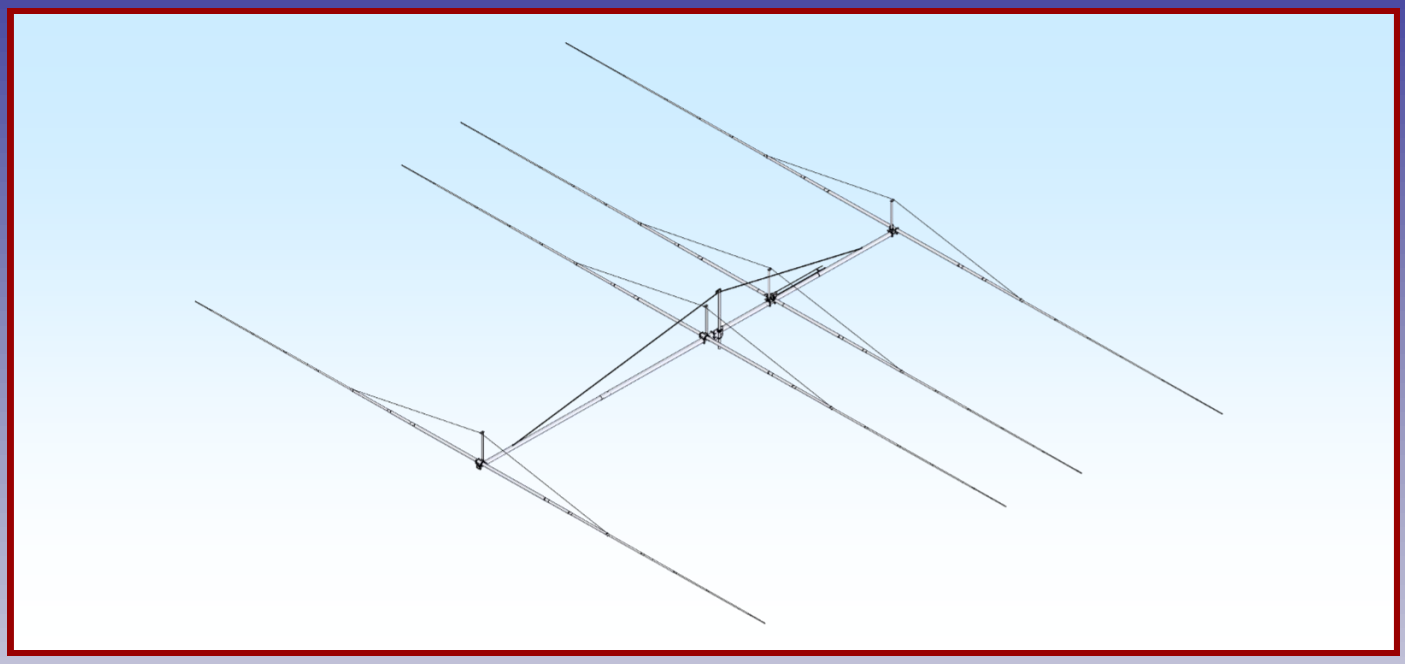
M2 Antenna Systems, Inc.
Model No 6.9-4FS-125



SPECIFICATIONS:

Model	6.9-4FS-125
Frequency Range	7.0-7.3 MHz
*Gain	8.4 dBi
Front to back	23 dB
Beamwidth	E=60°
Feed type	Hair pin match
Feed Impedance	50 Ohms Unbalanced
VSWR	1.3:1 typ. 2:1 max
Input Connector	SO-239 Others optional
Power Handling	3 kW Higher Opt.

Boom Length / Dia	48’ 2” / 4-1/2” To 4”
Element Length / Dia.	72 Ft. / 3” To 3/8”
Turning Radius:	43 Ft.
Stacking Distance	87’ To 96’
Mast Size	2” to 3 ” Nom.
Wind area / Survival	29.4 Sq. Ft.. / 125 MPH
Weight / Ship Wt.	390 Lbs. / 430 Lbs.

***Subtract 2.14 from dBi for dBd**

FEATURES:

The 6.94FS-125 is a full sized Yagi designed the way you would want it, providing full band coverage. The 6.94FS-125 is a powerful package of clean mechanical design, quality materials, littered with machined parts. The design produces outstanding performance that will keep the pileups coming for year and years of trouble free performance for years. Mechanically the boom is a 20 foot, *4-1/2"* X *1/4"* wall center with 4" x 1/8" wall tips. The mast mounting plate is *3/8"* and the boom mounts with rugged machined cradle clamps. The element sections have been computer optimized for 125 MPH winds. All three are supported by HPTG 1200 Phillistran overhead guy system. An HPTG 6700 overhead guy system is supplied for the boom as well. A hairpin type match couples the 3 kW 1:1 balun to the feed line. The antenna is completely DC grounded. Compare performance, construction, and durability with the competition...no one can even come close!

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Rev.01

6.9-4FS-125 ASSEMBLY MANUAL

TOOLS NEEDED: Tools handy for assembly process: Phillips head Screwdriver, 11/32, 7/16, 1/2, & 9/16 nut drivers, end wrenches and/or sockets, measuring tape.

Small containers' 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. Also use it on the threads of bolts and screws as an anti seize compound. ***NOTE: Some element inserts or sleeves may be factory installed. Check before assembly!***

BEFORE YOU BEGIN:
Look over the ELEMENT ASSEMBLY and DIMENSION SHEET drawings to get familiar with the various parts of the antenna. If you are familiar with the construction of M^2 HF antennas, the 40M3FS-125mph can be assembled mainly using the drawings. Otherwise, M^2 strongly recommends using this assembly manual. It will provide you with detailed assistance in critical areas and give overall order and efficiency to the construction process. Take your time: Let your assembly skills enhance the 40M3FS-125 mph's quality construction and performance.

THIS ASSEMBLY SEQUENCE IS FROM SMALL TO LARGE
(SEE ELEMENT ASSEMBLY DRAWINGS)

1. Locate the FOUR 8 x 8 x 1/4" ELEMENT TO BOOM PLATES and attach the FOUR welded ELEMENT SUPPORT BRACKETS. Use 1/4-20 x 1" bolts and locknuts. Loosely mount two 1-1/2" U-bolts and cradles in each bracket.

2. Now attach the ELEMENT SUPPORT RISERS, align the welded top plate so it points away from the bracket and over the element location. Tighten the U-bolts.

3. Mount the 2" x 36" CENTER INSULATOR fiberglass rod on one of the plate assemblies, using 2" saddles and 3/8-16 x 3-1/2" bolts and locknuts. Center the insulator, align the element mounting holes in the coupling rings perpendicular to the plate and tighten the saddle clamp bolts.
To complete this sub assembly, place two 1/4" diameter 2" stainless steel U-bolts around the center fiber glass insulator and drop the 4 x 4" BALUN MOUNTING PLATE over the u-bolt ends. Add 4 locknuts , align and center the plate and tighten the nuts. Add the 1:1 balun to the plate using a 2-1/2' U-bolt, 5/16"-18 nuts and lock washers. Orient the balun so the leads face the riser tube and come out each side toward the coupling rings on the center insulator Tighten the 2-1/2" U-bolt carefully until the lock washers just flatten. ***Be sure the balun vent / drain hole is DOWN.*** Set these three sub assemblies aside for now.

TIP ELEMENT ASSEMBLY (SEE ELEMENT ASSEMBLY DRAWINGS)

4. Assemble the 1/2-inch and the 3/4-inch diameter element tips first. Connect the two sections with 8-32 x 1" screws and locknuts. NOTE THE DRIVEN ELEMENT AND THE REFLECTOR HAS 3/8" DIA TIPS.
5. Next slide 7/8 x 45" sleeve into the 1" x 48" and align the holes. Slip another 7/8 x 45" over 3/4 x 60" SOE all the way to the butt end, and align the holes. Now add the 3/4 assembly to the 1" assembly and align the holes and secure the tubes with 8-32 x 1-1/4

screws and locknuts. Slip this tube assembly into the swaged end of the 1-1/4 x 48” and secure with 8-32 x 1-1/2” screws and locknuts. Note: the reinforcement sleeves should be in the 1-1/4” element butt. They are 1-1/8 x 44” and 1” x 15”.

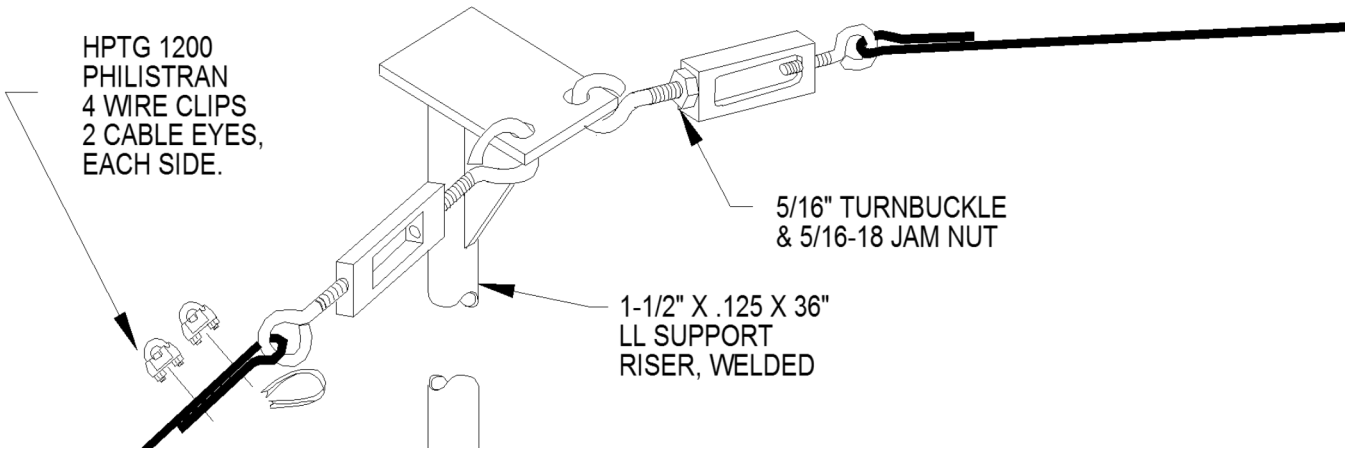
6. Slip a 1-1/2” swaged end over the butt of the 1-1/4” tube and align the holes. Secure with 8-32 x 1-3/4” screws and locknuts and tighten securely. The reinforcement sleeves should be in the 1-1/2” element butt. They are 1-3/8 x 47” and 1-1/4” x 47”.

7. Slip the 2” x .125 x 54” swaged end over the 1-1/2” element butt and align the holes. Insert just one 1/4-20 x 2-1/4” bolt into the outer hole and add a locknut finger tight. Insert a 1/4” x 3” forged eyebolt into the inner hole and add a locknut. Now tighten all hardware.

8. Slip the 2-1/2 x .125 x 36” swaged end over the 2” element but and secure with 1/4-20 x 2-3/4” bolts and locknuts. ***Repeat steps 4-8 for all element tips and set aside for now.***

9. Return to the center ELEMENT TO BOOM PLATE ASSEMBLIES. (Driven element first). Slide a 3” x .125 x 95” element section over the CENTER INSULATOR coupling rings. NOTE: THIS ASSEMBLY HAS BEEN LINE DIRILLED AND MARKED AT THE FACTORY. MATCH THE MARKINGS. Align the holes and from underneath insert a 1/4-20 x 4” bolt through the inner hole and add two 3/8” COUPLING BLOCKS, face to face followed by a BALUN wire lug, and 1/4” LOCKNUT. Tighten lightly at this time. (These 3/8” clamp blocks connect the hairpin tubes to the DRIVEN ELEMENT). Some block alignment may be necessary when the hairpin tubes are attached.

ELEMENT OVERHEAD SUPPORT DETAIL



10. Find and mark the measured center of the 3” x .125 x 191” center tube sections. Set two 3” heavy duty saddle clamps over the matching holes in the plate and place the element section into the saddles. Place two more saddles over the top and add four 3/8-16 x 4-1/2” bolts and locknuts. Center and rotationally align the element tip holes perpendicular to the

plate and tighten the bolts. Repeat for the other parasitic elements center sections. Label one “REFLECTOR” and the others “DIRECTOR #1 and DIRECTOR #2.

BOOM ASSEMBLY (things start to get big now!).
11. Note these boom sections have been line drilled and marked at the factory. Match the markings and slide the 4” x .125 x 181” sections into the 4-1/2 x .240 x 240” center section. Align the holes and secure with 3/8-16 x 5” bolts and locknuts. Add the forged eyebolt to each end. Attach the HPTG 6700 phillistran cables to each eyebolt using a cable eye or “thimble” and three, 3/8” “wire clips”.

ELEMENT TO BOOM ASSEMBLY – SEE DIMENSION SHEET
12. Loosely install bottom 4”or 4.5” SADDLE CLAMPS to the REFLECTOR and DIRECTOR ELEMENTS using 3/8-16 x 5-1/2" or 6” bolts and locknuts. LUBRICATE THE BOLTS. Slide REFLECTOR element onto end of boom, centering the element about 3" from the boom end. Tighten up saddle clamp bolts on element while ensuring the eyebolts are oriented up. Using the DIMENSION SHEET place DIRECTOR #2 element at other end of boom, align with reflector element and tighten saddle clamp bolts. Now add DIRECTOR #1 and align with the other elements.

13. Place the DRIVEN ELEMENT on the boom, spacing it per YOUR DIMENSON SHEET. Use 4-1/2” saddles and 3/8-16 x 6” bolts and locknuts. Align the element with the other two and tighten the hardware. Insert a 1/4-20 x 4” bolt from inside, through the hole in the #74 band clamp and install the band clamp on the boom at the chosen distance for the HAIRPIN SHORTING BAR from the driven element. Run a plain 1/4-20 nut all the way on to the bolt. Next, insert the hairpins tubes into the 3/8” clamp blocks and tighten gently to hold them in position. Add the SHORTING BAR to the other end and slide it to the desired dimension. Drop the shorting bar over the 4” bolt at the band clamp and add a 1/4-20 locknut. Insert the 1/4-20 x 1/4” set screws into the ends of the shorting bar. Align and tighten all hardware.

OVERHEAD GUY SUPPORT SYSTEM
14. Even without the outer element sections attached you can find the balance point of the antenna. The reflector is slightly heavier than the director so once you find the balance point, move about 1” toward the reflector and MARK THE BOOM. Attach the 12 x 12 x 3/8” BOOM TO MAST PLATE here. Use 4 more 4-1/2” saddle clamps and 3/8-16 x 6” bolts and locknuts. Orient the plate perpendicular to the elements and tighten the bolts.

15. Depending on your mast size, install either the 2” heavy duty u-bolts or the 3” u-bolts. Both sets are provided. If you use some other mast diameter, we can supply what you need if you contact us with your requirements. Insert a temporary mast at this time if possible so you can set your over head guy system up correctly before installation on the tower. Almost any tube diameter between 1-1/2 and 3-1/8” can be used for this setup.
16A. IF YOU HAVE A TEMPORARY MAST IN PLACE: Attach the heavy duty 4” x 6” x 1/4” TURNBUCKLE PLATE (TBP) on the mast 5 feet or higher on the mast. Add the “JAW” end of each turnbuckle to the TBP and then extend and equalize the turnbuckle threads so they extend just one thread inside the body of the turnbuckle. Add a cable eye (thimble) to each turnbuckle eye. Then add 3 wire clips to the HPTG Phillistran cable and route it through the turnbuckle eye and back on itself. Remove all the slack and slide a clip up against the thimble and tighten enough to hole the cable in position. Repeat for the other cable. Once both cable

are on, loosen the u-bolt and raise the TBP until the cable are taught. If one cable is much tight er than the other, make sure the temp. mast is straight. If it is straight, then readjust cable length as needed to equalize the cable tension on each side. Once this is accomplished, add the other two clips to each side and complete the tightening process.

16B. IF YOU DO NOT HAVE A TEMPORARY MAST, Use one 3" ubolt in the top set of holes in the boom to mast plate. Before you put the nuts on, slip on the turnbuckle plate. and add the nuts finger tight. Attach the "JAW" end of the Turnbuckle (TB) to the plate and adjust the turnbuckle so it is extended so both threaded rod ends protrude inside the body of the turnbuckle about one thread. Add the 3/8" thimbles to the TB eyes. Slip three wire clips on each Phillistran cable end and route the cable through the TB eye and back on itself. Equalize the cable excess on each side, making sure you can raise the cable and TB assembly at least 5 feet above the boom. Place one wire clip in place and tighten enough to hold the cable in place. Repeat for the other cable. Once you are satisfied that the cables will tension equally when on the mast, install and tighten the other wire clips.

17. If you have not already done so, add the element tip sections assembled in steps 4-8. NOTE: The tip pairs are different. Be sure to attach the correct tips on the matching inner element. Use 1/4-20 x 3-1/4" bolts and locknuts and tighten securely.

18. This completes the assembly of the 40M4FS-125mph. *PLEASE BE SAFETY CONSCIOUS DURING INSTALLATION AND ALWAYS USE GOOD QUALITY 50 OHM FEEDLINE AND CONNECTORS. If this antenna is to be placed on the same tower with other amateur antennas, it is best to have it at least 8 feet away from all the others . It is never a good idea to have a 15 meter antenna on the same tower with 40m as they are 3rd harmonically related and WILL interact. Usually the 15m antenna will suffer more.*

Carefully designed and manufactured by:

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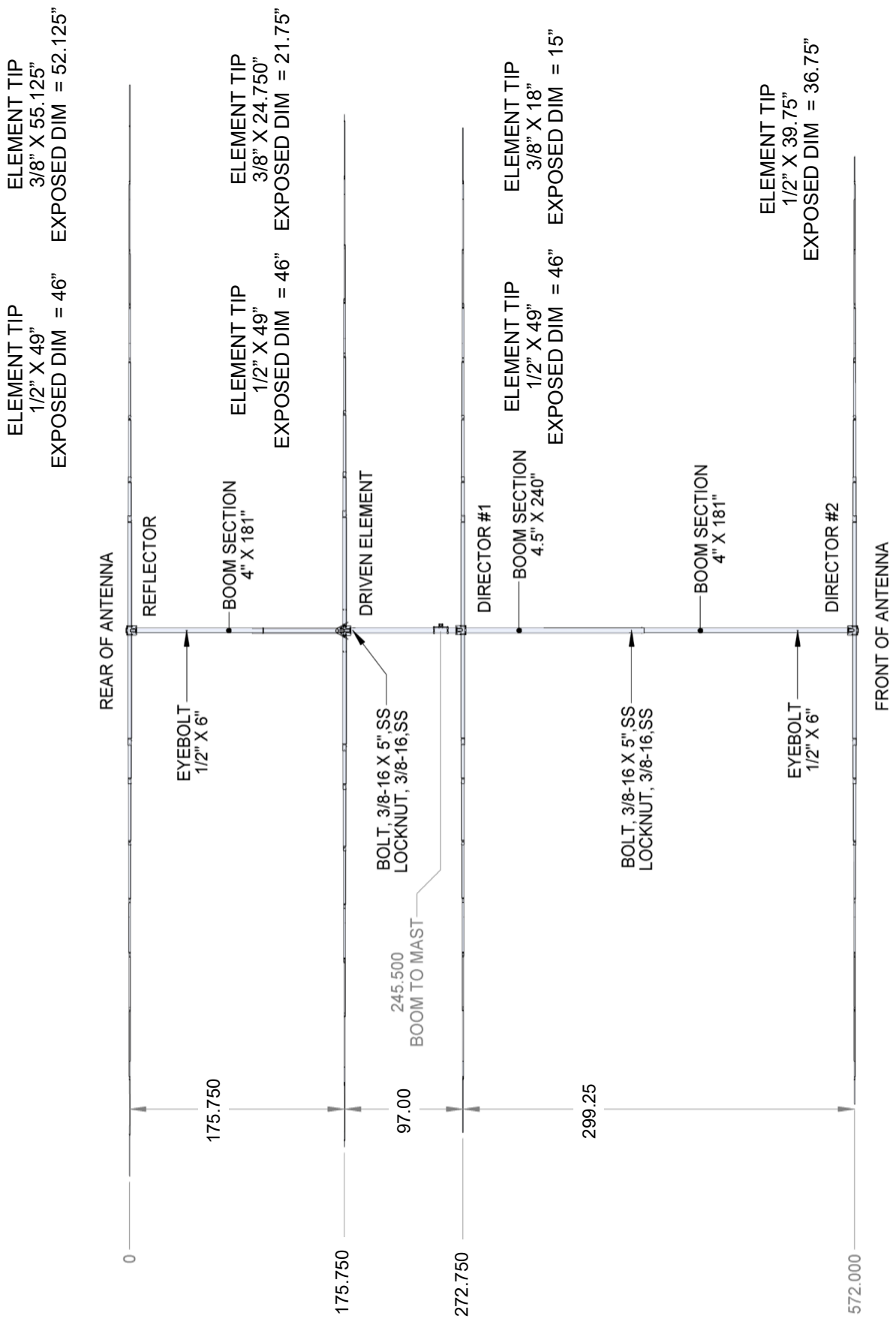
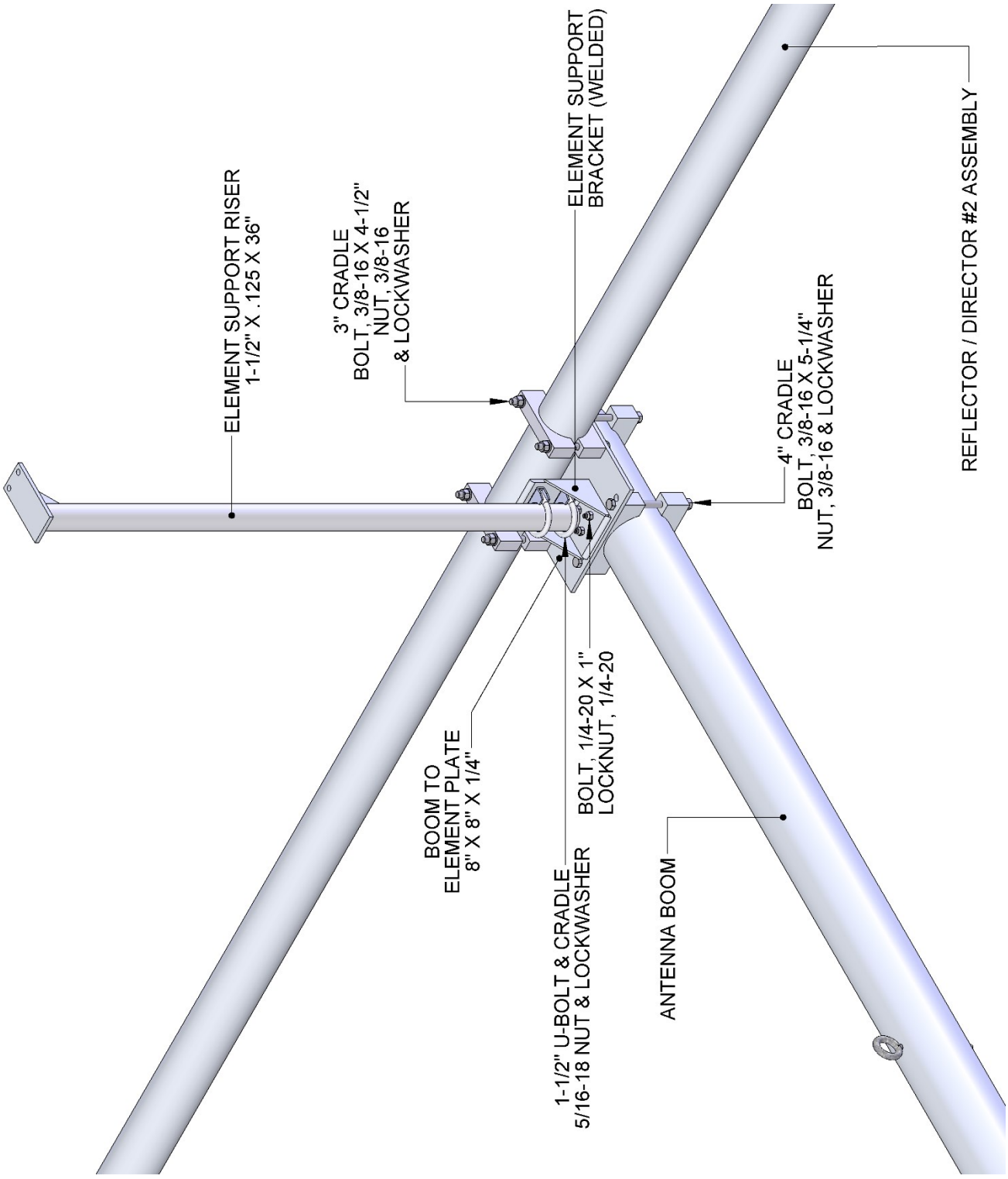
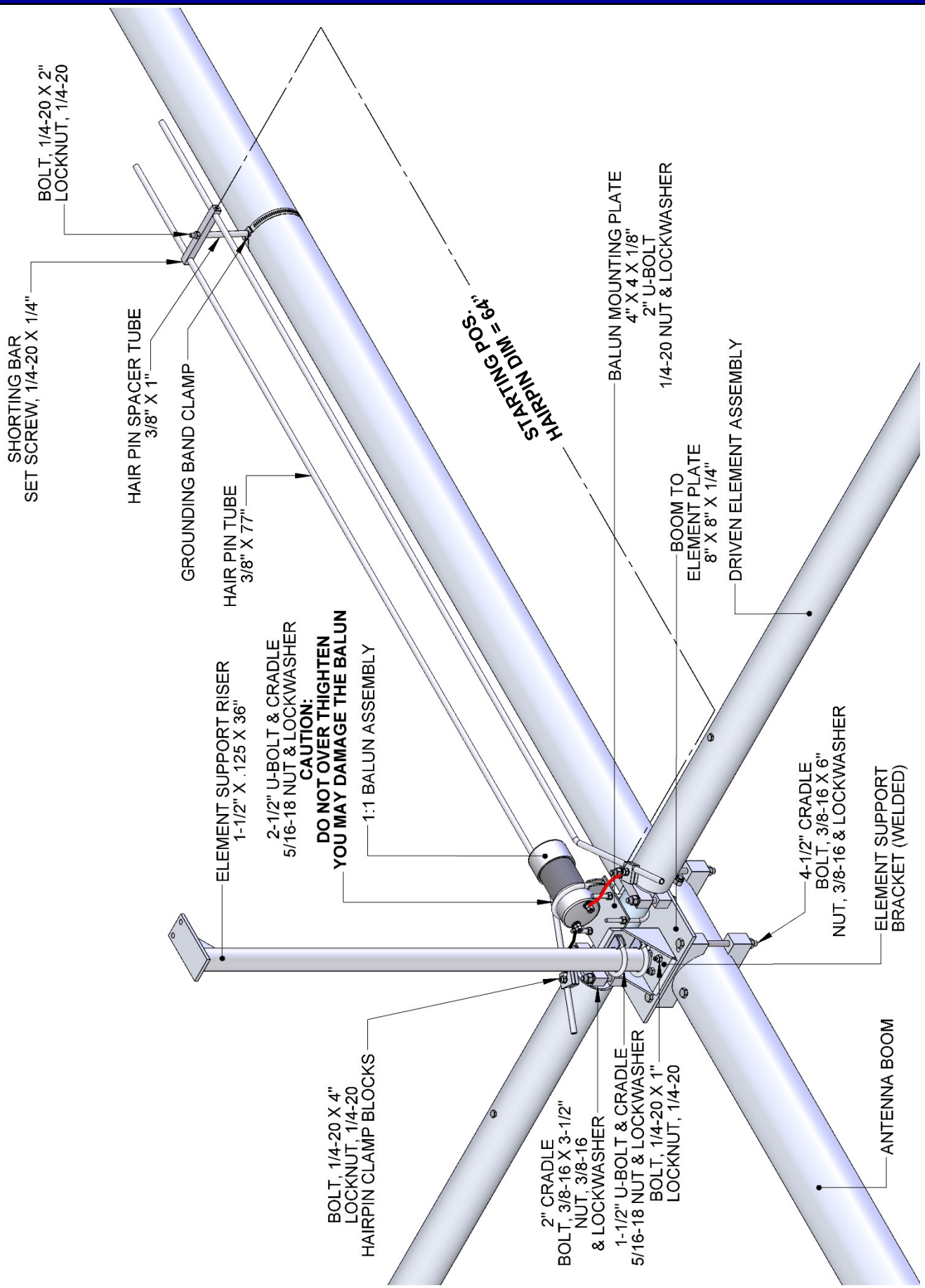
6.9-4FS-125 DIMENSION SHEET



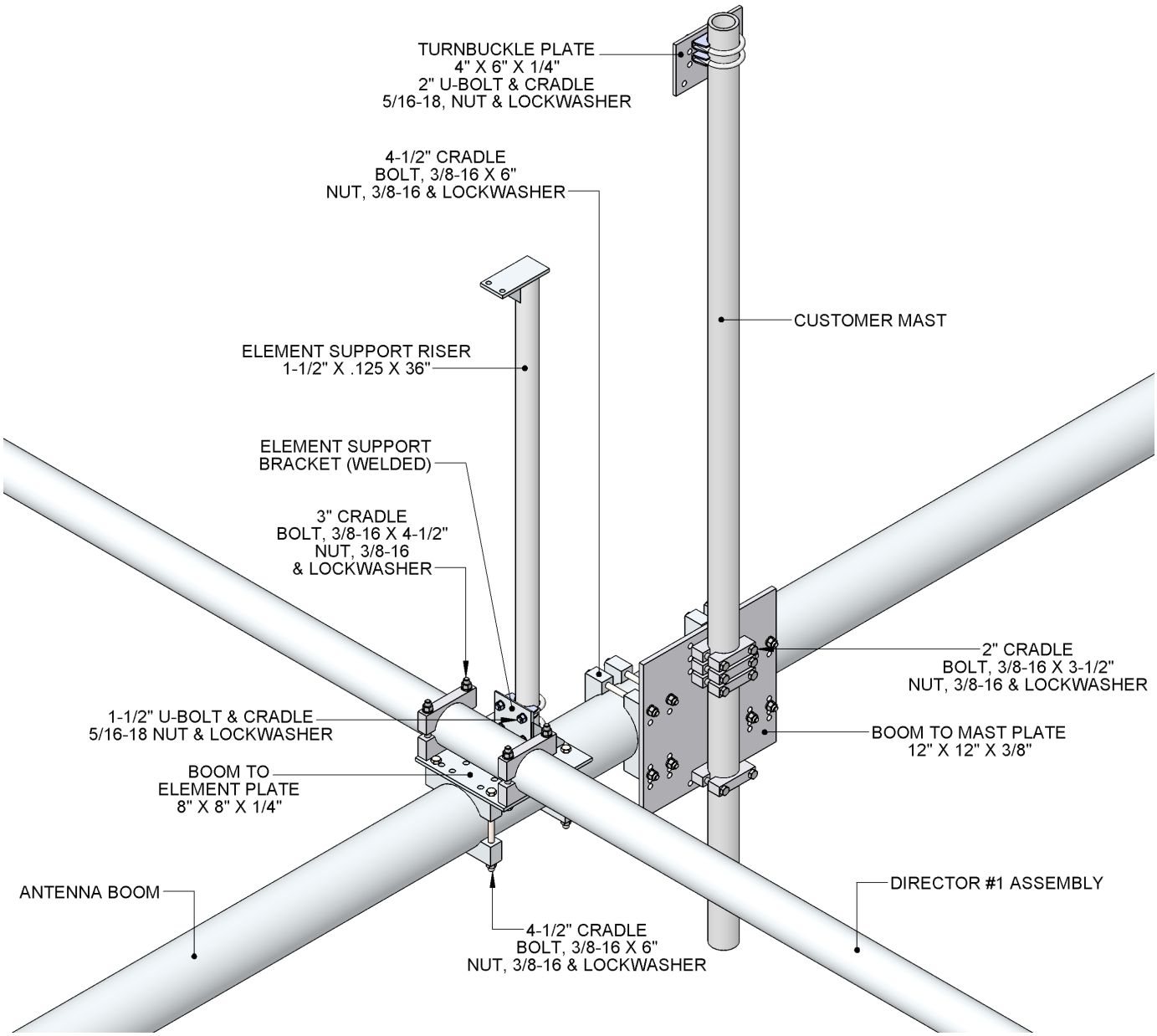
6.9-4FS-125 REFLECTOR/ DIRECTOR #2



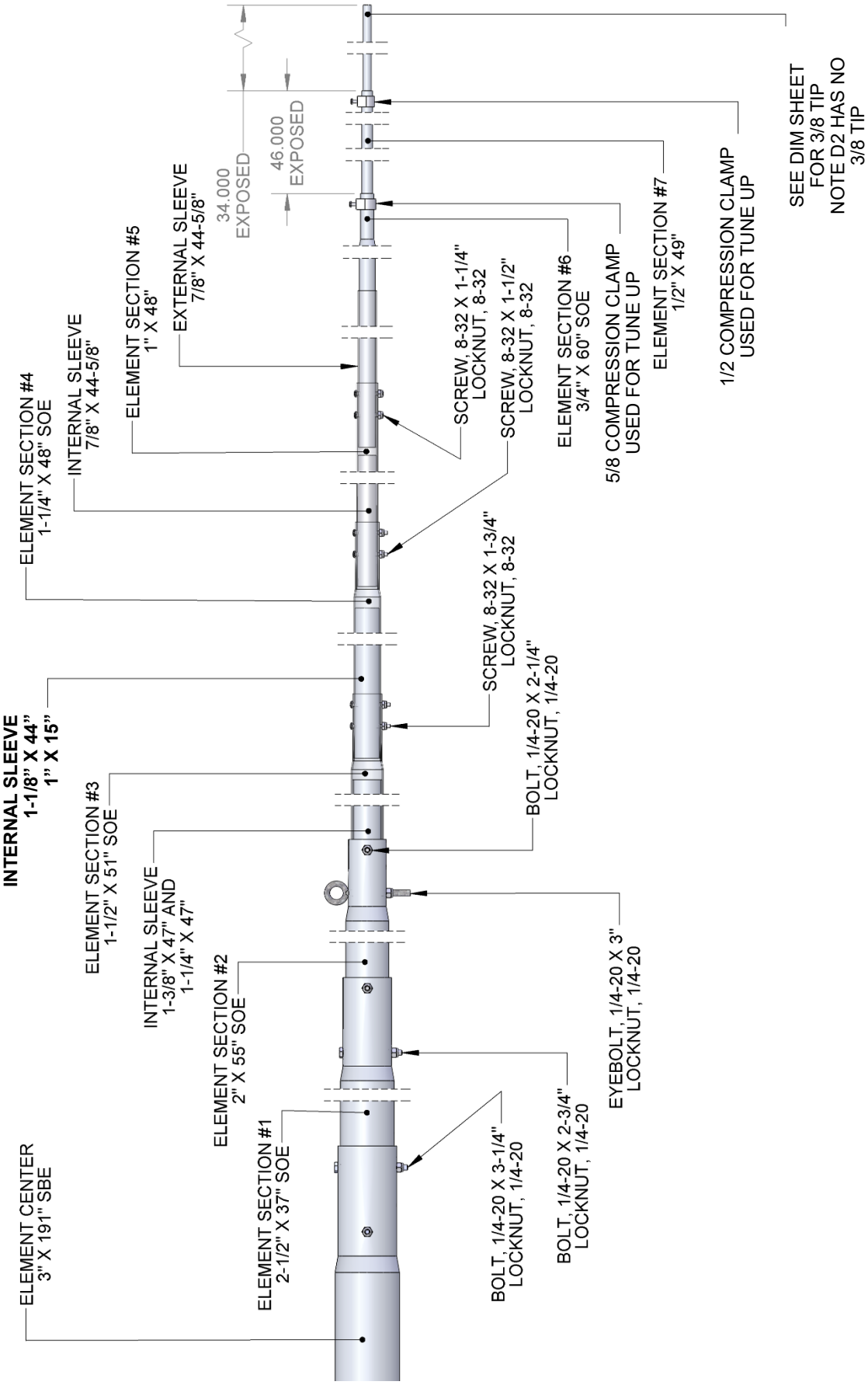
6.9-4FS-125 DRIVEN ELEMENT



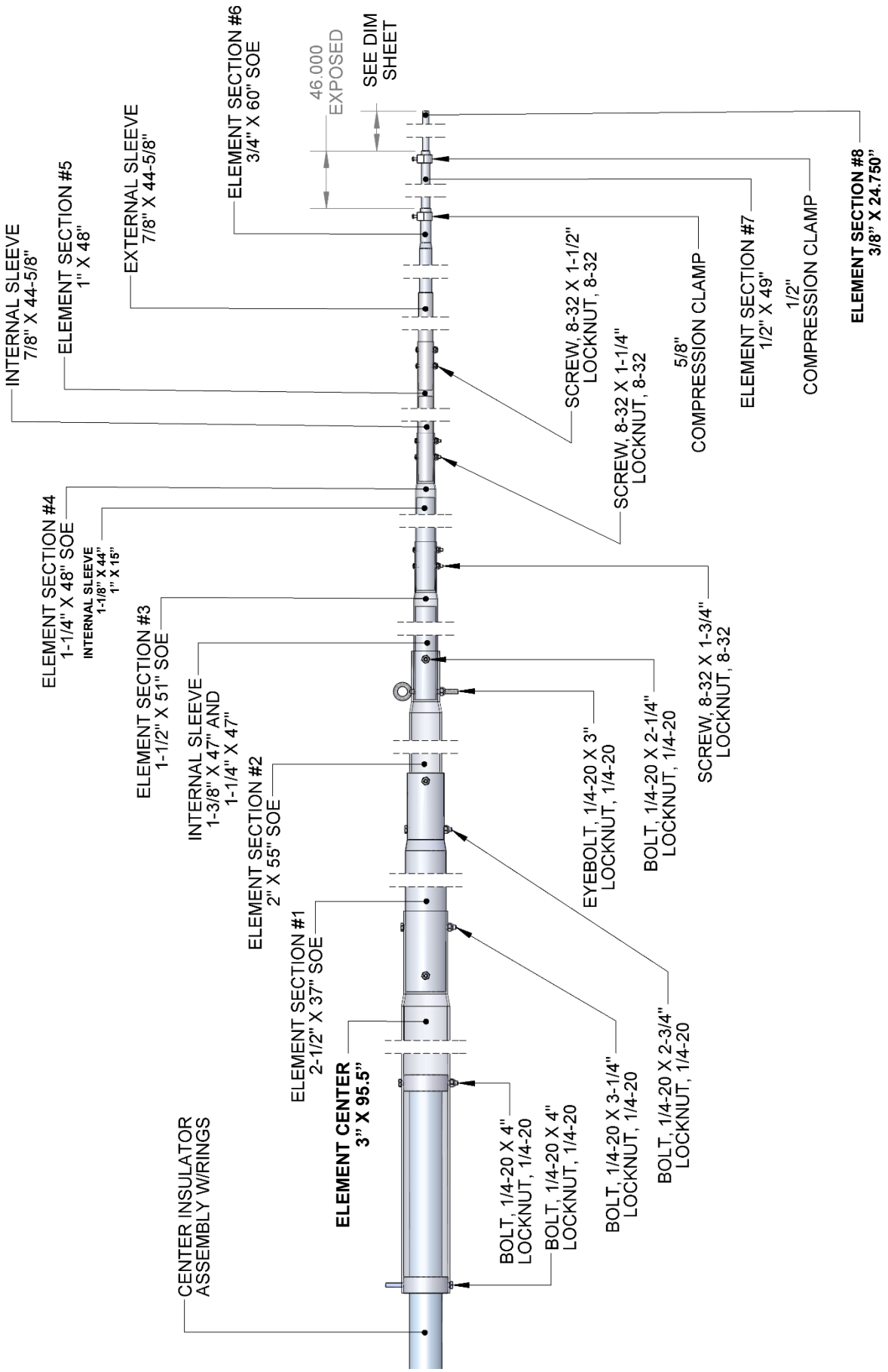
6.9-4FS-125 DIRECTOR #1



6.9-4FS-125 REFLECTOR / DIRECTOR



6.9-4FS-125 DRIVEN ELEMENT LAYOUT



6.9-4FS-125 PARTS & HARDWARE

DESCRIPTION	QTY
BOOM 4.5 X .250 X 240	1
BOOM 4.0 X .125 X 181	2
ELEMENT SEC. 3.0 X .125 X 95.5	2
ELEMENT SEC. 3.0 X .125 X 191.0	3
ELEMENT SEC. 2-1/2 X .125 X 37 SOE	8
ELEMENT SEC. 2.0 X .125 X 55.0 S.O.E.	8
ELEMENT SEC. 1 1/2 X .058 X 51.0 S.O.E.	8
ELEMENTSLEEVE SEC. 1 3/8 X .058 X 47.0 PLAIN	8
ELEMENT SEC. 1 1/4 X .058 X 48.0 S.O.E.	8
ELEMENT SLEEVE. 1 1/4 X 47.0 PLAIN	8
ELEMENT SLEEVE SEC. 1 1/8 X .058 X 44.0 PLAIN	8
ELEMENT SEC. 1.0 X .058 X 48.0 PLAIN	8
ELEMENT SLEEVE. 1.0 X .058 X 15.0 PLAIN	8
ELEMENT SLEEVE SEC. 7/8 X .058 X 44.625 PLAIN	16
ELEMENT SEC. 3/4 X .049 X 60 SOE	8
ELEMENT SEC. 1/2 X .049 X 49.0 PLAIN	6
ELEMENT TIP. 1/2 X .049 X 39.75 PLAIN (D2)	2
ELEMENT TIP. 3/8 X .049 X 18 PLAIN (D1)	2
ELEMENT TIP. 3/8 X .049 X 55.125 PLAIN (REF)	2
ELEMENT TIP. 3/8 X .049 X 24.750 (FOR D.E. AS NEEDED)	2
BETA TUBES 3/8 X .049 X 77” (BENT 30 DEG.)	2
CENTER INSULATOR 2.0 X 36.0 FG ROD W/ COUPLING RINGS (4)	1
ELEMENT SUPPORT RISERS 1-1/2 X .125 X 36”, WELDED (M2AVR0027)	4
SIDE GUY TUBES, 2.0 X .065 X 96	2

BOOM, SIDE GUY, ELEMENT GUY PARTS

PHILLISTRAN HPTG 6700 X 24’	2
TURNBUCKLES 1/2 X 12.0 FORGED GALV	2
WIRE CLIPS 3/8 GALV	12
THIMBLES 3/8	4
SIDE GUY PLATE,	1
TURN BUCKLE PLATE, 2 X 4 X .25	2
PHILLISTRAN CABLE,HPTG-1200 X 20’	8
TURNBUCKLES, 5/16” SS HOOK AND EYE	8
WIRE CLIPS, 1/8”	48
THIMBLES, 3/16”	24
EYEBOLT 1/4 X 3.0 FORGED GALV.	8
SIDE GUY CLAMP, 4.0”	2
PHILLISTRAN CABLE,HPTG-1200 X 20’	8

BTM , ELEMENT PLATES

BOOM TO ELEMENT PLATE 8” X 8” X 1/4” (M2APT0075)	4
TURNBUCKLE PLATE HD 4” X 6” X 1/4” (M2APT0130)	1

SMALL PARTS BOX

MACHINED CRADLE, 2” HD (M2AMC0131)	4
MACHINED CRADLE, 3” HD (M2AMC0140)	12
MACHINED CRADLE, 4” HD (M2AMC0138)	8
MACHINED CRADLE, 4-1/2” HD (M2AMC0139)	12
U-BOLT & CRADLE, 2” HD	4
U-BOLT & CRADLE, 3”	6
U-BOLT & CRADLE, 2-1/2”	1
U-BOLT & CRADLE, 2”	8
U-BOLT & CRADLE, 1-1/2	8
COMPRESSION CALMP, 5/8” (M2AMC0145)	8
COMPRESSION CALMP, 1/2” (M2AMC0146)	4
BRACKET, SUPPORT RISER, 3 X 4 X 1/4” WELDED (M2AVR0067)	4
GROUNDING/ SUPPORT BAND CLAMP, #72 WITH HOLE 4” TO 5”	1

6.9-4FS-125 PARTS & HARDWARE

SHORTING BAR 1/2 X 1/2 X 5.0 (M2ASB0262) 1
HAIRPIN SPACER, 3/8" X 1" (M2ASR0010)..... 1
CLAMP BLOCKS 3/8 4
BALUN, 1:1 (FGBL0100) 1
BALUN MTG PLATE, 4 X 4 X 1/8 or 3/16" (M2APT0011)..... 1
U-BOLT, 2",SS (HINDLEY)..... 2
ANTI SIEZE COMPOUND 2

HARDWARE

BOLT, 3/8-16 X 6.0 SS 16
BOLT, 3/8-16 X 5-1/2", SS..... 8
BOLT, 3/8-16 X 5.0",SS 4
BOLT, 3/8-16 X 4-1/2", SS..... 12
BOLT, 3/8-16 X 3-1/2" SS..... 4
BOLT, 3/8-24 X 1.1/4 SS 4
NUT, LOCKING, 3/8-16 SS 40
NUT, 3/8-16 SS..... 20
LOCK WASHER, 3/8", SPLIT RING, SS 24

NUT, 5/16-18,SS..... 44
LOCK WASHER, 5/16" SPLIT RING , SS 36

BOLT 1/4-20 X 4.0 SS 3
BOLT 1/4-20 X 3-1/2 SS..... 2
BOLT 1/4-20 X 3-1/4", SS..... 16
BOLT 1/4-20 X 2-3/4" SS 16
BOLT 1/4-20 X 2-1/4 SS..... 8
BOLT 1/4-20 X 1.0 SS 12
SET SCREW, 1/4-20 X 1/4", SS..... 2
NUT, NYLOC 1/4-20 SS 64
NUT, 1/4-20,SS..... 1
FLAT WASHER, 1/4", SS 2
ALLEN WRENCH, 1/8" 1

SCREW 8-32 X 1.750 SS 16
SCREW 8-32 X 1.5 SS 16
SCREW 8-32 X 1.250 SS 16
SCREW 8-32 X 1.0 SS 44
SCREW 8-32 X .750 SS 8
SCREW 8-32 X .500 SS 12
NUT, 8-32 X .500 SS 12
NUT, LOCKING, 8-32 SS 104

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