Vertical Antenna Matching Network

for the Hustler® 5-BTV, 6-BTV and other Quarter Wave Monoband Vertical Antenna Systems

DXE-VMN-1

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Introduction

The DXE-VMN-1 Vertical Antenna Matching Network is custom designed for use with the Hustler® 5-BTV and 6-BTV and other quarter wave monoband vertical antenna systems. In some installations of these antenna systems, achieving minimum SWR on the 80 meters may be difficult. The DXE-VMN-1 Vertical Antenna Matching Network will aid in tuning the customer selected portion of the 80 meter band to the minimum SWR.

While the example shown in this manual is the Hustler® 5 or 6-BTV, the Vertical Matching Network may be installed between ground and the feedpoint of any monoband quarter wave base-fed vertical antenna.

Features - The DXE-VMN-1 Vertical Antenna Matching Network:
- Precision machined Coil Tube
- Highest quality 12 gauge solid tin coated coil wire
- Custom made silver plated DXE-CLIP-P Coil Tap
- Custom "L" Bracket for mounting on the optional DXE-RADP-3 Radial Plate
- Stainless Steel Mounting Hardware
- #14 Stranded Copper Wire with Terminals for connection to the Hustler antenna
- Handles full legal limit
- Inductance: 300 kHz to 7 MHz = 5.6 µH, 14 MHz = 7.2 µH, 21 MHz = 8.5 µH, 28 MHz = 8.0 µH

Tools Required
Medium size Phillips head screwdriver (#2) for BTV Feedpoint screw
Small size Phillips head screwdriver (#1) for Coil Tap screw
Two 7/16" Wrenches, or one 7/16" Nut Driver and one 7/16" wrench

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.

Note: JTL-12555 Jet-Lube SS-30™ should be used on all bolts and stainless steel threaded hardware to prevent galling and to ensure proper tightening.

Note: The following assembly instructions are based on using the optional DXE-RADP-3 Radial Plate, optional DXE-363-SST Bulkhead Connector and the optional DXE-AOK-DCF Direct Coax Feed for the Hustler BTV antennas.

Note: The Hustler® BTV antenna should be tuned according to the instructions included with the antenna that was purchased from DX Engineering. The "New Assembly and High Performance Installation Instructions" has additional Hustler® BTV tuning instructions that should be done prior to installing the DXE-VMN-1 Vertical Antenna Matching Network.
Vertical Antenna Matching Network Parts List

<table>
<thead>
<tr>
<th>QTY</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Custom made Vertical Antenna Matching Network assembly with wire &amp; Coil Tap Clip</td>
</tr>
<tr>
<td>1</td>
<td>1/4&quot; Flat Washer</td>
</tr>
<tr>
<td>2</td>
<td>1/4&quot; Star Washer</td>
</tr>
<tr>
<td>1</td>
<td>1/4&quot; Split Lock Washer</td>
</tr>
<tr>
<td>1</td>
<td>1/4&quot;-20 Nut</td>
</tr>
</tbody>
</table>

Mounting the Vertical Antenna Matching Network to the Radial Plate

1. Use a small Phillips head screwdriver to loosen the tap clip screw and position the tap clip on the 6th or 7th turn on the coil as shown (this will be re-adjusted during tuning).

2. Attach the Base Matching Network Assembly to the optional DXE-RADP-3 Radial Plate using the 1/4" flat washer, 1/4" split lock washer, 1/4" star washer and a 1/4-20 hex nut as shown below. Verify the wires and coaxial cable will not be in the way when pivoting the antenna.
3. Connect the feedpoint connection wire from the Base Matching Network Assembly to the BTV feedpoint connection as shown. A star washer is included with the Vertical Antenna Matching Network for this added connection for the BTV antennas. The DXE-AOK-DCF feedpoint wire is attached to the same place.

![Diagram showing feedpoint connection](image)

The mounted Base Matching Network Assembly will look like the example below.

![Example of mounted Network Assembly](image)

**For Other resonant Monoband Vertical Antennas**

The easiest way to make a reliable feedline connection using customer supplied coaxial cable is using the optional DXE-RADP-3 Radial Plate with the optional DXE-112-KIT SO-239 Chassis Mount Connector as shown in Figure F-1.

Use a customer supplied insulated wire soldered on the center pin of the chassis mounted SO-239 (14 gage insulated wire is adequate) to a ring terminal which is connected to the antenna feedpoint hardware. Make the wire long enough so it will not bind when raising or lowering the antenna.

When connected in this manner, the customer supplied coaxial cable will feed the antenna and the shield will have a positive and reliable connection to the radial field.

For other monoband vertical antennas using this feedline set up, the DXE-VMN-1 will connect to the same feedpoint connection hardware as the DXE-112-KIT.
When tuning a monoband vertical antenna with the DXE-VMN-1, the same steps are followed as described for the BTV vertical antenna as described in the following Tuning section.

**Tuning**

The Hustler® BTV antenna should be tuned according to the instructions included with the antenna that was purchased from DX Engineering. The “New Assembly and High Performance Installation Instructions” has additional Hustler® BTV tuning instructions that should be done prior to installing the DXE-VMN-1 Vertical Antenna Matching Network.

Tuning the DXE-VMN-1 Vertical Antenna Matching Network is straightforward and intuitive. If you use an SWR meter or an analyzer at the base of the antenna you will get the most accurate readings in a timely fashion.

It is best to start the adjustment process with the Matching network disconnected. See picture on right showing the Matching network removed and insulated from the ground radial system.

As a result, initial 80 meter SWR measurements at the feedpoint of the antenna may indicate slightly elevated minimum SWR. This will be reduced substantially when the Base Matching Network is connected.

**Note:** For the purposes of these instructions the term “resonance” or “resonant frequency” is defined as the point of lowest SWR and may be used interchangeably.
After initial tuning, connecting the **DXE-VMN-1** Vertical Antenna Matching Network will reduce the minimum SWR on 80 meters. There will be some effect on the frequency of lowest SWR for the band.

As described earlier, start with the Tap Clip in the Base Matching Network at the 6th or 7th turn from the top as shown and proceed as follows:

1. Adjust the tap clip by moving the tap clip to a different coil turn on the **Vertical Antenna Matching Network** for minimum SWR on 80 meters. Disregard any frequency shift of the points of lowest SWR on this band at this time.

2. Recheck the lowest SWR on the 80 meter band. If the SWR of the 80 meter Band is higher move the tap clip on the **Vertical Antenna Matching Network** Coil to a position that gives the best SWR on the band. Securely tighten the tap clip when done.

Once final tuning is complete and you have verified correct operation on-the-air, the coil tap can be soldered in place to eliminate any future intermittent connection due to environmental corrosion to the coil tap and coil wire connection.

**Optional Items**

**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 such as the Hustler® BTV series (4-BTV thru the 6-BTV), the SteppIR™ (BiggIR or SmallIR), or one of your own construction.

**DXE-RADP-1HWK - Radial Plate Wire Attachment Hardware Kit - Stainless Steel**

Additional 20 Sets of ALL Stainless Steel Radial Hardware for use with the DX Engineering Stainless Steel Radial Plate. Includes:

- (20) 1/4" Bolts  
- (20) 1/4" Nuts  
- (20) 1/4" Flat Washers  
- (20) 1/4" Split Washers  
- (20) 1/4" Star Washers

**DXE-AOK-DCF - Direct Coax Feed for Hustler® BTV Verticals**

The **DXE-AOK-DCF** Direct Coax Feed assembly by DX Engineering for the Hustler® BTV series antennas allows direct connection from a coaxial cable with a PL-259 connector. Manufactured from heavy duty stainless steel, this add-on kit allows convenient connection from your coaxial cable feedline directly to the base of the Hustler® BTV-series vertical antennas. It may be positioned in any one of three different directions to allow straight-in connection from your feedline. Also order **DXE-8XD-002** (low power) or **DXE-8UDX002** (high power, low loss) coaxial jumper cable for connection to your **DXE-RADP-3** Radial Plate with **DXE-363-SST** Bulkhead Connector for a professional, reliable installation. New all-stainless steel hardware is provided for adapting to your new or existing Hustler BTV antenna. It allows for easy removal of the coaxial cable feedline for yard maintenance, or antenna layover and disconnection for “stealth” installations.
DXE-363-SST - Bulkhead Fitting, SO-239 Socket, Silver Plating, PTFE Insulation
This hi-quality bulkhead connector uses silver plated outer and inner conductors and a PTFE insulator. The connector has very low loss and high electrical break down. It comes with two nuts to secure the connector to our radial plate or other flat surface. Perfect for use with the DX Engineering Radial Plate, (DXE-RADP-3) it ensures the radial ground system, the antenna ground and the feedline shield are common. It can also be used in other coaxial applications where the male ends (PL-259) of 2 coax cables need to be connected, such as when joining two pieces of coax together. Don't forget to waterproof coaxial connections.

- Silver plated
- PTFE insulated
- Very low loss
- High electrical break down
- 2 in. long

DXE-112-KIT - SO-239, Chassis Mount Socket, PTFE Insulation -
Chassis mount with PTFE insulation for high power situations. Packaged with the correct stainless bolts, flat washers, star washers and Nyloc locking nuts.

- PTFE insulation
- Stainless steel hardware
- Nyloc nuts

DXE-CLIP-P - Coil Tap Clip, Silver Plated, Package of 5
Supplied in a convenient package of 5, the DX Engineering silver-plated DXE-CLIP-P Coil Taps provide easy, adjustable attachment points to uninsulated coils - including homebrew, Miniductor™ or Airdux™. They also are useful in non-RF applications like allowing flying connections to uninsulated wire without soldering or cutting the wire. These clips will accommodate wire sizes from #20 to #10 AWG. Furnished with a Phillips-head self tapping screw, they are movable to find the correct tap point, and may then be tightened for final connection. Soldering to the coil wire at that time ensures a permanent bond for outdoor applications. The clips are silver plated for ease of soldering, and the solderable jumper connection end is formed to accept a standard 4mm banana plug (not supplied) - making manual tap changing between multiple taps a simple task, once you have located the final tap points. Ideal for homebrew projects.

JTL-12555 Jet-Lube™ SS-30 Pure Copper Anti-Seize 12555
Jet-Lube™ SS-30 Pure Copper Anti-Seize is the top choice of engineers and technicians in government, industry and leading Amateur Radio contest stations, for protecting mechanical assemblies of aluminum tubing, general hardware and copper grounding systems. On bonded metal surfaces Jet-Lube™ SS-30 assures electrical and RF conductivity while preventing oxidation and corrosion. Surpassing the capabilities of other aluminum anti-oxidants, the wide temperature range of Jet-Lube™ SS-30 prevents long-term drying and caking, and allows easy disassembly and effortless cleaning of parts. It contains a high concentration of copper flakes, a requirement for heavy loads or compression; controlled frictional characteristics allow the surfaces of nuts and bolts to be tightened to their design torque specifications. This anti-seize product assures full hydraulic efficiency by allowing the metal surfaces to slide over each other without damaging metal-to-metal contact. Jet-Lube™ SS-30 is also designed to work as a similar and dissimilar component between two metal surfaces to prevent seizing and galvanic action. The SS-30 compound formula improves conductivity and ground continuity - and will not melt in high temperatures. Jet-Lube™ SS-30 Pure Copper Anti-Seize Features include: Meets MIL-PRF-907E spec. K-factor: 0.13, Service rating: -65 degrees F (-54 degrees C) to 1800 degrees F (820 degrees C), SS-30 Resistivity (ohm-CM x 108) 5

DXE-8XDX002 - Coax Cable, RG-8/X, with PL-259 ends, 2 ft. for the BTV Direct Coax Feed kit
Accessory for DXE-AOK-DCF Direct Coax Feed for Hustler® BTV Verticals, for connection between radial plate and antenna.

- Connectors: PL-259 Connectors at each end
- Length: 2 ft.
- Conductor: RG Type: 8X AWG: 16 Stranded: 19x29
- Conductor Diameter: .058 in.
- Conductor Material: Bare Copper
- Insulation Material: Gas injected FPE- Foam Polyethylene Diameter: .155 in.
- Outer Shield Type: Braid
- Material: Bare Copper
- % Coverage: 95%
- Outer Jacket Material: PVC- Polyvinyl Chloride
- Overall Nominal Diameter: .242 in.
DXE-8UDX002 - Coax Cable, RG-8/U, UHF connectors, 2 feet for the BTV Direct Coax Feed kit

Highly flexible accessory for DXE-AOK-DCF Direct Coax Feed for Hustler® BTV Verticals, for connection between radial plate and antenna.

Connectors: PL-259 Connectors at each end  Length: 2 ft  Conductor: RG Type: 8/U  AWG: 11
Stranded: 7x19  Conductor Diameter: 0.108 in.  Conductor Material: Bare Copper
Outer Shield Type: Braid  Material: Bare Copper  % Coverage: 97%
Outer Jacket Material: Black Polyvinyl Chloride
Overall Nominal Diameter: .403 in.

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.

Warranty

All products manufactured by DX Engineering are warranted to be free from defects in material and workmanship for a period of one (1) year from date of shipment. DX Engineering’s sole obligation under these warranties shall be to issue credit, repair or replace any item or part thereof which is proved to be other than as warranted; no allowance shall be made for any labor charges of Buyer for replacement of parts, adjustment or repairs, or any other work, unless such charges are authorized in advance by DX Engineering. If DX Engineering’s products are claimed to be defective in material or workmanship, DX Engineering shall, upon prompt notice thereof, issue shipping instructions for return to DX Engineering (transportation-charges prepaid by Buyer). Every such claim for breach of these warranties shall be deemed to be waived by Buyer unless made in writing. The above warranties shall not extend to any products or parts thereof which have been subjected to any misuse or neglect, damaged by accident, rendered defective by reason of improper installation, damaged from severe weather including floods, or abnormal environmental conditions such as prolonged exposure to corrosives or power surges, or by the performance of repairs or alterations outside of our plant, and shall not apply to any goods or parts thereof furnished by Buyer or acquired from others at Buyer’s specifications. In addition, DX Engineering’s warranties do not extend to other equipment and parts manufactured by others except to the extent of the original manufacturer’s warranty to DX Engineering. The obligations under the foregoing warranties are limited to the precise terms thereof. These warranties provide exclusive remedies, expressly in lieu of all other remedies including claims for special or consequential damages. SELLER NEITHER MAKES NOR ASSUMES ANY OTHER WARRANTY WHATSOEVER, WHETHER EXPRESS, STATUTORY, OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS, AND NO PERSON IS AUTHORIZED TO ASSUME FOR DX ENGINEERING ANY OBLIGATION OR LIABILITY NOT STRICTLY IN ACCORDANCE WITH THE FOREGOING.

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