

hy-gain[®]

LP-1010A / LP-1010AN

Log Periodic Antenna

Instruction Manual

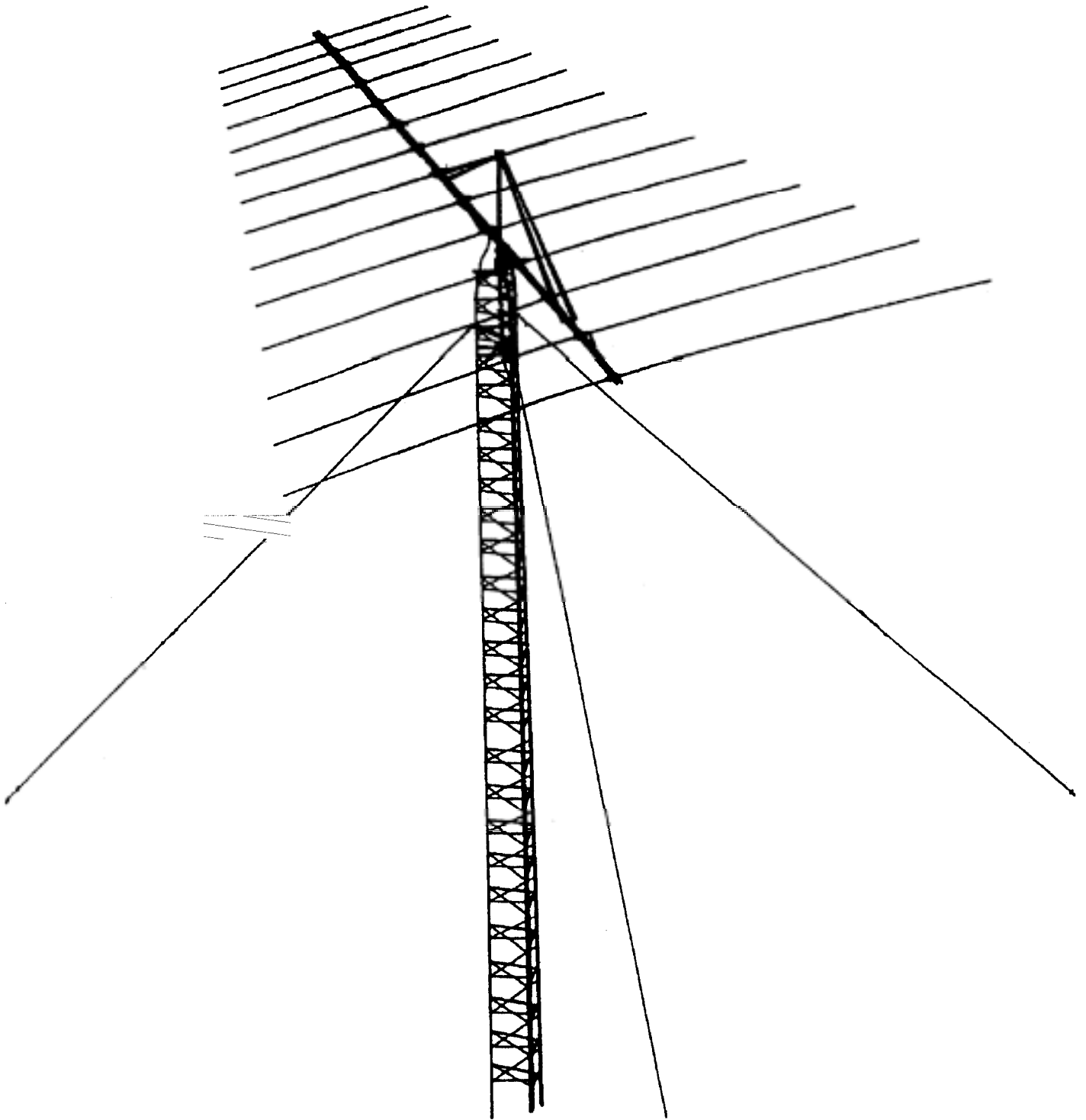


TABLE OF CONTENTS

Page	
	CHAPTER 1 General Information1-1
	General Description 1-2
	Theory of Operation..... 1-2
	Preparation for Assembly..... 1-2
	Installation Planning1-3
	Corrosion Precautions..... 1-3
	Assembly of the Boom and Boom-to-Mast Bracket.....1-4
	Boom Support..... 1-6
	Assembly of the Element-to-Boom Brackets on the Boom1-6
	Installation of Tubing Clamps on Elements..... 1-9
	Element Assembly 1-9
	Feedline Assembly.....1-10
	Coax Assembly.....1-13
	Installing Elements on the Boom.....1-16
	Balun Assembly 1-16
	Final Inspection.....1-17

CHAPTER 2

	Antenna Installation..... 2-1
	Installation on a Crank-Up Tower..... 2-1
	Installation on Guyed Towers..... 2-1
	Attachment of Coaxial Feedline..... 2-1
	Attaching the Antenna to the Mast..... 2-2
	Lightning Protection 2-2
	VSWR Curves..... 2-3
	Operation..... 2-4
	VSWR Record2-4
	Troubleshooting 2-5

CHAPTER 3

	Parts List..... 3-1
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LIST OF ILLUSTRATIONS

Figure		Page
1	Boom-to-Mast Bracket.....	1-4
2	Boom Assembly with boom support.....	1-5
3	Boom Support Cable Assembly.....	1-6
4	Element Location	1-7
5	Element-to-Boom Bracket	1-7
6	Element Tubing Clamps.....	1-8
7	Rope Dampening	1-9
8	Element Tubing Descriptions.....	1-10
9A	Exposed Tubing Lengths, LP-1010, American.....	1-11
9B	Exposed Tubing Lengths, LP-1010, Metric.....	1-12
10	Feedline Assembly, Front Section	1-13
11	Feedline Assembly, Middle Sections.....	1-14
12	Feedline Assembly, Rear Section	1-15
13	Installing Elements on the Boom.....	1-16

Theory of Operation

The design of the LP-1010 is based on a 14 element log-periodic dipole array with a 'TAU' of 0.896 and a 'SIGMA' of 0.05. These parameters give the LPDA a gain of approximately 7 dBi, a front-to-back ratio of approximately 17 dB, and maximum VSWR of 1.8:1. The mechanical design of each element was optimized by computer analysis to provide minimum weight and wind area yet survive wind speeds of at least 90 mph (150 kph).

Preparation for Assembly

The United States uses American units of measurement. Please see page 3-3 of this manual for American-to-metric conversion information. Most illustrations in this manual contain both American and metric dimensions.

When unpacking your antenna, check inside of all tubing for smaller diameter tubes and other small parts. To conserve space, these smaller parts are sometimes packed inside larger pieces. Check all parts against the parts list to ensure no parts are missing. The hardware supplied with this antenna is bagged by thread size for your convenience.

You may want to sort the aluminum tubing for the elements before assembly. This makes element assembly much easier. The following table shows the various element tubing sizes and quantities.

TUBING SIZE	QUANTITY SUPPLIED
1 1/4" x 83" with insert	2
1 1/4" x 64 3/4" with	2
1 1/4" x 59" with insert	2
1 1/4" x 51" with insert	2
1 1/4" x 37 3/4" with	2
1 1/4" x 20 1/2"	2
1 1/4" x 17"	2
1 1/4" x 15"	6
1 1/8" x 42"	2
1 1/8" x 36"	4
1 1/8" x 31 7/8"	4
1 1/8" x 17"	6
1" x 65" with insert	4
7/8" x 62"	4
7/8" x 55"	4
7/8" x 51"	4
7/8" x 46"	4
7/8" x 34"	4
7/8" x 24"	4
7/8" x 15"	4
5/8" x 33"	4
5/8" x 28"	4
5/8" x 24"	20
5/8" x 16"	2
7/16" x 42 3/4"	16
7/16" x 62"	4
7/16" x 57 7/8"	2
7/16" x 55"	6

TABLE 1

Choose a large, clear area to assemble your antenna. The area must be at least 28' x 38' (8.5 m x 11.6 m). You may wish to use a temporary mast with sawhorses to support the boom during assembly. A concrete driveway or parking area 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. We have included some extra small parts with this product, just in case some are lost.

All tubing supplied with the LP-1010 antenna telescopes together. Make all measurements to the given dimensions, plus or minus no more than 1/8 inch (3 mm).

TOOLS: The following tools are required for easy assembly.

Tape measure, 12 feet.....	1
Adjustable wrench, 8 inch.....	2
Nut Driver, 5/16"	
(element compression clamps).....	1
Nut Driver, 3/8" (#10 hardware).....	1
Nut Driver, 7/16"	
(element-to-boom clamps).....	1
Nut Driver or open-end wrench,	
1/2" (boom-to-mast).....	1

We suggest that the assembly of this product be done over at least a 3 day period. We further suggest that you read this manual thoroughly, in its entirety, and then go through the manual a second time and identify and familiarize yourself with all of the antenna components. Start assembling the antenna when you are prepared. A few extra minutes invested in the assembly process will ensure many years of satisfaction with this antenna.

NOTE: An extra page that contains Figures 9A and 9B, Element Assembly, has been inserted in this manual for use when assembling the elements.

Installation Planning

The Hy-Gain LP-1010 Log-Periodic Antenna requires a supporting tower structure which is at least 50' (15.2 m) in height above ground level and which will support at least 16 sq. ft. (1.5 sq. m) wind surface area. A support mast is not supplied with this antenna. Mast height will vary according to installation. A standard 10 foot mast will suffice in most cases. This antenna may also be installed atop buildings or other structures. In these cases, the antenna should be at least 10' (3 m) above a peaked roof and at least 20' (6.1 m) above a large flat roof. Performance may be degraded at less than these heights, depending upon the amount of metal in the roof and/or attic. Other nearby antenna structures, power lines, and guy wires may also affect the performance of this antenna.

The LP-1010 also requires a suitable rotator, if not installed in a fixed azimuth. Suitable rotators include Hy-Gain models T2X and HDR- 300/A.

Corrosion Precautions

The LP-1010 antenna is designed to be relatively maintenance free for most environments. All hardware is made of passivated stainless steel, typically grade 304. The internal tooth-type lockwashers used in this antenna are grade 410 stainless steel, and are slightly magnetic. The element tubing clamps are grade 304 stainless steel. Most other metallic parts are aluminum. All insulators exposed to sunlight are made from U.V. resistant black polyethylene or black Cyclocac®.

We have supplied a 3 oz. tube of Penetrox®-A from Burndy Corporation for use as an anti-oxidant within element tubing assemblies. This prevents aluminum oxide from forming on the aluminum surfaces, especially in coastal environments.

Cut the cap off the tube of Penetrox®. Have some rags available to clean off excess from tubing and hands. Be careful not to get this on your clothing.

Before assembling the tubing sections, abrade the mating surfaces with a wire brush or sandpaper. Apply the anti-oxidant to both surfaces, then assemble joint. Wipe off any excess material.

A light amount of clear lacquer or an acrylic spray may be used to coat the exterior surface of the element assemblies if this antenna is to be installed near a sea coast. Tighten all joints securely before coating! Also, if installed near a sea coast, the solder lugs on the pigtail wire assemblies should not touch the aluminum tubing or clamp directly. Each solder lug should be between 2 stainless steel flatwashers (not supplied). Tighten these connections securely and completely coat with Scotchkote® or RTV.

NOTE: Only use alcohol-based RTV (non-corrosive). The acid-based RTV (which releases acetic acid and smells like vinegar) will corrode metal.

If a UHF connector (PL-259) is used with the BN-4000 balun, seal the connector with Coax-Seal™ or black electrical tape for rain protection. Type N connectors are designed to be weatherresistant if tightened securely.

Assembly of the Boom

Slide the boom insert into boom ends, as shown in Figure 1. Select the boom-to-mast bracket and clamp parts. Loosely assemble them on the boom ends.

Secure the boom ends and brackets together with four (4) 1/4"-20 x 3/4" bolts, lockwashers and nuts (70, 75, 76), and two (2) 5/16"-18 x 2 3/4" bolts, lockwashers and nuts (80, 82, 83). Tighten these six bolts securely. The casting-to-boom bracket (7), may deform slightly when the four 1/4" bolts are tightened. This is normal.

Assemble the two cast aluminum brackets (1) on your temporary mast at about 4 feet (1.2 m) above ground. An eight foot length of 2" ABS or PVC plastic drain pipe makes an inexpensive temporary mast. Secure the two brackets together using two (2) 5/16"-18 x 3" bolts, lockwashers and nuts (78, 82, 83). Tighten these two bolts evenly until the brackets are snug.

Scotchkote® is a registered trademark of 3-M. 3M Center. St. Paul.

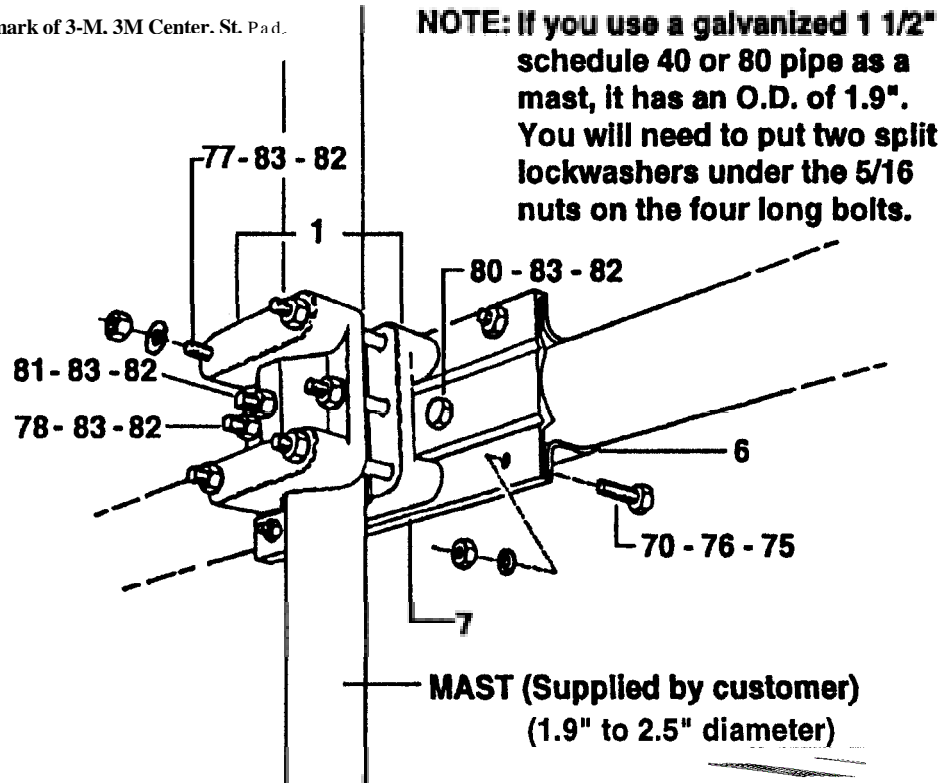


Figure 1
Boom-to-Mast Bracket

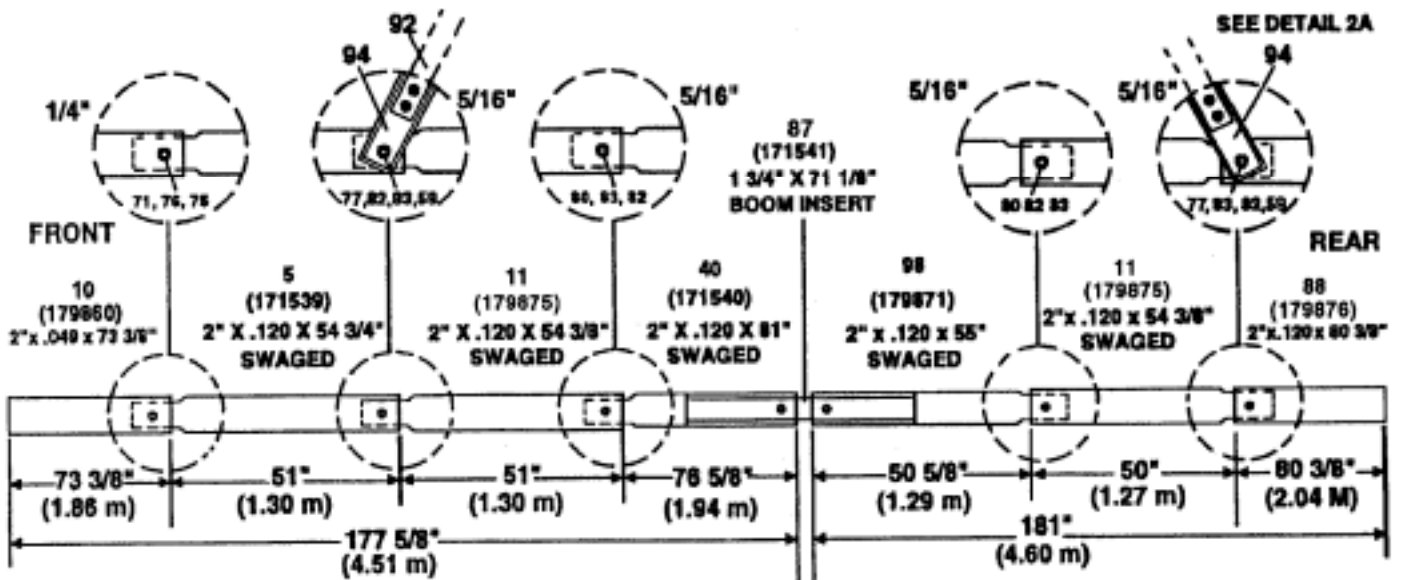
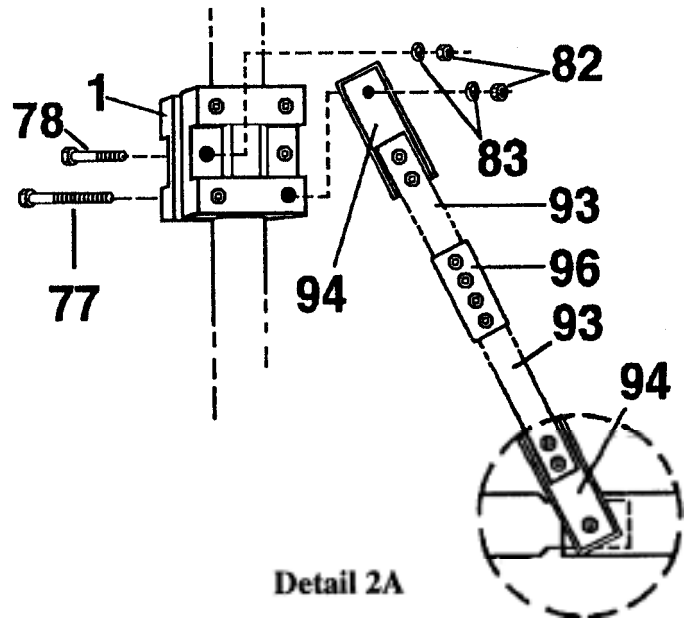
Item No.	Description
1	Mast Bracket, cast aluminum
6	Clamp, Boom-to-Bracket
7	Bracket, Casting-to-Boom
70	Bolt, hex head, 1/4"-20 x 3/4"
75	Nut, hex, 1/4"-20
76	Lockwasher, internal, 1/4"

No.	Description
77	Bolt, hex head, 5/16"-18 x 5"
78	Bolt, hex head, 5/16"-18 x 3"
80	Bolt, hex head, 5/16"-18 x 2 3/4"
81	Bolt, hex head, 5/16"-18 x 4"
82	Nut, hex, 5/16"-18
83	Lockwasher, split, 5/16"

Attach the boom and bracket assembly to these two brackets using the four (4) 5/16"-18 x 5" bolts, lockwashers and nuts (77, 82, 83). If you have problems aligning all of the holes in the brackets, you may wish to carefully run a 5/16" drill bit through these holes. Do not enlarge these holes beyond 5/16" or you may weaken the brackets. This will prevent alignment problems that might occur on the top of your tower!

Tighten these four bolts just enough to hold the weight of the antenna.

Slip the remaining boom sections over the swaged ends of the assembled boom. At two locations the boom support will be attached. At this time, loosely attach the channel brackets and 3/4" x 7/8" spacers with 5/16" x 5" bolt and hardware as shown in Figure 2. Secure the remaining location as shown in Figure 2.



Item No.	Description	Description
1	Bracket, cast aluminum	80 Bolt, hex head, 5/16" x 2 3/4", stainless steel
5	Boom, tube, 2" x 54 3/4"	82 Nut, hex, 5/16", stainless steel
10	Boom, tube, 2" x 73 3/8"	83 Lockwasher, split, 5/16", stainless steel
11	Boom, tube, 2" x 54 3/8"	87 Insert, Boom, 1 3/4" x 71 1/8"
40	Boom, tube, 2" x 81"	88 Boom, tube, 2" x 80 3/8"
59	Boom Support Spacer	92 Tube, boom support, front, 1 1/4" x 64 1/2"
71	Bolt, hex head, 1/4" x 2 1/2", stainless steel	93 Tube, boom support, rear, 1 1/4" x 52 1/2"
75	Nut, hex, 1/4", stainless steel	94 Channel bracket, 1 1/2" x 6"
76	Lockwasher, internal, 1/4", stainless steel	96 Tube, boom support, splice 1 3/8" x 6"
77	Bolt, hex head, 5/16" x 5", stainless steel	98 Boom, tube, 2" x 55"
78	Bolt, hex head, 5/16" x 3", stainless steel	

Figure 2
Boom Assembly with Boom Support

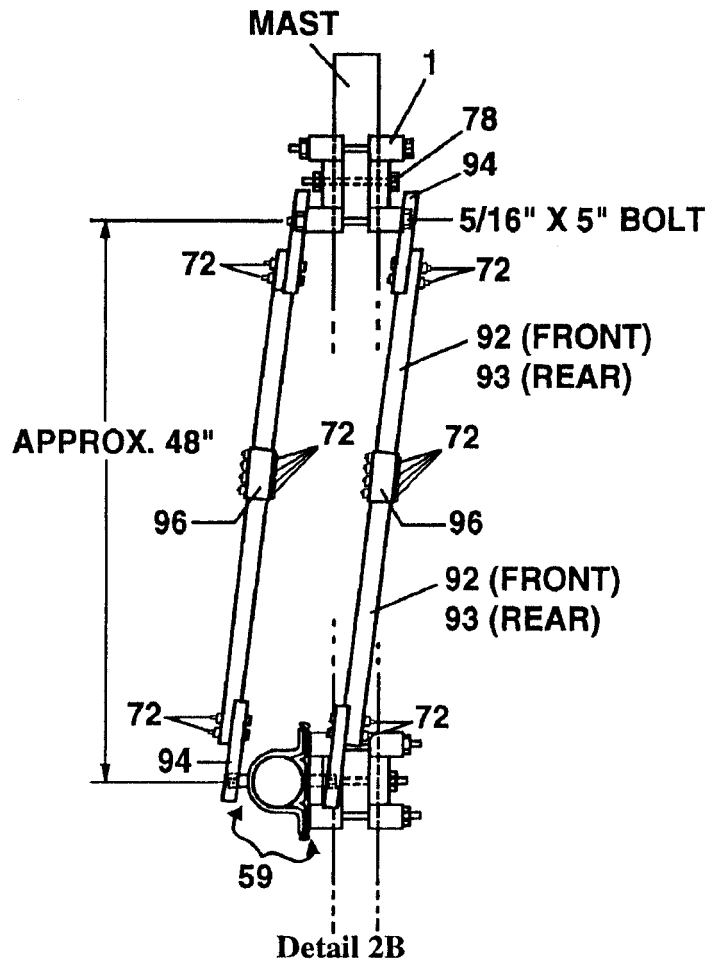
Boom Support

Refer to Figure 2 and select the (4) four front boom support tubes. Splice (2) two of the tubes together with the boom support splice and 1/4" x 13/4" bolts and hardware. Attach a channel bracket to one end of each of the spliced tubes, with 1/4" x 13/4" bolts and hardware. Repeat this with the rear boom support tubes.

Loosley attach (2) two mast brackets to the mast approximately 4 feet above the boom with (2) two 5/16" x 3" bolts and hardware, and the top (2) two 5/16" x 5" bolts and hardware. Attach the channel bracket ends of the spliced front and rear boom support tubes to the mast bracket on the bottom (2) 5/16" x 5" bolts. Slide the mast brackets up and down to line up the holes, then attach with 1/4" x 1 3/4" bolts and hardware. Tighten all hardware on the channel brackets and boom. Snug all hardware on the mast bracket so they do not vibrate off.

Assembly of the Element-to-Boom Brackets on the Boom

There are two sizes of element-to-boom brackets supplied with the LP-1010 antenna. The largest has a 1 1/2" I.D., and is used on the 10 longest elements. The remaining brackets have a 1 1/4" I.D., and are used on the 4 front elements.



The largest brackets are stamped with the number 14, while the smaller brackets are stamped with the number 13.

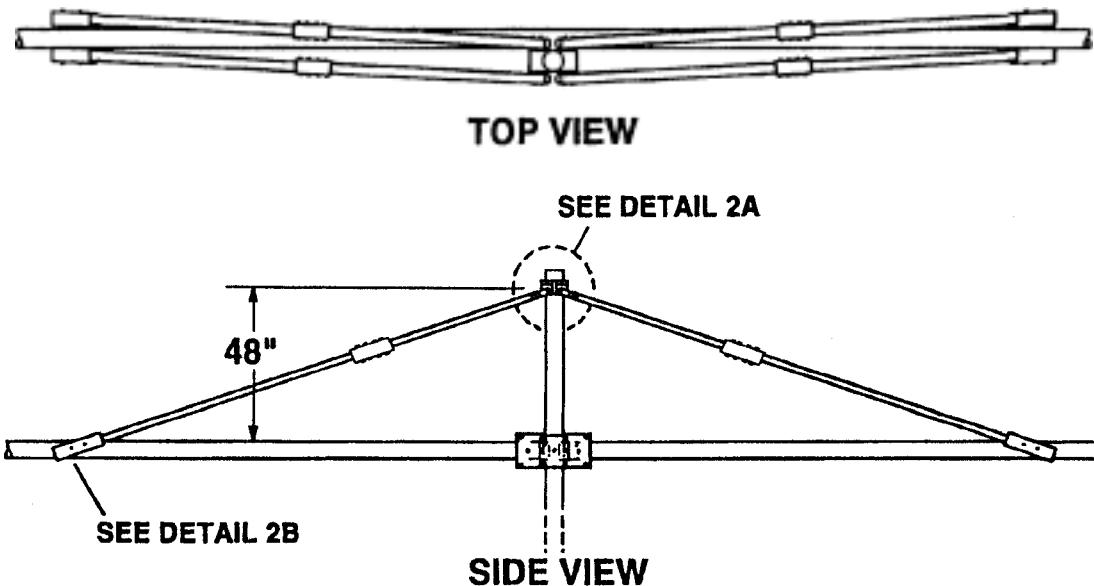


Figure 3
Boom Support Assembly

Assemble the brackets as shown in Figure 5 and locate them on the boom assembly as shown in Figure 4. It is easier to assemble the brackets on the boom at the correct location, rather than try to slide them on the boom. If you are going to leave this assembly unattended for more than 15 minutes, we suggest that you tighten the eight (8) bolts on each bracket, so that they do not vibrate off. Do not tighten the anchor bolt on the bottom of the brackets until the elements are

NOTE: The longest element (#12, #13, #14) uses top AND bottom anchor bolts! All other elements use only bottom anchor bolts!

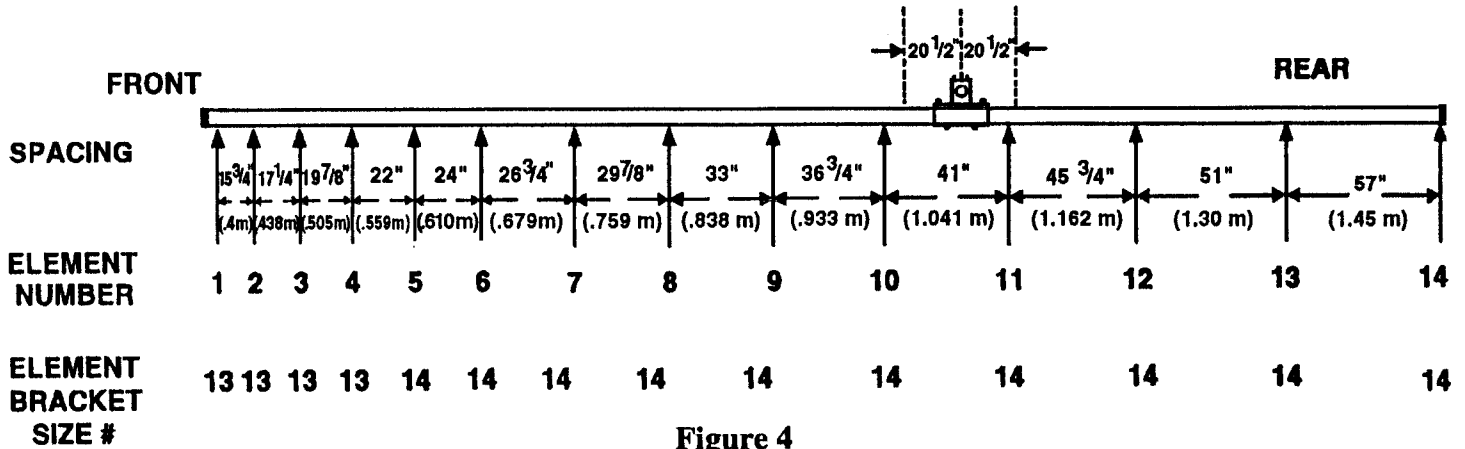


Figure 4
Element Location

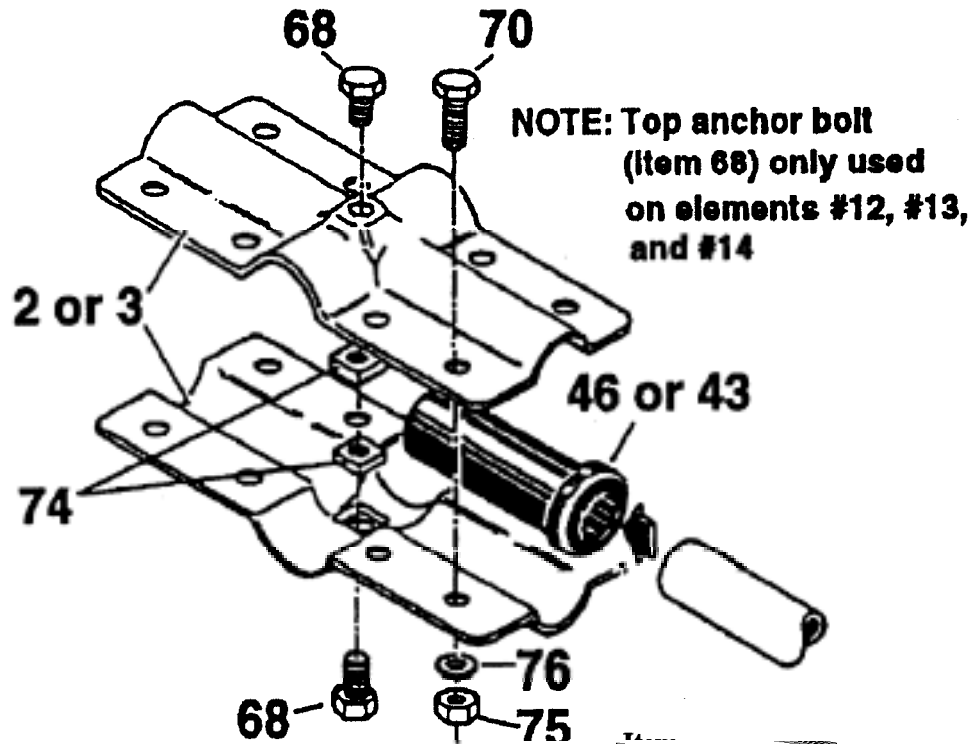
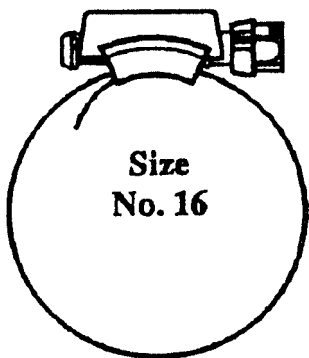
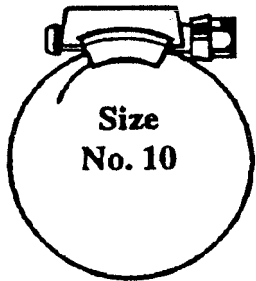
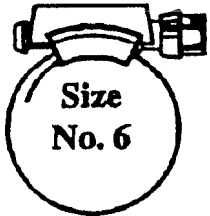
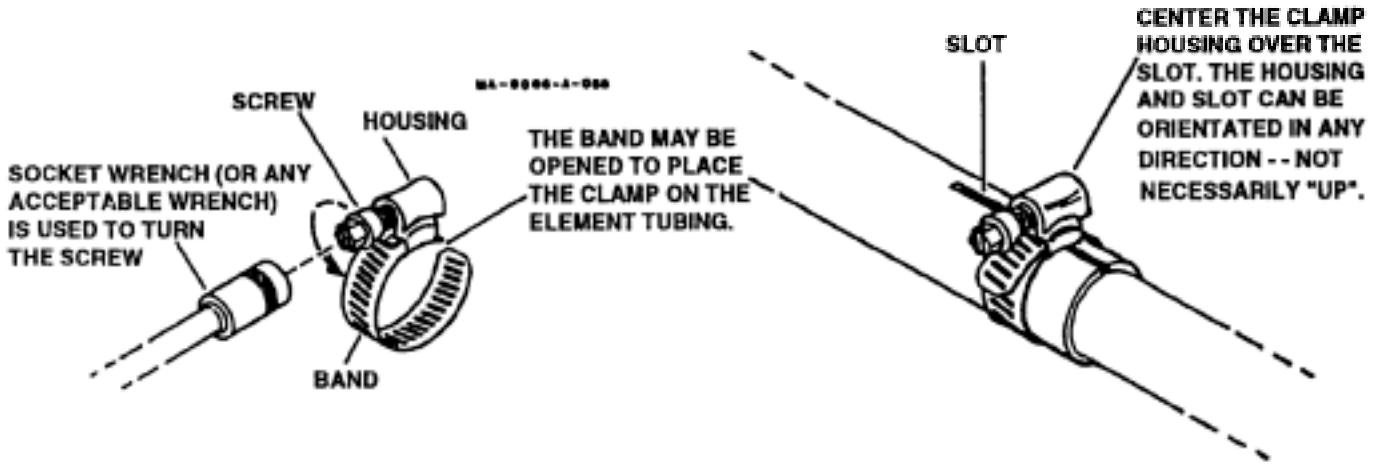


Figure 5
Element-to-Boom
Bracket

Item No.	Description
2	Bracket, element-to-boom, #13
3	Bracket, element-to-boom, #14
43	Insulator, Driven Element, 1 1/4" OD
46	Insulator, Driven Element, 1 1/2" OD
68	Bolt, hex head, 1/4" x 3/8"

No.	Description
70	Bolt, hex head, 1/4" x 3/4"
74	Nut, square, 1/4"
75	Nut, hex, 1/4"
76	Lockwasher, internal, 1/4"



Part No.	Description	Fit Tubing Sizes
-	Clamp, Size #6 all stainless steel 5/16" hex head screw	1/2 and 3/4"
358757	Clamp, Size #10 all stainless steel 5/16" hex head screw	1 1/8" or 1"

Part Description	Fits No. Tubing Clamp,
Sizes 358758 Size #16	1 1/4"
all stainless steel	
5/16" hex head screw	

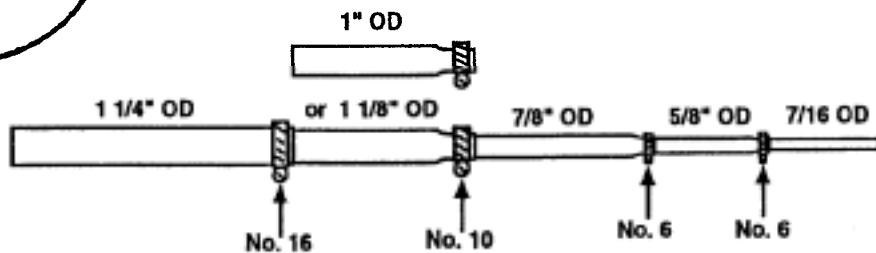


Figure 6
Element Tubing Clamps

You may want to mark the bracket location on the boom with an indelible marker. You can quickly realign the brackets to these marks when you install the elements in a later step.

Installation of Tubing Clamps on Elements

Select the proper size tubing clamps as shown in 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. **DO NOT** overtighten! Also, if you loosen and re-tighten a clamp more than 5 times, we suggest that you replace the clamp. After repeated tightenings, these clamps may become difficult to completely tighten. Should you need to replace these clamps, use only high quality stainless steel clamps to ensure proper torque.

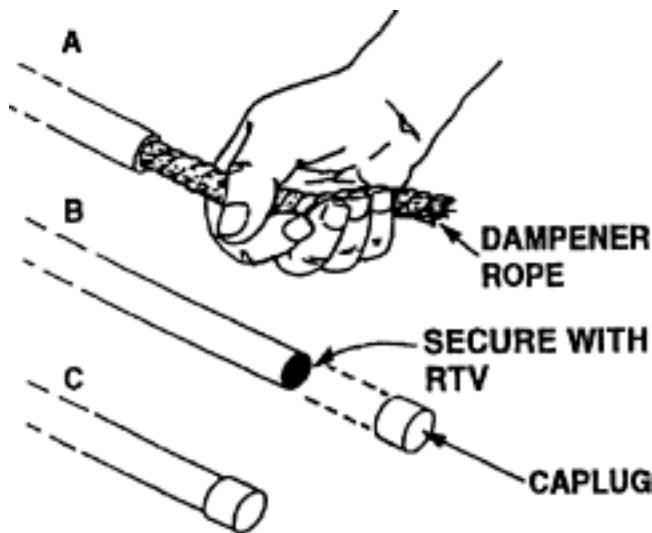


Figure 7
Rope Dampening

Element Assembly

Use Figure 8 to select the tubing for each element. If you previously sorted the tubing, this step will be much easier. Each element uses two identical element halves. Assemble both halves of each element at the same time.

Starting with the longest element (#14), accurately measure the exposed tubing lengths as shown in Figure 9. Tighten the tubing clamp after each measurement. Repeat for the other element half. Double-check all the measurements before you proceed. You may want to mark each element half with its position in the antenna with an indelible marker. For example, mark each of the longest element halves with #14. The shortest set of element halves will be #1. The longer elements will use tubing with strengthening inserts. The inserts go towards the boom end of each element. Select the 7/8" and 1 1/4" element insulators, and 7/8" and 1 1/4" tubing clamps that the pigtails will attach to at a later time. See Figures 4 and 12. Install them on the large end of each element.

Select the 5/32 inch black rope. Cut it into 28 equal lengths of 5'(1.5 m) each. Slip each rope piece into the outside tube (7/16") of each element. Secure the rope end within the tube with silicone caulk or RTV. Let dry, then install the 7/16" caplug. See Figure 6. This rope prevents low-frequency oscillations that may occur at low wind speeds. Set the assembled elements aside. The feedline will be attached to the boom before the elements.

NOTE: Elements 13 and 14 have a hole adjacent to the slot in the 1 1/4" diameter tubing. Line up this hole with the drilled hole in the 1" diameter tube, and secure using the #10 self-tapping screw. Tighten the tubing clamp securely.

Feedline Assembly

Select the fourteen (14) 3/4" feedline tubes, twelve (12) 7/8" x 2" splice tubes, pigtail wire assemblies, support clamps, insulators and hardware as shown in Figures 10, 11, and 12. The rear end of each feedline tube is identified with a label. This label also indicates which element is connected at that point. Assemble the feedline tubes and splice tubes together as shown, using #10-24 x 1 1/4" screws, #10 internal-tooth lockwashers, #10 split lockwashers and #10-24 hex nuts. Slide the 5/16" diameter spacer tubes into the open ends of the feedline tubes when installing pigtail wire assemblies for elements #1 and #14. These will prevent the screws from crushing the tubing at these points. Install the pigtail wire assemblies on the tubes. Elements 1-4 will use the 6 1/2" pigtail assemblies and 5-14 the 9 1/2" pigtail assemblies. Before tightening the hardware, position the pigtail wires as shown.

NOTE: The pigtail wires must alternate from crossed to not-crossed, starting at the rear of the phasing tube assembly and progressing toward the front. This is the normal configuration of a Log-Periodic Dipole Array (LPDA). Make sure you follow the pigtail configurations of Figures 10 through 13.

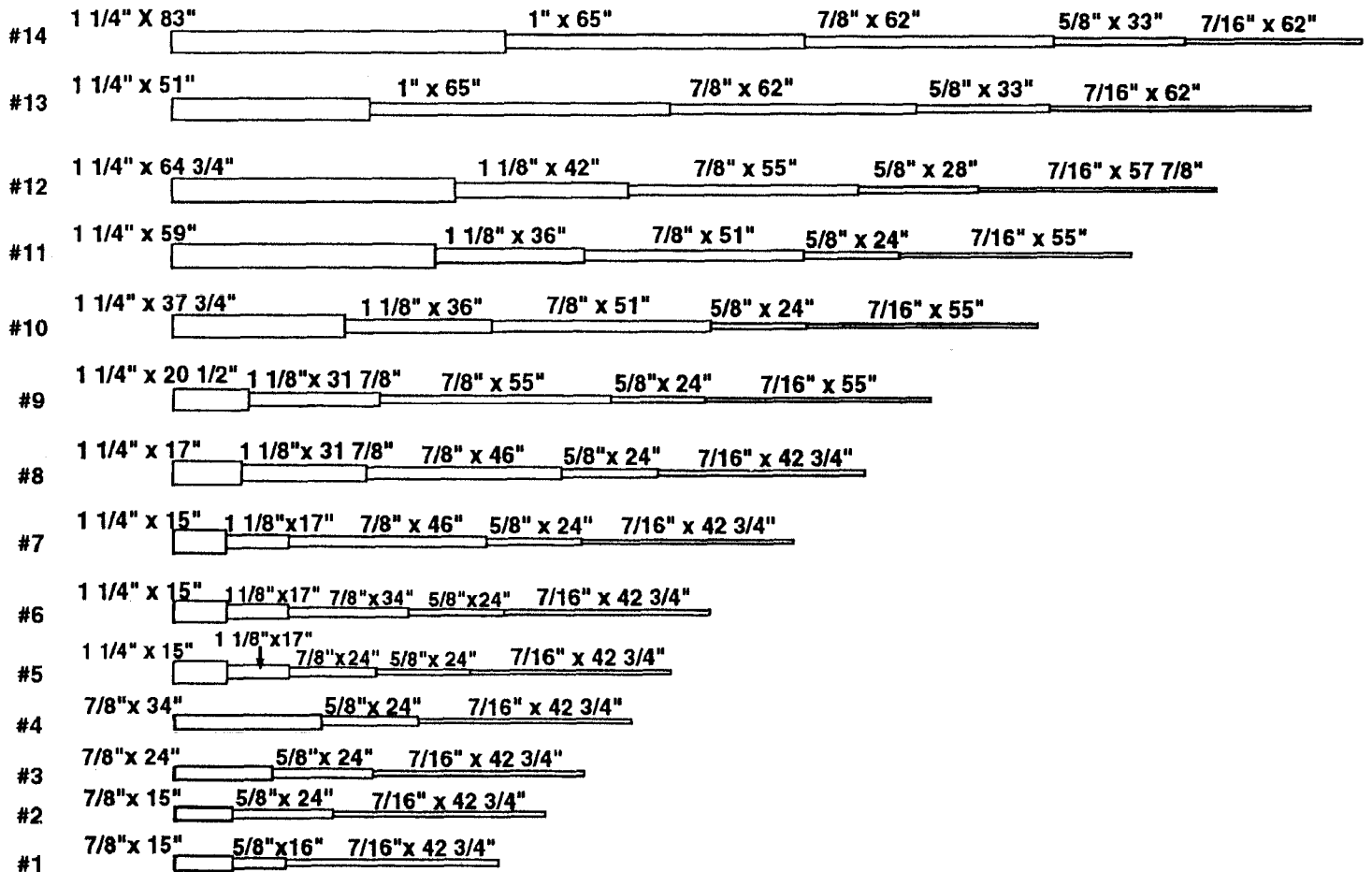
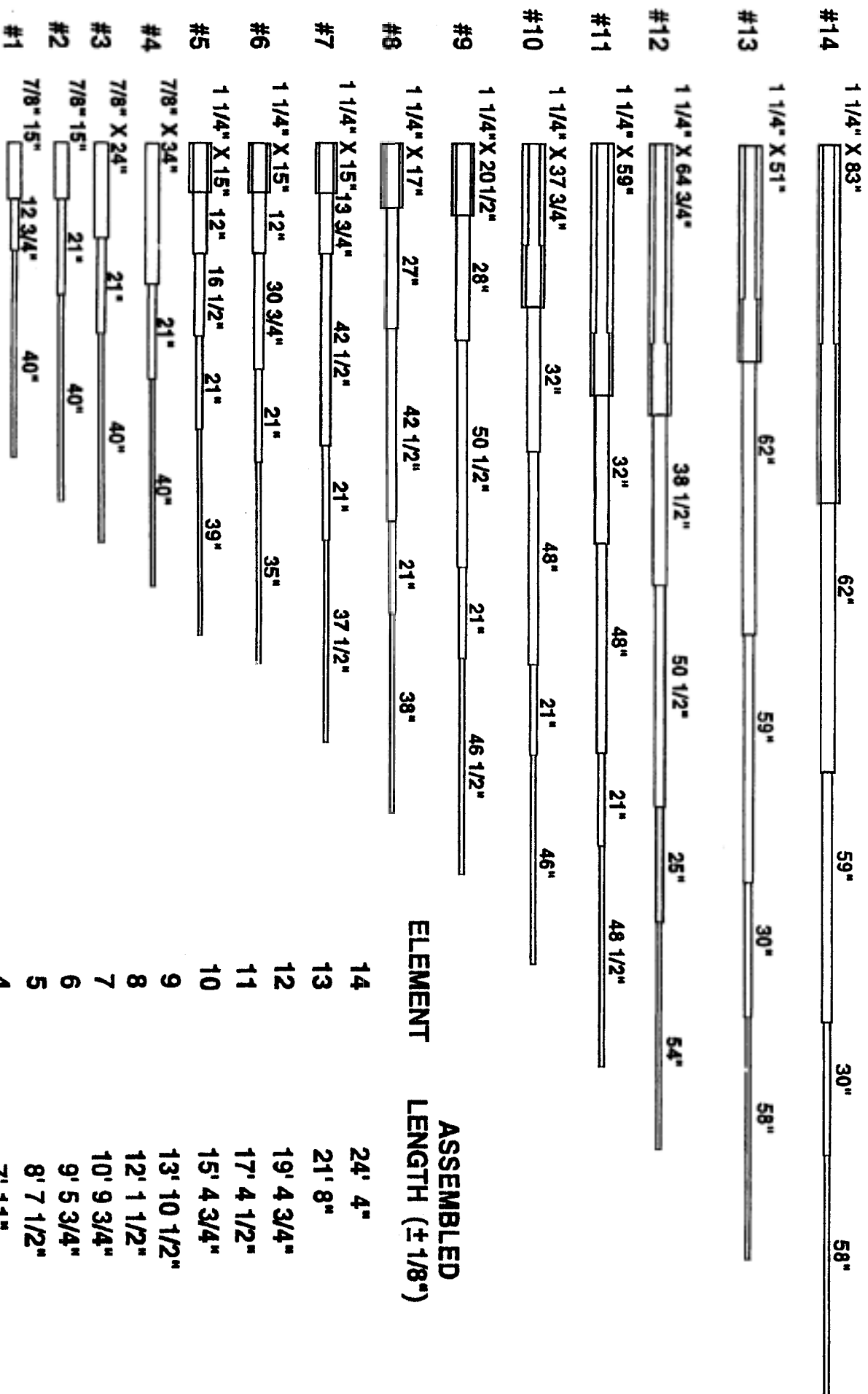
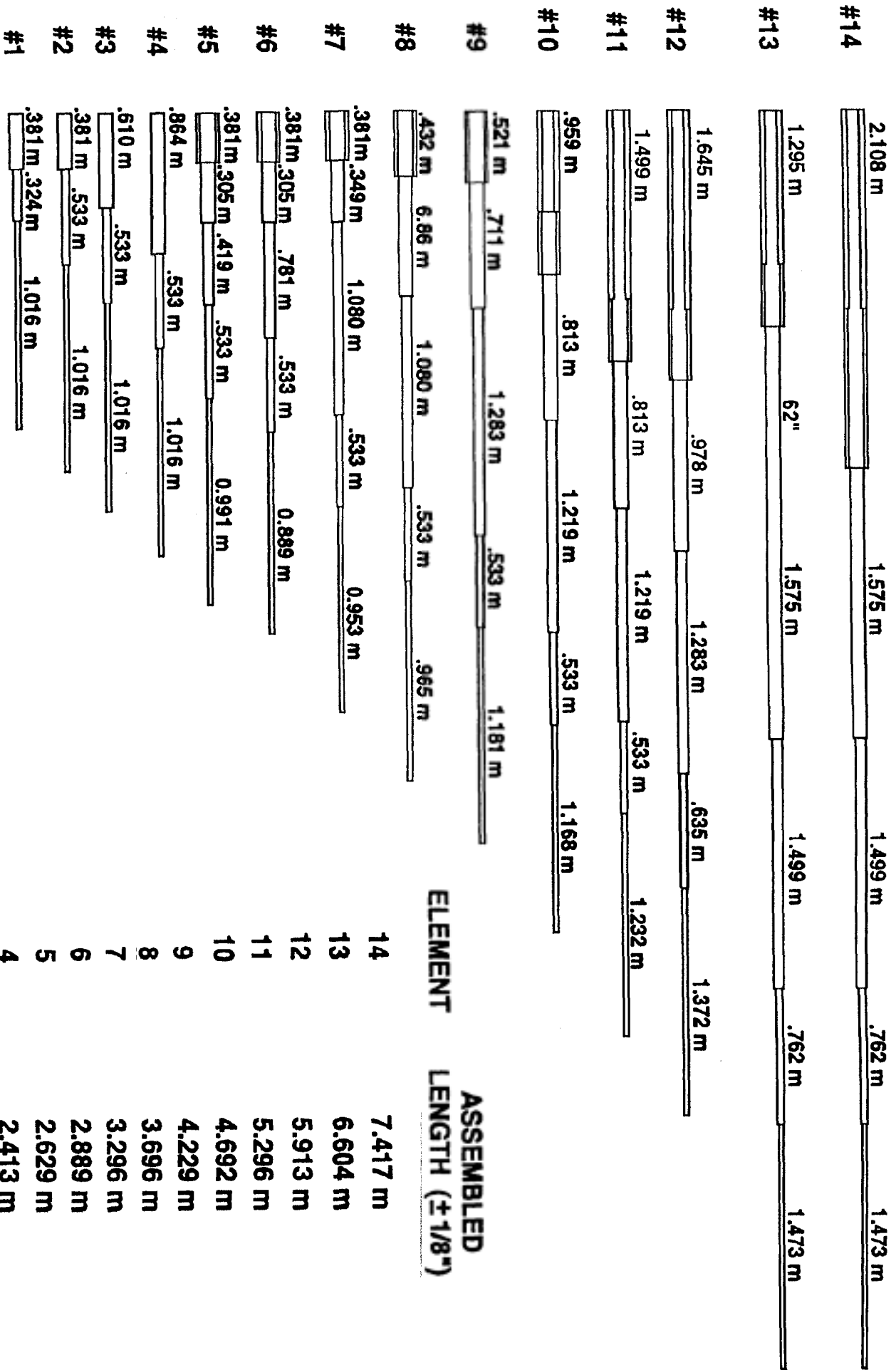


Figure 8
Element Tubing Descriptions



NOTE: Dimensions for largest tubes on each element are the actual tubing lengths.

Figure 9A
Exposed Tubing Lengths, LP-1010
American



ELEMENT ASSEMBLED LENGTH ($\pm 1/8"$)

Element	Assembled Length ($\pm 1/8"$)
14	7.417 m
13	6.604 m
12	5.913 m
11	5.296 m
10	4.692 m
9	4.229 m
8	3.696 m
7	3.296 m
6	2.889 m
5	2.629 m
4	2.413 m
3	2.159 m
2	1.930 m
1	1.721 m

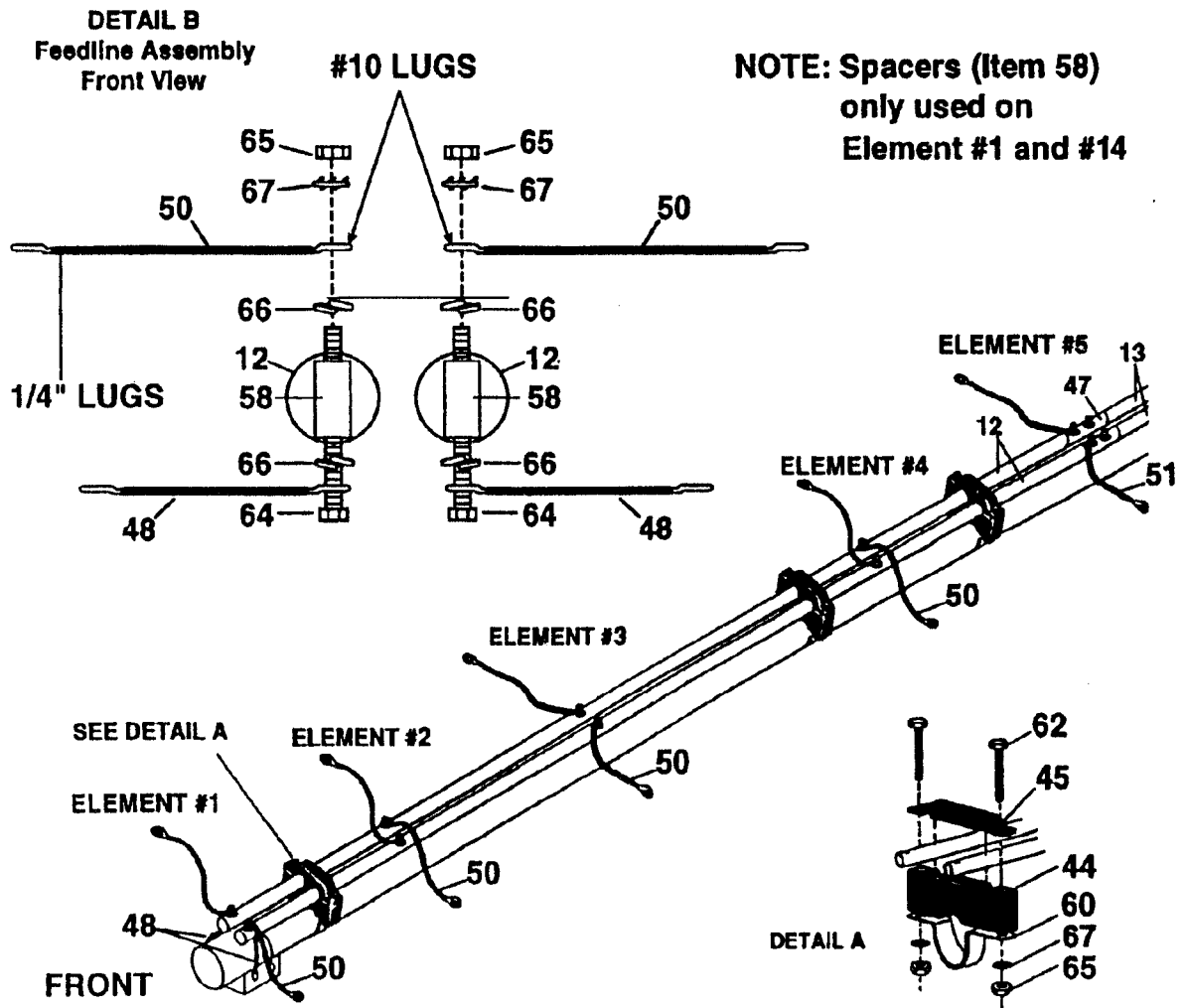
NOTE: Dimensions for largest tubes on each element are the actual tubing lengths.

Figure 9B
Exposed Tubing Lengths, LP-1010 Matrix

Lay the assembled feedline tubes above the boom with the support insulators in the correct positions. Attach the support clamps with the appropriate hardware as shown in Figures 10, 11, and 12, Detail A. The feedline tubes should be centered on top of the boom, except where they go around the boom-to-mast brackets. Allow a 3/4" gap between the closest feedline tube and the boom-to-mast brackets. Tighten all hardware securely.

Coax

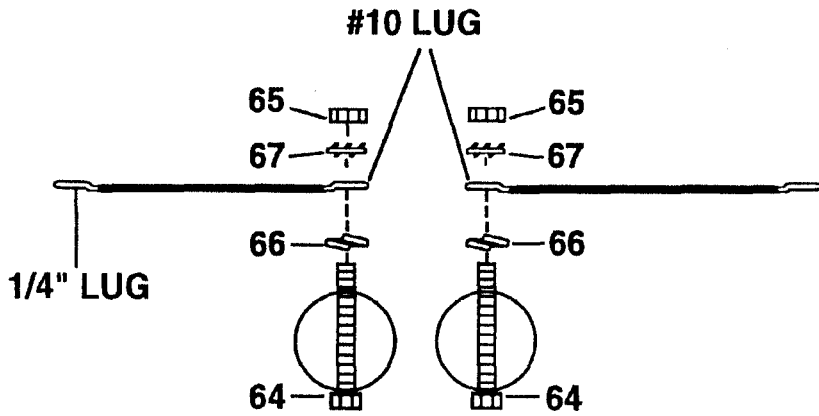
Attach the end of the coax assembly with two leads to the same location on the feedline that element 14 pigtails attach. Route the coax assembly under the boom using the four tie wraps. Attach the single lug end to the boom using the boom support strap and 5/8" space as shown in Figure 12.



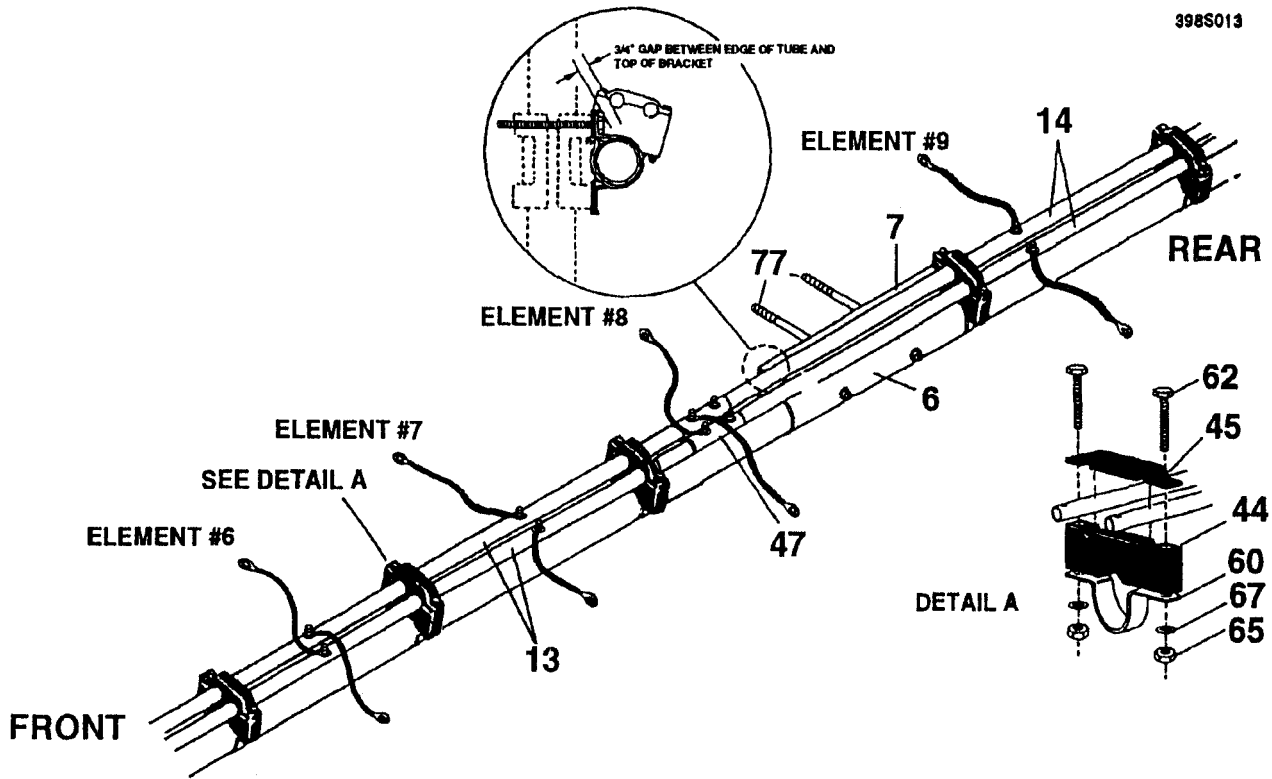
Item No.	Description
7	Bracket, casting-to-boom
12	Tube, front feedline, 3/4" x 75 7/8"
13	Tube, front-center feedline, 3/4" x 80 5/8"
44	Insulator, support (bottom)
45	Insulator, support (top)
47	Splice, aluminum, 7/8" x 2"
48	Pigtail Assy, 4 1/8"
50	Pigtail Assy, 6 1/2"
51	Pigtail Assy, 9 1/2"
58	Beta sleeve, 5/16" x 5/8"
60	Clamp, 3/4"

Item No.	Description
62	Bolt, hex head, #10-24 x 2"
64	Bolt, hex head, #10-24 x 1 1/4"
65	Nut, hex, #10-24
66	Lockwasher, #10, split
67	Lockwasher, internal, #10

Figure 10
Feedline Assembly
Front Section



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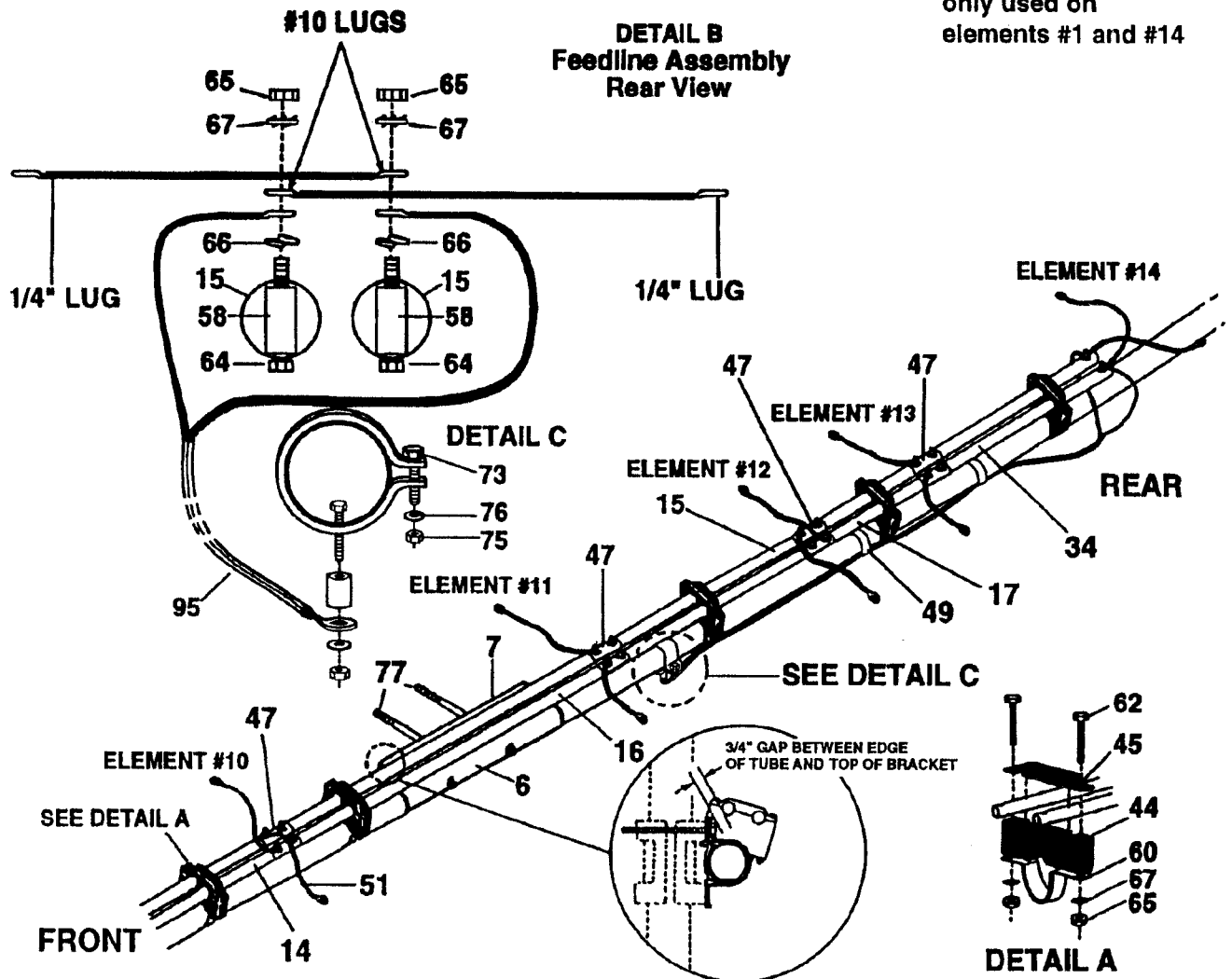


Item No.	Description
13	Tube, front-center feedline, 3/4" x 80 5/8"
14	Tube, rear-center feedline, 3/4" x 69 3/4"
44	Insulator, support (bottom)
45	Insulator, support (top)
47	Splice, aluminum, 7/8" x 2"
51	Pigtail Assembly, 91/2"
60	Clamp, 3/4"

Item No.	Description
62	Bolt, hex head, #10-24 x 2"
64	Bolt, hex head, #10-24 x 11/4"
65	Nut, hex, #10-24
66	Lockwasher, #10, split
67	Lockwasher, internal, #10

Figure 11
Feedline Assembly
Middle Sections

NOTE: Spacers (Item 58)
only used on
elements #1 and #14



Item No.	Description
6	Clamp, boom-to-bracket
7	Bracket, casting-to-boom
14	Tube, rear-center feedline, 3/4" x 69 3/4"
15	Tube, rear-feedline, 3/4" x 45 3/4", No. 12
16	Tube, feedline 41", No. 11
17	Tube, feedline, 51", No. 13
34	Tube, feedline, 52", No. 14
44	Insulator, support (bottom)
45	Insulator, support (top)
47	Splice, aluminum, 7/8" x 2"
49	Tie wrap
51	Pigtail Assembly 91/2"
57	Strap, boom-to-beta
58	Beta sleeve, 5/16" x 58"
60	Clamp, 3/4"

Item No.	Description
62	Bolt, hex head, #10-24 x 2"
63	Bolt, hex head, #10-24 x 11/2"
64	Bolt, hex head, #10-24 x 11/4"
65	Nut, hex, #10-24
66	Lockwasher, #10, split
67	Lockwasher, internal, #10
73	Bolt, hex head, 1/4" x 11/4"
75	Nut, hex, 1/4"
76	Lockwasher, internal, 1/4"
77	Bolt, hex head, 5/16" x 5"
95	Coax Assembly

Figure 12
Feedline Assembly

Installing Elements on the Boom

You should now have 28 completely assembled element halves. If you have both ends of the boom supported, you may start with element #1 at the front of the boom. If you do not have the boom ends supported, start with the elements near the center of the boom and proceed to each boom end, keeping the antenna balanced.

Insert the insulated end of each element half into the corresponding bracket on the boom and tighten the eight (8) 1/4"-20 x 3/4" bolts. Position the element compression clamps on the elements to the top side if the antenna will be raised over tower guy wires. Do not tighten the center anchor bolts until all elements are aligned in the same plane. Before you proceed to the next element, attach the pigtail wires to the tubing clamps as shown in Figure 12. Use 1/4"-20 x 1 1/4" bolts on the small clamps and 1/4"-20 x 1 1/2" bolts on the large clamps. Tighten these bolts securely.

Align each element so that it is parallel to the ground and perpendicular to the temporary mast. If you have a flat assembly area, you can use visual references, such as corners of structures and horizontal lines in exterior walls to align each element. When all elements are aligned, securely tighten the center anchor bolts and recheck the tightness of the other eight (8) bolts on each bracket.

Balun Assembly

Attach the BN-4000 balun to the boom, as shown in Figure 13. Use the U-bolt and #10-24 nuts. Attach the two 4 1/8" pigtail wires from the feed-line to the balun using 1/4"-20 x 3/8" screws and lockwashers. Tighten all hardware securely.

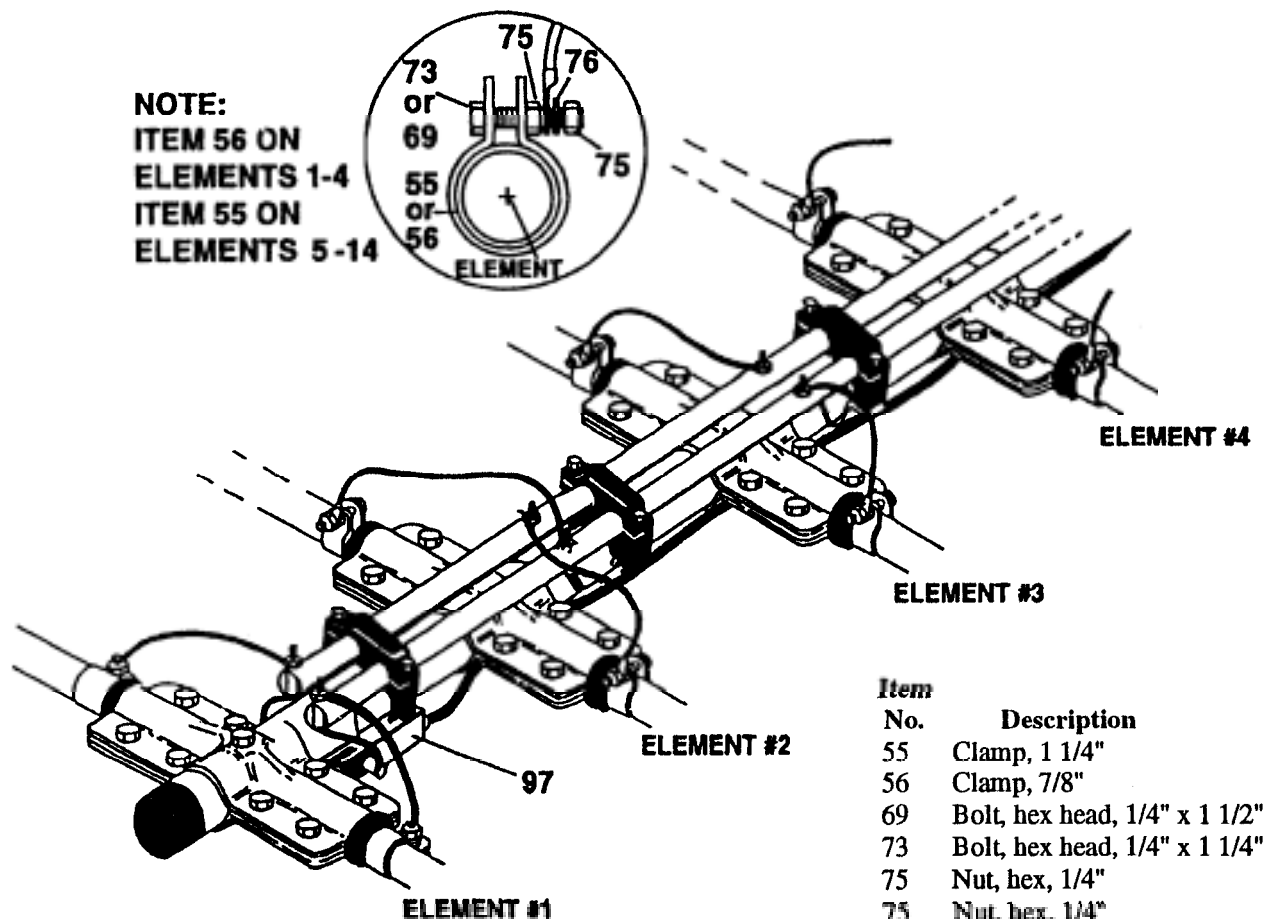


Figure 13
Installing Elements
on the Boom

Item No.	Description
55	Clamp, 1 1/4"
56	Clamp, 7/8"
69	Bolt, hex head, 1/4" x 1 1/2"
73	Bolt, hex head, 1/4" x 1 1/4"
75	Nut, hex, 1/4"
75	Nut, hex, 1/4"
76	Lockwasher, internal, 1/4"
97	BN4000, UHF Connector BN4000, Type N Connector

Final Inspection

Make sure **all connections are securely tightened**, recheck element lengths and spacings, and ensure that there is good clearance between pigtail wires and tubing and brackets. Check for a 3/4" gap between the feedline and the boom-to-mast bracket. The top two 5" bolts in the boom-to-mast assembly should be captivated by the feedline tubes. The bottom two 5" bolts will be installed during antenna installation.

CHAPTER 2

Antenna Installation

IMPORTANT: The LP-1010 is a very large and heavy antenna and requires consideration as to how you are going to get it to the top of your tower. Thoroughly read this section before beginning to install your antenna!

Installation on a Crank-Up Tower

Crank the tower completely down 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 cable. ALL sections must be prevented from moving!

WARNING: Installation of this product near power lines is dangerous! For your safety, follow the instructions provided with your tower and the instructions in this manual.

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 removed from your temporary mast and installed on the permanent mast as shown in Figure 1. The center hole in the cast brackets should be used to pin the brackets to the mast. If you wish to use this feature, you must drill a 5/16" hole through your mast at this location. Attach a gin pole to the tower or support structure to assist in lifting the antenna.

You may wish to install the antenna, mast and boom support as one assembly. In this case, use a large gin pole or crane to lift this assembly onto your tower.

Installation on Guyed Towers

When installing the LP-1010 on a guyed tower, you may wish to use a 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 during the raising process. You can use two ropes attached together at the top of the tower and attached to the ground about 15 to 20 feet apart. These two ropes can 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. Remember that this antenna weighs 150 pounds! Trim any tree branches that might interfere with the installation process.

Remove the cast boom-to-mast brackets from your temporary mast and install on your permanent mast. Drill 5/16" holes in your mast if you wish to pin the castings to the mast. This will ensure that your antenna does not twist on the mast in high winds.

Attachment of Coaxial Feedline

Use a good quality 50 ohm coaxial transmission line such as Times RG- 213/U (solid), or Belden 8267 (solid). Belden 9913 or 8214 is not required but may be used with careful connector installation. Belden 9913 should NOT be used above the rotator or on crank-up towers!! Take extra care when soldering connectors to foam dielectric coaxial cable. RG-213[U "TYPE" cable is not recommended because it usually has less shielding than better quality RG-213/U. Weatherproof all UHF connectors which will be exposed to rain or ice, with Coax-Seal C19 or another similar substance.

Pre-attach a 25' length of transmission line to the BN-4000 balun and tighten the connector securely. Tape the coax to the boom about every 3 feet (1 m) and provide suitable strain relief. Allow enough coax to reach your tower or other support structure.

Attaching the Antenna to the Mast

Attach the lifting rope to the balance point of the antenna. Be careful not to damage the feedline 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, guy wires, tree branches or ladder. The guide rope's two loose ends should be held by the ground crew, so that the guide rope can be retrieved later.

When the antenna reaches the mast bracket, the top two 5" bolts should be inserted through the top two holes in the aluminum castings and secured using 5/16" - 18 lockwashers and nuts.

NOTE: Use a few drops of heavy motor oil or grease on the stainless steel threads to prevent galling! If these threads gall, you may have to cut the bolts with a hacksaw to remove the antenna!

The other two remaining 5/16"-18 x 5" bolts should now be installed and secured with lockwashers and nuts. Tighten all bolts securely. The bolt heads must be on the same side of the boom-to-mast brackets as the feedline tubing.

Attach the boom support brackets and support tubes to the mast and adjust to level the boom.

NOTE: There will be considerable boom sag until the boom support tubes are adjusted.

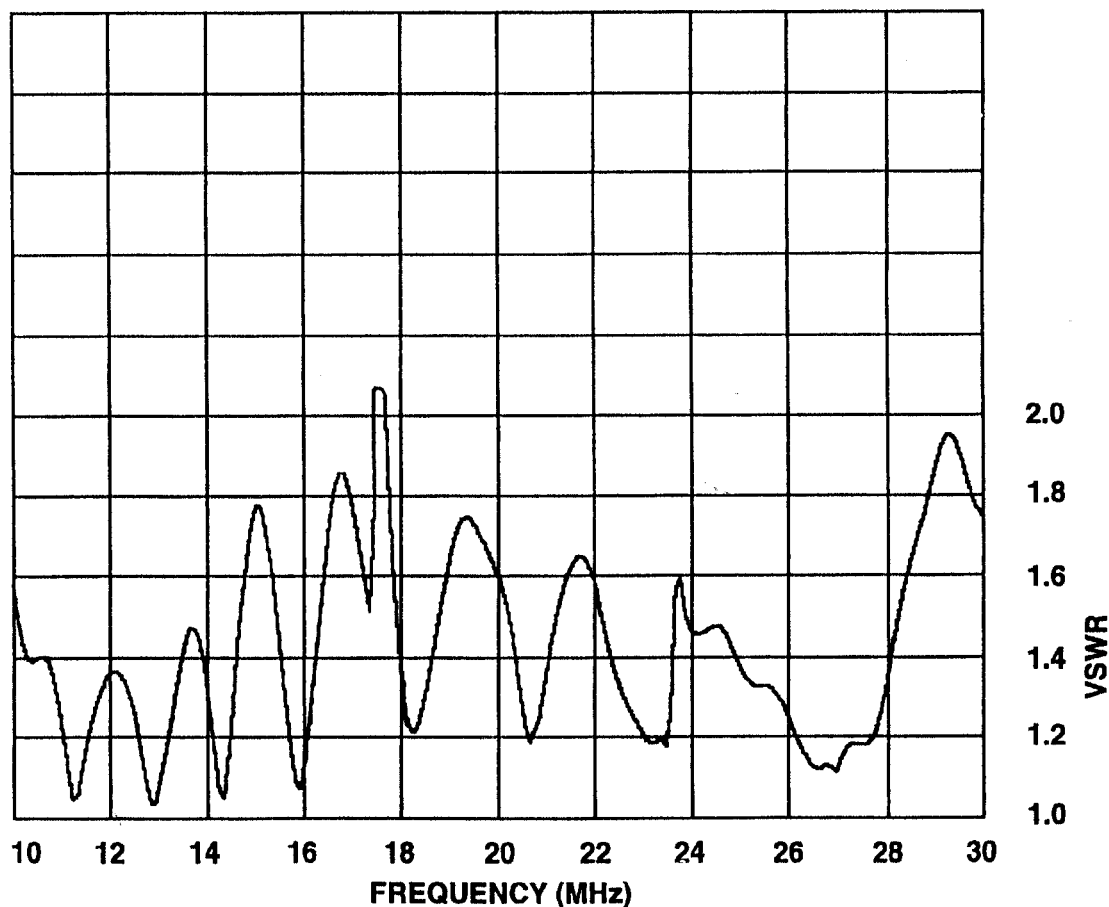
Lightning Protection

For proper lightning protection, you must ground your antenna supporting structure. Grounding will also help with noise reduction. A proper ground consists of a 1/2" x 8 foot copper clad steel ground rod driven into the ground approximately 12" (0.3 m) away from the concrete tower base. Connect the tower to the ground rod using #8 copper wire and commercial non-corrosive ground clamps.

VSWR Curves

These VSWR curves are typical for the antenna mounted 70 - 80 feet above the ground and fed with 100 feet of RG-213/U cable. Similar curves can be expected for this antenna mounted between 50 and 100 feet above ground. **DO NOT TRY TO TUNE THIS ANTENNA FOR LOW VSWR AT GROUND LEVEL.** Higher VSWR can be expected if mounted at less than 40 feet or within 20 feet of a large roof or metallic structure. Guy wires within 10 feet of this antenna should be broken into non-resonant lengths (less than 12 foot lengths) and insulated from the tower. Other antennas which are resonant somewhere in the 3 - 40 MHz range should be kept at least 10 feet above or below this antenna. Antennas which are resonant above 40 MHz can be mounted as close as 3 feet from this antenna. The measured VSWR may also be affected by strong local broadcast signals.

Extreme care must be used if you use an air-dielectric coaxial cable such as Belden 9913. Water intrusion can easily raise the VSWR and loss.



VSWR Curve

If you encounter problems with the operation of your LP-1010, follow these steps to isolate the cause of your problem. Usually you can isolate problems that occur in either your antenna or coaxial feedline or balun. If you experience high VSWR on some frequency bands, look for assembly errors in the antenna element lengths and log-periodic feedline connections or nearby resonant structures or antennas.

If you have high VSWR on all frequencies, look for shorts, opens or water in the coaxial feedline. balun and coaxial cable may also have been damaged by lightning.

Symptom:	Possible Causes:
VSWR above 3:1 on all frequencies.	Shorted coaxial connector. Water inside of coax. Coax damaged by lightning. Balun damaged by lightning. Antenna too close to roof. Antenna too close to ground. Balun not connected to antenna.
VSWR above 2:1 on all frequencies.	Antenna too close to roof. Antenna too close to ground. Antenna too close to wires.
VSWR above 2:1 from 10 - 12 MHz.	Antenna too close to ground Element #13 or #14 not assembled or connected right.
VSWR above 2:1 from 13 - 14 MHz.	Antenna too close to ground. Element #11 or #12 not assembled or connected right.
VSWR above 2:1 from 14 - 16 MHz.	Antenna too close to ground. Element #10 or #11 not assembled or connected right.
VSWR above 2:1 from 16 - 20 MHz.	Check elements 7, 8, 9, 10.
VSWR above 2:1 from 20 - 25 MHz.	Check elements 5, 6, 7, 8.
VSWR above 2:1 from 25 - 30 MHz.	Check elements 2, 3, 4, 5.

**CHAPTER
3 Parts List**

Item No.	Part No.	Description Qty
1	102734	Bracket, cast aluminum.....4
2	165919	Bracket #13, 2 to 1 1/4" hvy8
3	165920	Bracket #14, 2 to 1 1/2" hvy20
4	171533	Tube, 7/16" x 57 7/8".....2
5	171539	Boom, tube, 2" x 54 3/4".....1
6	172732	Clamp, boom-to-bracket1
7	172735	Bracket, casting to boom.....1
8	174939	Tube, 7/16" x 55"6
9	175512	Tube, 7/16 x 42 3/4"16
10	179860	Boom, tube, 2" x 73 3/8".....1
11	179875	Boom, tube, 2" x 54 3/8".....2
12	179862	Tube, front f.l. 3/4" x 75 7/8".....2
13	179863	Tube, front center, f.l. 3/4" x 80 5/8"2
14	179864	Tube, rear, center Ll. 3/4" x 69 3/4 ".....2
15	179879	Tube, rear, f.l. 3/4" x 45 3/4", No. 122
16	179880	Tube, Ll. 41", No. 112
17	179878	Tube, f.l. 51", No. 132
18	190004	Tube, 5/8" x 24"20
19	190010	Tube, 5/8" x 28"2
20	190011	Tube, 5/8" x 16"2
21	190204	Tube, 7/8 x 24".....4
22	190212	Tube, 7/8 x 15".....4
23	190309	Tube, 1 1/8" x 42"2
24	190311	Tube, 1 1/8" x 36"4
25	190312	Tube, 1 1/8" x 31 7/8 ".....4
26	190315	Tube, 1 1/8" x 17"6
27	190923	Tube, 1 1/4" x 20 1/2"2
28	190924	Tube, 1 1/4" x 17"2
29	190925	Tube, 1 1/4" x 15"6
30	191011	Tube, 7/8" x 55"4
31	191016	Tube, 7/8" x 51"4
32	191017	Tube, 7/8" x 46"4
33	191018	Tube, 7/8" x 34"4
34	179877	Tube, feedline, 52", No. 14.....2
35	690190	5/32", poly black braid.....2
36	850091	Penetrox A.....1
37	870522	Tubing assembly, 1 1/4" x 37 3/4".....2
38	870523	Tubing assembly, 1 1/4" x 59".....2
39	870524	Tubing assembly, 1 1/4" x 64 3/4".....2
40	171540	Boom tube, 2" x 81".....1

Parts List (continued)

Item No.	Part No.	Description	Qty
	870581	Parts Pack, 1010 Ins. #1.....	1
41	455625	Caplug, black	2
42	455644	Caplug, 7/16", black.....	28
43	463767	Insulator, 1 1/4", OD.....	8
44	465595	Insulator, support, bottom	13
45	465600	Insulator, support, top	13
	870582	Parts Pack, 1010 Insulator, #2.....	2
46	465833	Insulator 1 1/2" OD.....	20
	870583	Parts Pack, Feedline, 1010.....	1
47	191012	Splice, 7/8" x 2"	12
48	870546	Pigtail wire, 4 1/8"	2
49	451431	Tie wrap	4
50	878561	Pigtail assembly, 6 1/2".....	8
51	879973	Pigtail assembly, 9 1/2".....	20
	870584	Parts Pack, 1010 Clamp, #16	1
52	358758	Clamp, hose, #16, 5/16"	22
	870585	Parts Pack, 1010 Clamp, #6 and #10	1
53	358756	Clamp, hose, #6, 5/16".....	58
54	358757	Clamp, hose, #10, 5/16".....	22
	870586	Parts Pack, 1010 Misc, Clamps.....	1
55	168695	Clamp, 1 1/4"	20
56	169339	Clamp, 7/8"	8
57	170496	Strap, boom-to-beta.....	1
58	179874	Beta sleeve, 5/16" x 5/8".....	5
59	179887	Boom Support Spacer	4
60	177888	Clamp, 3/4"	13
61	540087	U-bolt, 2 3/4", stainless steel.....	1
	870587	Parts Pack, 1010, #10 Hardware	1
62	500157	Bolt, #10-24 x 2", hex head, stainless steel	31
63	500159	Bolt, #10-24 x 1 1/2", hex head, stainless steel	1
64	504739	Bolt, #10-24 x 1 1/4", hex head, stainless steel	44
65	554071	Nut, #10-24, hex head, stainless steel	75
66	561178	Lockwasher, #10, split, stainless steel	44
67	565697	Lockwasher, #10, internal, stainless steel	75
	870588	Parts Pack, 1010, 1/4" Hardware	1
68	500156	Bolt, hex head, 1/4" x 3/8", stainless steel	20
69	504098	Bolt, hex head, 1/4" x 1 1/2", stainless steel	22
70	505266	Bolt, hex head, 1/4" x 3/4", stainless steel	128
71	505734	Bolt, hex head, 1/4" x 2 1/2", stainless steel	1
72	505763	Bolt, hex head, 1/4" x 1 3/4", stainless steel	35
73	506518	Bolt, hex head, 1/4" x 1 1/4", stainless steel	11
74	551367	Nut, square, 1/4", stainless steel	18
75	554099	Nut, hex, 1/4", stainless steel	215
76	562961	Lockwasher, internal, 1/4", stainless steel	200

Parts List

Item No.	Part No.	Description	Qty
	870589	Parts Pack, 1010 Hardware, 5/16"	1
77	500349	Bolt, hex head, 5/16" x 5", stainless steel	11
78	500392	Bolt, hex head, 5/16" x 3", stainless steel	5
79	506966	Bolt, hex head, 5/16" x 2 1/2", stainless steel	2
80	506968	Bolt, hex head, 5/16" x 2 3/4", stainless steel	3
81	5142400	Bolt, hex head, 5/16" x 4", stainless steel	2
82	555747	Nut, hex, 5/16", stainless steel	22
83	564792	Lockwasher, split, 5/16", stainless steel	30
84	170495	Tube, 7/16" x 62"	4
85	190015	Tube, 5/8" x 33"	4
86	191022	Tube, 7/8" x 62"	4
87	171541	Insert, Boom, 13/4" x 711/8 ".....	1
88	179876	Boom, tube, 2" x 80 3/8".....	1
89	870578	Tubing assembly, 1 1/4" x 51".....	2
90	870579	Tubing assembly, 1 1/4" x 83".....	2
91	870580	Tubing assembly, 1, x 65"	4
92	179891	Tube, boom support form, 1 1/4" x 64 1/2"	4
93	179890	Tube, boom support rear, 1 1/4" x 52 1/2".....	4
94	179888	Channel bracket, 1 1/2" x 6"	8
95	870590	Coax assembly	1
96	179889	Tube, boom support, splice, 13/8" x 6".....	4
97	879915	BN 4000, UHF Connector, (LP-101 OA).....	1
	879959	BN 4000, Type N Connector, (LP-101OAN).....	1
98	179871	Boom, tube, 2" x 55".....	1

Converting American Measurements to Metric

Use this scale to identify lengths of bolts, diameters of tubes, etc. The American inch (1") and foot (1') can be converted to centimeters in

1 inch (1 ") = 2.54 cm
 1 foot (1') = 30.48 cm
 Example:
 42" x 2.54 = 106.7

FRACTION AND METRIC EQUIVALENT FOR ONE INCH			
FRAMONAL		FRACTIONAL	
INCH	MILLMMEERS	INCH	MILLIMETERS
1/16	1.599	9/16	14.288
1/8	3.174	5/8	15.875
3/16	4.700	11/16	17.463
1/4	6.350	3/4	19.050
5/16	7.937	13/16	20.638
3/8	9.525	7/8	22.225
7/16	11.112	15/16	23.813
1/2	12.700	1	25.400

