



Multi-Band Vertical Antenna 160 through 10 Meters *with the patented* SAF-T-TILT™ Base

DXE-MBVE-5A Series

US Patent Nos. 654,064 and 8,686,919

DXE-MBV5AS-INS - Revision 3a



MBVE-5 Shown with optional UNUN

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Introduction

The DX Engineering **DXE-MBVE-5A** series of antennas are designed from the ground up to offer ease of use, reliability and performance. The design was based on older 43 foot verticals enhanced with the newer tilt base, the overall length has been shortened from 43 feet for optimum performance. A fast taper multi-band vertical antenna system with the patented **SAF-T-TILT™** base (*US Patent Nos. 654,064 and 8,686,919*). The massive 3/8" thick rugged aluminum base allows easy, safe tilt action without unsafe removal of mounting hardware. The vertical antenna operates from 160 meters through 10 meters using a good quality outboard customer supplied tuner. There are also options available for remote tuners allowing operation at 200, 300, 600 or 1500 Watt power levels. There are no traps, coils or linear loading elements. Designed with 6063 corrosion-resistant aluminum tubing and stainless steel hardware, this antenna is very durable and attractive.

NOTE: The basic **DXE-MBVE-5A** requires an optional DX Engineering **UN-43 UNUN** and optional UNUN Bracket **DXE-UN-BRKT** with recommended **150 feet of RG-213** coaxial cable and a customer supplied in-shack **wide range** tuner or one of the optional remote tuners with remote tuner mounting methods as described in this manual.

If you already own a DXE-MBVE-5 or 5A, there are optional upgrades available for use with the remote tuner options.

Basic DXE-MBVE-5A Antenna Features

- Full band coverage from 160 through 10 meters - Outboard customer supplied wide-range tuner is required
- New massive **SAF-T-TILT™** Base (US Patent Nos. 654,064 and 8,686,919) allows safe raising and lowering of the antenna without hazardous removal of fastening hardware
- High strength Delrin® thermoplastic insulator that won't crack, splinter, peel or fail
- Rugged structural grade type 6063-T832 drawn aluminum vertical radiator - the best alloy for high strength, long lasting antenna applications
- Fast taper from rugged base to sleek top for the lowest wind resistance
- No coils or traps – Maximum radiation efficiency
- Power handling up to 5 kW - built to last
- All stainless steel hardware - very durable and attractive
- Free standing to 92 mph wind speeds

Manual Updates

Every effort is made to supply the latest manual revision with each product. Occasionally a manual will be updated between the time your DX Engineering product is shipped and when you receive it. Please check the DX Engineering web site (www.dxengineering.com) for the latest revision manual.

DXE-MBVE-5A Models Available

DX Engineering MBVE-5A Model Numbers	SAF-T-TILT™ Base	DXE-MBVE-5A with Short Base Tube	DXE-MBVE-5AE with Long Base Tube	DXE-RADP-3 Radial Plate	DXE-UN-43 UNUN and DXE-UN-BRKT Mounting Bracket and DXE-UNFK-5 UNUN to MBVE-5 Feedpoint Connection Kit	MFJ-993/4BRT Brackets	MFJ-993BRT Tuner 300 Watt	MFJ-994BRT Tuner 600 Watt	MFJ-998RT Brackets	MFJ-998RT Tuner 1500 Watt
DXE-MBVE-5A	X	X			Req'd					
DXE-MBVE-5A-4P	X	X		X	Req'd					
DXE-MBVE-5A-4UP	X	X			X					
DXE-MBVE-5A-4UPR	X	X		X	X					
DXE-MBVE-5AE-BRT	X		X	optional	not applicable	X				
DXE-MBVE-5AEBRT3	X		X	X	not applicable	X	X			
DXE-MBVE-5AEBRT4	X		X	X	not applicable	X		X		
DXE-MBVE-5AE-RT	X		X	optional	not applicable				X	
DXE-MBVE-5AERT8	X		X	X	not applicable				X	X

X = Included Req'd = Required (see text) optional = Purchase is optional (see text explaining the importance of a radial system)

DXE-MBVE-5A60MCK: Also available is a conversion kit to change the MBVE-5A Multi-Band antenna into a 60 meter Mono-Band Antenna

DXE-MBVE-5 or 5A Remote Tuner Upgrade Models Available

If you are upgrading from an existing DXE-MBVE-5 or 5A system with the original short base tube to a MBVE-5A with a MFJ-993BRT, MFJ-994BRT or MFJ-998RT remote tuner, the following upgrade kit options are available.

Upgrade kits include new longer base tube, brackets, remote tuners as selected below.

DX Engineering Upgrade Model Numbers	DXE-MBVE-5AEBASE - Long Base	DXE-RADP-3 Radial Plate	DXE-MBVE-THW Hardware Kit	DXE-MBVE-TBHW Hardware Kit	DXE-MBVE-5A-UJHW Hardware Kit	MFJ-993/4BRT - Brackets	MFJ-993BRT - Tuner 300 Watt	MFJ-994BRT - Tuner 600 Watt	MFJ-998RT - Brackets	MFJ-998RT - Tuner 1500 Watt
DXE-MBVE-5UG-BRT	X	optional	X		X	X				
DXE-MBVE-5UGBRT3	X	optional	X		X	X	X			
DXE-MBVE-5UGBRT4	X	optional	X		X	X		X		
DXE-MBVE-5UG-RT	X	optional		X	X				X	
DXE-MBVE-5UGRT8	X	optional		X	X				X	X

X = Included optional = Purchase is optional (see text explaining the importance of a radial system)

PLEASE - Read the entire manual to be familiar with the various options available. *Some of the assembly steps are common for all models.*

This manual describes in detail the DXE-MBVE-5A-4UPR antenna package which includes the basic antenna with the DXE-RADP-3 Radial Plate, DXE-43 UNUN and DXE-UN-BRKT.

Other sections in this manual describe the models using the remote tuner options.

Refer to the DXE-MBVE-5A60MCK if you are converting the MBVE-5A to a Mono-Band 60 Meter Antenna

Upgrade kits for existing MBVE-5/5A systems use the kit parts for MFJ-993/994BRT or MFJ-998RT remote tuner option installations.

The vertical elements for all models are the same.

The SAF-T-TILT™ Base is the same for all models with one exception. The thick wall base tube is longer for the tube mounted remote tuner options.

This manual describes in detail the **DXE-MBVE-5A-4UPR** antenna package which includes the basic antenna with the **DXE-RADP-3** Radial Plate, **DXE-43 UNUN** and **DXE-UN-BRKT**.

Tools Required

Two 7/16" wrenches, (one of them should be open-end)
5/16", 3/8", 9/16", and 3/4" wrenches or
5/16", 3/8", 9/16", and 3/4" sockets and drive
Medium size flat blade screwdriver or 5/16" nut driver for the element clamps
Medium size flat blade screwdriver or 1/4" nut driver for the smaller element clamps
Tape measure
Black Felt-tip marker or pencil

WARNING!

INSTALLATION OF ANY ANTENNA NEAR POWER LINES IS DANGEROUS



Warning: Do not locate the antenna near overhead power lines or other electric light or power circuits, or where it can come into contact with such circuits. When installing the antenna, take extreme care not to come into contact with such circuits, because they may cause serious injury or death.

Overhead Power Line Safety

Before you begin working, check carefully for overhead power lines in the area you will be working. Don't assume that wires are telephone or cable lines: check with your electric utility for advice. Although overhead power lines may appear to be insulated, often these coverings are intended only to protect metal wires from weather conditions and may not protect you from electric shock. Keep your distance! Remember the 10-foot rule: When carrying and using ladders and other long tools, keep them at least 10 feet away from all overhead lines - including any lines from the power pole to your home.

Suggested Parts

DXE-RADP-3 - Radial Plate, Stainless Steel with 20 Sets of SS Radial Attachment Hardware

The patented DX Engineering Radial Plate is meant for those of you that have or are building a quarter wave vertical antenna and who want an easy, neat and effective way to connect those essential radial wires and the coax to your vertical antenna for the lowest takeoff angle and strongest signals. DX Engineering Radial Plate is laser cut from tough stainless steel so that it has smooth edges, won't corrode and will always look good. You will be proud of how good your installation looks. This plate will work perfectly with most commercially available vertical antennas.



DXE-SSVC-2P - Stainless Steel V-Clamp for steel pipe, 2 inch V-bolt

This V-Clamp is made in one size that fits Steel tubing or pipe from 1" to 2" OD as used in antenna construction. The supplied V-bolt is long enough to attach tubing to thick plates and is made with anti-corrosive properties. The special Stainless Steel saddle has serrated teeth will clamp to the pipe securely by biting into the surface. For this reason, it is not recommended for softer aluminum tubing or pipe. Ideal for fastening a radial plate and antenna mounting to a steel pipe.



- Used to clamp 1 to 2" (OD) steel tubing or pipe
- Designed for attachments that don't require resistance to torque
- V-bolt and saddle made from high-strength 18-8* stainless steel
 - *The use of an anti-seize compound is HIGHLY recommended to achieve proper torque and prevent galling.

DXE-RADW Radial Wire Kits and Components

There are optional DX Engineering Radial Wire Kits available. **DXE-RADW-500K/BD** contains a 500 foot spool of 14 gauge copper stranded wire with black relaxed PVC insulation, 20 Terminal Lugs and 100 Steel or Biodegradable Lawn Staples. The **DXE-RADW-1000K/BD** Radial Wire Kit contains a 1,000 foot spool of 14 gauge copper stranded wire with black relaxed PVC insulation, 40 Terminal Lugs and 200 Steel or Biodegradable Lawn Staples. **RADW-20RT, -32RT** or **-65RT** contain 20 each radial wires with 1/4" terminal attached. These kits come in 20 Ft, 32 Ft, or 65 Ft lengths.

DXE-GUY-200 Guying Kit for Vertical Antennas

Some vertical antenna manufacturers indicate their antennas do not need guying. During times of high winds or ice loading, some of these vertical antennas may sustain damage or fail altogether. With the small amount of effort needed to install a four point guying system, the risk hardly seems worth taking. A four-point guying scheme provides the best mechanical advantage to reduce wind stress, regardless of direction. A four point guying system is recommended for use with the DX Engineering **SAF-T-TILT™** Base, because just one of the guy ropes has to be loosened when you tilt the vertical antenna down. The remaining guys help stabilize the vertical antenna in three directions when being raised. For details on guying this antenna, refer to the **Guying a Vertical Antenna System** page.

Additional Material Needed but not Supplied:

- **JTL-12555 Jet-Lube™ SS-30 Pure Copper Anti-Seize 12555** - To ensure good electrical and RF connection for Aluminum Element Sections and also used on the threads of Stainless Steel Hardware to prevent galling (seizing) and aid in proper tightening.
- **For a new installation: Antenna Mounting** - Steel mounting pipe, up to 2.0" OD, 0.25" wall thickness. A standard 1-1/2" galvanized water pipe (with its 1.9" OD) will work for this application and can usually be found at your local home building supply store. DX Engineering also has the **DXE-VGMT-2CG** Steel tubing for ground mount antennas made from high strength Chromoly: 2 inch OD x .25 wall thickness x 5 foot 4 inch length.
- **For a new installation: Quick-Set or other type of Concrete** - Mounting pipe installation (type depends on your particular conditions and landscape).

Basics for All New Installations

Site Selection

Select a mounting location clear from power lines, structures and other antennas by a minimum of 55 feet. **Consider overhead power lines, utility cables and wires.** The vertical should be mounted away from local noise sources or other metallic objects which can re-radiate noise and affect the tuning, radiation pattern and SWR. Determine the direction you want the antenna to tilt down and make sure there is adequate clearance (at least 55 feet). There should also be a clear diameter of 70 to 130 feet from the antenna for the guying and radial systems that will extend away from the antenna.

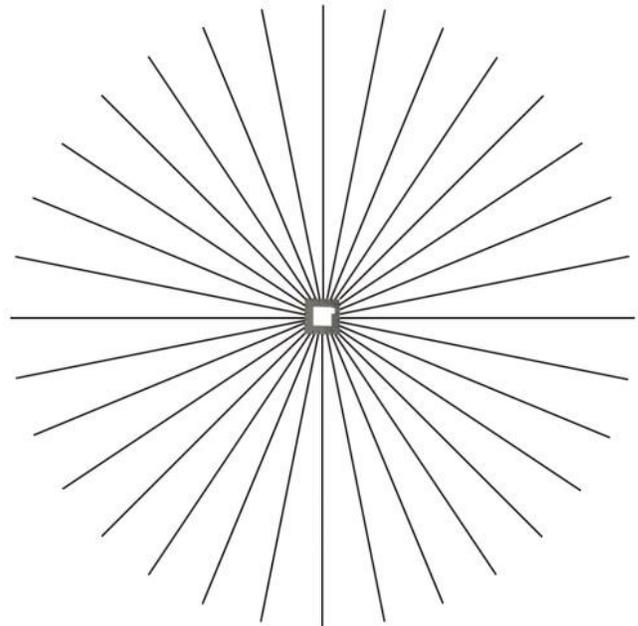
Radial System

The use of a radial system **is a key requirement** for any high performance quarter wave vertical antenna system. With a vertical antenna system, the radials are the second half of the antenna. The radials contribute to the radiation efficiency of the entire vertical antenna system.

At a minimum, 20 radials, each 32 feet long, should be used with this antenna. Using 32 radials at 65 feet long is preferred and highly recommended. The extra radials help overcome unknown poor-soil conditions, improve bandwidth, and ensure the best performance possible from the vertical antenna. **DXE-RADW** Radial Wire, a 14 gauge stranded copper with black relaxed PVC insulation wire is suggested for the best results.

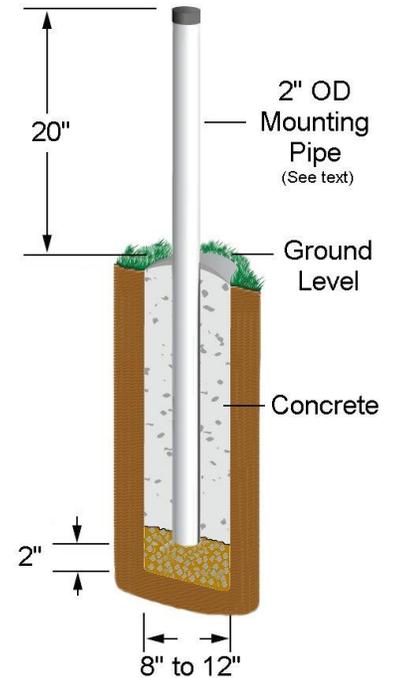
The wire radials should be placed as symmetrically as possible straight from the feedpoint around the vertical antenna and spaced evenly, regardless of how many radials are used. Do not cross or bunch any radial wires as this nullifies their effectiveness. If you have limited space, put in as many straight radials as you can. The radials must be connected to the shield of your feedline. The **DXE-RADP-3** Stainless Steel Radial Plate is the ideal optional item which provides an excellent system for attaching radial wires to your vertical antenna system.

Radial wires can be laid on the roots of the grass using **DXE-STPL** Radial Wire Anchor Pins to hold them down. Using enough staples will ensure the wires will not be snagged by mowers, people, or animals. Grass will quickly overgrow the radials and it will be virtually impossible to see them. An article describing this process is available on the DX Engineering website. Radials can also be buried just under the surface by using a power edger to make a slit in the soil.



Mounting Pipe

Use a customer supplied thick-walled galvanized steel mounting pipe *at least* 4 feet long. This will allow approximately 2 feet or more to be below ground and 20 inches above ground. A thick-walled steel pipe 1-3/4" OD to 2" OD *maximum* is recommended with a minimum thickness of 1/8" (1/4" preferred) should be used. **A steel mounting pipe, up to 2.0" OD, 0.25" wall thickness. A standard 1-1/2" galvanized water pipe (with its 1.9" OD) will work for this application and can usually be found at your local home building supply store. DX Engineering also has the DXE-VGMT-2CG Steel tubing for ground mount antennas made from high strength Chromoly: 2 inch OD x .25 wall thickness x 5 foot 4 inch length.** For permanent mounting, use a post-hole digger to make the hole deep enough to accommodate at least 2 feet of pipe and a couple inches of gravel at the bottom for drainage. Set the mounting pipe on the gravel, use the pre-mix concrete to fill around the pipe, adding water and mixing as you fill or mix the concrete first, then pour in the hole (depends on the type of quick concrete you purchase). Fill the hole until the concrete is level with the ground around it. Use a level on the mounting pipe as you fill the hole to be sure it is vertically straight. Allow to set overnight or per the concrete manufacturer's recommendations. Your location, landscape and ground conditions may require different mounting solutions in order to have the steel mounting pipe and the vertical antenna in a secure position. A black vinyl cap (DXE-VC-2000, for 2" pipe) can be used to cap the top of the mounting pipe to prevent water and debris from getting into the pipe.



Note: Galvanized steel, rather than aluminum, is much more suitable for mounting in concrete. Aluminum will quickly corrode due to incompatibility with the materials used to make concrete.

Assembly

Carefully un-box the antenna and separate the various parts. All of the element sections are 36" long. The 2-1/8" OD antenna element is slit on one end and drilled on the other end. All the other sections are slit on one end except for the top 3/8" OD element.

*Note: JTL-12555 Jet-Lube™ SS-30 Anti-Oxidant must be used between all antenna element sections. Jet-Lube™ SS-30 is an electrical joint compound to affect a substantial electrical connection between metal parts such as **aluminum tubing** or other antenna pieces. It ensures high conductivity at all voltage levels by displacing moisture and preventing corrosion or oxidation. Jet-Lube™ SS-30 **must** be used on all **element clamps and stainless steel threaded hardware** to provide good electrical contact, prevent galling, allowing easier disassembly and to ensure proper tightening.*

Note: The following assembly instructions are based on the MBVE-5A-4UPR which includes the DXE-RADP-3 Radial Plate and the DXE-UN-43 UNUN, DXE-UN-BRKT Bracket with hardware using a customer supplied 2" OD Mounting Pipe.

Note: For reference purposes, an exploded drawing of the completed SAF-T-TILT™ base is show in **Figure 21**.

Radial Plate to Mounting Pipe

Install the patented **DXE-RADP-3** Radial Plate on the 2" OD customer supplied mounting pipe using the **DXE-SSVC-2P** V-Bolt Saddle Clamp as shown in **Figure 1**. A steel mounting pipe, up to 2.0" OD, 0.25" wall thickness. A standard 1-1/2" galvanized water pipe (with its 1.9" OD) will work for this application and can usually be found at your local home building supply store. DX Engineering also has the **DXE-VGMT-2CG** Steel tubing for ground mount antennas made from high strength Chromoly: 2 inch OD x .25 wall thickness x 5 foot 4 inch length. Mount the Radial Plate so you have approximately 1" of space between the bottom of the plate and the ground level. This will allow easy access to install the radial wire hardware. The **DXE-RADP-3** Radial Plate comes with 20 sets of stainless steel hardware for mounting the radial wires. Additional hardware kits are available from DX Engineering: **DXE-RADP-1HWK** contains 20 sets of Radial Plate Hardware. Check which direction you want the antenna to tilt. Mount the radial plate as shown in relation to the **SAF-T-TILT™** Tilt Base. For reference, **Figure 19** shows a completed installation.

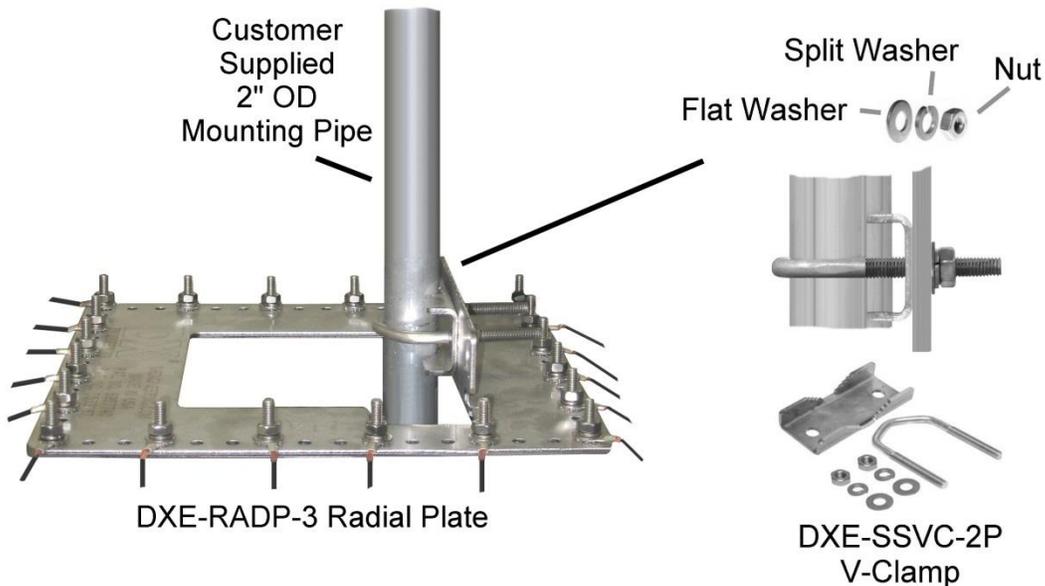


Figure 1 - DXE-RADP-3 Radial Plate Installation on customer supplied mounting pipe

Attaching the optional Ground Radial Wires to the Radial Plate

Using the 20 sets of supplied 1/4" stainless steel hardware (Bolt, Star Washer, Flat Washer, Split Washer, Nut) connect the optional ground radial wires to the **DXE-RADP-3** Radial Plate as shown in **Figure 2**. Additional hardware kits are available from DX Engineering: **DXE-RADP-1HWK** includes 20 sets of Radial Plate Hardware.

There are optional DX Engineering Radial Wire Kits available. **DXE-RADW-500K/BD** contains a 500 foot spool of 14 gauge copper stranded wire with relaxed black PVC insulation, 20 Terminal Lugs and 100 Steel or Biodegradable Lawn Staples. The **DXE-RADW-1000K/BD** Radial Wire Kit contains a 1,000 foot spool of 14 gauge copper stranded wire with relaxed black PVC insulation, 40 Terminal Lugs and 200 Steel or Biodegradable Lawn Staples. **RADW-20RT, -32RT** or **-65RT** contain 20 each radial wires with 1/4" terminal attached. These kits come in 20 Ft, 32 Ft, or 65Ft lengths. See these and other options available listed at the end of this manual.

Depending on the number of radial wires used, space them out evenly around the Radial Plate like the spokes on a wheel. The Radial Plate will accommodate up to 60 radial wires (60 laser drilled holes), or up to 120 radials if doubled up.

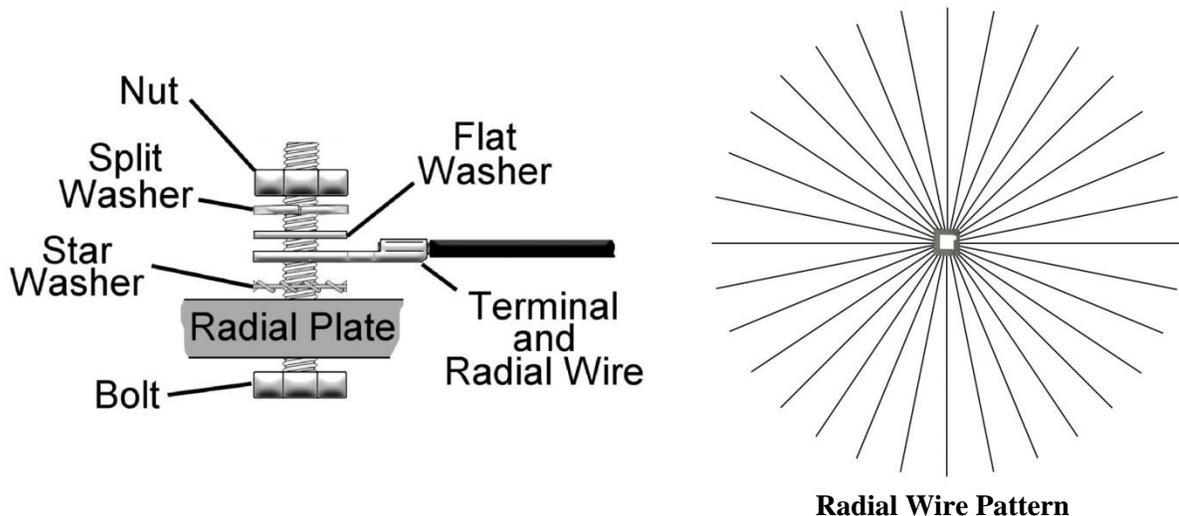


Figure 2 - Radial Wire Hardware Installation

Tilt Base to Mounting Pipe

Install the **SAF-T-TILT™** Tilt Base to the 2" OD mounting pipe using the two 3/8" SSVC V-Bolt Saddle Clamps allowing approximately 3-1/2" clearance between the bottom of the tilt base plate, to the top of the **DXE-RADP-3** Radial Plate as shown in **Figure 3**.

Make sure the Tilt Base and **DXE-RADP-3** Radial Plate are oriented correctly for the direction you wish to tilt the antenna. See **Figure 11** which shows the tilt action.

Tighten the V-clamps evenly so the length of the exposed threads is approximately equal. Any clamp should be tightened evenly from side-to-side with an equal amount of thread above each nut. Once tight, place a Black Vinyl Cap on the threaded ends of the V-Clamps as shown in **Figure 3**.

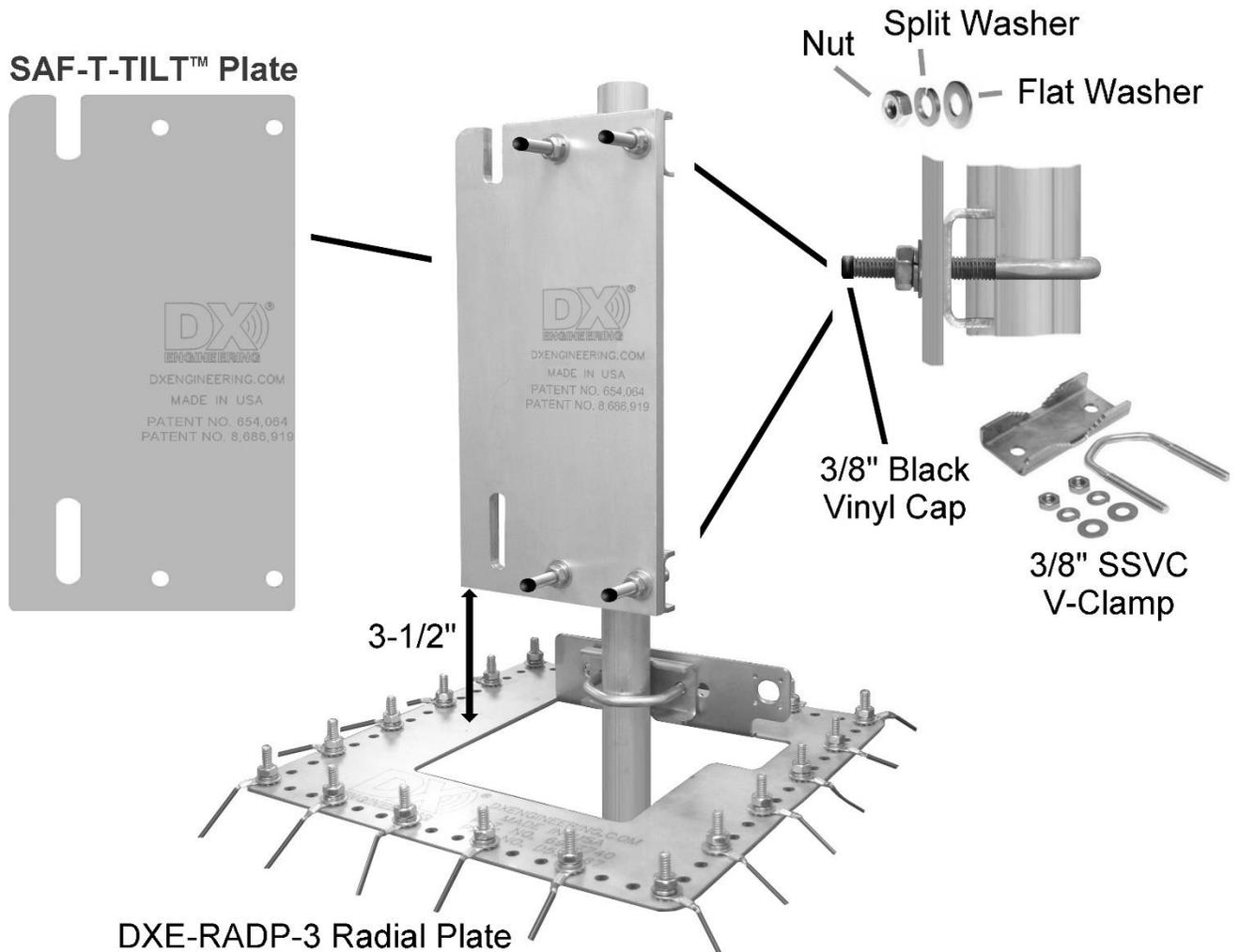
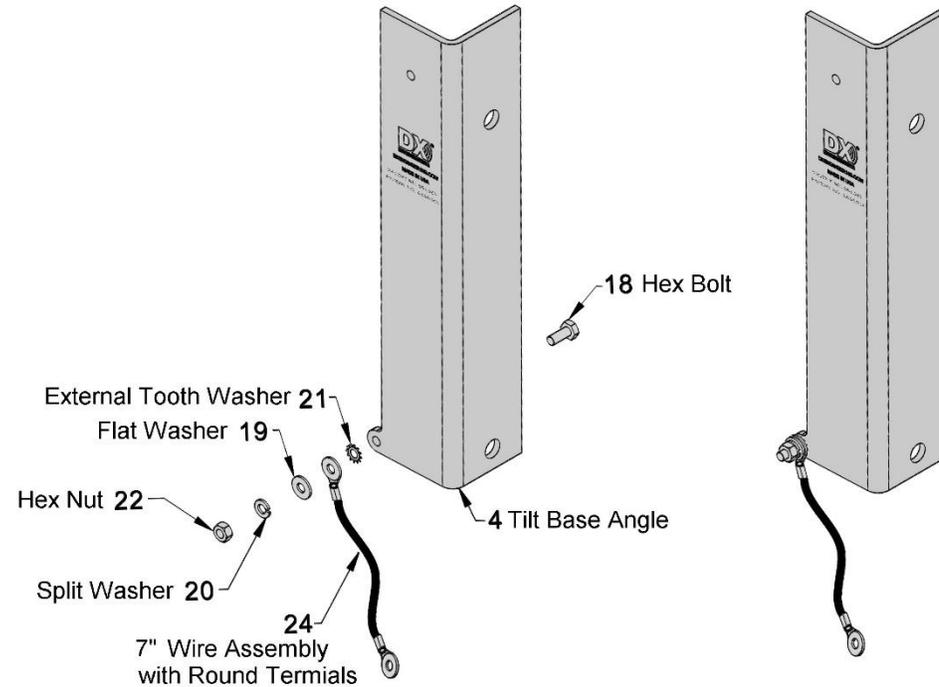


Figure 3

DXE-MBVE-5A SAF-T-TILT™ Antenna Base Section Assembly

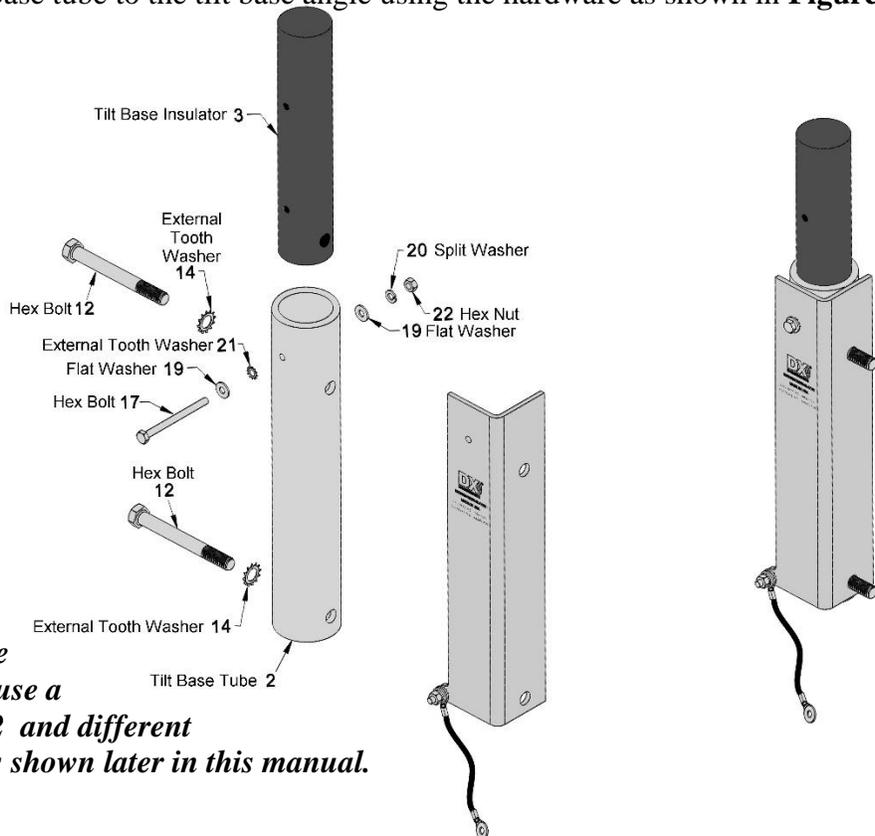
Attach the 7" ground wire with ring terminals to the tilt base angle plate using the hardware as shown in **Figure 4**. Refer to pages 26 & 27 for description of numbered parts.

Figure 4



Attach the tilt base tube to the tilt base angle using the hardware as shown in **Figure 5**.

Figure 5



NOTE: Remote Tuner models use a longer Tube #2 and different Insulator #3 as shown later in this manual.

Attach the completed assembly to the tilt plate using the hardware as shown in **Figure 6**.

Figure 6

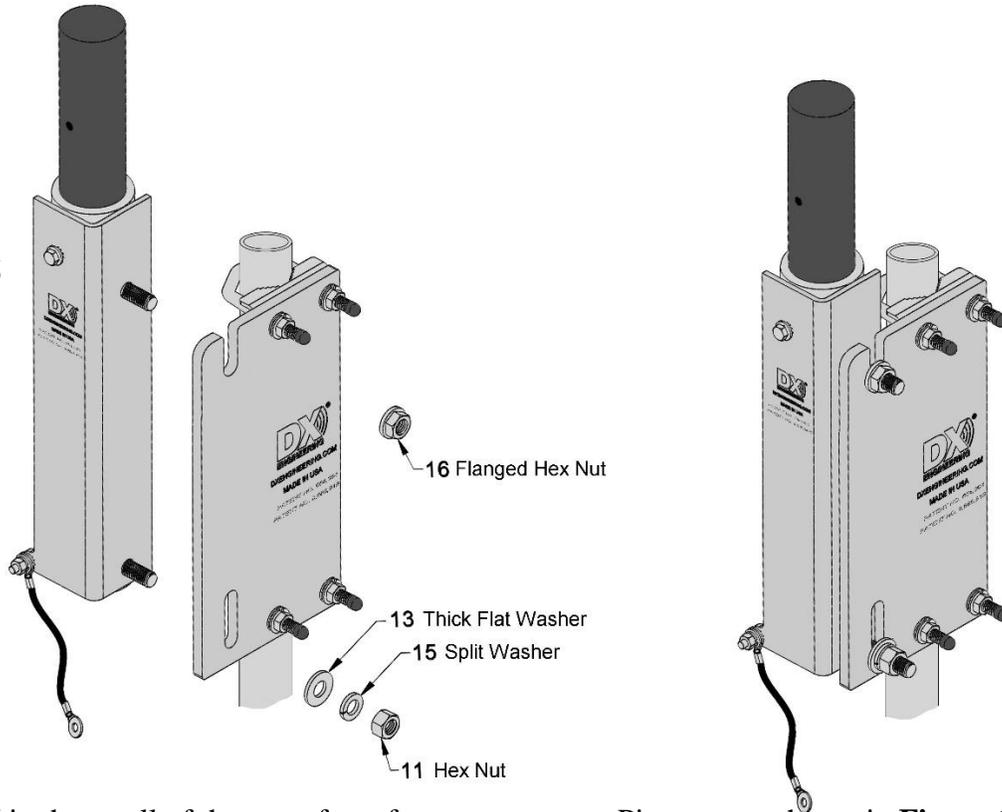
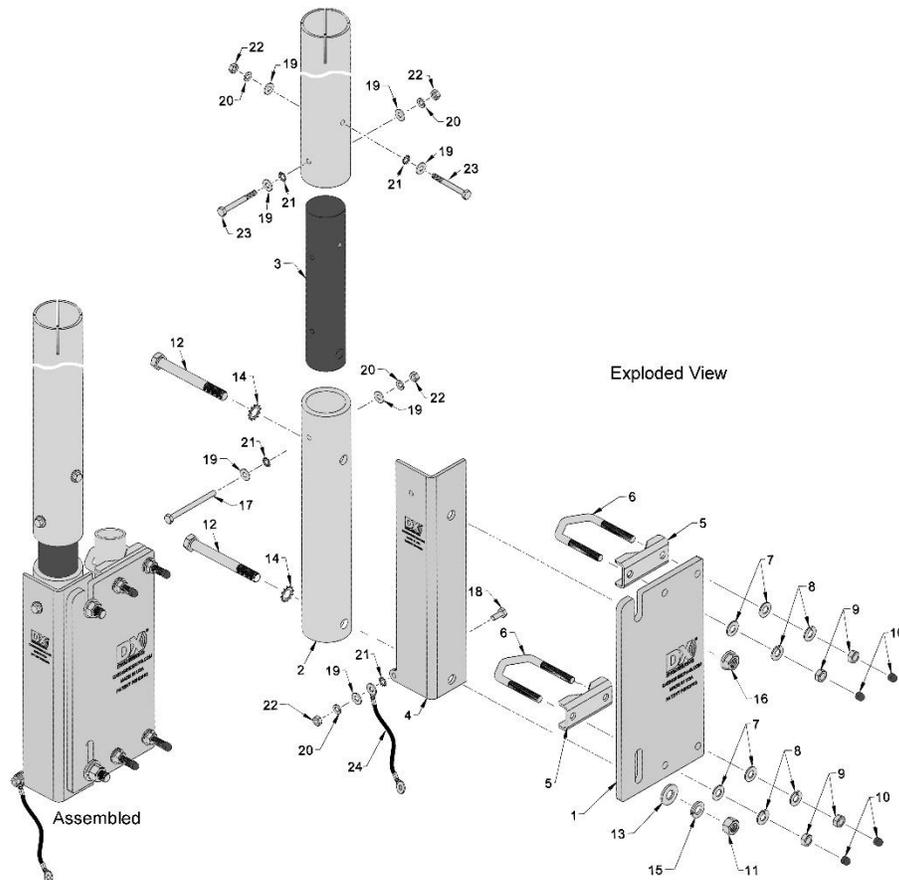


Figure 7 is shows all of the parts for reference purposes. Pictures are shown in **Figure 19** and **Appendix 1** has a full description of numbered parts.

Figure 7



Aluminum Tubing Information

*Note: **JTL-12555 Jet-Lube™ SS-30 Anti-Oxidant** must be used between all antenna element sections. **Jet-Lube™ SS-30** is an electrical joint compound to affect a substantial electrical connection between metal parts such as **aluminum tubing** or other antenna pieces. It ensures high conductivity at all voltage levels by displacing moisture and preventing corrosion or oxidation. **Jet-Lube™ SS-30 must be used on all element clamps and stainless steel threaded hardware** to provide good electrical contact, prevent galling, allowing easier disassembly and to ensure proper tightening.*

When assembling any telescoping aluminum tubing sections you should take the following steps:

1. Make sure the edges are smooth and not sharp. Deburring may be necessary, since burrs and shavings can occur on seams as well as edges. All surfaces need to be completely smooth to allow easy assembly of tubing sections.

Caution

*Aluminum tubing edges can be very sharp.
Take precautions to ensure you do not get accidentally cut.*

The raised particles and shavings that appear when the aluminum tubing is machined are referred to as burrs, and the process by which they are removed is known as deburring.

Deburring is a finishing method used in manufacturing. DX Engineering aluminum tubing is machine cut on both ends and machine slit on one end and you should further assure that there are no ragged edges or protrusions.

Use the **DXE-UT-KIT-DBR** for this operation.



2. Clean the inside of the aluminum tubing to clear out any dirt or foreign material that would cause the aluminum tubing sections to bind during assembly. Do not use any type of oil or general lubricant between the aluminum tubing sections. Oils or general lubricants can cause poor electrical connections for radio frequencies.
3. Clean the outside of the aluminum tubing to clear any dirt or foreign material that would cause the clamps to malfunction during assembly.
4. The use of **JTL-12555 Jet-Lube™ SS-30** is highly recommended. **Jet-Lube™ SS-30** is an electrical joint compound which effects a substantial electrical connection between metal parts such as telescoping aluminum tubing or other antenna pieces. Using **Jet-Lube™ SS-30** assures high conductivity at all voltage levels by displacing moisture and preventing corrosion or oxidation.
5. When assembling the aluminum tubing sections, ensure the area is clear of grass, dirt or other foreign material that could cause problems during assembly of the closely fitted telescoping sections.

Assembling the Vertical Sections

*Note: **JTL-12555 Jet-Lube™ SS-30 Anti-Oxidant** must be used between all antenna element sections. **Jet-Lube™ SS-30** is an electrical joint compound to affect a substantial electrical connection between metal parts such as **aluminum tubing** or other antenna pieces. It ensures high conductivity at all voltage levels by displacing moisture and preventing corrosion or oxidation.*

***Jet-Lube™ SS-30** must be used on all **element clamps and stainless steel threaded hardware** to provide good electrical contact, prevent galling, allowing easier disassembly and to ensure proper tightening.*

Assemble the vertical sections in an area that is flat and has sufficient room for the length of the antenna during assembly. Lay the tubing out in descending OD sizes. Orient the slits in the tubes toward the top of the antenna. The bottom 2.125" (2-1/8") OD base section has slits on one end and the feedpoint connection hole at the bottom end. All the sections are 36" long.

Each tubing section is inserted 4" into the next larger tube. Assembly is easier if the overlaps in the tubing sections are pre-marked. A dark color felt-tip marker works well. Measure and mark 4" from the end of each tube without the slit using a marker so it will be clearly visible.

Locate the 14 Element Clamps.

Element Clamp	Quantity
DXE-ECL-0500 - Element Clamp	1
DXE-ECL-0625 - Element Clamp	1
DXE-ECL-0875 - Element Clamp	2
DXE-ECL-1000 - Element Clamp	1
DXE-ECL-1250 - Element Clamp	2
DXE-ECL-1500 - Element Clamp	2
DXE-ECL-1750 - Element Clamp	2
DXE-ECL-2000 - Element Clamp	2
DXE-ECL-2250 - Element Clamp	1



Refer to **Figure 10** for element clamp sizes and locations. Slide the clamps over each section before putting them together. Align the clamps on each section facing the same direction. For final assembly, all the clamps should be positioned very close to the top of each section and the body of the clamp should be positioned between the slits as shown in **Figure 8**.



Figure 8

Vertical Antenna Elements	Qty
2.125" (2-1/8") x 0.058" x 36" Tube (Slit one end, drilled)	1
2.000" (2") x 0.058" x 36" Tube (Slit one end)	1
1.875" (1-7/8") x 0.058" x 36" Tube (Slit one end)	1
1.750" (1-3/4") x 0.058" x 36" Tube (Slit one end)	1
1.625" (1-5/8") x 0.058" x 36" Tube (Slit one end)	1
1.500" (1-1/2") x 0.058" x 36" Tube (Slit one end)	1
1.375" (1-3/8") x 0.058" x 36" Tube (Slit one end)	1
1.250" (1-1/4") x 0.058" x 36" Tube (Slit one end)	1
1.125" (1-1/8") x 0.058" x 36" Tube (Slit one end)	1
1.000" (1") x 0.058" x 36" Tube (Slit one end)	1
0.875" (7/8") x 0.058" x 36" Tube (Slit one end)	1
0.750" (3/4") x 0.058" x 36" Tube (Slit one end)	1
0.625" (5/8") x 0.058" x 36" Tube (Slit one end)	1
0.500" (1/2") x 0.058" x 36" Tube (Slit one end)	1
0.375" (3/8") x 0.058" x 36" Tube (no slits)	1

Making sure dirt or grass does not adhere to the sections to be joined, insert the marked end of an element tube into the next sized element tube until the 4 inch mark on the element tube is even with the top of the larger element tube section. Position one of the element clamps at the very end, but not hanging over the edge. Make sure the body of the element clamp is positioned between the slits and tighten securely. Repeat the procedure with the marked end of the elements and the other element tubes using one of the element clamps as you work your way up the antenna length. Continue mating the smaller tubes inside the larger ones. Double-check the vertical sections you have just assembled. A black vinyl cap is included for the top of the antenna.

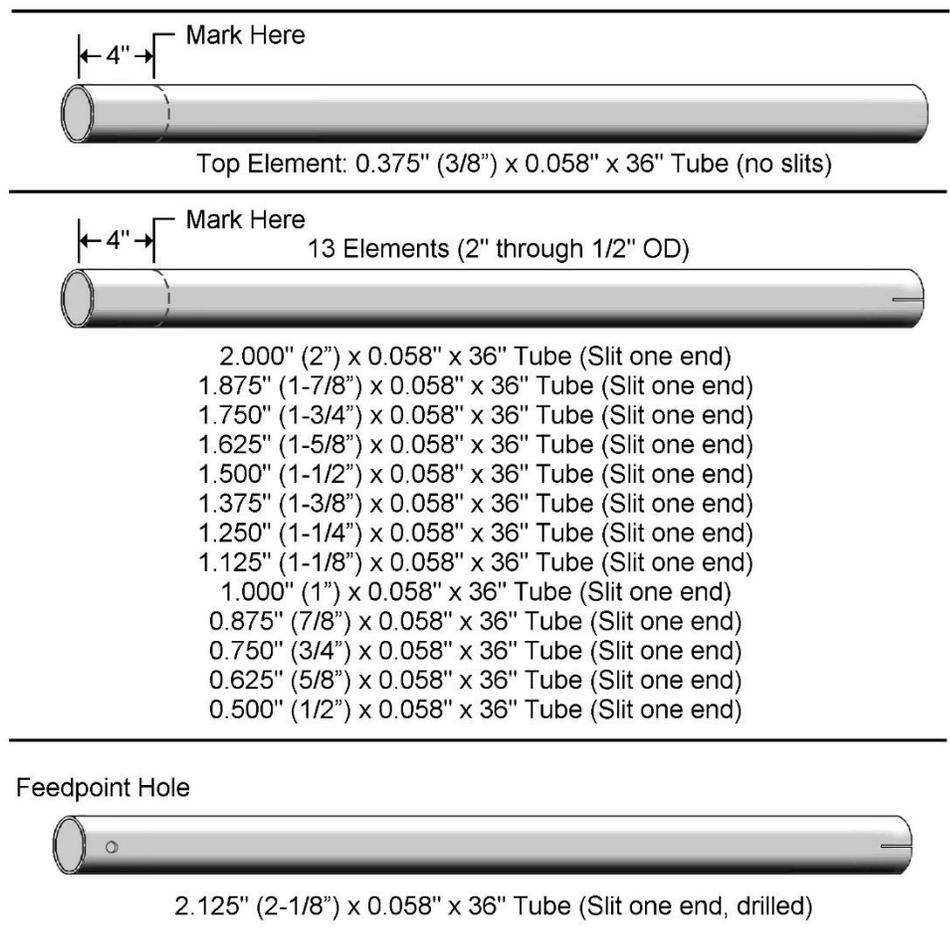


Figure 9

Note: Refer to the **DXE-MBVE-5A60MCK** if you are installing the 60 Meter Conversion Kit - the upper element and black cap are replaced with parts included in the conversion kit.

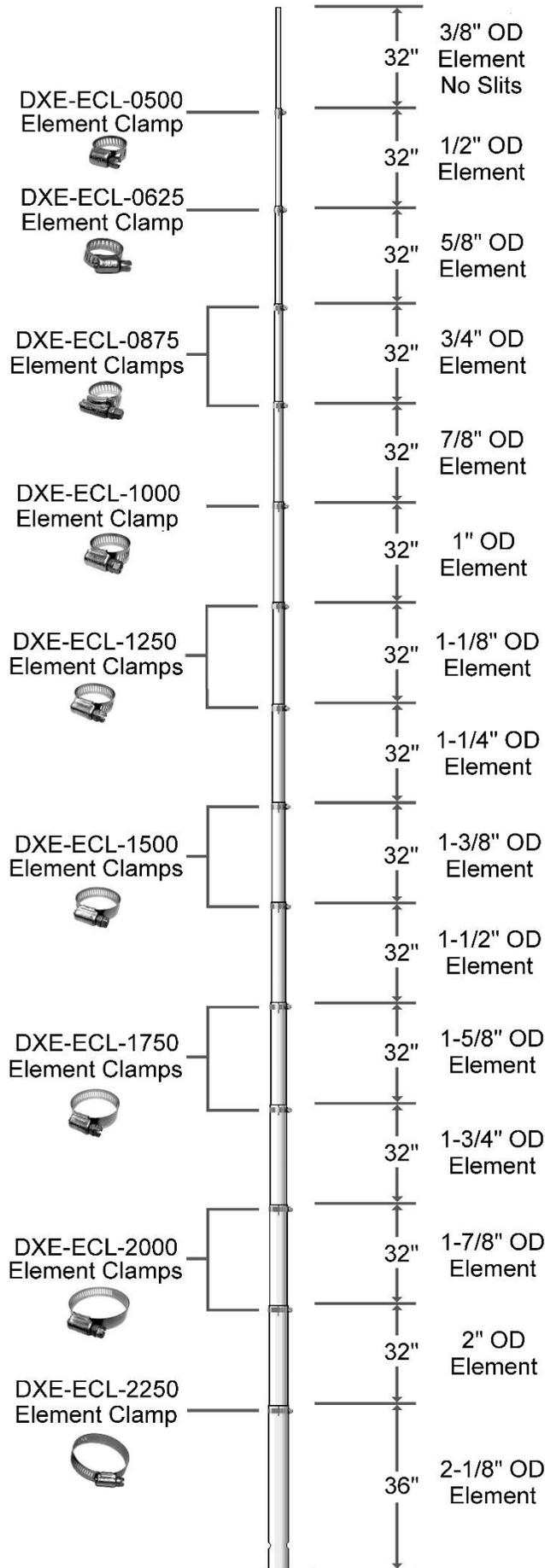


Figure 10
Element Assembly

(Drawing not scale)

Mating the Vertical Sections to the SAF-T-TILT™ Base

Note: Sawhorses or ladders should be used to support the vertical sections during assembly with the SAF-T-TILT™ Base and whenever the vertical is tilted down. As shown in Figure 12.

When the upper element sections are assembled together install the black vinyl cap in place at the top of the smallest element section.

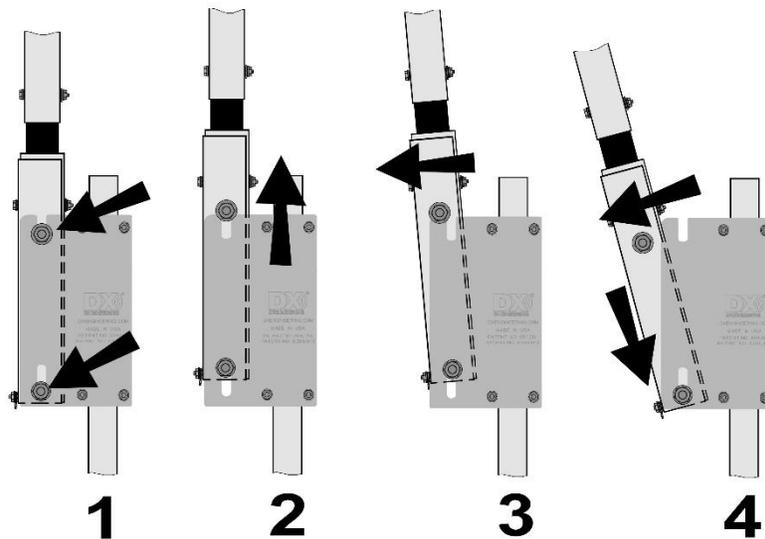


Figure 11 - SAF-T-TILT™ Tilt Action

1. Loosen the two large bolts just enough to allow movement. 1/2 turn or so should be sufficient.
2. Raise the base section up to move the upper bolt out of the safety channel.
3. Slightly tilt until the bolt slides off of the tilt base, which will;
4. Allow the bottom bolt to slide to the bottom of the lower safety channel. You can then lower the antenna as needed. Remember to support the antenna when tilted down. Do not allow the antenna to rest on the ground without support. Doing so may bend the vertical antenna elements. The antenna will normally bend when raising or lowering, but this temporary bending will not be permanent.

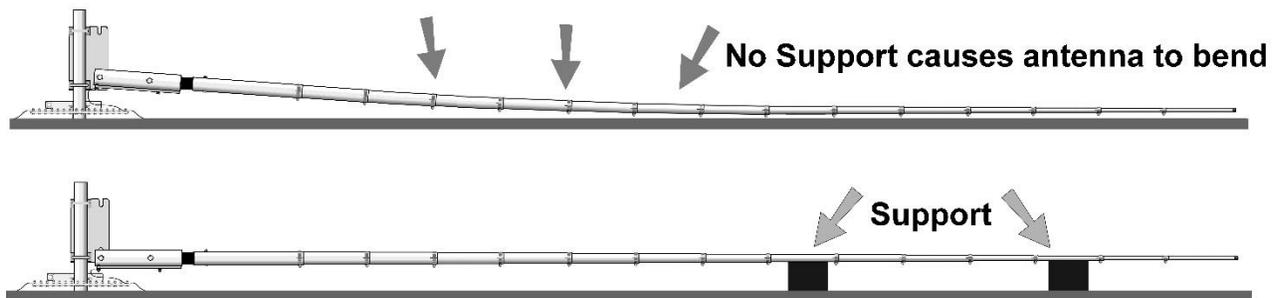


Figure 12 - Supporting a lowered antenna

While holding the base at approximately a 90 degree angle, slide the bottom 2-1/8" OD element section onto the black insulator, aligning up the two holes in the 2" OD aluminum tube with the two holes in the black insulator as shown in **Figure 13**.

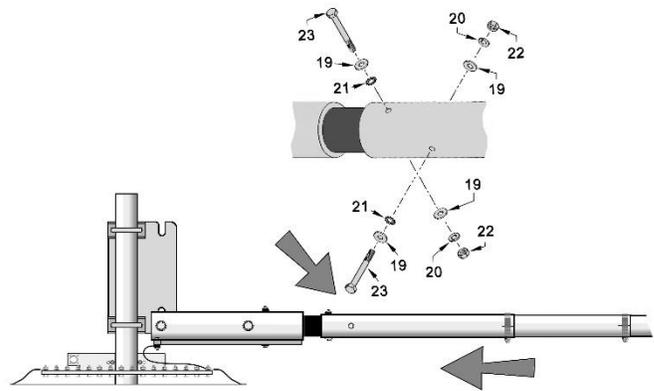


Figure 13 - Mating the vertical antenna to the SAF-T-TILT™ Base assembly

Once the holes are aligned, install the stainless steel hex bolts with the flat washers, external tooth washers, split washers and nuts as shown in **Figure 13**.

Raising the Vertical

DANGER: Make sure you have not inadvertently located the antenna underneath power lines. Residential power lines are often less than 40' high. Contact With Any Power or Utility Lines Can Be Lethal !

The tilt-base certainly makes it easier however, this antenna can be challenging to put up the first time or with gusty winds. If you have properly laid out your optional guy system in advance, it will help keep the vertical stable as you raise it – and stop you from going beyond vertical at the apex of the lift. See the **Guying a Vertical Antenna System** section of this manual for guy rope details. Make sure the optional guy ropes are in the clear before you begin. Under optimum conditions, this is usually a one-person operation.



1

Starting from mid way up the antenna, walk it up slowly using an overhead hand-over-hand motion, maintaining a slow and steady pace.



2

Once you get the antenna near the SAF-T-TILT™ base,



3

Lift and slide to the right (as shown) until the top bolt will,



4

Drop into the SAF-T-TILT™ base slot. Once in place, tighten the upper and lower bolts to secure the antenna in place.

Figure 14 - Raising the SAF-T-TILT™ Base

The antenna mounting channel must be kept in parallel alignment with the tilt-base plate to prevent binding until it is positioned in the tilt-base. Once the antenna is vertical, lift and slide the antenna to the right (as shown above) toward the tilt-base mounting pipe to allow top bolt to line up and drop down into the **SAF-T-BASE™** slot. Once the antenna is fully raised, tighten the tilt base hardware.

When lowering the antenna, it is only necessary to loosen the upper and lower nuts 1/2 turn or so, eliminating the chance of dropping and losing loose hardware on the ground, or trying to reach it when dropped beyond an arm-length away, an unsafe situation.

Assembling the **DXE-UN-BRKT UNUN Mounting Bracket & UNUN** (US Patent No. D597,086)

Using the #6 hex head bolts, #6 flat washers, and #6 Nyloc nuts, attach the **DXE-UN-43 UNUN** to the patented **DXE-UN-BRKT UNUN Bracket** with the SO-239 connector facing as shown below. Tighten the Nyloc Nuts so they are snug. Do not over tighten since the mounting tabs on the UNUN are plastic.

Attach the stainless steel studded element clamps to the UNUN Bracket using the Aluminum Spacers and #10 Nyloc nuts as shown in **Figure 15**. Snug the #10 Nyloc nuts just to the point that you can still rotate the custom studded element clamps. The Nyloc nuts will be tightened later.

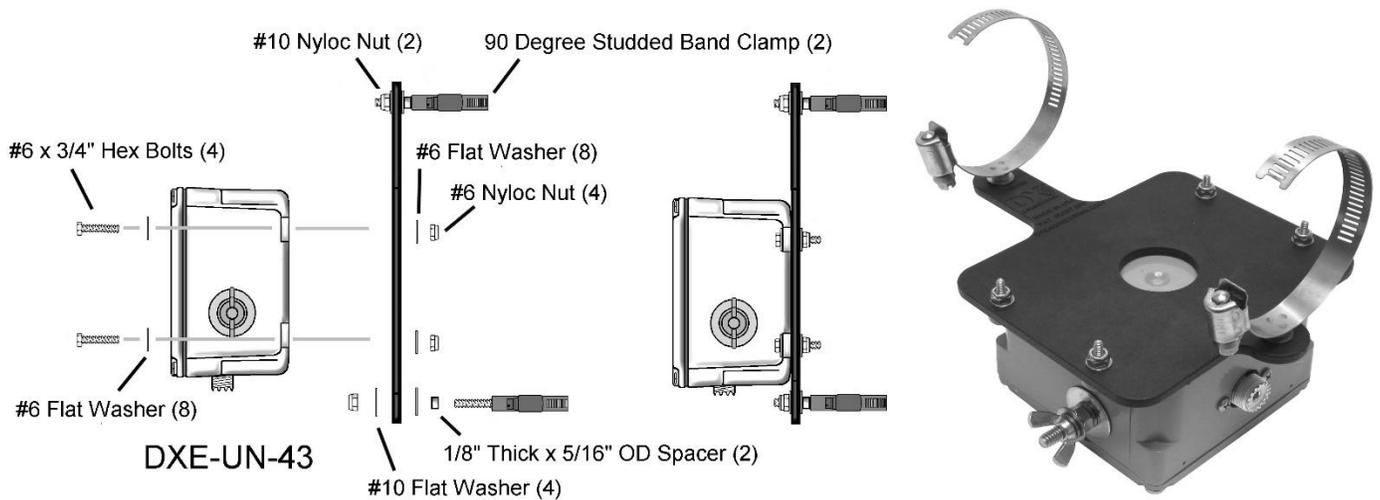


Figure 15

NOTE: If you are installing the optional **DXE-MBVE-5A60MCK** 60 Meter Mono-Band Conversion Kit - you will NOT be using an UNUN. You would use a 1:1 Balun. Refer to the **DXE-MBVE-5A60MCK** Instruction Manual

Installation of UNUN Assembly to Antenna Lower Section

The completed UNUN and UNUN Mounting Bracket assembly are mounted to the antenna lower section. To allow easy installation of the UNUN Bracket to the lower base section, open the upper and lower custom studded element clamps as shown in **Figure 16**.



Figure 16

Position the UNUN and mounting bracket so the bottom element clamp is located between the feedpoint hardware and the black insulator shown in **Figure 17**. Tighten the element clamps to hold the assembly in place. Also tighten the Nyloc nuts that hold the studded element clamps to the UNUN bracket.



Figure 17

**Clamps open, Clamp Ends inserted to go around the antenna element
Tighten in place with UNUN facing outward
Note: the current UNUN mounting bracket is black in color**

Feedline Connections

The **DXE-UN-43** UNUN is attached to the feedline antenna connection using one 6" wire with ring terminals and one 7" wire with ring terminals. Connect the 6" wire with terminals from the antenna feedpoint located on the antenna element to the terminal on the **DXE-UN-43** UNUN closest to the **Red "+"** on the label as shown in **Figure 18**. Do not over tighten the wing nuts. Hand tighten them only, do not use pliers or other tools to over tighten the wing nuts.

Connect the other 7" wire with ring terminals from the terminal on the **DXE-UN-43** UNUN closest to the **Black "-"** on the label to the bolt on the angle plate as shown in **Figure 18**.

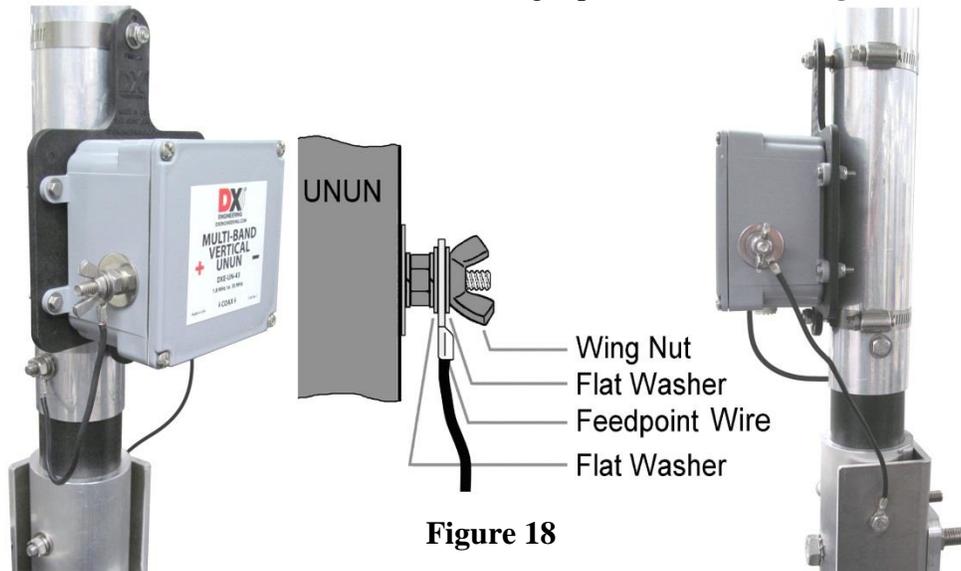


Figure 18

Your coaxial cable from the radio connects direct to the SO-239 connector on the **DXE-UN-43** UNUN. Weatherproof this coaxial connection using Scotch[®] Super 33+ and 3M Temflex[™] 2155 Rubber Splicing Tape.

Tuning the Vertical Antenna System

This trapless, non-resonant vertical antenna system, with element tubing of nearly 41 feet and the grounded mounting bracket of about 2 feet above the radial system, requires the use of a customer supplied, high quality, wide range outboard tuner. There is no requirement for antenna length adjustment. There is no need for a specific element length, like 43 feet, on a non-resonant antenna system that is force-fed onto many bands with a tuner. The tuner simply needs to be capable of tuning the **wide range** of impedances presented by the antenna and coaxial cable at all typical operating frequencies for this type of system.

Manual antenna tuners capable of this type of antenna's impedance range generally have a good size switched or roller inductor and at least one, but preferably two large variable capacitors for better SWR adjustment.

Tuners which are built into transceivers lack sufficient impedance tuning range for this type of high performance vertical antenna system.

The actual impedance of the multi-band antenna is affected by local conditions, including proximity to structures, other antennas, number of radials, or personal preference for the mounting location. It may be necessary to adjust the top element section slightly longer or shorter, or to vary the length of the coaxial cable, if tuning to best SWR is not achieved with your tuner on all bands.

The performance of this versatile, rugged antenna is highly dependent on the ability of your tuner to deliver a low SWR when tuned. Refer to your tuner user's manual for correct tuner operation.

Coaxial Cable and 160 Meter Notes

A MBVE-5A vertical antenna is a short antenna for 160, but it will get you on the air. In this instance, coaxial cable type is a **very important** item to consider. **DX Engineering recommends a length of 150 feet of DXE-213U an RG-213/U to give most tuners the ability to match the antenna on the lower frequency bands where most tuning problems are encountered.** One needs to examine the complex impedance ($R \pm j$) to see the problem.

On 160 meters, the use of 150 feet of polyethylene dielectric cable (such as **DXE-213U** which has a Velocity Factor of approximately 0.66) will transform the $2 - j183$ impedance at the output of the UNUN to a more tunable $38 + j180$ at the tuner.

If you use 150 feet of coaxial cable that has a Velocity Factor of 0.85 (like foam dielectric LMR-400), the impedance on 160 meters would be transformed to only $3.5 + j45$ – still too low an R value for many tuners. In order to achieve the recommended results, the LMR-400 length would need to be approximately 190 feet.

In general - the higher the R value, the easier it will be for the tuner to match the antenna system to your transceiver.

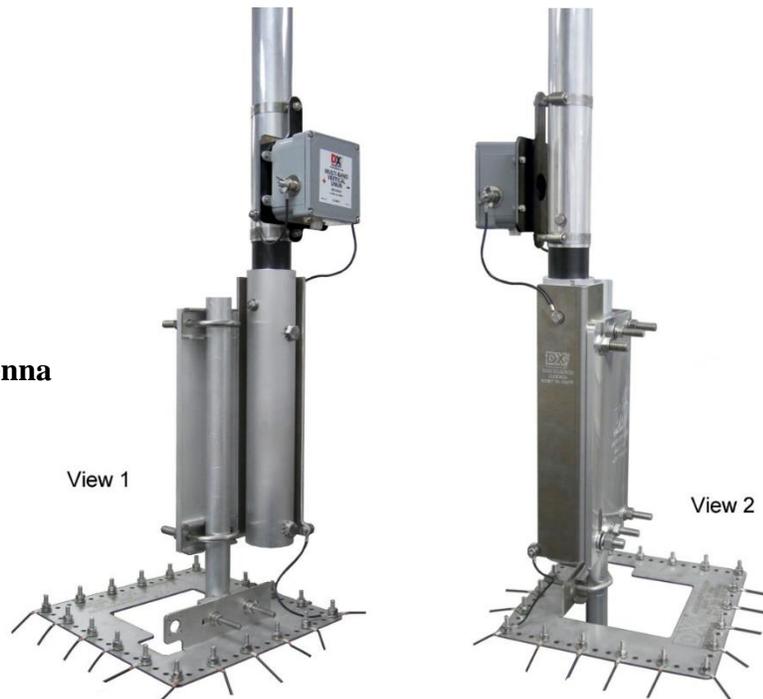


Figure 19
Completed Antenna
Base Pictures

DXE-MBVE-5A Antenna Parts List

SAF-T-Tilt™ Base Assembly (US Patent Nos. 654,064 AND 8,686,919)	Qty	Drawing Ref. Number
Tilt Base Plate - 12" x 6" x 3/8" thick	1	1
Tilt Plate Tube - 2.5" OD x 14" x 1/4" thick, drilled	1	2
Tilt Base Insulator - 2" OD x 10", drilled	1	3
Tilt Base Angle Bracket - laser cut and drilled	1	4
Stainless Steel Saddle for 3/8" V-Bolt	2	5
3/8" Stainless Steel V-Bolt	2	6
3/8" Stainless Steel Flat Washer	4	7
3/8" Stainless Steel Split Lock Washer	4	8
3/8"-16 Stainless Steel Hex Nut	4	9
3/8" Black Vinyl Tube Caps	5	10
1/2" Stainless Steel Hex Nut	1	11
1/2"-13 x 4-1/2" long Stainless Steel Hex Head Bolt	2	12
1/2" Stainless Steel Flat Washer, Thick	1	13
1/2" Stainless Steel External Tooth Washer	2	14
1/2" Stainless Steel Split Lock Washer	1	15
1/2"-13 Stainless Steel Flanged Nut	1	16
1/4"-20 x 3-1/4" long Stainless Steel Hex Head Cap Screw	1	17
1/4"-20 x 3/4" long Stainless Steel Hex Head Bolt	1	18
1/4" Stainless Steel Flat Washer	4	19
1/4" Stainless Steel Split Lock Washer	5	20
1/4" Stainless Steel External Tooth Washer	5	21
1/4"-20 Stainless Steel Hex Nut	5	22
1/4"-20 x 2-3/4" long Stainless Steel Hex Head Cap Screw	2	23
7" 14 ga PVC insulated wire with two 1/4 Round Terminals	1	24
24-1/2" 14 ga PVC insulated wire with one 1/4 Round Terminals	1	For Auto Tuner option

Vertical Antenna Elements and Band Clamps	Qty
2.125" (2-1/8") x 0.058" x 36" Tube (Slit one end, drilled)	1
2.000" (2") x 0.058" x 36" Tube (Slit one end)	1
1.875" (1-7/8") x 0.058" x 36" Tube (Slit one end)	1
1.750" (1-3/4") x 0.058" x 36" Tube (Slit one end)	1
1.625" (1-5/8") x 0.058" x 36" Tube (Slit one end)	1
1.500" (1-1/2") x 0.058" x 36" Tube (Slit one end)	1
1.375" (1-3/8") x 0.058" x 36" Tube (Slit one end)	1
1.250" (1-1/4") x 0.058" x 36" Tube (Slit one end)	1
1.125" (1-1/8") x 0.058" x 36" Tube (Slit one end)	1
1.000" (1") x 0.058" x 36" Tube (Slit one end)	1
0.875" (7/8") x 0.058" x 36" Tube (Slit one end)	1
0.750" (3/4") x 0.058" x 36" Tube (Slit one end)	1
0.625" (5/8") x 0.058" x 36" Tube (Slit one end)	1
0.500" (1/2") x 0.058" x 36" Tube (Slit one end)	1
0.375" (3/8") x 0.058" x 36" Tube (no slits)	1
DXE-ECL-0500 - Element Clamp	1
DXE-ECL-0625 - Element Clamp	1
DXE-ECL-0875 - Element Clamp	2
DXE-ECL-1000 - Element Clamp	1
DXE-ECL-1250 - Element Clamp	2
DXE-ECL-1500 - Element Clamp	2
DXE-ECL-1750 - Element Clamp	2
DXE-ECL-2000 - Element Clamp	2
DXE-ECL-2250 - Element Clamp	1

DXE-MBVE-5A SAF-T-TILT™ Base Section

For reference purposes **Figure 21** shows an exploded view of the **DXE-MBVE-5A** Base Section
(US Patent Nos. 654,064 AND 8,686,919)

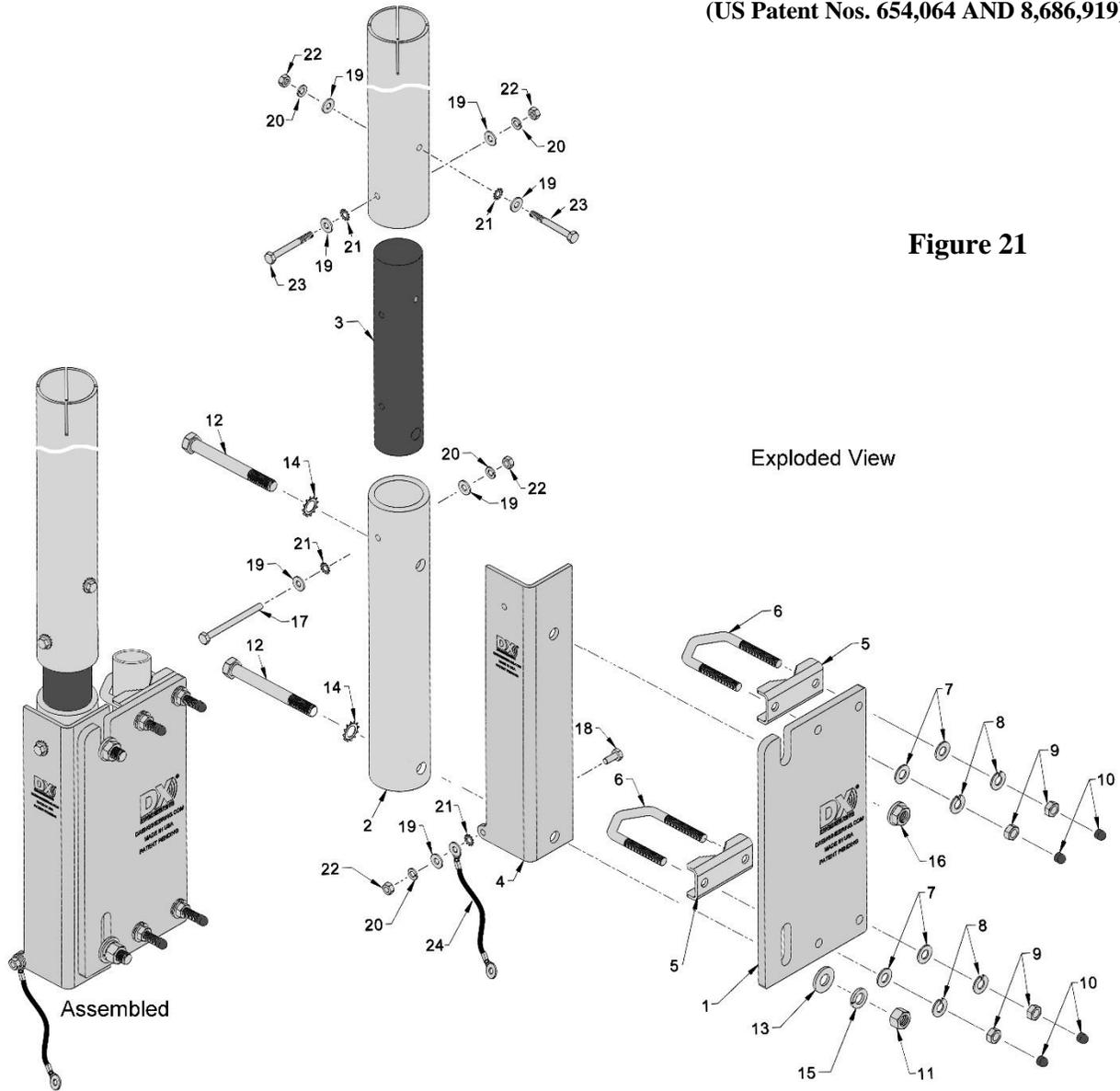


Figure 21

Exploded View

#	Item Description
1	Tilt Base Plate - 12" x 6" x 3/8" thick
2	Tilt Plate Tube - 2.5" OD x 14" x 1/4" thick, drilled
3	Tilt Base Insulator - 2" OD x 10", drilled
4	Tilt Base Angle Bracket - laser cut and drilled
5	Stainless Steel Saddle for 3/8" V-Bolt
6	3/8" Stainless Steel V-Bolt
7	3/8" Stainless Steel Flat Washer
8	3/8" Stainless Steel Split Lock Washer
9	3/8"-16 Stainless Steel Hex Nut
10	3/8" Black Vinyl Tube Caps
11	1/2" Stainless Steel Hex Nut
12	1/2"-13 x 4-1/2" long Stainless Steel Hex Head Bolt

#	Item Description
13	1/2" Stainless Steel Flat Washer, Thick
14	1/2" Stainless Steel External Tooth Washer
15	1/2" Stainless Steel Split Lock Washer
16	1/2"-13 Stainless Steel Flanged Nut
17	1/4"-20 x 3-1/4" long Stainless Steel Hex Head Cap Screw
18	1/4"-20 x 3/4" long Stainless Steel Hex Head Bolt
19	1/4" Stainless Steel Flat Washer
20	1/4" Stainless Steel Split Lock Washer
21	1/4" Stainless Steel External Tooth Washer
22	1/4"-20 Stainless Steel Hex Nut
23	1/4"-20 x 2-3/4" long Stainless Steel Hex Head Cap Screw
24	7" 14 ga PVC insulated wire with two 1/4 Round Terminals

Appendix A - DXE-MBVE-5A- Antenna Package with Extended Base Tube for Remote Tuner Options

As shown in the charts below, the **DXE-MBVE-5A** models, and upgrades for existing **DXE-MBVE-5/5A** antennas, that will be used with one of the remote tuners listed will require the longer base tube (36”), plus other hardware.

DX Engineering MBVE-5A Model Numbers	SAF-T-Tilt™ Base	DXE-MBVE-5AE with Long Base Tube	DXE-RADP-3 Radial Plate	MFJ-993/4RT Brackets	MFJ-993RT Tuner 300 Watt	MFJ-994RT Tuner 600 Watt	MFJ-998RT Brackets	MFJ-998RT Tuner 1500 watt
DXE-MBVE-5AE-BRT	X	X	optional	X				
DXE-MBVE-5AEBRT3	X	X	X	X	X			
DXE-MBVE-5AEBRT4	X	X	X	X		X		
DXE-MBVE-5AE-RT	X	X	optional				X	
DXE-MBVE-5AERT8	X	X	X				X	X

X = Included optional = Purchase is optional (see text explaining the importance of a radial system)

DXE-MBVE-5/5A Upgrade Models Available

Upgrade kits include new longer base tube, brackets, remote tuners as selected below.

DX Engineering Upgrade Model Numbers	DXE-MBVE-5AEBASE - Long Base	DXE-RADP-3 Radial Plate	DXE-MBVE-THW Hardware Kit	DXE-MBVE-TBHW Hardware Kit	DXE-MBVE-5A-UGHW Hardware Kit	MFJ-993/4RT - Brackets	MFJ-993RT - Tuner 300 Watt	MFJ-994RT - Tuner 600 Watt	MFJ-998RT - Brackets	MFJ-998RT - Tuner 1500 Watt
DXE-MBVE-5UG-BRT	X	optional	X		X	X				
DXE-MBVE-5UGBRT3	X	optional	X		X	X	X			
DXE-MBVE-5UGBRT4	X	optional	X		X	X		X		
DXE-MBVE-5UG-RT	X	optional		X	X				X	
DXE-MBVE-5UGRT8	X	optional		X	X				X	X

The assemblies or upgrades that use the extended base tube are basically built the same as the standard **DXE-MBVE-5A** which is described in detail earlier in this manual. The SAF-T-TILT™ base and the aluminum vertical elements are all the same for all of the **DXE-MBVE-5A** models. The only difference is the base tube length (Short Base tube is 14”, Long Base Tube is 36”) and associated hardware.

Figure A-1 - Extended Base Tube Drawing

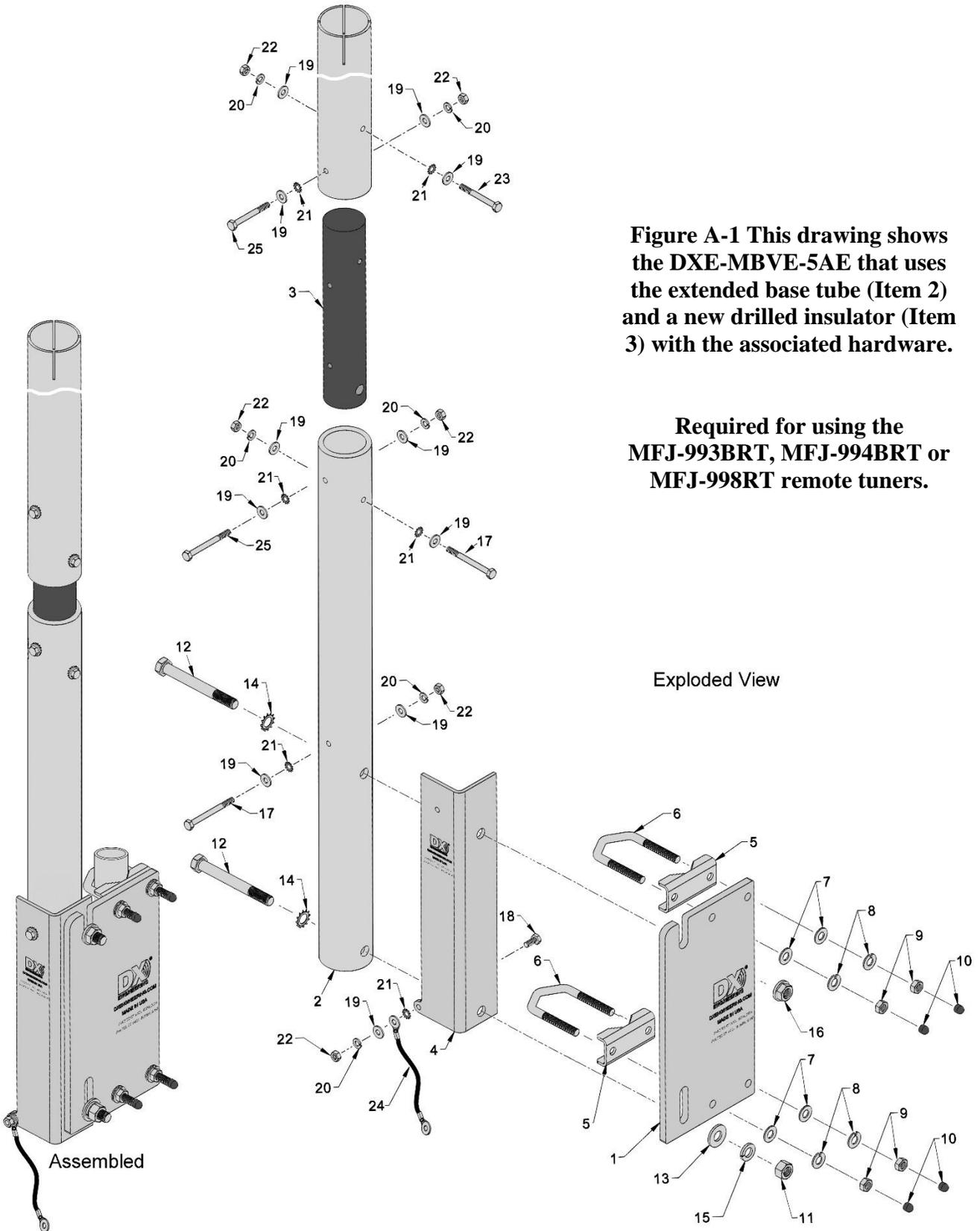


Figure A-1 This drawing shows the DXE-MBVE-5AE that uses the extended base tube (Item 2) and a new drilled insulator (Item 3) with the associated hardware.

Required for using the MFJ-993BRT, MFJ-994BRT or MFJ-998RT remote tuners.

Figure A-2 - Upgrade Hardware for the Extended Base Tube Drawing

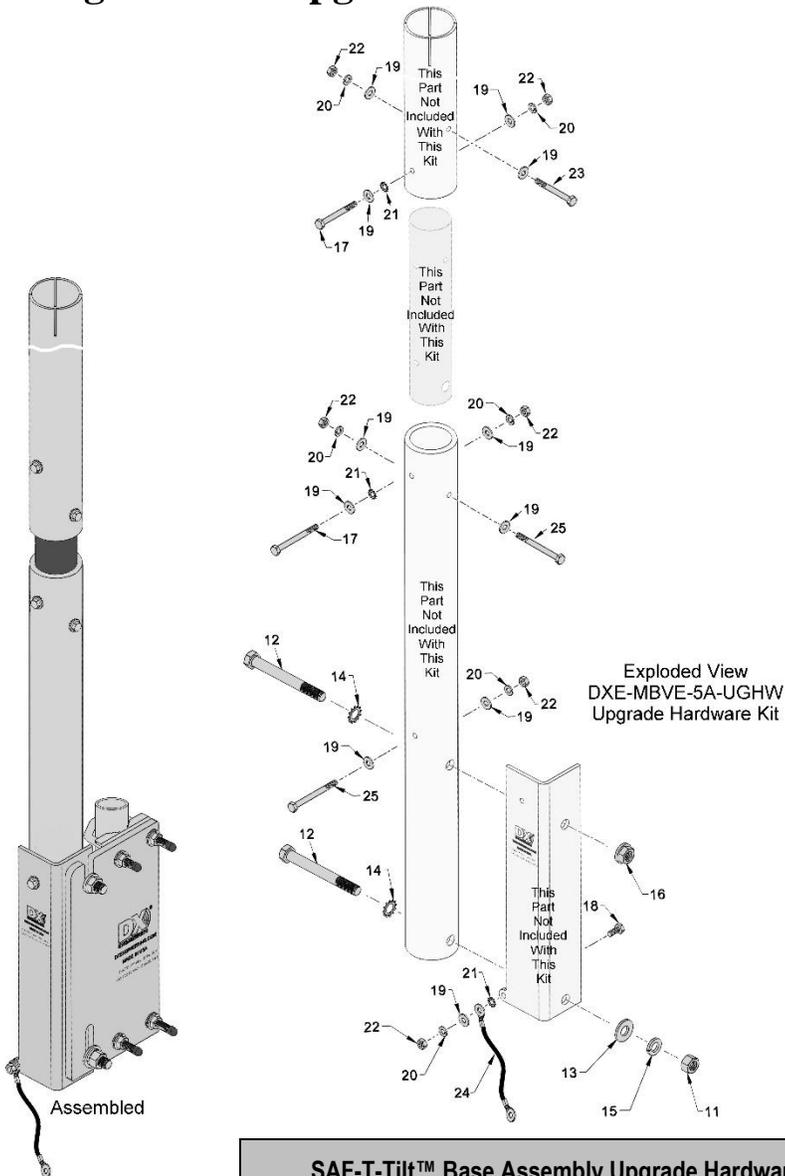


Figure A-2 - This drawing shows the Upgrade Hardware Kit that includes the associated hardware.

For existing systems, the new hardware is supplied with the upgrade kits to make installation easier.

SAF-T-Tilt™ Base Assembly Upgrade Hardware Kit DXE-MBVE-5A-UGHW for the extended base tube option	Qty
1/4"-20 x 3/4" long Hex Head Bolt, Stainless Steel	1
1/4"-20 x 2-3/4" long Hex Head Cap Screw, Stainless Steel	1
1/4"-20 x 3-1/4" long Hex Head Cap Screw, Stainless Steel	2
1/4" Flat Washer, Stainless Steel	11
1/4" Split Lock Washer, Stainless Steel	6
1/4" External Tooth Washer, Stainless Steel	3
1/4"-20 Hex Nut, Stainless Steel	6
1/4"-20 x 3" long Hex Head Cap Screw, Stainless Steel	2
1/2"-13 Hex Nut, Stainless Steel	1
1/2"-13 x 4-1/2" long, Hex Head Bolt, Stainless Steel	2
1/2" Flat Washer, Stainless Steel, Thick	1
1/2" External Tooth Washer, Stainless Steel	2
1/2" Split Lock Washer, Stainless Steel	1
1/2"-13 Flanged Nut, Stainless Steel	1
7" Wire, 14 ga PVC insulated, two 1/4" Ring Terminals	1

Drawing Ref. Number
18
23
17
19
20
21
22
25
11
12
13
14
15
16
24

Appendix B - MFJ-993BRT or MFJ-994BRT Remote Tuner Install

There are 3 complete **DXE-MBVE-5A** antenna systems for use with either the **MFJ-993BRT** or **MFJ-994BRT** Remote Tuner.

DX Engineering Antenna Model Numbers	MFJ-993/4BRT - Brackets	MFJ-993BRT - Tuner 300 Watt	MFJ-994BRT - Tuner 600 Watt
DXE-MBVE-5AE-BRT	X		
DXE-MBVE-5AEBRT3	X	X	
DXE-MBVE-5AEBRT4	X		X

There are two upgrade retrofit kits for existing **DXE-MBVE-5/5A** systems for use with either the **MFJ-993BRT** or **MFJ-994BRT** Remote Tuner. There is also one upgrade kit that has the hardware needed to mount the MFJ-998RT Remote Tuner that the customer already has.

DX Engineering Upgrade Model Numbers	DXE-MBVE-THW Hardware Kit	DXE-MBVE-5A-UGHW Hardware Kit	MFJ-993/4BRT - Brackets	MFJ-993BRT - Tuner 300 Watt	MFJ-994BRT - Tuner 600 Watt
DXE-MBVE-5UG-BRT	X	X	X		
DXE-MBVE-5UGBRT3	X	X	X	X	
DXE-MBVE-5UGBRT4	X	X	X		X

General Information

For new antenna installations (**DXE-MBVE5AE-BRT/BRT3/BRT4**), the antenna is installed as previously out lined in this manual. Additional clamps and hardware are included for mounting the MFJ Remote Tuner (**MFJ-993BRT** or **MFJ-994BRT**). The mounting method for either of these remote tuners is the same as outlined in this section of the manual.

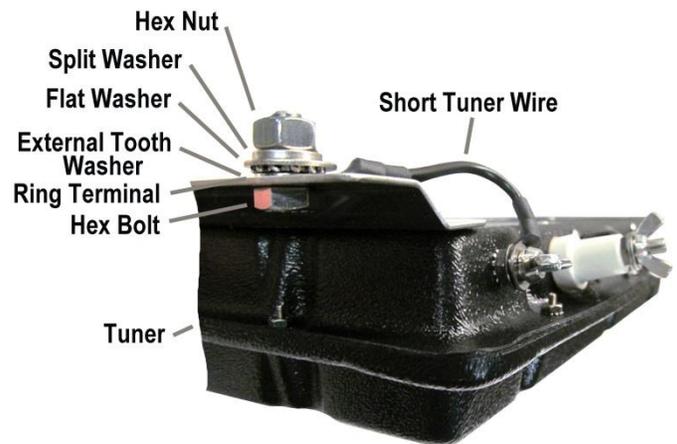
For an upgrade to an existing **DXE-MBVA-5/5A** (as shown in the chart above), the parts in the upgrade kits are installed as outlined in this section of the manual.

The MFJ Remote Antenna Tuner Add-on Kit for the **DXE-MBVA-5/5A** Multi-band Vertical Antennas is a remotely mounted automatic tuner allowing operation up to 300 or 600 Watts depending on the model chosen. The **MFJ-993BRT - 300 Watt** or **MFJ-994BRT - 600 Watt** are the perfect solution for the DX'er who wants improved performance on the multi-band vertical antenna. A Bias Tee is included with these special packages for supplying the +12 Vdc power through the coaxial cable from your radio shack to the remote tuner.

Your coaxial cable from the radio connects direct to the SO-239 connector on the **remote tuner**. Weatherproof this coaxial connection using Scotch® Super 33+ and 3M Temflex™ 2155 Rubber Splicing Tape.

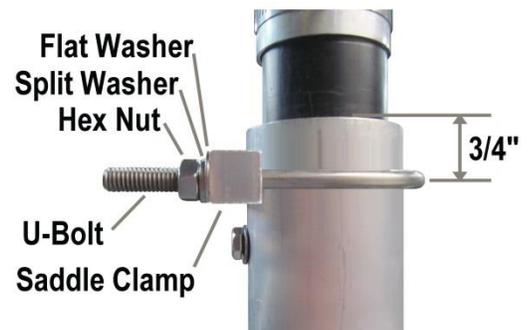
Installing the MFJ-993BRT or MFJ-994BRT option

1. Install the short ground wire in the corner hole on the tuner mounting flange using the 5/16"-18 Hex Nut, 5/16"-18 x 5/8" long Hex Head Cap Bolt, 5/16" Flat Washer, 5/16" External Tooth Washer, 5/16" Split Lock Washer and 3" Wire Assembly. The other end of the short 3" tuner wire goes to the tuner ground wing nut connection on the tuner as shown.



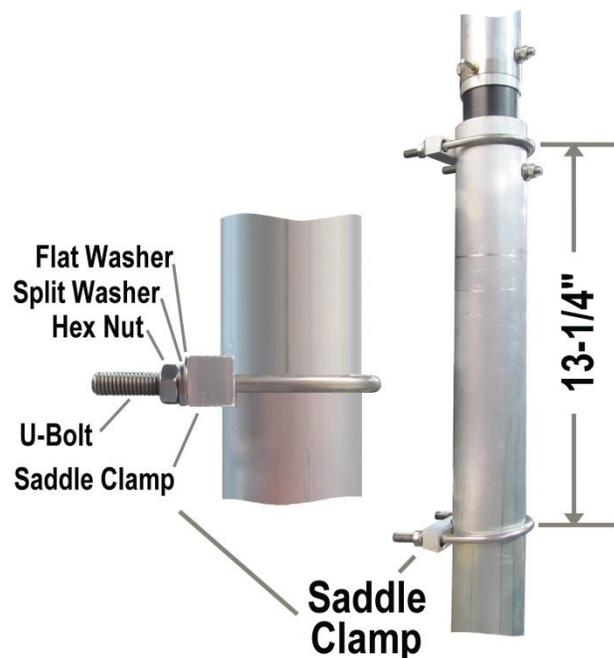
2. Position one of the tuner mounting aluminum V-saddle clamps 3/4" below the top of the thick wall tube as shown. Refer to the photos on Page 36 for the positioning of the clamps in as compared to the antenna base.

Use two 5/16"-18 Hex Nuts, two 5/16" Flat Washers, two 5/16" Split Lock Washers and one 5/16"-18 x 4" long U-Bolt. Do not over tighten the U-Bolt Hex Nuts which can break or bend the aluminum V-saddle clamp. Evenly tighten each side of the U-bolt until the split lock washer is seated properly.

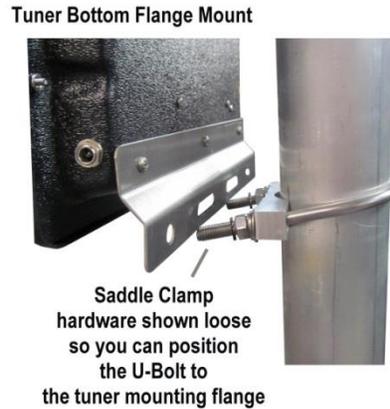


3. Loosely mount the bottom aluminum saddle clamp assembly approximately 13-1/4" below the previously (upper) mounted saddle clamp using the same hardware described for the upper clamp. Ensure both clamps are facing the same direction.

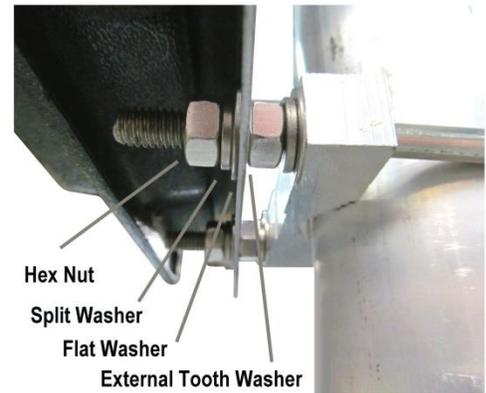
(This installation method works well since the MFJ tuner mounting flanges can be in slightly different positions on the tuners.)



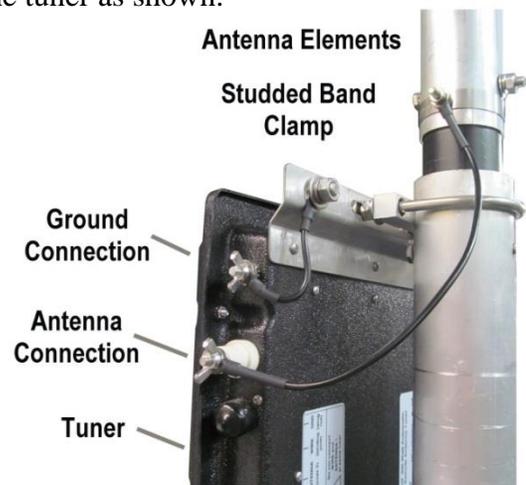
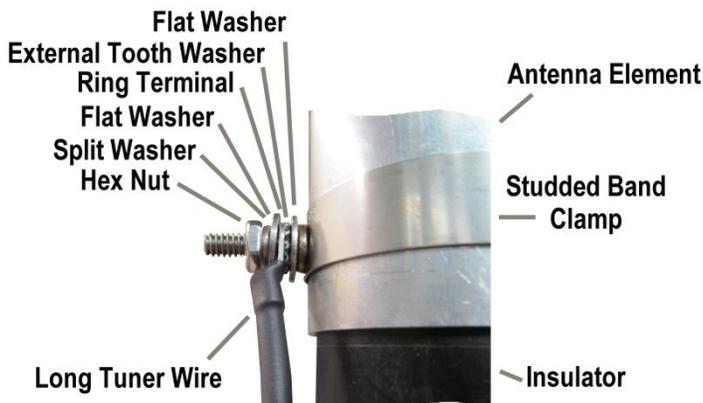
4. Place on 5/16" External Tooth Washer on each leg of the upper saddle clamp U-bolt and then position the MFJ-993BRT or MFJ-994BRT tuner in place on the upper U-bolt that protrudes from the saddle clamp. Once in place, loosely install the two 5/16" Flat Washers, two 5/16" Split Lock Washers and two 5/16"-18 Hex Nuts to hold the tuner in place on the upper clamp as shown. You want the tuner to be able to move a bit for final positioning.



5. Position the lower saddle clamp (with the external tooth washers on each leg) so the U-bolt will pass through the bottom mounting flange on the tuner as shown. Once the tuner is positioned in place and straight - use the two 5/16" Flat Washers, two 5/16" Split Lock Washers and two 5/16"-18 Hex Nuts to hold the bottom of the tuner in place. Tighten all of the tuner mounting hardware (top and bottom).



6. When the upper antenna parts are mounted to the base assembly (see previous installation instructions), install the Studded Band Clamp on the first element just above the black insulator with the stud facing the side nearest the tuner connections. Install the 10" long tuner wire on the studded band clamp using the #10 hardware as shown. The other end of the 10" wire is connected to the tuner output wing nut connection on the tuner as shown.



The wire jumper (item 24 shown on page 32) ensures proper connection of the radial field to the antenna system. Your coaxial cable from the Bias-T in your radio room connects directly to the SO-239 connector on the **remote tuner**. Weatherproof this coaxial connection using Scotch® Super 33+ and 3M Temflex™ 2155 Rubber Splicing Tape. See the Bias Tee Information - **Appendix D**.

Two views showing the MFJ-993BRT or MFJ-994BRT installed on the DXE-MBVE-5A antenna



Appendix C - MFJ-998RT Remote Tuner Installation

There are two complete **DXE-MBVE-5A** systems for use with the **MFJ-998RT** Remote Tuner

DX Engineering MBVE-5A Model Numbers	MFJ-998RT Brackets	MFJ-998RT Tuner 1500 Watt
DXE-MBVE-5AE-RT	X	
DXE-MBVE-5AERT8	X	X

There are two upgrade retrofit kits for existing **DXE-MBVE-5/5A** systems for use with the **MFJ-998RT** remote tuner. One with the tuner, one for use if the customer already has the tuner.

Upgrade kits include new longer base tube, brackets, remote tuner as selected below.

DX Engineering Upgrade Model Numbers	DXE-MBVE- TBHW Hardware Kit	DXE-MBVE-5A- UGHW Hardware Kit	MFJ-998RT - Brackets	MFJ-998RT - Tuner 1500 Watt
DXE-MBVE-5UG-RT	X	X	X	
DXE-MBVE-5UGRT8	X	X	X	X

General Information

For new antenna installations (**DXE-MBVE-5AE-RT** or **5AERT8**), the antenna is installed as previously out lined in this manual. Additional clamps and hardware are included for mounting the **MFJ-998RT** Remote Tuner. The mounting method for this remote tuner is outlined in this section of the manual.

For an upgrade to an existing **DXE-MBVA-5/5A** (as shown in the chart above), the parts in the upgrade kits are installed as outlined in this section of the manual. These MFJ Remote Antenna Tuner Add-on Kits for the **DXE-MBVA-5/5A** Multi-band Vertical Antenna are made for using the **MFJ-998RT** 1500 Watt remotely mounted automatic tuner which will greatly enhance the operating capabilities of the 43 foot antenna system.

Now you can have full performance 160-10 meters with no mismatch coaxial cable loss. A Bias-Tee from MFJ is included with the **MFJ-998RT** remote tuner for supplying the +12 Vdc power through the coaxial cable from your radio shack to the remote tuner.

Installing the MFJ-998RT option

The MFJ-998RT Tuner is mounted on a custom made stainless steel shelf that is attached to the **DXE-MBVE-5A** antenna.

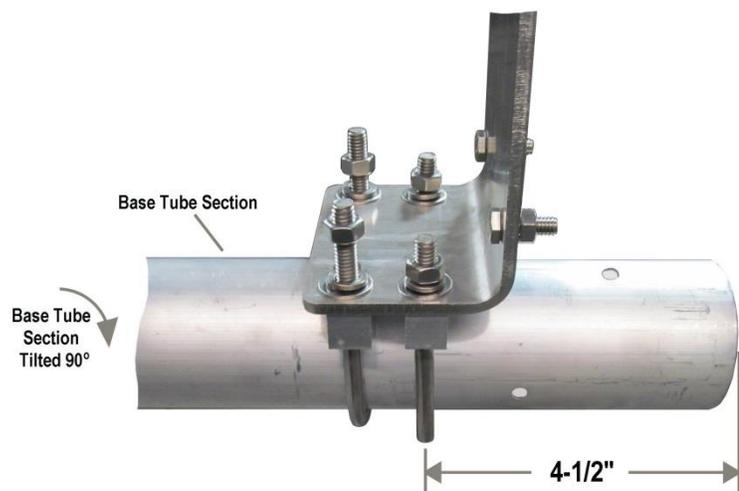
1. Install the four 1/4"-20 x 3/4" long Hex Head Cap Bolts, four 1/4" External Tooth Washers and four 1/4"-20 Hex Nuts on the tuner shelf bracket as shown. The hex bolt heads will be on the same side as the logo on the tuner shelf bracket.



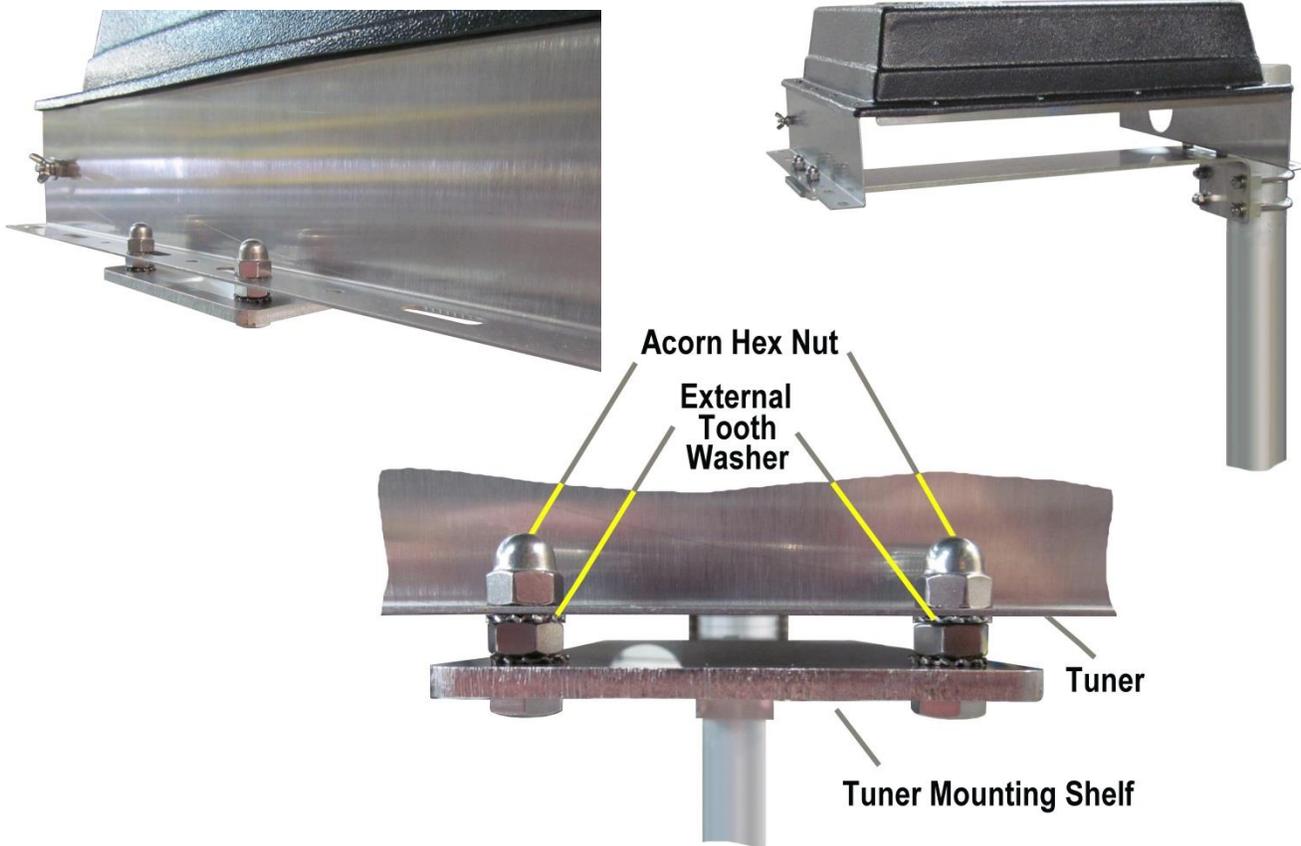
2. Loosely install the two 4" long U-bolts, two V-saddle clamps with the 5/16"-20 Hex Nuts, 5/16" Flat Washers, 5/16" Split Lock Washers and 5/16" External Tooth Washers as shown on the tuner shelf bracket.



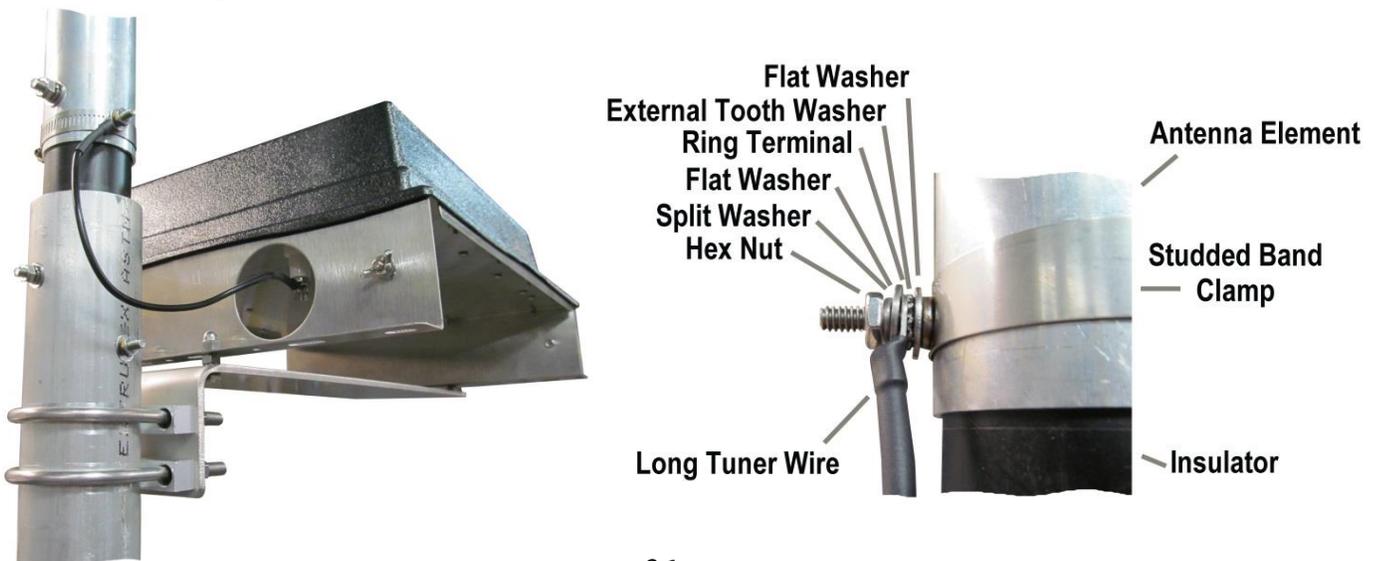
3. With the U-bolts loose, you can slip the assembly onto the lower base tube. *<Hint: If you tilt the base, it makes it easy to do this part of the installation.>* Position the top U-bolt 4-1/2" below the top of the base tube as shown. (Refer to Page 40 for photos showing the positioning of the clamps and tuner). Once positioned correctly, tighten all of the hardware holding the tuner shelf assembly to the lower base tube. Do not over tighten the U-Bolt Hex Nuts which can break or bend the aluminum saddle clamp. Evenly tighten each side of the U-bolt until the split lock washer is seated properly.



- Place one 5/16" External Star Washer on each of the four bolts that are installed in the tuner shelf bracket and then place the MFJ-998RT Tuner on the bolts as shown. Position the tuner so it is straight and the large hole on the tuner metal bracket is close to the antenna (this is where the feedline wire will pass through). Use one 1/4"-20 Acorn Nut on each of the bolts to secure the MFJ-998RT tuner in place.



- When the upper antenna parts are mounted to the base assembly (see previous installation instructions), install the Studded Band Clamp on the first element just above the black insulator with the stud facing the side nearest the tuner connections. Install the 10" long tuner wire from the studded band clamp using the #10 hardware. The other end of the 10" wire is connected to the tuner output wing nut connection as shown.



The wire jumper (item 24 shown on page 32) ensures proper connection of the radial field to the antenna system. Your coaxial cable from the Bias-T in your radio room connects directly to the SO-239 connector on the remote tuner. Weatherproof this coaxial connection using Scotch® Super 33+ and 3M Temflex™ 2155 Rubber Splicing Tape.



Two views showing the MFJ-998RT installed on the DXE-MBVE-5A antenna



Appendix D - Bias Tee Information

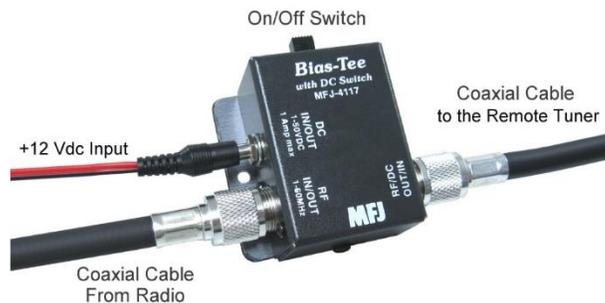
The MFJ-4117 Bias Tee is included with the MFJ Remote Tuner. Since the coaxial cable is supplying the DC voltage to the remote tuner (injected in the coaxial cable by the Bias Tee), the coaxial cable used must have a good DC path.



Lightning protectors that block DC cannot be used.

Follow the instructions provided by MFJ for both the Tuner and the Bias Tee.

Make certain the coaxial cables are properly connected to the Bias "T" as shown. Ensure the ON/OFF switch on the Bias "T" is turned ON when using the system.



NOTE: Review the MFJ Remote IntelliTuner™ manual for a detailed explanation of the Remote IntelliTuner™ and the Bias Tee operation. *Installing the Bias Tee incorrectly may cause damage to your radio.*

Parts Listings

DXE-MBVE-THW

DXE-MBVE-THW Mounting Hardware Kit For the MFJ-993BRT/MFJ-994BRT Tuner mounting option	Qty
U-Bolt, Stainless Steel, 2.5", 4" long, 5/16"-18 threads	2
Aluminum Saddle, V-Block	4*
5/16"-18 Hex Nut, Stainless Steel	9
5/16"-18 x 5/8" long, Hex Head Cap Bolt, Stainless Steel	1
5/16" Washer, Flat, Stainless Steel	9
5/16" Washer, External Tooth, Stainless Steel	5
5/16" Washer, Split Lock, Stainless Steel	9
2" Element Clamp with Threaded Stud, Stainless Steel	1
10-24, Hex Nut, Stainless Steel	1
#10 Washer, Split Lock, Stainless Steel	1
#10 Washer, Flat, Stainless Steel, Thick	2
#10 Washer, External Tooth, Stainless Steel	1
3" Wire Assembly, 12 ga, Black Insulated, two ring terminals	1
10" Wire Assembly, 12 ga, Black Insulated, two #10 ring terminals	1

* there are 4 aluminum saddle clamps - 2 are spares

DXE-MBVE-TBHW

DXE-MBVE-TBHW Mounting Hardware Kit For the MFJ-998RT Tuner mounting option	Qty
V-Block Saddle, Aluminum	2
U-Bolt, Stainless Steel, 3.75" x 5/16"-18	2
Tuner Shelf Bracket, Stainless Steel	1
5/16" Washer, Split Lock, Stainless Steel	4
5/16" Washer, Flat, Stainless Steel	4
5/16" Washer, External Tooth, Stainless Steel	4
5/16" Hex Nut, Stainless Steel,	4
2.25" Element Clamp with Threaded Stud, Stainless Steel	1
10-24 Hex Nut, Stainless Steel	1
1/4"-20 x 3/4" long Hex Bolt, Stainless Steel	4
1/4"-20 Hex Nut, Stainless Steel	4
1/4"-20 Acorn Hex Nut, Stainless Steel	4
1/4" Washer, External Tooth, Stainless Steel	8
#10 Washer, Split Lock, Stainless Steel, Thick	1
#10 Washer, Flat, Stainless Steel, Thick	2
#10 Washer, External Tooth, Stainless Steel	1
10" Wire Assembly, 12 ga, Black Insulated, two #10 ring terminals	1

DXE-MBVE-5A-UGHW

SAF-T-TILT™ Base Assembly Upgrade Hardware Kit DXE-MBVE-5A-UGHW for the extended base tube option	Qty	Drawing Ref. Number
1/4"-20 x 3/4" long Hex Head Bolt, Stainless Steel	1	18
1/4"-20 x 2-3/4" long Hex Head Cap Screw, Stainless Steel	1	23
1/4"-20 x 3-1/4" long Hex Head Cap Screw, Stainless Steel	2	17
1/4" Flat Washer, Stainless Steel	11	19
1/4" Split Lock Washer, Stainless Steel	6	20
1/4" External Tooth Washer, Stainless Steel	3	21
1/4"-20 Hex Nut, Stainless Steel	6	22
1/4"-20 x 3" long Hex Head Cap Screw, Stainless Steel	2	25
1/2"-13 Hex Nut, Stainless Steel	1	11
1/2"-13 x 4-1/2" long, Hex Head Bolt, Stainless Steel	2	12
1/2" Flat Washer, Stainless Steel, Thick	1	13
1/2" External Tooth Washer, Stainless Steel	2	14
1/2" Split Lock Washer, Stainless Steel	1	15
1/2"-13 Flanged Nut, Stainless Steel	1	16
7" Wire, 14 ga PVC insulated, two 1/4" Ring Terminals	1	24

(Reference Page 30 for drawing)

Technical Support

If you have questions about this product, or if you experience difficulties during the installation, contact DX Engineering at (330) 572-3200. You can also e-mail us at:

DXEngineering@DXEngineering.com

For best service, please take a few minutes to review this manual before you call.

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