12 Meter Add-On Kit for the Hustler 4/5/6-BTV Vertical Antennas

DXE-AOKB-12M
Patent Pending
DXE-AOKB-12M-INS Revision 0b

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The DX Engineering **DXE-AOKB-12M** kit adds 12 meter coverage to the Hustler BTV series of vertical antennas without giving up any existing band coverage. This kit will operate across the entire 12 meter band, 24.890 through 24.990 MHz, with an SWR of 1.5:1 or less. Can handle full legal limit power and adds negligible wind loading to the antenna.

Simply install this kit, check the tuning (if needed, make some minimal tuning adjustments to the vertical) and you're on the air with an additional band.

If your BTV is installed on the roof or in an elevated position, four resonant radials for 12 meters should be added (9 ft., 4-5/8 inches each).

Your BTV can have both the **DXE-AOKB-12M** 12 Meter add-on-kit and the **DXE-AOKB-17M** 17 Meter add-on-kit installed at the same time.

**Included Materials**

- Pre-assembled 12 Meter element wire with #10 soldered ring terminals
- Four Stainless Steel Band Clamps with Threaded Studs
- Bottom Mounting Bracket
- Spring loaded End Insulator to keep the 12 Meter element wire tight
- Upper Insulated Mounting Bracket
- Two 11-1/4” long Tuning Rods
- Scotch-Brite® Pad for cleaning the 12 Meter element connections
- All Stainless Steel Hardware

**DXE-AOKB-12M** shown installed on a Hustler BTV
Also shown is the optional DXE-RLT Reinforced Lower Tube
## Parts List

<table>
<thead>
<tr>
<th>Drawing Item #</th>
<th>Quantity</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>12 Meter Add-on Top Bracket</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>12 Meter Add-on Lower Bracket</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>12 Meter Insulator Bracket</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>DX Engineering End Insulator</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
<td>Element Spring</td>
</tr>
<tr>
<td>6</td>
<td>1</td>
<td>70” Ant. wire w/ #10 Ring Terminals</td>
</tr>
<tr>
<td>7</td>
<td>2</td>
<td>Tuning Rods w/large ball ends, 11-1/4”</td>
</tr>
<tr>
<td>8</td>
<td>4</td>
<td>1-1/4” Studded Band Clamp</td>
</tr>
<tr>
<td>9, 10, 11, 12</td>
<td>4</td>
<td>ECLS Hardware Pack &quot;See Below&quot;</td>
</tr>
<tr>
<td>13</td>
<td>1</td>
<td>Aluminum Spacer, 1/4” thick</td>
</tr>
<tr>
<td>14</td>
<td>3</td>
<td># 10-24 x 1” Stainless Steel Hex Bolt</td>
</tr>
<tr>
<td>15</td>
<td>8</td>
<td># 10 Small Flat Washer - Stainless Steel, Thin (0.435”).</td>
</tr>
<tr>
<td>16</td>
<td>6</td>
<td># 10 Split Washer - Stainless Steel</td>
</tr>
<tr>
<td>17</td>
<td>3</td>
<td># 10 External Star Washer - Stainless Steel</td>
</tr>
<tr>
<td>18</td>
<td>6</td>
<td># 10-24 Hex Nut - Stainless Steel</td>
</tr>
<tr>
<td>19</td>
<td>2</td>
<td># 10-24 Nyloc Hex Nut - Stainless Steel</td>
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<tr>
<td>20</td>
<td>1</td>
<td># 10-24 Wing Nut - Stainless Steel</td>
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<tr>
<td>21</td>
<td>3</td>
<td># 10-24 x 3/4” Carriage Bolt - Stainless Steel</td>
</tr>
<tr>
<td>22</td>
<td>1</td>
<td># 10 x 1” Fender washer - Stainless Steel</td>
</tr>
<tr>
<td>23</td>
<td>1</td>
<td>Scotch-Brite® Element Cleaning Pad 3” x 3”</td>
</tr>
</tbody>
</table>

*ECLS Hardware Packages (4) consist of the following parts*

<table>
<thead>
<tr>
<th>Drawing Item #</th>
<th>Quantity per package</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>2</td>
<td># 10-24 External Tooth Washer, Stainless Steel</td>
</tr>
<tr>
<td>10</td>
<td>4</td>
<td># 10-24 Flat Washer, Stainless Steel</td>
</tr>
<tr>
<td>11</td>
<td>2</td>
<td># 10-24 Split Washer, Stainless Steel</td>
</tr>
<tr>
<td>12</td>
<td>2</td>
<td># 10-24 Hex Nut, Stainless Steel</td>
</tr>
</tbody>
</table>
Exploded Parts Drawing

BTV Base, BTV Lower Element and DXE-RLT Reinforced Lower Tube not included with this Add-On Kit
Suggested Parts - Not Included

**Ruggedized BTV Reinforced Lower Tube**  DXE-RLT
Build or refurbish any Hustler BTV antenna to be stronger with a DX Engineering Ruggedized BTV Reinforced Lower Tube. The DXE-RLT double-wall aluminum tube is stronger than the original single-wall tube, and it works on all BTV Series antennas, new and old. It is overall 72 in. so it is direct replacement; it takes the place of the original Hustler BTV antenna 72 in. lower tube (HSR-4087-1).

**Jet Lube SS-30 Pure Copper Anti-Seize  JTL-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.

**OMNI-TILT™ Vertical Antenna Tilt Base**  DXE-OMNITILT-1P
Due to the design of the 12 meter and 17 meter add-on kits for the BTV series antennas, the OMNI-TILT™ Base is desired rather than the DXE-TB-3P style Tilt Base. If the DXE-TB-3P is used, the clamps holding the lower bracket assembly must be removed to allow the tilting action to be performed. The DX Engineering OMNI-TILT™ Vertical Antenna Tilt Bases are a completely new design that incorporates features that make this Tilt Base a 'must have' for all types of vertical antennas. NOTE: The OMNI-TILT™ REQUIRES two (2) optional DXE-OTMC-250P clamps to attach the non-tilt part of OMNI-TILT™ to a Mounting Pipe, 1-1/4 to 2-1/2 inches OD.

**Assembly**

Before you start installation, use an antenna analyzer to measure the low SWR frequencies of your Hustler BTV on each band and record those measurements. If the antenna needs to be tuned, do it prior to installing this add-on kit to ensure installation is not a cause of de-tuning your antenna. This will assure your antenna is working properly before adding the 12 meter kit. When installing stainless steel hardware, it is suggested that **JTL-12555 Jet-Lube SS-30** be used to prevent thread galling on stainless steel and ensure ideal RF coupling between parts.

When making this instruction sequence, DX Engineering decided to remove the antenna from the tilt base. Also removed was the bottom 6 foot section with the BTV base from the upper part of the antenna. Using a table to lay the antenna on, we found that installation of the parts was then straight forward and easy to accomplish. The following assembly procedure is just one suggestion for the installation of the 12 meter add on kit. You may vary from this sequence as you see fit as long as the measurements and hardware stack-ups are followed.

The lower section of the BTV antenna and base on a flat surface.

Note, the optional DXE-RLT, Ruggedized BTV Reinforced Lower Tube has been installed in this example.

Please refer to the over-all exploded parts drawing (page 4) for reference.
1. Assemble the upper 12 Meter Bracket Assembly using the parts as shown below. Both ends of the Upper Bracket (1) use the same hardware. Tighten the hardware until the carriage bolts (21) are flush to the insulator bracket (3). Install the wire retaining hardware (14, 15, 17, 18) and tighten against the upper bracket (1). Loosely install the other wire retaining hardware (17, 15, 16, 18) in place. This hardware will be tightened when the 12 meter wire is installed in a later step.

2. Install two studded band clamps (8) to the upper assembly using the hardware (10, 11, 12) that comes with the clamps as shown below.

3. Install the tuning rod holder hardware (16, 20, 21, 22) to the upper assembly as shown below.
4. Assemble the Lower Insulator parts as shown below. **Note the side of the insulator that has the cupped area.** The Spacer (13) is inserted in the large hole in the insulator. When attaching the spring (5) and Nyloc Nut (19), allow a gap to permit the spring to swivel in place.

![Diagram showing assembly of Lower Insulator parts](image)

5. Install the two studded band clamps to the lower aluminum mounting bracket using the hardware as shown below. Note install the Nyloc Nut (19) just snug at this point. It will be tightened after the element wire is installed.

![Diagram showing installation of studded band clamps](image)

**Note:** If you are also installing the **DXE-AOKB-17M** 17 Meter Add-on-kit, the lower brackets will be both mounted to the same studded band clamps. When installing the two lower brackets add external tooth washers (9) on each studded band clamp between the mounting brackets to ensure good electrical connection.
6. Attach one end of the 12 meter element wire to the lower insulator assembly as shown below. Fold the wire so there is approximately 10” of wire in a loop. **Note carefully how the wire is routed through the insulator in reference to the insulator’s cupped area.** When you have completed the wire installation, you want approximately 8” of wire as shown below. You can make adjustments to the wire positioning as needed before continuing to the next step in the assembly.

7. Attach the lower insulator with the wire to the lower bracket as show below. Remove the previously installed Nyloc nut, insert the end of the spring, re-attach the Nyloc nut and tighten. Allow a small gap so the spring can still rotate.
8. Looking at the following pictures. Clean the BTV Base for good RF connections where the two clamps will be positioned. Use the included Scotch-Brite® pad to clean the aluminum surface of the BTV base. Use a small amount of Jet-Lube SS-30 over this cleaned area just prior to installing the clamps. Position the assembly so the spacing between the lower bracket and the BTV base bracket as shown below. Tighten the clamps in place with the bracket horizontal as compared to the BTV base as shown.

9. Position the upper assembly on the BTV 16” below the upper end of the six foot BTV element as shown. Use the included Scotch-Brite® pad to clean the aluminum surface of the aluminum tube. Use a small amount of Jet-Lube SS-30 over this cleaned area just prior to installing the clamps. The Upper and lower assemblies should be in alignment with each other.

10. Connect the 12 meter wire with terminal (6) to the upper assembly (1) using the hardware as shown. When installed, the spring at the lower end of the 12 meter wire should be slightly pulled. This will keep the 12 meter wire tight in place.
11. Attach the two tuning rods (7) to the upper section between the fender washer and the upper bracket (in the slots) allowing approximately a 3” overlap as shown. Hand tighten in place with the wing nut. Adjustment to the tuning rods will be done during tuning.

12. Re-assemble the Lower assembly with the upper Hustler BTV assembly and re-mount the complete antenna to the tilt base.

The photograph to the right shows the **DXE-AOKB-12M** 12 Meter Add-on-kit installed on a Hustler BTV Antenna (right side of photo)

The BTV antenna is mounted to an optional **DXE-OMNITILT-1P** Tilt Base.

Other options shown installed include:

- **DXE-AOKB-17M** 17 Meter Add-On-Kit for the BTV antenna (left side of photo).
- **DXE-VMN-1** Vertical Antenna Matching Network used for 80 meter tuning.
- **DXE-AOK-DCF** Direct Coax Fee Add-on-kit for the BTV antenna and a DX Engineering coaxial cable jumper connected between the **DXE-AOK-DCF** and a **DXE-UHF-FDFB-KIT** SecureMount™ Bulkhead Connector.
- **DXE-RADP-3** Radial Plate and radial wires.
Tuning

An antenna analyzer is the best way to adjust the low SWR frequency of the antenna. Measurements should be made at the antenna using a short (5 or 6 ft) piece of 50Ω coax between the antenna and the analyzer. If you are too close to the antenna your presence can affect the tuning, if you are too far, the coax length may act as a radial and resonate. Taking readings close to the antenna also eliminates the possibility of a long or marginal feedline influencing the tuning or causing erratic readings. If necessary, tune the antenna for low SWR on 24.930 MHz. Normally, the SWR readings go down somewhat and the bandwidth readings increases once the feedline is reconnected and you measure the SWR at the operating position.

Adjustment of the low SWR frequency is done by slightly loosening the wing nut holding the tuning rods and adjusting the length of the tuning rods. Adjust both tuning longer to go lower in frequency or shorter to go higher in frequency. Both tuning rods should be adjusted equally and should not need to be adjusted more than a couple of inches. Make adjustments in small steps. 1/2 in. of adjustment should change the resonant frequency by about 75 kHz.

The 12m add-on kit electrically couples to the rest of the vertical and does have some influence on the tuning of adjacent bands. If retuning is required make minor adjustments as necessary. Refer to the DX Engineering BTV Installation and Assembly Guide available from DX Engineering.

In some installations, particularly those with very good soil conditions or a very good radial system, the traps themselves may have been changed from factory dimensions during the initial installation of the vertical to resonate the vertical in each band. In those cases where the traps have already been adjusted, leave them as-is for now.

Check the vertical for low SWR on each band and note those frequencies. This will help determine what adjustments are needed. After installation and tuning of the 12m kit, the BTV will likely be tuned to about the same frequency in the 10 meter band and a little higher in the 15 and 20 meter bands. No difference is likely on 30, 40 or 80 meters. In most cases, re-tuning to the desired frequencies for each band can be accomplished by adjusting the tubing dimensions of each section as described in the DX Engineering Hustler BTV Installation and Assembly Guide.
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.

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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