



## Tech Tips

[tech@rbdinstruments.com](mailto:tech@rbdinstruments.com)  
[www.rbdinstruments.com](http://www.rbdinstruments.com)

### 600/660 Objective Coil Replacement Procedure

#### Overview

This procedure describes the steps needed to successfully replace the objective coil on PHI 600 and 660 systems. **Note:** Use gloves, clean tools and place UHV aluminum foil on your workspace. For best results, dust off the assemblies with dry nitrogen or canned air as you reassemble the analyzer to remove any dust particles.

#### Tools required:

- Latex gloves
- Wrenches
- Small screwdrivers
- Tweezers and/or needle nose pliers
- 0.048 4-spline wrench

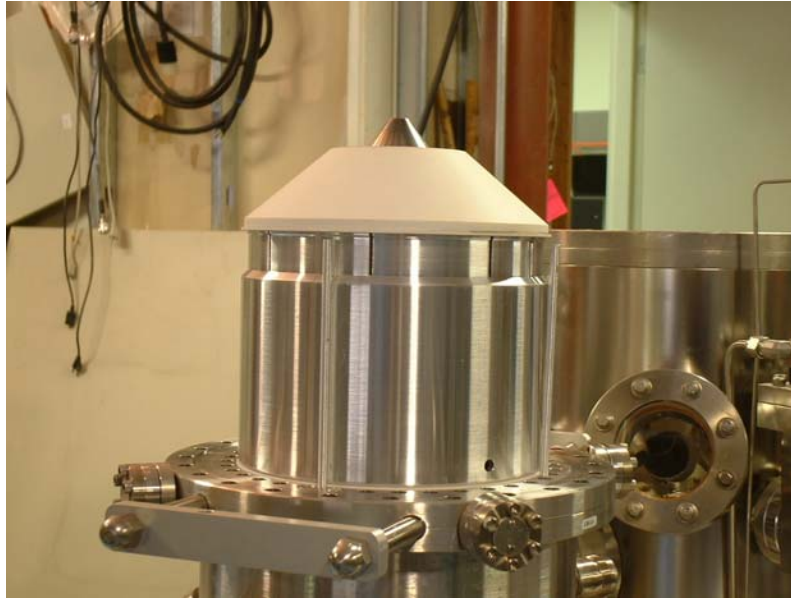
#### Disassembly Procedure

1. Vent the system.
2. Remove the filament housing (8" flange on a hinge).
3. Stand the analyzer on the back of the condenser nipple (8" flange).



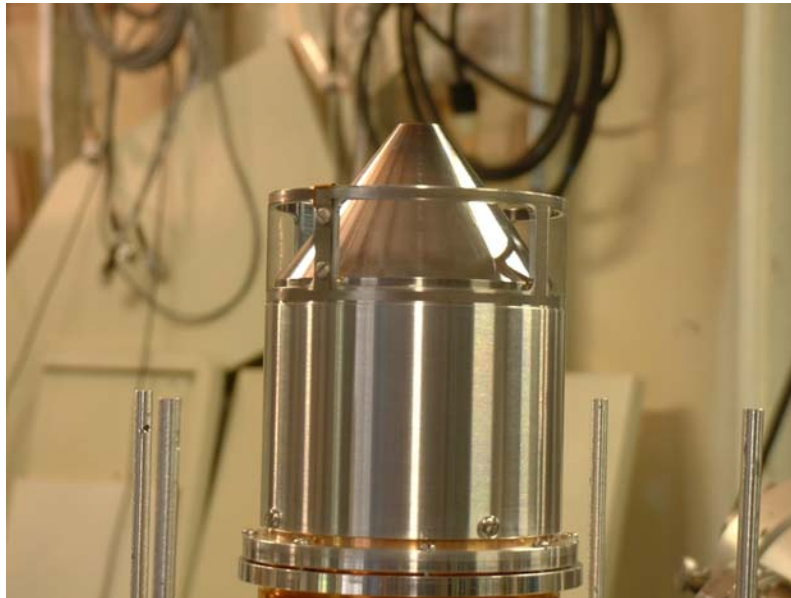
Figure 1. Analyzer placed on condenser nipple after removal of filament housing.

4. Remove magnetic shield (4 screws).



**Figure 2. The conical ceramic will be visible after removal of the magnetic shield.**

5. Remove conical ceramic (4 screws, aluminum ring).
6. Remove the outer cylinder after first disconnecting the  $V_m$  screw.



**Figure 3. The analyzer after removal of the conical ceramic and the outer cylinder.**

7. Remove the upper inner cylinder assembly (4 screws). Be very careful not to touch the grids.

8. Remove the 8 screws that hold the two aluminum rings in place and carefully lift up the Objective lens assembly.



**Figure 4. Removal of the objective housing from the analyzer.**

9. Scribe the objective lens assembly.



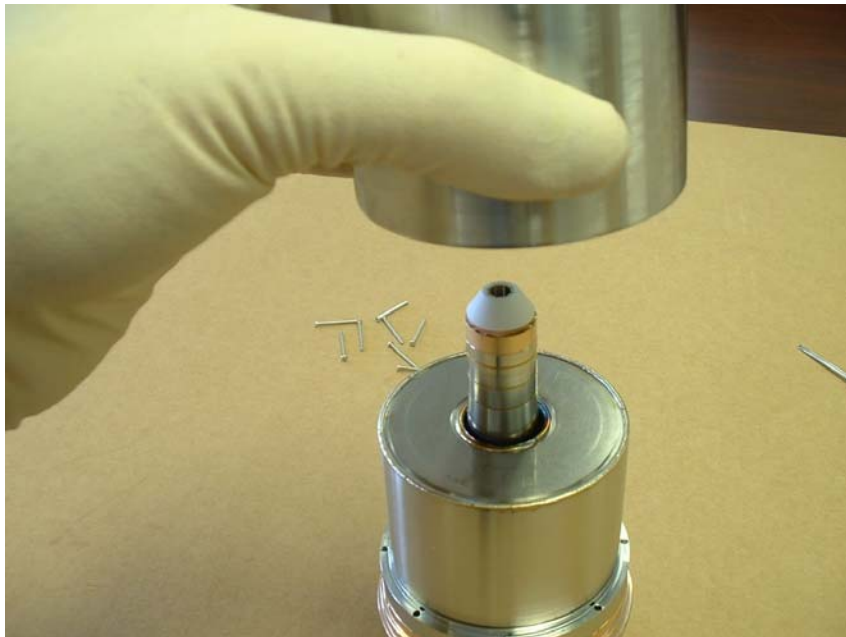
**Figure 5. Scribe the objective assembly so that the nose cap may be realigned during reassembly.**

10. Turn the Objective lens housing upside down and remove the 8 screws that hold the nose cap in place.



**Figure 6. Removing the 8 screws which hold the nose cap in place.**

11. Hold the cap and point the lens assembly up and carefully lift the nose cap off.



**Figure 7. Removal of the nose cap.**

12. Carefully lift off the octopole ceramic and spacers. *Position them on the clean aluminum foil in the order in which you remove them so that you can replace them in the same order later.*
13. Remove the 3 flat spring couplers and ceramics from the objective coil wires. You will need a 0.048 4-spline wrench.

14. Loosen and remove the 4 nuts which hold the objective coil to the base plate.
15. Remove the objective coil. Note that there are 4 spacers on the studs.

**Reassembly Procedure:**

1. Install the spacers on the objective coil studs and insert the objective coil into the base.
2. Put the nuts on the studs and tighten the nuts finger tight.
3. Using some 0.020 wire, slip it in and around the coil and the center tube so that the coil is evenly spaced around the center tube.
4. Securely tighten the 4 nuts.
5. Slide the ceramics over the objective wires and replace the 3 objective coil spring couplers.
6. Stack up the octopole ceramic spacers and slide the octopole ceramic back on. It is keyed and can only go on one way.
7. Carefully slide down the nose cap and replace the 8 screws finger tight.
8. Slightly rotate the nose cap to make sure that the octopole ceramic is well seated and then tighten the 8 screws.
9. Reinstall the objective lens assembly into the inner cylinder. It can only go in one way and still make the electrical connections.
10. Install the two aluminum rings in place and tighten the 8 screws.
11. Measure the resistance of the condenser and objective connectors and make sure that you have a good connection to the objective lens. The resistance on the two internal windings of the objective coil (Pins A, B and C) should be about 8  $\Omega$  each and 16  $\Omega$  across.
12. Check for connectivity on pins A, B, C, D, E, F, G and H on the octopole deflection feedthrough to the octopole ceramic to ensure that you have a good contact on each plate. The best way to do this is to set your meter up so that it beeps with continuity and then insert a small (0.010) wire into the nose cap and move it around while having the other end of the meter connected to the octopole deflection feedthrough. If the connections do not all check out then remove the objective lens assembly and look for a contact problem.
13. Reinstall the upper inner cylinder assembly. (Do not touch the grids!)
14. Install the outer cylinder and reattach the  $V_m$  wire.
15. Carefully place the conical ceramic on top of the outer cylinder and measure the resistance of the outer cylinder to ground. It should be 3 M $\Omega$ . If the conical ceramic is not making good contact, the resistance will be about 6 M $\Omega$ . It needs to be 3 M $\Omega$ . Shim with copper or gold foil if necessary.
16. Replace the aluminum ring on top of the conical ceramic and tighten the 4 screws evenly and firmly (but not too tight!).
17. Reinstall the magnetic shield.
18. Degauss the analyzer.
19. Ohm-out the objective connector one more time, and also ohm-out the  $V_m$  to ground to ensure that they are still correct.
20. Use a new gasket and reinstall the CMA into the bell jar.
21. Pump down the system and bake-out.

**Installation complete!**