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## Procedure to Clean an FID in a Working Maxum II Analyzer

Difficulty Level: Medium

### Revision History

Issue	Date	Reason
001	11/23/10	Initial Issue

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## FID Cleaning Instructions

### Description

This document describes the procedure to clean the upper body of an FID to reduce detector noise. It will be necessary to power down the analyzer for this procedure. All figures are located at the end of the procedure. For numbered items, refer to Figure 6.

### Statement of Usage

These instructions should be used only by a trained Siemens service engineer or by the user's maintenance personnel trained by Siemens. The order of the procedure must be followed and only the specified equipment and materials should be used. The procedure should only be started if it can be fully carried out.

### Required Equipment and Materials

- Ultrasonic cleaner
- Oven
- Compressed nitrogen
- De-ionized water
- Molykote
- Acetone
- Alcohol pump
- 4" cable tie
- Nitrile gloves

A tool kit containing both standard and metric wrenches, Allen wrenches, and nut drivers will also be needed.

### Note: This procedure may require the following parts to be replaced:

- 2021263-001 (FID/Oven Gasket)
- 2021376-001 (FID Purge Tube Gasket)



**Warning: Observe all necessary plant safety procedures during the execution of this procedure. This procedure must be executed with the approval of plant safety personnel and/or the local authority having jurisdiction.**

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## Procedure

### Detector Removal:

1. From the System Manager, backup the database of the Maxum analyzer that is to be modified (refer to the Maxum Maintenance Manual for instructions).
2. From the System Manager, verify operation of analyzer. Verify that there are no alarms or that all alarms are accounted for. (Refer to the Maxum Maintenance Manual for instructions).
3. Extinguish the flame to the FID either by shutting off the air supply to the detector (for hydrogen carrier) or shutting off the hydrogen to the detector (if not using hydrogen carrier). In order to prevent condensation in the detector, allow carrier to flow for several minutes after flame is extinguished. Use a mirror to check for condensation at the FID vent to verify the flame is not lit (no condensation means the flame is not lit).



**Warning: If the analyzer is equipped with a purged methanator and explosive gasses are present, it is necessary to wait at least 30 minutes for the methanator to cool after powering down the analyzer before opening the analyzer door.**

4. Power down the analyzer.
5. Turn off utilities.
6. Open the electronics mezzanine and oven doors. Use a 4mm Allen wrench if necessary.
7. Disconnect tubing from the FID flame arrestor insert tube in the oven. Refer to Figure 1.
8. Remove the flame arrestor insert, Item 7 and washer, Item 6 from the FID bottom body using a 9/16" open-end wrench. Refer to Figure 6.
9. Remove the 1/4" vent tube from the top of the FID block using a 9/16" open ended wrench. Refer to Figure 2.
10. Using a 3.0mm Allen wrench, remove the FID cover set screw from the front of the FID Assembly. Remove the cover and insulation from the FID block. Refer to Figure 1.
11. Temporarily label the utility gas line leads to make sure they can be reconnected correctly. Refer to Figure 3.

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12. Disconnect utility gas lines from the FID at the connecting union using a 5/16" open-end wrench.
13. Remove the ten screws that secure the mezzanine side panel and gasket to the Maxum enclosure.
14. Cut the cable tie at the back of the FID purge tube using wire cutters. Refer to Figure 3.
15. Remove the four M3 screws that secure the purge tube to the electrodes of the detector using a 2.5mm Allen wrench. Refer to Figure 3.
16. Pull the purge tube about 1 inch away from the detector assembly and carefully disconnect the bias, igniter, and signal cables from the FID block by pulling straight out from the block using needle nose pliers. Refer to Figures 4 and 5.
17. Loosen the FID block set screw. Refer to Figure 3.
18. Remove the FID Module assembly by pulling up and then out when the FID bottom body clears. Set the FID to Oven gasket aside, if damaged it will need to be replaced (2021264-001). Refer to Figure 3.

## Cleaning Instructions:

**Caution: A clean work surface should be used for disassembly of the FID.**

**Note: the following steps are to be done wearing nitrile gloves.**

19. Remove the screws, Item 1 that attach the upper and lower bodies. Refer to Figure 6.
20. Remove the set screw, Item 4 from the upper body.
21. Remove the output enclosure assembly, Item 2 and the Teflon seal, Item 3 from the upper body and set them aside.
22. Wash the upper body in clean acetone for 20 minutes in an ultrasonic cleaner. When the cycle has completed, remove and blow dry using nitrogen.
23. Wash the upper body in D.I. water for 40 minutes in an ultrasonic cleaner. When the cycle has completed, remove the parts and blow dry using nitrogen.
24. Set aside on a clean surface. Flush the flame arrestor, Item 7, with alcohol pump and then clean in clean acetone in an ultrasonic cleaner for 10 minutes. Refer to Figure 6.

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**Caution: In order to maintain the explosion proof protection of the FID the threads of the FID flame arrestor must be clean and no lubricant or other substances may be applied to the threads except as described in the following step.**

25. Cover both ends of the flame arrestor and coat the threads with molykote and allow to dry.
26. Spray the threads of screws, Item 1 with molykote and allow them to dry.
27. Reinsert the flame arrestor, Item 7 with washer, Item 6, into the bottom body. Make sure the flat washer fits into the recessed cavity at the lower end of the FID bottom body to insure it does not leak. Refer to Figure 6.
28. Tighten using a 9/16" open-end wrench being careful not to push up the quartz tube, Item 8 when tightening the flame arrestor.
29. Place the graphite seal, Item 5, on bottom body and then attach the upper body to the bottom body using screws, Item 1. Make sure that the wire on the ceramic feedthru is touching the quartz tube tip, Item 8.
30. Place the assembly on a rack and bake at 200° F for no less than 8 hours.
31. When this has been done, set the parts aside to cool.
32. When parts are cool, insert the Teflon® seal, Item 3 in the upper body. Then install the output enclosure assembly, Item 2 and the set screw, Item 4. Refer to Figure 6.

## **Reinstallation of Detector:**

33. Reinstall the FID to Oven Gasket and FID Module Assembly into the FID heater block. When looking at the inside ceiling of the oven, the lower end of the FID bottom body should protrude through the 1" hole in the oven ceiling. The FID to Oven Gasket should fit flush against the oven ceiling.
34. Tighten the FID block set screw on the front of the FID heater block using a 3mm Allen wrench.
35. Push the bias, igniter, and signal cables onto the connection pins of the FID block using fingers or needle nose pliers. If using pliers, take care not to damage the Teflon® insulation or crimp the ends of the cables. Refer to Figures 4 and 5 for connector pin location.
36. Slide the purge tube back into place making sure not to damage the gasket.

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37. Install the 4 M3 screws and tighten using a 3mm Allen wrench.
38. Install a cable tie in the hole at the back of the purge tube and secure around wires to keep from pulling away from the block.
39. Replace the mezzanine side panel and gasket.
40. Connect the utility gas lines to the correct connecting unions and tighten using a 5/16" open-end wrench. Remove the temporary labeling that was added earlier in this procedure.
41. Place the insulation and then the FID cover onto the FID block.
42. Install the FID cover set screw and tighten using a 3mm Allen wrench.
43. Reconnect the FID flame arrestor insert tubing.
44. Turn on utility gases and check for leaks.
45. Turn on power to the analyzer and switch the valves checking all possible flow paths for leaks. Refer to plumbing diagram provided in the custom documentation package for flow paths.
46. Turn up oven air to the normal setting and allow the oven to come to temperature and stabilize.
47. Set all gas flows after the detector is up to its temperature set point.
48. At this time you can ignite the FID using the HMI.
49. 15 to 30 minutes after the analyzer has reached temperature it will be ready for operation. Verify that the FID operates correctly and put analyzer back on line.

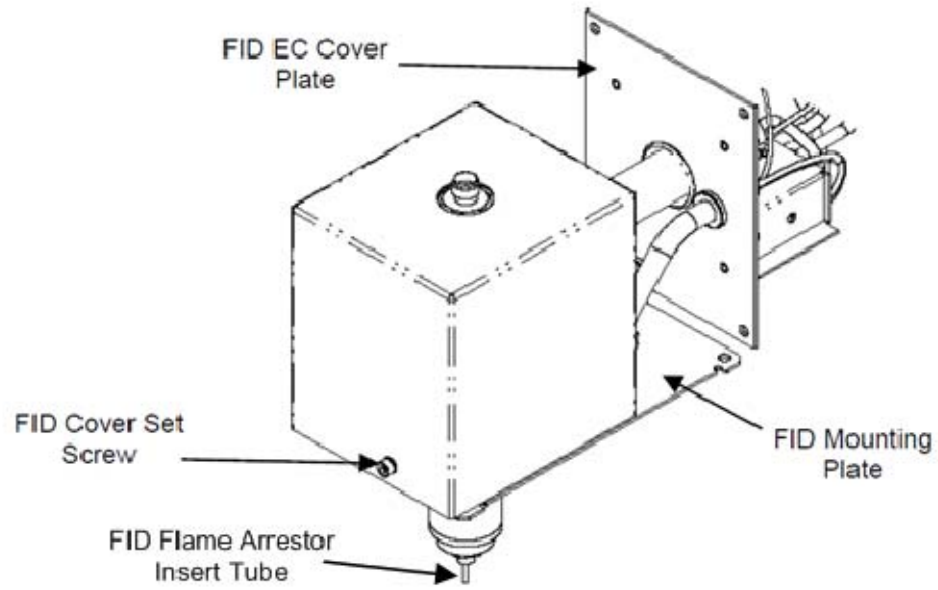


Figure 1

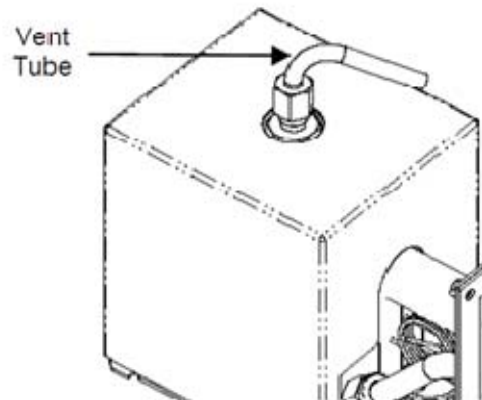


Figure 2

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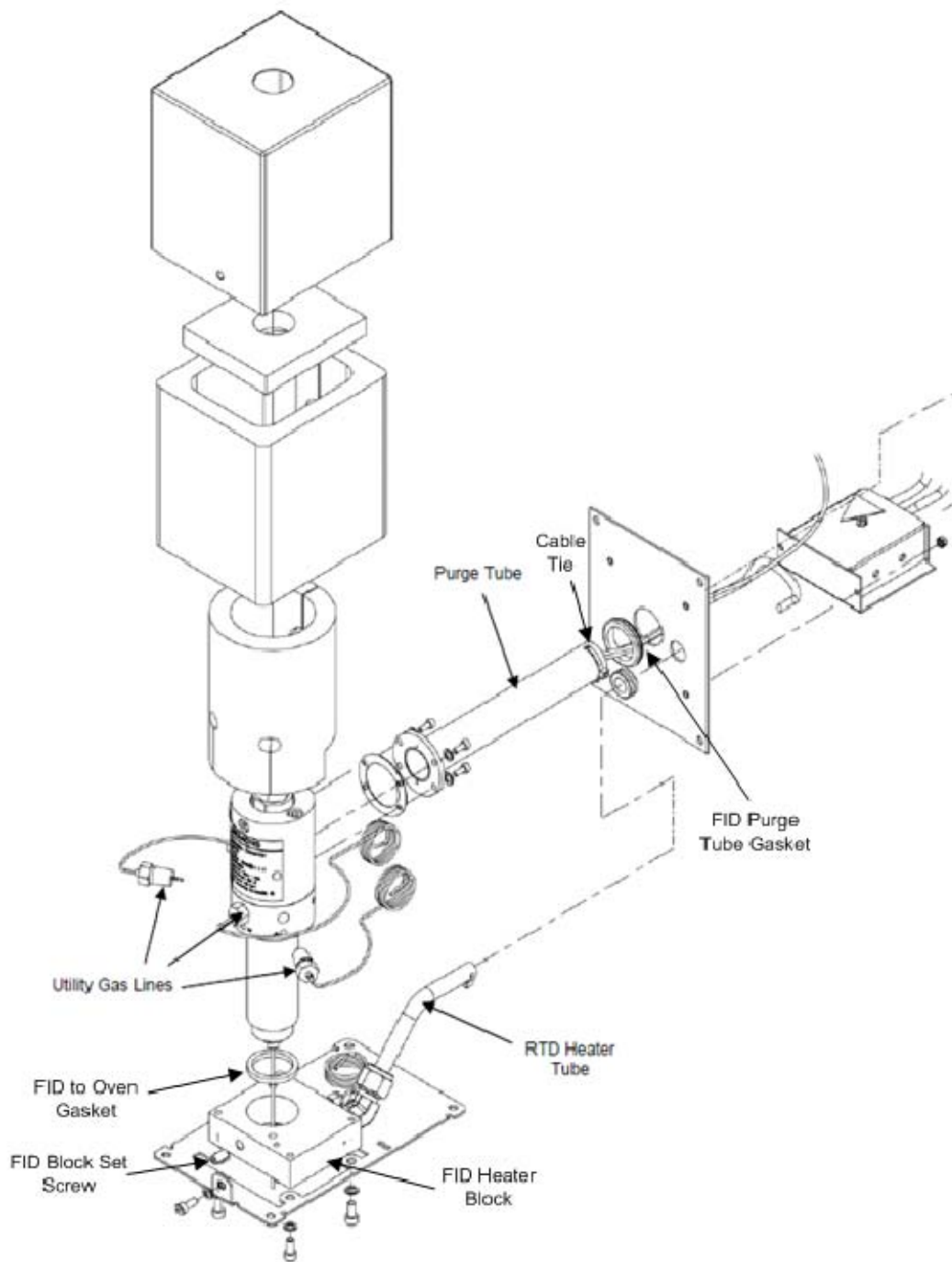


Figure 3



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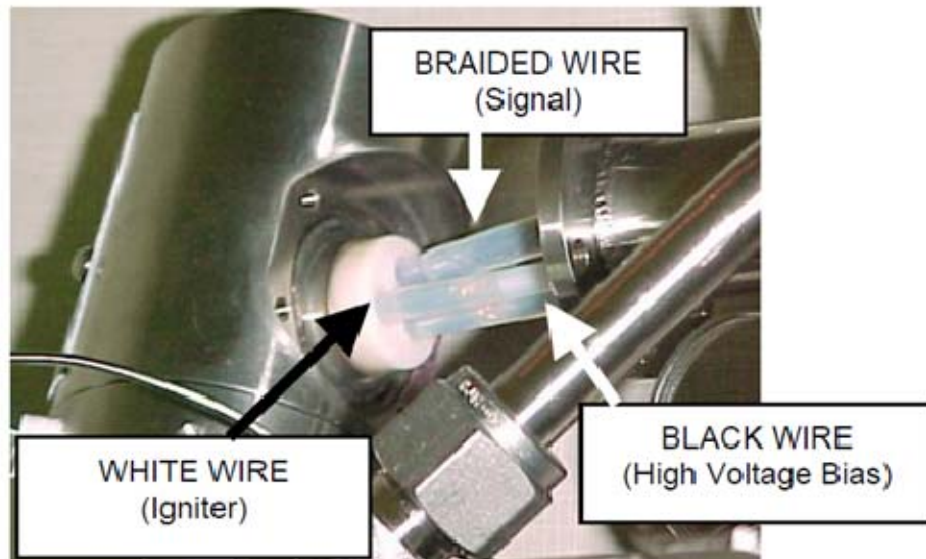


Figure 4

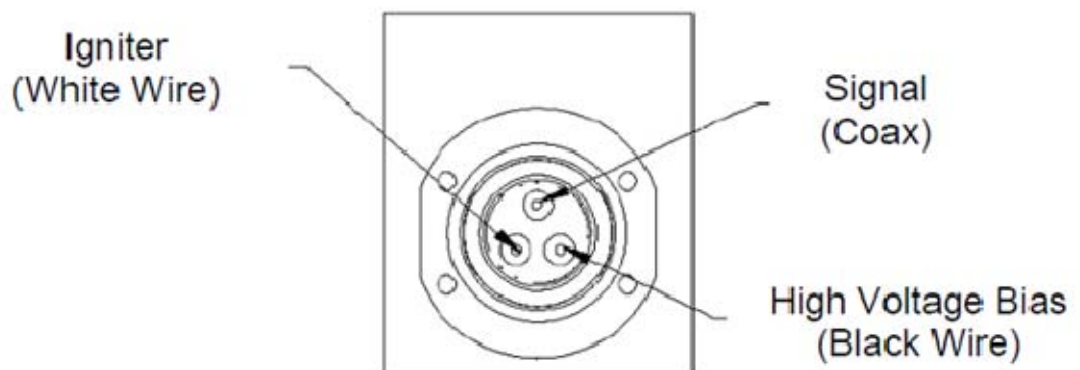


Figure 5

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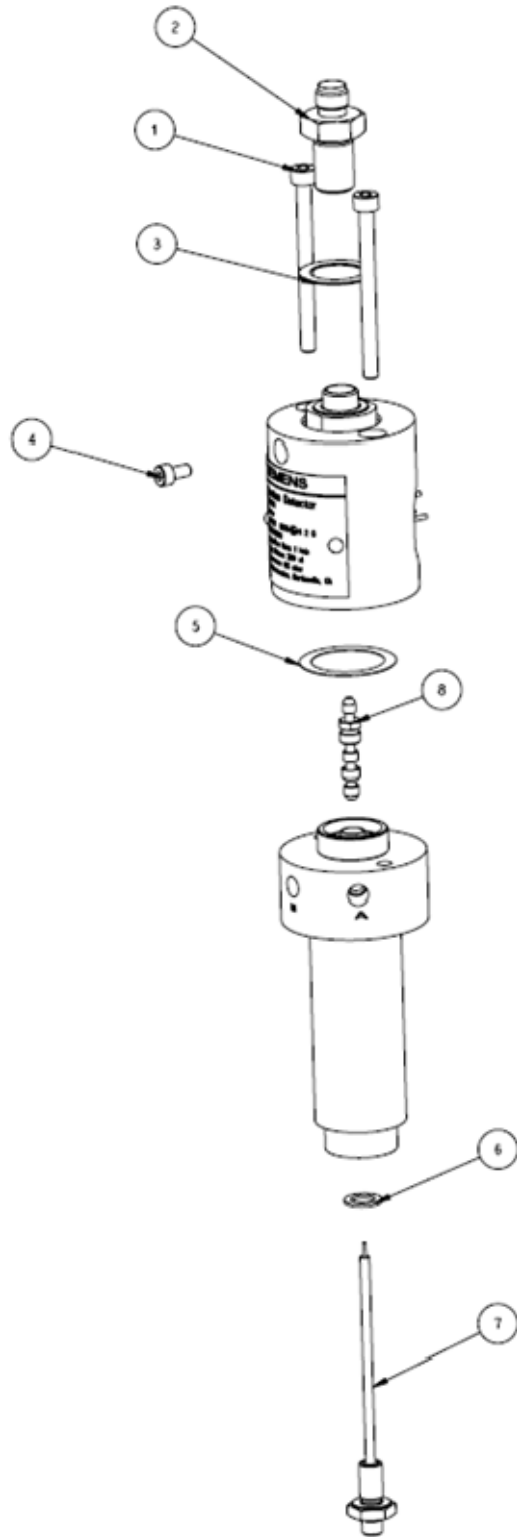


Figure 6