with a No. 13) and LOOSELY assemble on the Reflector end of the boom as shown in Figures 5 and 6. The Reflector end of the boom can be identified by the small hole drilled near the boom-to-mast bracket. Assemble the bracket 3" from the end of the boom to the center of the bracket as shown in Figure 6. Do not forget the 1/4-20 x 3/8" anchor screws with their associated square nuts.

#### NOTE

The following steps will be in singular form. They will have to be done first for one side of the boom then repeated for the other side.

{ } Select the "15-20 Ref" tubing bundle. Insert the thick-walled end of the R1 section (1 1/4 x 95 1/2") into the element-to-boom bracket assembled on the boom. Tighten the screws to hold the element securely but do not tighten the anchor screws at this time.

{ } Check to see that the 15-20 meter Reflector element will lie in a plane parallel to the earth when the antenna is mounted on the mast. This can be done by observing the position of the Reflector element with respect to the boom-to-mast bracket and then adjusting the Reflector element accordingly. Re-check the 3" measurement from the end of the boom to the center of the bracket then tighten the anchor screws SECURELY.

{ } Select a 1 1/4" compression clamp and its associated screw and square nut and assemble as shown in Figure 7.

#### NOTE

Figure 7 shows all the compression clamps with their associated hardware. The drawing is full size to aid you in identifying the parts. Simply lay the part over the proper drawing for easy identification.

{ } Slip the assembled compression clamp over the end of the R1 section. Select the R2 section (1 1/8 x 38") and slip the unswaged end into the R1 section.

{ } At this time you must decide which mode of transmission you wish to favor, either Lo Phone, Hi Phone or CW. Measure dimension of R2 for your mode of transmission as shown in Figure 6. The measurement is made from the end of R1 to the end of R2.

#### CAUTION

Once you have selected your mode of transmission (Lo Phone, Hi Phone or CW) you must use the same mode for remaining measurements. DO NOT attempt to use averages or various combinations of setting measurements on the same element, or serious deterioration in antenna performance will result. The VSWR charts shown in Figure 3 should aid you in deciding which mode to select.

{ } Assemble a 1" compression clamp as shown in Figure 7. Slip the assembled clamp over the end of R2. Select the 15 meter parasite trap and slip the unswaged end into the R2 section with drain hole down.

#### CAUTION

There are two style 15 and 10 meter traps. Observe the part number marking closely, as shown in Figure 6. The Driven Element traps are different internally than the parasitic element traps.

{ } Measure 1" from the end of the R2 section to the edge of the plastic trap cap as shown in Figure 6. Now, tighten the compression clamp SLIGHTLY.

{ } Assemble a 11/16" compression clamp as shown in Figure 7. Slip the assembled clamp over the end of the 15 meter trap. Select the R3 section (7/16 x 37") and slip it into the 15 meter trap. Measure dimension of R3 for your mode of transmission as shown in Figure 6. Tighten compression clamp SLIGHTLY.

{ } Carefully re-check all your measurements then tighten the compression clamps SECURELY.

#### ASSEMBLY OF THE 10 METER REFLECTOR:

{ } Select a set of small sized element-to-boom brackets (marked with a No. 4) and LOOSELY assemble on the boom 48" from the center for the 15-20 meter Reflector bracket to the center of the 10 meter Reflector bracket. Refer to Figures 5 and 6. Do not forget the taper point anchor screws with their associated square nuts as shown in Figure 5.

{ } Select the "10 Ref" tubing bundle and slip the unswaged end of the R2-1 section (7/8 x 55") into the bracket assembled on the boom. Tighten the screws to hold the element securely but do not tighten the anchor screws at this time.

{ } Check to see that the 10 meter Reflector will lie in the same plane as the 10-20 meter Reflector and carefully re-check the 48" measurement from the center of the one Reflector bracket to the center of the other Reflector bracket. Now tighten the anchor screws SECURELY.

{ } Assemble the remainder of the 10 meter Reflector in the same manner as you did the 15-20 meter Reflector. Refer to Figures 5, 6 and 7 for illustrations.

#### ASSEMBLY OF THE DRIVEN ELEMENT:

{ } Select a large sized set of element-to-boom brackets (marked with a No. 14) and assemble on the boom 75" from the center of the 10 meter Reflector bracket to the center of the Driven Element bracket. Refer to Figures 5 and 6.

{ } Select the DE1 section (1 1/4 x 48") from the Driven Element tubing bundle. Slip a Driven Element insulator (found in the parts pack) non split end of the DE1 section, then slip the insulated end of DE1 into the bracket assembled on the boom. Tighten the screws to hold the element securely but do not tighten the anchor screws at this time.

{ } Check to see that the Driven Element will lie in the same plane as the Reflector elements already installed. Carefully re-check the 75" measurement from the center of the 10 meter Reflector bracket to the center of the Driven Element bracket then tighten the anchor screws SECURELY.

{ } Assemble a 1 1/4" compression clamp as shown in Figure 7. Slip the assembled clamp over the DE1 section. Select the DE2 section (1 1/8 x 42") and slip the unswaged end into the DE1 section. Measure the DE2 dimension for your mode of transmission as shown in Figure 6 then tighten the compression clamp SLIGHTLY.

( ) Assemble a 1" compression clamp as shown in Figure 7. Slip the assembled clamp over the end of DE2.

( ) Select the 10 meter Driven Element trap. If you look closely at the trap you will notice that the part number is marked near one end. This is the SHORTED end of the trap. Slip the SHORTED end of the trap into the DE2 section and measure 1" from the end of DE2 to the plastic trap cap as shown in Figure 6. Now tighten the compression clamp SLIGHTLY.

( ) Assemble two 1" compression clamps and slip them on each end of the DE3 section (1 x 4") positioning them near each end. Slip the DE3 section over the 10 meter trap then slip the unswaged end of the 15 meter Driven Element trap into the DE3 sections. Keeping the DE3 section approximately equidistant from the two traps, measure the DE3 dimension for your mode of transmission as shown in Figure 6. Now tighten the compression clamps SLIGHTLY.

( ) Assemble a 11/16" compression clamp as shown in Figure 7 and slip it over the swaged end of the 15 meter trap. Select the DE4 section (7/16 x 28") and slip it into the 15 meter trap. Measure DE4 dimension for your mode of transmission as shown in Figure 6, then tighten compression clamp SLIGHTLY.

( ) Carefully re-check all dimensions then tighten the compression clamps SECURELY.

#### ASSEMBLY OF THE BETA MATCH:

( ) Select the Beta Match tubes (3/4 x 38 3/4"), Beta shorting wire (1/8" formed wire) and the Beta supporting insulators and clamps as shown in Figure 8. Attach the shorting wire to the Beta tubes using the two 10-24 x 1/2" screws, square nuts and lockwashers. Assemble the Beta tubes on the boom as shown in Figure 8 using four 10-24 x 2" screws, nuts and lockwashers but do not tighten the screws at this time.

( ) Select the Beta shorting clip and secure to the end of the Beta shorting wire using a 10-24 x 1/2" screw, nut and lockwasher. Attach the shorting clip to the boom using a No. 10 sheet metal screw and lockwasher. Now tighten all screws SECURELY.

#### ASSEMBLY OF THE 10 METER DIRECTOR:

( ) Select a set of small element-to-boom brackets (marked with a No. 4) and LOOSELY assemble on the boom 73" from the center of the Driven Element bracket to the center of the 10 meter Director bracket as shown in Figures 5 and 6.

( ) Select the "No. 10 Dir" tubing bundle and assemble on the boom in the same manner as you did the previous elements. Refer to Figures 5, 6 and 7. Make certain the 10 meter Director lies in the same plane as the other elements and carefully re-check the 73" dimension before tightening the bracket anchor screws SECURELY.

#### ASSEMBLY OF THE 15 METER DIRECTOR:

( ) Select the remaining set of small element-to-boom brackets (marked with a No. 4) and LOOSELY assemble on the boom 47 1/2" from the center of the 10 meter Director bracket to the center of the 15 meter Director bracket.

( ) Select the "15 Dir" tubing bundle and assemble on the boom in the same manner as the previous elements. Refer to Figures 5, 6 and 7 for illustrations. Make certain the 15 meter Director lies in the same plane as the other elements and carefully re-check the 47 1/2" dimension before tightening the bracket anchor screws SECURELY.

#### ASSEMBLY OF THE 10-20 METER DIRECTOR:

( ) Select the remaining set of medium sized element-to-boom brackets (marked with a No. 13) and LOOSELY assemble on the boom 39 1/2" from the center of the 15 meter Director bracket to the center of the 10-20 meter Director bracket.

( ) Select the "10-20 Dir" tubing bundle and the 10 meter Director trap and assemble in the same manner as the previous elements. Refer to Figures 5, 6 and 7 for illustrations. Make certain the 10-20 meter Director lies in the same plane as the other elements and carefully re-check the 39 1/2" dimension before tightening the bracket anchor screws SECURELY.

( ) Place a 7/16" caplug on the end of each element and a 2" caplug on each end of the boom.

#### ATTACHMENT OF THE FEEDLINE AND RF CHOKE:

( ) Wind yourself an RF choke similar to the one in Figure 8. The choke must consist of 12 turns of RG-8/U coaxial cable with each turn having 6" diameter. Allow enough cable at the end to reach from the mast to the Driven Element. Strip the coaxial cable as shown in Figure 8, Detail 2 and attach a solder lug (not supplied) to the center conductor and a solder lug to the braid.

#### NOTE

*This RF choke is necessary for the antenna to operate properly. However, it is recommended that you obtain a Hy-Gain Balun Model BN-86 to use in place of the RF choke. The Balun would allow the TH6-DXX to operate with an efficiency far greater than with the "homemade" choke. The model BN-86 is available at your local Hy-Gain dealer.*

( ) Select the two 1 1/4" tubing clamps and install one on each side of the Driven Element placing them close to the insulators as shown in Figures 6 and 8.

( ) Attach the center conductor from the RF choke and a pigtail lead (wire with solder lug at each end) to one tubing clamp and the RF choke braid and the other pigtail lead to the opposite tubing clamp as shown in Figure 8, Detail 1. Connect the loose end of each pigtail lead to the Beta tube using a 1/2" screw, square nut and lockwasher. Weatherproof the coax connection using Pli-O-Bond, Neoprene or some similar substance. Also weatherproof the coaxial cable where the braid leaves the outer insulator to prevent water from entering the coax and ruining the first few feet of cable. Tape the braid with waterproof tape to prevent it from shorting out on the antenna.

Tape the RF choke and feedline securely to the boom using water-proof tape. Later, when the antenna is mounted on the mast also tape the choke securely to the mast.



## ASSEMBLY OF THE BOOM SUPPORT CABLE:

{ } Select the 2" ID boom support clamps and the boom support straps and LOOSELY assemble on the boom approximately 100" from the boom-to-mast clamp as shown in Figure 9. Attach the boom support cable to the clamps using the thimbles and cable clips provided. Refer to Figure 9. Attach the turnbuckles to the opposite end of the cable as shown in the illustrations.

{ } Now tape the cables near the boom-to-mast bracket so they will be handy later when the antenna has been mounted on the mast. Make certain the cable is above the element.

{ } Mount the antenna on your mast using one of the methods suggested in the beginning of this section. Allow approximately 36" of the mast to extend above the boom-to-mast bracket for attaching the boom support cable.

### NOTE

*The Boom-to-Mast Brackets have a hole through their center to allow securing to the mast with the 5/16-18 x 3 1/2" bolt. It is recommended that the mast be removed and an 11/32 hole be drilled at the desired mast clamp position, then reinstall the mast.*

*If this is not possible, the clamp will hold its position on the mast in all but the most severe weather conditions.*

{ } Assemble the 1 5/8" boom support clamp (2 piece) on the mast as shown in Figure 9. Extend the turnbuckle to its full length then attach to the clamp and tighten the clamp SECURELY. Tighten each turnbuckle until the boom lies in a level plane with no sag.

## LIGHTNING PROTECTION:

For lightning protection and noise-free operation you must ground your antenna supporting structure. A proper ground consists of a 1/2" x 8' ground rod driven into the ground as close as possible to the base of your tower or mast. Connect the rod to the tower or mast using a copper strap or 12 gauge copper or aluminum wire.

For total protection of your equipment it is highly recommended that you obtain a Hy-Gain Model LA-1 Lightning Arrestor. The Model LA-1 is available at your local Hy-Gain dealer.

**THIS COMPLETES YOUR INSTALLATION OF THE TH6-DXX. SIMPLY ATTACH YOUR FEEDLINE TO THE RF CHOKE AND HAPPY DX'ING.**

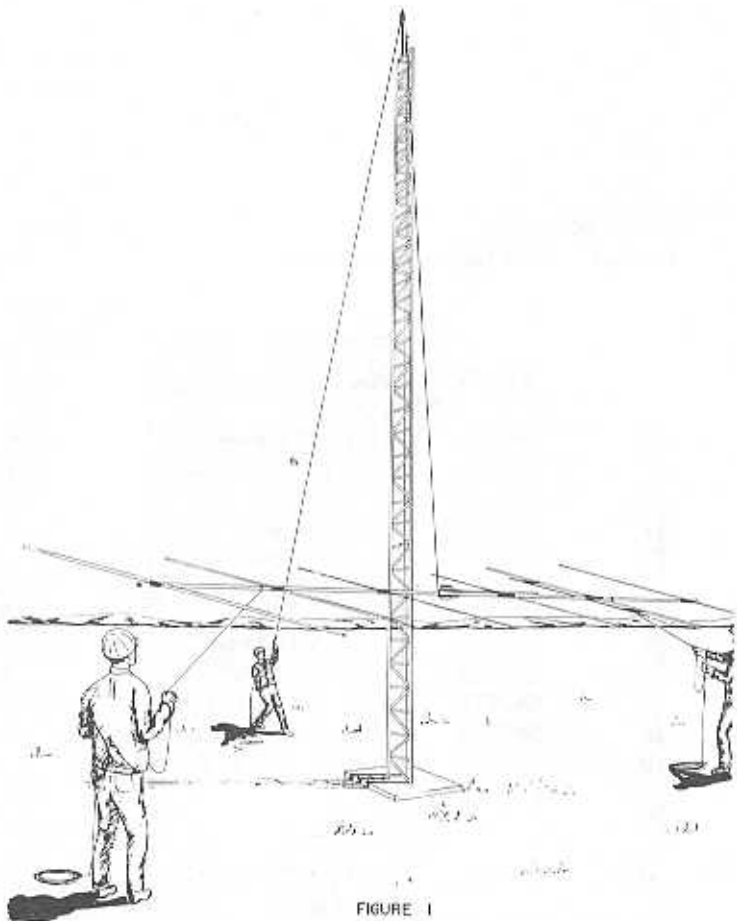


FIGURE 1  
COMPLETE ANTENNA HOISTED  
ON TOWER BY CABLE OR  
ROPE

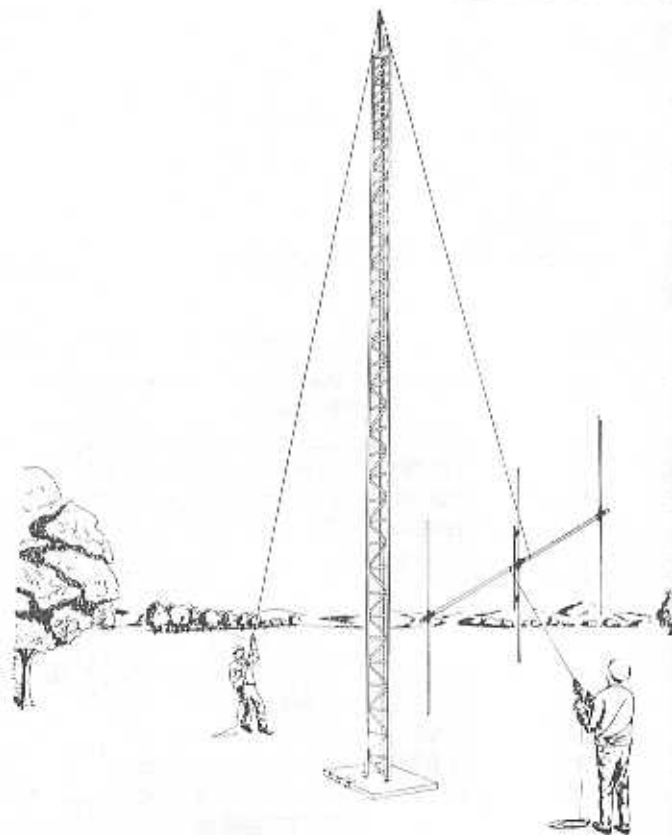


FIGURE 2  
ANTENNA SECTION BEING  
ERECTED ON  
TOWER

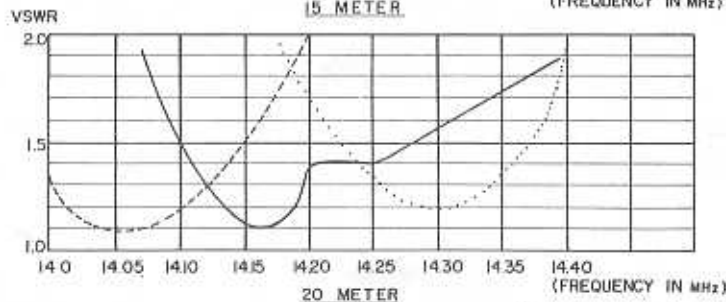
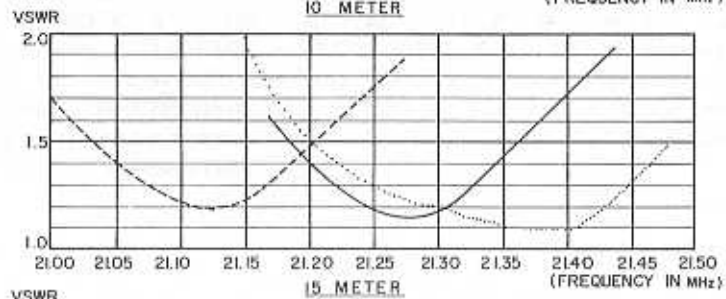
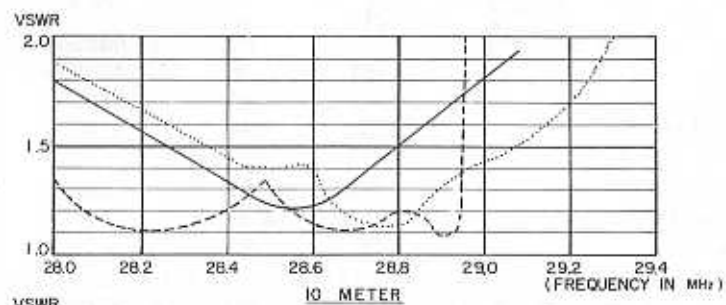


FIGURE 3

CW -----  
LO-FONE \_\_\_\_\_  
HI-FONE .....

**NOTE**

The Boom-to-Mast brackets have a hole through their center to allow securing to the mast with the 5/16-18 x 3 1/2" bolt. It is recommended that the mast be removed and a 11/32" hole be drilled at the desired mast clamp position, then reinstall the mast. If this is not possible, the clamp will hold its position on the mast in all but the most severe weather.

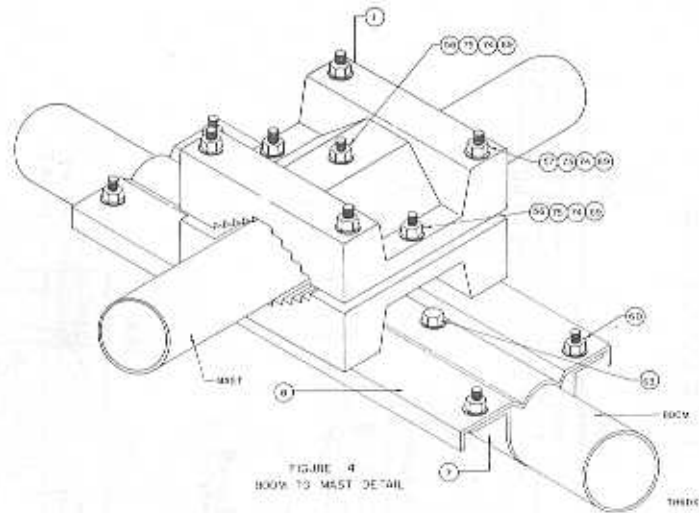
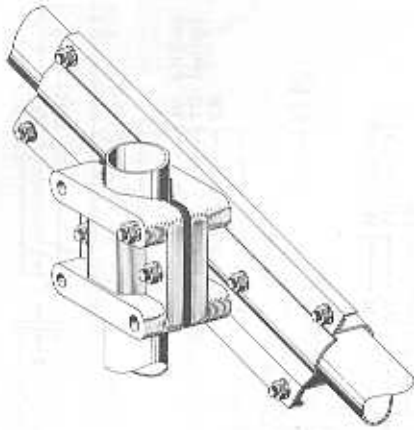


FIGURE 4  
BOOM TO MAST DETAIL

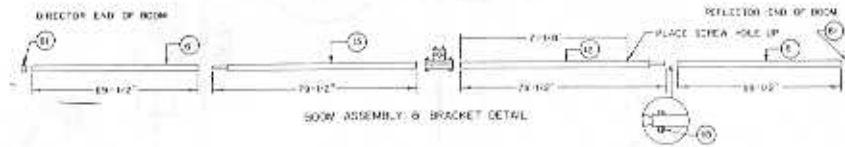
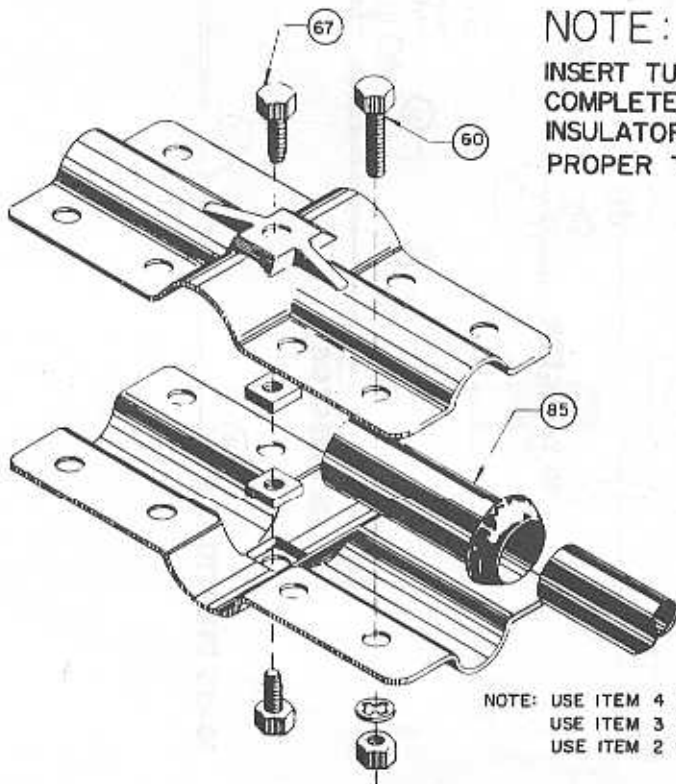


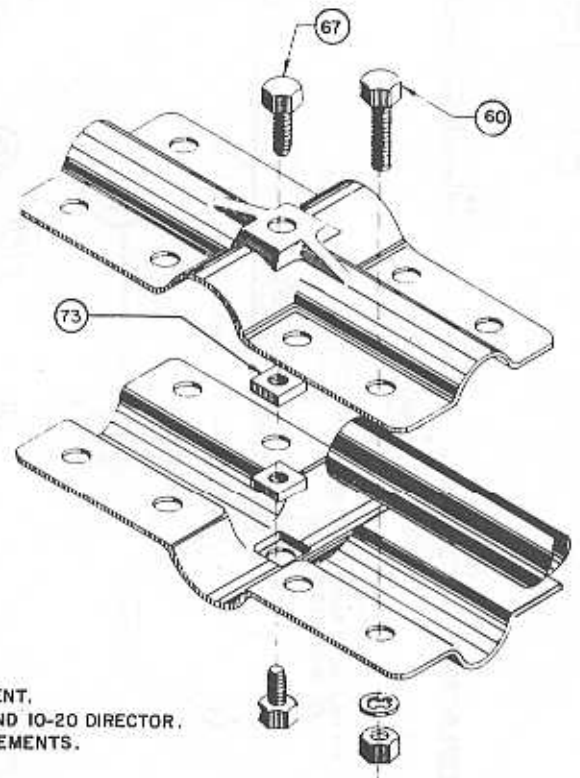
FIGURE 4



DRIVEN ELEMENT DETAIL

**NOTE:**  
INSERT TUBES  
COMPLETELY INTO  
INSULATOR TO INSURE  
PROPER TUNING

NOTE: USE ITEM 4 ON DRIVEN ELEMENT,  
USE ITEM 3 ON REFLECTOR AND 10-20 DIRECTOR,  
USE ITEM 2 ON REMAINING ELEMENTS.



REFLECTOR-DIRECTOR DETAIL

ELEMENT TO BOOM  
BRACKET  
FIGURE 5

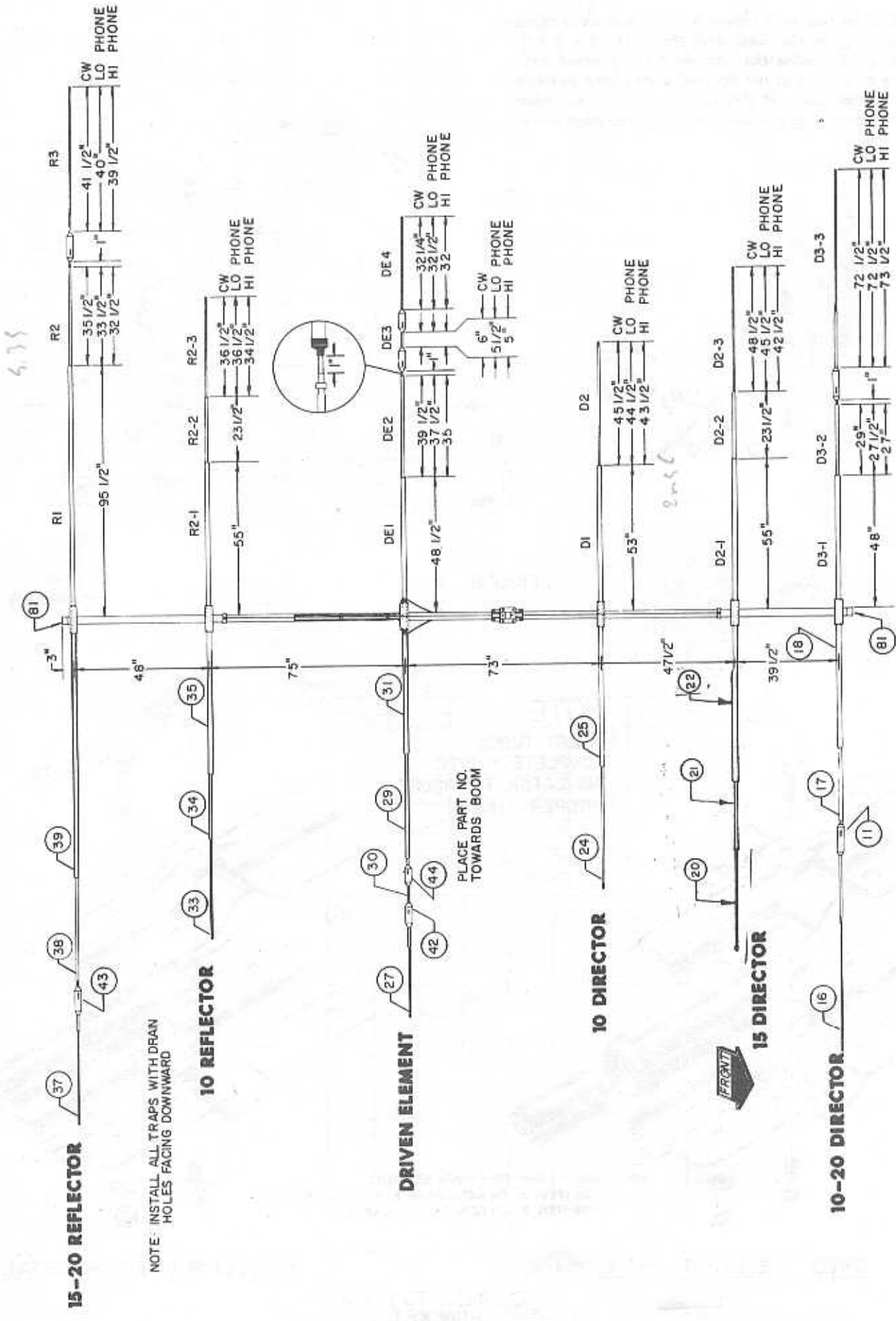
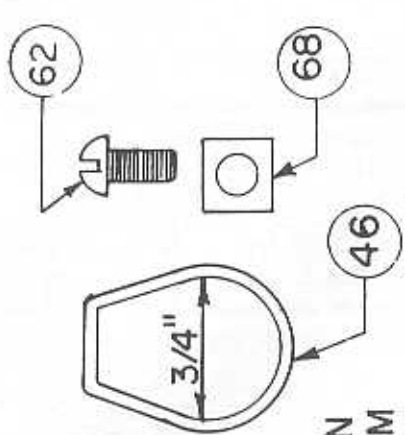
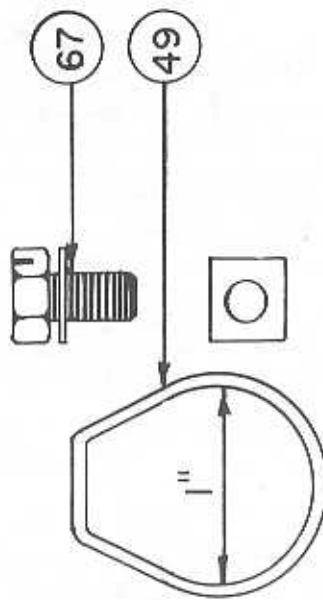
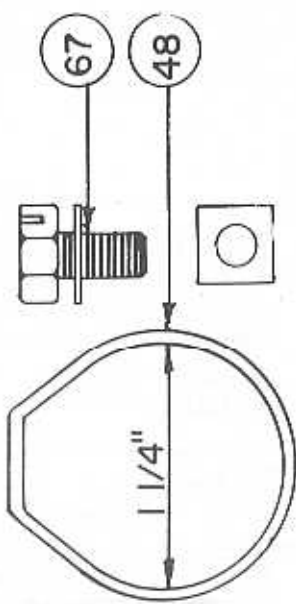
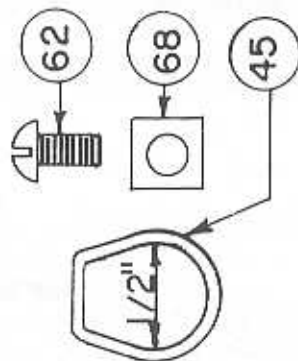
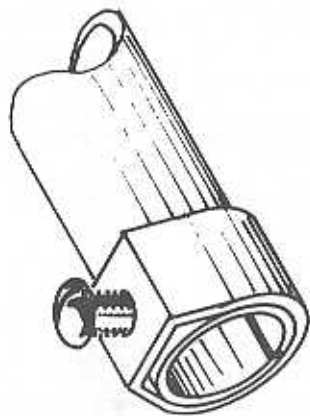
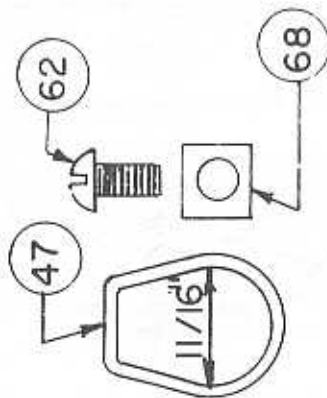


FIGURE 6



NOTE: PLACE COMPRESSION CLAMP SCREW 180° FROM SLOT IN TUBING



COMPRESSION CLAMPS

FIGURE 7



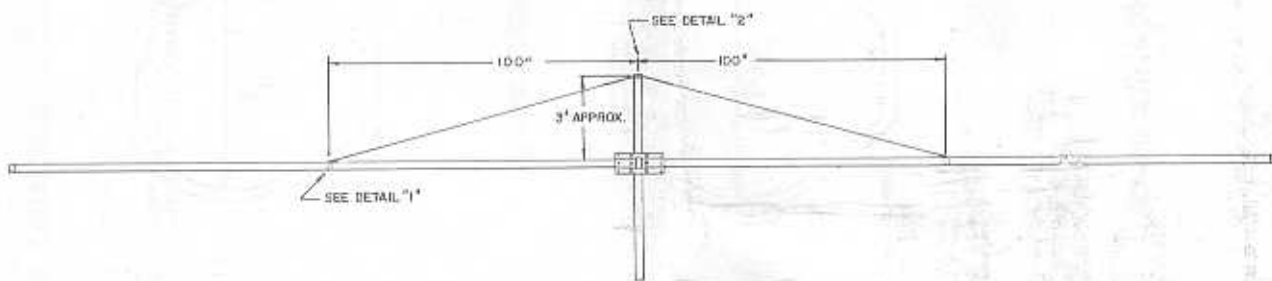
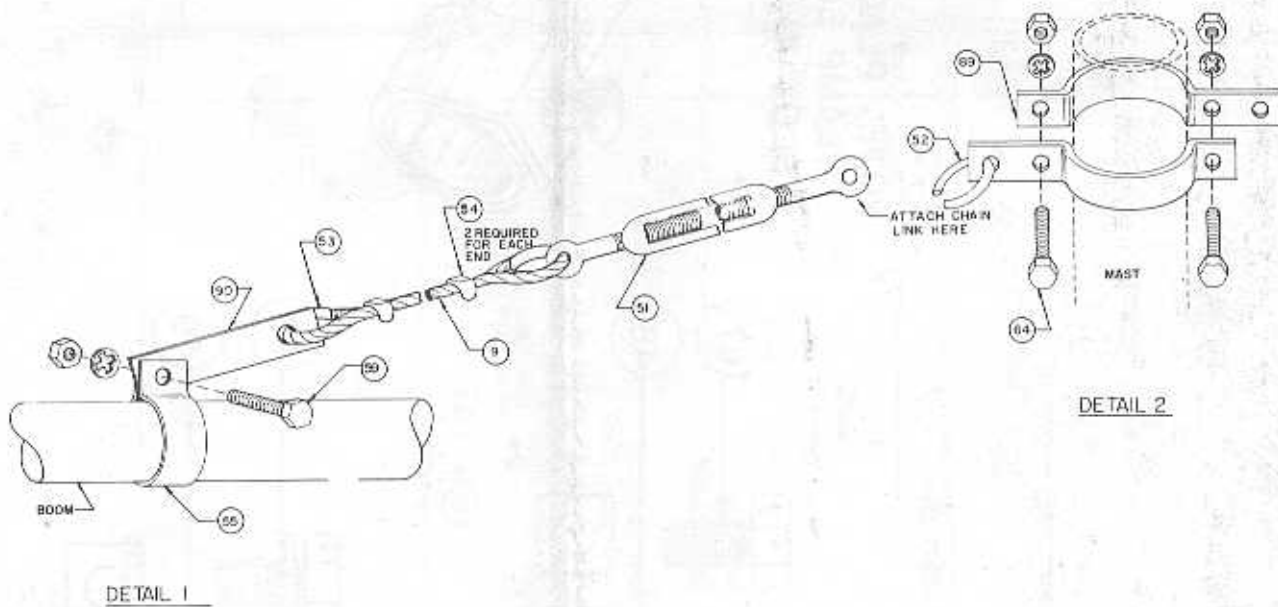
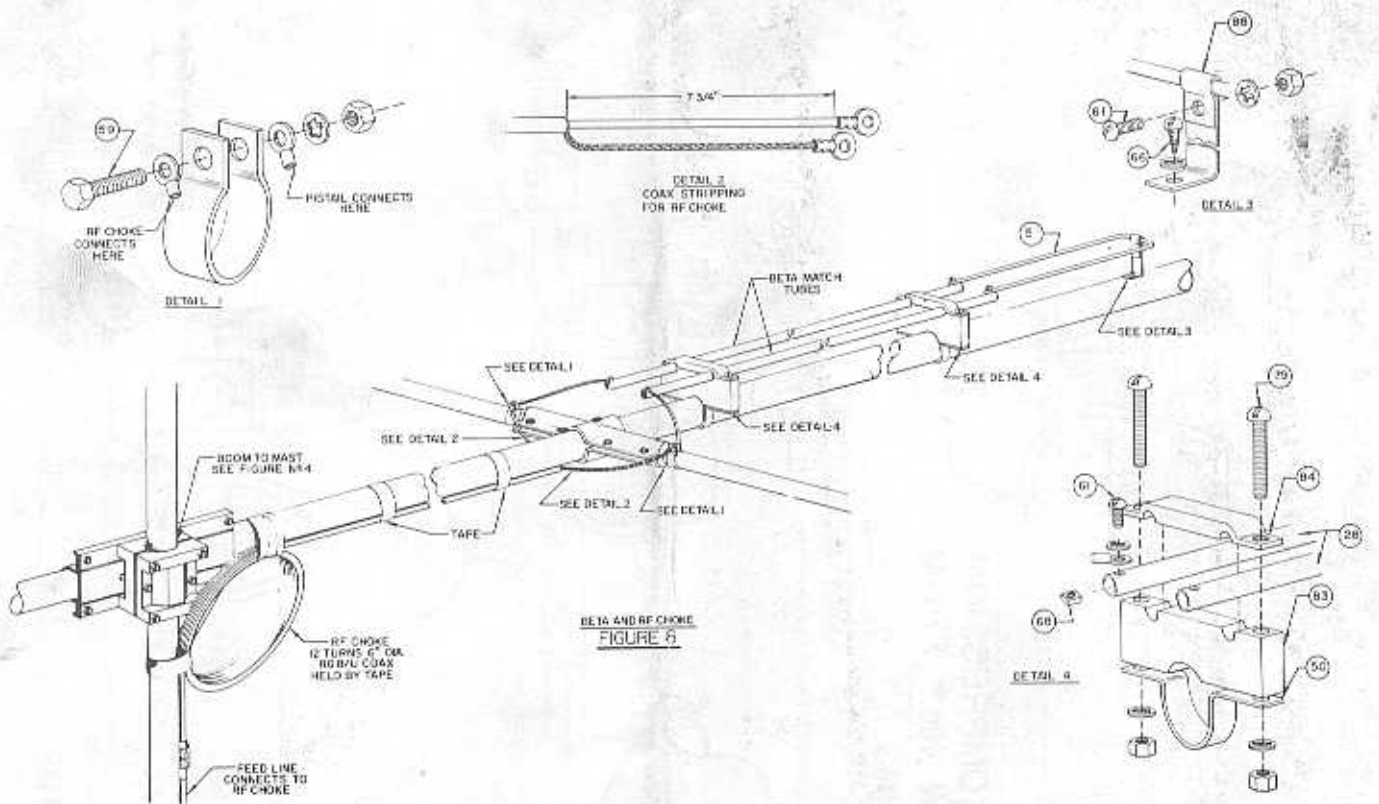


FIGURE 9

**PARTS LIST**

Item Code				Item Code			
Number	Part No.	Description	Qty	Number	Part No.	Description	Qty
1	102734	Bracket, Cast Aluminum	2				
2	163764	Bracket, Element-to-Boom No. 4	6	23	872647	Tubing Bundle	1
3	165919	Bracket, Element-to-Boom No. 13	4	24	174991	D2, 7/16 x 48"	2
4	165920	Bracket, Element-to-Boom No. 14	2	25	174861	D1, 7/8 x 53" Swg 7/16	2
5	171151	Beta Shorting Wire, 1/8" Dia.	1	26	872648	Tubing Bundle	1
6	171166	Boom Section, 2 x 69 1/2"	2	27	171152	DE-4, 7/16 x 28"	2
7	172732	Clamp, Boom-to-Bracket	1	28	178414	Beta Tube, 3/4 x 38 3/4"	2
8	172735	Bracket, Casting-to-Boom	1	29	190309	DE-2, 1 1/8 x 42" Swg 7/8"	2
9	691081	Cable, Boom Support 20'	1	31	190900	DE-1 and D2-1, 1 1/4 x 48"	2
10	872086	Parts Pack C	1	32	872649	Tubing Bundle	1
11	872095	Trap, 10M, Director	2	33	171154	R2-3, 7/16 x 39"	2
12	872097	Boom Tube Assembly, Beta	1	34	190006	D2-2 and R2-2, 5/8 x 26"	
13	872098	Boom Tube Assembly	1			Swg 7/16"	2
14	872394	Parts Pack D	1	35	190206	R2-1 and D2-1, 7/8 x 55"	
15	872645	Tubing Bundle	1			Swg 5/8"	2
16	114781	D2-3 and D3-3, 7/16 x 52"	2	36	872650	Tubing Bundle	1
17	190308	D3-2, 1 1/8 x 32 1/2" Swg. 7/8"	2	37	171153	R-3, 7/16 x 37"	2
18	190900	DE-1 and D3-1, 1 1/4 x 48"	2	38	190307	R-2, 1 1/8 x 38" Swg 7/8"	2
19	872646	Tubing Bundle	1	39	872091	R-1, 1 1/4 x 95 1/2"	2
20	114781	D2-3 and D3-3, 7/16 x 52"	2	40	873874	Parts Pack B	1
21	190006	D2-2 and R2-2, 5/8 x 26"		41	878413	Parts Pack A	1
		Swg. 7/16"	2	42	878637	Trap, 15M, Driven Element	2
22	190206	R2-1 and D2-1, 7/8 x 55"		43	878694	Trap, 15M	2
		Swg. 5/8"	2	44	878749	Trap, 10M, Driven Element	2

**WARNING**

WHEN INSTALLING YOUR SYSTEM, EXTREME CARE SHOULD BE TAKEN TO AVOID ACCIDENTAL CONTACT WITH POWER LINES AND OTHER OVERHEAD OBSTRUCTIONS BY ANY LADDER OR OTHER INSTALLATION EQUIPMENT. FAILURE TO EXERCISE THIS CARE COULD RESULT IN SERIOUS INJURY.

Item Code				Item Code			
Number	Part No.	Description	Qty	Number	Part No.	Description	Qty
41	878413	Parts Pack "A" contains the following:		67	505540	Screw, 1/4-20 x 3/8"	28
45	165123	Compression Clamp, 1/2"	4	68	555362	Nut, 10-24 Square	20
46	165361	Compression Clamp, 3/4"	4	69	556945	Nut, 5/16-18 Hex Jam	9
47	165763	Compression Clamp, 11/16"	8	70	556960	Nut, 1/4-20 Hex	58
48	168680	Compression Clamp, 1 1/4"	6	71	556970	Nut, 10-24 Hex	7
49	168682	Compression Clamp, 1"	10	72	558137	Nut, 3/8-16 Hex	2
50	177888	Clamp, Beta Support	2	73	558685	Nut, 1/4-20 Square	28
51	351243	Turnbuckle, 7/32 x 2" Eye and Eye	2	74	566664	Lockwasher, 5/16" Split	9
52	351244	Open End Chain Link, 3/16"	2	75	567085	Washer, 5/16" Flat	7
53	351700	Thimble, 5/32"	4	76	567095	Lockwasher, 3/8" Internal	2
54	359929	Clip, Wire Rope, 1/8"	8	77	567110	Lockwasher, 1/4" Internal	77
55	388861	Clamp, boom Support	2	78	567125	Lockwasher, No. 10 Internal	10
40	873874	Parts Pack "B" contains the following:		79	506435	Screw, 10-24 x 2" Round Head	4
56	501541	Screw, 5/16-18 x 3 1/2" Hex Head	3	80			
57	501543	Screw, 5/16-18 x 5" Hex Head	4	10	872086	Parts Pack "C" contains the following:	
58				81	455625	Caplug, 2"	2
59	506305	Screw, 1/4-20 x 1 1/4" Round Head	4	82	455644	Caplug, 7/16"	12
60	506325	Screw, 1/4-20 x 3/4" Hex Head	52	83	465595	Insulator, Beta Support (Bottom)	2
61	506485	Screw, 10-24 x 1/2" Round Head	5	84	465600	Insulator, Beta Support (Top)	2
62	506520	Screw, 10-24 x 3/8" Round Head	16	85	465833	Insulator, Driven Element	2
63	506741	Screw, 5/16-18 x 2 3/4" Hex Head	2	86	878561	Pigtail Leads	2
64	509320	Screw, 3/8-16 x 1" Hex Head	2	14	872394	Parts Pack "D" contains the following:	
65	506290	Screw, 1/4-20 x 2 1/2" Round Head	2	87	168695	Clamp, 1 1/4" Tubing	2
66	516470	Screw, No. 10 x 1/2" Type "A" Round Head	1	88	171149	Clip, Beta Shorting	1
				89	381100	Clamp, Boom Support, 1 5/8" I.D.	2
				90	381253	Strap, Boom Support	2
				30	190609	DE3- 1 x 4 1/2"	2

When ordering replacement parts, be sure to include the product number (389), item code number, part number and the full description of the item.