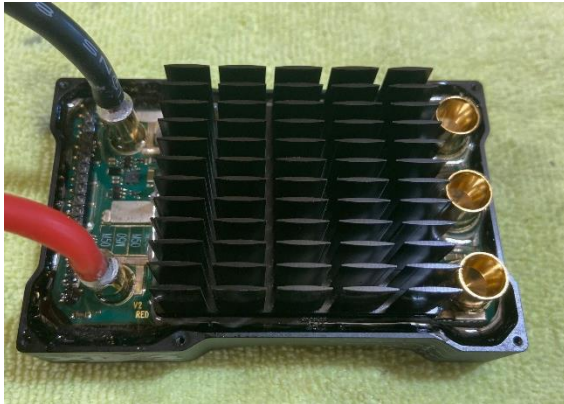


Thank you for purchasing Stump Fabrications Castle X8S/XLX2 cooling plate. This instruction set goes through the steps to modify your Castle Creations X8S/XLX2 controller to a marine version using Stump Fabrications cooling plate. The steps are the same both controllers.

Step 1: Remove the four screws that secure the cooling fan to the plastic cage using a Phillips screw driver.



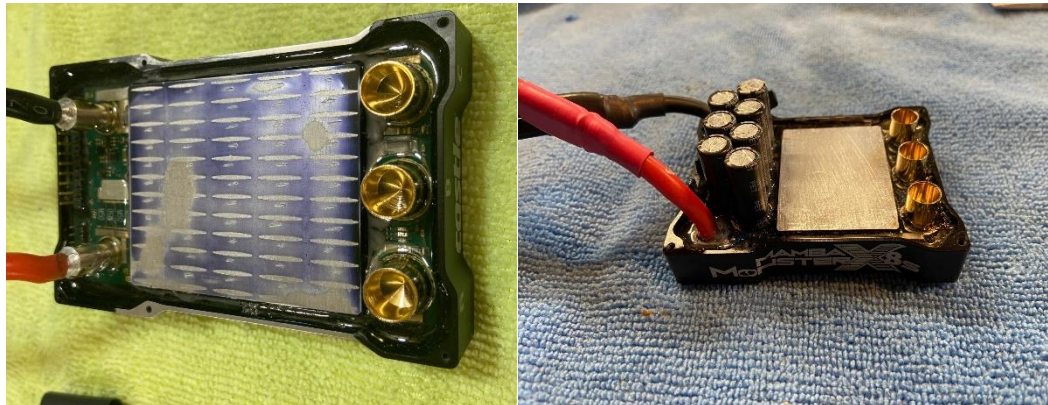
Step 2: Remove the 6x- screws around the periphery of the fan shroud using a 1.5mm Allen wrench.



Step 3: Using a pair of needle nose pliers grab each fin as close to the base as possible and work backwards and forwards till the fin breaks loose from the baseplate. There will be some remanent of the fin left over as shown below. Do not try to remove the left over heatsink. It is epoxied in place.



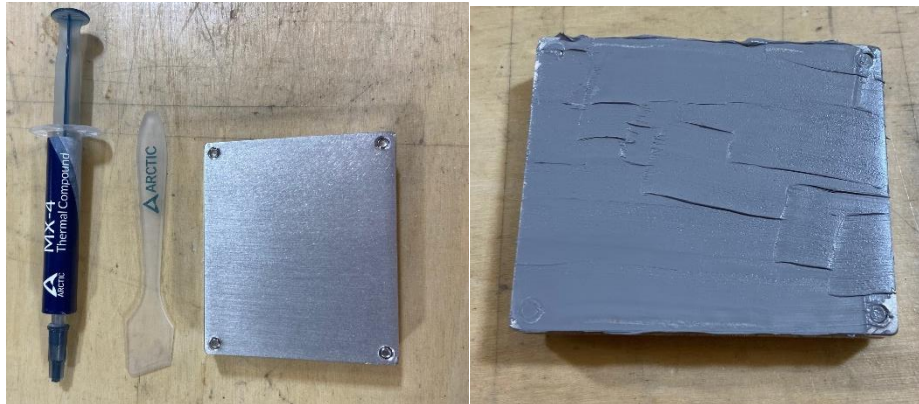
Step 4: Sand the baseplate down removing any material remaining from the fins. You can use a metal file, sand paper, Dremel tool or appropriate machine to sand flat. Be cautious the outer case is slightly higher than the flat heat sink plate. It is OK so sand away part of the exterior housing but be careful not to hit the battery inputs and motor outputs. We recommend wrapping these in tape or a protective layer to avoid bumping into them with your sanding tools. If you have access to a mill, you can use an appropriate end mill to make a skim pass and flatten the surface. You want the end result to be a smooth flat plate.



Step 5: Once your ESC heat sink is sanded smooth and flat it's time to apply a thermal heat transfer grease or thermal epoxy to your Stump Fabrication cooler. Thermal greases and epoxies transfer heat from the embedded heat sink to the cooler. Ideally you want the grease or epoxy to be as thin as possible. This improves the heat conduction between the hot and cold plates. Thermal grease will not "set" like an epoxy so the chill plate will need to be secured by external means. A 2-part epoxy will set up and harden and no external strap is needed. Thermal greases are readily available and often far cheaper than thermal 2-part epoxies. The following is a list of thermal greases and epoxies we recommend. The key metric is "thermal conductivity" and is typically stated in $W/(m-K)$. A higher number means better heat transfer. Look for thermal greases and pastes with a value between 5-8 $W/(m-K)$. I highly recommend the Zinc-Oxide thermal paste from McMaster-Carr over the typical thermal grease. The Zinc-Oxide is closer to a putty than a grease and as such it has been tackiness compared to a grease. This helps keep the cooling plate attached to the aluminum heat sink.

1. Artic Silver MX-5 thermal grease: [Artic Silver on Amazon](#)
2. Thermal Grizzly Kryonaut grease: [Thermal Grizzly paste on Amazon](#)
3. Thermal adhesive tape: [Thermal Adhesive tape on Amazon](#)
4. **Zinc-Oxide Thermal paste:** <https://www.mcmaster.com/3883k102/>
5. Silver bearing 2-part epoxy: <https://www.mcmaster.com/7595a33/>

Start by using a half pea size ball of material to spread a thin layer of the grease or epoxy on the cooler plate. Make sure to spread thin and cover all the surface area.

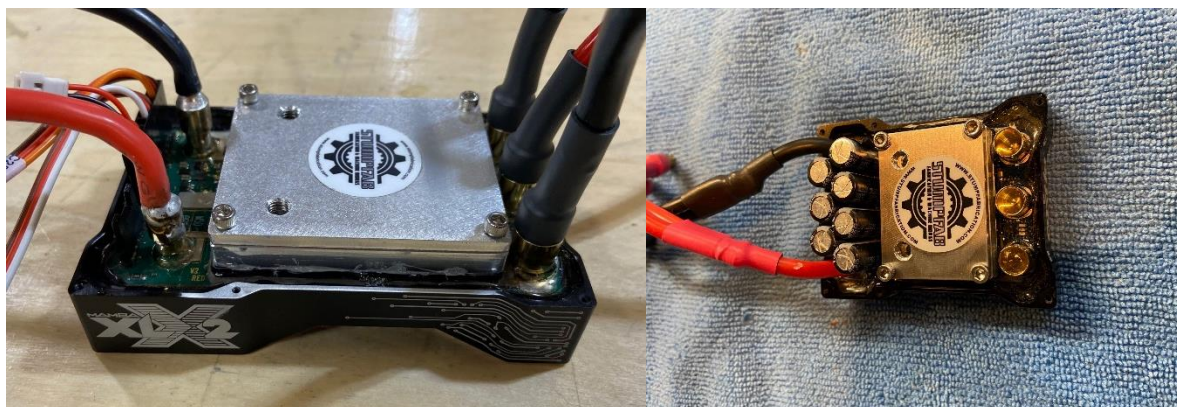


Step 6: Place cooler on Castle heat sink and use a clamp or similar to apply pressure to the cooler to ensure a good bond between the cooler and heatsink.



Step 7: If you used thermal grease you will need to secure the cooler to the ESC. You can use thick zip ties or strong tape wrapped around the ESC and cooler to secure it.

Step 8: Screw in the included water fittings. We recommend using some thread sealant to ensure a leak free seal. We realize many customers may want to upgrade the fitting to metal or a swivel style. The thread is a 10-32, but you can likely also use a M5x0.8.



Here are several recommendations for metal swivel fittings:

1. 10-32 plastic swivel fitting for 3/32" (small) tubing: <https://www.mcmaster.com/5153K53/>
2. Nickel plated brass low profile for 1/8" ID tubing: <https://www.mcmaster.com/2844K73/>
3. 10-32 plastic fixed barb for 1/8" tubing: <https://www.mcmaster.com/5463K54/>
4. Beswick Engineering miniature fittings: https://storage.googleapis.com/beswick-images/cc_catalogs/Beswick/additional_product_images/SMLSnewd.png
5. Amazon 10-32 swivel fitting for 1/8" or 3mm tubing: <https://www.amazon.com/Fitting-10-32-Degree-Elbow-Water/dp/B07V9NMZY7>
6. Dynapex 10-32 swivel fitting for 1/8" tubing: <https://www.fittings.space/hb32u-02-u03x32m-90>