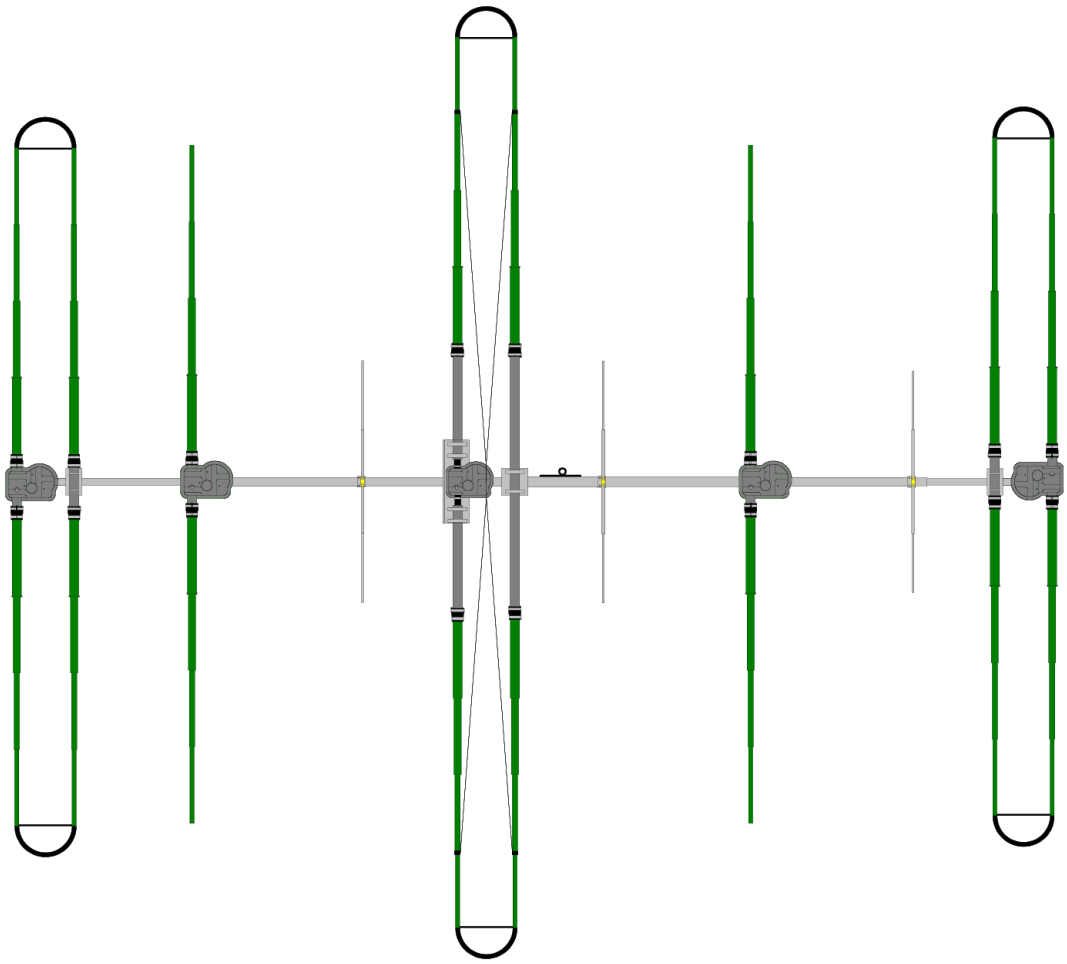
steppIR COMMUNICATION SYSTEMS

DB42 MonstIR PRO Installation Manual



This assembly manual is intended to be printed in full COLOR. If the manual is printed in black and white, many important details could be lost.

REV 10.14
05/22/2023

DB42 MonstIR PRO Specifications

Specifications	DB42 Element Yagi
Boom length	42 ft 8 in / 13.0 m
Boom outside diameter	1.75 in—3 in / 4.45—7.6 cm
Longest element	49 ft / 14.9 m
Turning radius	29 ft / 8.8 m
Weight	238 lb / 108 kg
*Projected Area	32.38 sq ft / 3.0 sq m
Wind rating	100 mph
Adjustable elements	5
Power Rating	3000w Key Down / *1500w on 80m (option)
Feed points	2
Frequency coverage	6.8 MHz—54 MHz (*3.5MHz w/ 80m option)
Control cable	24 conductor shielded, 22AWG

Gain / Front to rear by band	Gain, dBi Forward DIR	Front to rear, db forward	Gain, dBi Reverse DIR	Front to rear, dB reverse
80M	1.7	NA	1.7	NA
40M	8.0	25.5	8.0	23.2
30M	9.0	12.4	9.0	12.4
20M	10.1	22.0	10.0	23.2
17M	10.8	23.2	10.7	21.9
15M	11.0	25.7	10.6	20.0
12M	11.9	24.1	10.4	8.9
10M	12.2	20.0	10.5	11.7
6M	14.0	25.0	NA	NA

*Projected area is the total perpendicular surface area measured in square feet/square meters, that is exposed to wind. To calculate wind load you always take the largest projected area whether that is from the perspective perpendicular to the boom or perpendicular to the elements. In the case of SteppIR Yagi's, the maximum projected area will always be the sum of the surface area's perpendicular to the Yagi elements. This calculation is a constant number and will not change regardless of EIA specification changes. Do not mistake this projected area calculation as anything more than a datapoint to present to your structural engineer, tower manufacturer or rotator manufacturer so that they can determine what is necessary for your application.

When sizing an antenna to a tower, many factors need to be taken into consideration including, but not limited to: projected area of antenna in square feet or square meters, weight of the antenna and other items on tower, turning radius, element lengths, antenna height, location exposure category, locations three-second gust wind-speed, locations maximum radial ice loading.

Improper specification of an antenna or rotator to a tower can result in product failure, injury or death. SteppIR is not an expert on tower or rotator sizing and for this reason will never offer any recommendation – this specification process is meant for industry professionals such as a structural engineer, tower manufacturer or rotator manufacturer. Please do not attempt to self-specify our products – the information provided by SteppIR is to be utilized by industry professionals only and we will not accept any liability for improperly specified antenna/tower/rotator applications.

READ THIS BEFORE STARTING INSTALLATION

You have ordered you SteppIR Antenna, and are waiting for delivery. What do you do in the meantime?

1. Go to the SteppIR web site at consumer.steppir.com/ and download the latest manual for your antenna, and also the Operators Manual for the controller. Look for any new or updated documents that may pertain to your antenna.
2. Read the manuals from cover-to-cover ---TWICE! Don't just read them –Study them, so you are familiar the terminology used about the antennas and have a good idea of how the antenna is assembled and where the various parts go.
3. As you go through the manuals make notes of any instructions you may not clearly understand, then call or email for clarifications. It is better to have it all sorted out before you start assembly. We don't mind answering your questions beforehand.
4. Now, wait for notification your antenna is being shipped.

Your antenna has arrived! What is the first thing to do?

1. If the antennas is to arrive on Wednesday----DO NOT plan an antenna party for Saturday
2. Even if you plan to install the antenna weeks later, the first thing to do is to unpack the antenna and do a complete inspection. Make sure nothing is missing or has been damaged in shipment.
3. Do a complete inventory of every part, nut and bolt. Yes it takes time, but it also allows you to notify SteppIR if anything is missing and allow time to get it to you before you start assembly of the antenna. There is nothing more frustrating than realizing that something is missing, just hours before you want to install the antenna.
4. Go back to the SteppIR website and download the latest manual. SteppIR constantly is improving and adding to the manual, so even though your paper instruction manual is going to have all the data you need, it makes sense to check for the latest updates online. This is especially true If you purchased the antenna and a period of time has passed between arrival and install dates.
5. Take the controller and power supply out of their wrappings and connect them. The controller does not have to be connected to the antenna in order to familiarize yourself with it. In fact, it is best to get familiar with the controller when it is not connected to the antenna. Turn on the controller and read through the Operators Manual again while operating the controller in all it modes. Go through

READ THIS BEFORE STARTING INSTALLATION (continued)

the menus so you know what each does and how to navigate through the various menus and functions.

6. When you have finished working with the controller be sure the display indicates "Elements Home" and the controller has been turned OFF. When the controller is connected to the antenna and the controller is turned back on the next time, it will immediately tune to whatever position the controller was left in last time you were using it, so you want to be sure that position is HOME.
7. Once the antenna is completely assembled and ready to mount on the antenna tower, use an antenna analyzer, if you have one, to test resonance of the antenna.. If you don't have an analyzer, try to borrow one. It will save you a lot of time and worry. Check the antenna on each band for some sign of resonance within the frequency range. Leave the antenna on the default frequency and tune the analyzer to see where the dip occurs. It will be somewhere below the lower band edge on each band with the antenna 3 or 4 feet above the ground on sawhorses. Also, don't expect to see a 1:1 SWR here, just look for a good indication of resonance.

   Once it has been determined this part of the antenna is working correctly do the following: Select the lowest band and establish the dip condition by tuning the analyzer. Do not touch the analyzer again. Retract the elements and then reselect the same band. The antenna should come back the very near the same setting. Do this 2 or 3 times on each band. Also, try going from the band being tested to any other band and back again and observe that the antenna comes back to the same resonant point. Now you know the antenna is tuning correctly from band to band and is consistent.
8. DO NOT put the antenna up onto the tower until you are positive it is working correctly—this is what these tests are helping you determine. Err on the side of caution.
9. When you are ready to use the antenna, be sure to "enable" the DB42 in the controller menu, or your antenna will not work properly on 40m and 30m. If you purchased the 6m option, be sure to enable that in the "options" menu of the controller. When done enabling, save and then turn the controller off, and back on again.
10. Enjoy the antenna!

DB42 BILL OF MATERIALS

It is important that you do an inventory of the items that were shipped to you. Nothing is worse than discovering a day before a planned installation that there are missing parts! We do our very best to ensure that you receive everything needed for construction of your antenna, but better to be safe than sorry—inventory your parts well in advance of your installation. The items in **blue** represent options available for the DB42 Yagi—you will need to check these items off only if you purchased them.

Antenna Box (61" x 13" x 10") 92 lbs

✓	QTY	PART NUMBER	DESCRIPTION
	16	10-1013-02	Telescoping Pole, 18 foot 4 section **(in pole box)**
	1	10-1501-23	Cover for Black EHU, With countersunk drain hole
	1	21-6040	Splitter, 6" 3-1/2mm, Stereo Male to Two RCA Female
	16	60-1006-22	QUICK DISCONNECT, 1-1/2" to 1-1/4", Fernco, (1056-150-125)
	1	70-3408-01	EHU, DB42 20m Driven w/ Normal Driven Relay
	1	70-3409-01	EHU, DB42 40m Driven w/ Normal Passive Relay
	1	70-3412-01	EHU, DB42 20m Driven w/ Normal Passive Relay
	2	70-3422-01	EHU, 40m Passive w/ Terminal lug Assembly
	1		QR Code—Instruction Manual

Sweep Box 1 (32" x 24" x 7") 48 lbs

✓	QTY	PART NUMBER	DESCRIPTION
	1	10-1021-43	Boom to Mast Plate, 8", HIGH WIND..with saddle holding holes
	1	10-1050-21	Counter Weight, DB42
	4	10-1509-02	Diverter Cones
	3	10-1153-01	Poly Sweeps (100psi)
	6	10-1511-01	Sweep Diverter
	6	10-1059-21	Polyolefin Heat Shrink 1.1" x 6"
	3	10-1503-21	Fiberglass rod, 3/8" x 31-3/4" long, black
	1	10-1605-12	Element Support Plate, 49 ft element
	3	10-1608-01	Element Return Plate
	2	10-1610-23	Boom to Mast plate 11" X 1/4"
	65 ft	21-5001-01	Control cable, 4 conductor
	40	21-5013	Cable, 6 conductor 22 GA with shield
	1	21-6301-80	Coax jumper, 8', PL259/RG213
	1	21-6301-96	Coax jumper, 11' 6", PL259/RG213
	1	21-6301-98	Coax jumper, 15', PL259/RG213
	95 ft	21-7002-01	Dacron double braided poly rope, 3/16"
	78 ft	21-8002	Phillystran, 2100i
	2	70-1015-11	EST return tube, 1-3/4" x 12", fiberglass (DB style)
	4	70-2030-11	DB style mounting plate with foam mounting guide
	1	70-2038	Connector Junction Box, DB42
	1	70-3003-01	Balun Switch Box, 80m, 4:1

DB42 BILL OF MATERIALS

Sweep Box 2 (32" x 24" x 7") 61 lbs

✓	QTY	PART NUMBER	DESCRIPTION
	3	10-1153-01	Poly Sweeps (100psi)
	6	10-1511-01	Sweep Diverter
	6	10-1059-21	Polyolefin Heat Shrink 1.1" x 6"
	3	10-1503-21	Fiberglass rod, 3/8" x 31-3/4" long, black
	2	10-1606-01	Element support plate, 2-1/4"
	4	10-1607-11	Truss Attaching Plate V2
	1	10-1619-01	BRACKET, Coax Switch
	1	70-3000-11	33v 100 watts 33v Power Supply—DB42
	1	70-3001-01	Antenna Coax Switch Box
	2	72-0018-31	Kit, 39' Element Truss, 2E, 3E, DB18/18E/36/42 end Elements
	3	72-0030-61	Kit, Sweep Hardware
	1	72-0110	Kit, DB42 Hardware
	1	72-0112	Kit, DB42 Saddle
	1	72-0114	Misc. Parts, DB42
	1	72-1001-81	Kit, DB42—6m Hardware
	1	72-3000	Kit, DB42 80m Dipole Hardware

Boom Box (72" x 8" x 8") 93 lbs

✓	QTY	PART NUMBER	DESCRIPTION
	3	70-6001-01	DB 6m passive element
	1	10-1018-11	Aluminum tube, 1-3/4" (4' Boom)
	3	10-1054-02	Truss Support, 30m/40m, 36"
	2	10-1202-01	DB style aluminum boom section, 1-3/4" x 72"
	2	10-1202-11	DB style aluminum boom section, 2.00" X 72"
	2	10-1202-21	DB style aluminum boom section, 2"-1/4 x 48"
	2	10-1202-71	DB style aluminum boom section, 2-1/2" x 44", DB42
	1	10-1202-81	aluminum boom section, 3" x 72" x 1/4", wall, for DB42
	2	10-1203-21	Reinforcing sleeve, 2" x 10" - 2-1/4" boom section, DB36, DB42
	1	10-1618-21	Boom truss support, 1-3/4" x 36", DB42
	4	10-1630-11	Aluminum reinforcing sleeve, 2" x 3", DB36, DB42
	1	10-1630-21	Aluminum reinforcing sleeve, 2" x 12", DB36, DB42
	6	70-2025-13	CPVC tube, 49" x 3/4", with coupler
	6	70-2025-23	CPVC tube, 39-7/8" x 3/4", w/o coupler
	2	70-2025-33	64" x 3/4" CPVC tube with foam sealing ring and rubber coupler
	2	70-2028-01	EST extension, 66-3/8", with aluminum reinforcing ring, - DB36, DB42
	2	70-2029-01	EST extension, 60-3/4", with aluminum reinforcing ring, - DB36, DB42

DB42 KITS BILL OF MATERIALS

39' Element Truss Kit, 2E, 3E, DB18/18E/36/42 end Elements (2 qty)
72-0018-31

✓	QTY	PART NUMBER	DESCRIPTION
	2	10-1601-03	1-3/4" ALUMINUM SADDLE HALF
	4	10-1510-21	ELEMENT TRUSS COUPLER (SETS)
	2	60-0083	4" STAINLESS TURNBUCKLE
	1	60-0110	1/4" x 1-1/4" HEX HEAD BOLT
	1	60-0030	1/4" NYLOCK NUT
	2	60-0065	5/16" x 3-1/2" HEX HEAD BOLT
	2	60-0046	5/16" NYLOCK NUT
	2	60-0033	5/16" FLAT WASHER
	75 ft	21-7001-01	1/8" DACRON ROPE
	16	60-0014	6-32 NYLOCK NUT
	16	60-0014-01	6-32 x 7/8" PAN HEAD SCREW
	2	60-0158	1/8" THIMBLE
	4	60-0157	1/8" WIRE CLAMP
	1	10-1028-01	ANTI SEIZE PACKET
	1	09-0001	ELECTRICAL TAPE
	1	60-0112	SET SCREW

Sweep Hardware Kit (3 qty)
72-0030-61

✓	QTY	PART NUMBER	DESCRIPTION
	28	60-0014	NUT, 6-32 NYLOCK
	20	60-0016	WASHER, 6-32, FLAT
	28	60-0186	SCREW, 6-32 x 2", 18-8 SS, BUTTON SOCKET CS
	8	10-1155-01	SWEEP CLAMP, SCH-160 CLAMP HALF
	1	60-9000	TURN KEY, LONG ARM HEX TIP 5/64"

DB42 KITS BILL OF MATERIALS

DB42 HARDWARE KIT
72-0110

✓	QTY	PART NUMBER	DESCRIPTION
	20	60-0014-01	6-32 X 7/8" SS PAN HEAD SCREW
	20	60-0014	6-32 SS NYLOK NUT
	35	60-0112	10-32 X 1/4" SET SCREW
	6	60-0113	10-32 X 5/8" SS PAN HD SCREW (SADDLES TO MAST PLT)
	50	60-0017	10-32 X 3/4" SS SCREW
	3	60-0017-10	10-32 X 7/8" SS FLAT HEAD SCREW
	5	60-0101	3/4" X 10-32 PAN HD SCREW WITH NYLOK PATCH
	70	60-0018	#10 SS WASHER
	55	60-0019	10-32 NYLOK NUT
	1	60-0110	1/4" -20 X 1-1/4" SS BOLT
	5	60-0029	1/4"-20 X 3" SS BOLT
	5	60-0063	1/4"-20 X 3-1/4" SS BOLT
	5	60-0100	1/4"-20 X 3-1/2" SS BOLT
	60	60-0041	1/4" SS WASHER
	20	60-0030	1/4" NYLOK NUT
	36	60-0075	5/16" X 3-1/4" SS BOLT
	13	60-0065	5/16" X 3-1/2" SS BOLT
	17	60-0114	5/16" X 3-3/4" SS BOLT
	17	60-0066	5/16" X 4" SS HEX BOLT
	9	60-0115	5/16" X 4-1/2" SS HEX BOLT
	7	60-0141	5/16" X 5" SS BOLT
	100	60-0046	5/16" NYLOK NUT
	10	60-0033	5/16" SS WASHER
	2	60-0151	3/8" x 2-1/2" Eye-bolt S/S
	1	60-0145	3/8" X 4-1/2" EYEBOLT
	3	60-0034	3/8" SS WASHER
	2	60-0152	3/8" X 1-3/4" SS BOLT
	6	60-0050	3/8" SS NYLOK NUT
	1	60-0142	7/16" X 5" BOLT, ALL THREADED
	1	60-0143	7/16" NYLOCK NUT
	2	60-0160	7/16" LOCK WASHER
	2	60-0161	7/16" STANDARD NUT
	8	60-0144	7/16" GALVANIZED WASHER
	4	60-0157	1/8" Wire Clamp
	2	60-0158	1/8" Thimble
	32	60-0045	3/16" WIRE CLIPS
	8	60-0048	3/16" WIRE THIMBLE
	4	10-1613-01	1" ALUM SPACER
	16	10-1613-11	1/4" ALUM SPACER
	8	60-0044	PHILLYSTRAN CAP, BLACK
	2	60-6000-15	SS HOSE CLAMP #016
	2	60-0083	1/4" x 4" SS TURNBUCKLE
	4	60-0070	3/8" x 6 " GALV TURNBUCKLE

DB42 KITS BILL OF MATERIALS

DB42 ALUMINUM SADDLES KIT
72-0112

✓	QTY	PART NUMBER	DESCRIPTION
	36	10-1601-03	1-3/4" ALUMINUM SADDLE HALF
	28	10-1601-22	2" ALUMINUM SADDLE HALF
	4	10-1601-32	2-1/4" ALUMINUM SADDLE HALF
	6	10-1601-41	2-1/2" ALUMINUM SADDLE HALF
	10	10-1601-61	3" ALUMINUM SADDLE HALF

DB42 MISC. PARTS KIT
72-0114

✓	QTY	PART NUMBER	DESCRIPTION
	4 ft	09-1022	COAX SEAL, 12' x 1/2"
	50	10-1059-01	POLYOLEFIN HEAT SHRINK 1-1/2" x 3"
	1	60-0117	CABLE CLIP, ACC19-AT-C0
	4	70-1007-01	FOAM PLUG ASSEMBLY
	1	10-1028-21	TM-1 THREAD MAGIC ANTI-SEIZE STICKS
	1	72-0009-03	GLUE KIT
	3	09-0001	ELECTRICAL TAPE 3/4" PVC MERCO 307
	1	70-6010-01	ADAPTER, 25 PIN DSUB FIELD SPLICE
	1	09-1025	CONICAL GRINDING STONE, 3/4", (ENCO)
	1	10-1029-01	CONNECTOR PROTECTOR CAT, NO CP-1, .14 oz
	8	10-1510-21	ELEMENT TRUSS COUPLER (SETS)

6M PASSIVE ELEMENT KIT
72-1001-81

✓	QTY	PART NUMBER	DESCRIPTION
	3	10-1019-31	6M MOUNTING PLATE
	4	60-0075	5/16" X 3 1/4" SS BOLT
	2	60-0115	5/16" X 4 1/2" SS BOLT
	6	60-0046	5/16" SS NYLOK NUT
	6	60-0001	1 INCH SS U- BOLT .25"
	12	60-0030	1/4" NYLOK NUT
	6	60-6000-60	7/32" - 5/8", 5/16" width, #4 SS HOSE CLAMP
	4	10-1601-22	2" ALUM SADDLE
	2	10-1601-61	3" ALUM SADDLE

DB42 KITS BILL OF MATERIALS

80M DIPOLE KIT
72-3000

✓	QTY	PART NUMBER	DESCRIPTION
	50 ft	21-5009-01	ULTRA-FLEX 12 GA WIRE WITH TERMINAL LUGS
	60 ft	21-7002-01	3/16" DACRON ROPE
	2	60-0066	5/16" x 4" SS HEX BOLT
	2	60-0114	5/16" X 3 3/4" SS BOLT
	2	60-0075	5/16" X 3 1/4" SS BOLT
	8	60-0046	5/16" NYLOK NUT
	2	10-1601-03	1 3/4" ALUM SADDLE
	2	60-0028	1/4" X 2 1/4" SS BOLT
	2	60-0030	1/4" X 20 NYLOK NUT
	2	60-0116	1/4" X 20 REGULAR NUT
	2	60-0034	3/8" SS WASHER
	2	60-0094	3/16" SS QUICK LINK
	2	60-0037-21	4" X 5/16" GALVANIZED EYEBOLT
	4	60-0033	5/16" SS WASHER
	2	10-1613-01	1" ALUMINUM SPACER
	2	10-1607-01	TRUSS ATTACHMENT PLATE
	1	21-6301-70	4' COAX JUMPER CABLE
	5 ft	21-5001-01	4 CONDUCTOR 22 GA CABLE
	1	09-0001	ELECTRICAL TAPE 66' X 3/4"
	1	10-1029-01	CONNECTOR PROTECTOR
	1	60-0117	CABLE CLIP WITH ADHESIVE BACK
	3	60-0112	10-32 X 1/4" SET SCREW

A WORD ABOUT STAINLESS STEEL GALLING

From time to time, we get complaints from customers regarding galling of stainless steel fasteners.

Here is an excerpt from the Industrial Fastener Institute's Standards Book:

Thread galling seems to be the most prevalent with fasteners made of stainless steel, aluminum, titanium and other alloys which self-generate an oxide surface film for corrosion protection. During fastener tightening, as pressure builds between the contacting and sliding thread surfaces, protective oxides are broken, possibly wiped off and interface metal high points shear or lock together. This cumulative clogging-shearing-locking action causes increasing adhesion. In the extreme, galling leads to seizing - the actual freezing together of the threads. If tightening is continued, the fastener can be twisted off or its threads ripped out.

During minor galling, the fastener can still be removed, but in severe cases of galling, a strong bond between the bolt and nut can prevent removal of fasteners. Unfortunately, little is known on how to control it, but here are two ways to minimize this effect:

Decreasing installation RPM speed will cause less friction and decrease heat generation. Lubrication used prior to assembly can dramatically reduce or eliminate galling. Recommended lubricants should contain higher amounts of molybdenum disulfide, such as graphite which is very commonly used as a solid lubricant or special anti-galling lubricants sold by chemical companies.

We provide an anti-seize compound stick called "Thread Magic" (shown in picture below) with all of our antennas and **strongly encourage** you to use it to reduce the aggravation of galling. The Thread Magic stick is fantastic—you can get plenty of anti-seize on the fastener without getting it on your hands!

Turn-of-nut tightening of nuts to bolts is recommended where torque values are not named, with metal to metal connections. Turn the wrench/socket until it is flush with the material it will seat against and snug-tightened, and then turn approximately 2/3 of a rotation past that point. When in doubt use common sense to ensure the fastener is not too loose, or not too tight—both positions can cause issues. On all connections, check the tightness 30 minutes or more later to ensure no creeping has taken effect.

Contrary to popular belief, galling of stainless steel is not a symptom of a "cheap" fastener - it is prevalent in all types of stainless steel, aluminum and titanium fasteners. You can be assured that the stainless steel fasteners we provide with our products are manufactured of very high quality.

Save yourself a lot of grief and always use a thread lubricant when working with stainless steel fasteners.

Preparing to Build the DB42 Yagi

Before beginning assembly of this antenna, please read the manual in it's entirety to familiarize yourself with the task at hand. Doing so will eliminate potential confusion.

Be sure to do an inventory of your parts as soon as possible after receipt of the antenna, and well before your intended installation date - this way we can get you the parts required before it's too late.

A large, cleared flat area is recommended for assembly of an antenna of this size and complexity. Typically, an area 40 ft x 50 ft would be ideal. We recommend using sawhorses or sturdy tables when installing the boom. By having the boom elevated, it is easier to ensure that the elements are level. Rubber or nitrile gloves are recommended when applying the anti-seize to the stainless steel fasteners or the aluminum boom sections.

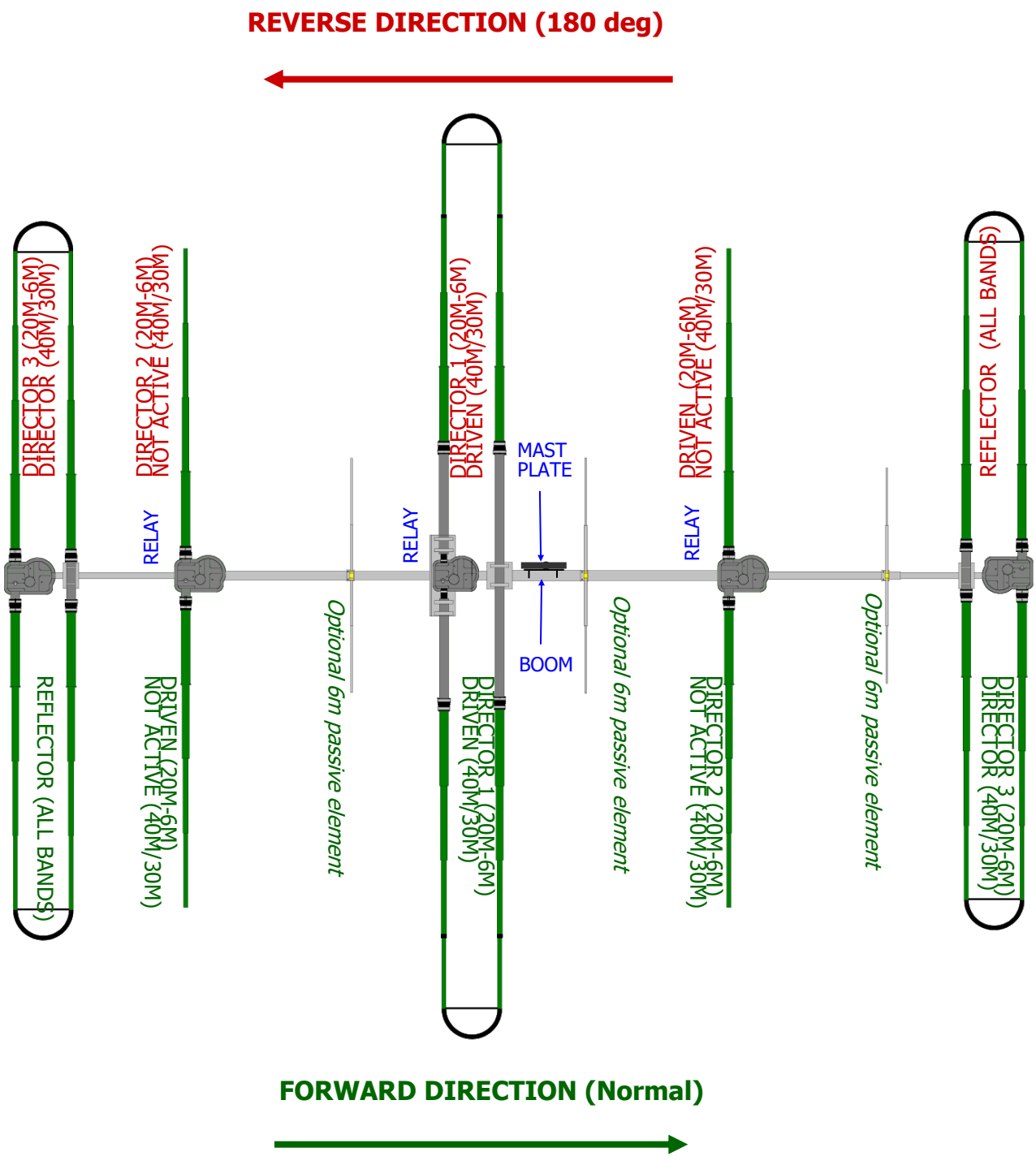
If you do not have room near the tower to assemble the antenna, we suggest you find a place that you can put the antenna together in it's entirety and then disassemble as needed for transportation to the tower area.

Be sure to refer to the DB42 configuration drawing on the following page so that you can fully understand how the antenna operates. In addition, the configuration drawing identifies EHU placement, which is important as you progress in your installation of the antenna.

Use of a level for adjusting the Element Housing Units (EHU's) is highly recommended. This is a surprisingly accurate and consistent method. Simply place the level on the mast plate, and adjust each element accordingly.

Be sure to use the anti-seize compound supplied to prevent the galling of the stainless steel fasteners. If you do not use the anti-seize, count on issues with the hardware galling. Heat is one of the primary culprits with galling, so if you use a ratchet, steady speed as you tighten will help minimize galling. We have found that when the anti-seize is applied to the bolt portion of the hardware, it will eliminate any galling issues.

DB 42 ELEMENT CONFIGURATION DRAWING

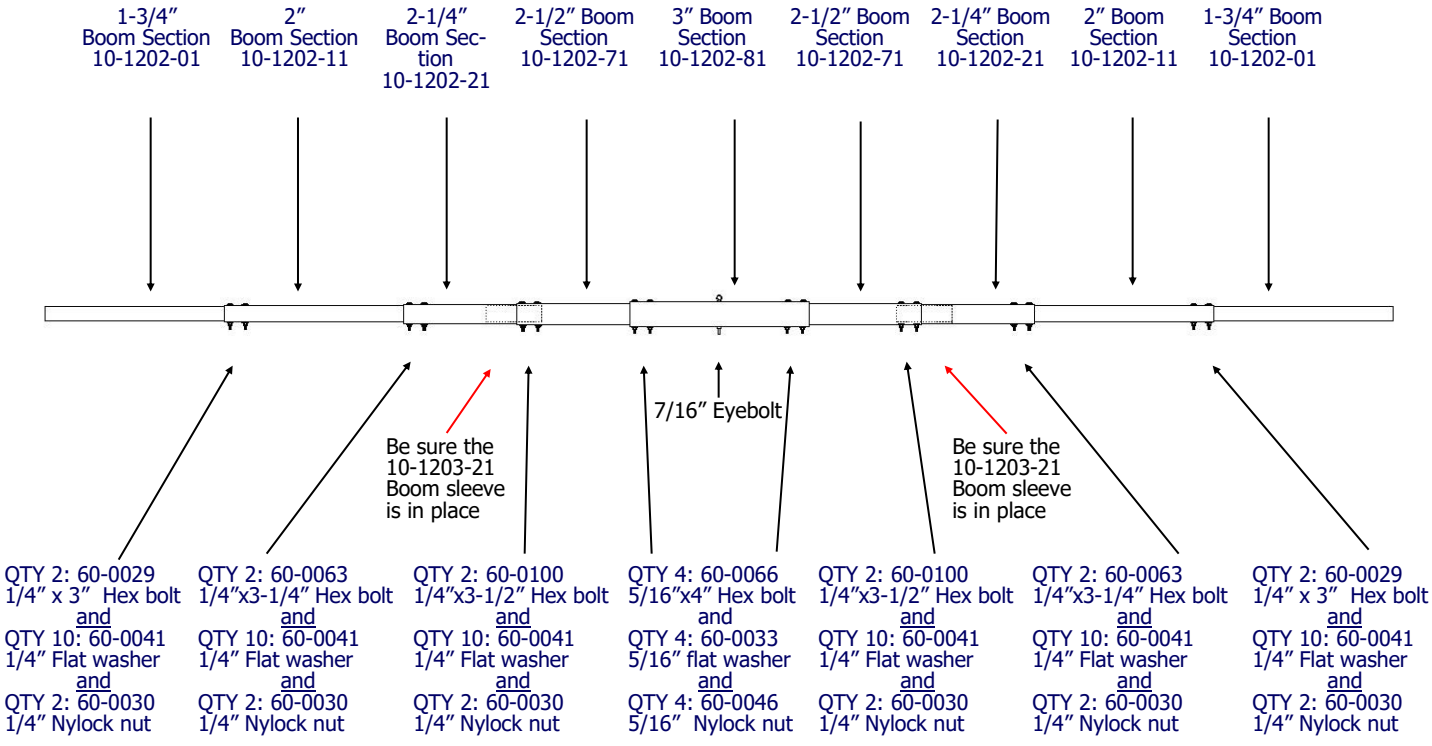


BOOM ASSEMBLY OVERVIEW

Our boom pieces are all drilled on a very precise drill press. This ensures that all the bolts are snug when assembled. It is always better to be too tight than too loose. If your boom ever gets damaged or destroyed we can send the specific replacement boom piece(s) required. Always apply an anti-seize lubricant to stainless steel bolts that are using stainless steel nuts. This will prevent the two from galling together. Galling of stainless steel is common and has nothing to do with the quality of the material. Each bolt has a specific length for the tubing it is holding together this is critical so that only the shank is engaged in the tubing. Use 5 washers per bolt to secure the bolt as shown in figure 1.02.

1. Apply a thin film of connector protector or a spray-on lubricant (i.e. Anti-seize, Noalox) to the male engagement area of the boom sections. Failure to do so may cause the tubes to seize inside each other.
2. Match the boom pieces as shown in figure 1.01 below and slide each boom piece together until the pre-drilled holes align.
3. Secure the correct bolts and washers onto the boom as shown in figure 1.02.
4. Repeat this for each section until the boom is completely assembled.
5. Secure the 7/16" eyebolt as shown in figure 1.01 and figure 1.03. Note that in the event of a tight fit, it is acceptable to use a mallet to drive the eyebolt in as shown in figure 1.04.

FIG. 1.01



Note: Check the following page for information on washer placement

BOOM BOLT / EZ EYEBOLT DRAWINGS

When securing the eye-bolt and boom bolts to the boom, install the eye and the head of the bolts on the same side of the boom, so that they will be facing upwards when the boom is secured to the tower. The 1/4" boom bolts require 5 washers, as shown below in figure 1.02. The 5/16" boom bolts will use only 1 washer on the nut side against the boom.
Note: In the event the EZ-eyebolt resists when you insert it into the boom, you can use a hammer or mallet as long as you strike it with something that will not damage the eyebolt, as shown in figure 1.04.

FIG. 1.02—Inserting the boom bolts into the boom

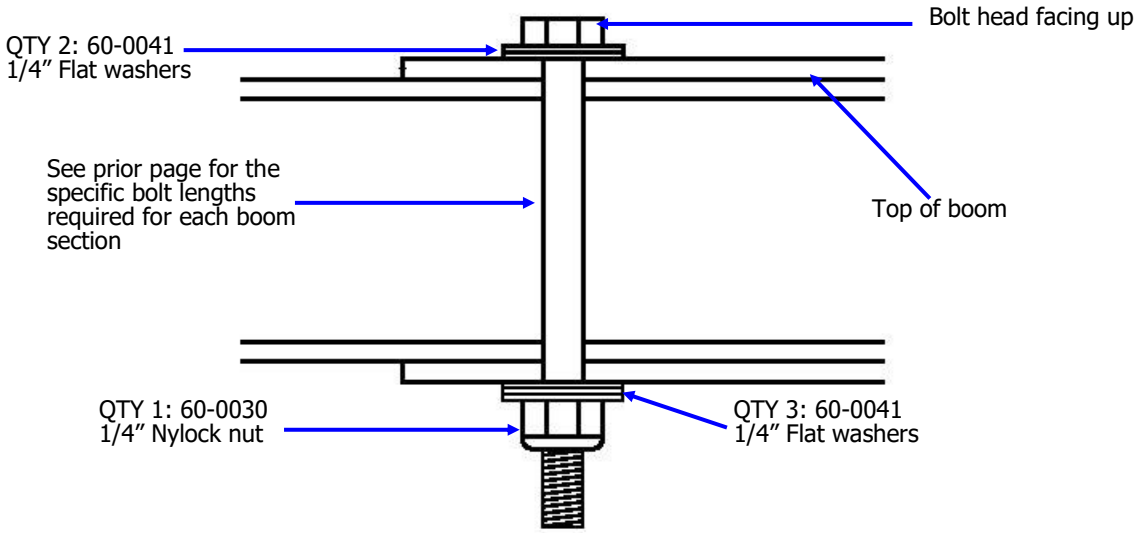


FIG. 1.03—EZ Eyebolt configuration

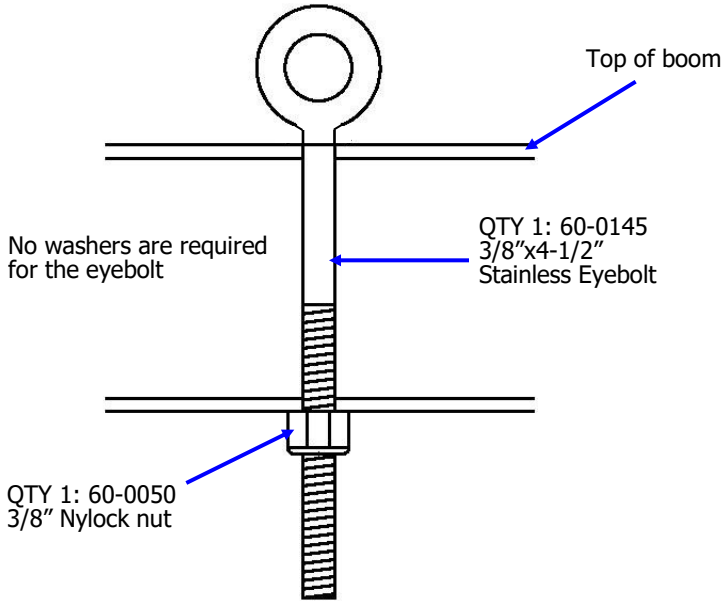


FIG. 1.04

MEASURING AND MARKING THE BOOM

On the DB42 Yagi there are many components that are mounted on the boom. All of these items are mounted using aluminum saddles. The following instructions will allow you to pre-measure the placement of the saddles, making it much easier to assemble the required items. In addition to marking the saddle placement, you may also want to label the marking so you can easily identify it later. *Measuring and marking helps to simplify the process, but **NEVER** use the saddle marks as the permanent measurement— you must always defer to the center-to-center measurements for each element or the antenna will not function properly.*

We recommend that you use an aluminum saddle half for drawing your marks on the boom. Determine your mark using the table on the following page. The measurement shown is to the closest edge of the saddle from the starting point, then draw a line on each side of the saddle piece as shown in figure 1.12 and figure 1.13. This prevents any possible mistakes on where the saddle edge should be on the measurement. The truss anchor point between the boom bolts shown below in figure 1.10 is the same configuration on each side of the boom.

The EZ-Eye is NOT at the center point of the boom. Because of this, you will have a short side and a long side (on the 3" boom section) in relation to the EZ-Eye. Position boom as shown below when measuring for your marks. Mount each aluminum plate and truss saddle as shown in the table, be aware that the dimensions shown in the table refers to the saddles closest to the reflector end of the boom for the mounting plates.

FIG. 1.10

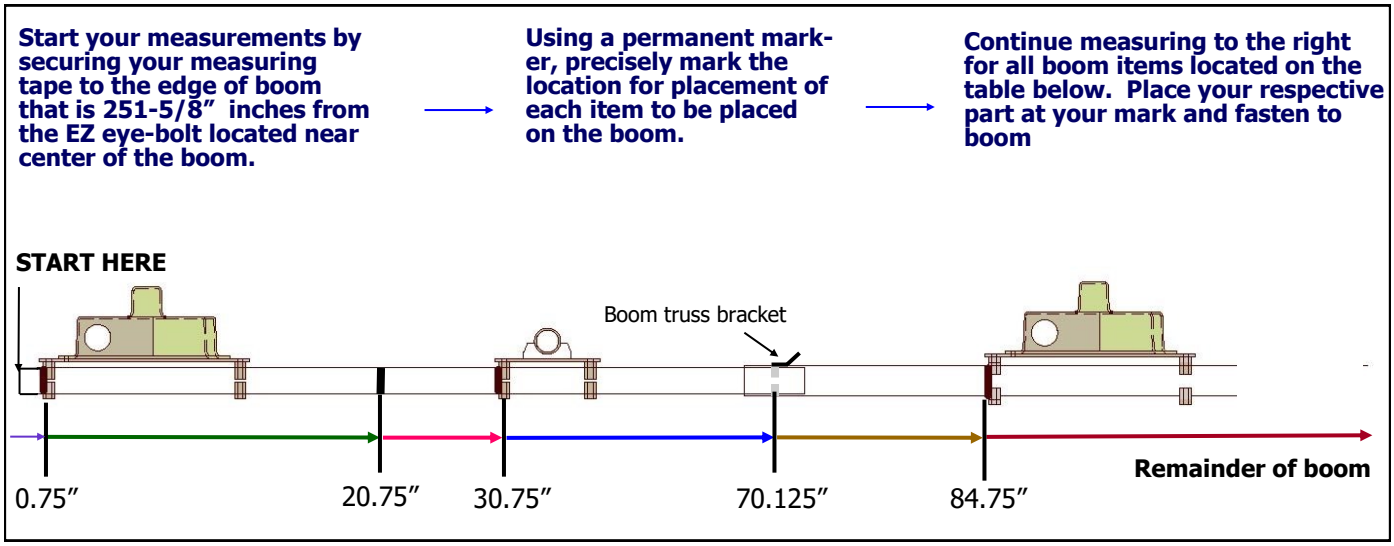
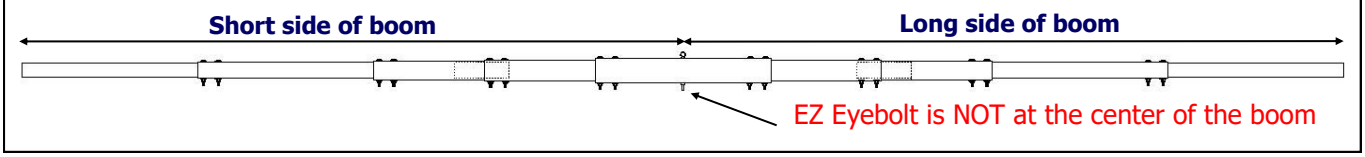


FIG. 1.11



DB42 BOOM MARKING TABLE

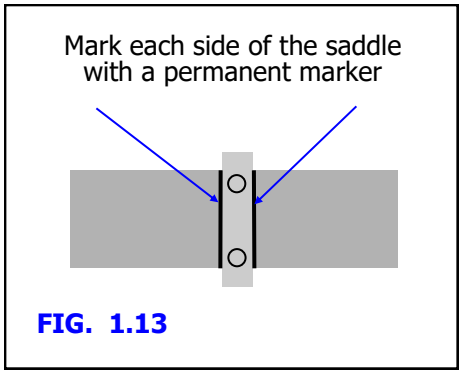


FIG. 1.13

MARK LOCATION		LABEL
Fractional Length	Metric Length	Description
0.75 inch (3/4″)	1.91 cm	Reflector
20.75 inch (20-3/4″)	52.71 cm	39 ft Truss support/ 80m dipole support
30.75 inch (30-3/4″)	78.11 cm	Reflector return
70.125 inch (70-1/8″)	178.1 cm	Boom truss clamp
84.75 inch (84-3/4″)	215.26 cm	Driven element
120 inch	304.8 cm	OPTIONAL 6m director 1
200.75 inch (200-3/4″)	509.91 cm	Director 1
218.25 inch (218-1/4″)	554.35 cm	49 ft Element truss
230.75 inch (230-3/4″)	586.11 cm	Director 1 return
243.9 inch (243-7/8″)	619.51 cm	Mast plate
260.0 inch	660.4 cm	Antenna switch
277.5 inch (277-1/2″)	704.85 cm	OPTIONAL 6m director 2
350.75 inch (350-3/4″)	890.91 cm	Director 2
434.5 inch (434-1/2″)	1103.63	OPTIONAL 6m director 3
441.875 inch (441-7/8″)	1122.4 cm	Boom truss clamp
474.75 inch (474-3/4″)	1205.87 cm	Director 3 return
494.75 inch (494-3/4″)	1256.66 cm	39 ft Truss support / 80m Dipole Support
497.75 inch (497-3/4″)	1264.29 cm	Director 3

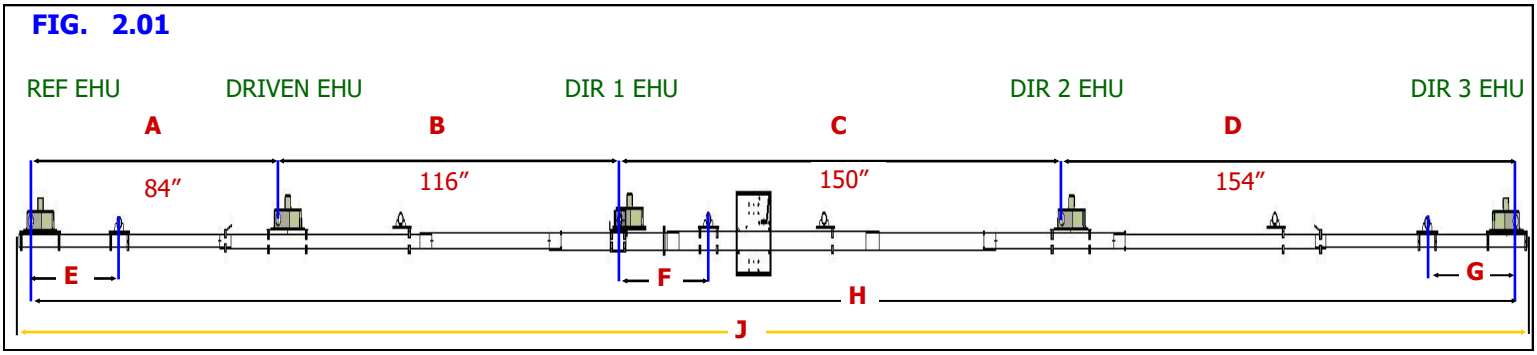
CENTER-TO-CENTER SPACING MEASUREMENTS

It is critically important that the center-to-center spacing is correct when assembling your SteppIR Yagi. Use figure 2.01 for placement of each of the elements. Start from the left edge of the boom and measure from there.
As you assemble each of the element housing units (EHU's), refer to this drawing. We recommend this sequence:

1. Secure the element mounting plates to the boom using the correct saddles and fasteners (be sure to use anti-seize on all stainless steel fasteners). Tighten enough to hold them in place, but loose enough so you can move the mounting plates for final tightening.
2. Wire the EHU's and secure them to the element mounting plates (don't forget the gasket!). The mounting plate itself acts as the lid for the DB42 EHU's.
3. Measure your center-to-center lengths, level the mounting plates and firmly tighten.
4. Re-measure all of your lengths and correct if needed. Take your time, get it right.

All of this is covered in greater detail in this manual, but it's important to understand the proper flow BEFORE you start—it will save a lot of time.

FIG. 2.01



KEY	Start measurement at center-point of:	Finish measurement at center-point of:	Measurement distance between points
EDGE	Edge of boom	Reflector EHU	4 inches
A	Reflector EHU	Driven EHU	84 inches
B	Driven EHU	Director 1 EHU	116 inches
C	Director 1 EHU	Director 2 EHU	150 inches
D	Director 2 EHU	Director 3 EHU	154 inches
E	Reflector EHU	Reflector return tube	30 inches
F	Director 1 EHU	Director 1 return tube	30 inches
G	Director 3 return tube	Director 3 EHU	30 inches
EDGE	Director 3 EHU	Edge of boom	4 inches
H	Reflector EHU	Director 3 EHU	504 inches
J	Edge of boom	Edge of boom	512 inches

ELEMENT HOUSING UNIT (EHU) WIRING OVERVIEW

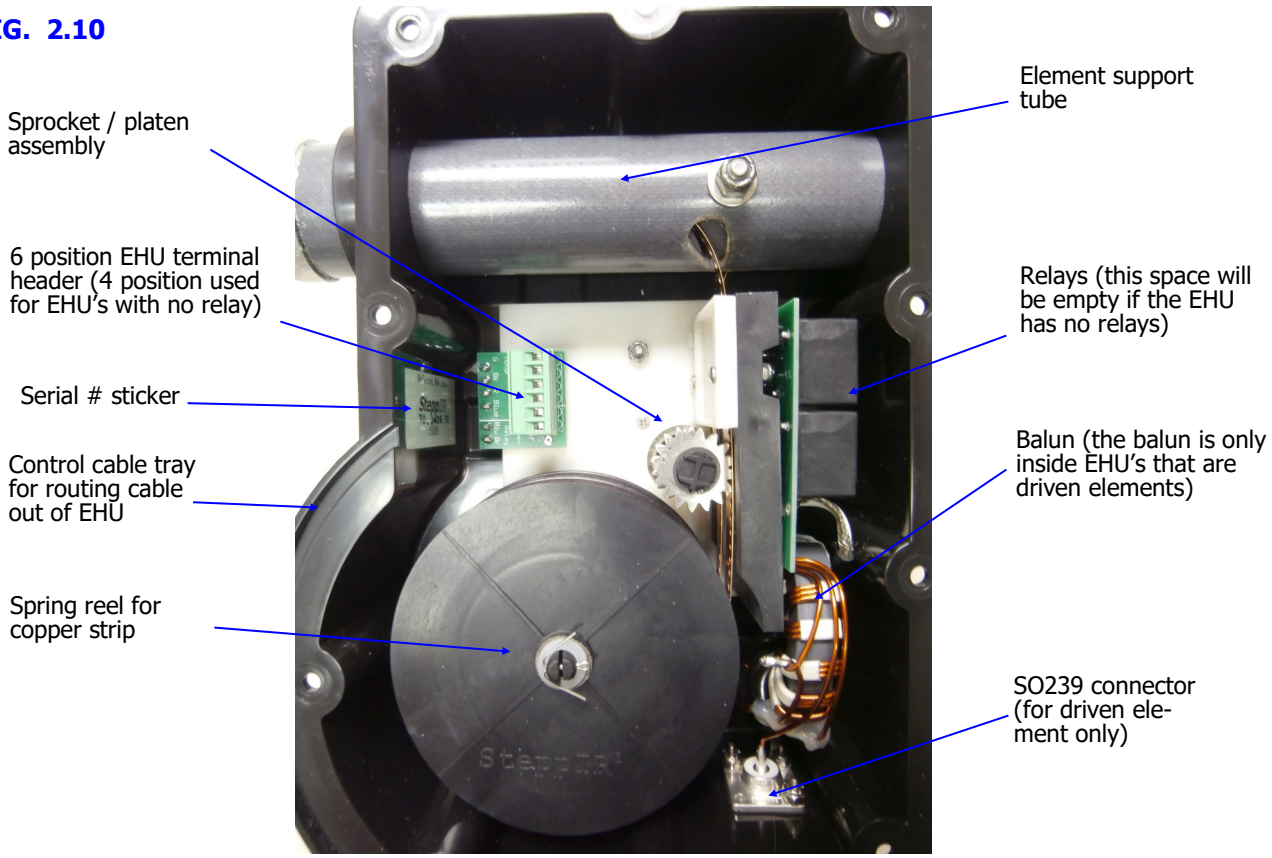
When wiring the EHU's on the DB42 Yagi, it is important to know that there are two different types of EHU. The Driven element, Director 1 and Director 2 each have relays inside the EHU. The Reflector and Director 3 EHU do not utilize a relay. Refer to the DB42 Yagi configuration guide in the Preamble section of this manual for more details.

The EHU's that have relays, uses 6 conductor control cable; 4 wires to control the stepper motor, and 2 wires to control the relays. The EHU's that do not have relays use 4 conductor control cable since only the motor needs to be controlled for these elements. It is critical that the right control cable is used for the respective EHU or the antenna will not function correctly, and the electronic controller could be damaged.

This brings up an important note: **NEVER DO ANY WIRING WHEN THE ELECTRONIC CONTROLLER IS CONNECTED TO THE CONTROL CABLE.** Even if the power is turned off of the controller, damage can occur. This is the number one cause of antenna installation failures, so please be sure to heed the advice.

Figure 2.10 gives an overview of the inside of a SteppIR EHU.

FIG. 2.10



MOUNTING THE EHU'S ON THE BOOM (continued)

EHU WIRING

Trim approximately 1.5 inches of the outer jacket of the control cable (4 or 6 wire, depending on which EHU). Remove the shield material, the support thread and cut the ground wire off as shown in figure 2.10. Attach electrical tape at the end of the trimmed control cable jacket so that there is no chance for a short. Remove 0.25 inches of the insulation from each of the individual 22 AWG wires, leaving bare copper. Tinning of the copper wire ends with solder is not required but may be helpful in keeping the ends together while attaching the control cable wires. Figure 2.11 shows the control cable should look like when you are finished with the trimming. Dip each of the copper wires into connector protector before inserting into the terminal plug. Figure 2.12 shows what the connector protector will look like.

The terminal header assembly consists of the terminal header and the terminal plug as shown in figure 2.14. The plug is shipped loosely attached to the header. Remove this plug when wiring and firmly plug back in when completed.

Follow the wire sequence in figure 2.14 for each EHU. The 6 pin wiring sequence is for the Driven, Director 1 and Director 2 elements, and the 4 pin wiring sequence is for the Reflector and Director 3 elements. *Be careful to ensure hat there are no bare wires protruding out from the terminal clamps, to avoid potential shorts.*

The wiring sequence for each EHU is also imprinted on the PCB that the terminal header is mounted on (located inside the EHU), as shown in figure 2.13. Pay no attention to the second row of imprinted text, these pins are for use in the manufacturing of the board itself and are of no use to you. Figure 2.13 shows a blue line crossing out the text in question. The yellow circle shows the correct wiring sequence.

FIG. 2.10

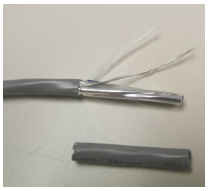


FIG. 2.11

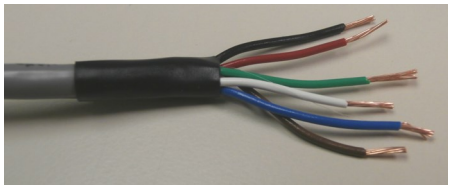
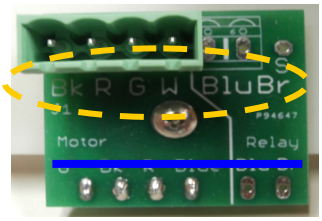


FIG. 2.12

FIG. 2.13

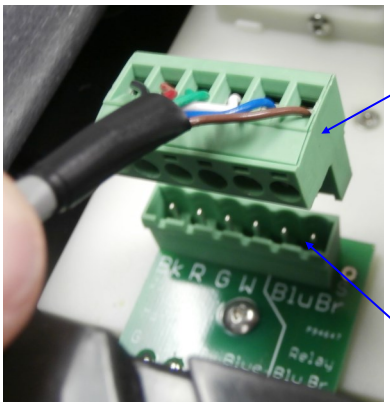


6 Pin Header Wiring Sequence (EHU's with Relays)

BLACK	RED	GREEN	WHITE	BLUE	BROWN

4 Pin Header Wiring Sequence (EHU's without Relays)

BLACK	RED	GREEN	WHITE



TERMINAL PLUG

TERMINAL HEADER

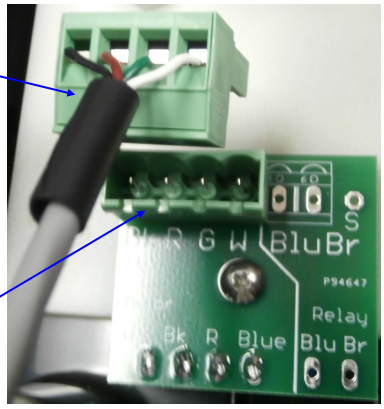


FIG. 2.14

EHU WIRING (continued)

Check to be sure the terminal plug is firmly inserted into the terminal header.

Lay the control cable wire inside the wire tray of the EHU as shown in Figure 2.16 This trough acts as a strain relief so that the cable will not be pulled out of the EHU. It is a good idea to leave a small amount of slack between the plug and the point which the tray starts as shown in Figure 2.17

Using the coax seal and cut into 1 inch strips as shown in Figure 2.15. You will need 3 strips. The remainder can be used to seal the driven element SO-239 connectors, should you wish to.

Apply coax seal on top of the control cable and **wrap it around the cable** as shown in Figure 2.18. This will help keep water from entering into the EHU. Apply the coax seal to the remaining areas of the wire tray as shown in Figure 2.19.

Repeat wiring and coax seal preparation for all EHUs. When finished, the EHUs will be secured

FIG. 2.15

FIG. 2.16

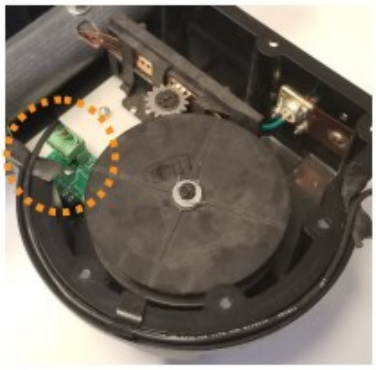


FIG. 2.17

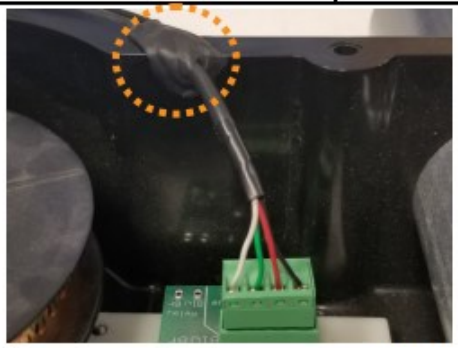
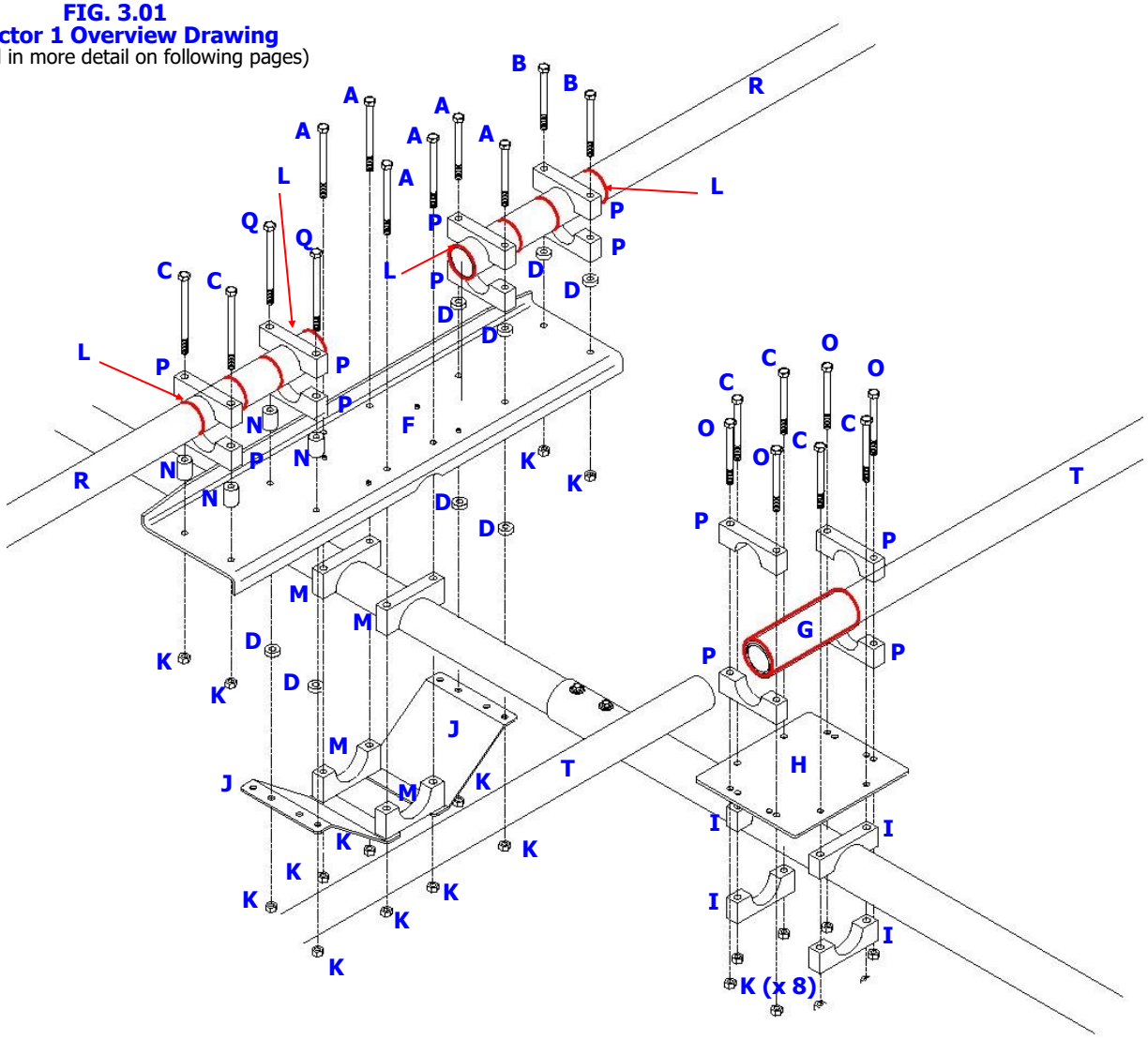


FIG. 2.18

FIG. 2.19

DIRECTOR 1 EHU & RETURN TUBE ASSEMBLY

FIG. 3.01
Director 1 Overview Drawing
(Covered in more detail on following pages)



Key	QTY	Part Number	Description	Key	QTY	Part Number	Description
A	6	60-0066	5/16" x 4" Hex head bolt	K	20	60-0046	5/16" Nylock nut
B	2	60-0114	5/16" x 3-3/4" Hex head bolt	L	4	10-1601-11	2" x 3" Stress relief tube
C	6	60-0115	5/16" x 4-1/2" Hex head bolt	M	4	10-1601-41	2-1/2" Aluminum saddle half
D	8	10-1613-11	1/4" Aluminum spacer	N	4	10-1613-01	1" Aluminum spacer
F	1	10-1605-11	Element support plate	O	4	60-0065	5/16" x 3-1/2" Hex head bolt
G	1	10-1630-21	2" x 12" stress relief tube	P	12	10-1601-22	2" Aluminum saddle half
H	1	10-1608-01	Element return plate	Q	2	60-0141	5/16" x 5" Hex head bolt
I	4	10-1601-61	3" Aluminum saddle half	R	2	70-2029-01	1-3/4" X 60-3/4" EST tube
J	2	10-1606-01	Element support plate	T	2	70-2028-01	1-3/4" x 66-3/8" EST tube

ATTACH THE ELEMENT MOUNTING PLATE—DIRECTOR 1

The DB42 Director 1 loop element is 49 feet in length. The other two loop elements (REF& DIR 3) on the DB42 are 39 feet in length. There is a reason for this— by having the middle loop element 49 feet, it electrically makes the two end elements perform as if they are 49 feet in length. This is the basis for one of the SteppIR patents and is fundamental in the outstanding performance the DB42 delivers on the 40m and 30m bands while being 40% shorter than a full sized Yagi on those bands.

The construction of the Director 1 element is the most complex portion of the DB42 installation process. To make life easier for the installer, we have condensed this procedure into four separate sections. Figure 3.02 and 3.02A shows the items required for installing the element mounting plate for the Driven element. Detailed instructions follow.

FIG. 3.02

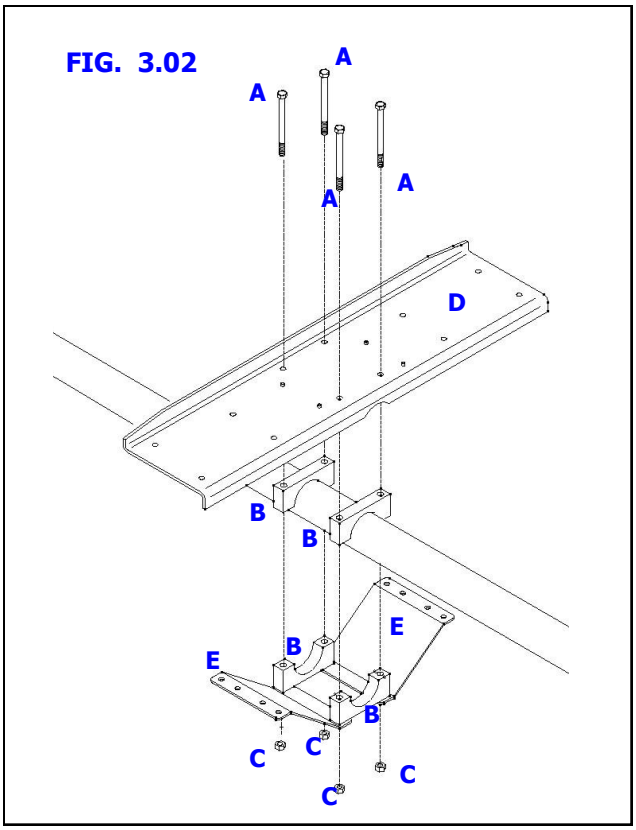
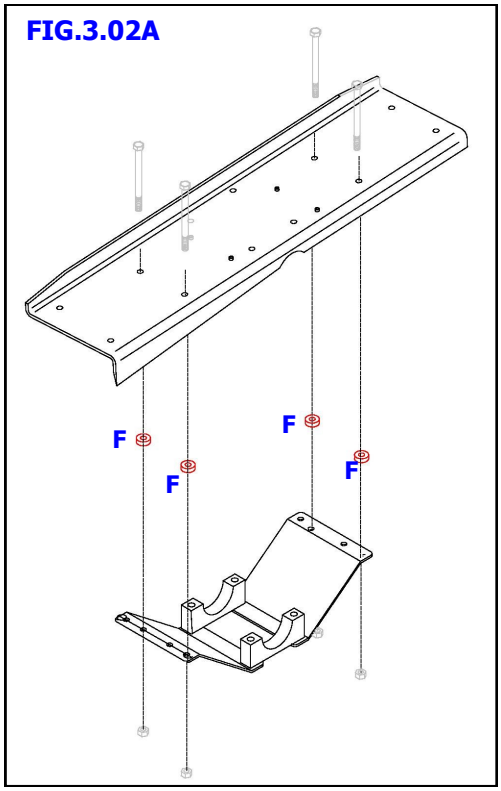


FIG.3.02A



Key	QTY	Part Number	Description
A	4	60-0066	5-1/6" X 4" Hex head bolt
B	4	10-1601-41	2-1/2" Aluminum saddle half
C	4	60-0046	5/16" Nylock nut
D	1	10-1605-11	Element mounting plate
E	2	10-1606-01	Element support plate
F	4	10-1613-11	1/4" Aluminum spacer

ATTACH THE ELEMENT MOUNTING PLATE—DIRECTOR 1 (continued)

Locate the element mounting plate (PN 10-1605-11) and insert four 5/16" x 4" hex head bolts (PN 60-0066) through the plate as shown in figure 3.03. Insert two of the 2-1/2" aluminum saddle halves (PN 10-1601-41) onto the hex head bolts and place on top of the boom on the 2-1/2" section as shown in figure 3.04. The upward lip of the mounting plate should be facing towards the Reflector side of the boom as shown in figure 3.05. Securing the element mounting plate with a clamp is highly recommended, especially if there is only one person doing this step. Figure 3.06 shows the clamp in place with the upward lip of the mounting plate facing the Reflector side of boom.

Figure 3.07 shows how the two element support reinforcing plates (PN 10-1606-01) will be positioned underneath the element mounting plate. Place two of the 2-1/2" aluminum saddles onto the 5/16" x 4" hex head bolts, follow with a reinforcing plate on the bottom of each saddle as shown in figure 3.08. Attach four 5/16" Nylock nuts (PN 60-0046), but leave loose. Be sure to apply anti-seize on each stainless steel fastener. Note that the 1/4" aluminum spacers (PN 10-1613-11) are in place as shown in figure 3.09 and the outward side of the reinforcing plates have not yet been fastened. This will be covered in a later step.

Figure 3.10 shows the completed element mounting plate attached to the boom. After setting the final location and leveling the plate in the next steps, install set screws (PN 60-0112) in the exposed holes of the aluminum saddles and tighten. The clamp has been removed for clarity, we recommend you keep it in place until later in the assembly process.

FIG. 3.03

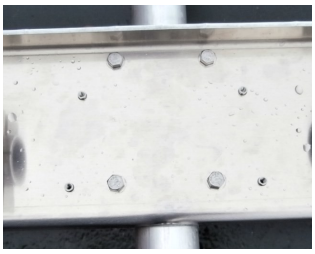


FIG. 3.04

FIG. 3.05

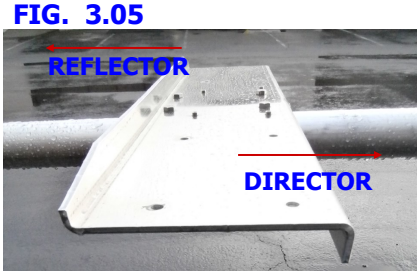


FIG. 3.06

FIG. 3.07

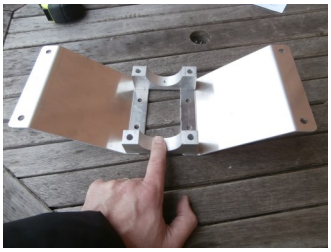


FIG. 3.08

FIG. 3.09

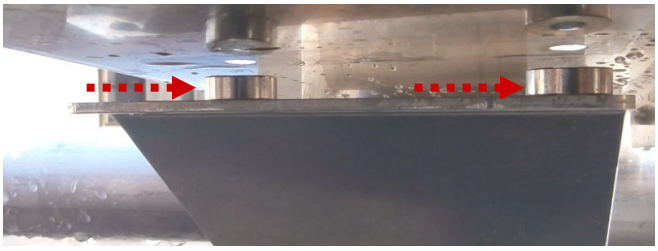


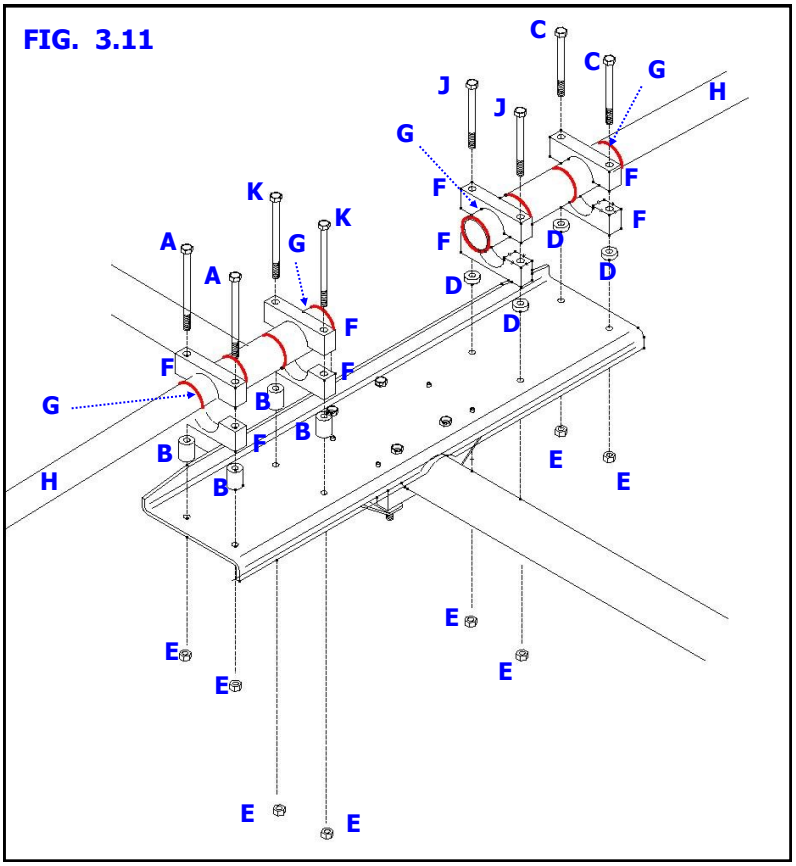
FIG. 3.10

ELEMENT SUPPORT TUBE (EST) MOUNTING - OVERVIEW

Figure 3.11 shows the detail for attaching the element support tubes (EST's) to the Director 1 mounting plate.

Note the reinforcing tubes shown in figure 3.11—they are outlined in red to show their placement. These tubes are placed on the outside diameter (OD) of the 1-3/4" fiberglass EST tube to keep the saddles from crushing when the aluminum saddles are secured in place. This will be covered in more detail later in this section.

FIG. 3.11



Key	QTY	Part Number	Description
A	4	60-0115	5/16" x 4-1/2" Hex head bolt
B	4	10-1613-01	1" Aluminum spacer
C	4	60-0114	5/16" x 3-3/4" Hex head bolt
D	4	10-1613-11	1/4" Aluminum spacer
E	8	60-0046	5/16" Nylock nut
F	8	10-1601-22	2" Aluminum saddle half
G	4	10-1601-11	2" x 3" Reinforcing tube
H	2	70-2029-01	1-3/4" x 60-3/4" EST tube
J	2	60-0066	5/16" x 4" Hex head bolt
K	2	60-0141	5/16" x 5" Hex head bolt

PREPARE MOUNTING PLATE FOR ATTACHING THE EST's

All of the SteppIR EHU's have a "diverter" inside them to direct each half of the copper-beryllium strip in the correct direction. The Director 1 element on the DB42 is quite a bit longer than the normal loops, so a different diverter system must be employed. This is the reason why the Director 1 element has 3/4" CPVC tubing coming out each side, with the tubes being offset from each other as shown in figure 3.12.
The EST tubes on each side of the element need to be level with each other, so different sized aluminum spacers are used to accomplish this.

Locate four 1" aluminum spacers (PN 10-1613-01). These are used on the "high" or closest side of the EHU when facing the boom with the reflector to your left as shown in figure 3.13. Using two 2" aluminum saddles halves (PN 10-1601-22), insert two 5/16" x 5" hex head bolts (PN 60-0141) and two 5/16" x 4-1/2" (PN 60-0115) hex head bolts through the respective saddle halves and insert the 1" aluminum spacers onto the hex head bolts as shown in figure 3.14. The inner saddle pairs (closest to EHU) for each side will be inserted through the mounting plate, 1/4" spacers and the reinforcing plate as shown in figure 3.15.

Locate four 1/4" aluminum spacers (PN 10-1613-11). These are used on the "low" or furthest side of the EHU when facing the boom with the reflector to your left as shown in figure 3.16. Using two 2" aluminum saddles halves (PN 10-1601-22), insert two 5/16 x 4" hex head bolts (PN 60-0114) and two 5/16" x 3-3/4" hex head bolts (PN 60-0114) through the respective saddle halves and then insert the 1/4" aluminum spacers onto the hex head bolts as shown in figure 3.17. Attach this assembly to the element mounting plate by inserting the thread ends of the hex head bolts through the mounting plate holes. Loosely thread on the 5/16" Nylock nuts (PN 60-0046).

There are different lengths of 5/16" hex head bolts for each saddle pair that is attached to the mounting plate, which can be confusing. Figure 3.18 shows the required bolt length for each saddle. See figure 3.11 on the prior page for specific size and part number information.

FIG. 3.12

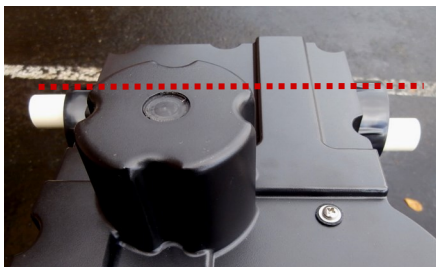


FIG. 3.13

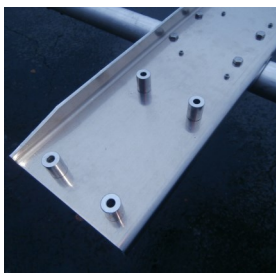


FIG. 3.14

FIG. 3.15

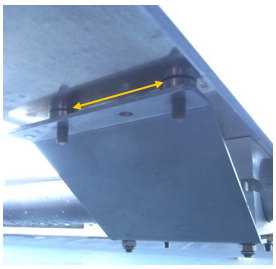
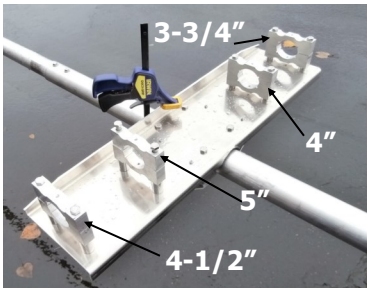


FIG. 3.16

FIG. 3.17

FIG. 3.18



ATTACH THE ELEMENT SUPPORT TUBES—DIRECTOR 1

Locate the 1-3/4" x 60-3/4" element support tube (PN 70-7029-01). Note that there are two different lengths of element support tube (EST) for the Director 1 element. The shorter EST's (60-3/4") are used for the EHU side, and the longer ones (66-3/8") are used for the return tube side. Slide a 2" x 3" reinforcing sleeve (PN 10-1601-11) onto the EST. Using a tape measure, position the reinforcing sleeve so that the top edge of the sleeve is 5.625" from the edge of the EST that does NOT have the reinforcing ring already attached on the edge, as shown in figure 3.20.

Slide the second reinforcing sleeve onto the EST, so that it is flush with the EST and the slotted portion of the reinforcing sleeve faces downward as shown in figure 3.21. The slotted portions on each of the two reinforcing rings should be aligned so that they are in the same downward position. Using a tape measure, mark 1/2" from the flush edge of the EST tube as shown in figure 3.22. Repeat for the EST for the other side of the EHU. Figure 3.23 shows the prepared EST.

Insert the end of the EST that has the reinforcing sleeves on it through the 2" saddles located on the mounting plate. Position the EST so that the mark you made 1/2" from the edge of the EST is now lined up with the edge of the forward saddle, and the other reinforcing sleeve is centered on the rear saddle as shown in figure 3.24. Tighten the saddles to no more than 7 ft lb. Be sure the slotted portion of reinforcing sleeves are pointing downward.

Position the EHU so that the center-point of the element is 204 inches from the left edge of the boom as shown in figure 3.25. Place a level in-between the two ends of the EST's as shown in figure 3.26 and when level, tighten the saddles firmly. Figure 3.27 shows the prepared EST's ready for the EHU to be mounted.

FIG. 3.20

FIG. 3.21

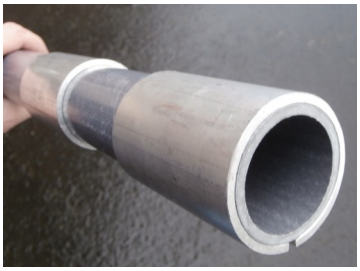


FIG. 3.22

FIG. 3.23

FIG. 3.24

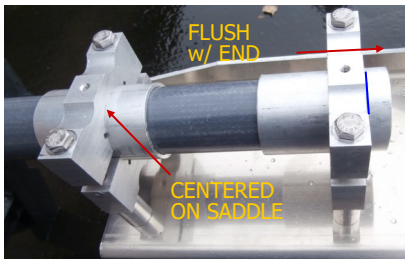
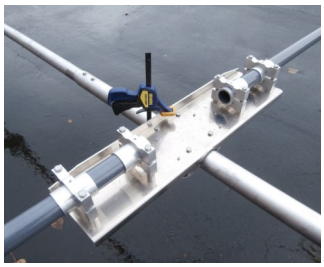


FIG. 3.25

FIG. 3.26

FIG. 3.27



SECURE THE DIRECTOR 1 EHU TO THE MOUNTING PLATE

The Director 1 element (PN 70-3409-01) is different from the rest of the EHU's because there is a plastic lid that needs to be installed before attaching the EHU to the mounting plate. The other EHU's all utilize the mounting plate itself as the lid.

The Director 1 EHU must be wired before placing the lid on it and the coax seal needs to be in place as covered earlier. Be sure to remove and discard the foam protector that is shrink wrapped to the EHU before the lid is secured. Failure to do so could lead to catastrophic failure. Figure 3.31 shows the foam protector pad *before* it is removed from the EHU.

There are a total of ten #10 screws used to fasten the lid. Six of these screws utilize the Nylock nuts, and will be positioned with the threads pointing upward as shown in figure 3.30. Note that two of the Nylock screws are flat headed as shown in figure 3.30 (Key F). The remaining four #10 machine screws are used to attach the Driven EHU to the element mounting plate and will be covered in more detail in the next step.

Place the gasket material so that it aligns with the holes in the EHU lid as shown in figure 3.30. Place the EHU on top of the gasket and using ONLY the six #10 x 3/4" screws (PN 60-0017), #10 Nylock nuts (PN 60-0019) and #10 flat washers (PN 60-0018), fasten the lid to the EHU. There must be a washer between the top of the EHU flange and the Nylock nut. Be sure that the control cable wire is cleanly positioned inside the molded wiring trough. Tighten each nut **but be careful not to over-tighten or the flange on the EHU could crack.**

Always tighten from the nut side of the screw/nut combination.

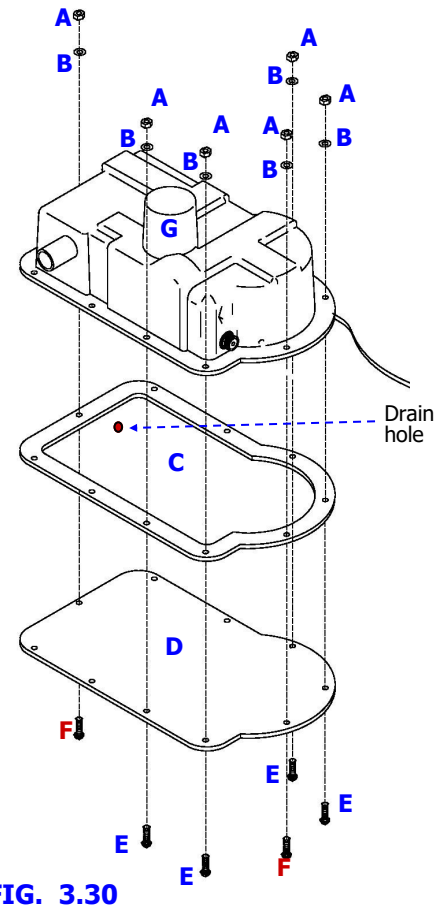
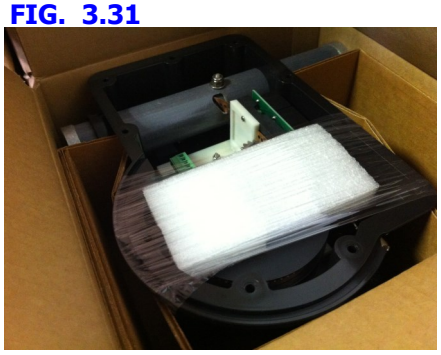


FIG. 3.30

FIG. 3.31



Key	QTY	Part #	Description
A	6	60-0019	#10 Nylock nut
B	6	60-0018	#10 Flat washer
C	1	10-1502-12	EHU gasket
D	1	10-1022-21	EHU lid
E	4	60-0017	#10 x 3/4" machine screw
F	2	60-0017-10	#10 x 7/8" Flat head screw
G	1	70-3409-01	Director 1 EHU

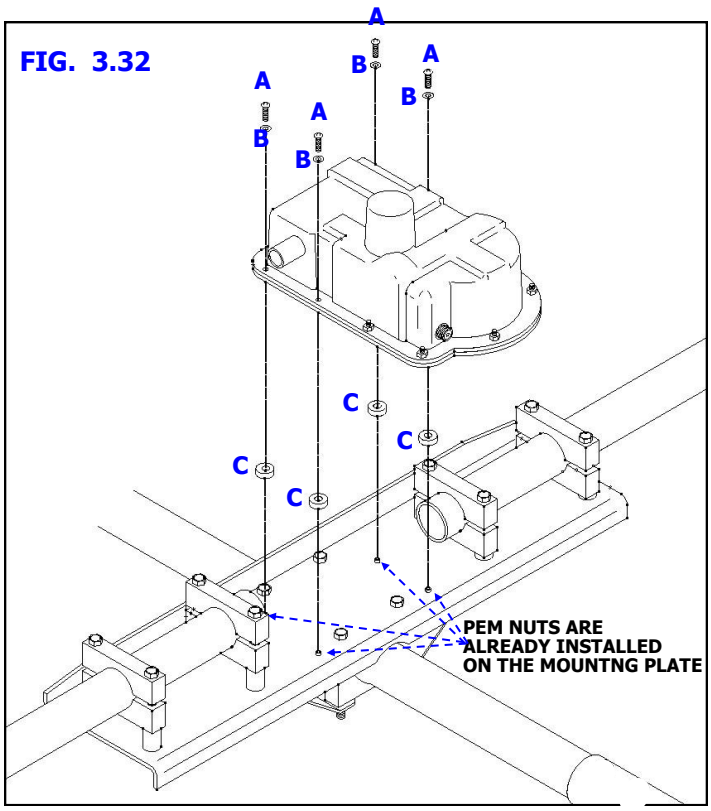
SECURE THE DIRECTOR 1 EHU TO THE MOUNTING PLATE (continued)

Place the EHU as shown in figure 3.32. Be certain the four 1/4" aluminum spacers (PN 10-1613-11) are positioned over the PEM nuts, between the element mounting plate and the EHU lid as shown in figure 3.33. The aluminum spacers protect the PEM nuts and elevate the EHU above the bolt heads that are holding the mounting plate to the boom.

When the EHU is placed on top of the spacers, the plastic EST tube that protrudes out of the EHU should be roughly aligned with the center of the EST extension tube as shown in figure 3.34.

Insert the #10 x 3/4" machine screws (the ones with the locking strip as shown in figure 3.35, PN 60-0101) with the threads pointing downward. Be certain that there is a #10 flat washer between the top flange of the EHU and the head of the machine screw. Align with the PEM nuts and tighten each screw. Do not over-tighten or you could potentially crack the mounting flange on the EHU.

FIG. 3.32



Key	QTY	Part #	Description
A	4	60-0101	#10 x 3/4" Machine screw with locking strip on threads (see PIC 3.35)
B	4	60-0018	#10 Flat washer
C	4	10-1613-11	1/4" Aluminum spacer

FIG. 3,33

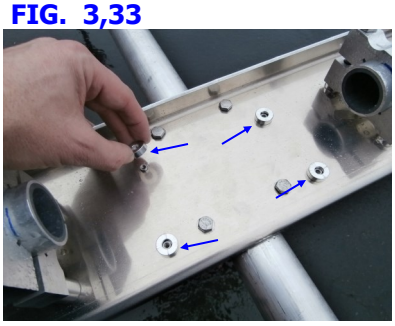


FIG. 3.34

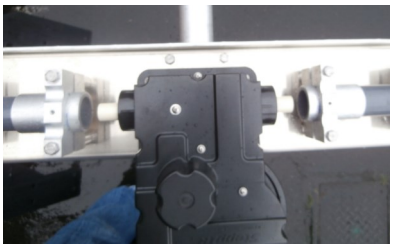


FIG. 3.35

INSTALLING THE CPVC INNER GUIDE TUBE—DIRECTOR 1

All of the looped elements have inner guide tubes. The DB42 Director 1 element utilizes a different method for attaching the inner guide tubes than the two 39 foot end loops due to it's extra length.
DO NOT INSTALL THE CPVC TUBES UNTIL COMPLETING THE WIRING TESTS IN SECTION 11.3.

There are three sections to the inner guide tube as shown in figure 3.40. In this chapter, you will be working with the first section of the tube (PN 70-2025-33). We recommend you wait until just before the telescoping poles are attached later in this manual before gluing the remaining sections. This will keep you from potentially tripping over them while the rest of the antenna is being assembled. ***When gluing the 3 pieces together, be sure you do NOT put any glue inside the coupler—only apply glue to the outside diameter of the tubing.***

Locate the section of the guide tube that has the pre-installed foam centering rings and the black rubber coupler on it (PN 70-2025-33). The foam centering rings have a slot in them as shown in figure 3.41. It is important that these slots are facing upward when inserting into the element support tube (EST). The slots are used as vents to assist in preventing condensation from forming internally. Because you will not be able to see that the slots are indeed pointing upward once the guide tubes are in place, we recommend you mark the correct position on the opposite end of the guide tube as shown in figure 3.42. Insert the inner guide tube into the EST as shown in figure 3.43 and continue to push until the black rubber coupler is protruding slightly as shown in figure 3.44.

Figure 3.45 is a cutaway drawing to give you a visual perspective during this process.

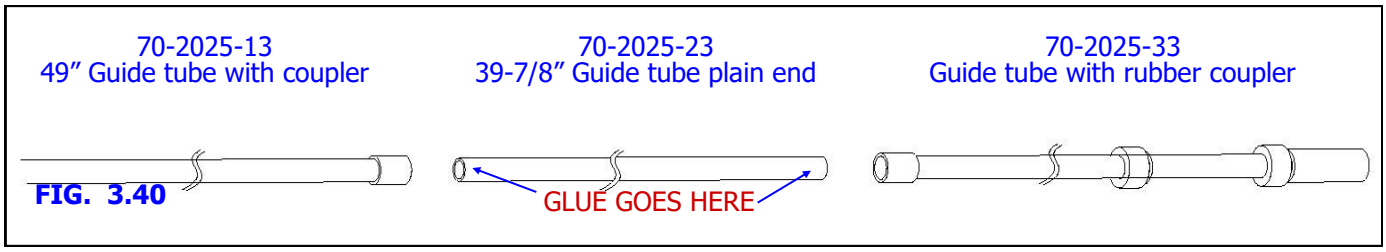


FIG. 3.40

FIG. 3.41

FIG. 3.42

FIG. 3.43

FIG. 3.44

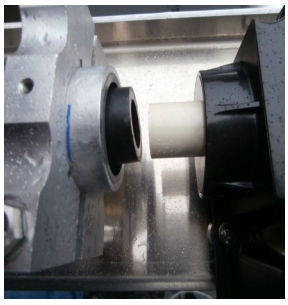
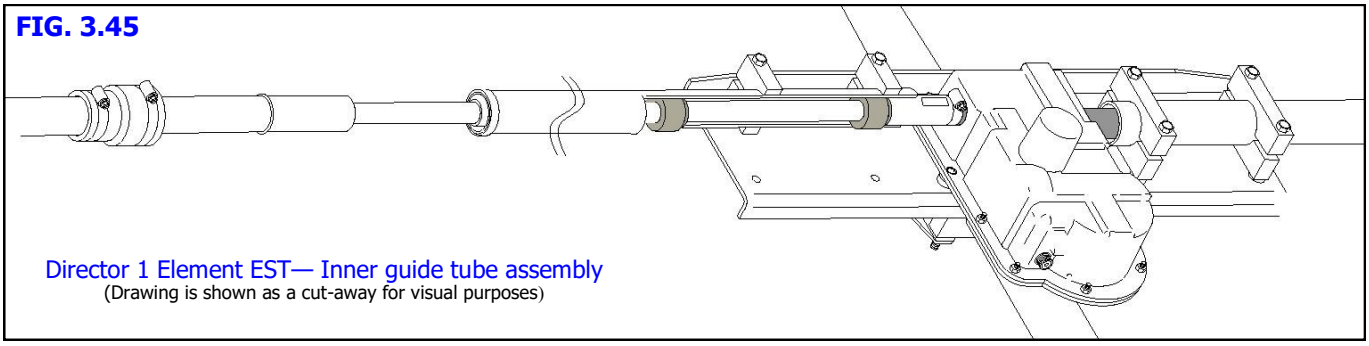


FIG. 3.45



Director 1 Element EST— Inner guide tube assembly
(Drawing is shown as a cut-away for visual purposes)

INSTALLING THE CPVC INNER GUIDES—DIRECTOR 1 (continued)

Insert the #16 Stainless steel hose clamp (PN 60-6000-15) onto the CPVC tube as shown in figure 3.46. Position the black rubber coupling until it is aligned with the CPVC tube and then slide the hose clamp onto the rubber coupling.

Grip the end of the guide tube that is protruding out of the EST and rotate the tube as needed while pushing the guide tube in until the black rubber coupler bottoms out against the EHU as shown in figure 3.47. Tighten the hose clamp firmly as shown in figure 3.48. Wait 20 minutes and then tighten it again to guard against cold flow of the plastic. Repeat for the other side of the EHU.

Figure 3.49 shows the completed inner guide tube assembly. Figure 3.50 gives you an idea of how far out the CPVC inner guide tubes will extend when glued together. This is why we recommend you wait until much later in the process to complete the guide tube assembly.

FIG. 3.46

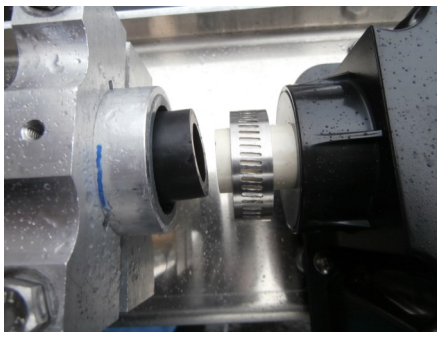


FIG. 3.47

FIG. 3.48

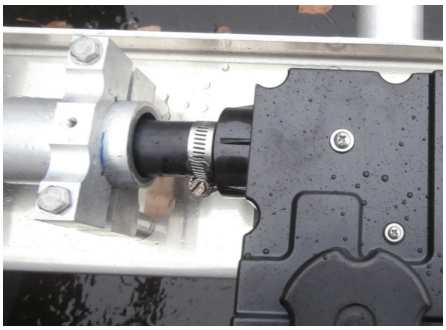


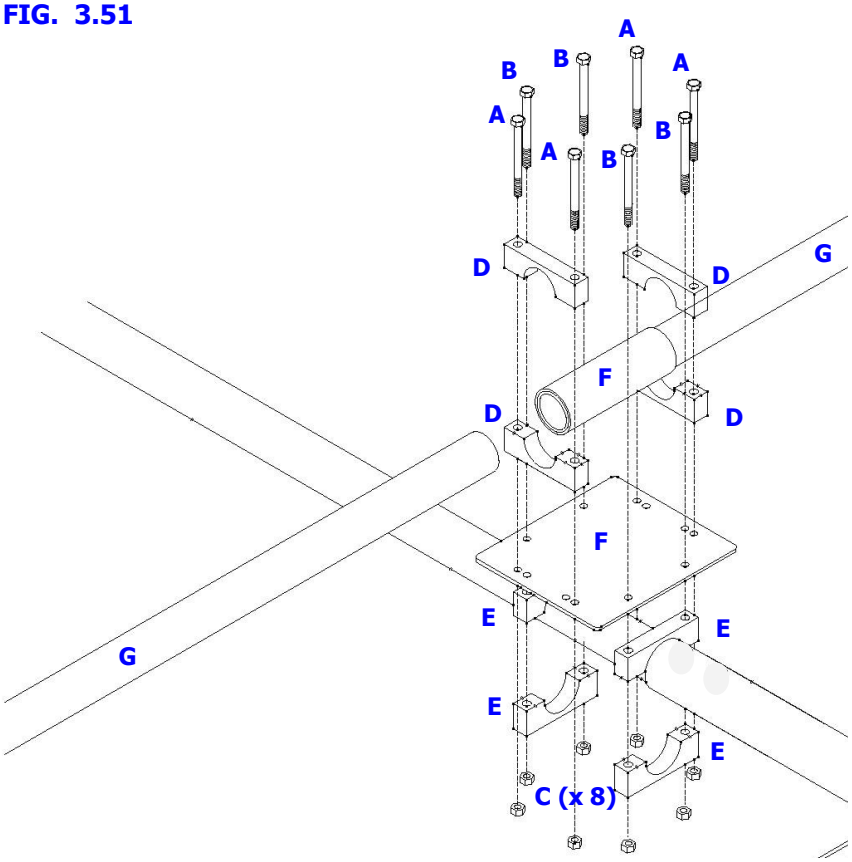
FIG. 3.49

FIG. 3.50

RETURN TUBE ASSEMBLY—DIRECTOR 1

Figure 3.51 shows an overview of the return tube assembly for Director 1.

FIG. 3.51



Key	QTY	Part Number	Description
A	4	60-0065	5/16" x 3-1/2" Hex head bolt
B	4	60-0115	5/16" x 4-1/2" Hex head bolt
C	8	60-0046	5/16" Nylock nut
D	4	10-1601-22	2" Aluminum saddle half
E	4	10-1601-61	3" Aluminum saddle half
F	1	10-1630-21	2" x 12" Slotted aluminum sleeve
G	2	70-2028-01	1-3/4" x 66-3/8" EST return tube
H	1	10-1608-01	Element return plate

RETURN TUBE ASSEMBLY (continued)

Install the element return mounting plate (PN 10-1608-01). Use four of the 3" aluminum saddles (PN 10-1601-61), 5/16" x 4-1/2" hex head bolts (PN 60-0115) and 5/16" Nylock nuts (PN 60-0046) as shown in figure 3.52. Tighten the nuts, but leave loose enough to adjust for the center-to-center measurement. Using four of the 2" aluminum saddles, 5/16" x 3-1/2" hex head bolts (PN 60-0065) and Nylock nuts, loosely install the return tube saddles as shown in figure 3.53.

Insert the 2" x 12" slotted aluminum sleeve (PN 10-1630-21) as shown in figure 3.54. Be sure to position the slotted portion of the aluminum tube so that if faces downward as shown in figure 3.55 Center the return tube on the return plate. You should measure around 2.25" from the edge of the return plate on each side of tube to the aluminum saddle as shown in figure 3.57. At this point tighten the Nylock nuts until they are just snug enough to hold the aluminum sleave.

Measure 30 inches from the center-point of the Director 1 EHU to the center-point of the element return tube as shown in figure 3.56. Level the return bracket assembly as shown in figure 3.58 and tighten the saddle bolts firmly. Do not forget to use anti-seize on all stainless steel fasteners, and also remember to install a set screw into each boom saddle pair (one set screw per saddle pair).

FIG. 3.52

FIG. 3.53

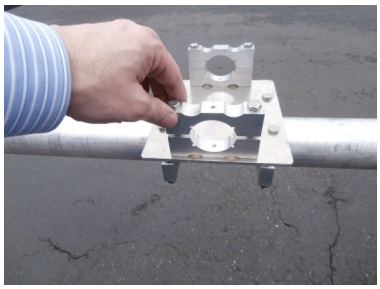


FIG. 3.54

FIG. 3.55

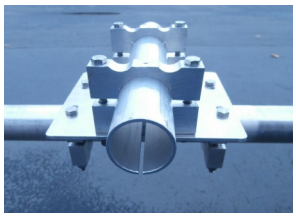


FIG. 3.56

FIG. 3.57

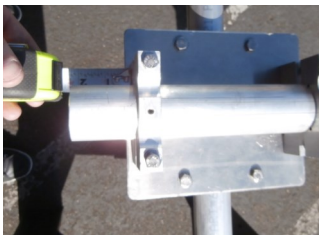


FIG. 3.58

RETURN TUBE ASSEMBLY (continued)

Locate the 1-3/4" x 66-3/8" element support tube (PN 70-2028-01). Measure 6 inches from the flush end of the element support tube (EST) and mark with a felt pen as shown in figure 3.58. Repeat for the other EST.

Insert the EST end into the aluminum sleeve as shown in figure 3.59. Position the EST so that the mark you made is flush with the aluminum sleeve as shown in figure 3.60. Repeat for the other EST. Be sure that the aluminum sleeve is still centered on the return plate. Tighten the saddles to no more than 7 ft lbs (9.5Nm). This is very important. The aluminum saddles can crush the fiberglass tubes if the saddles are too tight.

Figure 3.61 shows the completed return assembly. Figure 3.62 shows the completed Director 1 element mounting plate and return assembly.

FIG. 3.58

FIG. 3.59

FIG. 3.60

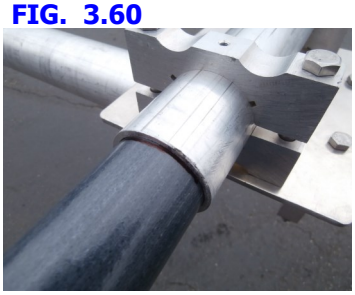
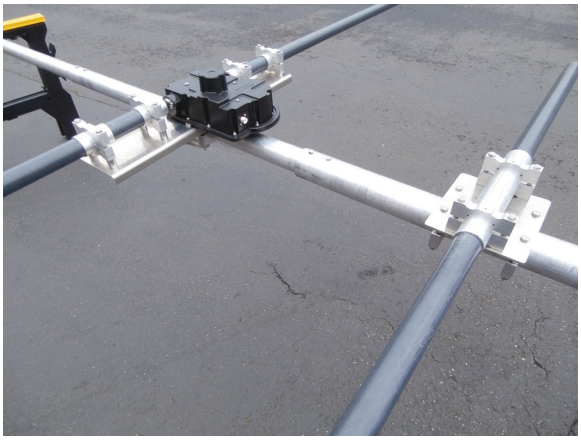


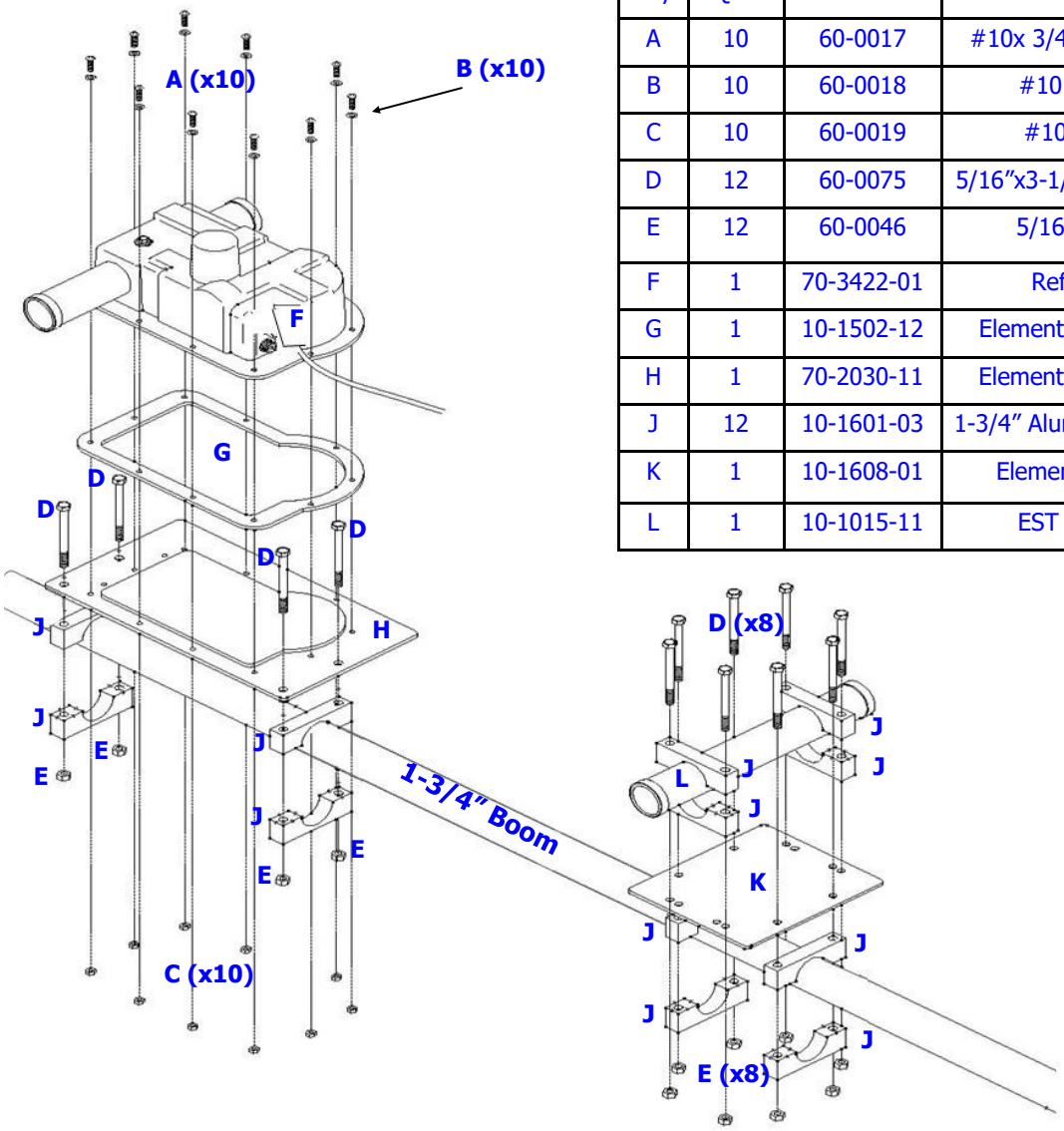
FIG. 3.61

FIG. 3.62



REFLECTOR EHU OVERVIEW DRAWING

Figure 4.01 shows an overview of the Reflector EHU assembly, which is covered in more detail on the following pages.



Key	QTY	Part #	Description
A	10	60-0017	#10x 3/4" Machine screw
B	10	60-0018	#10 Flat washer
C	10	60-0019	#10 Nylock nut
D	12	60-0075	5/16"x3-1/4" Hex head bolt
E	12	60-0046	5/16" Nylock nut
F	1	70-3422-01	Reflector EHU
G	1	10-1502-12	Element housing gasket
H	1	70-2030-11	Element mounting plate
J	12	10-1601-03	1-3/4" Aluminum saddle half
K	1	10-1608-01	Element return plate
L	1	10-1015-11	EST Return tube

WARNING!
Extra bracket used in this section if installing the 80m dipole. Refer to the 80m dipole instructions for further detail.

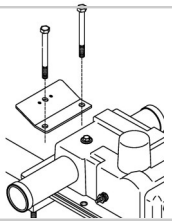


FIG. 4.01

SECURE MOUNTING PLATE AND EHU TO BOOM—REFLECTOR

Refer to the center-to-center measurements in Chapter Two when installing each of the EHU's and mounting plates to the boom. The EHU should already be wired before placing it on the aluminum mounting plate.

Position the aluminum mounting plate (PN 70-2030-11) and align the 1-3/4" aluminum saddle halves (PN 10-1601-03) as shown in figure 4.02. Insert the 5/16" x 3-1/4" hex head bolts (PN 60-0075) and thread on the 5/16" Nylock nuts (PN 60-0046). Tighten but allow the mounting plate to be loose enough for adjusting the center-to-center measurement. Be sure to use anti-seize on all stainless steel fasteners.

Place the EHU gasket (PN 10-1502-12) onto the mounting plate as shown in figure 4.03
Align the gasket with the holes on the mounting plate. Place the EHU (PN 70-3406-01) onto the mounting plate and attach using the #10 x 3/4" machine screws (PN 60-0017), #10 flat washers (PN 60-0018) and #10 Nylock nuts (PN 60-0019) as shown in figure 4.04. Be sure that the flat washer is between the machine screw head and the EHU housing as shown in figure 4.05 . Tighten the Nylock nuts enough to compress the gasket material but do not over tighten or you can crack the plastic EHU housing.

Measure the proper distance from the edge of the boom to the center point of the element (4.0 inches) as shown in figure 4.06. *(A tip from Adam Blackmer K7EDX, SteppIR operations manager— use the mold spline located on the EHU housing as a place to hold your tape measure edge when measuring center-to-center as shown in figure 4.07*). The center-to-center measurement from the Reflector element to Director 1 is 200 inches.

Level the EHU as shown in figure 4.08 and tighten the aluminum saddles firmly. Now insert the set screws into the exposed side of the saddles and tighten.

FIG. 4.02

FIG. 4.03

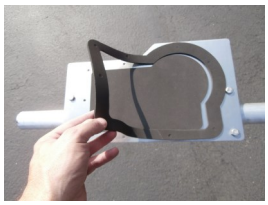


FIG. 4.04

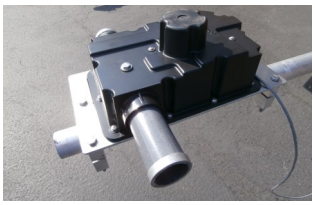
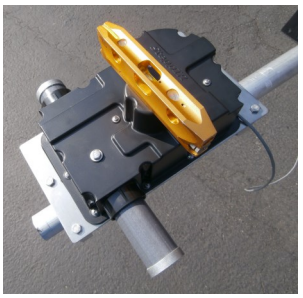


FIG. 4.05

FIG. 4.06

FIG. 4.07

FIG. 4.08



RETURN TUBE MOUNTING—REFLECTOR EHU

Install the element return mounting plate (PN 10-1608-01). Use four of the 1-3/4" aluminum saddles, 5/16" x 3-1/4" hex head bolts and 5/16" Nylock nuts as shown in figure 4.10. Tighten the nuts, but leave loose enough to adjust for the center-to-center measurement. Again using four of the 1-3/4" aluminum saddles, 5/16" x 3-1/4" hex head bolts, and Nylock nuts, loosely install the return tube saddles as shown in figure 4.11.

Insert the element return tube (PN 10-1015-11) as shown in figure 4.12. Be sure that the return tube is protruding out approximately 2.25 inches away from the aluminum saddle edge on each side, as shown in figure 4.14. Tighten the nylock nut until they are snug. Later after you install the fiberglass poles tighten the saddles to a maximum of 7 ft lb (9.5Nm). This is very important. The aluminum saddles can crush the fiberglass tubes if the saddles are too tight. DO NOT put a set screw in the aluminum saddles that are used on the fiberglass return tube material.

Measure 30 inches from the center-point of the Director EHU to the center-point of the element return tube as shown in figure 4.13 Level the return bracket assembly as shown in figure 4.14 and tighten the saddle bolts firmly. Do not forget to use anti-seize on all stainless steel fasteners, and also remember to install a set screw into each boom saddles (one set screw per saddle pair).

Figure 4.15 shows the completed director EHU and return bracket.

FIG. 4.10

FIG. 4.11

FIG. 4.12

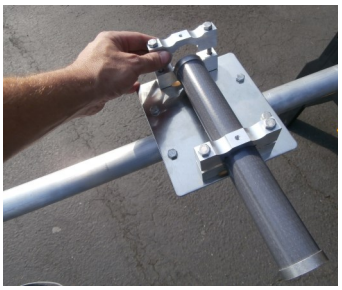


FIG. 4.13

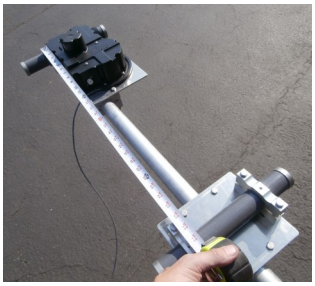
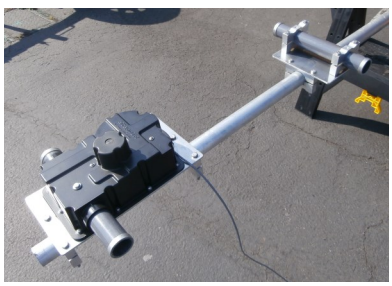


FIG. 4.14

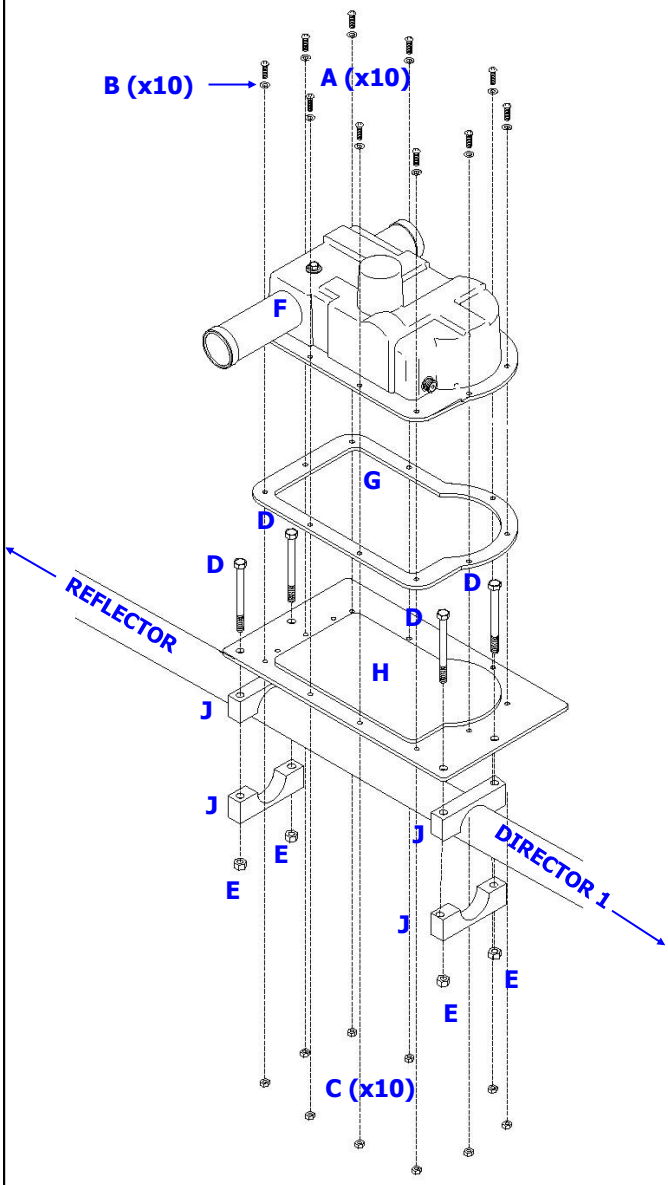
FIG. 4.15



DRIVEN ELEMENT ASSEMBLY DRAWING

The parts explosion drawing in figure 5.01 gives you an overview of the assembly of the driven EHU. Detailed instructions follow. The nomenclature for the Driven element can be confusing, because on 20m-6m operation, the element below acts as the Driven. On 40m/30m operation, this element is not used at all and Director 1 becomes the "Driven" element.

FIG. 5.01



Key	QTY	Part #	Description
A	10	60-0017	#10x 3/4" Machine screw
B	10	60-0018	#10 Flat washer
C	10	60-0019	#10 Nylock nut
D	4	60-0065	5/16"x3-1/2" Hex head bolt
E	4	60-0046	5/16" Nylock nut
F	1	70-3412-01	Driven Element EHU
G	1	10-1502-12	Element housing gasket
H	1	70-2030-11	Element mounting plate
J	4	10-1601-22	2" Aluminum saddle half

MOUNT THE DRIVEN ELEMENT ONTO THE BOOM

Refer to the center-to-center measurements in Chapter Two when installing each of the EHU's and mounting plates to the boom. The EHU should already be wired before placing it on the aluminum mounting plate.

Position the aluminum mounting plate (PN 70-2030-11) and align the 2" aluminum saddle halves (PN 10-1601-22) as shown in figure 5.02. Insert the 5/16" x 3-1/2" hex head bolts (PN 60-0065) and thread on the 5/16" Nylock nuts (PN 60-0046). Tighten, but allow the mounting plate to be loose enough for adjusting the center-to-center measurement. Be sure to use anti-seize on all stainless steel fasteners.

Place the EHU gasket (PN 10-1502-12) onto the mounting plate as shown in figure 5.03. Align the gasket with the holes on the mounting plate. Place the Driven EHU (PN 70-3412-01) onto the mounting plate as shown in figure 5.04 and attach using the #10 x 3/4" machine screws (PN 60-0017), #10 flat washers (PN 60-0018) and #10 Nylock nuts (PN 60-0019) as shown in figure 5.05. Be sure that the flat washer is between the machine screw head and the EHU housing as shown in figure 5.06 . Tighten the Nylock nuts enough to compress the gasket material but do not over tighten or you can crack the plastic EHU housing.

Measure the proper distance (116 inches) from the center-point of the Driven element to the center-point of the Director 1 element. *(A tip from Adam Blackmer K7EDX, SteppIR operations manager— use the mold spline located on the EHU housing as a place to hold your tape measure edge when measuring center-to-center as shown in figure 5.07).*

Level the EHU as shown in figure 5.08 and tighten the aluminum saddles firmly. Now insert the set screws into the exposed side of the saddles and tighten. Figure 5.09 shows the completed Reflector EHU and return tube.

FIG. 5.02

FIG. 5.03

FIG. 5.04

FIG. 5.05

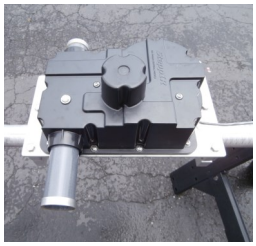
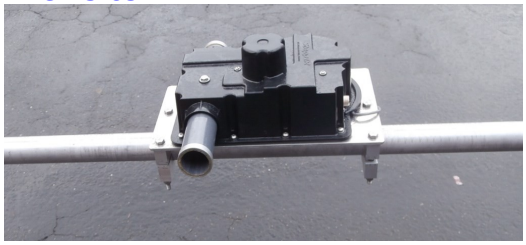


FIG. 5.06

FIG. 5.07

FIG. 5.08

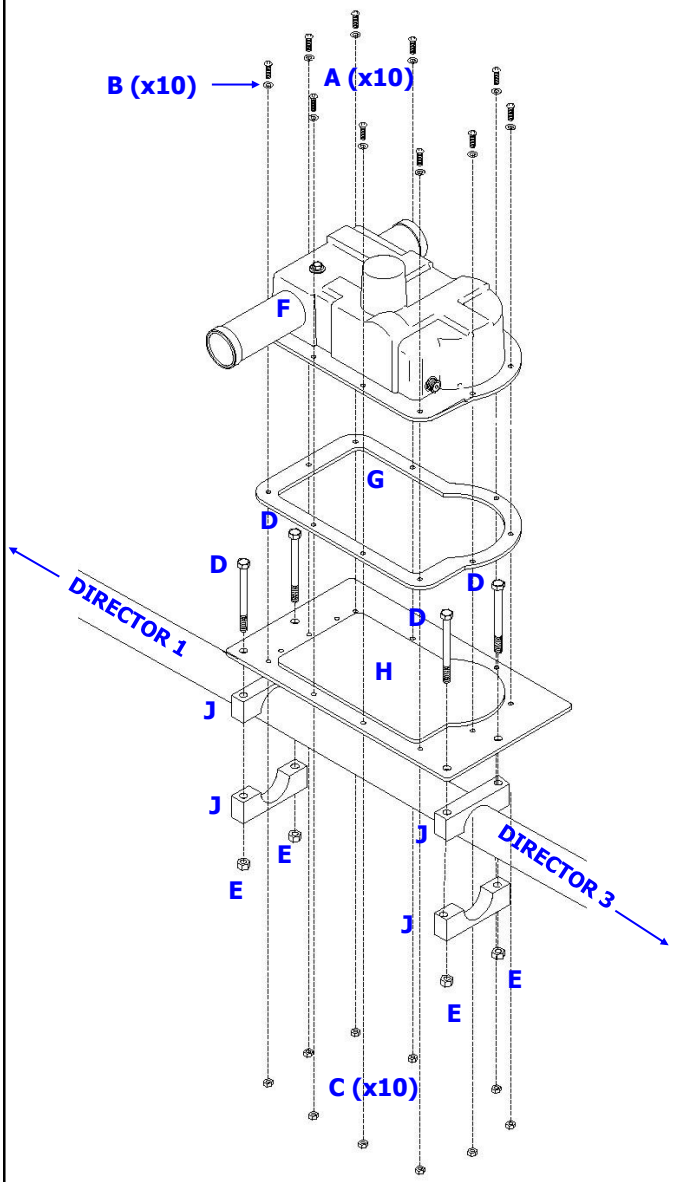
FIG. 5.09



DIRECTOR 2 EHU ASSEMBLY DRAWING

The parts explosion drawing in figure 6.01 gives you an overview of the assembly of the Director 2 EHU. Detailed instructions follow.

FIG. 6.01



Key	QTY	Part #	Description
A	10	60-0017	#10x3/4" Machine screw
B	10	60-0018	#10 Flat washer
C	10	60-0019	#10 Nylock nut
D	4	60-0114	5/16"x3-3/4" Hex head bolt
E	4	60-0046	5/16" Nylock nut
F	1	70-3408-01	Director 2 EHU
G	1	10-1502-12	Element housing gasket
H	1	70-2030-11	Element mounting plate
J	4	10-1601-32	2-1/4" Aluminum saddle half

MOUNT THE DIRECTOR 2 EHU ONTO THE BOOM

Refer to the center-to-center measurements in Chapter Two when installing each of the EHU's and mounting plates to the boom. The EHU should already be wired before placing it on the aluminum mounting plate.

Position the aluminum mounting plate (PN 70-2030-11) and align the 2-1/4" aluminum saddle halves (PN 10-1601-32) as shown in figure 6.02. Insert the 5/16" x 3-3/4" hex head bolts (PN 60-0114) and thread on the 5/16" Nylock nuts (PN 60-0046). Tighten, but allow the mounting plate to be loose enough for adjusting the center-to-center measurement. Be sure to use anti-seize on all stainless steel fasteners.

Place the EHU gasket (PN 10-1502-12) onto the mounting plate as shown in figure 6.03. Align the gasket with the holes on the mounting plate. Place the Director 2 EHU (PN 70-3408-01) onto the mounting plate as shown in figure 6.04 and attach using the #10 x 3/4" machine screws (PN 60-0017), #10 flat washers (PN 60-0018) and #10 Nylock nuts (PN 60-0019) as shown in figure 6.05. Be sure that the flat washer is between the machine screw head and the EHU housing as shown in figure 6.06 . Tighten the Nylock nuts enough to compress the gasket material but do not over tighten or you can crack the plastic EHU housing.

Measure the proper distance (150 inches) from the center-point of the Driven element to the center-point of the Director 1 element. *(A tip from Adam Blackmer K7EDX, SteppIR operations manager— use the mold spline located on the EHU housing as a place to hold your tape measure edge when measuring center-to-center as shown in figure 6.07).*

Level the EHU as shown in figure 6.08 and tighten the aluminum saddles firmly. Now insert the set screws into the exposed side of the aluminum saddle and tighten. Figure 6.09 shows the completed Reflector EHU and return tube.

FIG. 6.02

FIG. 6.03

FIG. 6.04

FIG. 6.05

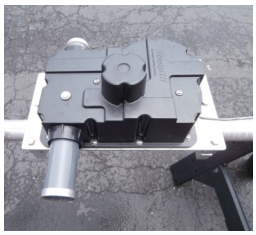


FIG. 6.06

FIG. 6.07

FIG. 6.08

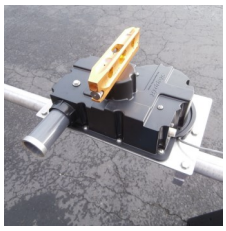
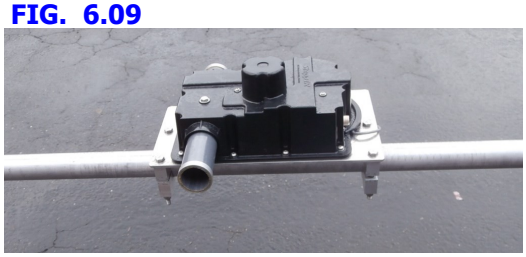
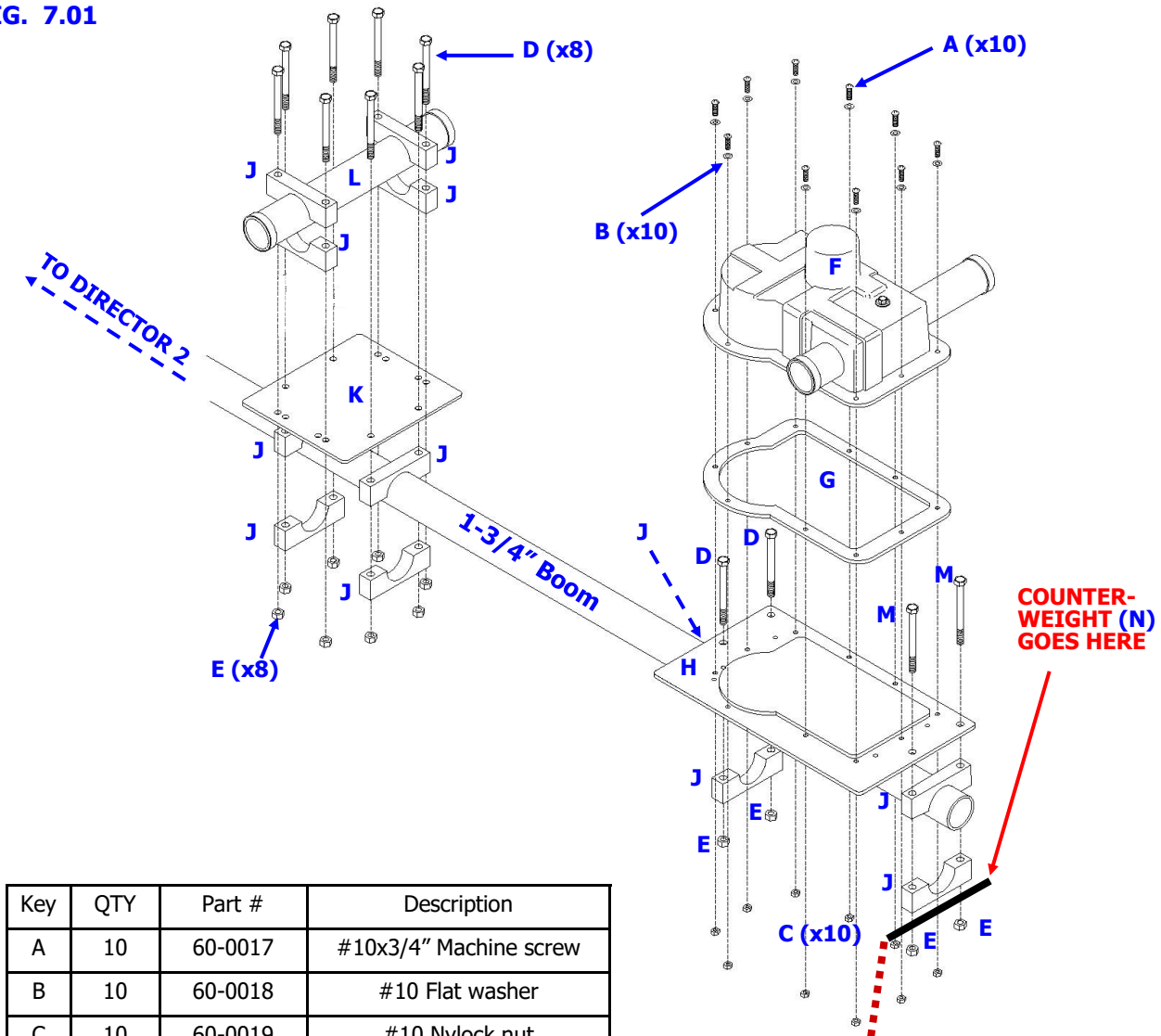


FIG. 6.09

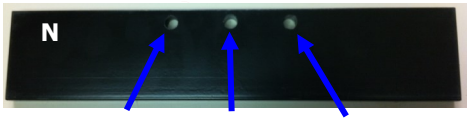


DIRECTOR 3 EHU & ELEMENT RETURN TUBE ASSEMBLY

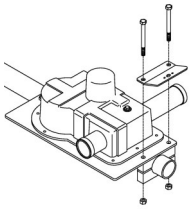
FIG. 7.01



Key	QTY	Part #	Description
A	10	60-0017	#10x3/4" Machine screw
B	10	60-0018	#10 Flat washer
C	10	60-0019	#10 Nylock nut
D	10	60-0075	5/16"x3-1/4" Hex head bolt
E	12	60-0046	5/16" Nylock nut
F	1	70—3422-01	Director 3 EHU
G	1	10-1502-12	Element housing gasket
H	1	70-2030-11	Element mounting plate
J	12	10-1601-03	1-3/4" Aluminum saddle half
K	1	10-1608-01	Element return plate
L	1	10-1015-11	EST Return tube
M	2	60-0114	5/16" x 3-3/4" Hex head bolt
N	1	10-1050-21	Boom counterweight



WARNING!
Extra bracket used in this section if installing the 80m dipole. Refer to the 80m dipole instructions for further detail.



MOUNT THE DIRECTOR 3 EHU ONTO THE BOOM

Refer to the center-to-center measurements in Chapter Two when installing each of the EHU's and mounting plates to the boom. The EHU should already be wired before placing it on the aluminum mounting plate.

Position the aluminum mounting plate (PN 70-2030-11) and align the 1-3/4" aluminum saddle halves (PN 10-1601-03) then insert the 5/16" x 3-1/4" (PN 60-0075) and 5/16" x 3-3/4" hex head bolts (PN 60-0114) and then slide the boom counterweight (PN 10-1050-21) onto the bolts as shown in figure 7.02. thread on the 5/16" Nylock nuts (PN 60-0046). Tighten, but allow the mounting plate to be loose enough for adjusting the center-to-center measurement. Be sure to use anti-seize on all stainless steel fasteners. Figure 7.03 shows the mounting plate attached to the boom.

Place the EHU gasket (PN 10-1502-12) onto the mounting plate as shown in figure 7.04. Align the gasket with the holes on the mounting plate. Place the Director 3 EHU (PN 70-3422-01) onto the mounting plate as shown in figure 7.05 and attach using the #10 x 3/4" machine screws (PN 60-0017), #10 flat washers (PN 60-0018) and #10 Nylock nuts (PN 60-0019) as shown in figure 7.07. Be sure that the flat washer is between the machine screw head and the EHU housing as shown in figure 7.07 . Tighten the Nylock nuts enough to compress the gasket material but do not over tighten or you can crack the plastic EHU housing.

Measure the distance from the center-point of the element to the right edge of the boom (4.0 inches as shown in figure 7.08. The center-to-center measurements from the Director 2 EHU to the Director 3 EHU must be 154.0 inches.

Level the EHU as shown in figure 7.09 and tighten the aluminum saddles firmly. Now insert the set screws into the exposed side of saddles and tighten.

FIG. 7.02

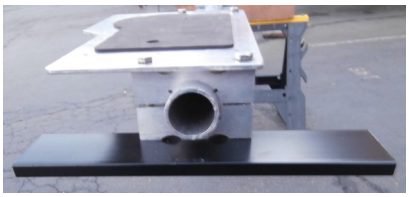


FIG. 7.03

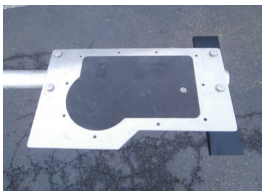


FIG. 7.04

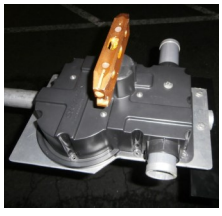
FIG. 7.05

FIG. 7.06

FIG. 7.07

FIG. 7.08

FIG. 7.09



RETURN TUBE ASSEMBLY—DIRECTOR 3

Install the element return mounting plate (PN 10-1608-01). Use four of the 1-3/4" aluminum saddles (PN 10-1601-03), 5/16" x 3-1/4" hex head bolts (PN 60-0075) and 5/16" Nylock nuts (PN 60-0046) as shown in figure 7.10. Tighten the nuts, but leave loose enough to adjust for the center-to-center measurement. Figure 7.11 shows the return tube mounting bracket attached to the boom. Again using four of the 1-3/4" aluminum saddles, 5/16" x 3-1/4" hex head bolts, and Nylock nuts, install the return tube saddles as shown in figure 7.12. The saddles should remain loose, with the Nylock nuts threaded on just a couple of turns as shown in figure 7.13.

Insert the element return tube (PN 10-1015-11) as shown in figure 7.14. Be sure that the return tube is protruding out approximately 2.25 inches away from the aluminum saddle edge on each side, as shown in figure 7.15. Tighten the saddles to a maximum of 7 ft lb (9.5Nm). This is very important. The aluminum saddles can crush the fiberglass tubes if the saddles are too tight. DO NOT put a set screw in the aluminum saddles that are used on the fiberglass return tube material.

Measure 30" from the center-point of Director 3 as shown in figure 7.16. Level the return bracket assembly as shown in figure 7.17 and tighten the saddle bolts firmly. Do not forget to use anti-seize on all stainless steel fasteners, and also remember to install a set screw into each boom saddle (one set screw per saddle pair) and tighten.

Figure 7.18 shows the completed Director 3 EHU and return assembly.

FIG. 7.10

FIG. 7.11

FIG. 7.12

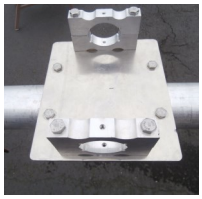


FIG. 7.13

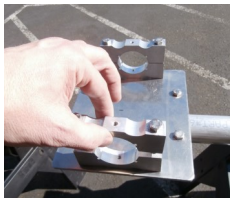


FIG. 7.14

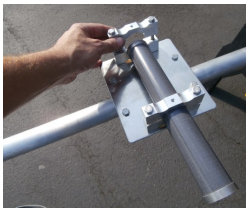


FIG. 7.15

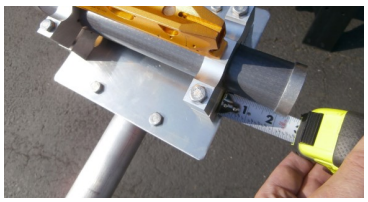


FIG. 7.16

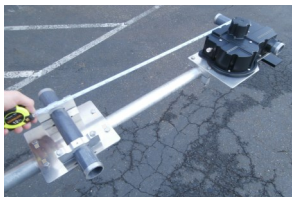


FIG. 7.17

FIG. 7.18

MOUNTING THE MAST PLATE TO THE BOOM

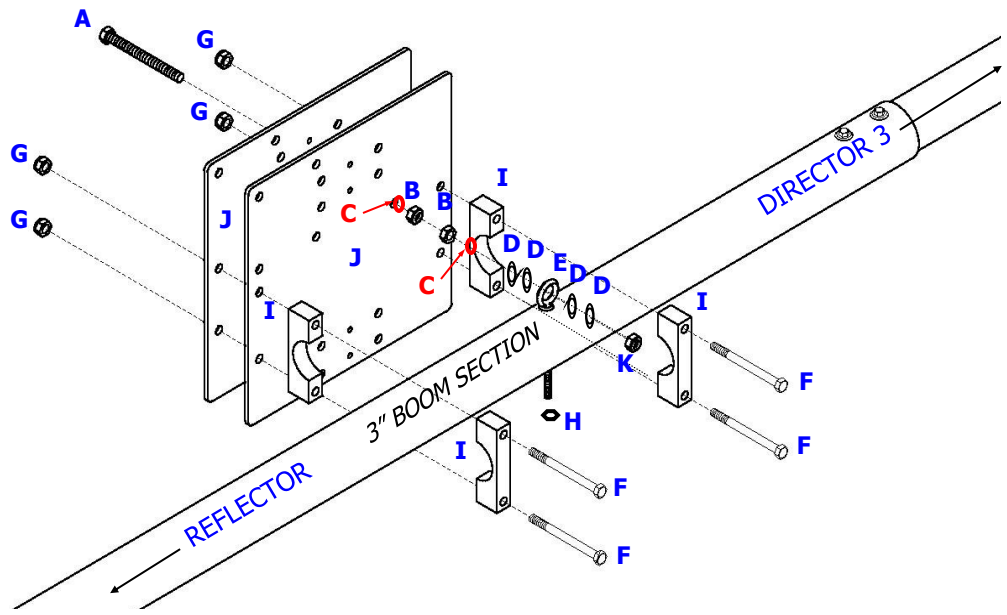
When you have finished mounting and leveling each of the EHU's, use clamps or cord to secure the boom in place onto the sawhorses or whatever structure you are using to support the boom. Double check the level readings of the EHU mounting plates before securing. By doing this, you are "locking" the boom into a level position, which will make the leveling of the mast plate much easier.

The DB42 uses two identical mast plates, mounted together as shown in figure 8.01. The reason we do this, is because it is much easier to form two aluminum plates that are 0.25" thick than a single plate that is 0.50" thick. There is no compromise in strength by doing so.

The DB42 employs a special system, called the EZ-Eye, for both mounting and leveling the boom. The EZ-Eye is also used in preventing the boom from shifting during high winds.

Figure 8.01 Shows an exploded drawing of the boom and mast plate assembly, along with the EZ-Eye system. This parts explosion is a useful referral tool as you complete the steps in this section.

FIG. 8.01



Key	QTY	Part #	Description
A	1	60-0142	7/16" x 5" Threaded EZ Eye bolt
B	3	60-0161	7/16" Nut
C	2	60-0160	7/16" Lock Washer
D	4	60-0144	7/16" Galvanized washer
E	1	60-0145	3/8" Stainless steel eyebolt
F	4	60-0141	5/16" x 5" Hex head bolt

Key	QTY	Part #	Description
G	4	60-0046	5/16" Nylock nut
H	1	60-0050	3/8" Nylock nut
I	4	10-1601-61	3" Aluminum saddle half
J	2	10-1610-22	11-1/2" Aluminum mast plate
K	1	60-0143	7/16" Nylock Nut

MOUNTING THE MAST PLATE TO THE BOOM (continued)

Locate the 7/16" x 5" threaded bolt (PN 60-0142). LIBERALLY apply anti-seize to this bolt as shown in figure 8.02. Note there is lubricant applied to four sections of the bolt. If you do not do this, the bolt will likely gall. For information on galling, see the Preamble section of this manual.

To be sure your mast plate is oriented properly, refer to figure 8.03. When looking at the boom (meaning that you can visually SEE the boom with the mast plate behind it) as it is mounted on the mast plate, these 4 holes should be on the upper left side.

Insert the 7/16" x 5" threaded bolt through the two identical mast plates (PN 10-1610-23) as shown in figure 8.04. Secure with the 7/16" standard nut (PN 60-0161) and 7/16" lock washer (PN 60-0160) as shown in figure 8.05. Tighten firmly. Thread the second 7/16" standard nut onto the bolt until there is approximately 3/4" of clearance between the two standard nuts as shown in figure 8.06.

Slide the 5/16" x 5" hex head bolts (PN 60-0141) into the mast plate, and place the first half of the 3 inch aluminum saddles (PN 10-1601-61) onto the bolts as shown in figure 8.07. Place one 7/16" lock washer and two 7/16" galvanized washers (PN 60-0034) onto the EZ-Eye threaded bolt as shown in figure 8.08, BEFORE inserting the threaded bolt into the EZ-Eye. Position the mast plate to the boom, sliding the 5" threaded bolt through the eyebolt as shown in figure 8.09.

FIG. 8.02

FIG. 8.03

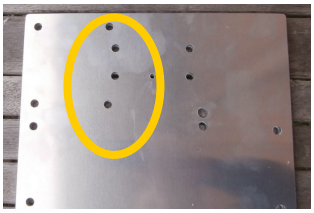


FIG. 8.04

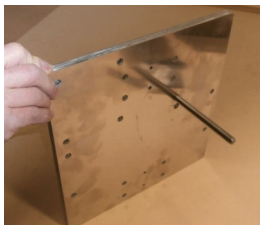


FIG. 8.05

FIG. 8.06

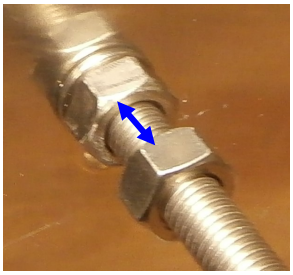
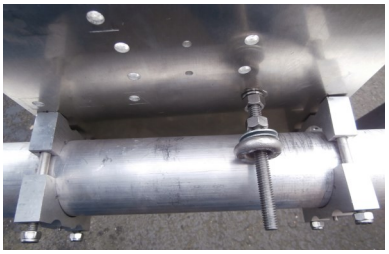


FIG. 8.07

FIG. 8.08

FIG. 8.09



SECURE THE MAST PLATE TO THE BOOM

Attach the other half of the 3" aluminum saddles and thread on the 5/16" Nylock nuts (PN 60-0046). Tighten the nuts until the boom is snug, but you can still rotate it. Place the remaining two 7/16" flat washers onto the threaded bolt as shown in figure 8.10. Insert a 7/16" Nylock nut onto the 7/16" x 5" threaded bolt as shown in figure 8.11. Tighten the Nylock nut until it is resting near the galvanized washers as shown in figure 8.12. Take care to liberally coat the bolt with anti-seize when securing the Nylock nut. The Nylon inside the nut causes friction which creates heat, and this can lead to galling of the threads on the bolt.

Use a short level and attach a wrench on each of the 7/16" "leveling" nuts as shown in figure 8.13. Adjust the nuts as needed to level the boom to the mast plate. When the mast plate is level with the boom, tighten all of the nuts firmly, and don't forget to install the set screws in the saddles as shown in figure 8.14. Only the exposed half of the saddles will require a set screw.

Figure 8.15 shows the completed mast plate assembly.

FIG. 8.10

FIG. 8.11

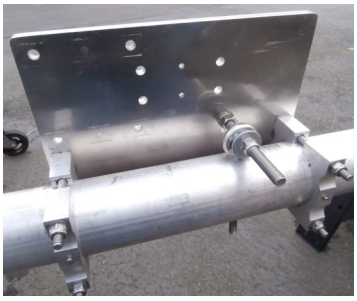


FIG. 8.12

FIG. 8.13

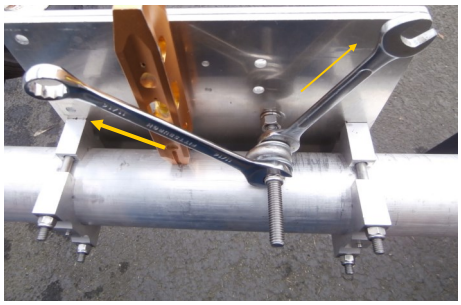
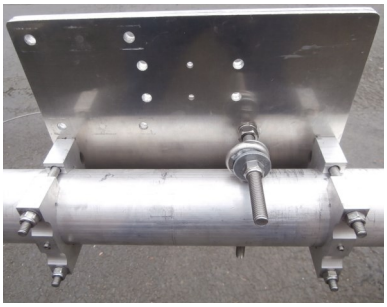


FIG. 8.14

FIG. 8.15

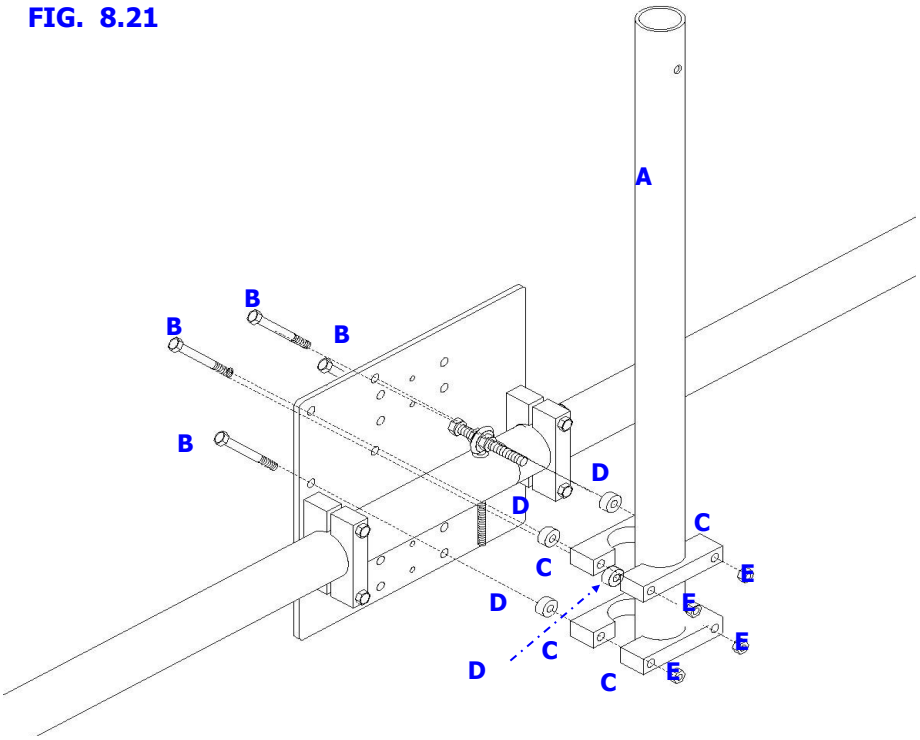


ATTACH THE TRUSS MAST

Review figure 8.21. Insert four of the 5/16" x 4" hex head bolts (PN 60-0066) so the threads of the bolts are on the boom side of the mast plate as shown in figure 8.22. Insert the first half of the 1-3/4" aluminum saddle (PN 10-1601-03) as shown in figure 8.23. Position the truss support mast (PN 10-1614-41) so that it is resting on the aluminum saddle, then slide the other half of the saddle onto the hex head bolts. Thread on the 5/16" Nylock nuts (PN 60-0046) for the left side of the saddles (when facing the boom), as shown in figure 8.24. The hex head bolts on the left side of the saddles (circled in yellow) are used to install the connector junction box. .

Install the connector junction box on the saddles so that the lid of the junction box opens from the bottom as shown in figure 8.25. Note that there are more details on the connector junction box installation in Chapter Eleven. Holding the connector junction box in place, insert the 5/16" Nylock nuts onto the hex head bolts and tighten, but leave loose enough so you can align the truss support mast in the next step.

FIG. 8.21



Key	QTY	Part #	Description
A	1	10-1618-41	48" Boom truss support mast
B	4	60-0066	5/16" x 4" Hex head bolt
C	4	10-1601-03	1-3/4" Aluminum saddle half
D	4	10-1613-11	1/4" aluminum spacer
E	4	60-0046	5/16" Nylock nut

FIG. 8.22

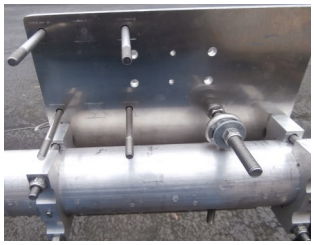


FIG. 8.23

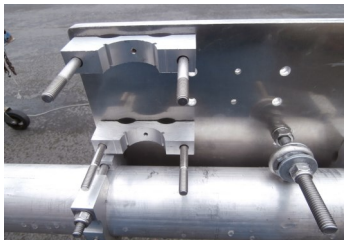


FIG. 8.24

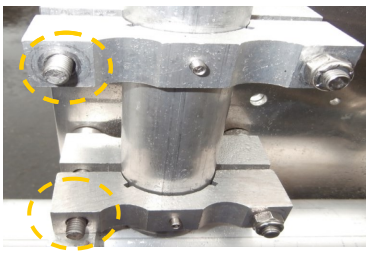
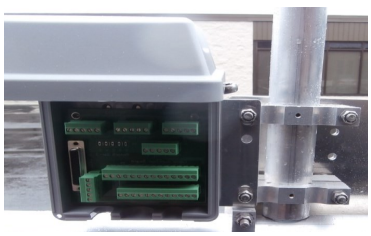


FIG. 8.25



ATTACH THE TRUSS MAST PLATE TO THE TRUSS MAST

The double truss system provides vertical loading support, as well as side-to-side support. There are two components that make up the framework of the system, the 48 inch truss mast, which was installed in the prior step, and the 36" truss boom. It is critical that the that the truss boom be mounted perpendicular to the antenna boom with the location on the side of the truss mast that will place the truss boom above the antenna mast as shown in figure 8.30. This allows the truss system to be balanced.

The best way to install the truss mast plate on the truss mast, is to loosely attach the saddles and then slide the mast plate onto the mast. Locate the truss mast plate (PN 10-1021-43). Insert four 5/16" x 3-1/4" hex head bolts (PN 60-0075) and attach one half of the 1.75" aluminum saddles (PN 10-1601-03) and insert the 5/16" x 3-1/4" hex head bolts as shown in figure 8.31. Attach the other half of the saddles onto the bolts and loosely thread on the 5/16" Nylock nuts (PN 60-0046) as shown in figure 8.32.

Slide the loose saddles over the truss mast so that the top edge of the plate is level with the top edge of the pipe as shown in figure 8.33. Tighten the saddles evenly, so that the gap between the two saddles is the same on each side. Be sure to install the set screws and tighten them as shown in figure 8.33 and .

FIG. 8.30

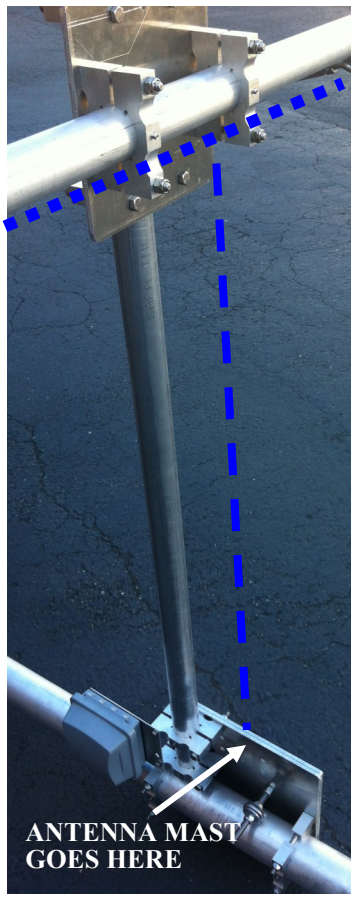
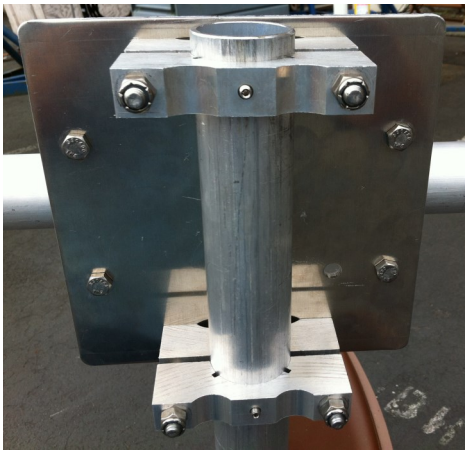


FIG. 8.31

FIG. 8.32

FIG. 8.33



ATTACH THE TRUSS BOOM TO THE TRUSS MAST PLATE

Measure and mark the centerpoint of both the truss boom (PN 10-1618-21) and the truss boom mast plate as shown in figure 8.40. The centerpoint of the truss boom will be 18 inches and the centerpoint of the truss mast plate will be 4 inches.

Attach one half of the 1.75" aluminum saddles (PN 10-1601-03) and insert the 5/16" x 3-1/4" hex head bolts as shown in figure 8.40. Attach the other half of the saddles onto the bolts and loosely thread on the 5/16" Nylock nuts (PN 60-0046) as shown in figure 8.41.

Slide the truss boom through the saddles, taking care to align the centerpoint measurements with each other as shown in figure 8.42. Rotate the truss mast boom so that the holes on the ends are pointing downward. These holes are used for installing eyebolts in the next step. Be sure to measure the distance from each end of the boom to the centerpoint of the mast to ensure accuracy. Tighten firmly. Now install and tighten the 10-32 set screws (PN 60-0112) into the exposed truss boom saddle threaded holes. See figure 8.42.

Figure 8.43 and figure 8.44 shows the completed truss mast plate assembly.

FIG. 8.40

FIG. 8.41

FIG. 8.42

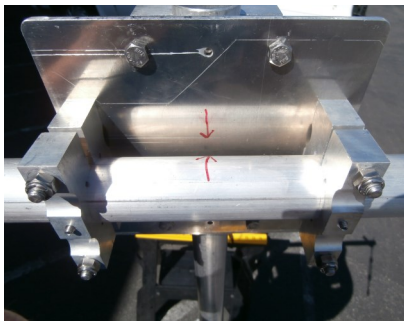


FIG. 8.43

FIG. 8.44

PHILLYSTRAN BOOM TRUSS ATTACHMENT POINTS

Install the eyebolts on each side of the truss boom. The 3/8" x 2.5" eyebolts (PN 60-0151) come with a standard nut and flat washer, you will need to remove these and use the provided 3/8" Nylock nut (PN 60-0050) instead as shown in figure 8.50. Apply anti-seize to the bolt and tighten the Nylock nut firmly onto the truss boom as shown in figure 8.51.

Each turnbuckle assembly consists of two 6 inch turnbuckles (PN 60-0070), one 3/8" x 1-3/4" stainless steel hex head bolt (PN 60-0152), a 3/8" Nylock nut (PN 60-0050) and two 7/16" galvanized flat washers (PN 60-0144). The flat washers are 7/16" so that they will completely cover the ends of the turnbuckles during the tightening process. Be sure that each of the flat washers are on the outside of the appropriate eyebolt as shown in figure 8.52.

Figure 8.52 shows the proper sequence for attaching the turnbuckles to the eyebolt. Be sure to apply anti-seize to the 3/8" bolt before tightening. Tighten snugly but loose enough for the turnbuckles to move.

Repeat for the other side of the truss boom. Figure 8.53 shows the completed truss turnbuckle assembly.

FIG. 8.50

FIG. 8.51

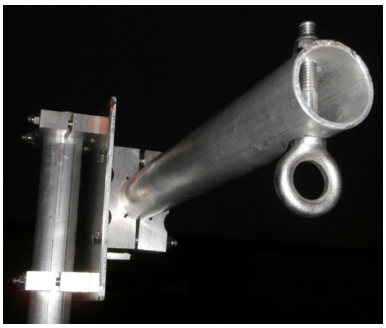


FIG. 8.52

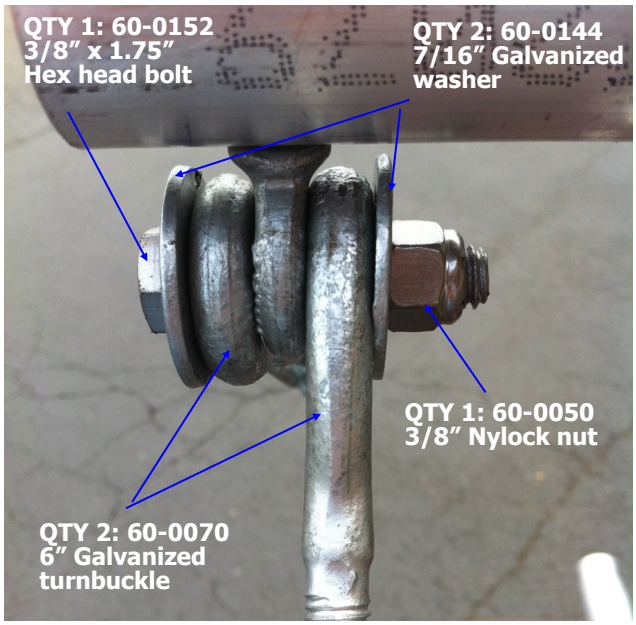


FIG. 8.53

PHILLYSTRAN BOOM TRUSS ATTACHMENT POINTS (continued)

The Phillystran truss material used for the DB42 truss is the HPTG 2100I, which has a break strength of 2100 lb. This material is 0.22 inch OD, and is an ideal truss material. When installing the Phillystran on the DB42 Yagi, you will want to start from the truss attachment plates on the outside ends of the boom first, and then complete the process by attaching the other end to eyebolts located on the truss mast boom.

Locate the two identical truss attachment plates (PN 10-1607-11). These will be used along with two 2" aluminum saddle halves (PN 10-1601-22), two 5/16" x 3-1/2" hex head bolt (PN 60-0065), and two 5/16" Nylock nuts (PN 60-0046). Figure 8.54 shows the configuration of the parts used for this assembly.

You will have already marked the placement of the saddles in chapter one. The placement of the truss attachment plates are located in between the two boom bolts that hold the 2" and 1.75" sections of the boom together as shown in figure 8.55. The boom is double walled at this point of attachment, which limits flexing of the boom under loading situations.

Before threading on the Nylock nuts, be sure to apply anti-seize to the bolts. Be sure the attachment plate is level in relation to the boom before tightening as shown in figure 8.56. Tighten firmly and repeat these steps for the attachment plate on the other side of the boom.

Locate the 3/16" galvanized thimbles (PN 60-0048) and pry the end apart so that it will slide over the truss attachment plate. We have found using pliers and lock grips tends to minimize both damage to the thimble, as well as damage to the fingers! Figure 8.57 shows this method. Regardless of how you choose to pry the thimbles apart, be careful not to damage them—the Phillystran must fit into the channel of the thimbles around its entire area. When the thimble is attached, be sure to bend the ends back so that it cannot fall off, as shown in figure 8.58.

FIG. 8.54

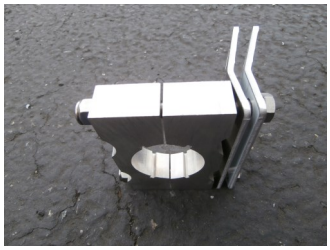
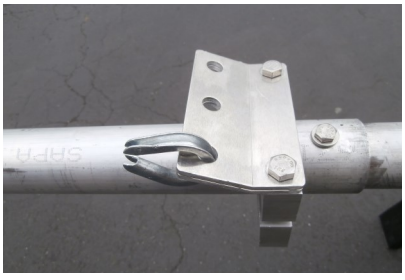


FIG. 8.55

FIG. 8.56

FIG. 8.57

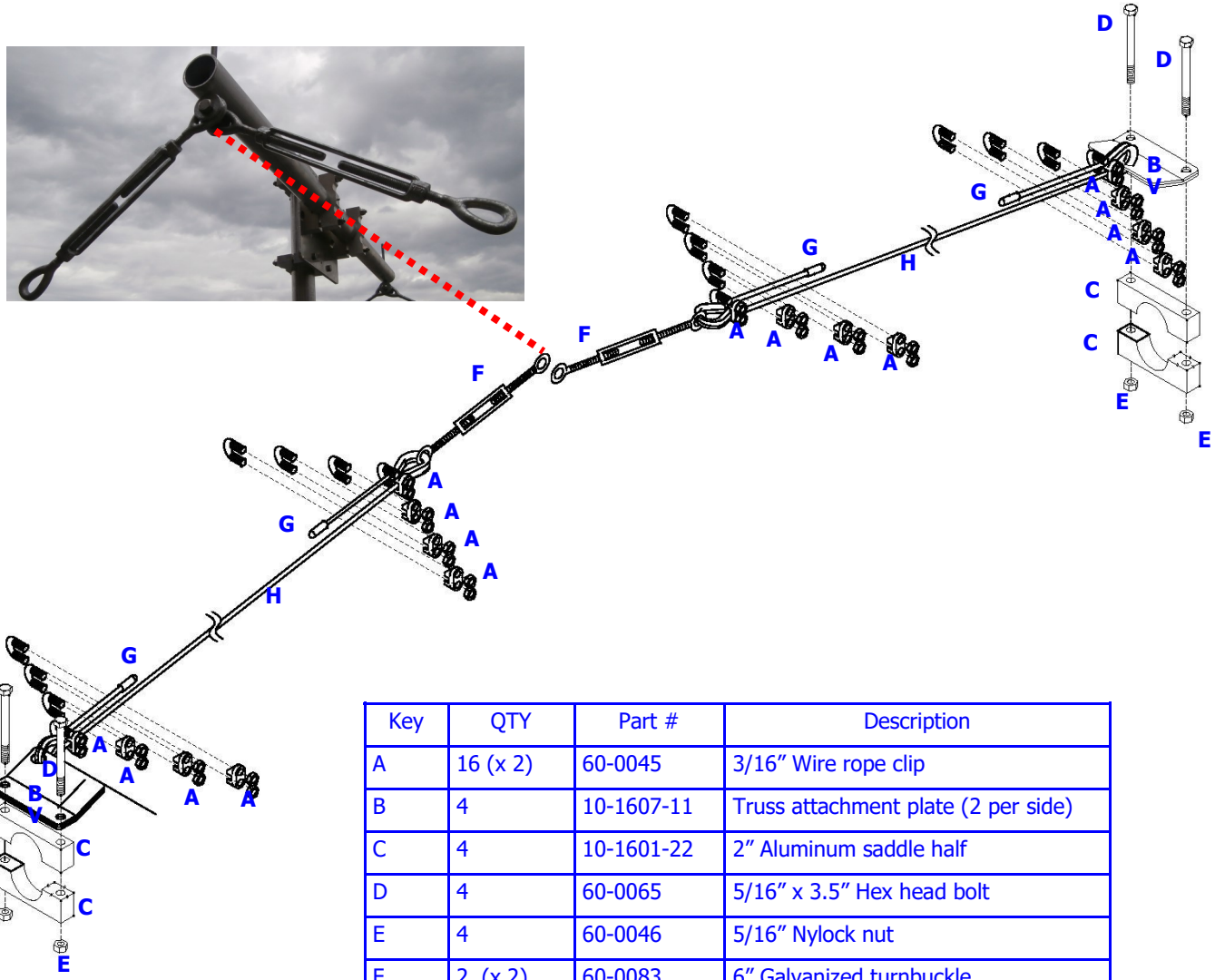
FIG. 8.58



PHILLYSTRAN BOOM TRUSS ASSEMBLY

Figure 8.60 is an explosion drawing for the Phillystran double truss and will come in handy while working through the next section. The parts explosion is representative of a single truss, so on some of the items there will be two sets of a particular quantity of parts. Whenever this occurs, you will see an (x 2) in the quantity column of the table below.

FIG. 8.60



Key	QTY	Part #	Description
A	16 (x 2)	60-0045	3/16” Wire rope clip
B	4	10-1607-11	Truss attachment plate (2 per side)
C	4	10-1601-22	2” Aluminum saddle half
D	4	60-0065	5/16” x 3.5” Hex head bolt
E	4	60-0046	5/16” Nylock nut
F	2 (x 2)	60-0083	6” Galvanized turnbuckle
G	4 (x 2)	60-0044	Phillystran end cap
H	78 ft	21-8002	Phillystran 2100I (trim as you go)

PHILLYSTRAN BOOM TRUSS ASSEMBLY (continued)

When securing the Phillystran truss cable, the rule of "don't saddle a dead horse" applies. You must be certain that the saddle portion of the wire clip is on the longer or "live" side of the Phillystran, and the U-bolt section is on the "dead" or (short) side of the Phillystran. Because of this, how you thread the Phillystran through the thimble is important.

When preparing the Phillystran truss, you will need to bring the Phillystran from below the thimble as shown in figure 8.61. Loop the Phillystran around the thimble until approximately 8" of the Phillystran is on the "dead" side as shown in figure 8.62.

Position the first of the four wire clips (PN 60-0045) so that the wire clip is as close to the thimble as possible, as shown in figure 8.63. Again, be sure that the U-bolt portion of the wire clip is on the "dead" side, and the saddle portion is on the "live" side. Tighten the wire clips, alternating between each nut so that the tightening force is evenly distributed. Hold each portion of the Phillystran in place while tightening, to ensure that a good mate is formed between the two cables. Wait 20 minutes and tighten some more, as cold-flow of the plastic usually occurs. Position the next wire clip approximately 1 inch behind the first wire clip and tighten accordingly. Repeat with the remainder of the wire clips as shown in figure 8.64.

Locate the plastic end cap (PN 60-0044) and push it onto the end of the Phillystran as shown in figure 8.65. The cap will be difficult to slide on. An easy way to accomplish this is to heat the cap slightly with the heat gun—it will slide on easier, but take care not to melt your plastic cap (or your fingers). Secure the Phillystran pieces at the end of the wire clips with electrical tape as shown in figure 8.65.

FIG. 8.61

FIG. 8.62

FIG. 8.63

FIG. 8.64

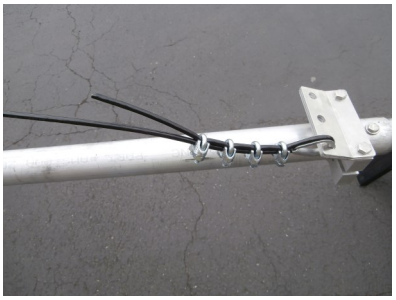


FIG. 8.65

PHILLYSTRAN BOOM TRUSS ASSEMBLY

When attaching the Phillystran truss material to the turnbuckle located on the truss boom, the rule of "don't saddle a dead horse" still applies. You must be certain that the saddle portion of the wire clip is on the longer or "live" side of the Phillystran, and the U-bolt section is on the "dead" or (short) side of the Phillystran. Locate the 3/16" galvanized thimbles (PN 60-0048) and pry the end apart so that it will slide over the eye portion of the turnbuckle. When the thimble is attached, be sure to bend the ends back so that it cannot fall off. Unwind the turnbuckle so that approximately 1 inch of threads are still inside the frame, as shown in figure 8.66. The slack is needed so that you can appropriately tighten the Phillystran once secured to the turnbuckle.

When preparing the Phillystran truss, you will need to bring the Phillystran from below the thimble as shown in figure 8.67. Loop the Phillystran around the thimble until the Phillystran is as tight as possible. Leave approximately 8" of the Phillystran on the "dead" side as shown in figure 8.68 and trim with a utility knife.

While holding the Phillystran so that it remains tight, position the first of the four wire clips (PN 60-0045) so that the wire clip is as close to the thimble as possible. Tighten the wire clips, alternating between each nut so that the tightening force is evenly distributed. Hold each portion of the Phillystran in place while tightening, to ensure that a good mate is formed between the two cables. Wait 20 minutes and tighten some more, as cold-flow of the plastic usually occurs. Position the next wire clip approximately 1 inch behind the first wire clip and tighten accordingly as shown in figure 8.69. Repeat with the remainder of the wire clips as shown in figure 8.70.

Locate the plastic end cap (PN 60-0044) and push it onto the end of the Phillystran as shown in figure XX. The cap will be difficult to slide on. An easy way to accomplish this is to heat the cap slightly with the heat gun—it will slide on easier, but take care not to melt your plastic cap (or your fingers). Secure the Phillystran pieces at the end of the wire clips with electrical tape as shown in figure 8.71.

Repeat the process of attaching the Phillystran to the truss attachment plate and the turnbuckles for the remaining 3 portions of the boom truss. When all of the Phillystran is secured, the boom can be leveled.

FIG. 8.66

FIG. 8.67

FIG. 8.68

FIG. 8.69

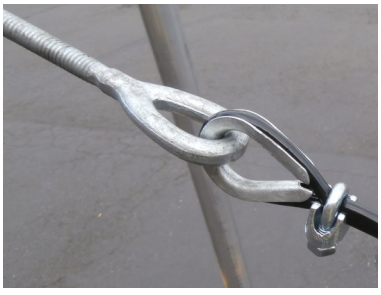


FIG. 8.70

FIG. 8.71

PHILLYSTRAN BOOM TRUSS ASSEMBLY (continued)

When leveling the boom, it is important to place the level at the correct place on the boom. We recommend placing the edge of the level at the edge of the boom transition between the 2.25" section and the 2" section as shown in figure 8.71. Arrange the sawhorses so that they are supporting the 3" boom section only, so that the rest of the boom is suspended by the trusses.

Using two adjustable wrenches, tighten each of the turnbuckles while holding the eye portion of the turnbuckle from moving so that the Phillystran does not "wind up" as shown in figure 8.72. Repeat the process for each truss portion until the boom is level. Monitor your boom level at the ends of the boom as you adjust, to ensure that you don't raise the boom beyond level at the tips.

When the boom has been leveled, it is necessary to secure the turnbuckles so that they cannot work loose. Using some galvanized, stainless steel wire, or leftover Phillystran, insert the end through the eyebolt, then through the body of the turnbuckle, and then through the eyebolt on the other end. Insert back through the body, and then back through the original eyebolt hole as shown in figure 8.73. Secure with electrical tape. This is required to "lock" the turnbuckles from accidentally loosening up.

Figure 8.74 and figure 8.75 show the completed Phillystran truss ends. (without the locking wire)

FIG. 8.71

FIG. 8.72

FIG. 8.73

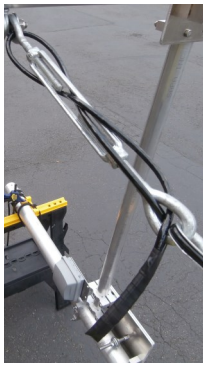


FIG. 8.74

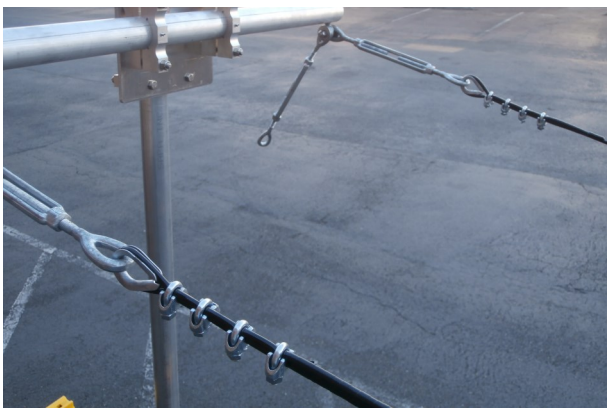


FIG. 8.75

MOUNTING THE 6M PASSIVE ELEMENTS

While the DB42 has a 5 element 6m Yagi that is standard, the spacing is a bit wide so gain is compromised and there is reduced front-to-rear. For the average 6m user, this configuration works just fine, with gain of 5.0dBi and front-to-rear of 14dB. Adding the aluminum fixed length 6m passive elements creates a formidable 8 element Yagi, with gain of 14dBi and front-to-rear of 25dB. As with any fixed length element, there is a limit to the effective frequency range— you can expect the 6m passive elements to function well in 50.00 MHz to 50.400 MHz frequency range, but there will be no 180 degree or bi-directional mode for the DB42 when operating on 6m. In addition, you will need to rotate it like a traditional Yagi for this band only.

There are three passive elements that function as directors (D1A, D2A and D3A), each are a different overall length. Each passive element consists of three sections of polished aluminum—a single 58" long x 1/2" OD center piece with plastic insulator, and two 36" long x 3/8 OD sections that telescope into each side of the 1/2" OD aluminum. The 1/2" aluminum has slotted ends, so that a stainless steel hose clamp can secure the two sections firmly together. Using a measuring tape as shown in figure 9.02, measure the 3/8" aluminum pieces and mark with a permanent ink pen the length required for the 6m passive element (D1A, D2A or D3A) as shown in figure 9.01.

Telescope the 3/8" aluminum sections into each end of the 1/2" aluminum section. Place the stainless steel hose clamps (PN 60-6000-60) over the slotted portion of the joint as shown in figure 9.03. Tighten enough to hold the pieces in place but loose enough to adjust if needed. Measure the overall length of the 6m passive element (D1A, D2A or D3A) as shown in figure 9.04. If the element is the required length, tighten the stainless steel hose clamp firmly on each side.

FIG. 9.01

6m Passive element	Total Element length	3/8" Aluminum length to reach total length (per side)
D1A	110.5 inch	26.25 inch (26-1/4")
D2A	108.25 inch	25.125 inch (25-1/8")
D3A	106.125 inch	24.06 inch (24-1/16")

FIG. 9.02

FIG. 9.03

FIG. 9.04

ATTACH THE 6M PASSIVE ELEMENTS TO THE BOOM

Locate the 6m mounting plate (PN 10-1019-31). Using the 1 inch U-bolts (PN 60-0001) as shown in figure 9.05, place the 6m passive element on top of the 6m mounting plate with the slit in the plastic sleeve pointing downward as shown in figure 9.06. Position the plastic insulator so that it is centered between the two U-bolts. Tighten using the 1/4" Nylock nuts (PN 60-0030). Be careful not to over-tighten or you will crack the plastic insulator.

It is critical that each of the three 6m passive elements be placed in the same configuration, so that the center-to-center element spacing is correct. FOR EACH 6M PASSIVE ELEMENT, THE SIDE OF THE 6M MOUNTING PLATE THAT HAS THE BOLT HOLES, NEEDS TO FACE TOWARDS THE REFLECTOR EHU. Figure 9.08 shows a mounting detail drawing. Remember, center-to-center spacing is more important than any other measurement if you want your antenna to function as it should.

Refer to the measurements that were marked in chapter one, section 1.1. We have included the center-to-center lengths again here for your convenience as shown in figure 9.09. Refer to figure 9.09 for the correct size of aluminum saddle and 5/16" hex head bolts. Use the Nylock nuts (PN 60-0046) to tighten the 6m mounting plate enough to hold it in place, but loose enough you can move it. Level each passive element as shown in figure 9.07 and then tighten firmly in place. Secure set screw in bottom half of saddle. Repeat for remaining 6m passive elements.

FIG. 9.05

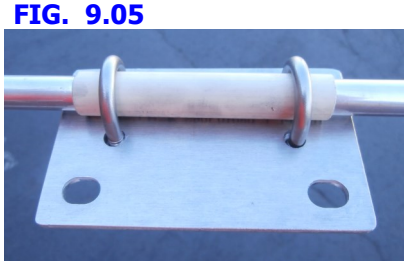


FIG. 9.06

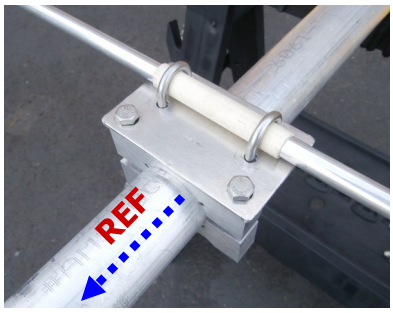


FIG. 9.07

FIG. 9.08

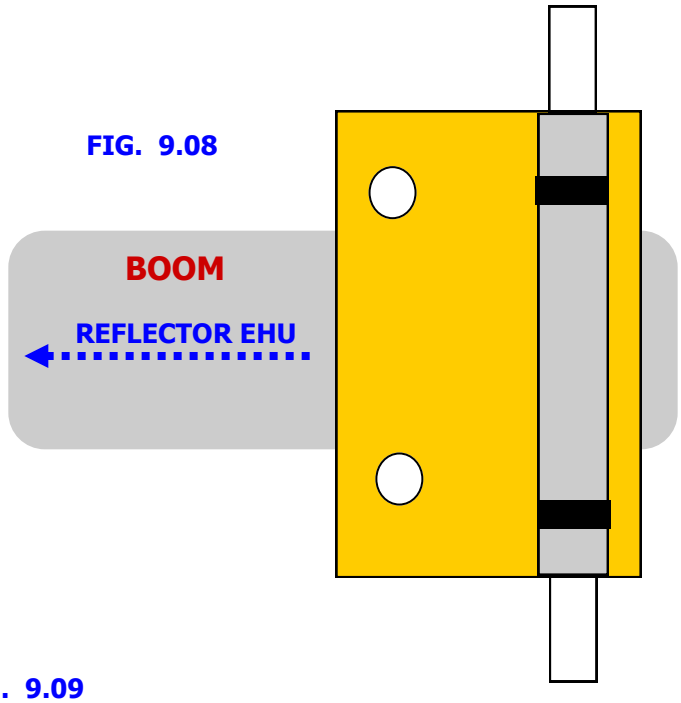


FIG. 9.09

6m Passive element	Center-to-center measurement Reflector EHU to 6m passive	Saddle Size	Hex head bolt length
D1A	117.5 inches	2 inch	5/16 x 3.25 inch
D2A	275.0 inches	3 inch	5/16 x 4.5 inch
D3A	432.0 inches	2 inch	5/16 x 3.25 inch

MOUNTING THE COAX SWITCH HOUSING ASSEMBLY

The DB42 Yagi offers high performance regardless of which band or direction the antenna is in. To do this, at any given time each EHU functions as a Driven element. This is accomplished by using a single feed line, and switching in and out each driven element using a relay. The coax switch housing is where the relays and the relay board are located.

The installation of the coax switch box is not difficult, but as with all wiring functions, it is critical that you take great care to ensure that the wiring is correct. Always make sure the electronic controller is completely disconnected from the control cable and the power is off while doing any wiring. Locate the coax switch mounting bracket (PN 10-1619-01). Use two 5/16" x 4-1/2" hex head bolt (PN 60-0115) and two 5/16" Nylock nuts (PN 60-0046) to connect to the boom using two 3" aluminum saddle halves (PN 10-1601-61) as shown in figure 10.01.

You should have already marked the location for the coax switch in Chapter One. Position the base portion of the coax switch box onto the mounting plate. Line up the two holes located on the inside of the aluminum case with the holes in the mounting plate as shown in figure 10.02. Insert two #10 x 5/8" machine screws (PN 60-01130) through the holes, Philips head positioned on top. Secure with two #10 Nylock nuts (PN 60-0019) as shown in figure 10.03 . A nut drive works well if you have one available. Be sure the coax switch is level before tightening. Do not forget to use a set screw on the exposed portion of the aluminum saddle. Figure 10.04 shows the mounted coax switch base.

Locate the 4 conductor control cable, it will be a single piece, 2 ft in length. Trim the cable jacket off (about 1-1/2" will suffice) and remove the foil. Be careful when removing the cable jacket—too much pressure can cause damage to the other wires. Trim the reinforcing thread so that you end up with a cable end that looks like figure 10.05. Only three of the four wires are used, along with the shield wire. The green wire needs to be trimmed as shown in figure 10.06. Use electrical tape to cover the end of the trimmed green wire, to ensure that there is no opportunity for an electrical short to occur. Figure 10.07 shows the completed control wire prep. It is not required, but you may want to tin the ends of the control cable, to prevent fraying of the copper strands.

FIG. 10.01

FIG. 10.02

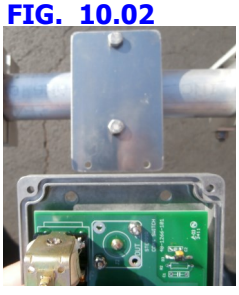


FIG. 10.03

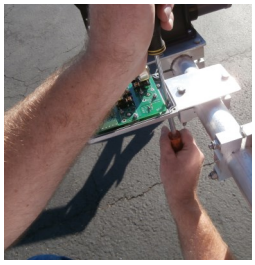


FIG. 10.04

FIG. 10.05

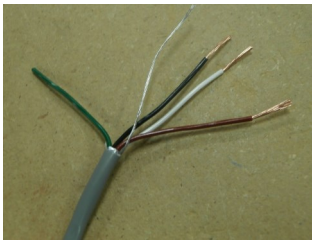


FIG. 10.06

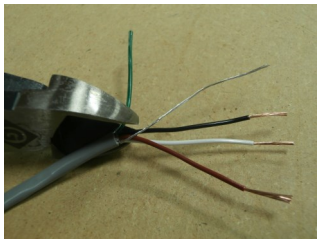
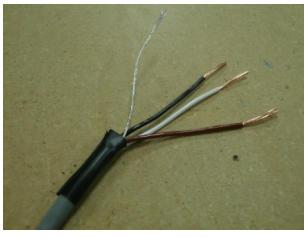


FIG. 10.07



COAX SWITCH WIRING

Figure 10.10 shows the wiring sequence for the coax switch. **BE CERTAIN TO NOT USE TERMINAL PIN R4 AS SHOWN IN** figure 10.11**.** This is the green that was cut off in the earlier step.

Always dip your bare copper wire ends into the provided connector protector before securing to the terminal connections. Insert wires as shown in figure 10.12.

Form a knot in the control cable as shown in figure 10.13. This will serve nicely as a strain relief. Be careful not to over-stress the control cable while forming your knot. Additionally, a tie wrap works well.

FIG. 10.10

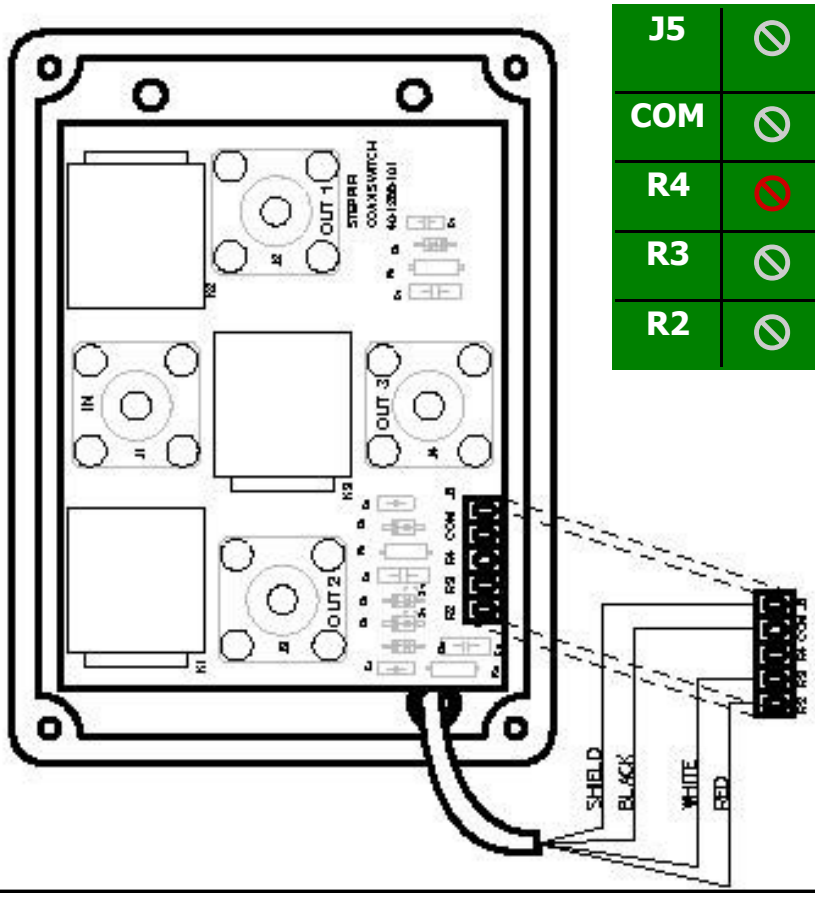


FIG. 10.11

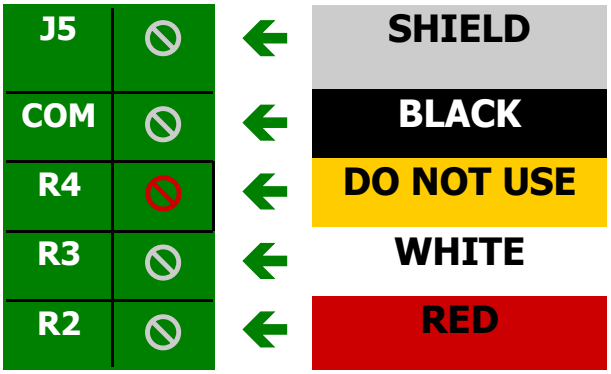


FIG. 10.12

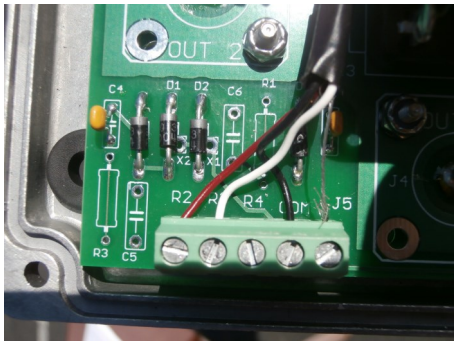
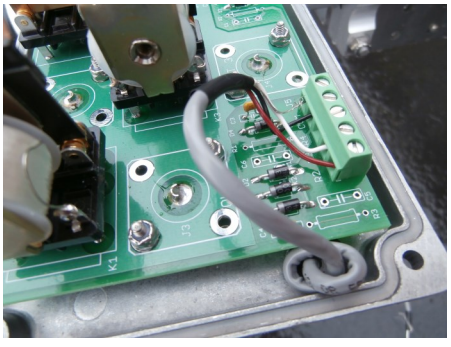


FIG. 10.13



SEALING & SECURING THE COAX SWITCH HOUSING

Locate the small plastic bag that contains the enclosure gasket and the screws used for securing it as shown in figure 10.20. Inside this baggie there will also be two tiny 1/4" screws—these will not be used.

The gasket is more accurately described as "piping" material. Push this material into the gasket tray as shown in figure 10.21. There is plenty of material, and you will need to trim it as shown in figure 10.22.

Lower the top half of the enclosure and position so that the mounting holes are lined up as shown in figure 10.23. Locate the flathead threaded screws included in the plastic baggie. The screws will be inserted from the bottom of the housing as shown in figure 10.24. Tighten so that the lid is firmly in place.

You will likely need to take the lid off for the final wiring test, but leaving it in place is necessary in order to protect the components of the coax switch housing while completing assembly of the antenna.

Figure 10.25 shows the completed coax switch housing.

FIG. 10.20

FIG. 10.21

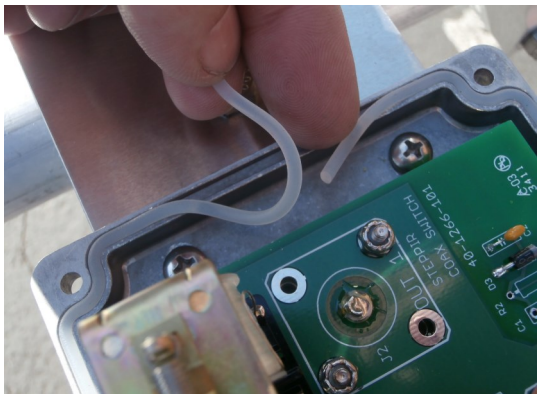


FIG. 10.22

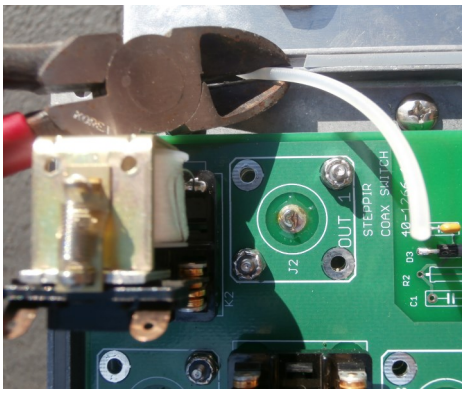


FIG. 10.23

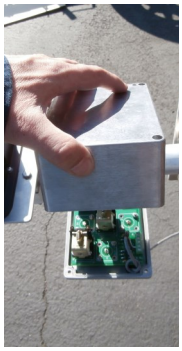


FIG. 10.24

FIG. 10.25

ATTACH THE COAX JUMPERS & FEED LINE

Figure 10.30 shows the coax switch housing with the appropriate coax connections. The table in figure 10.31 identifies the orientation of the feedline and the three coax jumpers. Route the coax jumpers along the boom, being careful to avoid placement on sharp edges. Secure with electrical tape.

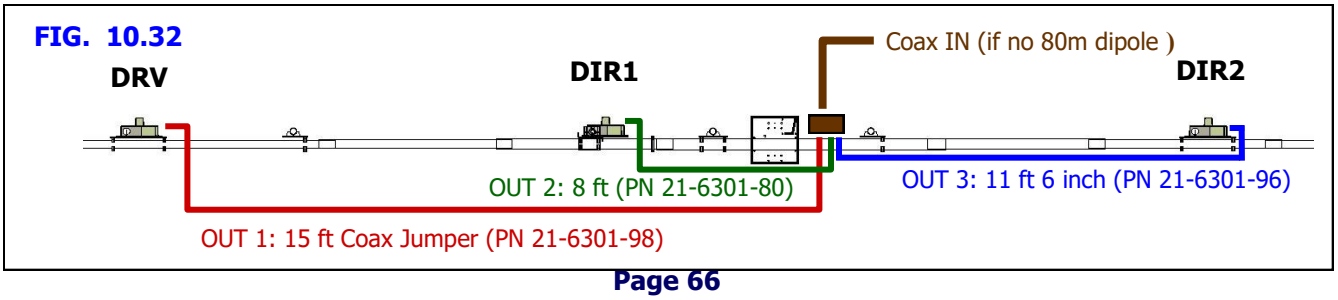
Taping of the coax jumpers and control cable to the boom should be one of the last items done before mounting the DB42 onto the mast. The coax jumpers will need to be disconnected during the wiring testing covered in Chapter .

Figure 10.32 shows how the coax jumpers should be routed to each EHU. NOTE: The drawing shows the coax jumpers as being below the boom—this is for illustration purposes only. The coax jumpers should be taped against the antenna boom. It is a good idea to label each coax jumper in case you ever need to remove them. As a last step we recommend waterproofing the PL259 connectors using the included coax-seal. It is a good idea to first put a layer of tape over the PL259's and apply the coax-seal over the tape for ease of removal, should it prove necessary. Do not do this step until the entire antenna has been tested and is ready to put up on the tower.

FIG. 10.30

COAX SWITCH SO239 CONNECTOR	FIG. 10.31 COAX PURPOSE	JUMPER LENGTH
IN	FEEDLINE FROM SHACK (feedline from 80m dipole switch box if this option is purchased)	NA
OUT 1	COAX JUMPER TO DRIVEN EHU	15 FT
OUT 2	COAX JUMPER TO DIRECTOR 1 EHU	8 FT
OUT 3	COAX JUMPER TO DIRECTOR 2 EHU	11 FT 6 IN

FIG. 10.32



MOUNT THE CONNECTOR JUNCTION BOX ONTO BOOM

The connector junction box is the "hub" for all wiring. It has a hinged cover, which allows for easy access inside. Having pluggable connections makes it much easier to access wiring. An added feature is the inclusion of a 25 pin female connector located on the inside of the connector junction box. This makes it convenient to do antenna testing at the install site, as opposed to having to go all the way inside the ham shack to access the electronic controller.

The connector junction box attaches to the saddle bolts used for mounting mast onto the mast plate as shown in figure 11.01. Position the junction box mounting plate onto the 5/16" hex head bolts and attach the 5/16" Nylock nuts. The hinged cover needs to open from the bottom, as shown in figure 11.02.

FIG. 11.01

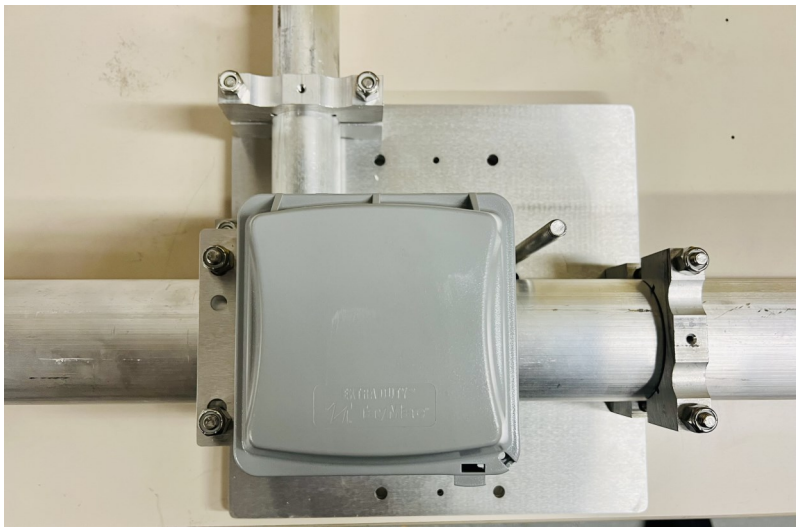


FIG. 11.02

WIRING THE CONNECTOR JUNCTION BOX

Every electrical function is routed through the connector junction box. There are six junction connections, each of which consists of a female header that is attached to the circuit board inside the box, and a male plug for each as shown in figure 11.10. When we ship the connector junction box, the plugs will already be attached to the female headers and will need to be removed for wiring as shown in figure 11.11. Figure 11.12 shows the connector junction box with the plugs removed.

The table in figure 11.13 identifies each of the connector junctions inside the connector junction box and provides notes for each connection. Note: The wiring drawings for Figure 11.14, 11.15 and 11.16 mentioned below, will follow this page. WARNING: The DB42 wiring is not straight through, the pins flip-flop so you must be extra careful to follow the wiring instructions.

Figure 11.14 shows detailed wiring information for each of the connector junctions inside the box. Be sure to dip each of the exposed wires into the included connector protector before inserting into the terminal strip inside the junction box. Figure 11.15 shows in detail the diagram for connecting the 24 wire control cable to the P1 and P2 plugs inside the junction box. Figure 11.16 shows in detail the diagram for connecting the control cable from the coax switch to the junction box. When connecting the wiring for J6 (coax switch housing), the green wire will need to be trimmed and taped in the same manner covered in Chapter Ten.

- When routing wires through the cover of the junction box, **DO NOT** seal around the wires. The channel is left open to allow any condensation collecting in the box to escape.
- Don't forget to relieve strain from your cables in the junction box. This can be done by using a zip tie on the inside of the box to prevent the cables from pulling out.
- Use dielectric grease (included in the box) to protect each bare conductor. Apply the grease to the plug/header connection as well.
- We recommend using a small zip tie through the hole next to the junction box's latch to keep it permanently closed. Do this **AFTER** final wiring and testing.

FIG. 11.10

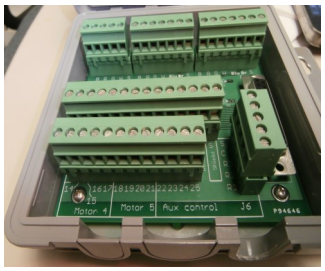


FIG. 11.11

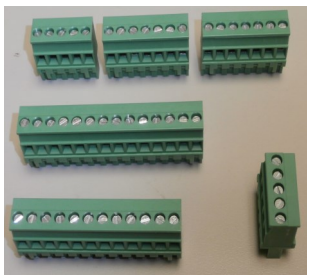
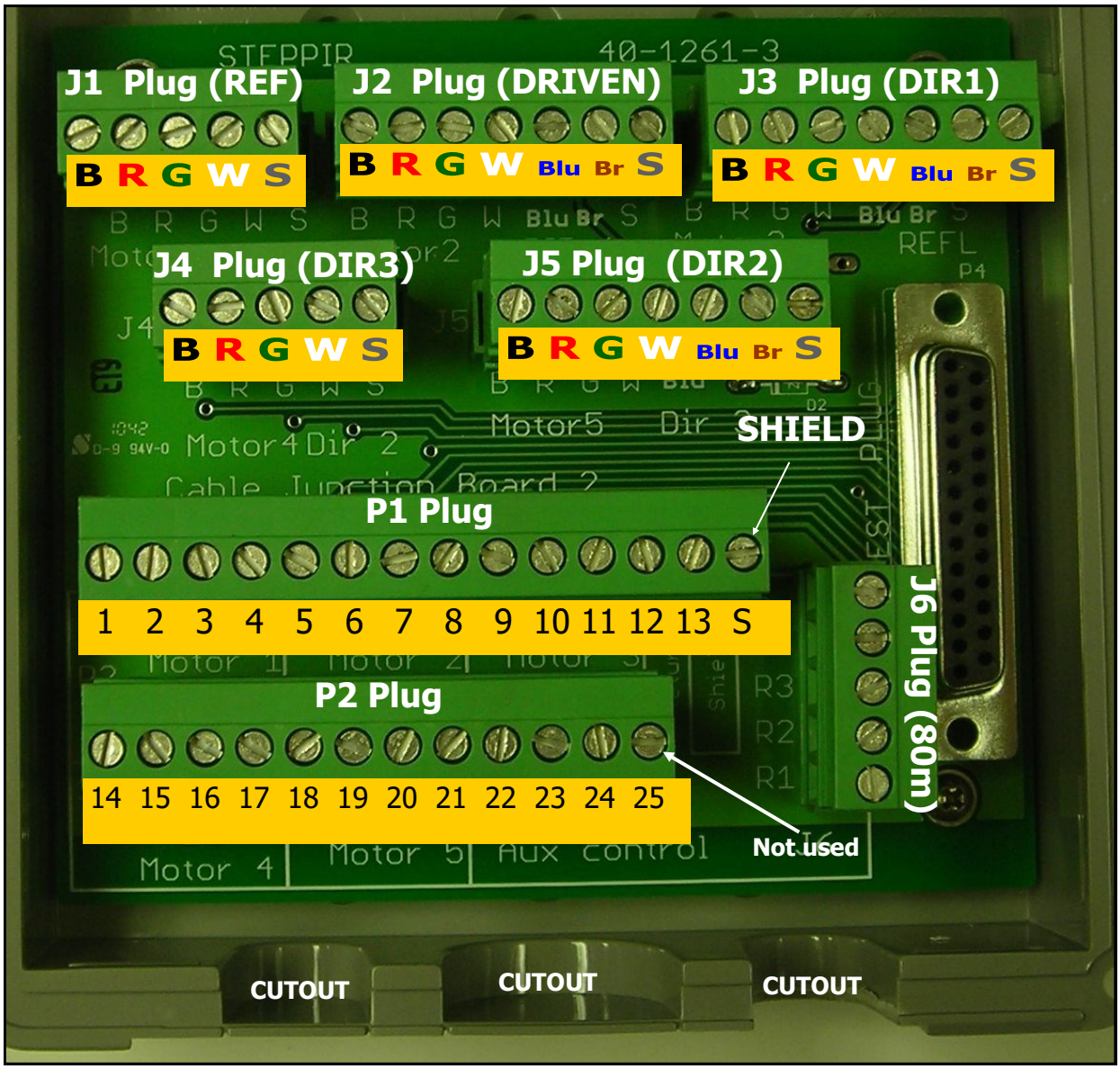


FIG. 11.12

ID	Cable Routed From:	Figure 11.13 Installation Notes
J1	REFLECTOR	4 wire control cable, plus shield wire (all wires used).
J2	DRIVEN	6 wire control cable, plus shield wire (all wires used).
J3	DIRECTOR 1	6 wire control cable, plus shield wire (all wires used).
J4	DIRECTOR 3	4 wire control cable, plus shield (all wires used)
J5	DIRECTOR 2	6 wire control cable, plus shield (all wires used)
P1	CONTROL CABLE FROM HAM SHACK	The first 13 wires of the 24 the conductor cable used (Pins 1-13), plus the shield wire.
P2	CONTROL CABLE FROM HAM SHACK	The remaining 11 wires of the 24 conductor cable used (Pins 14-24). Pin 25 is **NOT USED**.
J6	COAX SWITCH HOUSING	4 wire control cable; the green wire needs to be trimmed and taped; R1 is NOT USED. 3 total wires used, plus shield wire.

WIRING THE CONNECTOR JUNCTION BOX

FIG. 11.14



4 wire control cable key

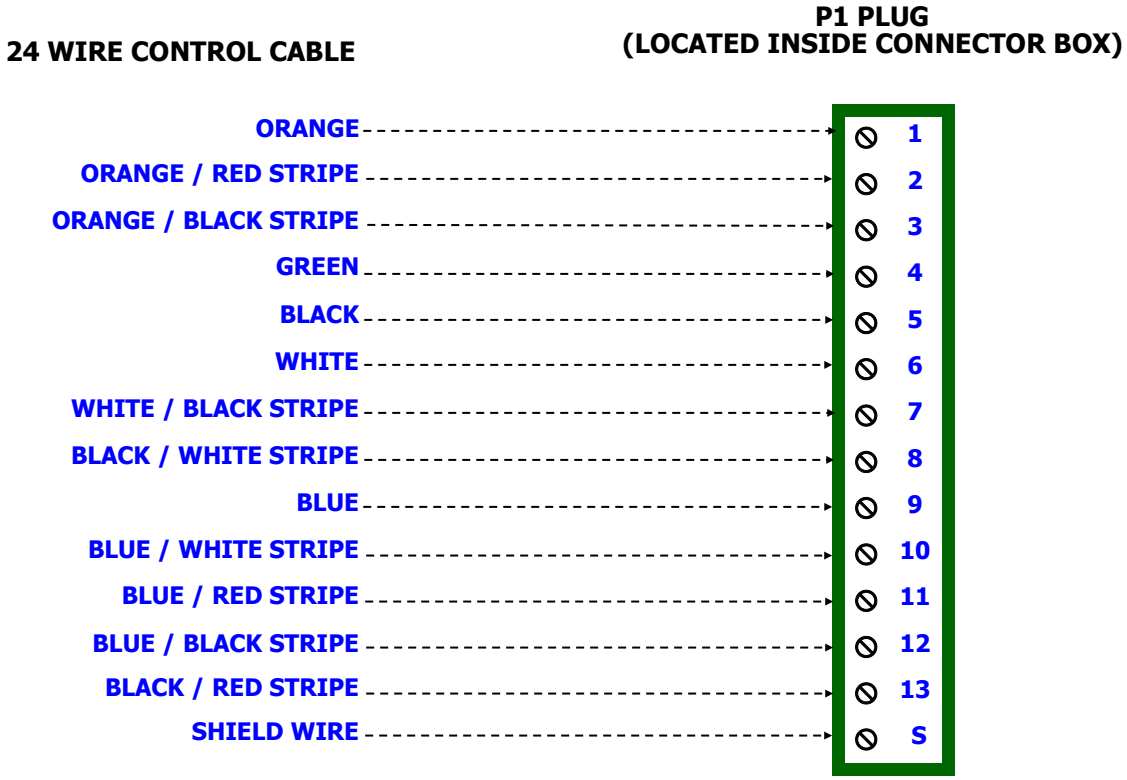
B	R	G	W	S
BLACK	RED	GREEN	WHITE	SHIELD

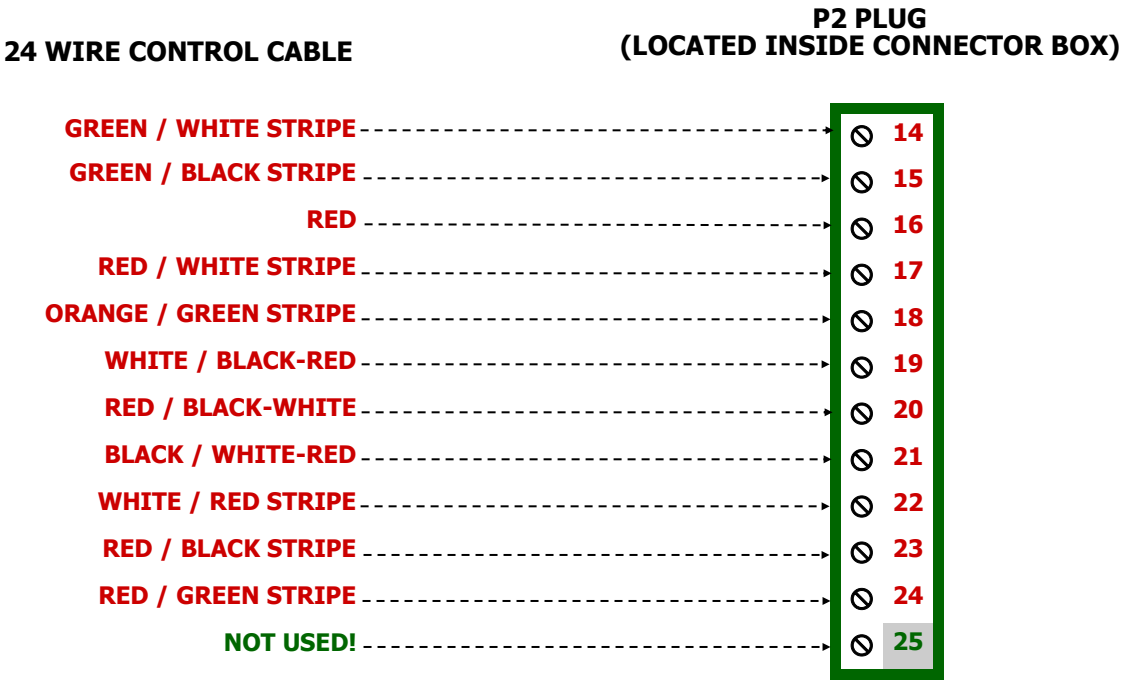
6 wire control cable key

B	R	G	W	Blu	Br	S
BLACK	RED	GREEN	WHITE	BLUE	BROWN	SHIELD

WIRING THE CONNECTOR JUNCTION BOX (continued)

FIG. 11.15



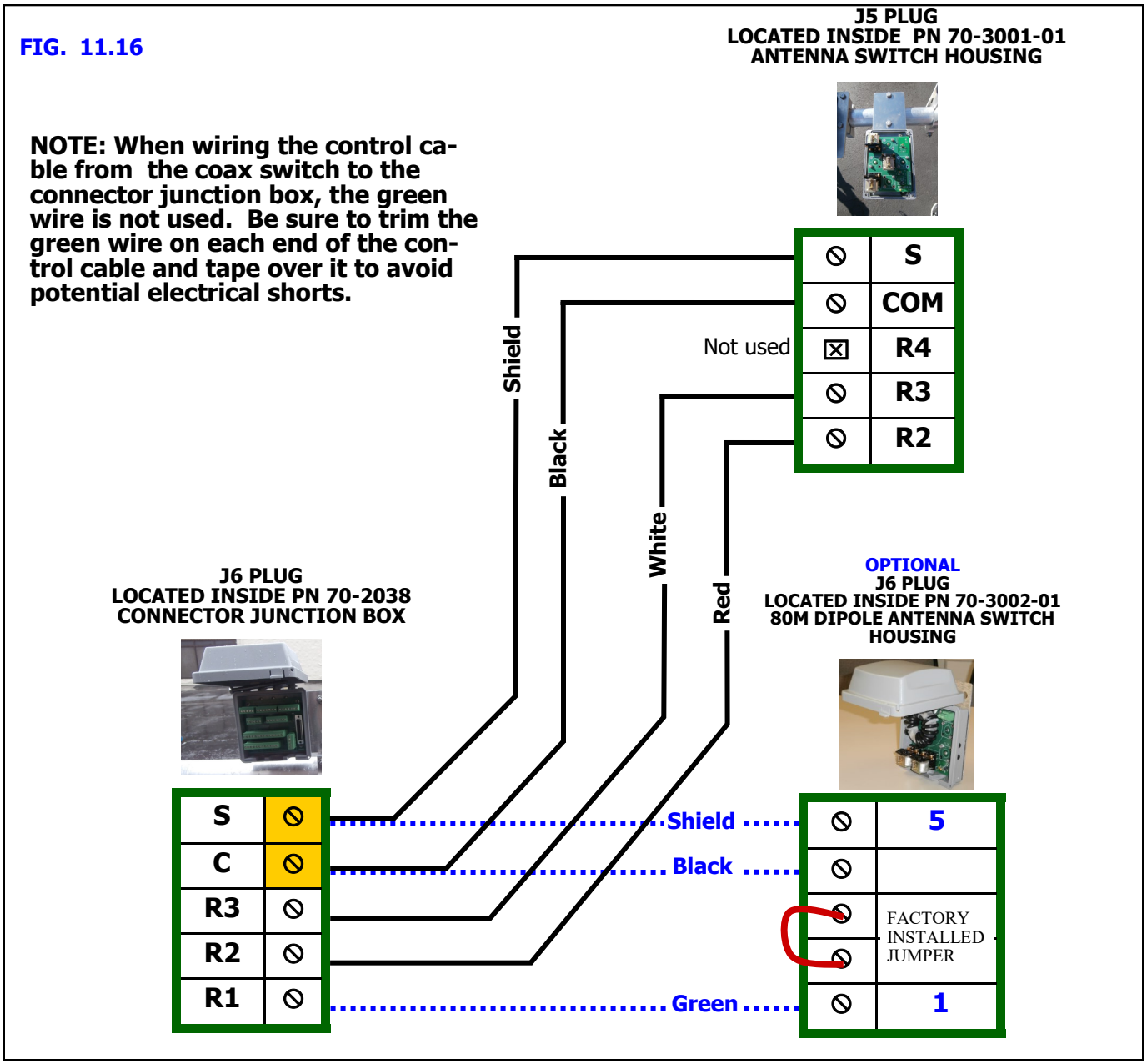


CONNECT CONTROL CABLE FROM COAX SWITCH TO JUNCTION BOX

If the 80m dipole option was purchased, terminal lug "S" and "C" on J6 (inside connector junction box) will have 2 wires being inserted into each lug. Be sure to twist these into a "pair" before inserting into the respective terminal lug (these lugs are highlighted in yellow).

Start your wiring at J6 plug inside the connector box; route the wiring from there to the antenna switch box and/or 80m dipole box. 5 ft of control wire is provided, which can either be coiled up or trimmed to size. Be sure to route the cable BEFORE cutting it to be sure you have enough. To avoid confusion in wiring, it is recommended that the wires of the 4 conductor control cable that are not used are trimmed back from the connections. Wires used going to J5 plug are: shield, black, white and red. Green is not used. For optional 80m dipole wires used are: shield, black and green. Red and white are not used. The factory installed jumper should be left untouched! Do not tin the ends of the wires.

FIG. 11.16



WIRING THE CONNECTOR JUNCTION BOX (continued)

PREPARING THE CONTROL CABLE

1. Strip the jacket and aluminum shielding off of the control cable as shown in figure 11.20, approximately 2.75" from end of control cable, being careful not to damage the individual wires.
2. Strip the plastic insulation off of each of the control cable wires, approximately 0.25" in length should be bare wire.

CONNECTING CONTROL CABLE TO THE DB25 FIELD SPLICE

The DB25 Field splice is used to connect the control cable from the antenna to the electronic controller.

1. Apply the provided dielectric grease to the exposed copper portion of each wire.
2. Connect each wire to the appropriate terminal and tighten using a flat head screwdriver. Note that the terminals may be closed by default. If so, turn the terminal screw counter-clockwise ~10 turns to open it before inserting the wires. Consult the table on the next page for the correct wiring sequence.
3. Position the control cable between the cable clamp halves as shown in figure 11.23.
4. Tighten the two pan head screws until the cable is snug, but do not over-tighten.
5. Thread the two thumb screws into the connector face as shown in figure 11.24.
6. Plug the DB25 splice into the back of the controller and twist the thumb-screws to secure it.

FIG. 11.20

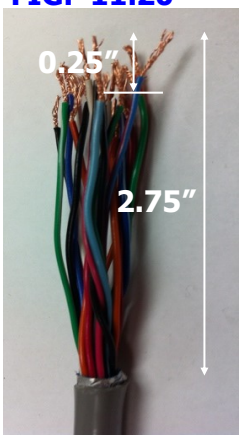


FIG. 11.23

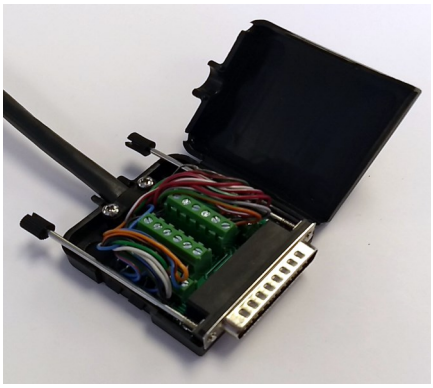
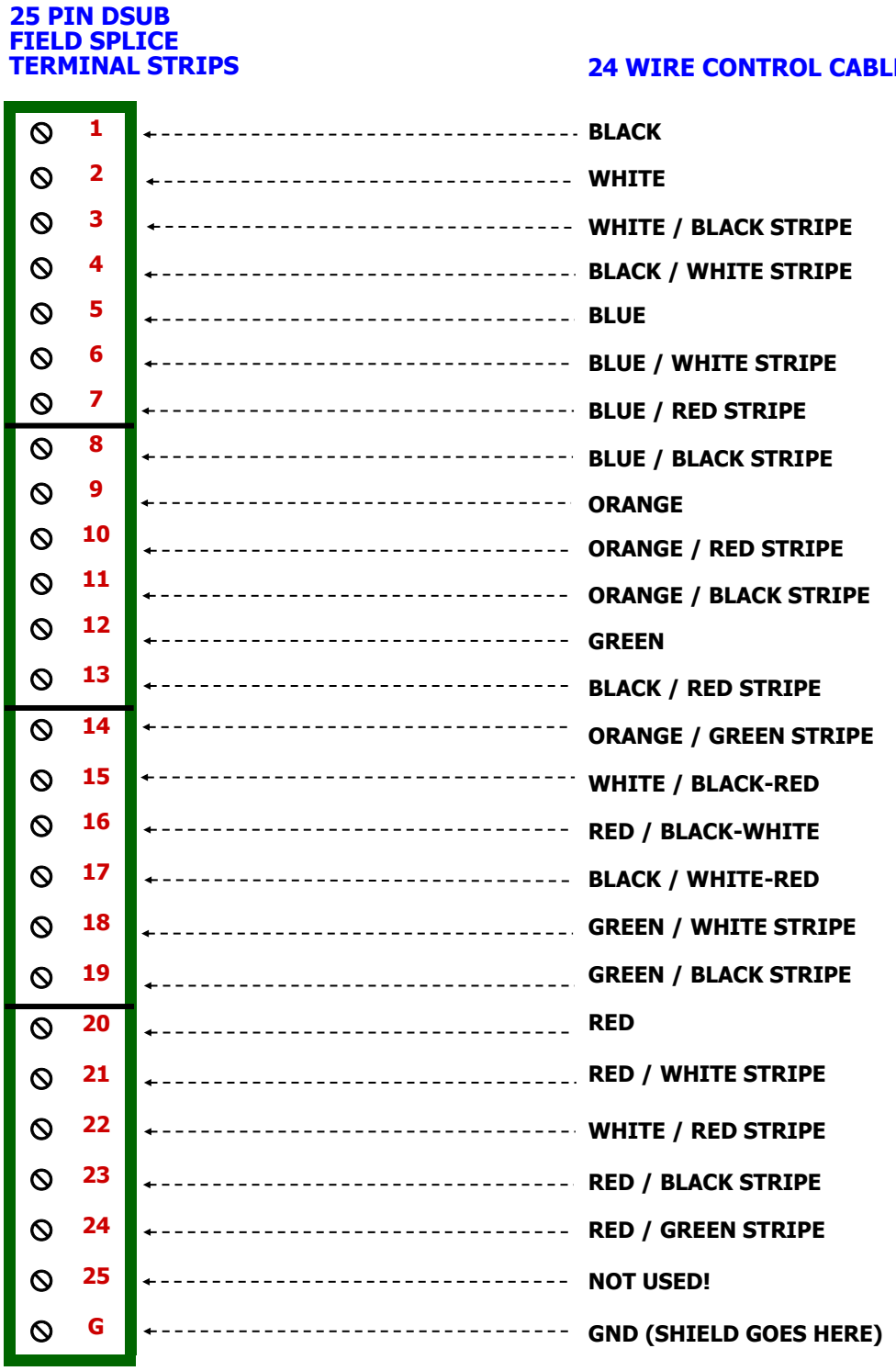


FIG. 11.24

WIRING THE CONNECTOR JUNCTION BOX (continued)

CONNECTING CONTROL CABLE TO DB25 FIELD SPLICE (continued)

FIG. 11.24



Note: If you are wiring the control cable yourself using a 25 pin connector and backshell instead of using the above dSub field splice, use the same pin numbers shown above. For the 25 pin connector installation, you would solder the ground wire to the case of the 25 pin connector and then put the backshell on.

CHAPTER ELEVEN
SECTION 11.3

WIRING THE CONNECTOR JUNCTION BOX (continued)

DB42 WIRING TEST

IMPORTANT: Before beginning these steps read through the SDA-100 Operators Manual so you are familiar with the operation of the controller. Then read through the following section before performing any of the steps below. You will also need an ohm meter to test for continuity. The jumper cables and fiberglass poles should not be installed on the antenna at this time.

1. With control cable NOT CONNECTED to the controller, turn the controller on. It should read "Elements Home" on the 2nd line. If not, push the retract button. After the tuning LED stops flashing the controller will turn off. Turn the controller back on and it should now read "Elements Home". The 1st line will say "Antenna Cable Open" anytime the controller goes to move an element with the control cable disconnected. Don't be alarmed by this as long as the elements move accordingly.
2. The next step is to extend the Driven, D1, and D2 elements.
3. Go into Setup mode and select "Create Modify" mode. Next CONNECT the control cable to the controller.
4. THE ELEMENTS WILL BE EXTENDED OUT OF EACH EHU LESS THAN 1'. MAKE SURE THE ENDS OF EACH EHU ARE CLEAR OF OBSTRUCTIONS
5. Select each element in turn and extend them to about 16" , as indicated by the controller LCD display. This will allow you to put the ohm meter probe on the copper elements during the tests. Each ehu should also correspond to the correct description on the controller. Driven is DRVN, Director 1 is DIR1, etc. If not, stop, disconnect the control cable, and recheck your wiring.
6. DISCONNECT the control cable BEFORE exiting "Create, Modify". This is to prevent the elements from moving when changing the controller to the first test frequency.
7. Set the controller to normal direction by selecting the button labeled "Normal", the green LED next to the button should light.
8. Set the controller frequency to any frequency in the 20m band.
9. When the Tuning LED stops flashing, RECONNECT the control cable.
10. Set the ohm meter to a low ohms scale (around 200 ohms or so) and check the resistance on each of the three "driven" elements (Driven, D1, D2) between the center conductor of the SO-239 and each of the two copper tapes. The Driven element should measure near a dead short, while D1 and D2 should measure open circuit. (or a very high value) Note that when an element is in the "driven" mode there will still be a dead short between the copper tapes, rest assured it is only a dead short at DC not RF frequencies. This is by design of the balun. This verifies that the Driven EHU element is selected to be the driven element for 20m Normal direction.
11. Next check the resistance between the two copper tapes on both D1 and D2, it should be very near a dead short. This verifies they are switched to be passive elements by the internal relays in the EHUs.
12. The next test is to verify the antenna switch has selected the proper coax line.
13. Using the ohm meter verify there is close to a dead short between the center conductor of the SO-239 labeled "IN" and the center conductor of the SO-239 labeled "OUT1". Verify that an open circuit exists between the "IN" connector and both "OUT2" and "OUT3" center pins. Also, there should be a dead short between "OUT2" and "OUT3" center pins and ground. (chassis)
14. If any of these tests fail check your wiring and correct any mistakes.
15. DISCONNECT the control cable.
16. Set controller to "180" direction (leave the frequency as it was on 20m) and wait for tuning to stop.
17. RECONNECT the control cable and repeat the above procedure except now D2 is the driven element and Driven and D1 are passives. D2 should now show continuity between the coax connector center pin and each of the two copper elements. Director 1 and Director 2 elements should not. As before check the elements that are passives for continuity between their two copper tapes.
18. The antenna switch box should now show a dead short between the "IN" connector center pin and the "OUT3"connector center pin. There should be an open circuit between "IN" and "OUT1" and "OUT2". Also there should be a dead short from each "OUT1" and "OUT2" to ground.
19. DISCONNECT the control cable from the back of the controller.
20. Set the controller to "NORMAL" direction and the frequency to anywhere in the 30m band, wait for the Tuning LED to stop.
21. RECONNECT control cable and repeat the previous procedures except now D1 is the driven element. There should be a short circuit between the center pin of the Director 1 coax connector and

WIRING TEST (continued)

each of the copper tapes. The Driven EHU should show a open circuit between the coax connector center pin and each of the copper tapes. Director 2 will show CONTINUITY between the coax center pin and each of the copper tapes. This is correct and ok since the EHU is disconnected by the coax switch box. The Driven EHU and Director 2 EHU will also show a dead short between each of their copper tapes.

22. The antenna switch box should now show a dead short between the "IN" connector center pin and the "OUT2"connector center pin. There should be an open circuit between "IN" and "OUT1" and "OUT3". Also "OUT1" and "OUT3" should each measure a dead short to ground.
23. If all these tests are good, DISCONNECT the control cable from the back of the controller. Push the "SETUP" button on the controller and select "RETRACT ELEMENTS" and choose "YES". Wait until the Tuning LED stops flashing.
24. RECONNECT the control cable. You should still be in "SETUP". Scroll through and select "Calibrate" and choose "YES". The copper tapes will now go back into the EHUs and you will hear a ratcheting sound for approximately 70 seconds. When finished the controller and antenna are now synchronized.
25. This concludes the test and verifies the antenna is wired correctly and all the relays operate properly.

80m Dipole:

DISCONNECT the control cable and set the controller to any frequency in the 80m band. Wait for tuning LED to stop flashing.

1. RECONNECT control cable and verify a dead short circuit between the center pin of the SO-239 labeled "IN" and the two pins of the terminal strip on the PCB board in the 80 m Dipole box (probe the tops of the screws on the green terminal strip). The center pin of the "IN" connector should show an OPEN circuit to the center pin of the "OUT" connector on the dipole box.
2. DISCONNECT the control cable. Set the controller frequency to 40m and wait for tuning to stop.
3. Verify there is now an open circuit between the center pin of the "IN" connector and the PCB mounted terminals (labeled 80m Dipole) pins.
4. Verify there is a dead short between the center pin of the "IN" connector and the "OUT" connector center pin on the 80m dipole box.
5. If the results of these tests are good, DISCONNECT the control cable. Push the "RETRACT" button on the controller. The controller will turn off when finished tuning.

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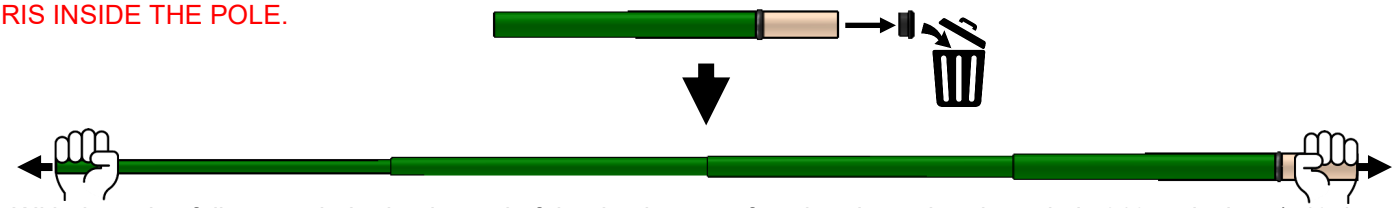
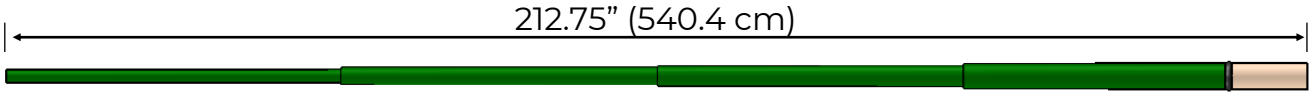
CHAPTER TWELVE
SECTION 12.0

PREPARING THE TELESCOPING POLES

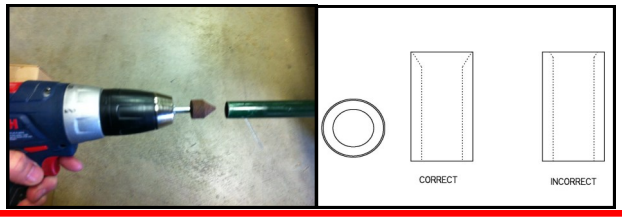
1. Extend the telescoping poles (PN 10-1013-02) to full length by firmly locking each section of the pole in place. A good methodology is to position each half of the joint so that they are several inches apart (while still within each other), and then pull quickly and firmly. Do this for each pole. There are rubber plugs inside the base section of each telescoping pole. These make it easier for handling, but they MUST BE REMOVED BEFORE ASSEMBLY. VERIFY THE FOAM INSERT IN THE PLUG HAS NOT MADE ITS WAY DOWN THE POLE AND THAT THERE IS NO OTHER FOREIGN DEBRIS INSIDE THE POLE.



2. With the poles fully extended, trim the end of the tip element of each pole so that the pole is 212.75 inches (540.4 cm) from the tip of the pole to the butt end, as shown below. ONLY trim the poles used for the 40/30 loops—if your antenna has 20m-6m straight elements, those should not be trimmed (must have a length of at least 213.1"). Use a hack saw, pipe cutter, or similar cutting blade that is suitable for fiberglass. Be sure that you cut the pole perpendicular to the length of the pole so that it is as "square" as possible.

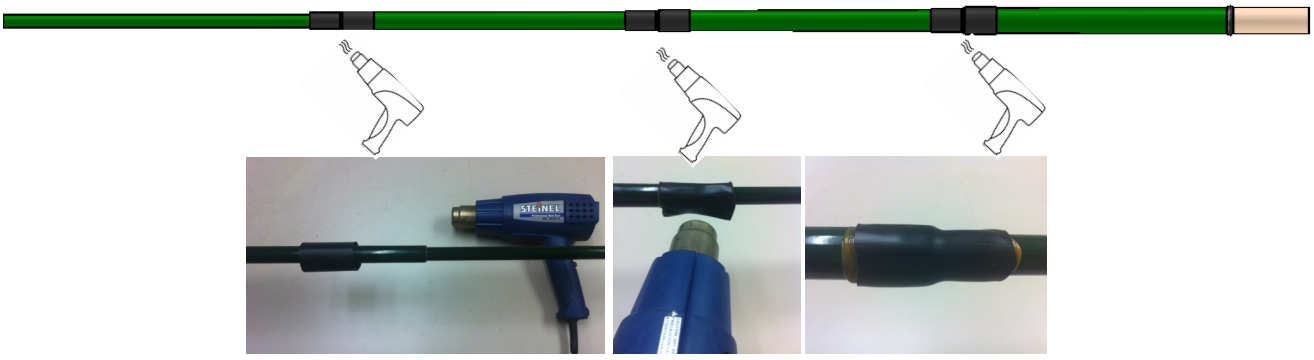


3. Using the conical drill bit, chamfer the tips of the 40/30 poles as shown below. The image below shows the proper angle to chamfer to. Clean out the interior of the fiberglass poles after chamfering it.

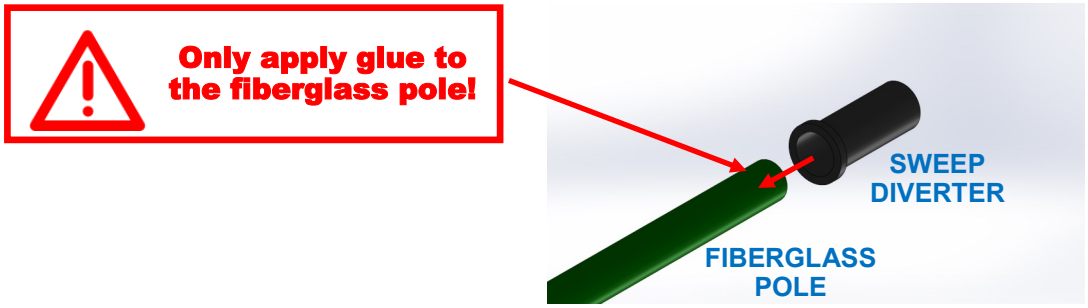


LOOK INSIDE OF THE TELESCOPING POLE TO VERIFY NOTHING IS BLOCKING IT. YOU SHOULD BE ABLE TO SEE LIGHT AT THE OTHER END IF THE POLE IS KEPT STRAIGHT. DEBRIS INSIDE THE TELESCOPING POLES CAN LEAD TO FAILURE OF THE EHU.

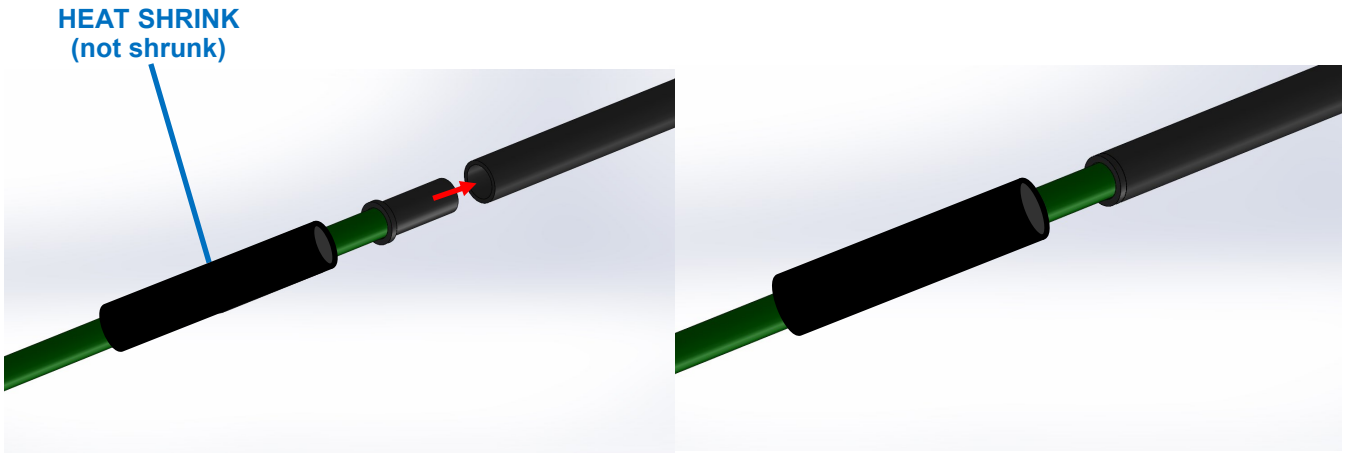
4. Each telescoping pole uses 3 polyolefin heat shrink pieces 1.5" x 3" (PN 10-1059-01), one covering each joint after it has been pulled tight. Once finished, the seal is secure and waterproof. This product requires a heat gun for activation of the adhesive.
5. When positioning the heat shrink, place it so that the joint of the telescoping pole is centered in the middle of the heat shrink.
6. Using a heat gun (hair dryers will NOT work), apply heat evenly around the entire area of heat shrink. Note: there are 4 blue colored lines imprinted on the tubing. The joint is considered done being heated and waterproof when the lines change color to a yellowish green. Each line needs to change color to ensure even adhesion temperatures.
7. The heat shrink will want to slide as it is heated so wear gloves and reposition the heat shrink to keep it centered on the joint as needed. Caution: The heat shrink will be HOT, wear insulated gloves!



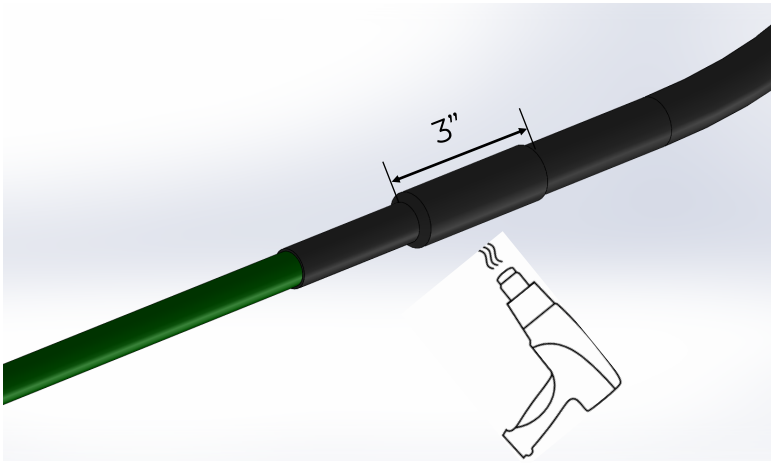
8. Use the glue kit (PN 72-0009-03) from the glue/tape kit to attach the sweep diverters (PN 10-1511-01) to the tips of the fiberglass telescoping poles. ONLY APPLY GLUE TO THE FIBERGLASS. Slowly rotate the sweep diverter as you slide it onto the pole to let the glue cover the most surface area possible. MAKE SURE THE SWEEP DIVERTER IS PUSHED AS FAR DOWN ONTO THE FIBERGLASS POLES AS POSSIBLE. The sweep diverter should be oriented in the same way as shown in the figure below, with the flanged edge towards the rest of the pole. Be sure the glue has dried completely before moving onto the next steps.



9. Put a piece of polyolefin heat shrink 1.1” x 6” (PN 10-1059-21) onto the telescoping pole, leaving the diverter clear. It should be down on the pole far enough that it doesn’t interfere with fitting the diverter into the sweep.
10. Insert the fiberglass pole, with the sweep diverter on it, into the sweep as far as possible. DO **NOT** GLUE THE SWEEP DIVERTER INTO THE SWEEP. Reposition the heat shrink to cover the joint.



11. Shrink the polyolefin sleeve over the joint as described on step 6 on the previous page; LEAVE AT LEAST 3” OF HEAT SHRINK ON THE SWEEP SIDE OF THE JOINT. **Be EXTREMELY careful not to overheat the poly sweep, you will deform or kink the material if too much heat is applied** (if this occurs you will need to undo your work and replace the poly sweep).
12. Remember, the heat shrink will want to slide as it’s heated. Reposition it as it cools to make sure the joint is fully covered. The heat shrink will be hot; wear insulated gloves.



ATTACHING SWEEP COUPLERS TO SWEEP TUBES

- Refer to figure 12.06 during the following steps for an overview of the assembly process.
- Each of the sweep coupler halves (PN 10-1155-01) will have a notch in the mold on one side marked with silver sharpie. IT IS CRITICAL THAT THESE NOTCHES ARE POINTING TOWARDS THE SWEEPS OR THEY WILL NOT WORK PROPERLY. See figure 12.07 for the location of the mark. Be certain that each half of the coupler has the mark facing the sweep tube!

13. Place the coupler halves over the heat shrink on the sweep side of the joint. The flange on the diverter should still be visible through the heat shrink, as well as the edge of the sweep material. The non-marked side of the coupler should be placed as close to the edge of the sweep material as possible, without overhanging, as shown in the cutaway in figure 12.08 where the sweep diverter is highlighted in blue.

14. Insert four of the 6-32 x 2" socket head screw (PN 60-0186) with washer (PN 60-0016). Place the screws so that the threaded portion of the screw is facing downward. BE SURE THAT THE DRAIN HOLES FOR THE PLASTIC SWEEP TUBE ARE POINTING DOWNWARD BEFORE INSTALLING THE COUPLERS.

15. Apply anti-seize to the threads and screw the Nylock nuts on. Tighten using a 5/16" wrench/socket to turn the nut and the provided 5/64" Allen Key to hold the screw. Tighten enough so that the clamp is held in place on the sweep/heat shrink. Final tightening will happen once the fiberglass spreader is installed.

16. Repeat the previous steps on the other side of sweep tube.

FIG. 12.06

Key	QTY	Part Number	Description
A	6	60-0186	Screw, 6-32 x 2", 18-8 Button Socket CS
B	6	60-0014	Nut, 6-32 Nylock
C	4	60-0016	Washer, 6-32, Flat
D	1	10-1503-21	Fiberglass Rod, 3/8" x 31-3/4" long, black
E	2	10-1155-01	Sweep Clamp, SCH-160 Clamp Half
F	1	10-1153-01	Poly Sweeps (100psi)
G	1	10-1013-02	Telescoping Pole, 18 foot 4 section
H	1	10-1059-21	1.1" x 6" polyolefin heat shrink

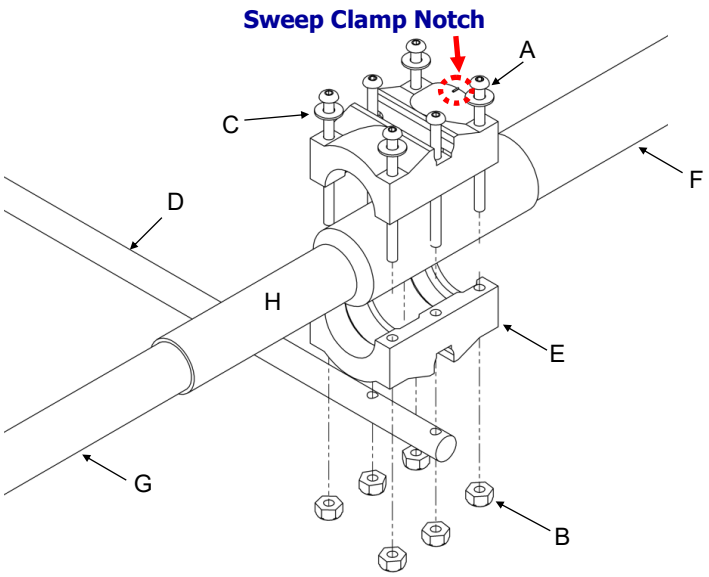
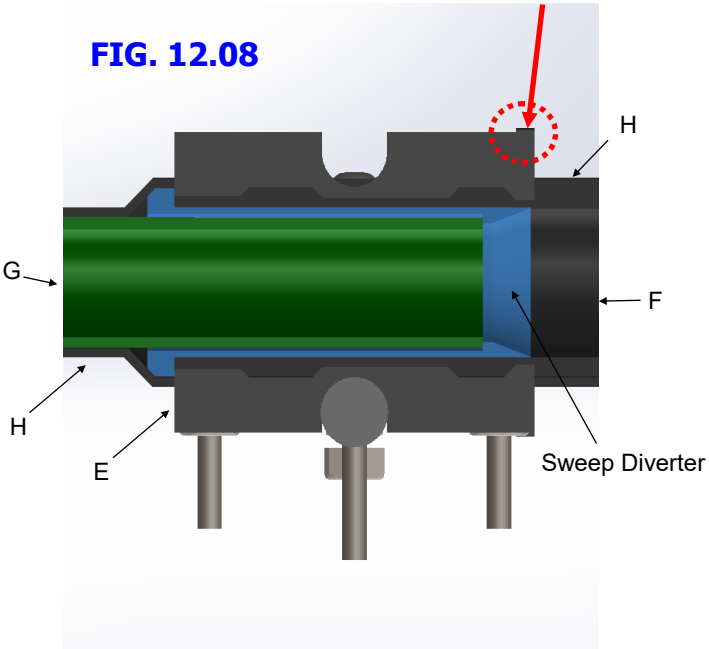


FIG. 12.07

FIG. 12.08



17. Mount the black fiberglass sweep spreaders (PN 10-1503-21) to the sweep couplers. There is a concave mounting area on each side of the plastic couplers. Position the fiberglass spreader so that the holes align with the clam shell couplers as shown in figure 12.10. When installing the fiberglass spreader, you will want the spreader to be underneath the plastic coupler as shown in figure 12.11. The spreaders will be longer than the couplers on each side of the loop. This is done on purpose to ensure plenty of fiberglass material is on each side of the screw.
18. Insert 2qty 6-32 x 2" socket head screw (PN 60-0186) through each of the coupler halves and the fiberglass rod. This screw must be placed so that the Nylock nut (PN 60-0014) is resting on the fiberglass material and the screw head are resting inside the concave groove on the top of the sweep coupler. Refer to figures 12.10 and 12.11 for detail. The screws are longer than necessary so that you can get the nut on in the initial stages.
19. Tighten the Nylock nuts firmly. Be sure to use anti-seize on these screws or they will likely gall and have to be replaced.
20. Repeat the previous steps on the other side of sweep tube.

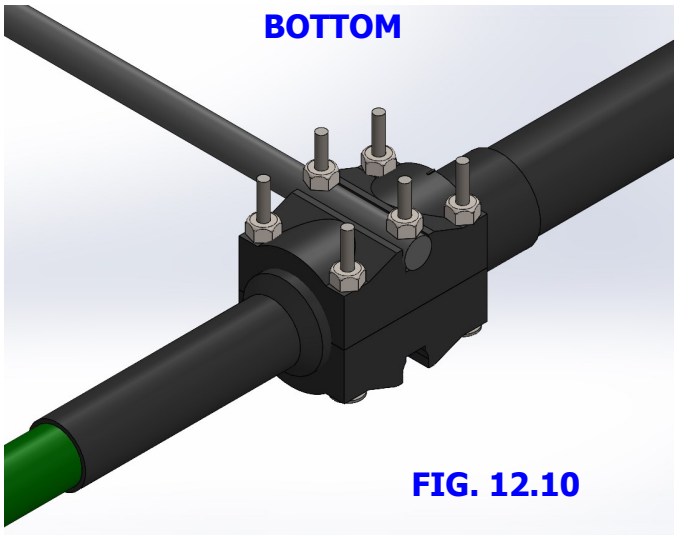


FIG. 12.10

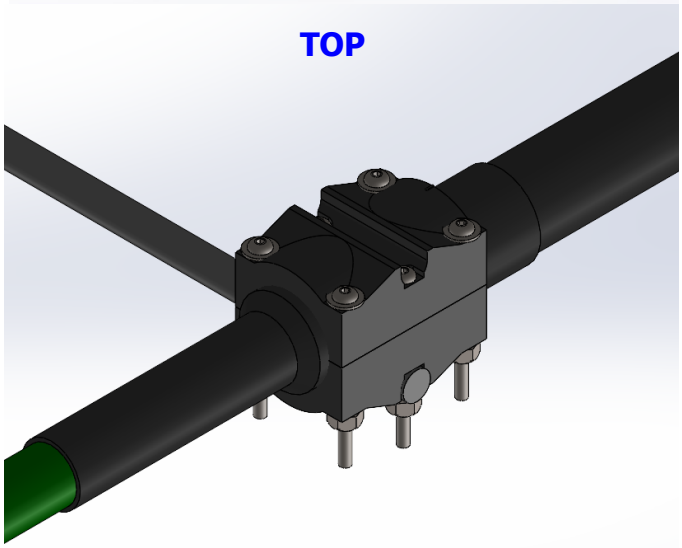


FIG. 12.11

21. Finish tightening the four screws on the outside corners of the plastic coupler. Tighten evenly, in an automobile X type pattern as shown in figure 12.14. If you do not tighten evenly, you may break the fastener. Once the outsides are firmly tight, tighten the two screws that hold the fiberglass spreader in place. Figure 12.15 shows the suggested method for tightening the screws.
22. When completely tightened, THE SWEEP COUPLER HALVES SHOULD HAVE GAP OF ABOUT 5/16" – 3/8", as shown in figure 12.16. This gap is not critical as the coupler is mostly to keep the spreader in place properly. IT IS BEST TO LET THE SCREWS SIT FOR A WHILE (15-30MIN) AND TIGHTEN IN INTERVALS IN ORDER TO ALLOW THE PLASTIC CLAMP MATERIAL TO RE-FORM. This also will reduce the chance of snapping a screw.
23. Figure 6.17 shows the completed sweep—repeat the process for each sweep.

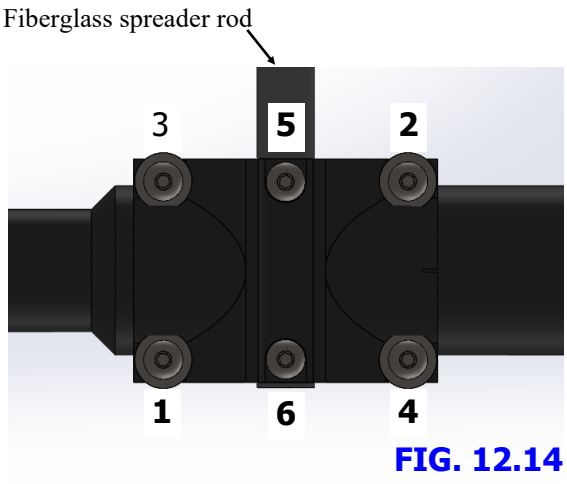


FIG. 12.14

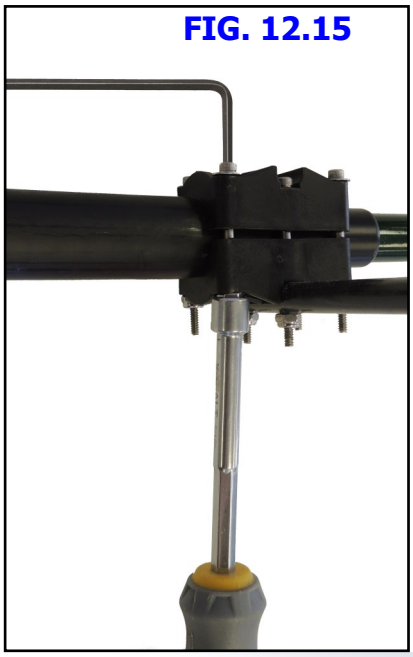


FIG. 12.15

FIG. 12.16

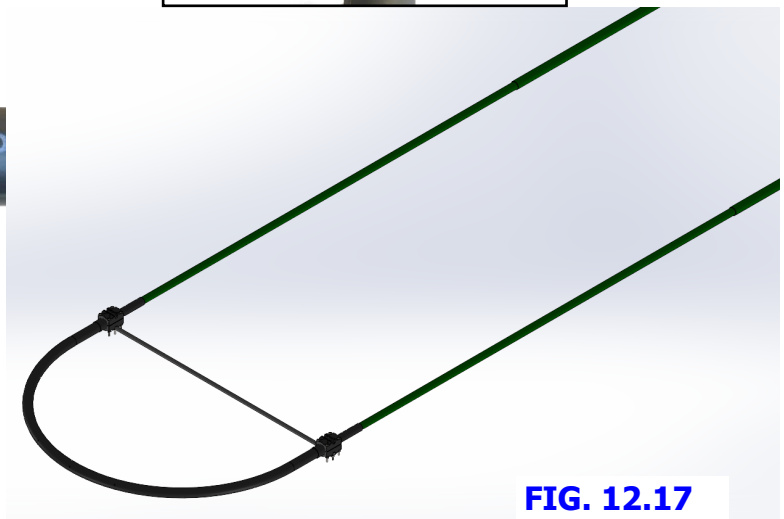


FIG. 12.17

ATTACH FOAM PLUG HOUSINGS TO NON-LOOP TELESCOPING POLES

Each 20m-6m telescoping pole tip requires a breathable foam plug to allow for venting of the EHU. The foam plug assembly (PN 70-1007-01) consists of a special UV resistant foam plug material, a plastic housing and a metal screen as shown in figure 12.30.

The foam plug is installed inside the plastic housing at the factory. No trimming or chamfering is required for the 20m-6m telescoping poles used for the driven element.

The fit of the plastic housing on the pole tip is purposely very tight, so that the foam plug assembly will stay in place. Before attaching the plastic housing, spread a small amount of dish soap around the inside edge of the plastic housing as shown in figure 12.31. This helps the housing slide on easily, and the soap will eventually evaporate, leaving you with a firm interference fit.

Insert the plastic housing onto the telescoping pole tip as shown in figure 12.32. Be sure that the plastic housing bottoms out on the pole tip, as shown in figure 12.33.

Repeat for the other non-loop telescoping pole tips.

FIG. 12.30

FIG. 12.31

FIG. 12.32

PREPARE THE CPVC INNER-GUIDE TUBE & DIVERTER CONE

The 40/30 loops on the DB42 Yagi use a plastic tube and a diverter cone located inside the telescoping pole, to guide the copper strip out of the EHU. The plastic tube is off-white and is made of CPVC. There are 3 pieces that make up the guide tube assembly: The diverter cone (PN 10-1509-02), the 39-7/8" section of 3/4" CPVC with no coupler (PN 70-2025-23) and the 49" section of 3/4" CPVC with a coupler attached to one end (PN 70-2025-13). The guide tube is not needed on the return side of the loop. Figure 13.01 shows the three pieces in the assembly.

The smaller diameter end of the diverter cone is glued to one end of the 39-7/8" CPVC tube as shown in figure 13.02 . Use the supplied glue and applicator as shown in figure 13.03. Apply the glue evenly around the outside diameter of the tube. Be sure you get even coverage all the way around the tube. Cover about 3/4" of an inch deep as shown in figure 13.03. Firmly push the 39-7/8" CPVC tube into the diverter cone end as shown in figure 13.04. Let the glue dry at least 20 minutes before moving it.

Apply glue evenly around the outside diameter of the 39-7/8" CPVC tube as shown in figure 13.05. Apply approximately 3/4" deep as per prior step. Locate the 49" CPVC tube (PN 70-2025-13) with coupler, as shown in figure 13.06. Push the 39-7/8" tube firmly into the coupler as shown in figure 13.07.

Repeat above instructions for remaining guide tube assembly's (two per standard 40/30 loop, four total).

WARNING: Do not apply glue to the inner "female" portion of either the diverter cone or coupler. The glue applied to the outside of the tube is sufficient to bond the two pieces, and will prevent potential for damaging obstructions being formed by dried glue.

FIG. 13.01

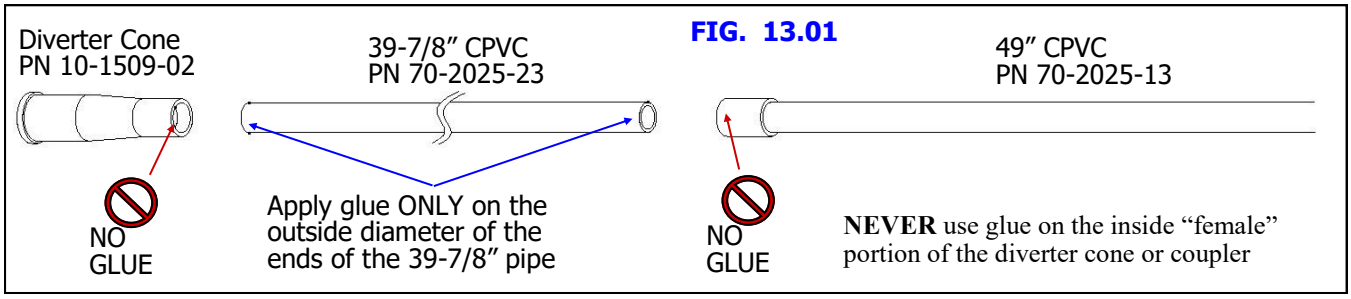


FIG. 13.02

FIG. 13.03

FIG. 13.04

FIG. 13.05

FIG. 13.06

FIG. 13.07

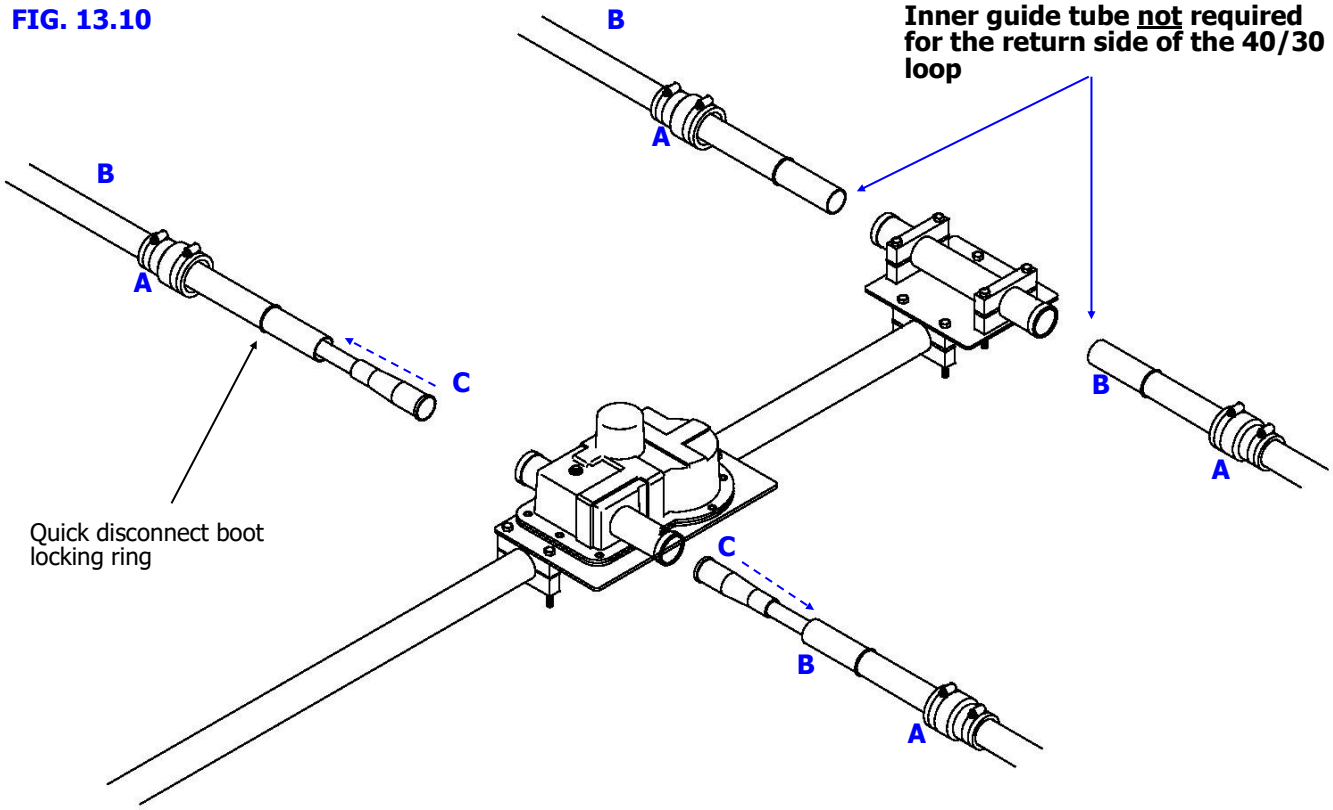
ATTACH THE ELEMENTS TO THE EHU's (continued)

SECURING THE ELEMENT SUPPORT TUBE (EST) TO THE EHU

When the CPVC inner guide tubes are completed, they will need to be inserted into the telescoping poles and secured to each EHU. Figure 13.10 below gives an overview of this procedure, with detailed instructions following on the next page.

This drawing shows the EHU placement for the Reflector element, the procedure is the same for the Director and Driven elements. The parts required in the table below are shown for EACH complete loop assembly.

FIG. 13.10



Key	QTY	Part #	Description
A	4	10-1006-22	Quick disconnect boot
B	4	10-1013-02	Telescoping pole
C	2	NA	Inner guide tube assembly consisting of diverter cone , 39-7/8" and 49" CPVC Plastic tube, glued together. They are only used on the EHU side of the 40/30 loop
D	4	NA	Quick disconnect boot locking ring (these are molded into the base section of each telescoping pole and are used to keep the pole from sliding out of the quick disconnect boots in high wind situations)

SECURING THE ELEMENT SUPPORT TUBE (EST) TO THE EHU (continued)

When attaching the telescoping fiberglass poles to each of the EHU's, special care must be taken to ensure that the rubber plugs that are in the base section of each pole are removed before placing the telescoping poles onto the EHU. **Failure to remove these plugs will result in catastrophic failure of the EHU**. Figure 13.11 shows how the plug is in place for shipping purposes. Each end of the DB42 boom has a 40/30 loop for use on 40m as well as the 49 ft loop Driven element, for a total of three elements on 40m/30m . These loops were prepared earlier in the installation process and should look like the one shown in figure 13.12. Be sure to put your quick disconnect boot (PN 10-1006-22) onto the pole before inserting into the EHU.

The CPVC inner guide tube is inserted into the EHU side of the loop assembly as shown in figure 13.13. A close up view of this assembly is shown in figure 13.14. The guide tube is not required for the non-EHU side of the loop (commonly called the return tube). Insert the guide tube so that the edge of the diverter cone is flush with the base of the telescoping pole as shown in figure 13.15. Slide the pole base and guide tube into the EHU tube until it bottoms out firmly as shown in figure 13.16. There may a small portion of unpainted pole protruding. This is OK as it is shielded from the sun by the quick disconnect boot. There is a raised area called a locking ring that is molded onto the base section of each of the telescoping poles. These are there so that the quick disconnect boot cannot "slide" off in the event of high winds. Figure 13.16 shows the locking ring. Align the telescoping pole on the return tube side of the loop. Insert the end firmly into the return tube as shown in figure 13.17.

Before tightening the quick disconnect boots, twist the base sections of the telescoping poles until the loop portion of the element is as level as possible, as shown in figure 13.18. Chapter Fourteen shows this leveling process in greater detail, specifically figures 14.29, 14.30 and 14.31 . Tighten the quick disconnect boots firmly. Wait 20 minutes and tighten again—the flexible material will tend to cold flow initially. It is also a good idea to do a final tightening of all the quick disconnect boots and all fasteners as a last step before mounting the antenna onto the tower mast. Repeat above steps for the other half of the loop. The installation pictures below represent the Reflector element. Repeat the above steps for Director 2. The instructions are exactly the same with the exception of the orientation of the EHU and return tube.

FIG. 13.11

FIG. 13.12

FIG. 13.13

FIG. 13.14

FIG. 13.15

FIG. 13.16

FIG. 13.17

FIG. 13.18

INSTALLING THE TRUSS SUPPORT MAST

The great advantage of telescoping fiberglass poles are that they are both flexible and extremely strong. This is a significant advantage for such adverse weather situations as high winds, icing or snow accumulation. The only negative to this, is because of the flexibility, there is a slight natural "droop" at the element ends. This droop has no impact whatsoever on performance, but some people do not care for the look. On the DB42 Yagi, it is more pronounced because the Driven element is a straight telescoping pole, which droops less than the 40/30 loop elements on either side of it. For primarily aesthetics purposes, we offer the optional 40/30 loop end truss kit which allows for the leveling of the Reflector and Director 3 loop elements to the same level as the straight elements. This makes for a better overall profile of the Yagi.

Since Director 1 is substantially longer, the 40/30 loop truss is *REQUIRED* for additional load bearing support of the 49' element. The Reflector and Director 3 elements also are trussed. The mechanics of installing each are the same. The Director 3 element is shown below for instructional purposes but the methodology will be the same for the Reflector (39') and Director 1 element (49') loops.

The truss mast needs to be mounted so that it is centered on the halfway point between the EHU center-point and the return tube center-point. The overall length between the two center-points is 30 inches, so the halfway point is 15 inches. Make a mark on the boom 15 inches between the two center-points as shown in figure 14.01. Locate the truss support (PN 10-1054-02) and two 2-1/2" aluminum saddle halves (PN 10-1601-41). Place the saddles so that the edge of the saddle is on the edge of the mark as shown in figure 14.02. This will ensure that the support is indeed on the center point. Insert two of the 5/16" x 4" hex head bolts (PN 60-0066) and secure with 5/16" Nylock nuts (PN 60-0046). Remember to use anti-seize on the stainless steel fasteners. Level the support before tightening as shown in figure 14.03. After tightening, insert a set screw into the exposed saddle and tighten. (The REF and DIR 3 trusses use 1-3/4" saddles and 5/16" x 3.5" bolts to mount the truss support to the boom.)

Attach each of the 4" stainless steel turnbuckles (PN 60-0083) using the 1/4" x 1-1/4" hex head bolt (PN 60-0110), two of the 5/16" stainless steel flat washers (PN 60-0033) and 1/4" Nylock nuts (PN 60-0030) as shown in figure 14.04 and figure 14.05. Figure 14.06 shows the top of a completed element truss support without the Dacron rope attached.

FIG. 14.01

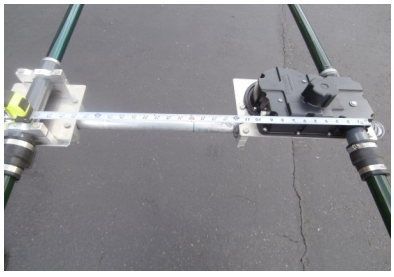


FIG. 14.02

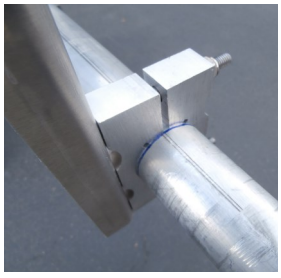


FIG. 14.03

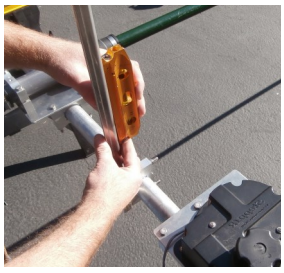


FIG. 14.04

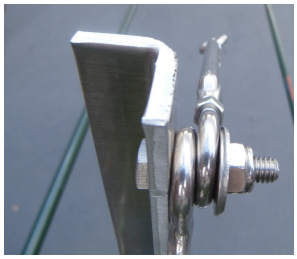


FIG. 14.05

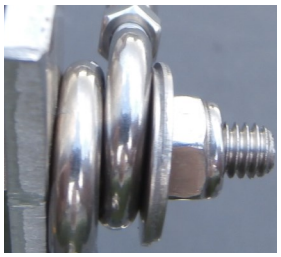


FIG. 14.06

ATTACH THE TRUSS COUPLERS

There are two pieces to the truss couplers (PN 10-1510-01) as shown in figure 14.10. The couplers are mounted on each side of the loop, located at the outer joint of the telescoping poles as shown in figure 14.11. The truss coupler butts up against the edge of the polyolefin heat shrink.

There are nut trays molded on one side of the truss coupler, recessed so the nut can rest inside, as shown in figure 14.12. These are handy for holding the #6 Nylock nut (PN 60-0014) when tightening, but you will need to position your finger over the nut to keep it from spinning when you thread on each of the #6 x 7/8" pan-head machine screw (PN 60-0014-01). Align the truss coupler so that the Dacron rope hole is parallel with the ground as shown in figure 14.13. Do not over tighten the screws. The coupler halves do not need to bottom out against themselves, a small gap is fine.

The Dacron truss cord is provided in a single piece and will need to be trimmed as you progress with the installation of the end trusses. Thread the Dacron cord through the truss coupler, leaving approximately ten inches of truss cord. Tie four half-hitches and leave approximately four inches of spare rope after the knots are tied. Figure 14.14 shows the proper way to tie a half-hitch. When finished, apply electrical tape so that the leader of the Dacron rope is secured to the truss line. Figure 14.16 shows a tied truss line before electrical tape is applied.

FIG. 14.10

FIG. 14.11

FIG. 14.12

FIG. 14.13

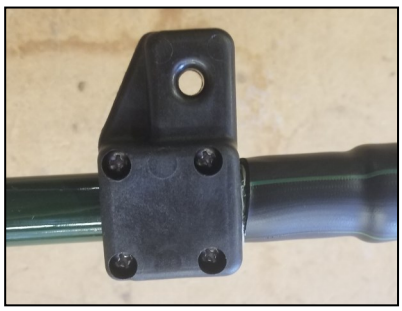


FIG. 14.14

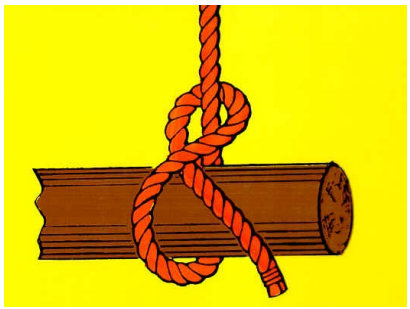


FIG. 14.15

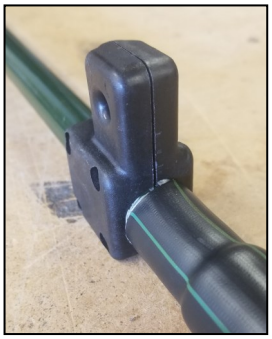
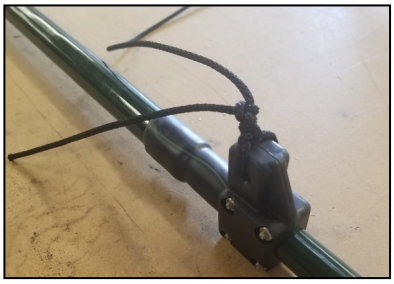


FIG. 14.16



ROUTING THE DACRON TRUSS CORD

Before inserting the cord through the eyebolt of the 4" turnbuckle, unthread each eye so that there is approximately 3/8" thread remaining in the frame of the turnbuckle portion, as shown in figure 14.20. Locate the 1/8" thimble (PN 60-0158). Spread the thimble apart enough to slide on to the eye of the turnbuckle. When the thimble is through the eyebolt, bend the tips of the thimble back as close to each other as possible, as shown in figure 14.21.

Thread the Dacron truss cord through the eye of the turnbuckle and around the 1/8" thimble as shown in figure 14.22. Pull the truss cord back down to the truss coupler on the opposite side of the loop. Insert the Dacron cord through the truss coupler (refer to prior page for instructions), pulling the cord tight so that there is no slack on either side of the cord. The procedure for securing the Dacron truss cord on this end of the loop is exactly the same as the truss coupler you prepared initially.

At this point of the installation of the 40/30 loop element truss, it is important to assemble the truss couplers and Dacron truss cord on the other side of the EHU. Because of the significant torque generated by leveling of the elements, there needs to be equal force applied on each side as shown in figure 14.23.

When the 40/30 loops on each side of EHU have both been prepared, attach two 1/8" galvanized wire clips (PN 60-0157) on each side as shown in figure 14.24. Position the first wire clip as close as possible to the tip of the thimble. Position the second wire clip an inch behind the first. Be certain that the rope is "stacked" one on top of the other as shown in figure 14.25. Tighten the wire clips firmly. Repeat for the reflector and director 2 elements.

FIG. 14.20

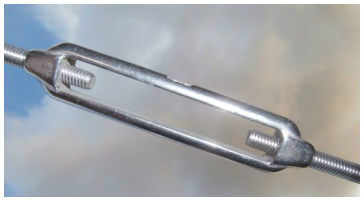


FIG. 14.21

FIG. 14.22

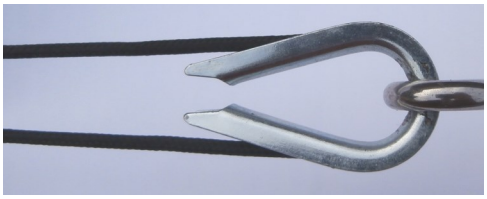


FIG. 14.23

FIG. 14.24

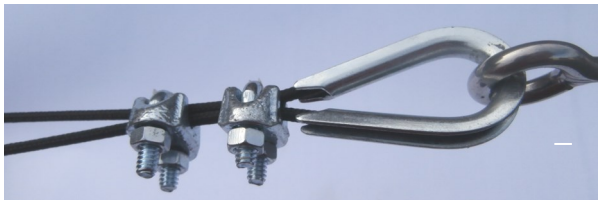


FIG. 14.25

ROUTING THE DACRON TRUSS CORD (continued)

When leveling the elements, use two adjustable wrenches as shown in figure 14.26. The wrench that is placed on the thimble is held stationary, while the wrench that is on the frame of the turnbuckle is rotated. Adjust each turnbuckle a few turns at a time until the elements are level.

Be careful not to raise the elements so that the loops are above the profile of the straight elements—some droop is necessary so that water will not accumulate in the poles. When the elements are at the desired position, tighten the lock nuts on each end of the turnbuckle frame as shown in figure 14.27. Be sure to do this with ALL turnbuckles, as this will prevent the turnbuckle from unwinding. As a secondary measure, we recommend looping rope or wire through the eye and frame of the turnbuckle as shown in figure 14.28.

In addition to the leveling of the elements, it is also important to ensure that the fiberglass spreader on the loops are parallel to the boom. The best method for this is to loosen the quick disconnect boots on the telescoping poles and twist the base of the pole until the loops are parallel to the boom. Figure 14.29 shows a loop that is not parallel. Figure 14.30 shows the loop being adjusted. Figure 14.31 shows the level and parallel half of the 40/30 element.

When the position of the loops are as desired, tighten the quick disconnect boots firmly. Wait 30 minutes and tighten again.

Repeat this procedure for reflector and director 2 elements

FIG. 14.26

FIG. 14.27

FIG. 14.28

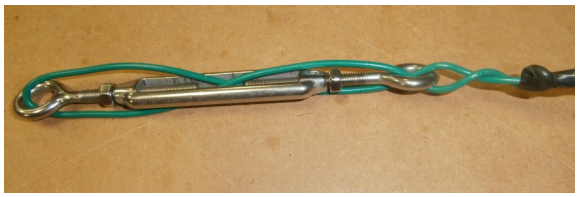


FIG. 14.29

FIG. 14.30

FIG. 14.31

SECURE THE CABLES ONTO THE BOOM

When the antenna assembly is completed, the last step before attaching the DB42 Yagi to the tower mast is the securing of cable and coax to the boom. Note that in many cases, the taping of the 16 wire control cable may be the last step, done after the antenna is mounted on the tower. The most important aspect of the taping task is to be certain that **NO** control cable or coax is resting against a sharp edge. The most notable sharp edges occur when routing past an aluminum saddle, mast or mounting plates and even the threads on the stainless steel fasteners. AVOID these sharp edges! If you are routing the cable and find that you cannot avoid a sharp edge, take measures to put something between the cable and the sharp edge. In addition, be careful not to over-bend or kink any of the cables. Figure 15.01 shows an example of taping around a potential edge-hazard—in this case, the boom bolts.

There are several ways to secure the cables to the boom. The method used most of the time is to apply electrical tape. We have provided you with enough electrical tape to secure the cables to the boom. When using electrical tape, be sure to cut the tape with scissors. Do not pull the tape off until it severs, this can damage the tape. When done wrapping the electrical tape, leave a small flap on the edge of the cut end, for easier removal should the need occur at a later date. Approximately two wraps of electrical tape are sufficient for most control cable, three wraps for coax jumpers. As a general rule, applying tape approximately every two feet is adequate.

Other methods include the use of tie-wraps. Be careful when using tie-wraps! Be sure to purchase high quality, UV rated tie-wraps that are recommended for cable. Most of the standard off the shelf tie-wraps are not properly rated and will become brittle and may fail within a short period of time. Do not pull the tie wraps too tight, some brands have sharp edges and can actually damage the cable over time if pulled too tight.

When taping cable that terminates at a terminal connection, such as the connector junction box or coax switch housing, be sure to leave some excess cable before taping, to avoid unnecessary stress being placed on the cable connection. Figure 15.02 shows good routing methods, with the control cable exiting out of one of the connector junction box conduit plugs and the EHU cables exiting out the other conduit plug.

We recommend you label each of the control cable wires and the coax jumpers. The best place to label them is at the point nearest the connector junction box or the coax switch box. Labeling now will help out significantly should you need to disconnect your antenna at some point in the future. Figure 15.03 shows an example of a connector junction box with labeled control cables. (The picture is of a DB18 box.) Note the tie wrap placed on the control cable as it exits the connector junction box—this is a great way to make your own strain relief, coupled with leaving slack in the cable itself when you tape it.

Excess control cable can either be coiled up and taped to the boom or trimmed to length. If you decide to trim the control cable to length, be sure you don't make it too short! Do not trim the coax cables.

FIG. 15.01

FIG. 15.02

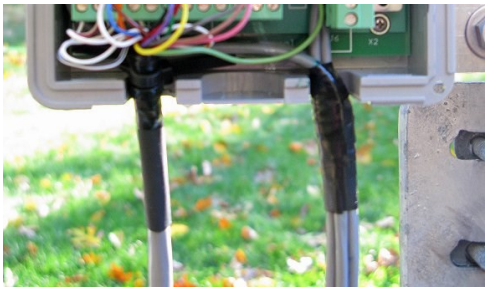
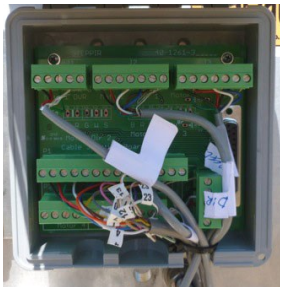


FIG. 15.03



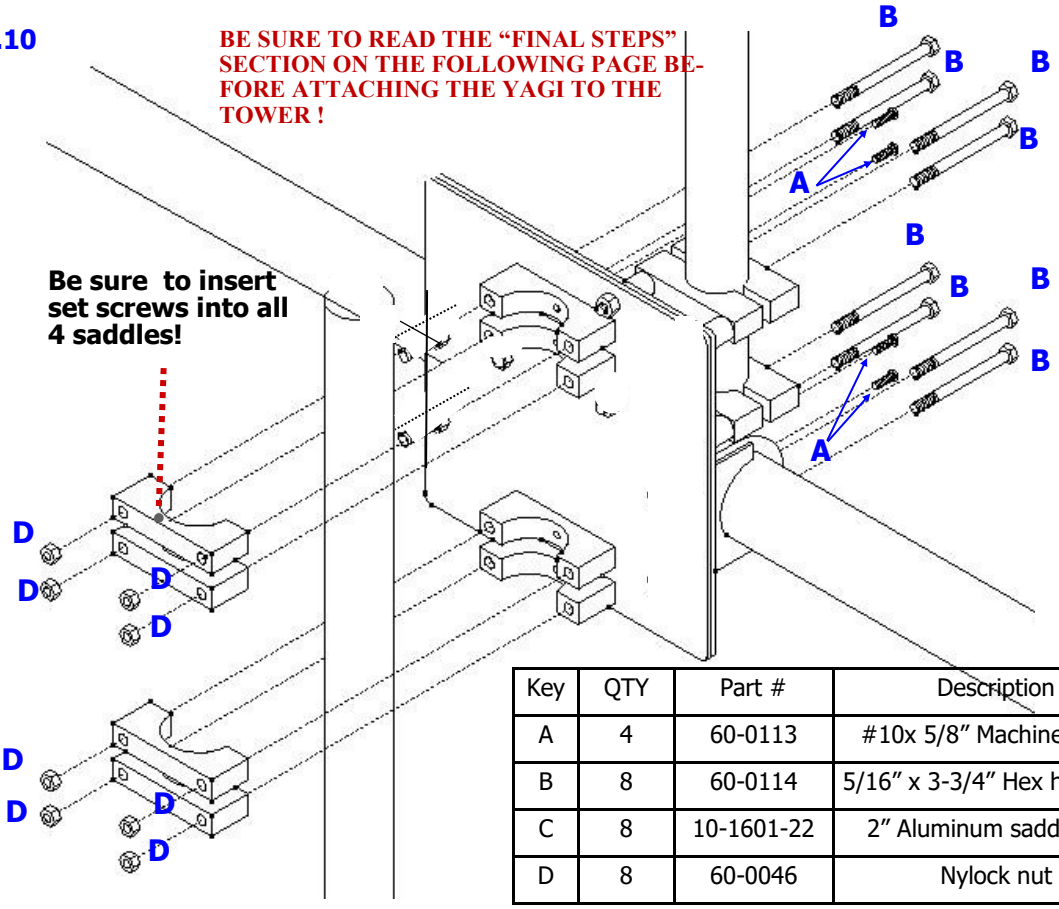
MOUNT THE DB42 ONTO THE TOWER MAST

There are many different methods and mechanisms that are used in the course of attaching an antenna to its final resting spot. The most common method by far for a Yagi antenna is to mount it on a tower, with a mast fixed in place at the top of the tower. That is the assumption with these instructions. In a best case scenario in terms of ease of access, the antenna is being mounted on a tilt-over, crank-up tower or a crank-up tower that nests at the fairly traditional 21 ft. A Yagi often times is mounted at the top of a fixed-tower, high up in the air, where someone is strapped to the tower awaiting the antenna by means of gin-pole and transmission line or a crane/bucket lift. With this in mind, the mast plate is set up on the DB42 so that the mating process from mast plate to tower mast is made as easy as possible.

The tower mast connection uses four sets of aluminum saddles to attach the antenna to the tower mast as shown in figure 15.10. In most cases the tower mast is 2 inches in diameter, but occasionally the mast size may be different, depending on the customers situation. SteppIR offers saddle sizes in 1-3/4", 2", 2-1/4", 2-1/2" and 3". Since the vast majority of installations of the DB42 will be utilizing the standard 2 inch saddles, that is the verbiage used in the instructions that follow.

The 2 inch aluminum saddle halves (PN10-1601-22) are held in place using 5/16" x 3-3/4" hex head bolts (PN 60-0114) and 5/16" Nylock nuts (PN 60-0046) as shown in figure 15.10. The first half of the aluminum saddles rest against the mast plate and are held firmly to the mast plate using #10 x 5/8" machine screws (PN 60-0113), which insert through the mast plate and thread into the portion of the aluminum saddle normally reserved for the set screw. When connecting the saddle halves to the machine screws, be sure that the bolt holes line up perfectly. This will be of critical importance when the antenna is connected to the tower mast.

FIG. 15.10



Key	QTY	Part #	Description
A	4	60-0113	#10x 5/8" Machine screw
B	8	60-0114	5/16" x 3-3/4" Hex head bolt
C	8	10-1601-22	2" Aluminum saddle half
D	8	60-0046	Nylock nut

MOUNT THE DB42 ONTO THE TOWER MAST (continued)

Figure 15.11 shows the #10 x 5/8" machine screws inserted through the mast plate. Figure 15.12 shows the a saddle half that has been mounted on the mast plate, with a machine screw below it awaiting the next saddle half. Figure 15.13 shows all of the aluminum saddle halves mounted to the mast plate.

The antenna is now nearly ready for mounting onto the tower mast.

FIG. 15.11

FIG. 15.12

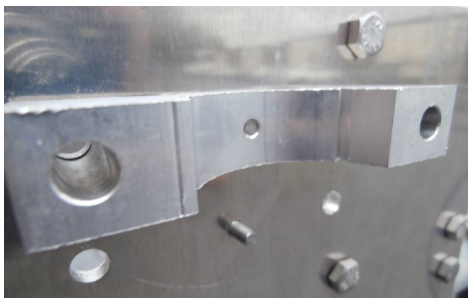
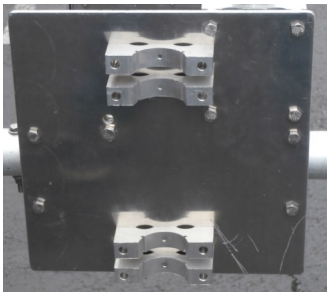


FIG. 15.13



LAST STEPS:
IT IS VERY IMPORTANT THAT YOU PERFORM EACH OF THESE STEPS BEFORE ATTACHING THE ANTENNA TO THE TOWER MAST

1. Connect the controller to the control cable and extend the elements simultaneously all the way out to the 40m band. Have someone listen as the copper strip extends outward into the support tubes. Ideally, having one person per element works best.
2. As the motors extend the copper strip, they start out moving very slowly, and then ramp up to full speed. There should be an accompanying hum for this that should never sound harsh, or choppy.
3. If there are any obstructions stopping the copper strip from making it's way out, you should notice a significant sound that will not be confused with the smooth motor sound. Listen for any significantly loud "clicks", scraping sounds or anything that sounds out of the ordinary.
4. If there is something that outright stops the copper strip from extending or retracting, you will get a harsh sound as the motors try to keep going but the tape is stuck.
5. If any of these "bad" sounds occur, try to locate the area where the problem is happening and investigate. Repeat these steps again. If all is OK, proceed to step 6.
6. Check all fasteners on the antenna to be certain that they are tight. This may seem redundant, but the time to discover a loose fastener is NOW, not when that part it was supposed to hold falls out of the sky.
7. Be sure that you have set-screws in all the saddles, where applicable. Be sure they are tightened.
8. Check all the quick disconnect boots to be sure they are as tight as possible and are in the correct position relative to the EHU and the telescoping poles.
9. Check all wiring and coax jumpers to ensure that they are secured to the boom and that they are not resting against any sharp objects.
10. If you have any of the optional trusses, be sure your turnbuckles are locked in place and that the loop element or boom is level.
11. Check to be sure that the elements are level with the boom— a level antenna looks much better when suspended in the air than one that is not!
12. Check the antenna with an antenna analyzer/VNA to make sure you have some resonant point below 3:1 near the controller frequency. This will vary depending on which frequency you are on due to the height above ground.
13. Get the DB42 Yagi on that tower so you can work some good DX!

TROUBLESHOOTING TIPS

SteppIR antennas are all powered by stepper motors, hence the name. Stepper motors function by rotating the shaft a specific number of "steps" per revolution. The SDA 100 is simply counting the steps, of which for each step sequence there is a known length that the antenna is adjusting. If for some reason the antenna gets out of calibration, the method for recalibrating is pretty simple. When you press the calibrate button, the controller retracts each element until it assumes it is "home", and then keeps retracting the stepper motors for a period of time to ensure that there is no question that the elements have indeed been homed. At that point, the controller sends the elements back out to the exact frequency they were at when the calibration function started. That is why in calibration mode you will hear the antennas make a loud growling sound towards the end of the retracting—the elements are homed but the stepper motors keep right on going for a while longer before sending the elements back out.

It is important to note that if a problem arises with the elements, such as an obstruction that is impeding the path of the copper strip, the SDA 100 controller will not recognize this, so just because the controller is showing the proper length for any given band, there may still be an issue. Even though the controller may indicate that the copper strip is moving, in a troubleshooting situation it very well may not be. The controller does not have much say in the indicating of a problem—it's job is to simply get the elements to the right length. This is why we have come up with the following information for you to review when having issues:

The antenna is out of calibration—this is something that happens from time to time and is not a problem at all. Whenever you suspect a problem the very first thing that should be done is a calibrate. It is always a good idea to calibrate the antenna if you are having trouble. It is best to set the DB42 to 20M before doing the calibrate function. You only need to calibrate once. To be certain that the antenna was indeed out of calibration, check the SWR before you calibrate and check it again after you calibrate to see if there are any improvements. If the SWR is unchanged, the antenna was in calibration and is not the issue.

The lengths of the antenna are incorrect— Using the "Cause/Effect" theory, generally the first place to look for trouble is the last place you have been. Using this line of thinking, if there is a problem with your antenna, we need to be sure you are using the factory default lengths for your controller. Regardless of whether you think you have done anything that could change the lengths, as a second step in troubleshooting (the first being the simple calibration of the antenna), be sure to reset the factory default lengths.

The SDA 100 electronic controller has a defective or intermittent driver chip—It only takes a momentary short to damage a driver chip. The problem with driver chips, is that a blown driver chip or a damaged driver chip that has not failed outright can act a lot like a damaged EHU. What we don't want you to do, is jump to conclusion on an EHU issue, only to spend time and money taking your antenna down and find out that it was a driver chip problem, or some other issue with the controller in the first place. Taking the time to troubleshoot and repair a controller is **MUCH** easier than taking down an antenna to repair an EHU.

With that in mind, the following are steps for checking the voltage between the pin pairs that feed the motor windings. This information is critical to our technical support staff and you can save a lot of time by having this data available before contacting us. Instructions as follows:

With the DB-25 connector removed from the back of the controller, measure the voltage between the pin pairs that feed the motor windings. For example, pins 1 & 2 and 3 & 4 when referring to the driven element. The other elements pin pairs are listed in the troubleshooting guide These are the same pairs you use to check the resistance of the motor windings**. Be very careful not to short the pairs together or touch any other pins in the process, or you can potentially damage the controller driver chips.**

With the controller power plugged in, you should read approximately 3.5 VDC across each pin pair. At this point, change bands using the controllers band change button. As an example, switching from 20m to 10m generally gives a long enough run to get a good reading. You should be reading on your volt-ohm meter approximately 20 to 25 VAC using a 24 volt power supply. To check the next pin pair, you can then change bands back to 20m and so on through the wire pairs. If you have significantly different values at any point in the test process, you can be reasonably certain that you have a damaged driver chip for that element.

TROUBLESHOOTING TIPS

Please be aware that in some cases, we have seen driver chips partially damaged, causing them to work part of the time. This can be confusing in the test process.

If you do not have the optional 25 pin dSub splice assembly (see Chapter Five, Section 5.2) when measuring the voltages, a suggestion would be to use a bare 25pin dsub to plug into the SteppIR controller and then insert a paper clip to penetrate the pin hole. Usually about .75" long will do the trick. One paper clip being longer than the other also helps. Again, be careful NOT to short the pins. Even if the controller is turned off, there is always voltage going to the pins with a SteppIR controller. We do this to "lock" the stepper motors, and minimize the need to calibrate the antenna on a regular basis.

There is a defective coax jumper cable from the coax switch relay box output to the Director or the Reflector—our coax jumpers are manufactured by a company that specializes in these products, so a defective jumper is relatively rare, but it has happened. To check the coax jumper cable, measure the resistance between the center conductor of the PL-259 on the each end of the coax. The coax jumper should measure a very low resistance of 3 ohms or less (has continuity). If the coax jumper has high resistance (no continuity), there is likely a problem with it.

There is a defective relay inside the coax switch box— relays are mechanical devices so there is always a chance one could be defective, although we test all coax switch boxes before they leave the factory. Refer to pages 74-75 for the relay test instructions.

The coax relay box is not switching due to a defective relay or the relay switching voltage is somehow not getting to the relays—this could be due to a defective control cable, a broken wire or a defective controller relay board. Refer to pages 74-75 for the relay test instructions.

The Director or Reflector element is not tuning, or tuning intermittently—This could be a defective control cable, controller driver chip or a defective EHU. If you have already tested for these potential issues and to verify if the EHU is actually tuning, follow these steps:

1. Go to "Create/Modify" in setup mode and apply enough power to get a good SWR reading.
2. Select the Reflector element and change its length about 15-inches and see if you see a difference in SWR. It doesn't matter if the SWR improves or gets worse as long as it changes. This indicates the element is tuning.
3. Select the Director element and repeat the above steps. If the SWR changes the element is moving.

If the EHU looks like it is not moving and you have already done all of the wiring checks in this section, contact our technical support department for further instructions.

STEPPIR COMMUNICATION SYSTEMS

5 YEAR LIMITED PRODUCT WARRANTY

(as of May 22, 2023; Prior to that date warranty is 2 years)

Our products have a limited warranty against manufacturers defects in materials or construction for five (5) years from date of shipment. Do not modify this product or change physical construction without the written consent of Fluidmotion Inc, dba SteppIR Communication Systems.

This limited warranty is automatically void if the following occurs: improper installation, unauthorized modification and physical abuse, customer misuse or damage from weather events or natural disasters that are outside of the stated survivability of the product. For wind damage, proof of winds beyond 100 mph must be presented. Lightning or near-lightning events are not covered under this warranty. Driver chip module replacement is not covered under this warranty. This warranty is not transferrable.

SteppIR Communication System's responsibility is strictly limited to repair or replacement of defective components, at SteppIR's discretion. SteppIR will not be held responsible for any installation or removal costs, costs of any ancillary equipment damage or any other costs incurred as a result of the failure of our products.

In the event of a product failure, a return authorization is required for warranty repairs. This can be obtained at www.steppir.com. Shipping instructions will be issued to the buyer for defective components, and shipping charges to the factory will be paid for by the buyer. SteppIR will pay for standard shipping back to the buyer. The manufacturer assumes no further liability beyond repair or replacement of the product.

Modification of this product is not authorized and may cause product failure, injury or death.

SteppIR Contact Information

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New orders or questions about your current order: **Visit** steppir.com **or email us at** sales@steppir.com

Existing customers requiring technical or product support services: steppir.com/support

Information and questions about our products: sales@steppir.com

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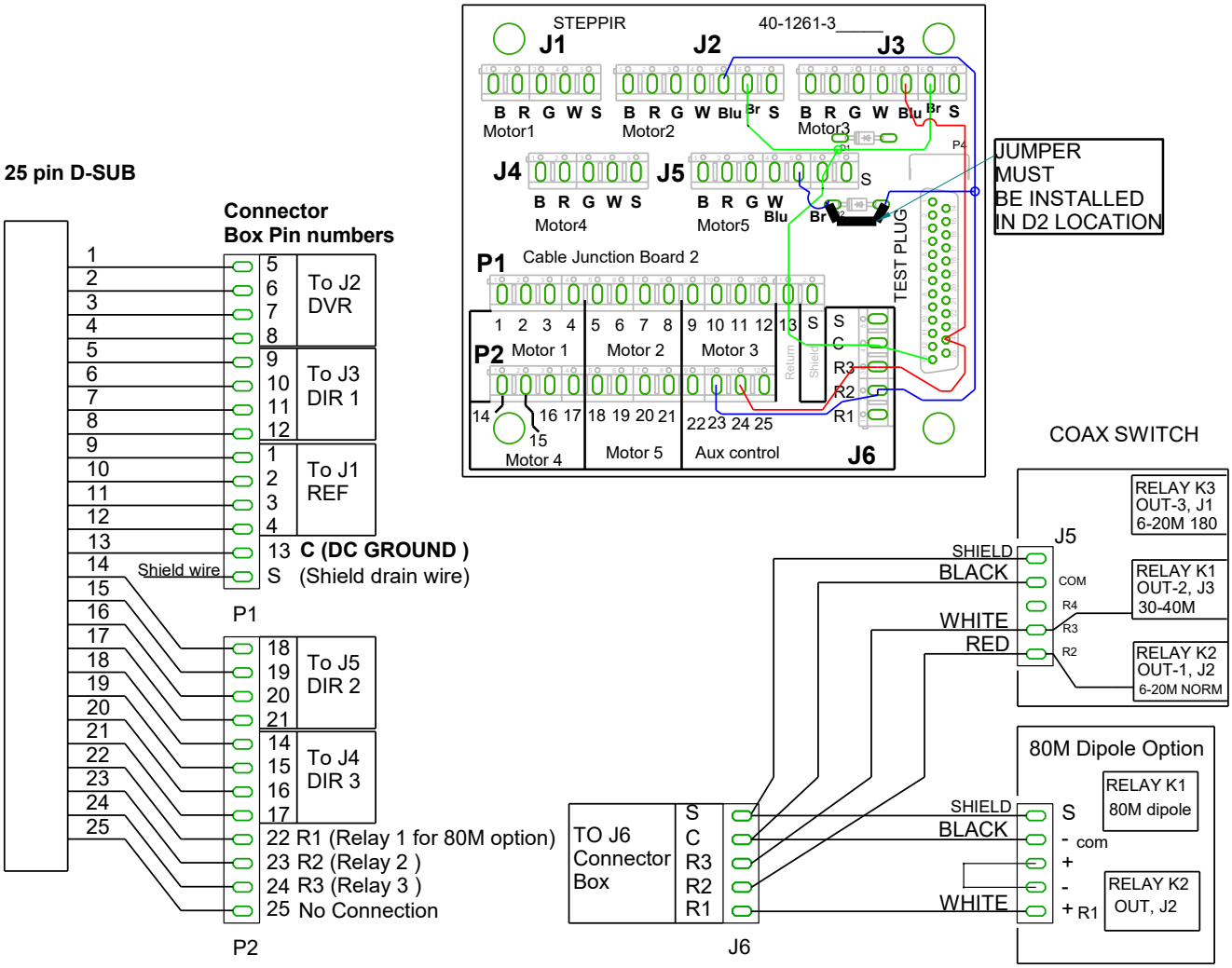
from Adam Blackmer K7EDX and Jim Strieble K4DLI

DB42 Connector Junction Box Wiring Schematic

WARNING: This schematic should only be used if you are well versed in reading and understanding a document such as this. Refer to Chapter Eleven for step-by-step connector junction box instructions.



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