

# TSI 3010 Peltier cooler replacement

Tools and supplies needed: → *Italics – means may not need it*

- Phillips screwdriver
- Hex wrench (size=7/64")
- Razor/sharp flat blade
- *Wire strippers*
- Peltier cooler (TEC)
- Isopropyl alcohol
- Thermal grease  
(T-Global Tech. 'type S606C' or TechSpray '1978-DP')
- *Crimping stuff (pins, shell, crimper)*
- *Hardware for condenser*
- *Silicone tubing*

0) Drain CPC and remove from rack if needed, put message in message log

1) Remove cover from 3010 (need screwdriver).

2) Remove optical block from condenser (need hex wrench+screwdriver). This will also involve removing some tubing and connectors. **note#1** See Figure 1 for location of optical block. Can also refer to our document about cleaning critical orifice.

3) Remove 2 screws holding condenser to back of CPC (need screwdriver)

4) Remove 5 screws holding back of CPC to reservoir (need screwdriver)

5) Pull back of CPC away from body of CPC – need to lift back of CPC up then out to get back away from drain port on back of CPC. May need to undo more connectors/tubing. **note#1**

6) Remove old Peltier cooler and clean grease off back of CPC (towels, EtOH, may need razor/blade to scrape off hard grease). **note#2**

7) Remove foam insulation from condenser by lifting foam box up. There are some foam plugs that need to be removed to lift foam box up. May also need to make cuts in foam so wire to condenser can remain in place

8) Clean grease off condenser (towels, EtOH, may need razor/blade)

- 9) Loosen 3 screws holding condenser to reservoir. (May want to remove and replace these screws/washers if corroded.) Note: these screws are threaded into plastic so don't force!). You are loosening screws so can get new TEC properly positioned – condenser needs to be loose, but not floppingly loose.
- 10) Put sticky piece of post-it on new TEC (this is mimicking the volume the thermal grease will occupy) and put TEC in approximately correct position on condenser side. For this you can have the TEC wires vertical so you can hold on to the TEC wires to keep it in position.
- 11) Put the CPC partly back together: slide the back down and on to the reservoir. Screw in 3/5 screws along the bottom that hold the CPC back to the reservoir and the 2 screws on either side of the TEC. Be careful when you tighten the 2 screws on either side of the TEC. Alternate between tightening each screw. Also if you tighten them too much you can crack the TEC which you don't want to do. The point of doing this step is to figure out the proper position of the condenser. You want the condenser, the TEC, and the back of the CPC to be parallel and snug.
- 12) When you have the back of the CPC tight then tighten the 3 screws holding the condenser to the reservoir so it is no longer loose. Again you want it snugly fastened down but not too tight and remember the screws holding the condenser down are being threaded into plastic so be careful!
- 13) Now that you have the condenser positioned and tightened down, remove the back of the CPC again – the 2 screws around the TEC and the 3 screws holding the back to the reservoir.
- 14) Put the foam box back on the condenser. Put in the little foam plugs.

- 15) Apply a thin even layer of thermal grease to both sides of the TEC (use the wood part of a q-tip to apply). The combined thickness of the grease from both sides should be ~ same as the thickness of a post-it note.
- 16) Place the new TEC on the condenser in the proper position – red wire is down - closer to the reservoir. The grease should hold it in place enough to get everything back together.
- 17) Position the TEC wires so can access them after the back of the CPC has been reattached to the reservoir – can bend the wires around condenser or tape them somewhere accessible.
- 18) Reattach the back of the CPC (5 screws for the reservoir, 2 screws around the TEC). Remember alternate when tightening the 2 screws around the TEC and don't tighten too much. You want the CPC back snug but not super tight – don't want to crack the TEC.
- 19) Reinstall the optical block (need hexwrench and screwdriver) and associated tubing and connections.
- 20) Put cover back on and hope for no smoke!

Note#1: If tygon tubing was used for butanol flow replace with silicon tubing. The tygon tubing gets hard as the butanol attacks it and you won't be able to remove the tubing from the nipple.

Note#2: GMD puts a connector inline with the TEC to make replacing the TEC easier. If this is the case will need a TEC with the appropriate connector. If this is not the case but have TEC with the appropriate connector can get pins+connector and make the connection that way or solder and shrinkwrap the less nice TSI way. Be careful if you do this!

Figure 1



Optics block

Condenser (with foam insulation)

Reservoir

Foam plugs (remove in step 7)



Figure 2ab

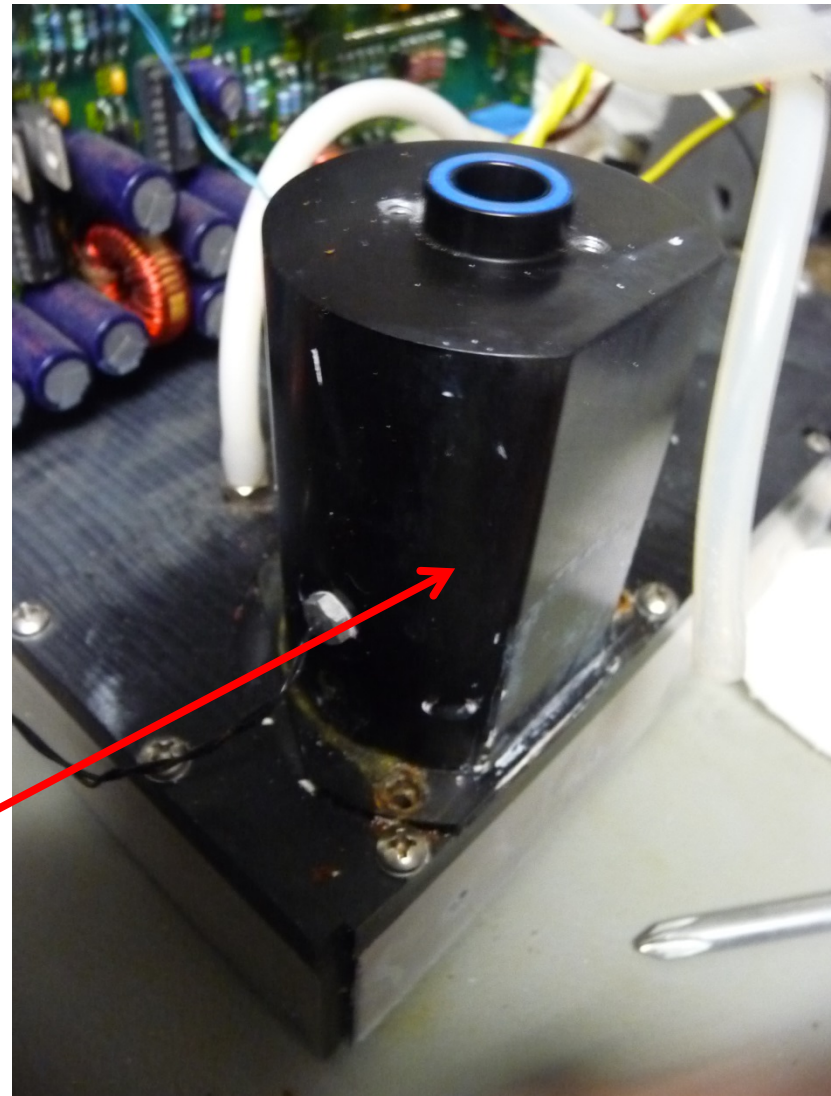
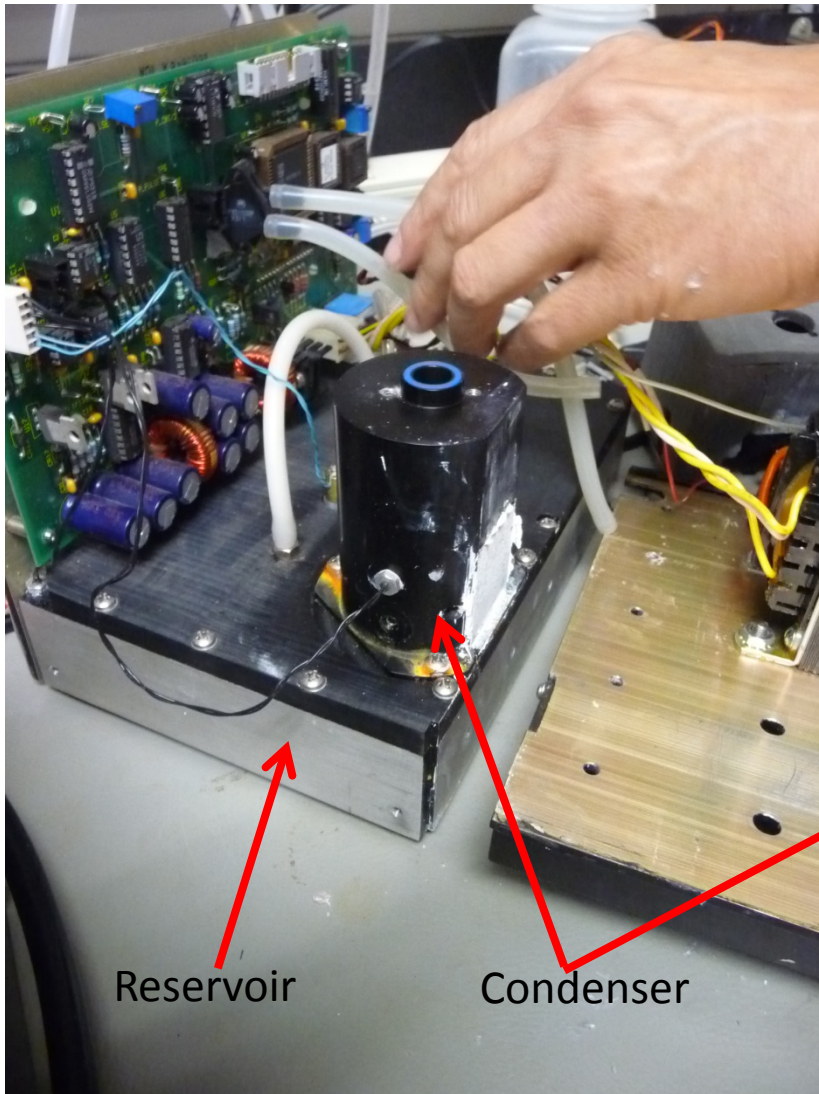
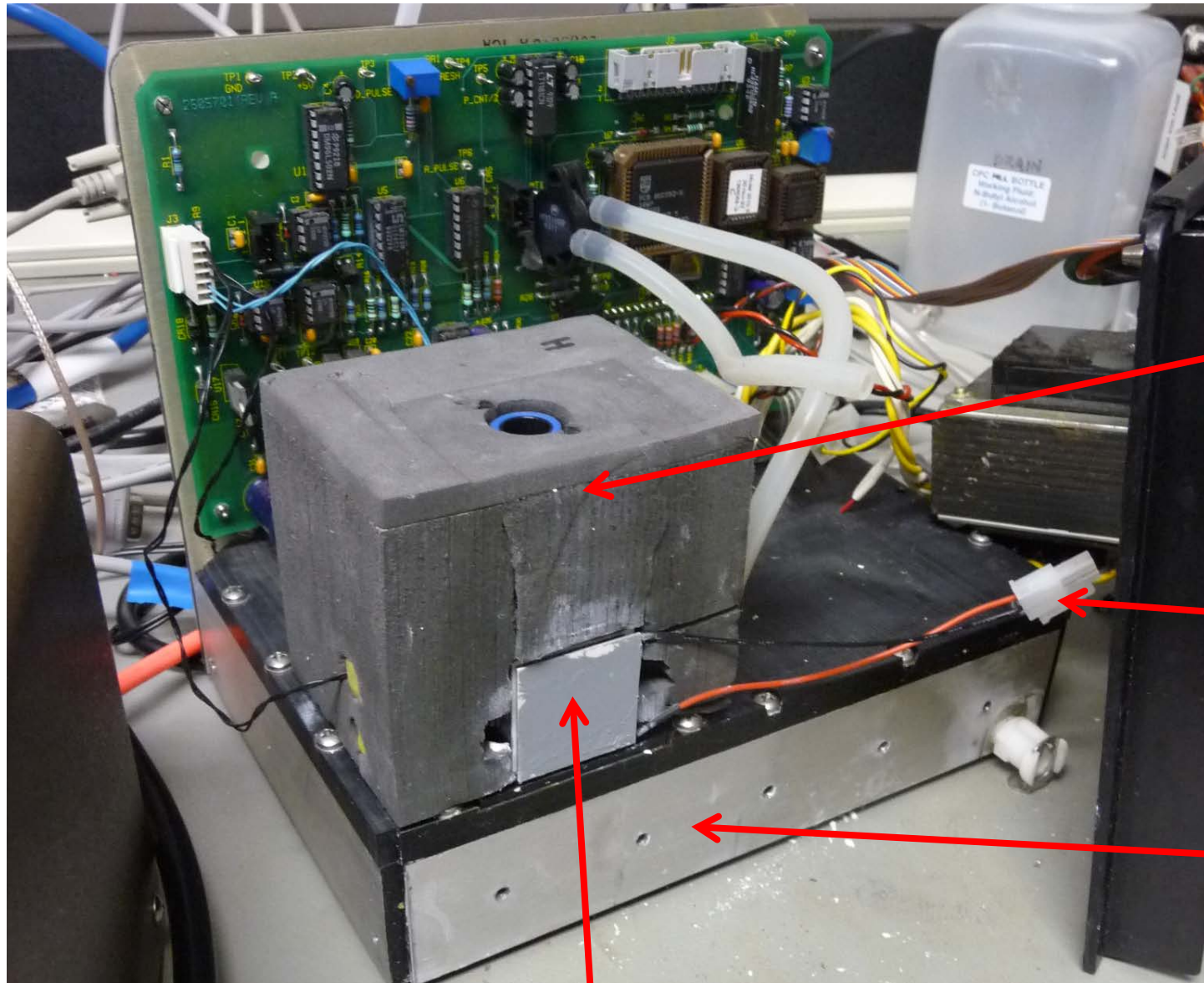


Figure 2a on left shows lots of thermal grease on condenser. It needs to be cleaned off so looks like figure 2b on right.

Figure 3



Condenser

TEC connector

Reservoir

TEC (red wire down, black wire up)