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### INSTALLATION INSTRUCTIONS:

#### **BKT-Flat-4 & 4S<sup>®</sup> Heavy Duty Flat Mounts for Large Screwdriver/Motorized HF Antennas**

Thank you for your purchase; we appreciate your business and interest in our products.

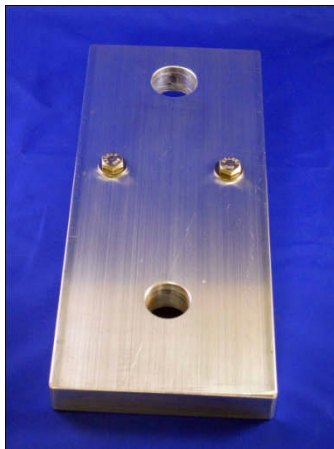
These instructions describe how to install the BKT-Flat-4<sup>®</sup> and BKT-Flat-4S<sup>®</sup> (“BKT”) super heavy-duty flat mounts which provide a simple yet very strong method for mounting large HF motorized and screwdriver antennas with a base diameter up to 4 inches. Both models include a ¾ inch diameter antenna mounting hole with a panel thickness of ¾ inches, a 1 inch hole for mounting to your vehicle or fixed base location, and two ¼ inch ground bolts.

The BKT’s can be bolted to a trailer hitch or front or rear bumpers, with a ¾ to 1 inch bolt or trailer hitch ball (not included). They can also be mounted to a vertical surface with our optional **AMB-VMA-4** adapter “L” bracket.

The only difference between the “4” and “4S” is that the “4S” has a SO239 barrel connector.

The two BKT models and types of antennas that can be used are:

- **BKT-Flat-4** (left photo below): This was designed as a simple yet very strong mount for Scorpion screwdriver antennas and other applications where you do not need the SO239 barrel connector. Information on Scorpion antennas can be found at: <http://www.scorpionantennas.com/>
- **BKT-Flat-4S** (middle and right photos): This was designed for Hi Q Antennas “ruggedized” HF motorized antennas and other brand screwdriver HF antennas or applications where the SO239 barrel connector is desired. This BKT can be used with the Hi Q ruggedized antennas **WITHOUT** the need for the Shakespeare spring base (for those with the Shakespeare spring base we make the **BKT-Sksp-1** version of this mount). Hi Q antennas can be found at: <http://hiqantennas.com/>



#### **Specifications**

- Materials of construction: 6061 aluminum, 18-8 stainless steel hardware.
- Finish: hand buffed aluminum or five optional powder coated finishes.
- Dimensions: ¾ inch thick x 4 inches wide x 9.5 inches long – very strong!
- Blueprinted design.
- Two ¼ inch ground bolts for vehicle ground cable with provided heavy-duty solder lugs.
- Antenna hole: ¾ inch diameter, panel thickness ¾ inch.
- Mounting hole: 1 inch diameter, recommend ¾ to 1 inch bolt or trailer hitch ball (not included).
- **Model 4-S only** - High quality SO239 barrel connector with nicely machined rust proof heavy-duty nuts.
- Options: see *page 2*.

## Options

The following options are compatible with the BKTs. Additional photos are included at the end of these instructions.

1. **AMB-VMA-4:** Vertical mounting adapter, heavy-duty L bracket that allows you to bolt your BKT to a vertical surface.



2. **SHUNT-100:** Unique adjustable weather proof HF load inductor shunt coil, bolts to either of the ground bolts on the BKT.



3. **CNCT-PL259-WXQD(B):** Weather proof quick disconnect for coax, for mobile and fixed base applications.



4. **AntExtend 2.5:** one and two foot long, 2.5 inch diameter, solid aluminum extensions for Hi Q ruggedized motorized HF antennas. With stainless steel mounting hardware.



5. **Jumper cables & solder lugs:** we offer a 1.5 foot (18 inch) cable with your choice of solder lug (you solder only the lug) or a 7.5 inch "shunt100" cable. Both cables are single conductor, made from Belden RG8 coax. All come with a "real deal" Amphenol PL259 plug. We also carry heavy duty solder lugs in sizes from 1/4-1/2 inch.



6. **Coax connectors:** we offer Amphenol PL259 plugs, right angle adapters and TEE connectors, and other brand slip-on, double male adapters and a 2 inch SO239 barrel with nicely machined heavy duty nuts (not "thin nuts" that are found on most barrel connectors).



7. **Mounting bolt:** we offer a stainless steel 3/4 inch, 3.5 inch long, bolt and hardware for mounting the BKT.

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## **Safety First!**

*Use caution if you are installing your antenna on a vehicle, balcony or other location where the antenna could fall on someone or cause damage if it were to come off. It is solely up to the user to determine the suitability of the BKT with their antenna and mounting situation. As with any antenna installation, be careful around thunderstorms and lightening, and you may want to remove your antenna or disconnect the coax **BEFORE** a storm appears - remember that if you can hear thunder you can be struck by lightning! These instructions are meant to provide general guidelines but cannot provide all of the details on how to safely install your mount and antenna, as each installation is unique. If you feel that you cannot safely install your antenna on the BKT, you are not sure, or it does not meet your needs, you may return it for a refund within two weeks (see Warranty for details). **SAFETY FIRST!***

## **What You Need In Addition To the “BKT”**

- Antenna with antenna mounting hardware.
- Bolt or trailer hitch ball (3/4-1 inch diameter) for attaching the BKT to your hitch, bumper etc.
- Various options, if needed, for your installation (listed above).
- Coax, motor control wires, ferrite bead filters.

## **Tools Needed to Install BKT and Options**

No special tools are required. A wrench is needed to tighten the mounting bolts.

## **Installation**

The following steps apply to both models 4 and 4S.

### 1) General considerations before mounting the BKT and your antenna.

- a) **Mobile installations.** Decide where to install the BKT and if installed on a hitch or rear bumper determine if it will block your rear door or tail gate. If so you may want to use a quick disconnect on the antenna. Consider how you will ground the BKT to your vehicle. This can be done, preferably, by grounding the BKT to your hitch or receiver and then grounding the forward part of your hitch/receiver to your vehicle ground – using separate but very short grounding cables. Alternatively but less desirable, you can use a single but longer ground braid or cable from one or both of the included ¼ inch ground bolts on the BKT to your vehicle ground, bypassing the hitch/receiver. Grounding is very important and may require trying different methods if you have tuning or SWR problems on one or more bands. Additional information with illustrations are included on our UHAM-150 instructions that can be viewed or downloaded on our [DOWNLOADS](#) web page, click on [MANUALS](#).

Mounting an HF antenna to a trailer hitch or bumper is less efficient but if done correctly with a decent antenna it can result in perfectly good performance. In most cases, this is the simplest and most secure place to mount a large antenna, and for many of us our vehicle type does not allow any other practical mounting location. The best location is the center of the roof, but air bags and complicated mounting for large HF antennas do not make this a practical location for most people. The second best location is a pickup truck bed but this can require a more complicated installation as some trucks have composite beds while others have thin sheet metal that has to be reinforced. Consider performance, practicality and your abilities (or willingness to hire someone) when deciding where to install your antenna. Job 1 is installing a *safe* antenna while Job 2 is RF *performance*!

Also consider RF exposure to you and your passengers. This is especially true if running over 100 watts. Review the FCC regulations and calculations regarding RF exposure.

Be sure there is enough clearance for the top of your antenna whip to clear garages and bridges, and that the BKT will not hit road objects if mounted on a low vehicle. If you are mounting the BKT to a receiver type hitch you may want to purchase a “rise or drop” type of receiver to raise or lower your antenna. Receivers are available up to at least 10 inches of rise or drop - this helps place the height of the antenna so the BKT will not hit road obstructions and your whip will clear overhead objects. Receiver hitches fit somewhat loosely into the hitch when using a standard hitch pin. While secure, this results in some undesired movement of the antenna. This can be solved by purchasing a special threaded pin with insert for hollow receivers, or special threaded receiver, which enables you to “bolt” the receiver tightly to your hitch, eliminating all movement.

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If you are mounting your antenna on a van or pickup with camper, you might consider mounting to your FRONT bumper, to get your antenna farther away from the metal sides of your vehicle. If mounting to a front bumper, take into consideration the safety of doing this on your vehicle – be sure it does not block your view of the road or result in other safety issues.

- b) **Fixed base installations.** You will need some type of ground counterpoise if mounting your antenna at a fixed base location that does not have a horizontal metal surface that can act as the counterpoise, such as when mounted on a vehicle. If you use MANY radials, 20-30, you can lay wire radials on the ground. If you can elevate the radials, which is preferred, use at least four wire or telescoping whips as your counterpoise. We include more details on fixed base counterpoise radials on our BKT-Sksp-1 instructions that are available free on our DOWNLOADS web page, click on MANUALS. The BKT can be mounted to a horizontal surface, or to a vertical surface with our **AMB-VMA-4** heavy-duty “L” bracket.

- 2) **Mount the BKT to your vehicle or fixed-base location, to a horizontal surface.** (or vertical surface with optional AMB-VMA-4). The BKT mounts with a ¾ to 1 inch bolt or trailer hitch ball and hardware (not included with the BKT but we can provide). The BKT can be mounted perpendicular or parallel to the bumper. Be sure to use flat washers on both sides of the BKT, and use a lock washer under the nut. Securely tighten. Check periodically to be sure that the hardware and antenna base are not loose.

- 3) **If purchased, you may want to install any OPTIONS now.**

See the detailed instructions that come with the options. Also see the illustrations on **page 6** below.

- 4) **Connect vehicle ground cable (also refer to Step 1 above)**

Use one (or both) of the provided ¼ inch solder lugs to connect a heavy-duty ground cable or copper/metal strap to your vehicle ground (ground cable not included with the BKT). Connecting a good ground connection is one of the most important factors in installing an HF mobile antenna on a vehicle. If your antenna does not resonate or the SWR is not below 2.0:1 on one or more bands, try another type of ground connection or install more than one ground cable. The key is to use the shortest and heaviest overall ground connection that you can install.

As mentioned in **Step 1** above, one ground cable going from the BKT to vehicle ground may not work as well as grounding each component of your mounting system together via two or more very short cables, and grounding the forward most part of your mounting components to the vehicle ground using the shortest possible ground cable or metal/copper strap. For example, run a short ground cable from the BKT ground point to a bare metal point or hole in your hitch near the BKT, then run another short ground cable from the forward end of the hitch nearest a good ground point on your vehicle. The goal is to run a ground cable across each part in your BKT/hitch/bumper mounting system that is not a continuous metal part or not welded together – bolting across painted surfaces does NOT provide a ground! It’s a matter of trial and error; if the first attempt is not successful try another grounding method.

You may also need to run ground straps across the various components of your vehicle, especially if it is constructed “body on frame”.

- 5) **Install antenna on the BKT.**

Mount your antenna with the base bolt, hardware and insulating wafers (insulating wafers NOT required for Scorpion antennas) that came with your antenna. The Scorpion and Hi Q all mount into the ¾” hole (panel thickness ¾ inch) in the BKT.

Hi Q “ruggedized” (e.g. ½ inch base bolt) motorized HF antennas come with a 1 inch diameter threaded tenon that the ½ inch base bolt screws into. The Hi Q antenna quickly screws into the top of the tenon. The tenon is the SAME part that is on top of the Shakespeare spring base that also can be used (but is NOT required) with the Hi Q ruggedized models – our **BKT-Sksp-1** flat mount is a wider version of the **BKT-Flat-4S** for the Shakespeare spring base.

- 6) **Connect Coax to the BKT.**

- a) **BKT-Flat-4 (no SO239 connector).** Your radio coax connects directly to the antenna’s SO239 connector on Scorpion antennas, For antennas *without a built-in SO239* connector, the coax center conductor connects to the antenna’s base bolt and the coax shield is connected to one of the BKT’s ¼ inch ground bolts..

- b) **BKT-Flat-4S** (with SO239 barrel connector). *See the illustrations on page 6.* On Hi Q ruggedized motorized antennas, and many other brand large screwdriver antennas without a built-in SO239 connector, the antenna base bolt connects to the center conductor of your coax and to a shunt coil (such as our SHUNT100) that you may need to increase your impedance at resonance (lower the SWR) on the low HF bands (radio coax & shunt in parallel).

You have two methods that are equally effective for connecting your coax, as detailed below; it's a matter of preference. For either method you can use a 12 or 14 gauge single conductor insulated wire, or preferably, make your cable from RG8 coax. The advantage of using RG8 is that the end going into a PL259 connector is more secure than simply running a single conductor wire into the PL259; the outer insulation and coax shield is then removed approximately ½ inch from the PL259. Use as short a cable as practical. We can provide optional jumper cables made from RG8 coax with Amphenol PL259 connectors and heavy duty solder lugs.

- Method 1: Using a PL259 TEE connector on the bottom of the BKT's SO239. Run a single conductor wire from the antenna base bolt using a solder lug (Hi Q ruggedized antennas require a ½ inch solder lug) and on the other end use a PL259 plug – the plug goes into one end of the TEE. If you are using a shunt coil, run a second single conductor wire from the shunt (SHUNT100 requires a ¼ inch solder lug) to another PL259 plug that goes into the other side of the TEE. Your radio coax goes into the top of the BKT's SO239 connector. The TEE is *not* included with the BKT but we can provide a high quality Amphenol TEE if you need one.
- Method 2: NO TEE connector (shown in the example on last page). Use the same type of single conductor jumper cables that are used for Method 1. Run one jumper cable from the base bolt of the antenna to a PL259 plug that goes into the bottom of the BKT's SO239 connector. Run a second jumper cable from a ¼ inch solder lug on the SHUNT100 (or your own shunt coil) to a second solder lug for the antenna base bolt. Your radio coax plugs into the top of the BKT's SO239 connector. To avoid your jumper sticking down too far below the BKT's SO239 connector, such if mounted on a trailer hitch, you can use a PL259 elbow adapter on the bottom of the BKT's SO239 connector. See the illustrations on **page 6**.

7) Ferrite Bead Filters (for all antennas including Scorpion).

Ferrite bead filters are used to reduce HF antenna tuning problems and to help prevent RFI in devices connected to your radio. For the HF bands, use Mix 31 or other types that are designed to filter the entire HF band. Do NOT use unknown ferrites as they may not work at HF frequencies! You may want to install at least 3 ferrites, closely spaced, over your coax / antenna motor cable as close to your antenna as possible. At least one of these should have the coax wound 2-3 times around the ferrite(s) to improve filtering especially on the lower frequencies. Also install ferrites in a similar fashion on your motor/turns counter cable (all two or four wires go through the same ferrites as you do not need ferrites for each cable), and install one ferrite on the coax near your transceiver. Some installations may require 10 or more ferrites on EACH cable, at the antenna end of the cables – stop adding ferrites once your tuning / RFI problems are solved. A white paper on this topic can be downloaded for free from our web page:

<http://www.repdesign.us/Download.html>.

8) SWR adjusting device for low HF bands (not required for Scorpion which have built in shunt coil).

The purpose is to reduce the SWR to an acceptable level at the antenna resonance point on 160m and 80m, and maybe also on 40m – low mounted HF antennas have very low impedance on the low bands. Devices that may work for you include a simple shunt load inductor, UNUN, or “switch box” to reduce the SWR. Some of these devices need to be installed at the antenna and if so should be weather resistant (like our **SHUNT-100** shown on page 6). Shunt load inductors, whether using our SHUNT-100 or your home wound shunt, are preferred as they usually only have to be tuned once and then work on all bands without retuning as they are electrically invisible on the upper bands.

**Spare parts, accessories, downloads and related products.**

Let us know if you need spare parts or are looking for something that we do not yet provide – your idea could become a new product! As a specialty company, we are looking for unique ideas to serve the amateur and two-way radio community.

**Warranty Summary**

**All products include a two (2) week "return for any reason" and six (6) month manufacturing defects limited warranty. If you should need to return your product please contact us **IN ADVANCE** to obtain a return**

authorization number. Please refer to the complete warranty terms that are enclosed with your order; this is also included on our web site.

**Changes to These Instructions**

We periodically update our instructions. The latest versions (PDFs) with color photos can be found on our "DOWNLOADS" web page, under "MANUALS". The version date code is provided at the bottom of each page.

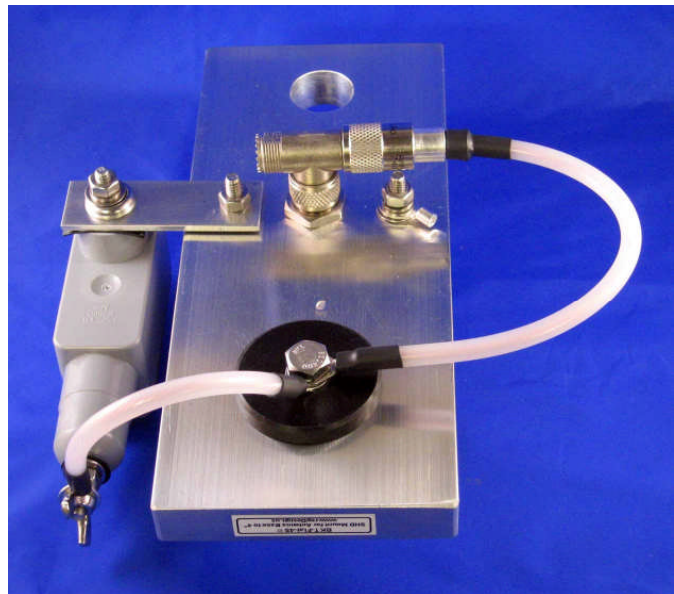
**BKT-Flat-4S Coax Connection Example – Method 2 in Step (6)**

The two photos below show a **BKT-Flat-4S** with a **SHUNT-100** HF load inductor, Hi Q antenna insulating wafers and hardware (e.g. Hi Q Antennas uses 2.5 inch OD wafers on their ruggedized models), two single conductor jumper cables made from RG8 coax, and Amphenol PL259 elbow (the TEE in the photo simulates the elbow, which we did not have when the photo was taken!).

The two side bolts are the two ¼ inch ground bolts. The open hole (1 inch diameter) is for mounting the BKT.



**TOP SIDE** OF BKT-Flat-4S



**BOTTOM SIDE** OF BKT-Flat-4S

Thanks for using our products or viewing these instructions on-line. HAPPY DX!