



## REP Design LLC

193 Winding Ridge Rd, Southington, CT 06489 1- 860.426.1894 n7emw@cox.net www.repDesign.us

### INSTALLATION INSTRUCTIONS:

#### **SHD-SO239<sup>®</sup> Super Heavy Duty SO-239 Antenna Mounting System**

**Thank you for your purchase! We appreciate your business and would like to hear from you about your installation – comments, suggestions and photos! Also let us know if you have ideas for new products!**

These instructions describe how to install the SHD-SO239<sup>®</sup> (“SHD”) antenna mounting system to your antenna and mount. The SHD comes fully assembled but can be disassembled if needed, to replace any of the internal insulating washers or if you want to use a different length 3/8x24 antenna bolt (“stud”) than what is provided (extends 1 inch from the top of the SHD). If you do disassemble it be sure to use “blue” Permatex thread lock (or the equivalent), as described in these instructions. Refer to the **Figures** at the end of these instructions for installation and connection ideas.

The most current version of these instructions is on our web site “Downloads” page, and may be more recent than hard copy instructions provided with our products. The instruction version date is on the footer of each page of our instructions.

**If you do not feel that you have the ability to safely install the SHD to your antenna, please contact us if you would like to return it (within the first two weeks, see Warranty for details). SAFETY FIRST!**

#### **Description of the SHD:**

The purpose of the SHD is to provide a sturdy way to mount an SO-239 connector directly to the base of your antenna, with the ability to use **DIFFERENT LENGTHS of 3/8x24 antenna mounting studs** – unlike other SO-239 mounts our SHD has a **REMOVABLE stud**. All parts are stainless steel and nylon 6/6 – no softer brass like many SO-239 mounts. The SHD is tightened to your antenna using the provided Allen wrench that fits into the SO-239 center conductor “hex bolt”, so you directly tighten the antenna stud unlike most other SO-239 mounts where the center conductor is press fit into the base and therefore can not be tightened as much as our SHD.

The SHD can be used to mount small antennas such as CB/10meter whips and longer VHF antennas without a second point of attachment. It can be used to mount larger antennas, such as HF motorized / screwdriver antennas, if used with a **SECOND** point of attachment. The second point of attachment is required for larger antennas, as with any SO-239 the ability to fit a PL-259 plug means that the internal parts have to be limited in size and are not quite as strong as mounting an antenna with a single 3/8x24 hex head bolt. Our SHD uses as strong or stronger materials that are used with any other SO-239; hence we call it a “super heavy duty” SO-239 antenna mounting system. The internal treaded parts are installed with Permatex “Blue” thread lock. This helps to keep parts from unscrewing but parts can be disassembled using standard tools.

Our SHD is custom-designed and custom made. There is **NO OTHER** SO-239 with its features. It was initially designed as an option for our UHAM antenna mounts (models 100 and the latest 150), but it can be used with any mount that has the features listed below.

#### **What you need to install the SHD:**

No special tools are required; a standard 1/4 inch Allen wrench is provided to tighten the SHD to your antenna. You will need one insulating washer (type that is flat on **BOTH** sides, *without a lip* that sticks into the mounting hole) between the base of your antenna and the top of your mount; one is **NOT** needed between the SHD and your mount as you want a good ground between the SHD and your mount. To disassemble the SHD (e.g. install a different length antenna mounting stud)



you will need a 3/16 inch Allen wrench to unscrew the 3/8x24 antenna stud (while using the provided Allen wrench on the other end). You will need standard pliers and possibly have to put the SHD in a vice, since we use thread lock which makes parts a bit harder to disassemble.

**The installation and maintenance instructions for the SHD are as follows:**

**(1) Requirements for installing the SHD-SO239<sup>®</sup> (“SHD”)**

The SHD will mount directly to our UHAM-100 or UHAM-150 mounts or any mount that has the following features (see **Figure 2**):

- 3/4 to 13/16 inch diameter mounting hole,
- is at least 3/4 inch thick (can be thicker and is only limited by the length of the 3/8x24 stud that is used; the provided 3/8x24 stud sticks out 1 inch from the SHD),
- has a second antenna support if used with medium and large antennas, as described below (for an example of a second antenna support system, see Figure 5), and
- has a good ground (e.g. bare metal) from the mount to the base of the SHD – any paint or non conductive coating must be removed under the SHD.

In addition, your antenna must mount with a standard 3/8x24 mounting stud (“bolt”)

**(2) Installing the SHD on your antenna mount (UHAM or other)**

- 2.1.** One insulating washer (type that is flat on BOTH sides, *without a lip* that sticks into the mounting hole) is required between your antenna (or quick disconnect) and your mount. An insulating washer is NOT used between the SHD base and the mount, as you want a good ground between the bottom of your mount and the body of the SHD. For a UHAM-100 or 150 mount, the insulating washer can be up to 2 inches in diameter. The suggested thickness of the insulating washer is 1/4 inches, for use with the provided antenna stud.
- 2.2.** If you use a quick disconnect, it is recommended that you occasionally wipe on “WD-40” on the quick disconnect mating surfaces to help prevent unscrewing the SHD while turning your antenna to remove it from the quick disconnect. For a UHAM-100 or 150 mount, the quick disconnect can be up to 2 inches in diameter.
- 2.3.** If installed on a painted mount, including our earlier UHAM-100 in powder coat, you must completely remove the paint around the SHD base, to ensure a good ground from the SHD to your mount. If your mount is bare metal, it is suggested that you use steel wool to clean off any oxidation that may exist on your mount. Our UHAM-150 powder coated mounts have an area larger than the SHD masked off when powder coated, so that the SHD has a bare metal ground (see **Figure 5**).
  - 2.3.1.** You can check to see if you have a good ground (AFTER the SHD is installed and fully tightened) by using a volt-ohm meter or digital meter, on the LOWEST resistance scale setting. The resistance between the SHD base and the ground connection on your mount (e.g. where the vehicle ground cable connects to your mount) should be the same resistance as when putting the meter leads tightly together. For example, on some meters the resistance between the leads will be 0.0 or 0.1 ohms. The SAME (not even 0.1 ohms higher) resistance should be indicated when putting the meter leads tightly against the SHD base and your mount ground. Even a slight increase in resistance between your coax ground and mount (with the SHD or ANY connection) can affect the operation of HF antennas. We have tested this with our UHAM series of mounts and the SHD.
- 2.4.** To install the SHD to your mount and antenna/quick disconnect, simply screw it into the base of our antenna with the insulating washer installed below the bottom of your antenna. Tighten the SHD into your antenna using the provided Allen wrench. Tighten the SHD 8 to 10 ft-lbs, which is “very snug” using the provided Allen wrench by hand (e.g. NO “cheater bar or vice grips” on the Allen wrench).

**(3) Connecting your PL-259 coax plug to the SHD.**



Like with any SO-239 connector, you simply screw your PL-259 coax plug “snug hand tight” into the SHD. There will be a slight gap between the end of the outer shell of the PL-259 and the SHD, as shown in **Figure 3**. This is normal, and you will obtain a tight fit with the PL-259 center conductor and outer shell. The hex head of the SHD is specially made to accept an Allen wrench and the PL-259 pin.

**(4) Weather proofing suggestions**

- 4.1. It is recommended that you seal around the base of the SHD where it rests against your mount, to help prevent water from entering the space where the SHD rests against the bottom of your mount. “Coax –Seal” (<http://www.coaxseal.com>), “non corrosive” RTV sealer (do not use regular RTV as it is corrosive – this has a vinegar odor – the non corrosive type will mention this on the label) or some other water proofing can be used. It is best to use a flexible sealer that is easy to remove if you need to remove the SHD.
- 4.2. It is also recommended that you also seal around all coax connectors. You can use black electrical tape, self fusing tape, or “Coax-Seal”. If you use some type of tape around the connector, it is best to put “Coax-Seal” or the same type of sealer you used between the taped coax connector and the SHD, **AFTER** installing the tape. The Coax-Seal (or other type) should be put on the outside of the end of the tape, between the end of the tape and your mount/SHD base, so water can not enter around the edge of the tape near the mount. If you need to disconnect your coax from your antenna on a regular basis, you might want to check out our “CNCT-PL259 WXQD” weather resistant coax quick disconnect.

**(5) Disassembly and Re-assembly of the SHD**

- 5.1. If you need to install a different length of 3/8x24 antenna stud, or disassemble the SHD for any reason, follow these procedures.
  - 5.1.1. Unscrew the SHD from your antenna / mount using the provided 1/4 inch Allen wrench.
  - 5.1.2. Slide off the outer white nylon insulating tubing (shown in **Figure 2**) from around the stainless steel coupler. This fits tightly on the coupler but can be removed with pliers by twisting the insulator – keep the SHD from rotating by placing the Allen wrench into the center of the SHD base.
  - 5.1.3. To unscrew **ONLY** the 3/8x24 antenna stud, place the stainless steel coupler (without the insulator) firmly in a vice and using a 3/16 inch Allen wrench unscrew the stud using the hex fitting in the provided stud. It will be a bit hard to remove as “Blue” Permatex thread lock is used, but can be removed in this manner.
  - 5.1.4. To disassemble the internal parts of the SHD, place the coupler (without insulator) in a vice and unscrew the center hex fitting in the base of the SHD, using the provided Allen wrench. Again, this will be a bit hard to do as the same thread lock is used. Note the order and number of insulating washers and tubing, so they can be replaced in the same manner that they were removed. All of the internal parts can be replaced, some with a screw driver to push them out of the inside of the SHD base.
- 5.2. The following steps describe how to re-assemble the internal parts of the SHD.
  - 5.2.1. Assemble the insulators in the same way they were removed. All internal parts slide in to the SHD base; a small screwdriver can be used to push them in.
  - 5.2.2. **HAND TIGHTEN the SHD hex bolt** that fits from the base into the coupler.
    - 5.2.2.1. If installed, first REMOVE the 3/8x24 antenna stud from the coupler, as described above.
    - 5.2.2.2. Be sure to place the single white washer between the coupler and SHD base.
    - 5.2.2.3. BEFORE screwing the hex bolt into the coupler, put **“BLUE” Permatex thread lock** on the end of the bolt. If not used, the bolt could come loose from the coupler. Only use this “color” of Permatex as it is medium strength and made for the bolt sizes that are used in the SHD – this is available at automotive stores.
    - 5.2.2.4. Screw the hex bolt with Permatex into the coupler. **ONLY HAND TIGHTEN** the bolt until the coupler JUST TOUCHES the washer but is slightly loose. The coupler and washer do NOT have to be snug against the SHD base, as this is not “structural” to mounting your antenna. Also, having them just touching but slightly loose allows you to tighten the SHD into your antenna or quick disconnect without the SHD base rotating.



5.2.2.5. Re-install the 3/8x24 antenna stud into the coupler, AFTER the SHD hex bolt is installed per above. (NOTE: if the hex bolt is installed with the antenna stud in the coupler, you will not be able to fully seat the hex bolt); see detailed steps below.

5.2.2.5.1. Use "**BLUE**" **Permatex thread** on the antenna stud, where it goes into the coupler. Be sure the hex insert on this stud is pointing toward the antenna (NOT into the coupler), so you can tighten the stud into the coupler with an Allen wrench.

5.2.2.5.2. Screw the antenna stud into the coupler. Using Allen wrenches on BOTH the SHD hex bolt and antenna stud, snugly tighten the hex bolt and antenna stud into the coupler. This is **IMPORTANT** so that the two bolt ends "lock together" tightly inside the coupler. (NOTE: the coupler should NOT be firmly tight against the SHD base, as mentioned above. Only the two bolts have to be tightened firmly into the coupler).

5.2.2.6. Screw the SHD assembly into your antenna, and torque 8 to 10 ft. lbs. (as described above in detail)

## (6) **Maintenance.**

The SHD requires little maintenance as it is made from stainless steel and nylon 6/6 parts. Some suggestions are as follows.

- 6.1. The waterproofing suggestion in **Step 4** above also help to make sure your antenna system will last a long time.
- 6.2. If you use a quick disconnect that requires twisting while pushing down, you may experience twisting of the SHD, if the SHD is not torqued as mentioned above and your quick disconnect is sticking.
  - 6.2.1. Occasionally wipe on a light lubricant such as WD-40, on both surfaces of the quick disconnect. This makes inserting and removing the antenna into a quick disconnect much easier and therefore there is less tendency for twisting the SHD. A thicker oil or grease is not suggested as dirt and grit will stick to it, causing friction in your quick disconnect.
- 6.3. Maintain a good ground between the SHD housing and your mount ground. The metal surfaces must not be allowed to oxidize, such as if water gets between the mounting surfaces. You can check the continuity between the SHD base (ground) and the ground point on your mount – see detailed description in **Step 2** above.
  - 6.3.1. If a good ground is not being made, remove the SHD as per **Step 5** above and use fine steel wool or sand paper to remove any oxidation on the mating surfaces between the SO-239 and mount. Wipe clean with any type of alcohol, such as what is purchased at a hardware store. Allow to dry and re-assemble the SO-239 to your mount, following **Step 5** above. Re-check the resistance.
- 6.4. Periodically, or if you remove the SHD, check that it is torqued tightly (8 to 10 ft. lbs.) into your antenna or quick disconnect. If it starts to loosen, with a quick disconnect, the SHD may turn as you twist off your antenna from the quick disconnect. Also, if the SHD is loose, you may see erratic conductivity between the SHD and your mount ground.

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

Let us know if you need spare parts or are interested in our other products. For a current description of our products, photos, videos and prices please visit our web site: [www.repDesign.us/](http://www.repDesign.us/). If you don't see something you're looking for, related to mobile or portable radio operation, please let us know – your idea could become a new product! As a specialty company, we are looking for unique ideas to serve the amateur radio community.

For a listing of our current products, with links to detailed information and to order, go to our "Products" web page: <http://www.repdesign.us/Products%20%26%20Ordering.html>

You can find the current versions of product instruction manuals on our "Downloads" page: <http://www.repdesign.us/Download.html>

## **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.

**SHD Illustrations :**

**Figure 1: What is provided :** SHD-SO239<sup>®</sup> ("SHD") and 1/4 inch Allen wrench. The white material around the center of the SHD is nylon 6/6 insulation (this and internal insulators can be replaced). This insulates the center stud / coupler from the ground part of your mount, and fits around the stainless steel coupler that the 3/8x 24 studs is screwed into.



**Figure 2:** Diagram of the SHD with installation diagram and dimensions.



**Figure 3:** The left photo shows the end of the SHD where your PL259 coax plug fits into - and also shows the hex fitting that the provided Allen wrench fits into to fasten and tighten the SHD into your mount and antenna. The right photo shows the normal gap between the PL-259 body and the SHD – once tightened the PL-259 is snug against the SHD.



**Figure 4:** The two photos BELOW show two examples of connecting your coax to the SHD. Shown in the photos is a bare aluminum and powder coated UHAM-150 mount. The SHD can also be installed on any mount that has the features described in these instructions. The left photo shows a PL-259 plug, with Hi Q Antennas black insulating washer and Giant



Quick Disconnect (others brands can also be used). No shunt inductor is used in this example. The right photo shows a coax “tee” connector connected to the SHD so that a load inductor (example shown is our SHUNT-100) can plugged into one end and the coax to your radio to the other end of the “tee”. A load inductor will likely be needed for mobile antennas used on 160 and 80 meters, and possibly on 40 meters, to lower your SWR to an acceptable level at antenna resonance. The left black object on the coax (bottom left of right photo) is a Mix 31 split ferrite bead filter (several are installed but not visible here). NOTE: the UHAM-150 “matte black” mount shown here has the V-clamp removed.



**Figure 5:** The photo below shows the SHD with a “matte black” powder coated UHAM-150 mount – the silver area around the base of the SHD is masked off during powder coating to ensure a “bare metal” mounting surface for the SHD. It is **very important** to ensure a good ground - if your mount is painted or has a non-conductive coating, this coating **MUST** be removed between the SHD and the bottom of your mount. This photo also shows an example of a second point of attachment that is required for medium and larger antennas if mounted to the SHD (or any SO239 antenna mount for that matter).

