

M2 Antenna Systems, Inc. Model No: 6-10LP5-125



SPECIFICATIONS:

Model	6-10LP5-125
Frequency Range	6-10 MHz Continuous
Gain free space / 65'	5.0 dBi / 9.0 dBi Typica
Front to back	8 dB Typical
Beamwidth	E=77° Typical
Feed Impedance	50 Ohms Unbalanced
Maximum VSWR	2.0:1
Input Connector	SO-239, Others avl.
Feed Impedance Maximum VSWR Input Connector	50 Ohms Unbalanced 2.0:1 SO-239, Others avl.

3 kW, Higher avl.
29.5' / 3.0 x .125 Wall
55'
32'
2" to 3 " Nom.
13 Sq. Ft. / 125 MPH
170Lbs. / 220 Lbs.

*Subtract 2.14 from dBi for dBd

FEATURES:

The 6-10LP5-125 log periodic is a rugged, versatile performer designed for years of trouble free service. For the amateur radio operator it covers the 7 and 10 MHz amateur bands with high efficiency and no traps! Machined aluminum element-to-boom clamps and solid fiberglass rod center insulators are just a few of the unique structural features in this remarkable antenna. Linear loading of the two longest elements reduces element length and turning radius, putting less demand on the rotator and tower structure. All element section except tips are sleeve reinforced.

For continuous extended coverage, the 6-10LP5-125 is designed to team up with our popular 10-30LP8-125 log periodic. This combination efficiently and economically covers a frequency range of 6 to 30 MHz, to keep a system frequency agile instantaneously.

The 6-10LP5-125 is proving valuable in a variety of Maritime, Government, Commercial, MARS, Scientific and Amateur applications. Installed at 65 feet or higher, this five element antenna is a world wide performer. Solid electrical and structural design will maintain communications when other antennas have long since faded into the noise.

Tools handy for assembly process: screwdriver, 11/32, 7/16, 1/2, 9/16 and 5/8" nut drivers, end wrenches and/or sockets, measuring tape.

A small container of zinc paste (Penetrox, Noalox, or equiv.) has been provided to enhance and maintain the quality of all electrical junctions on this antenna. Apply a thin coat wherever two pieces of aluminum come in contact or other electrical connections are made.

1. **Loosely** assemble the pair of the 1/2" X 3" X 6" ELEMENT #5 PLATES (1/2" radius channels for 1" fiberglass rod) AND the pair of ELEMENT #4 PLATES (5/8" radius channels for 1-1/4" fiberglass rod).

2. *Loosely* assemble three pairs of the 1/2" X 3" X 6" ELEMENT #1, 2, 3 MOUNTING PLATES (5/8" OR 3/4" radius channels for 1-1/2" fiberglass rods).

Locate the two 1 X 24" welded square ELEMENT OVERHEAD SUPPORT POSTS. Install each post to the open, middle two holes of two mounting plate pairs. Refer to the element detail for hardware size call outs. Add locknuts but leave loose at this time. These element mounting plate assemblies with posts are for the two rear linear loaded elements, #1 and #2.

3. Slide a 1-1/2" x 48" FIBERGLASS ROD into the channels inside both element mounting plate pairs with the vertical posts (elements #1 and #2) and one standard pair with 3/4" radius channels (element #3). Center the rod ACCURATELY in the clamps, align the drilled holes vertically, and tighten all six element clamp plate bolts EVENLY onto the rod, starting with the two center bolts. Make sure plates remain parallel, top to bottom. Slide a polyethylene 1-1/2" I.D. DISC INSULATOR onto each end of rod and up against the clamp plates. Repeat for element clamp pairs #4 (1-1/4" x 48" Fiberglass rod and 1-1/4" I.D. disc insulator) and #5, (1" x 23-7/8" Fiberglass rod and 1" I.D. disc insulator).

4. Next, apply a little zinc paste to the channels in all the small rectangular PHASING LINE CLAMP CAPS and the larger PHASING LINE CLAMP BLOCKS (3 @ 1-3/4" I.D., 1 @ 1-1/2" I.D., AND 1 @ 1-1/4" I.D.). Then loosely assemble plates to blocks, channel to channel, with 1/4-20 x 1" FLATHEAD SCREWS AND LOCKNUTS.

5. Gather ALL INNERMOST ELEMENT SECTIONS together: 6 @ 1-3/4" x 60", 2 @ 1-1/2" x 60", 2 @ 1-1/4" x 48" - all will have a single 1/4" hole in butt end. Apply a little *zinc oxide paste* to the last inch of each element butt and install a PHASING LINE CLAMP BLOCK ASSEMBLY. Orient the small clamp plate to element butt.

ELEMENT ASSEMBLY NOTE: MANY ELEMENT SECTIONS REQUIRE INTERNAL REINFORCING SLEEVE SECTIONS. SEE **ELEMENT ASSEMBLY LAYOUT DRAWINGS FOR DETAILS**.

6. ELEMENT #1: Slide a 1-1/2" x 36" SLEEVE SECTION into undrilled end of the 1-5/8" x 55.5" SLEEVE SECTION, flush with end. Slide drilled end of 1-5/8" section over ELEMENT #1 fiberglass rod and align holes. Slide a 1-3/4" x 60" INNER ELEMENT SECTION over 1-5/8" SLEEVE SECTION. Repeat for the other element half. Now TEMPORARILY position each phasing line clamp block 1/4" away from the disc insulator.

7. Repeat step 6 for ELEMENT #2 and #3. Also repeat for ELEMENTS #4 and #5 with following changes:

Element #4: 1-3/8" x 55.5" sleeve with 1-1/2" sleeve on 1-1/4" x 48" fiberglass rod, 1-1/2" x 60" element section.

Element #5: 1-1/8" x 40.5" sleeve on 1" x 23-7/8" fiberglass rod, 1-1/4" x 48" element section. 8. Install second element section to all inner elements:

Elements #1, #2, #3: 1-1/2" x 60" ELEMENT SECTION with 1-3/8" x 55.5" sleeve, 1-1/4" x 48" sleeve, and 1-1/8" x 48" sleeve.

Element #4: 1-1/4" x 48" ELEMENT SECTION with 1-1/8" x 43.5" sleeve and 1" x 6" sleeve. Element #5: 1" x 60" ELEMENT SECTION with 7/8" x 27" sleeve.

9. ELEMENTS #3, #4, #5: Continue to install ALL remaining outer element sections, using size, length, sleeves and hardware listed on ELEMENT ASSEMBLY LAYOUT DRAWINGS.

10. ELEMENTS #1 AND #2: Pair up each 1-1/4" x 48" STRAIGHT ELEMENT SECTION with a 1-1/4" x 12" SWAGED ELEMENT SECTION. Select one pair and install a 1-1/8" x 48" sleeve into 1-1/4" x 48" section (Note hole spacing is different at each end - match with sleeve). Orient straight ends of 48" and 12" sections with holes spaced at 1/2" and 3-1/2" from ends towards each other. Slide a LINEAR LOADING ARM onto this end of each section and position up against the screws closest to the end. Slide a Support arm and stabilizer bar assembly about 3" on the other end of the 48" section. SEE ELEMENT ASSEMBLY DRAWING.

11. Install a 1-1/8" x 7-1/2" SLEEVE onto a 1" x 9" FIBERGLASS ROD INSULATOR and align holes. Then add the 1-1/4" x 12" section, aligning all holes. Install other end of fiberglass rod into 48" sections.

12. Loosely install LINEAR LOADING ARM. Align arms at right angles to the screws in the element and to opposite sides of each element. Then slide both arms towards the inner end of the element assembly until they butt up against screw heads (see hardware assembly drawing. Repeat steps #10, 11, 12 for three remaining 1-1/4" element pairs.

13. Install the 1-1/4" x 48" ELEMENT ASSEMBLIES to ELEMENT #1 AND #2.

14. Place ELEMENT #1 and ELEMENT #2 on a level, flat surface with the support post up. Feed the $3/16 \times 130^{\circ}$ (ele #1) or $3/16 \times 66^{\circ}$ (ele #2) linear loading rods through each support insulator and on through the linear loading arm on the $1-1/4^{\circ}$ inch sections. Adjust the rod ends so $3/4^{\circ}$ extends through each arm towards the element tip. Tighten the set screws. Install two SHAFT RETAINERS, one at a time, onto each rod tip and snug up to linear loading arm.

NOTE: To install the RETAINER, hold the 3/8 x 3" push tube in your hand with one end between your thumb and forefinger. Now center retainer on this end, "dish" into tube, and hold in place with the same thumb and forefinger. Grasp the linear loading rod near the end with your other hand and firmly push the retainer onto the rod.

15. SHORTING BAR PREPARATION

Locate the 8 shorting bar halves. Assemble the shorting bars with 8-32 x 7/8" screws and locknuts. Finger tighten the locknuts for now. Next, begin to assemble the phyllistrand tension lines as shown on the ELEMENT HARDWARE drawing. For element #1 use the 60" PHILLISTRND cord and for element #2 use the 124" PHILLISTRAND cord. On each shorting bar assembly, insert one end of each length of PHILLISTRAN HPTG-1200 CORD into the CENTER hole of the shorting bar. Loop the cord around the delrin strain relief and back through the other hole and allow about 2" to protrude. Place a cable clip here as a "backup" to the final clamping action of the shorting bar halves. Don't tighten the hardware at this time.

(OPTIONAL) On each phyllistrand tension line insert two more 1/8" cable clips and allow them to slide all the way to the shorting bar for now.

16. SHORTING BAR INSTALLATION

Next, feed each shorting bar onto the pair of linear rod ends and position them at the measurement as shown on the DIMENSION SHEET. NOTE the dimension is measured from the OUTSIDE edge of the LL arm to the OUTSIDE edge of the shorting bar. (USING A BLACK PERMANENT MARKING PEN OR EQUIVALENT, MARK THE SPOT ON THE ROD WHERE THE SHORTING BAR SHOULD BE) Be sure the linear loading lines are centered about the main element. Once the shorting bars have been correctly set, tighten all of the 8-32 hardware. Cut off the excess material so that about 1" of rod extends beyond the shorting bar. Start a SHAFT RETAINER onto each rod tip. Push the retainers up against the shorting bar. Repeat for of the other element halves.

17. SUSPENSION OF PHYLLISTRAND TENSION LINES

At this point you might want to perform the remaining steps with a friend.

On a flat surface, support the ends of each element tip up so that it is at the same height as the center section. Next insert the phyllistrand tension lines through element support clamp, note the self locking phyllistrand rout through the holes, and pull tight. Rout the other end of the upper support cable through upper turnbuckles, around each thimble eye, and then finally back through the two cable clips. See the ELEMENT HARDWARE drawing for an illustration. Now pull on the free end of the phyllistrand until the entire element appears to be level. (IT MAY BE HELPFUL TO RAISE THE OUTER END OF THE ELEMENT HALF WITH A 4" BLOCK OF WOOD OR BRICK. At this point, secure the tension line by tightening the two 1/8" cable clips. After the element is straight equalize the tension of the linear loading phyllistrand support lines. Repeat this procedure for all the other element halves. The final tensioning of element support and linear loading rods is done with the TURNBUCKLES. This can be performed after the elements have been secured to the boom.

18. Examine the 2-1/2" x 12' BOOM SPLICE for nicks or bumps and file off if found. Examine the drilled boom ends to be coupled for dings, internal burrs or chips and remove if found. Lubricate the splice bushings with light oil and slide the splice halfway into one 3" x 15' BOOM SECTION. Align holes, and secure with $1/4-20 \times 3-1/2$ " bolts and locknuts but DO NOT TIGHTEN YET. Add the remaining boom section to the splice, align holes, and install bolts. Now tighten ALL the bolts. Install the 3/8" EYEBOLTS into the boom, one 3' in from each boom end. Secure with 3/8" stainless nuts and lock washers.

19. Loosely install two saddle clamps to the bottom of ELEMENT #1 clamp plates. Slide the element onto EITHER end of the boom (its symmetrical) and position the rear clamp plate at 1" from boom end. Align boom so eyebolts are "up" and perpendicular to elements, then tighten the saddle clamp bolts. Position remaining elements on the boom as shown on DIMENSION SHEET. and tighten bolts. Dimension Sheet. Element spacing dimensions are center to center, but can also be used edge to edge with a tape measure.

20. INSTALLING THE PHASING LINES. SEE DIMENSION SHEET & HARDWARE ASSEMBLY DRAWINGS

A. Start with the shortest set between element #4 and #5 For each set, feed the phasing lines through a 3/4" x 3" DELRIN SPACER so that the spacer sits at the crossover point between the lines. Hold the spacer in place loosely around the boom with a large nylon tie but don't tighten it yet. Adjust phasing lines so that their bends are even and the lines run parallel to the boom.

B. Apply a small amount of conductive paste to the rod ends and feed the #5 ends into the clamp block channels until 1/4" extends beyond clamp. Temporarily tighten the 1/4-20 x 1" flathead screws and locknuts on element #5. Insert the other rod ends into the clamp block assemblies on element #4 but do not tighten. Continue to the next phasing line set between element #4 and #3 Apply paste and insert the ends into the clamp blocks at element #4 and NOW tighten the flathead screws and nylon tie. Then adjust the block assemblies flush to the disc insulators and tighten 8-32 clamp screws.

C. Continue in the same fashion tightening the hardware and nylon ties as you go.

D. Before securing phasing lines on ELEMENT #1, attach the 20 turn COIL to screw studs. Then tighten. Keep coil and leads clear of all other hardware by at least 1/2"

21. MOUNTING THE 4:1 BROAD BAND BALUN: Secure the BALUN to the 2" x 4-1/2" BALUN MOUNTING PLATE with a 2-1/2" U-bolt and cradle. DO NOT OVERTIGHTEN - BALUN HOUSING COULD BE DAMAGED! Install assembly to boom with 3" U-bolt and cradle. Position balun just to the rear of element #5, connector pointing to front and leads easily reaching clamp block screw studs. Now remove the 1/4 inch nuts from the clamp block screws. Apply some zinc paste to the lugs on the balun leads and place over each screw stud. Replace the nuts and retighten. If practical at this time, attach the main 50 Ohm feed line to the balun, loop back under boom, and route down to the boom to mast plate position at phasing line crossover between elements #2 and #3. Secure coax with the large nylon ties or equivalent. HELPFUL TIP: The life of the nylon ties can be extended after all are positioned and tighened by covering the ties with a wrap or two of Scotch 33 or equivalent black electricians tape. The black tape keeps the suns rays from baking the polymers and UV protection out of the nylon tie.

22. Mount the BOOM TO MAST PLATE using 3" U-bolts, 3/8-16 stainless lock washers, and nuts. Center the plate at the crossover point of the phasing lines between element #2 and #3. Align plate to vertical and tighten nuts. Shape the phasing lines as needed to clear the plate by at least 1/2". *Heavy duty* 2" U-bolts are provided for mounting antenna to mast.

23. Do a final element alignment if necessary and check over the entire antenna for loose hardware. Check that phasing rods are straight and parallel. Tighten the nylon ties securing the Delrin spacers

24. OVERHEAD BOOM SUPPORT SYSTEM.

A. Install a 2' to 3' temporary mast section to the boom to mast plate and attach the turnbuckle plate and adjust the position to simulate the actual position of the plate in the final installation. Install the eye & jaw turnbuckles with the jaw end in the corner holes of the turn buckle plate. Support the antenna at the boom to mast plate. Find the phylistrand cable, note the positions of the eye bolts and the BTM plate are note equal. Cut the cable to an adequate length as to have enough cable to get through and around the thimbles and to have 3" of cable to secure two wire nuts. The phylistrand cable cord DOES NOT STRETCH. When the guy system has taken a "set", loosen the 2" U-bolt and adjust turnbuckle plate height until boom is straight and level.

E. After final installation, do any minor boom straightening with the turnbuckles. Then safety wire to prevent changes to settings.

25. This completes the ASSEMBLY. When the antenna is installed in position on the mast, REMEMBER to support the feedline at the antenna boom and on the mast. Leave an adequate feedline loop for rotation around the tower. Mount horizontally polarized VHF and UHF antennas at least 40" above or below this antenna to minimize interaction.

Carefully designed and manufactured by:

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6-10LP5-125 DIMENSION SHEET



6-10LP5-125 BOOM DETAILS



6-10LP5-125 ELEMENT #1 & #2 LAYOUT



6-10LP5-125 ELEMENT #3 LAYOUT



6-10LP5-125 ELEMENT #4 LAYOUT



6-10LP5-125 ELEMENT #5 LAYOUT



6-10LP5-125 ELEMENT #1 & #2 CENTER DETAIL



6-10LP5-125 ELEMENT #3 CENTER DETAIL



6-10LP5-125 ELEMENT #4 CENTER DETAIL



6-10LP5-125 ELEMENT #5 CENTER DETAIL



6-10LP5-125 ELEMENT #1 (COIL DETAIL)



ELEMENT OVERHEAD (GENERIC DETAIL)



ELEMENT #1 & #2 OVERHEAD SUPPORT



6-10LP5-125 OVERHEAD SUPPORT



6-10LP5-125 ASSEMBLY DETAILS



6-10LP5-125 PARTS & HARDWARE

DESCRIPTION	QTY
Boom Section, 3 x .125 x 180"	2
Boom Splice with Rings 2-1/2 x .125 x 144"	. 1
Inner Element Section 1-3/4" x 0.058 x 60" SOE, 1/4" hole	. 6
Butt Element Sleeve 1-5/8" x 0.058 x 55.5", 1/4" hole, STR	. 6
Inner Element Section 1-1/2 x .058 x 60" SOE, 1/4" hole	2
Element Section 1-1/2 x .058 x 60" SOE,	6
Element Sleeve 1-1/2 x .058 x 36" STR	6
Butt Element Sleeve 1-3/8 x .058 x 55.5", 1/4" hole, STR	2
Element Sleeve 1-3/8 x.058 x 55.5" STR	6
Element Sleeve 1-1/4 x .058 x 48" STR	. 6
Inner Element Section 1-1/4 x .058 x 48" SOE, 1/4" hole	. 2
Element Section 1-1/4 x .058 x 48" SOE,	. 4
Element Section 1-1/4 x .058 x 48" STR	. 4
Element Sleeve 1-1/4 x .058 x 36" STR	. 2
Element Section 1-1/4 x .058 x 12" SOE.	. 4
Element Section 1 x .058 x 60" SOE	. 4
Element Section 1" x .058 x 60" STR	. 6
Element Sleeve, 1" x .058 x 27" STR	. 4
Element Sleeve, 1 x .058 x 10" STR	. 2
Element Sleeve, 1 x .058 x 6" STR	. 2
Element Sleeve 1-1/8 x .058 x 48" STR	. 4
Element Sleeve, linear loading, 1-1/8 x .058 x 48" STR	. 4
Element Sleeve 1-1/8 x .058 x 43.5" STR	. 4
Butt Element Sleeve 1-1/8 x .058 x 40.5", 1/4" hole, STR	. 2
Element Sleeve, linear loading, 1-1/8 x .058 x 7.5" STR	. 4
Element Sleeve 7/8 x. 058 x 33"	4
Element Sleeve 7/8 x. 058 x 27"	4
Element Sleeve 7/8 x. 058 x 16"	4
Element Section 0.75 x .058 x 48" SOE	. 10
Tip Element Section 0.5 x .035 x 55" STR	. 6
Tip Element Section 0.5 x .035 x 53" STR	. 2
Tip Element Section 0.5 x. 035 x 52" STR	. 2

6-10LP5-125 PARTS & HARDWARE

Boom to Mast Plate 8 x 8 x 1/4" plate alum. diamond pattern	 3 2 2 10
Element Clamp Block for 1-3/4" tubes6	3
Element Clamp Block for 1-1/2" tubes	2
Element Clamp Block for 1-1/4" tubes	<u>'</u>
Small Clamp Block	10
Linear Loading Arm .375 X 1.5 X 3.875	5
Support arm, alum. (MZAPL0202)4	F 1
Turn Buckle 1/1" H&F	ŀ
Cable Eve 3/16	
Wire Nut. 1/8	
Phylistrand cable, HPTG 1200 x 60"	
Phylistrand cable, HPTG 1200 x 124"2	
Strain Relief, 1/2 x 1/2 Delrin (M2APL0100)4	
Shorting Bars 1/4 x 3/4 x 5-7/8 (M2ASB0250)	3
Delrin Spacers, phasing line, 3/4" x 3" (M2ASO0040)4	ł
Phylistrand HPTG400 x 30ft1	
Rod, 1-1/2 x 48", Fiberglass	3
Rod, 1-1/4 x 48", Fiberglass1	1
Rod, 1" x 23-7/8", Fiberglass1	4
Rod, Linear loading, 1"X 9", Fiberglass4	ł
Balun, 4.1, 3 KW	1
$\begin{array}{c} \text{Daturt would in y Flate, 2 X . 125 X 4-1/2} \\ \text{Coil} \#10 \text{ AWC 20T on 1" form} \end{array}$	1
Descing rods 3/16 v (pre-cut and pre-bent)	2
Linear loading Rod 3/16" x 130"	, 1
Linear Loading Rod 3/16" x 66"	г 1
Disc Insulator Polyethylene 1-1/2"	5
Disc Insulator, Polyethylene, 1-1/4"	>
Disc Insulator, Polyethylene, 1"	2
Compression Clamp, 5/8" (M2AMC0145)1	10

ELEMENT OVERHEAD SUPPORT UPGRADE	QTY
Element Overhead Support, 1" X 1" X 24" W/SLOT (M2AVR0051)2
Element Overhead Support Clamp, HD	4
Element Overhead Support Line, HPTG1200 x 34'	2
Turnbuckle, 1/4 X 5-1/4", Hook and Eye	4
Cable Eye, 3/16"	4
Wire Clip, 1/8"	8
Bolt, 1/4-20 x 3-3/4"	4
Locknut, 1/4-20,ss	4
Nut, 1/4-20,ss	4
Screw, 8-32 x 1-3/4", Pan Head Phil,ss	4
Locknut, 8-32,ss	4

6-10LP5-125 PARTS & HARDWARE

IN HARDWARE BAG	QTY
U-Bolt, 3" with cradle	3
U-bolt, 2-1/2 with cradle	1
U-Bolt, 2" Heavy Duty, with cradle	4
U-bolts, 2" standard	1
Eyebolts 3/8" x 5", Forged Galv	2
Turnbuckles 3/8" x 8", Forged Galv	2
Thimble, 1/4", Zinc	4
Wire Nuts, 1/4"	8
Turnbuckle plate, 2 x 5 x 3/16" alum	1
Bolt, 1/4-20 x 3-1/2" hex cap stainless	10
Bolt, 1/4-20 x 3"	12
Bolt, 1/4-20 x 2-3/4"	22
Bolt, 1/4-20 x 2-1/2"	12
Bolt, 1/4-20 x 2-1/4"	6
Bolt, 1/4-20x2"	2
Bolt, 1/4-20x1-3/4	2
Bolt, 1/4-20 x 1-1/4"	4
Bolt, 1/4-20 x 1" Countersunk Flathead	10
Nut, 1/4-20, LOCKING	60
Screw, 8-32 x 2"	0 10
Screw, 8-32 x 1 $3/4$ "	10 26
Screw, 8-32 x $1-3/4$	36
Screw 8-32 x 1-1/2"	20
Screw 8-32 x 1"	20
Screw, 8-32 x 7/8"	
Screw, 8-32 x 1/2"	10
Set Screw, 8-32 x 1/4"	16
Nut, 8-32, Locking	164
Nut, 8-32	10
Nut, 5/16-18, stainless	4
Lockwasher, 5/16" split ring stainless	4
Nut, 3-8-16 stainless	16
Lockwasher, 3/8", split ring stainless	16
Shaft Retainers	32
Nylon ties, large 11" black	8
Push tube for keepers, 3/8 x 3" alum	1
Allen wrench, 5/32	1
Linc paste (Penetrox or equiv.)	1

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