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25-270 Analyzer Filament Procedure

Overview:

By following this procedure you will be able to safely replace the filament assembly in your PHI 25-270 or 25-260 double pass ESCA/Auger CMA. These analyzers are used in the PHI 570 and 560 ESCA/Auger systems, respectively.

η Safety Warning: This analyzer is heavy. Be careful when removing and installing the analyzer from the system. Do not attempt to remove the analyzer unless you are capable of lifting 70 lbs.. η

Tools required:

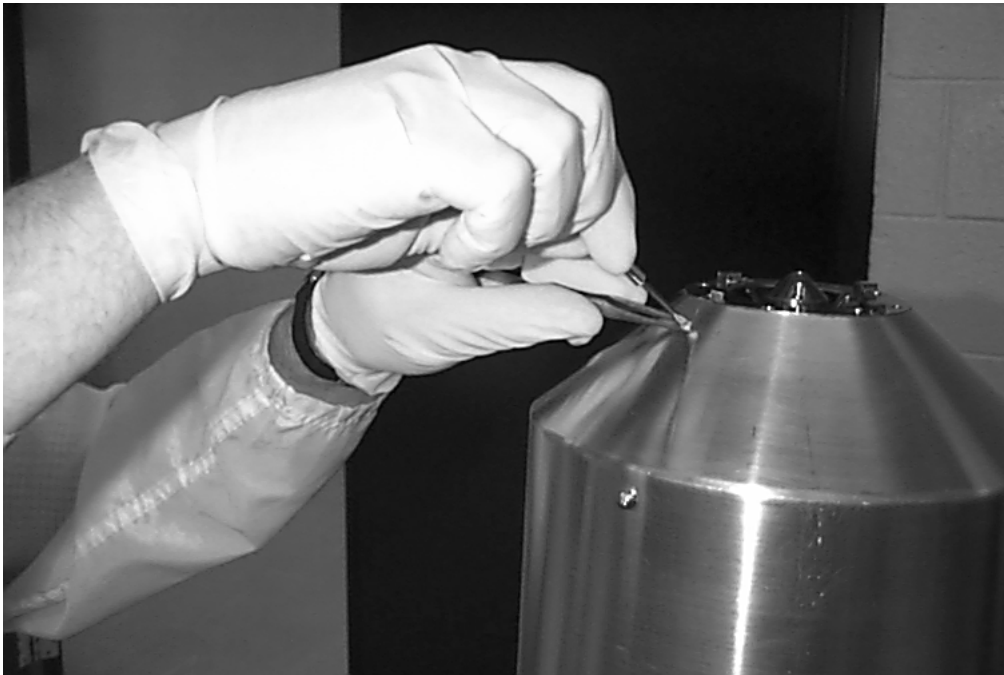
- Small straight screwdrivers
- Tweezers
- Long needle nose pliers
- Bristol wrench
- Analyzer stand
- De-gaussing coil
- Aluminum foil (and a clean work area)
- Clean gloves
- Ethanol or methanol
- Kimwipes or lint-free clothes
- Canned air or dry nitrogen

Procedure:

Prior to beginning this procedure, clean all tools with methanol and de-gauss them. Prepare a work area and lay down some aluminum foil to place analyzer parts on. Set up the analyzer stand next to the aluminum foil. Dust off all parts as you re-assemble the analyzer.



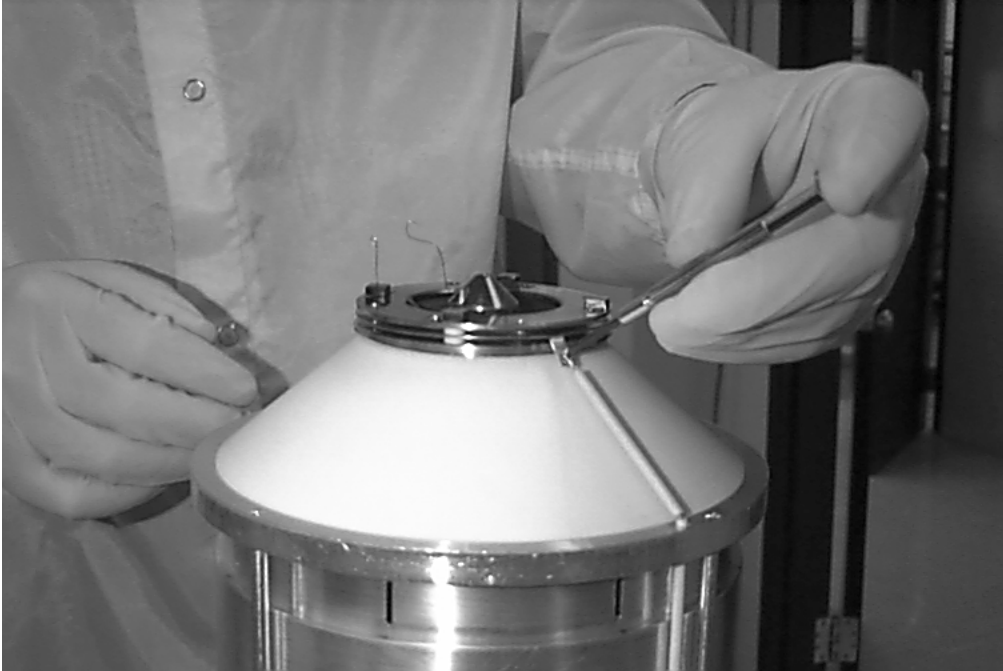
1. Vent the system and remove the analyzer, carefully lifting it by the handles. Try not to touch the inside of the chamber as you remove the analyzer. Set the analyzer on the stand. If no stand is available, you can use manuals stacked up on either side of the handles to support the analyzer. A stand is highly recommended.
2. Remove the screw that connects the grounding wire to the magnetic shield and the grid assembly, and the grounding wire to the gun cap, if there is one.



3. Remove the screws around the sides of the magnetic shield and carefully lift the magnetic shield up and off of the analyzer.



4. Next remove the guard ring ceramic screw and set it on the foil.



5. Loosen the four flat head screws in the base of the guard ring assembly. These screws are located in the base of the assembly. You can see them if you look down into the four holes in the top of the guard ring assembly. Do not remove these screws, only loosen them up.



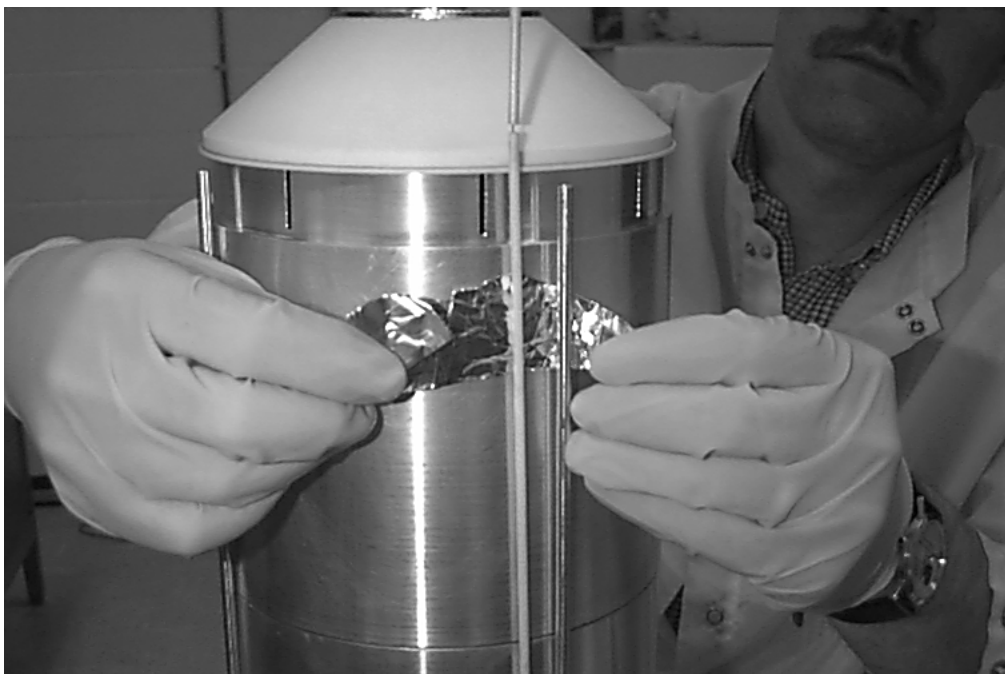
6. Carefully lift up the guard ring assembly and set it on the foil.
7. Loosen the four flat head screws on the perimeter of the aluminum conical ceramic support ring.



8. Carefully remove the aluminum conical ceramic support ring and place it on the table. You will need to slide the guard ring ceramic through the support ring as you lift it up



9. Use a small piece of aluminum foil to connect the guard ring ceramic to the long aluminum rod that is next to it. This will prevent the guard ring ceramic from falling over and breaking



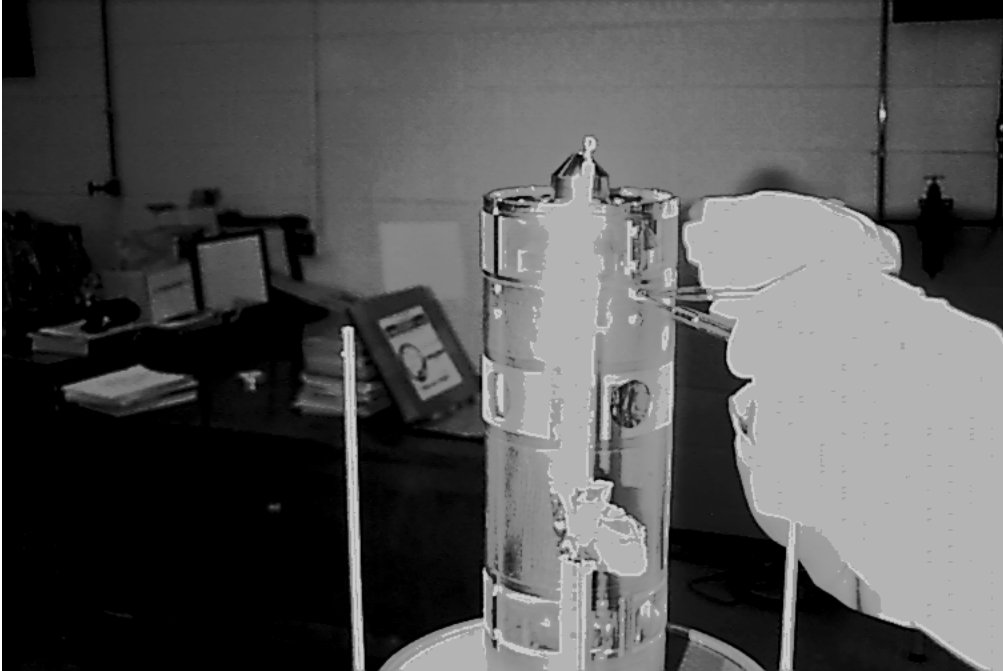
10. Very carefully, lift up the conical ceramic and place it on the table. This is a very brittle and expensive part, so use extreme care when handling



11. Remove the upper outer cylinder. Sometimes this part may be stuck. If so you may be able to loosen it up using a heat gun around the base. The next trick would be to use some methanol to help loosen it up. Only as a last resort, use some small straight screw driver tips to loosen it up. If you do have to use some screwdrivers, you will need to file down any nicks that you may create before this part is put back on later in the procedure.



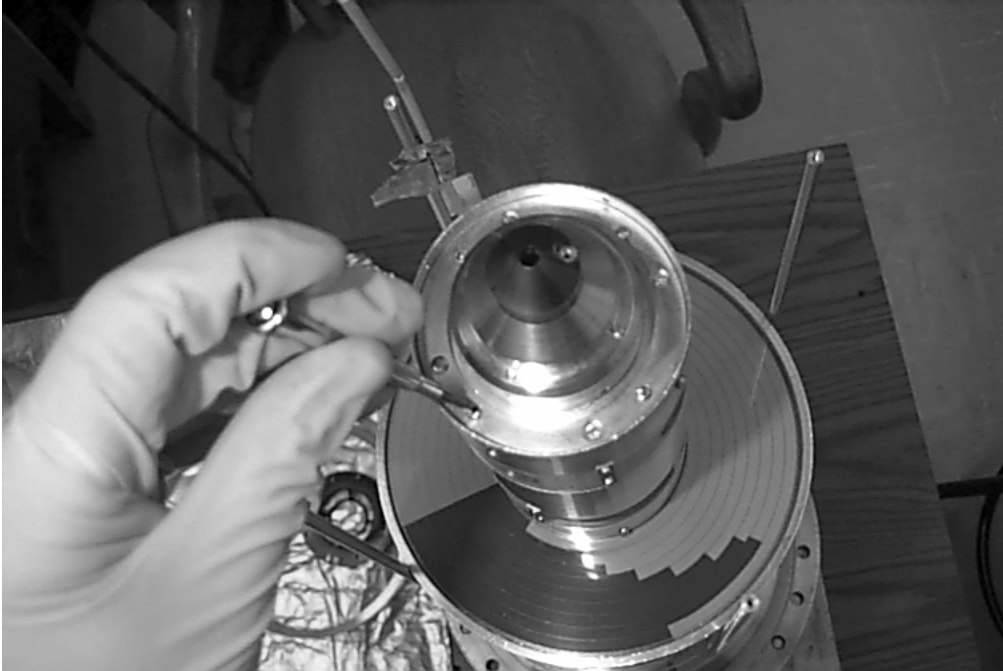
12. Remove the four pan head screws at the base of the upper inner cylinder. Use extreme care not to put a hole into the grids.



13. Carefully work the upper inner cylinder cap up and off of the inner cylinder. Touch only the metal areas between the grids and the base. Do not touch the grids.
14. Set the upper inner cylinder grid cap on the table.



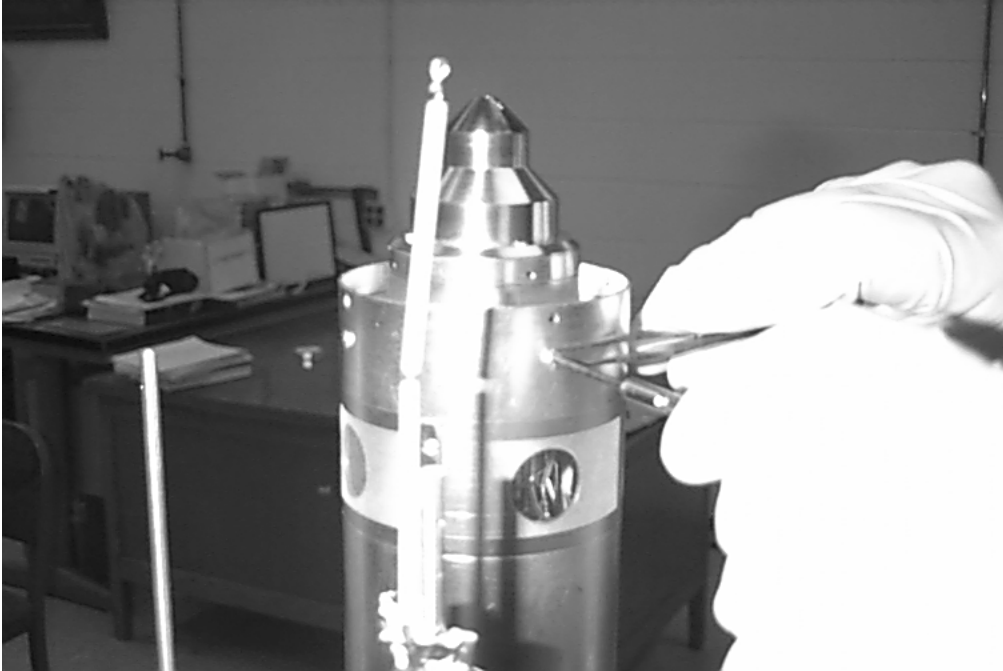
15. Loosen and remove the 4 pan head screws on the top of the gun assembly, located inside of the inner cylinder. Also tighten up the 4 flat head screws that are visible through the holes in the cooper ring.



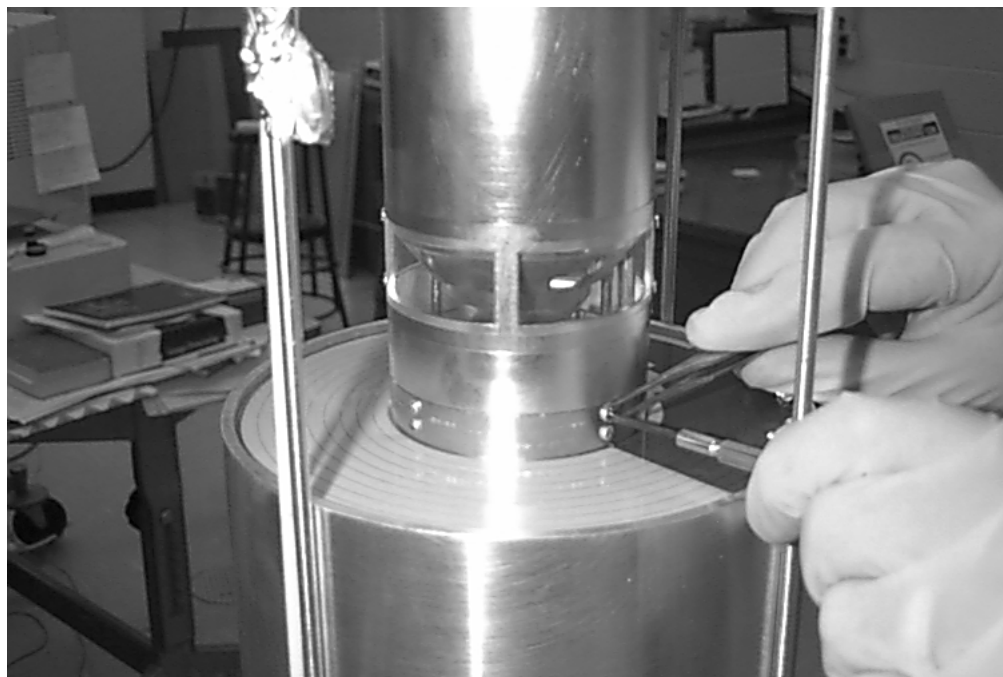
16. Remove the copper ring and set it on the table.



17. Remove the 4 pan head screws on the upper part of the inner cylinder.



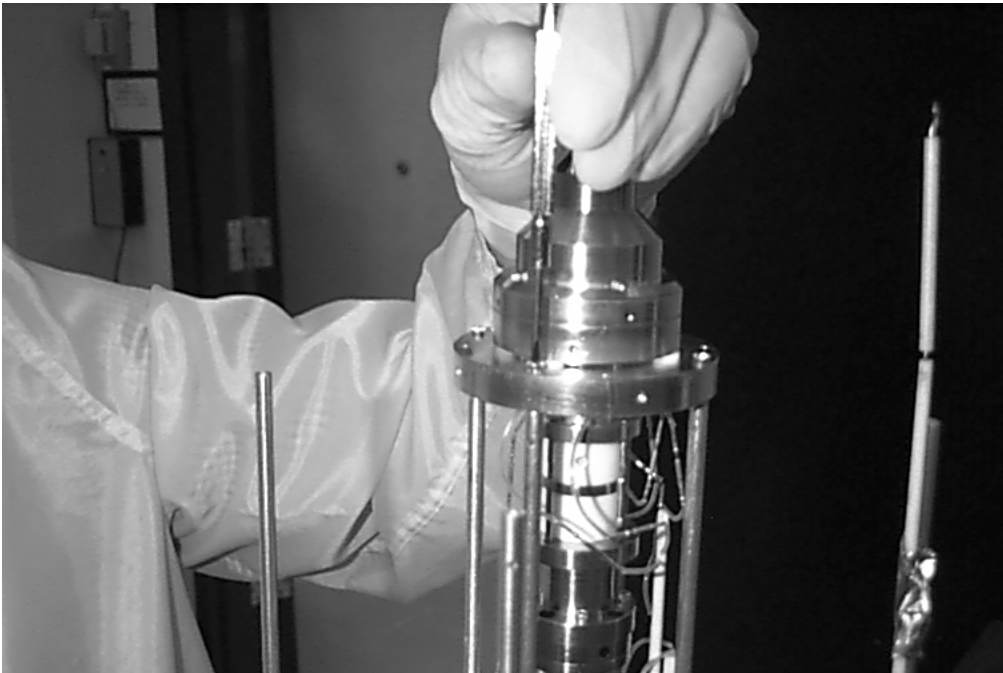
18. Remove the four pan head screws at the base of the inner cylinder.



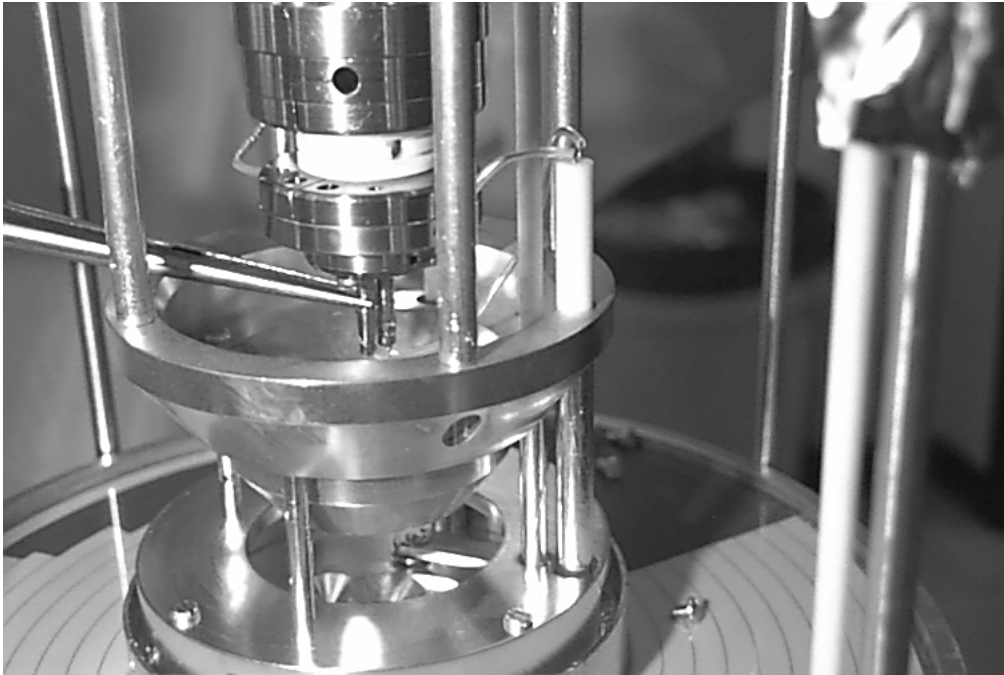
19. Carefully lift up the inner cylinder and set it on the table. Use the same tricks as before if it is stuck. Do not touch the grids.



20. Loosen the four flat head screws on the aluminum support posts.



21. Remove the two connectors from the filament. These are the two posts at the base of the gun assembly. The connectors will slide off using a needle nose pliers.



22. Separate the wire that connects the emission cap to the emission wire ceramic. All of these wires are connected by a male and female pin type connector. Use a needle nose pliers and a tweezers to gently separate these types of connections.



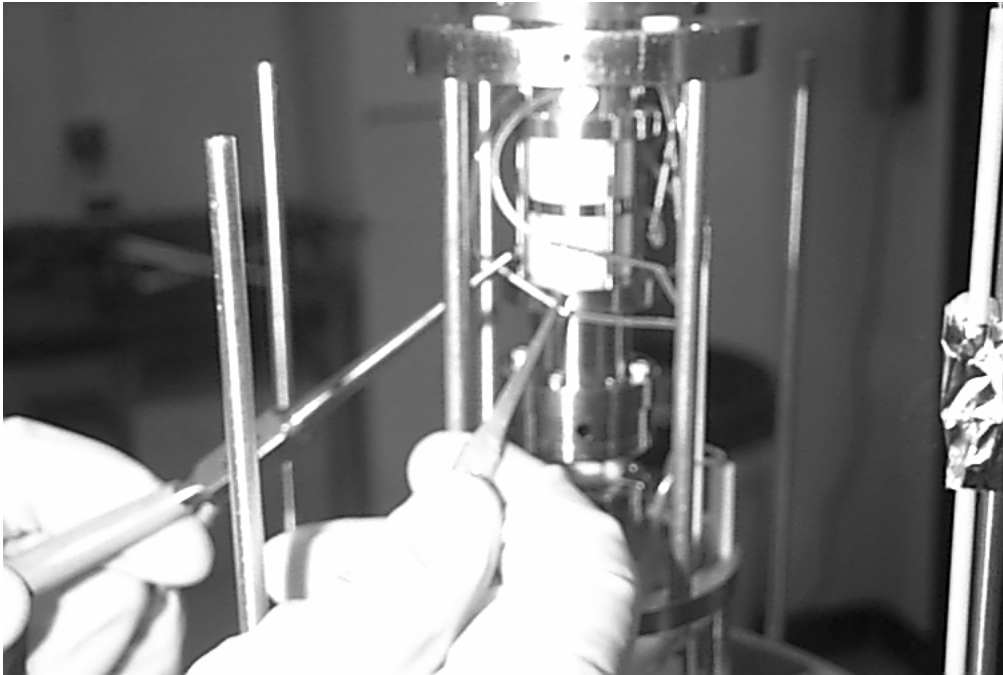
23. Remove one or two of the aluminum support rods and tilt the gun assembly out so that you can loosen the spline screws on the base of the filament assembly. Be careful to keep an eye on all of the wire connections as some of them may pull loose as you tip the gun. That is OK, just make sure that you can keep track of where they were so that you can re-connect them after tilting the gun back down.



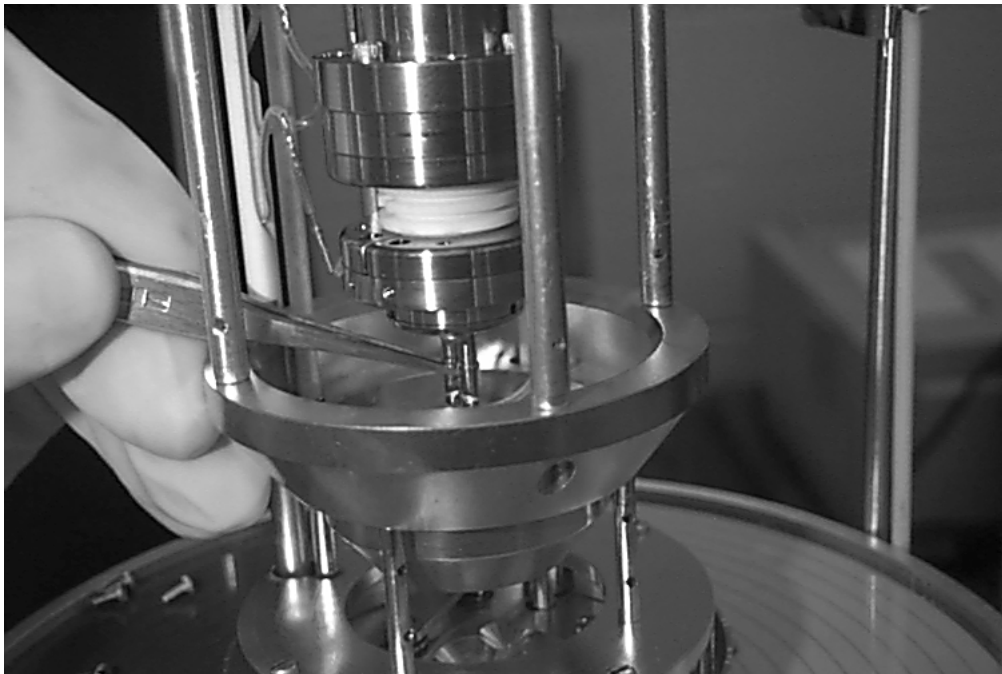
24. Remove the filament assembly and install the new filament assembly. You will need a spline wrench for this step. If you have only the C75-010 filament, it will need to be installed into the existing emission cap. Make sure that the new filament is well centered.

25. The filament is now installed, and the process will be reversed to put the analyzer back together.

26. After installing the filament, replace the aluminum support rods and tip the gun back on the supports. Re-connect any wires that may have come loose



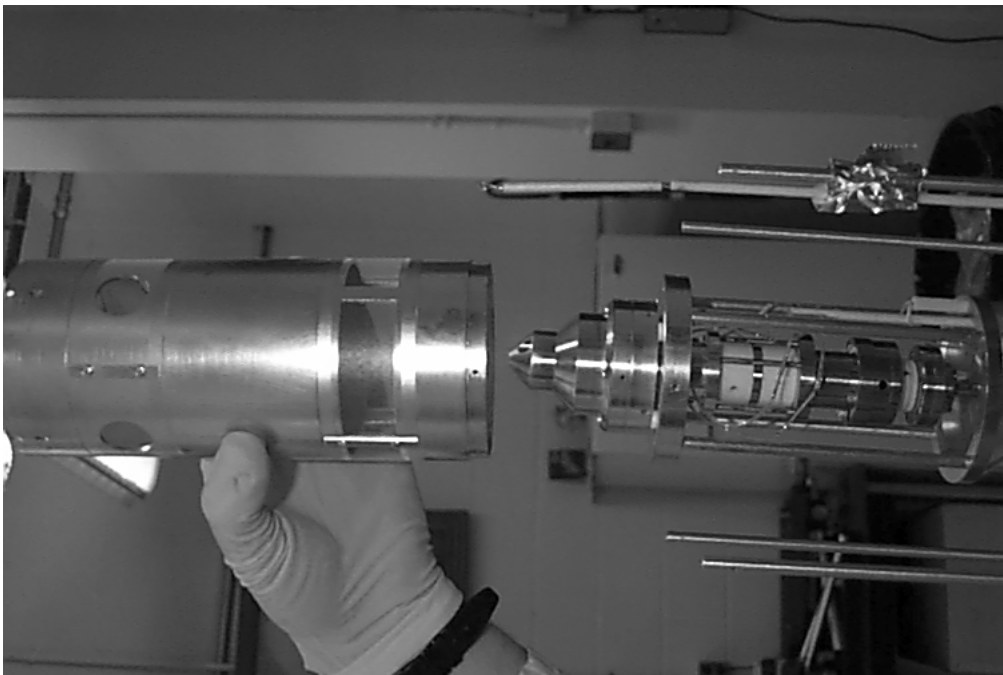
27. Re-connect the two filament connectors. Make sure that they are tight. If necessary, compress the connectors with a needle-nose pliers before sliding the connectors on to the filament posts

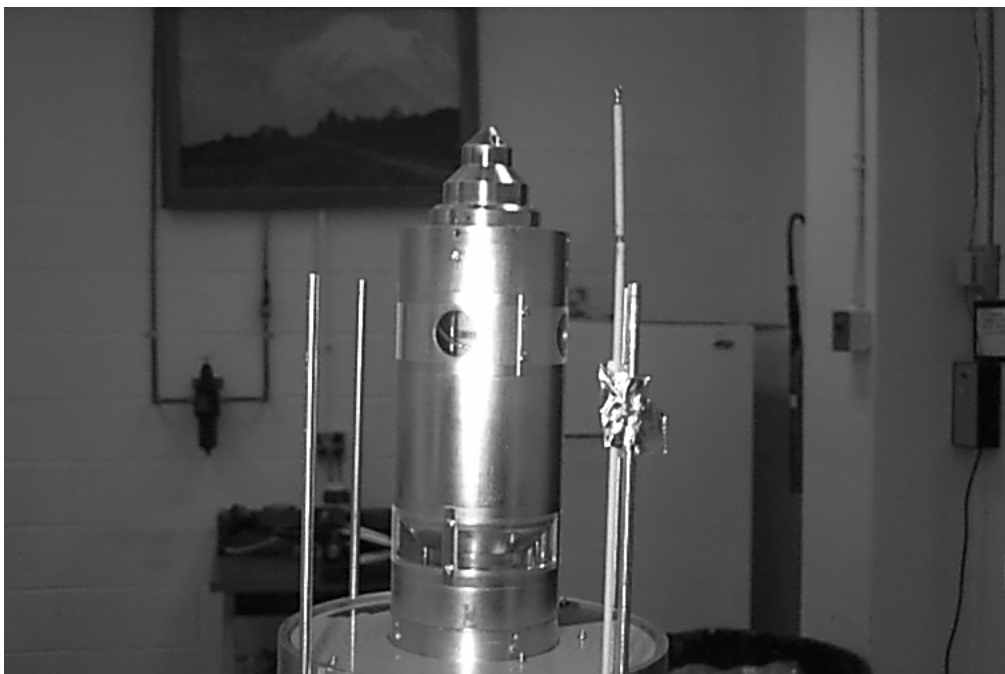


28. Periodically, de-gauss the analyzer. To do this, plug in the coil and turn it on. Place it over the analyzer and move it in a circular motion around and up and down the analyzer. Slowly raise the coil up and away from the analyzer. Turn the coil 90 degrees so that it is perpendicular before turning the coil off.

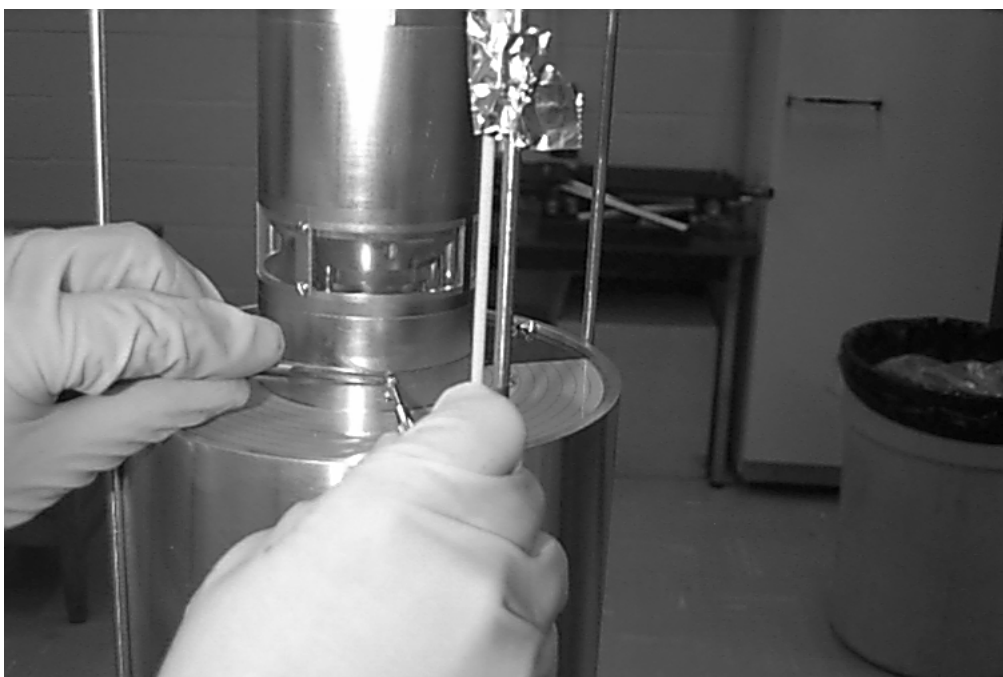


29. Slide the inner cylinder back on top of the gun assembly. Line up the metal between the grids with the ceramics on the base of the gun assembly. The idea is to minimize any loss of signal as the electrons pass through the grids.





30. Re-install and tighten the four pan heads screws at the base of the inner cylinder.

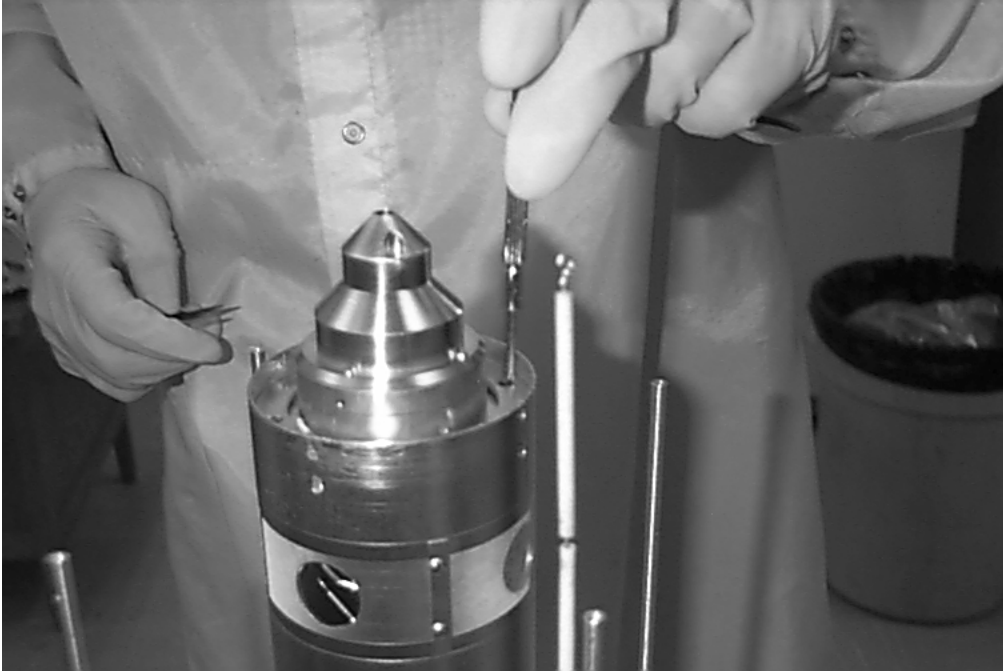


31. Place the copper ring back on top of the inner cylinder. Line up the large holes in the copper ring with the flat head screws on the top of the gun assembly.

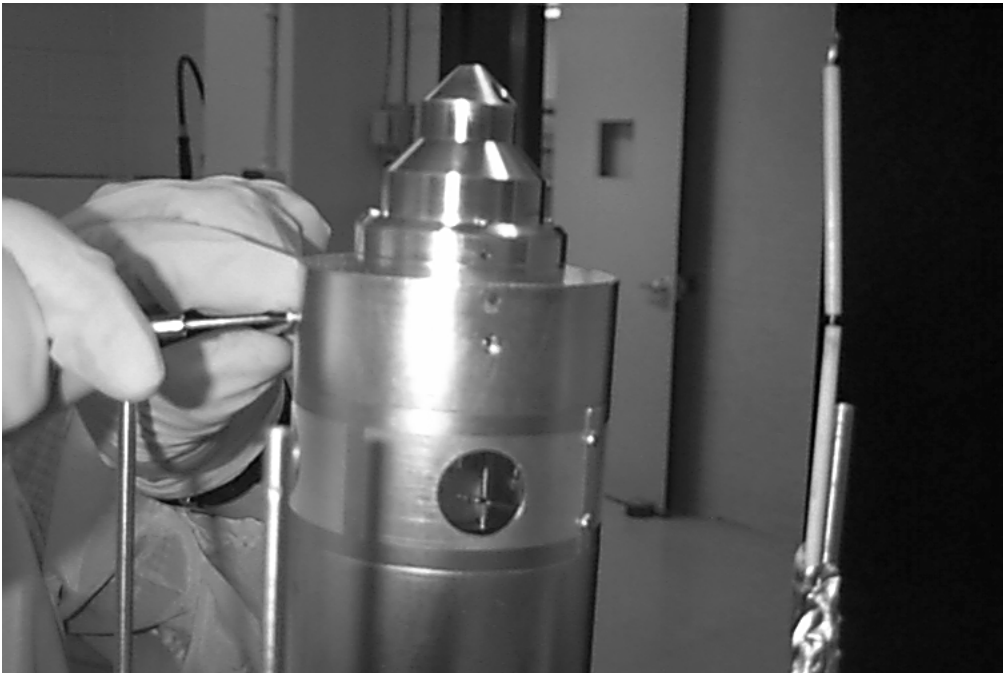


32. Replace the 4 pan head screws into the copper ring. Loosen the four flat head screws and then evenly tighten up the four pan head screws. This will pull up the gun assembly so that it is perpendicular to the inner cylinder. Make sure that the flat head screws are loose while you do this. After the four pan head screws are tight, also tighten the four flat head screws. The flat head screws are only used to support the gun assembly during the filament change. The gun assembly is secured to the inner cylinder by the pan head screws.





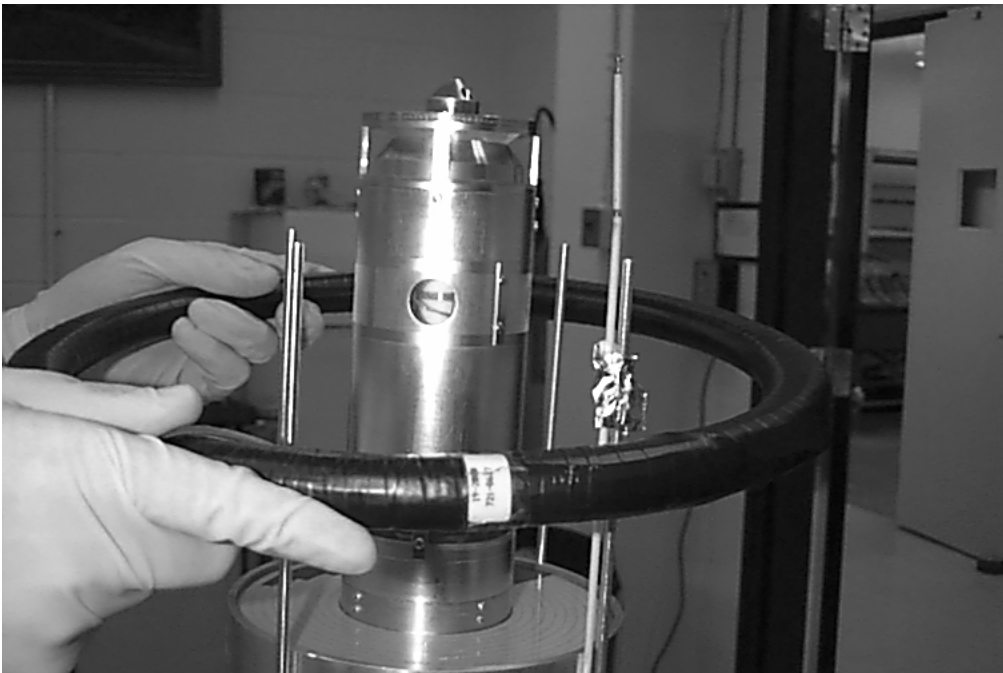
33. Replace the four pan head screws on the outer part of the inner cylinder.



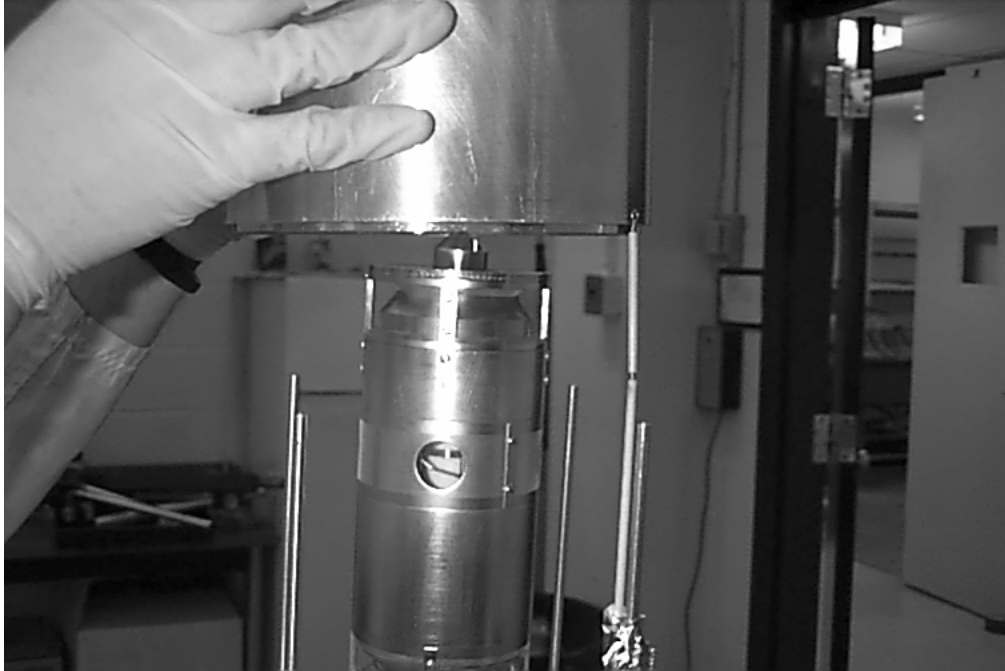
34. Carefully replace the upper inner cylinder grid cap. Do not touch the grids. The grid opening should match with the grid openings in the lower part of the inner cylinder.



35. Degauss the analyzer as before.



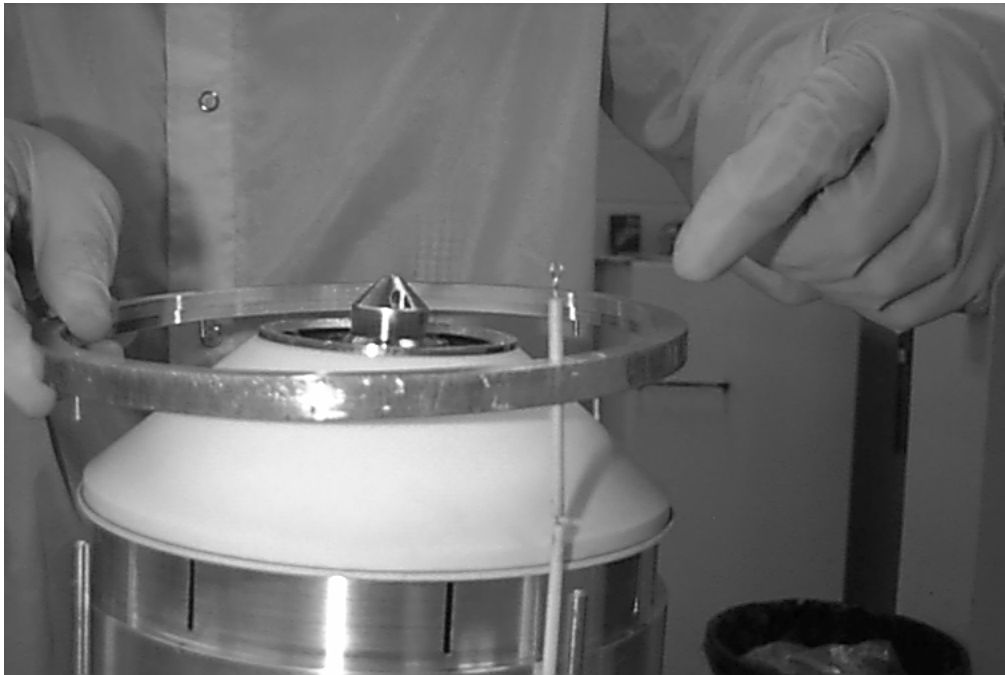
36. Replace the upper out cylinder. Press it down gently but firmly to ensure that it is as far down as possible.



37. Very carefully, replace the conical ceramic. It should fit snugly over the inner cylinder. Do not force it.

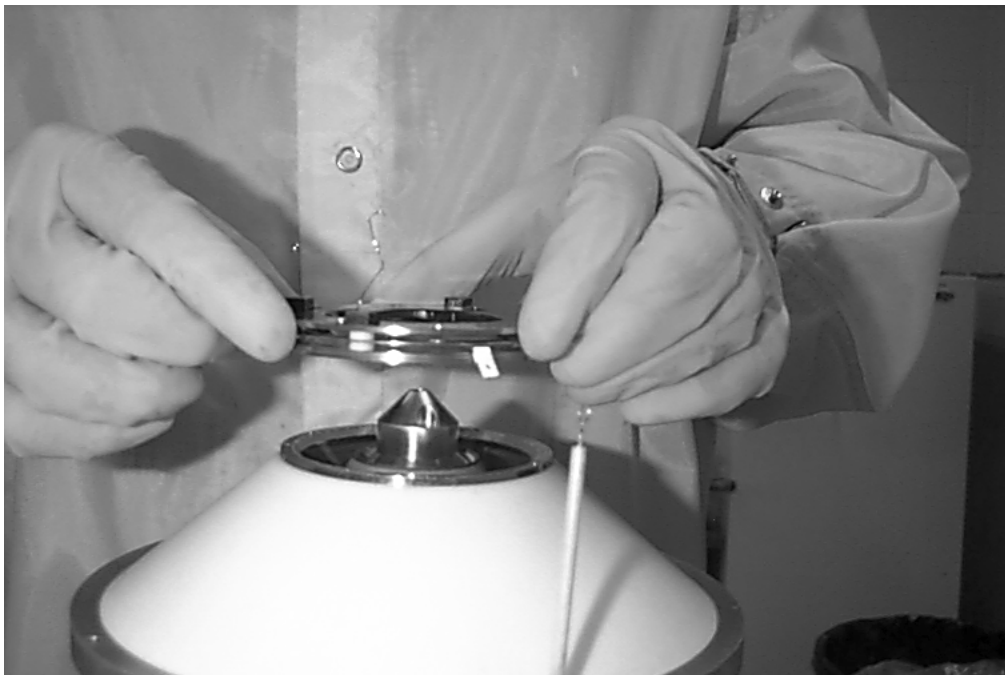


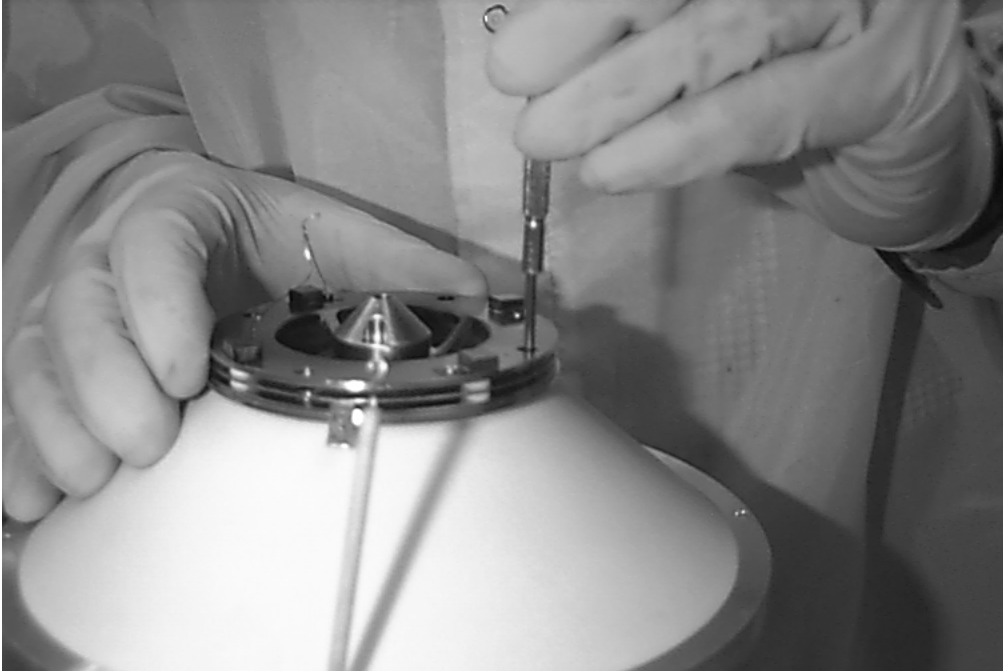
38. Replace the aluminum conical ceramic retainer ring, slide the guard ring ceramic into the hole carefully and place it on top of the conical ceramic.



39. Loosely tighten the four flat head screws in the ring. You will need to adjust the position of the ring (left and right) a little bit to make sure that the magnetic shield is lined up before you do the final tightening.

40. Replace the guard ring assembly. Line up the tab that will connect the guard ring ceramic to get the proper position. The four small flat head screws will line up with the holes in the top of the inner cylinder cap. Make sure that the assembly is flat, then tighten the four small flat head screws.





41. If your analyzer has a ground wire from the top of the grid assembly to the nose of the electron gun, replace that wire at this time.



42. Connect the guard ring wire and de-gauss the analyzer. Also remove the foil that was holding the guard ring ceramic to the aluminum post.



43. Slide the magnetic shield over the analyzer and check if all of the holes line up for the magnetic shield screws. There are 4 screws on the top and four larger screws on the bottom. Rotate the conical ceramic ring as needed, then tighten up the four flat head screws on the aluminum conical ceramic support ring.



44. Slide the magnetic shield back on and tighten all of the magnetic shield screws. Reconnect the grounding wire from the outside of the shield to the top of the grid assembly.



Congratulations! You have successfully completed a filament change on this analyzer!

Additional information:

Continuity Check:

From	To	Reading
Gun connector		
Pin 1	F1	<1 ohm
Pin 3	V3	<1 ohm
Pin 4	V2	<1 ohm
Pin 5	V1	<1 ohm
Pin 6	F2	<1 ohm
All gun pins	To base flange	open
Base flange	Gun nose	<1 ohm
Analyzer feedthru		
Pins A and E	All pins	open
B = OC (outer cylinder)	D (OC to IC)	Approx 500K ohms
B	Base flange	6-10M ohms plus IC to OC
C = GR (guard ring)	All pins	open
D = IC (inner cylinder)	B (IC to OC)	Approx 500K ohms
D	Base flange	6-10M ohms