

# **Installation Guide**

**Thermal Conductivity Detector on a 6890 GC  
Accessories G1563A, G1592A**



**Agilent Technologies**

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### Safety Information

The Agilent Technologies 6890 Gas Chromatograph meets the following IEC (International Electrotechnical Commission) classifications: Safety Class 1, Transient Overvoltage Category II, and Pollution Degree 2.

This unit has been designed and tested in accordance with recognized safety standards and designed for use indoors. If the instrument is used in a manner not specified by the manufacturer, the protection provided by the instrument may be impaired. Whenever the safety protection of the Agilent 6890 has been compromised, disconnect the unit from all power sources and secure the unit against unintended operation.

Refer servicing to qualified service personnel. Substituting parts or performing any unauthorized modification to the instrument may result in a safety hazard. Disconnect the AC power cord before removing covers. The customer should not attempt to replace the battery or fuses in this instrument. The battery contained in this instrument is recyclable.

### Safety Symbols

Warnings in the manual or on the instrument must be observed during all phases of operation, service, and repair of this instrument. Failure to comply with these precautions violates safety standards of design and the intended use of the instrument. Agilent Technologies assumes no liability for the customer's failure to comply with these requirements.

### WARNING

A warning calls attention to a condition or possible situation that could cause injury to the user.

### CAUTION

A caution calls attention to a condition or possible situation that could damage or destroy the product or the user's work.



Indicates a hot surface



Indicates earth (ground) terminal

### Sound Emission Certification for Federal Republic of Germany

Sound pressure  $L_p < 68$  dB(A)

During normal operation

At the operator position

According to ISO 7779 (Type Test)

### Schallemission

Schalldruckpegel  $LP < 68$  dB(A)

Am Arbeitsplatz

Normaler Betrieb

Nach DIN 45635 T. 19 (Typprüfung)

## **Overview**

This document contains the procedure for installing a thermal conductivity detector (TCD) on an Agilent 6890 Gas Chromatograph (hereafter referred to as the GC). Review the safety information on the inside front cover before following this procedure.

### **Parts list**

#### **EPC**

- TCD
- Two screws for attaching the detector to the oven top
- Top insulation
- Bottom insulation

#### **NonEPC**

- TCD
- Two screws for attaching the detector to the oven top
- Makeup and reference gas regulator
- Two screws for installing the makeup and reference gas regulator
- Top insulation
- Bottom insulation

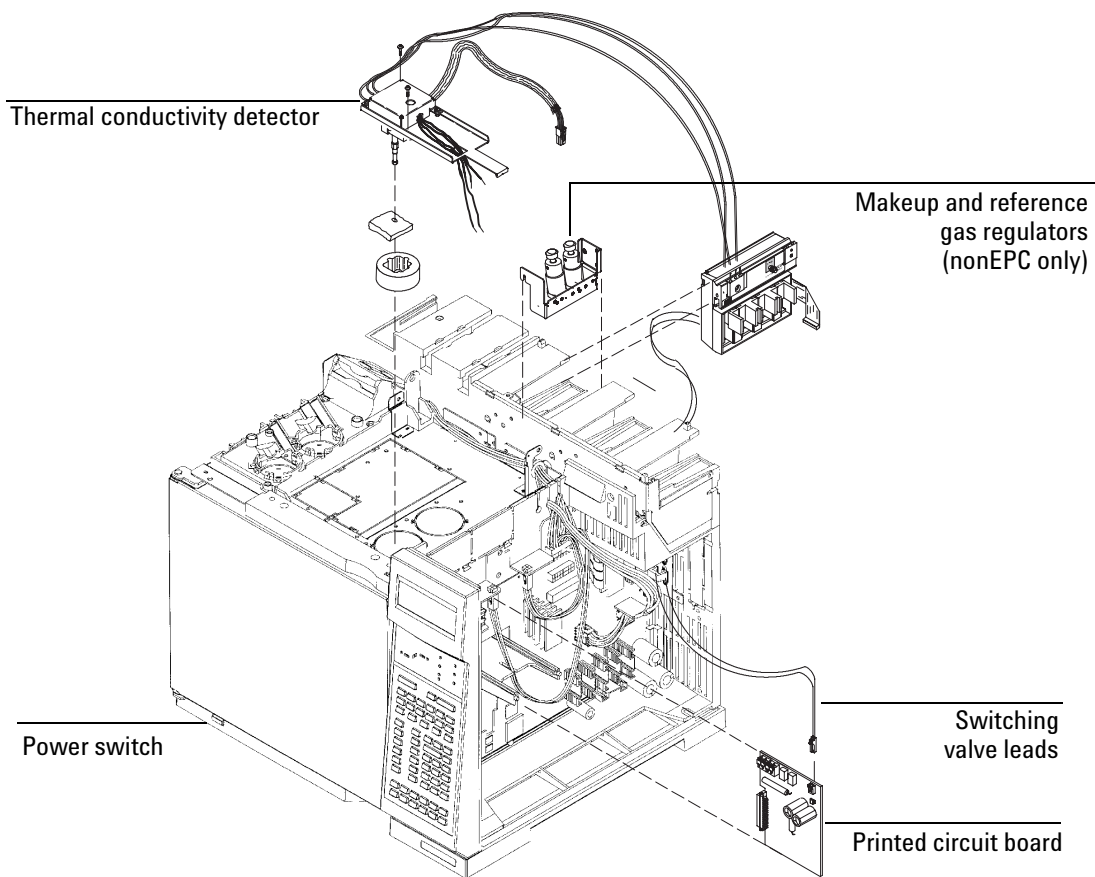
### **Tools**

- Electrostatic protection such as a grounded wrist strap (part no. 9300-0969 for large wrists or part no. 9300-0970 for small wrists)
- T-20 Torx screwdriver
- Diagonal cutters
- Small flat-blade screwdriver
- 7/16-inch wrench (nonEPC detectors only)

## Overview

### Steps

1. Preparing the GC
2. Installing the flow manifold
3. Installing the regulator (nonEPC detectors only)
4. Positioning and securing the detector
5. Connecting the detector
6. Routing the tubing
7. Restoring the GC to operating condition
8. Calibrating your detector (EPC detectors only)



## Preparing the GC

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**WARNING**

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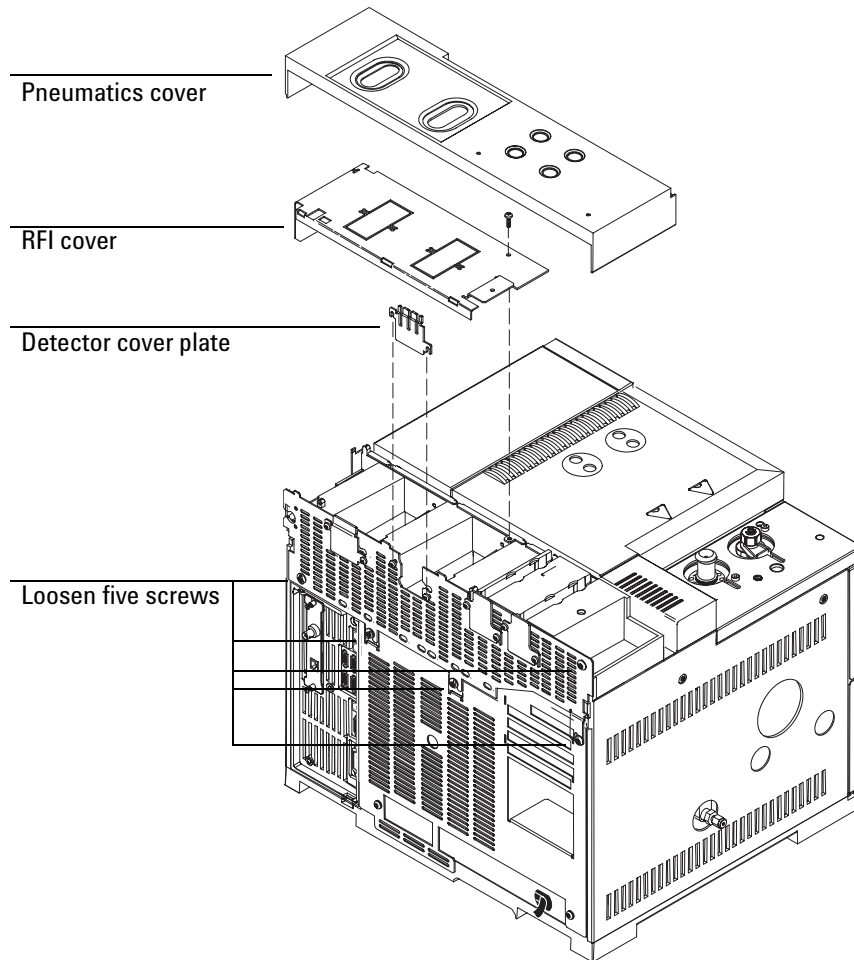
Hazardous voltages are present in the mainframe when the GC is plugged in. Avoid a potentially dangerous shock hazard by unplugging the power cord before removing the side panels.

1. Turn off the GC and unplug the power cord. Allow time for all heated zones to cool and then turn off supply gases at their sources.

From the back of the GC (see the figure on the next page):

2. Unsnap and lift off the pneumatics top cover.
3. Remove the RFI cover. Remove the screw with a T-20 Torx screwdriver, slide the cover to the left until it disengages from the top rear panel, and remove it.
4. If you are installing a nonEPC detector, remove the detector cover plate from the front or back position by loosening the two screws with a T-20 Torx screwdriver and sliding the plate up and off.

5. Loosen the five screws in the top rear panel with a T-20 Torx screwdriver. Grasp the panel at each end and gently lift it up and then away from the GC. Be careful not to disrupt the supply tubing.



6. Raise the gray plastic top cover (with the holes and ventilation slots) to the vertical position. Examine the hinge in the right rear corner.
  - **Early 6890 models.** The hinge is a metal bracket attached to the oven top. Pull the clip at its top toward you to release the hinge pin. Push the pin to the left to release the cover. Raise the right side of the cover and remove it.

## Preparing the GC

- **Current 6890 models.** Raise the right side of the cover and lift to remove it.

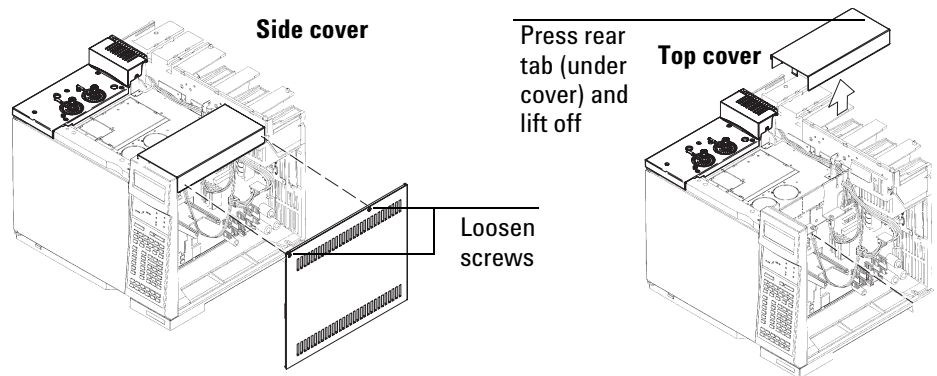
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### Caution

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Board components can be damaged by static electricity; use a properly grounded static control wrist strap when removing the electronics covers.

7. Remove the electronics side and top covers.





## Installing the flow manifold

This section describes installation of the current version of the pneumatics module. For information on the earlier version, see the Appendix.

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**Caution**

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It is not necessary and not advisable to separate detectors from their pneumatics modules. Doing so can cause leaks. Although handling the detector and pneumatics module as a unit is awkward, it can be managed.

1. Locate the correct slot for the pneumatics module.
  - **Detector in the front position.** Use the second slot from the left, as viewed from the back of the GC.
  - **Detector in the back position.** Use the third slot from the left, as viewed from the back of the GC.

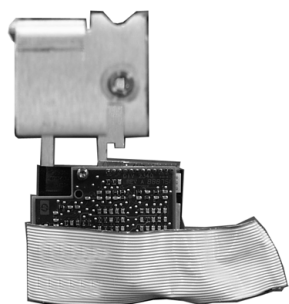
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**Caution**

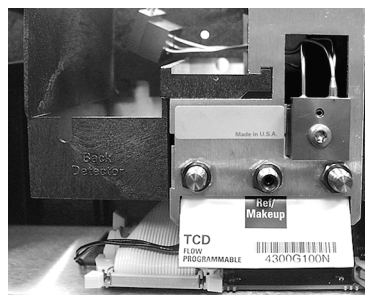
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Hold the manifold by its support bracket to avoid damaging the components.

2. Route the ribbon cable behind the manifold assembly as shown in Figure 1. Slide the manifold and bracket assembly into the slot until the bracket seats flush against the end of the rails. See Figure 2.



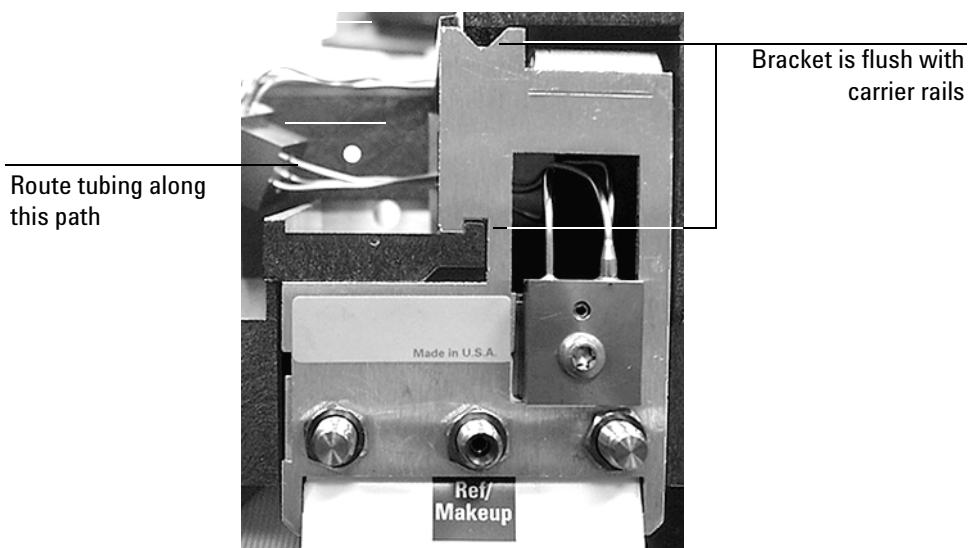
Back view of manifold



Manifold installed with cable routed to left

**Figure 1. Routing the ribbon cable**

## Installing the flow manifold

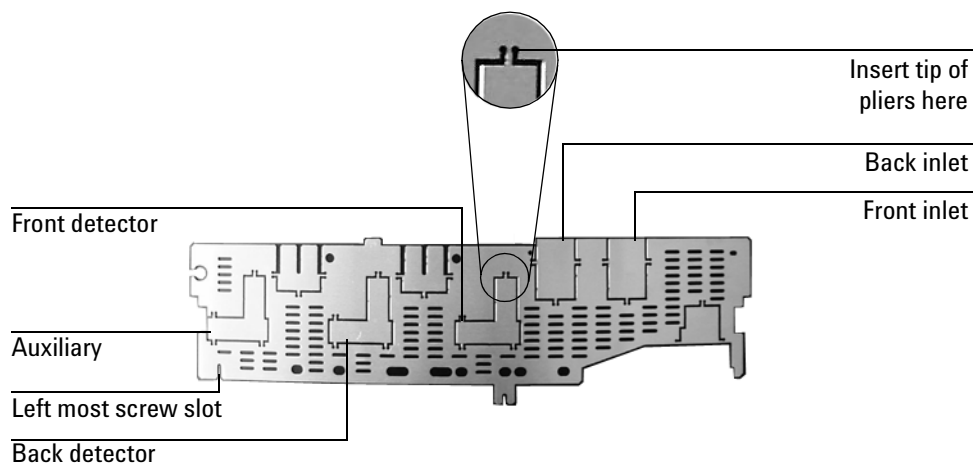


**Figure 2. Manifold, after installation**

3. Secure the manifold in place using a Torx T-20 screw from the front of the pneumatics chassis.
4. Route the gas tubing over the top of the chassis and through the slots to the detector location.
5. Connect the ribbon cable to the mating connector on the pneumatics board. Arrange the cable to keep it away from the valves and keep it from being pinched between board components and the manifold.

For the back detector, you may want to loosen the manifold and slide it out of the carrier a few centimeters to connect the cable to the pneumatics board. Then, reinstall the manifold.

6. Using a pair of needle-nosed pliers, remove the appropriate top rear panel detector cutout for the TCD. Also remove any cutouts needed to access other manifolds or accessories installed in the GC. See Figure 3.



**Figure 3. Top rear panel cutouts**

7. Place the top rear panel on its left-most mounting screw. Use the screw as a hinge and angle the panel while sliding each manifold ID tag through its cutout in the panel, working from left to right. When all the tags are through the panel, finish installing the panel on the GC.
8. Install the RFI cover, the pneumatics cover, and the detector top cover.
9. Connect the source gas lines to the manifold. See Figure 4.



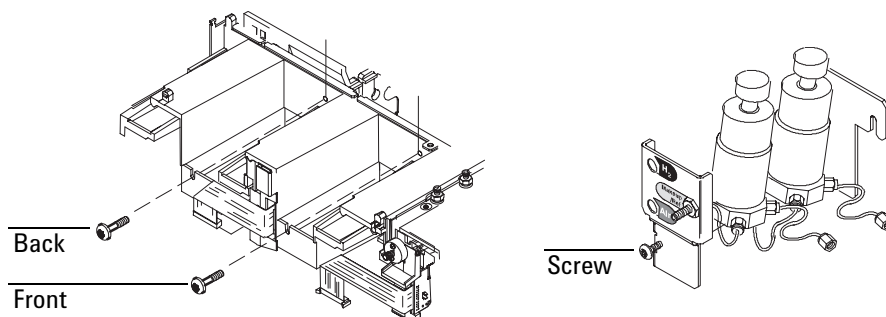
**Figure 4. Gas line connections**

10. Restore gas pressures and leak check all fittings.

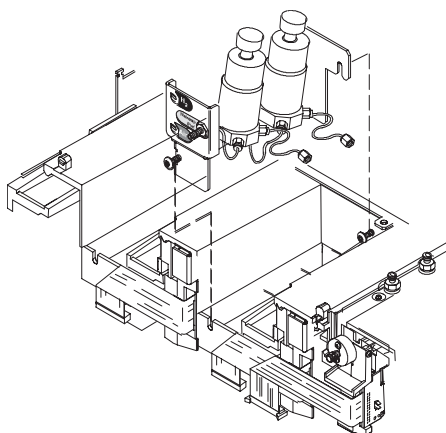
## Installing the makeup and reference regulators (nonEPC detectors)

1. Install a screw in the front or back position of the pneumatics carrier. Do not tighten the screw.

Install a screw in the regulator bracket. Do not tighten the screw.



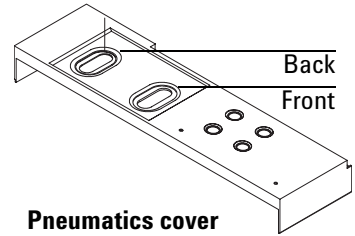
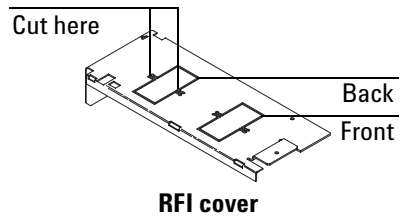
2. Place the regulators in the front or back position of the pneumatics carrier. Tighten the screws with a T-20 Torx screwdriver.



3. Connect the tube on the makeup gas regulator to the fitting labeled *MU* on the flow manifold. Tighten the nut fingertight, then use the 7/16-inch wrench to tighten it 3/4 of a turn. Follow the same procedure for connecting the reference gas regulator to the fitting labeled *Reference* on the flow manifold.

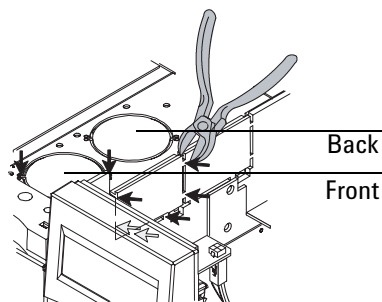
## Installing the makeup and reference regulators (nonEPC detectors)

4. Locate the RFI and pneumatics covers that you removed in *Preparing the GC*.

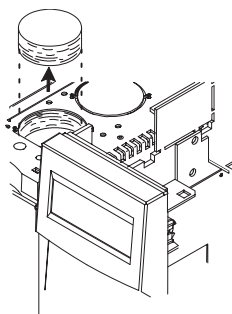


## Positioning and securing the detector

1. Remove the round metal cutout on the oven top and the square plastic cutout in the electronics carrier in the front or back detector position, if necessary. Cut the metal circle with diagonal cutters so that the nibs are connected to the piece removed. Cut the plastic in six places with diagonal cutters. Discard the cutouts.



2. Lift out the die-cut insulation plug from the front or back detector position, if necessary.



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**Caution**

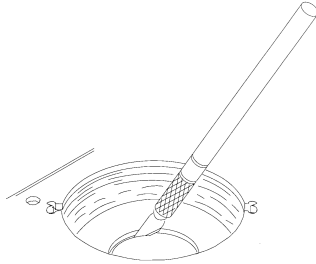
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Be careful to remove only the insulation within the scribed circle.

3. Carefully remove the scribed circle of insulation from the oven top to create an opening into the oven.

## Positioning and securing the detector

**Method 1:** Use a sharp knife to cut out the insulation using the scribed circle as a guide.



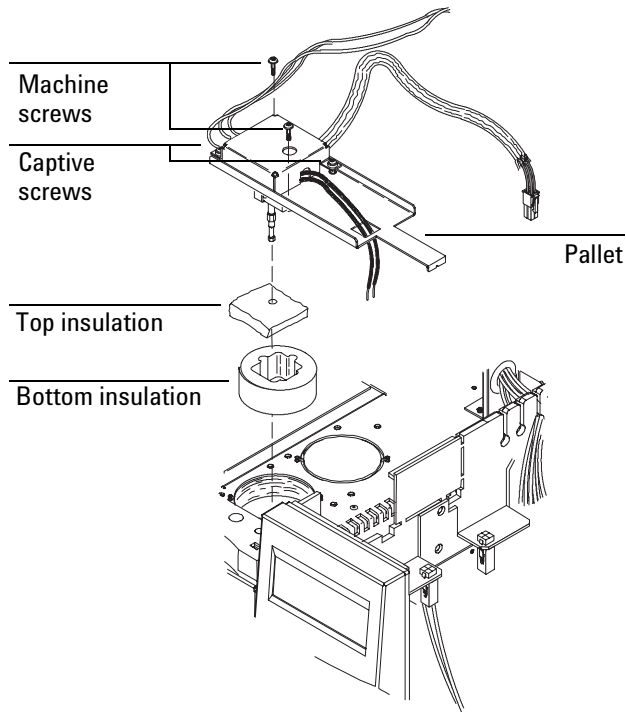
**Method 2:** Pierce the insulation with a screwdriver. Rotate the screwdriver around the circumference of the scribed circle to remove excess insulation.

Clean up any pieces of insulation that fall inside the oven.

4. Place the bottom insulation in the detector cavity.

## Positioning and securing the detector

5. Place the top insulation in the detector cavity.



6. Place the detector pallet in the insulated cavity. Partially tighten the two captive screws with a T-20 Torx screwdriver. Install the two machine screws and partially tighten. Tighten all the screws to snugness.



## Connecting the detector

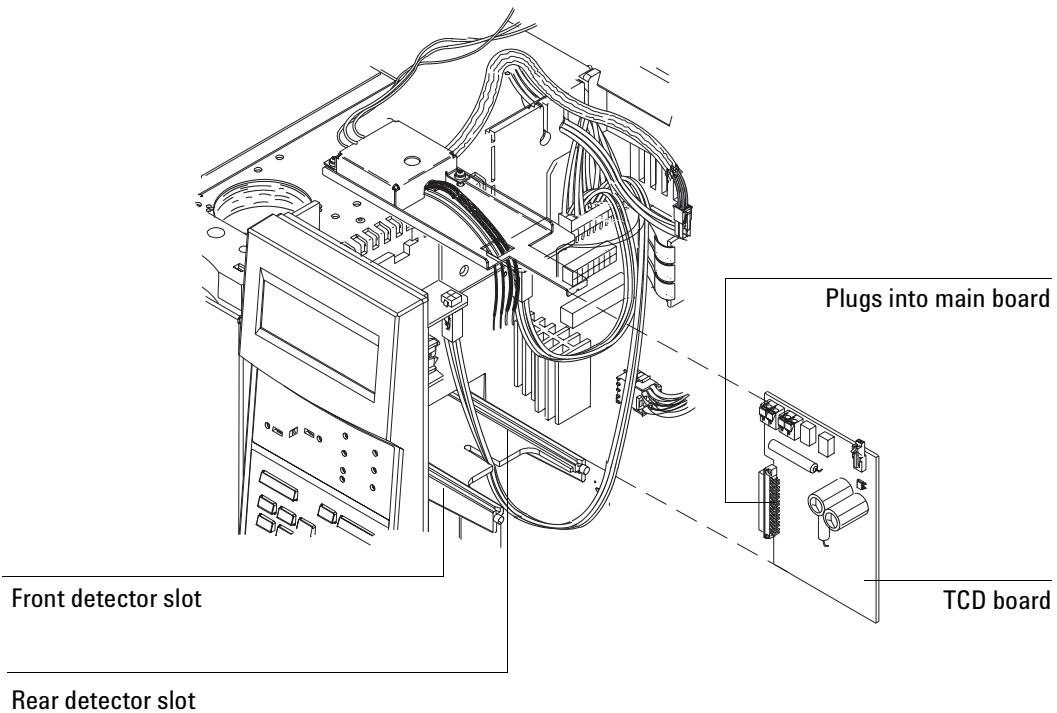
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**Caution**

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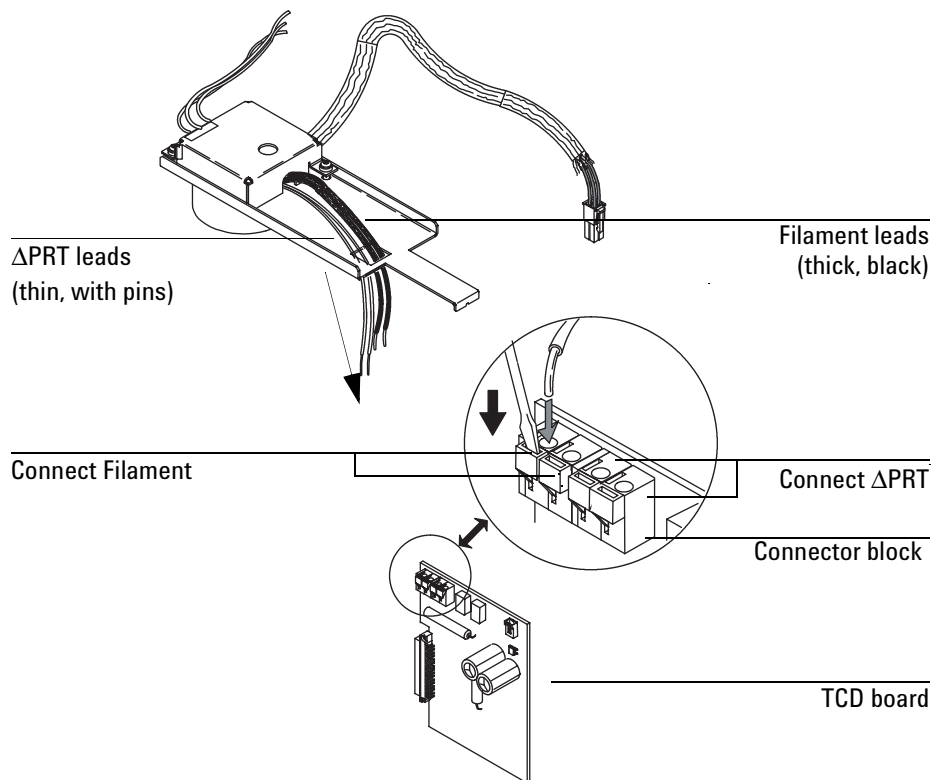
Board components can be damaged by static electricity; use a properly grounded static control wrist strap when handling the TCD board.

1. Remove the TCD board from its static control bag and slide into the front or back slot on the main circuit board until it is plugged in. The top of the board should be lined up with the slot on the TCD pallet.



## Connecting the detector

2. Attach the filament leads to the TCD board in the two left-most positions of the connector block. Insert a small flat-blade screwdriver in the rectangular slot and depress it while you insert the filament lead in the round hole. Polarity does not matter.



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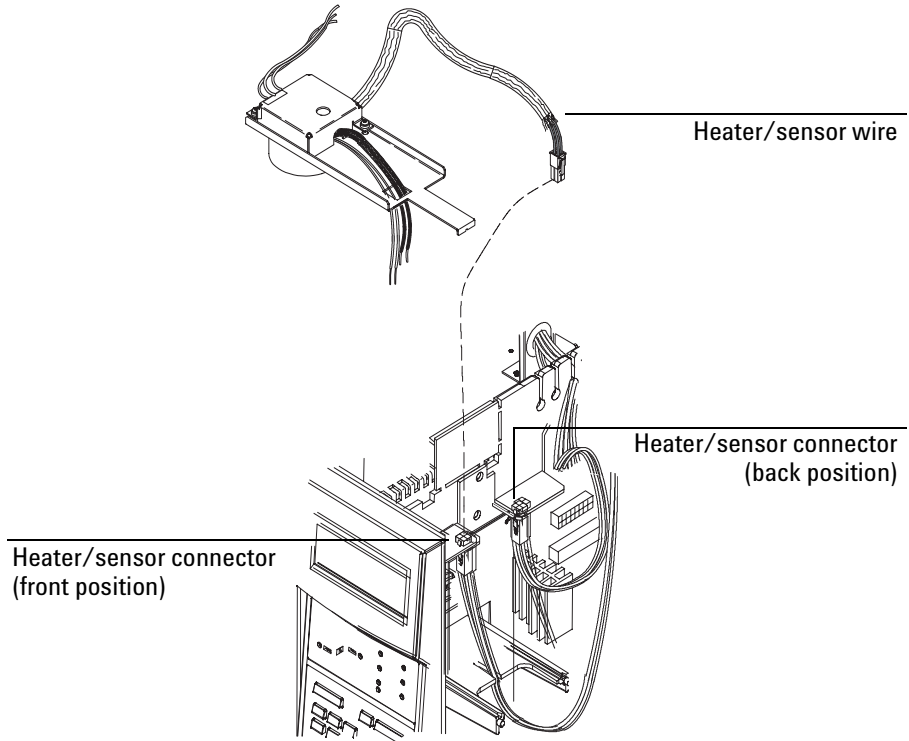
### Caution

If the  $\Delta$ PRT is not properly connected to the detector interface card, filament burnout can occur.

3. Similarly, connect the  $\Delta$ PRT leads to the two right-most positions in the connector block. Polarity does not matter.

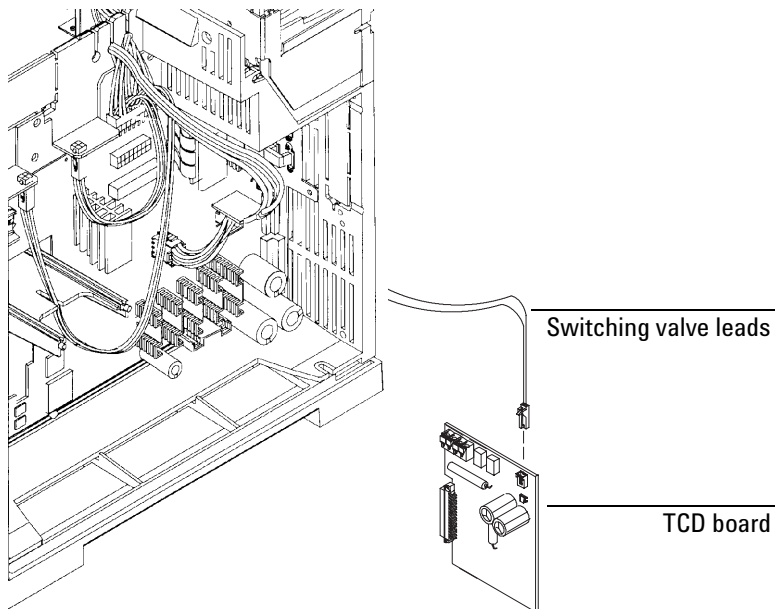
## Connecting the detector

4. Connect the heater/sensor wire to the square connector closest to the front or back detector.



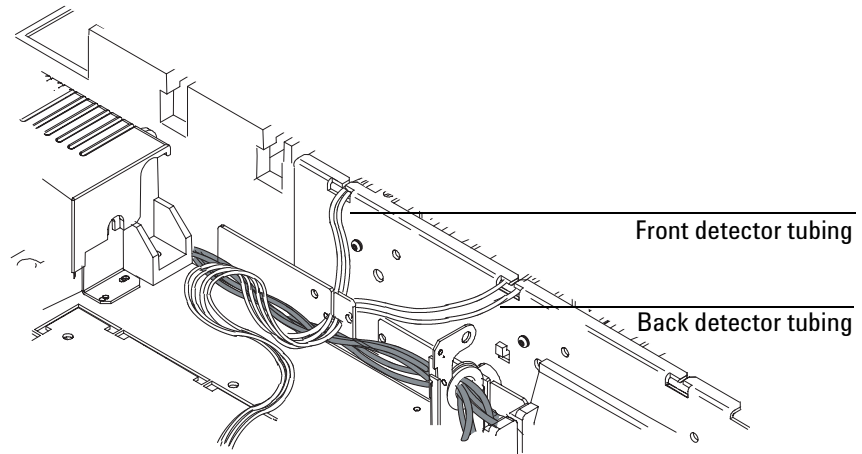
## Connecting the detector

5. From the right side of the GC, locate the switching valve leads. Route the leads across the main board and connect them to the TC board.



## Routing the tubing

Route the tubing from the flow manifold over the top of the pneumatics carrier, through one of the slots, to the detector area.



## Restoring the GC to operating condition

1. Reinstall the electronics side panel.
2. Reinstall the top rear panel
3. Reinstall the detector cover.
4. Reinstall the electronics top cover.
5. Plug in the GC and turn it on.
6. Press [Front Det] or [Back Det]. If the detector has been properly installed, you will see the following display:

### EPC

FRONT DET (TCD)		
Temp	24	Off
Ref flow	0.x†	Off
Mkup (He)	0.x†	Off <
Filament		Off
Output (off)	0.0	
Neg polarity		Off

### NonEPC

FRONT DET (TCD)		
Temp	24	Off
Ref flow		Off
Mkup (He)		Off <
Filament		Off
Output (off)	0.0	
Neg polarity		Off

† An actual flow value is displayed when the gases are off or not connected. This is not an error. After the gases are connected and the detector is operational, the actual flow values will be equal to the setpoint values.

## Zeroing your detector (EPC only)

Your detector's flow manifold contains a pressure sensor that may be zeroed after it is installed on your GC. This zero procedure ensures an accurate detector display.

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**Caution**

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Do not connect the detector and makeup gases to your flow manifold until you have zeroed your detector's pressure sensor.

1. Plug in your GC and turn it on, if you haven't already done so.
2. Wait 15 minutes. This allows your GC to reach thermal equilibrium.
3. Zero the detector's pressure sensors:
  - a. Press [Options], scroll to Calibration, and press [Enter].
  - b. Scroll to Front detector or Back detector and press [Enter].
  - c. Scroll to Reference zero and press [On].
  - d. Scroll to Makeup zero and press [On].
4. Turn off your GC and unplug the power cord.
5. Plumb the reference/makeup gas to your detector. See the *6890 Site Preparation and Installation Manual* for instructions.
6. Reinstall the RFI cover.
7. Replace the pneumatics top cover.
8. Plug in the GC again and turn it on.

## Appendix: Installing the pneumatics module (early version)

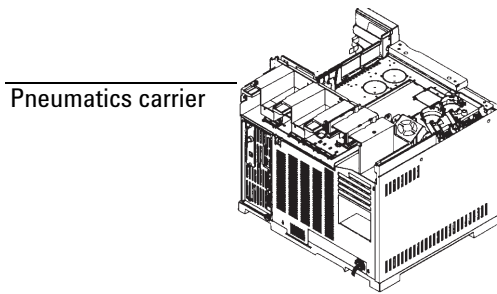
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**Caution**

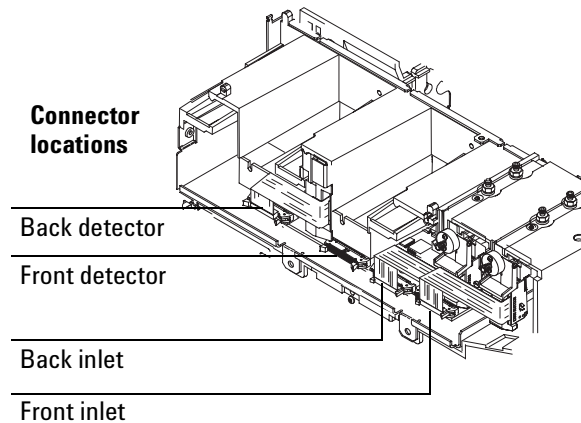
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Board components can be damaged by static electricity; use a properly grounded static control wrist strap when removing the electronics covers.

1. From the back of the GC, locate the pneumatics carrier.



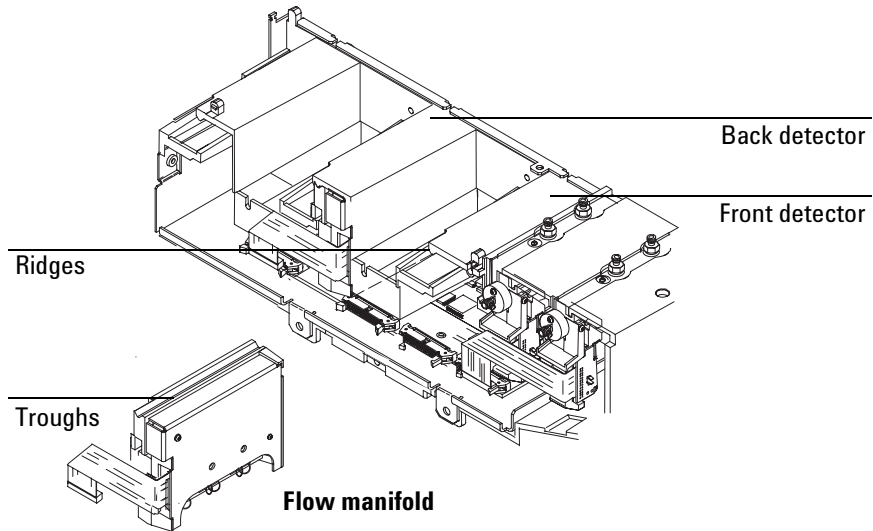
2. If you are installing a detector in the front position and an inlet is installed in the back position, unplug the back inlet ribbon cable. Unlock the connector by pushing the tabs away from the center.



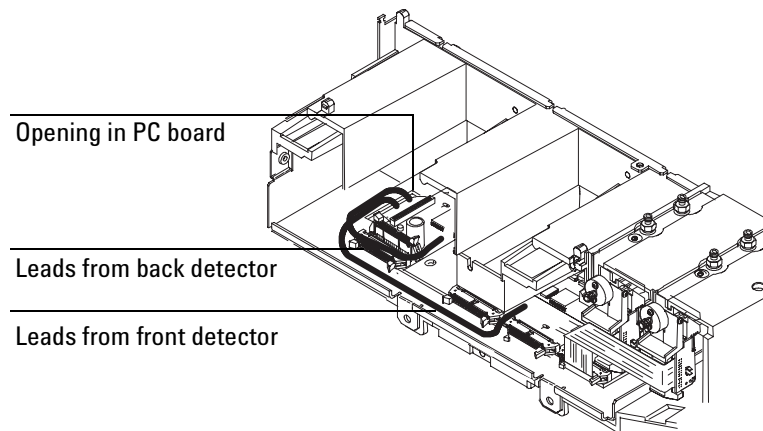


## Appendix: Installing the pneumatics module (early version)

3. Locate the troughs in the flow manifold and the ridges in the pneumatics carrier. Slide the flow manifold into the carrier, lining up the ridges and troughs.

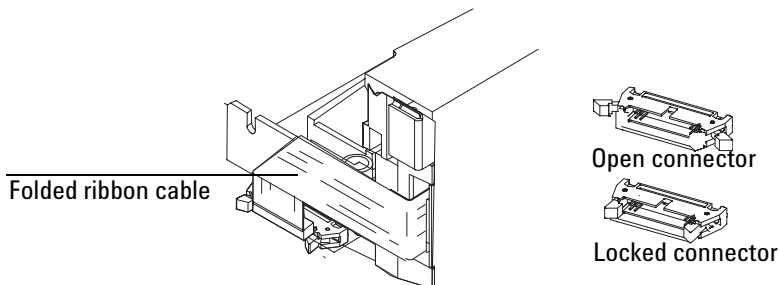


4. Route the switching valve leads from the flow manifold to the opening in the PC board. If you're installing a front detector, tuck the leads underneath the connectors on the PC board as shown. Gently insert the leads into the opening.

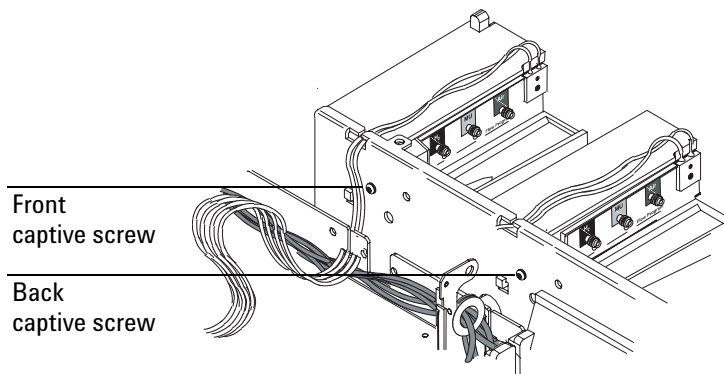


## Appendix: Installing the pneumatics module (early version)

5. Plug the ribbon cable into the front or back connector. Make certain the connector is firmly seated and locked. If the flow manifold is installed and plugged into the correct position, the ribbon cable will retain its fold as shown in the diagram. If you unplugged an inlet ribbon cable in Step 2, replace it.



6. From the front of the GC, secure the flow manifold to the carrier by tightening the captive screw until snug using a T-20 Torx screwdriver.







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