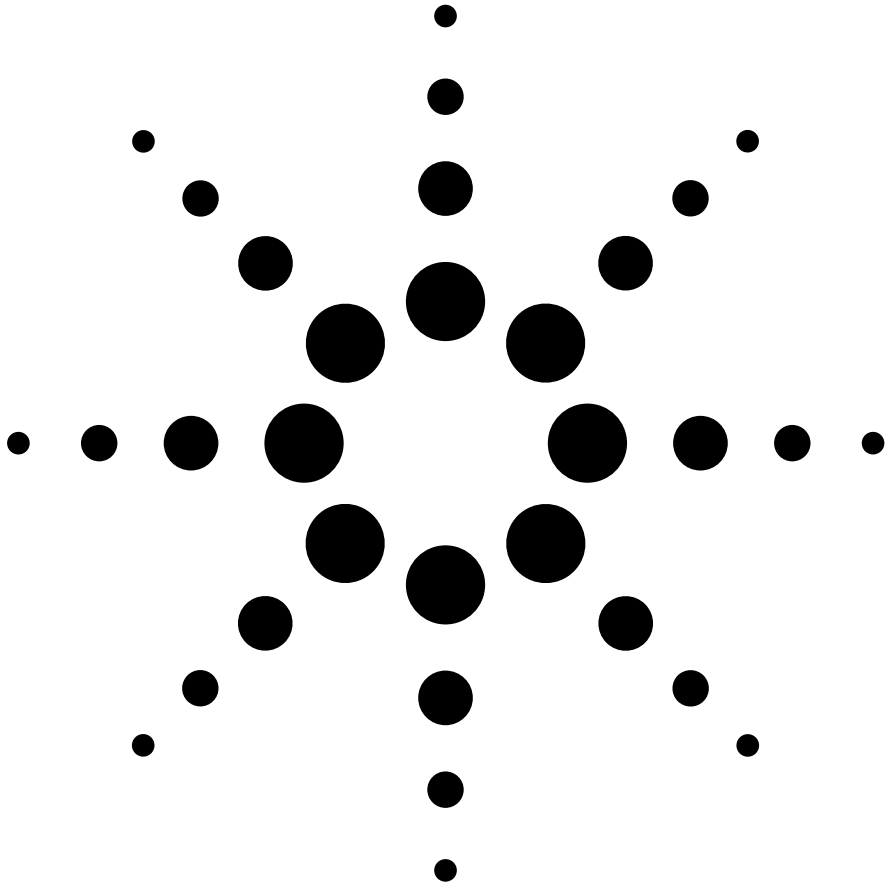


Installation Guide

Flame Photometric Detectors on 6890 GC
Accessories HP G2333A and G2334A

Agilent Technologies

Part number G1535-90327

First Edition, MAY 2000

Second Edition, AUG 2001

Replaces Part No. G1535-90300, Installation Guide for Single and Dual Flame Photometric Detectors, Part No. G1535-90307, Update to above guide.

Printed in USA

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 Lp < 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)

Agilent Technologies, Inc.
2850 Centerville Road
Wilmington, DE 19808-1610
USA

Installing Flame Photometric Detectors

Accessories G2333A and G2334A

Parts Provided

Description	Part Number	Qty
Electronics cover, FPD	G1535-80540	1
Electronics cover pan	G1535-00120	1
Top cover, FPD		1
Single wavelength FPD	G1535-80550	
or Dual wavelength FPD	G1535-80560	
Flame photometric detector assembly		1
Single wavelength FPD	G1535-60550	
or Dual wavelength FPD	G1535-60560	
Actuator solenoid bracket	G1580-00070	1
Auxiliary zone/valve box harness	G1530-60660	1
Torx screw, M4 x 12, T20	0515-2496	7
ROM set	G1530-60700*	1
Wrist strap	9300-1408	1
Label, Hot warning		1

* This part number is for ROM version A.03.01. Future releases will have different part numbers.

Tools Required

- T-20 Torx screwdriver
- Open end wrenches
- Knife
- Electric drill with 1/8 inch bit (early 6890s only)
- Chip removal tool (Amp 821903-1 or equivalent)

Turn the power off

WARNING Hazardous voltages are present in the instrument whenever the power cord is connected. Avoid a potentially dangerous shock hazard by disconnecting the power cord before working on the instrument.

1. Set the main power line switch in the lower left corner of the front panel to the off position. The pushbutton should be "out".
2. Disconnect the power cable from its receptacle.
3. Allow time for the oven and heated zones to cool.
4. When the heated zones are cool, turn off all gas supplies.

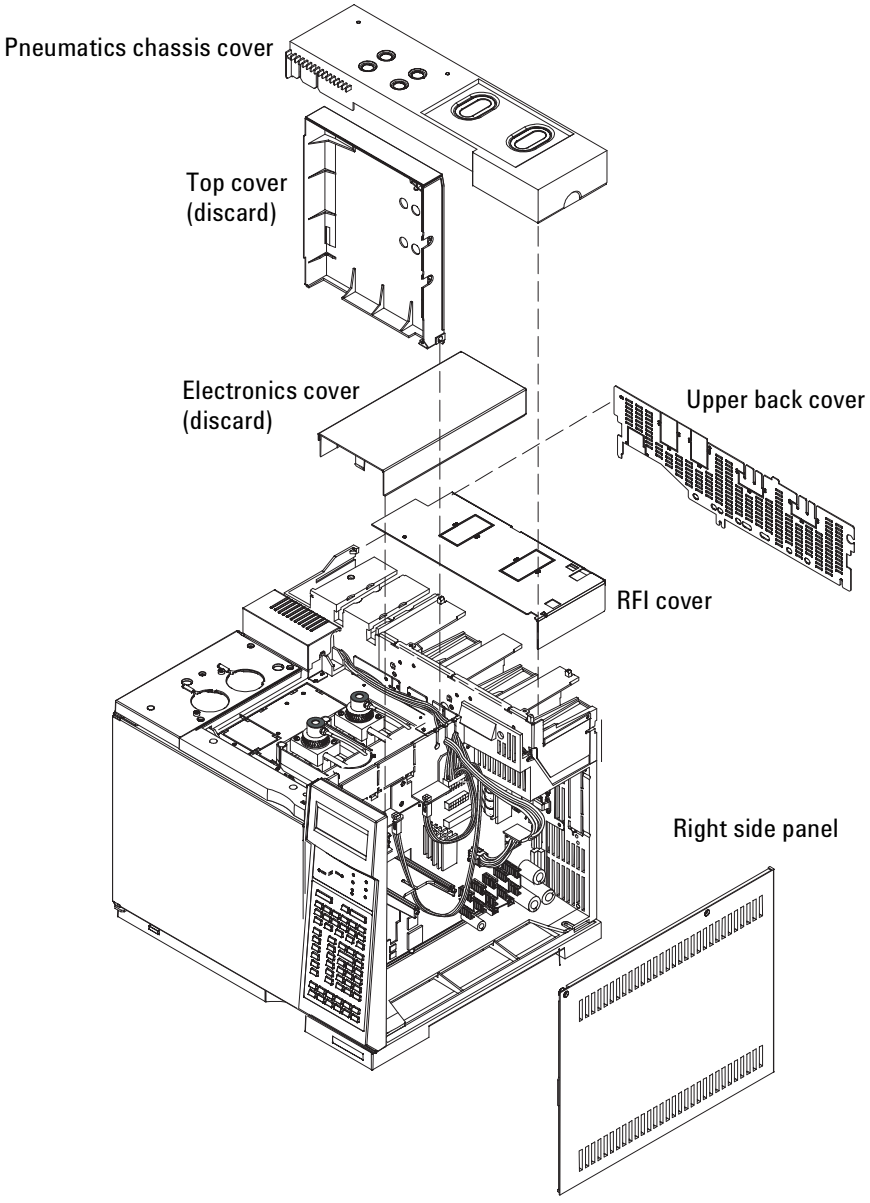
Clean out the oven

Remove columns and hardware associated with both detectors to clear the way for the flame photometric detector.

Remove the right side panel

Caution This operation exposes static-sensitive parts. Do not touch any of the parts inside the right side panel until specifically instructed to do so.

1. Loosen the two captive screws securing the gray plastic right side panel along the top edge.
2. Slide the panel toward the rear of the instrument to disengage the hook at the top, tilt the panel outward, and lift.


Pneumatics chassis cover
Top cover
(discard)
Electronics cover
(discard)
Upper back cover
RFI cover
Right side panel

Remove the electronics cover

Two spring clips hold this—the front one is visible in the drawing. Reach under the cover, release the clips, and lift the cover. Discard the cover.

Remove the top cover

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. Discard the cover.

  The hinge is held to the oven top by two rivets and to the bracket behind it by one rivet. Use a 1/8-in. bit in an electric drill to remove the three rivets. Discard the hinge.

Caution Be careful not to drill too deep. You only want to remove the rivet heads.

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

Remove the pneumatics chassis cover

This is the gray plastic cover across the top rear of the GC. It is held by spring clips on the left and right ends. Lift up on each end to release the clips and remove the cover.

Remove the RFI cover

The RFI cover is secured by one screw at the front left corner. Remove the screw, slide the plate to the right to disengage the tabs, and lift it off.

Remove the upper back cover

Remove the upper (3 screws) metal back cover of the instrument. Do not remove the lower back cover.

Overview

Single wavelength FPD

One or two single wavelength FPDs can be installed. If only one is installed, it is usually most convenient to place it in the back location because of its size. However, there is no reason—other than convenience—why it cannot be installed in the front position.

Each single wavelength FPD has a printed circuit board that mounts in a slot on the right side of the GC. A detector in the front location must connect to a board in the front slot; similarly, the board for a back detector must be in the back slot.

The signal, high voltage, and ignitor cables from the detector connect to its printed circuit board. The heater/sensor cables—two per detector, one short and one long—plug into connectors on the right side of the GC. Details appear later in this document.

The pneumatics module mounts in the pneumatics chassis at the top rear of the GC. There are specific module locations for the front and back detector locations, which appear later in this document.

Dual wavelength FPD

This detector has one burner assembly and two photomultiplier tube (PMT) assemblies. It must be mounted in the back location. It uses two printed circuit boards, one in each slot. The one in the back slot is the master; the ignitor cable must connect to this board. It doesn't matter which board serves which PMT, but the high voltage and signal cables for a given PMT must go to the same board. The heater/sensor cables go to the positions for a back detector. Again, details appear later.

The pneumatics module goes in the back detector position.

A typical installation

The figure shows the parts for a single wavelength FPD mounted in the back location. For the front location, the pneumatics module goes in the slot to the right of the one shown and the detector and board are moved to the front location and slot.

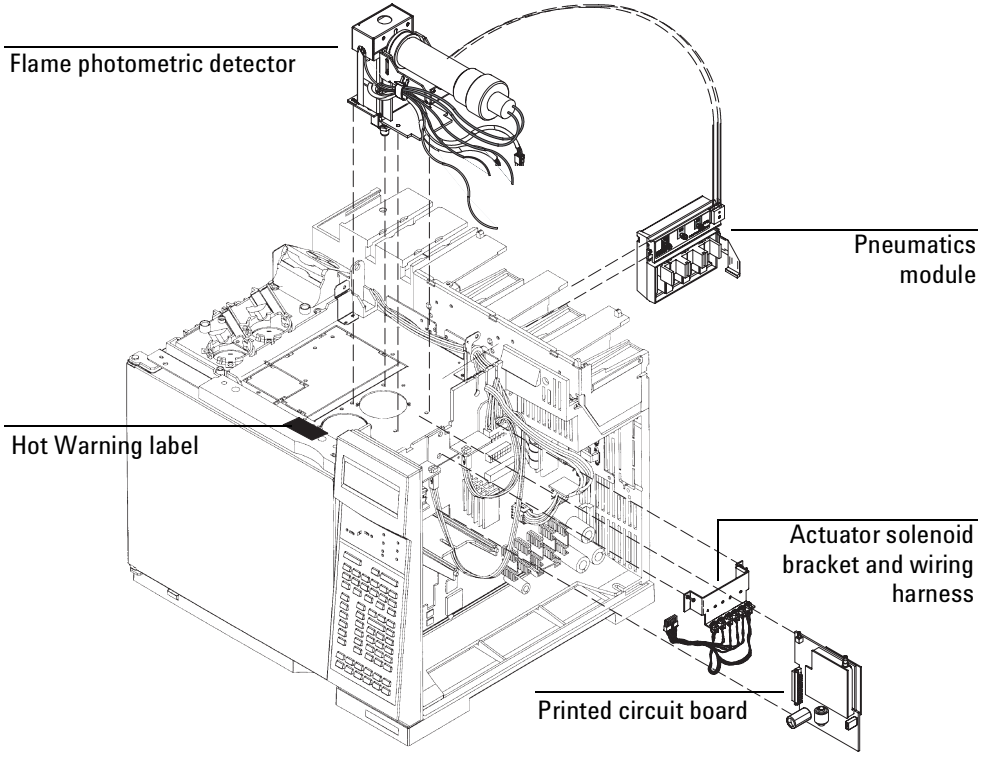


Figure 1. Installing a single wavelength FPD

Remove or relocate an existing detector

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

1. Select the location—front or back—where the FPD will be installed. If possible, it should be installed in the back position. If a detector is presently mounted in the selected location, remove it and its pneumatics module. See the manual for the existing detector for details.

Caution This procedure requires precautions against electrostatic discharge. Use the grounded wrist strap (part no. 9300-1408) and connect it to a bare metal surface of the GC. Failure to heed this caution may result in damage to the instrument or to the detector electronics.

2. Pneumatics modules are held by a single screw from the front. Remove the screw and slide the module, the detector, and other attachments out the back of the chassis.
3. If the existing detector is to be installed in the other detector location, see its manual for details.

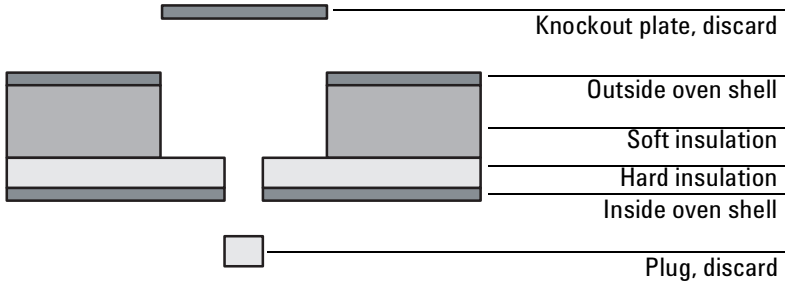
Install the Hot Warning label

Install the warning label above the oven door, as shown in Figure 1. Align it with the left edge of the large hole and the rear edge of the blue bar.

Prepare the detector location

If the detector location has not been used before

1. The detector location may be covered by a metal knockout plate. Either cut the webs that hold it or use a screwdriver in the center slot to bend it back and forth until the webs break. Discard the plate.
2. There are two layers of insulation on top of the oven. Use a sharp knife to cut through the top layer—the soft one—using the hole in the metal as a template. Remove the soft insulation to expose the hard insulation.
3. There is a precut hole in the hard insulation that is filled with a plug. Push the plug out into the oven and discard it.



If the location has been used before

1. Remove any insulation left over from a previous detector. Check that the hole in the soft insulation conforms to the hole in the metal top plate.
2. If the precut hole in the hard insulation is still plugged, push the plug out and discard it.

Install the pneumatics module

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

Caution It is not necessary and not advisable to separate detectors from their pneumatics modules. Doing so can create 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.
   - If the detector is to be mounted in the front location, use the second slot from the left (as viewed from the back of the GC).
   - If the detector is to be mounted in the back location, use the third slot from the left (as viewed from the back of the GC). Note that a dual wavelength detector must be mounted in the back location.

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

2. Slip the ID tag on the manifold through the slot in the mounting bracket, then align the bracket holes over the gas fittings. Secure the bracket with three 7/16 inch hex nuts. See Figure 2.

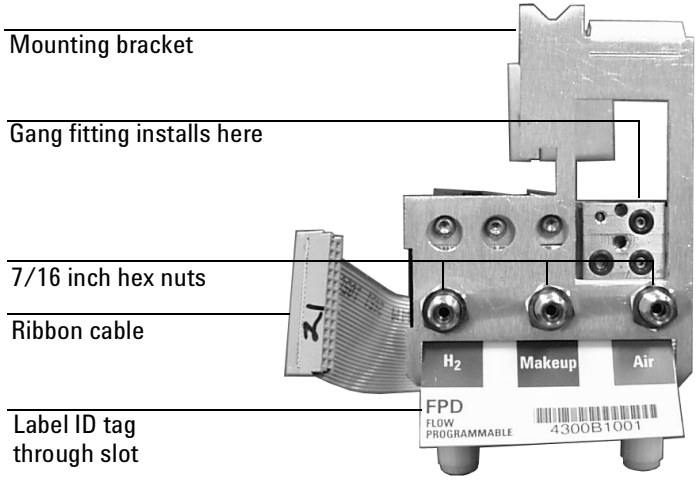
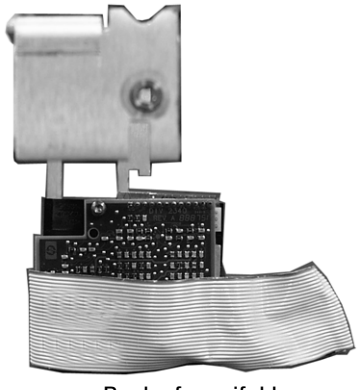
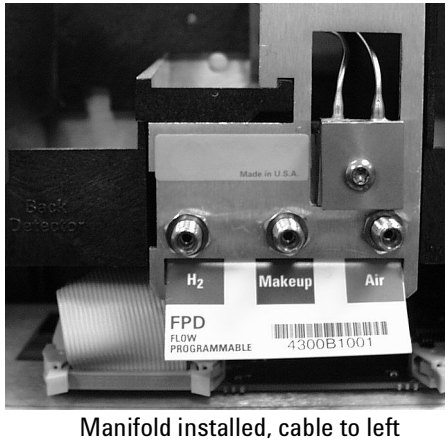


Figure 2. Bracket mounted on the manifold

3. Peel the blank label from its backing and paste it on the mounting bracket over the screw heads. See Figure 3.
4. Shape the tubing from the gang fitting so that it bends up and back from the block as shown in Figure 4.
5. Route the ribbon cable behind the manifold assembly as shown in Figure 3. Then, slide the manifold and bracket assembly into the slot until the bracket seats flush against the end of the rails. See Figure 4.



Back of manifold



Manifold installed, cable to left

Figure 3. Routing the ribbon cable

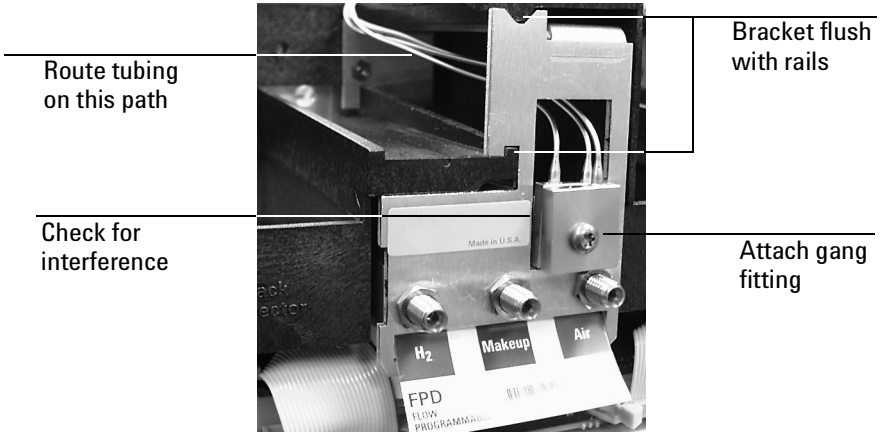


Figure 4. Manifold, after installation

6. Route the gas tubing:
   - **Detector in the back position.** Route the tubing behind the manifold, over the top of the chassis, and through the slots as shown in Figure 4.
   - **Detector in the front position.** Route the tubing behind the manifold and over the top of the chassis. Run it directly to the detector; do not run it through the slots.
7. 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 against 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.
8. Secure the manifold in place using the Torx T-20 mounting screw on the front of the pneumatics chassis.
9. Using a pair of needle-nosed pliers, remove the appropriate top rear panel detector cutout for the FPD. Also remove any cutouts needed to access other manifolds or accessories installed in the GC. See Figure 5.

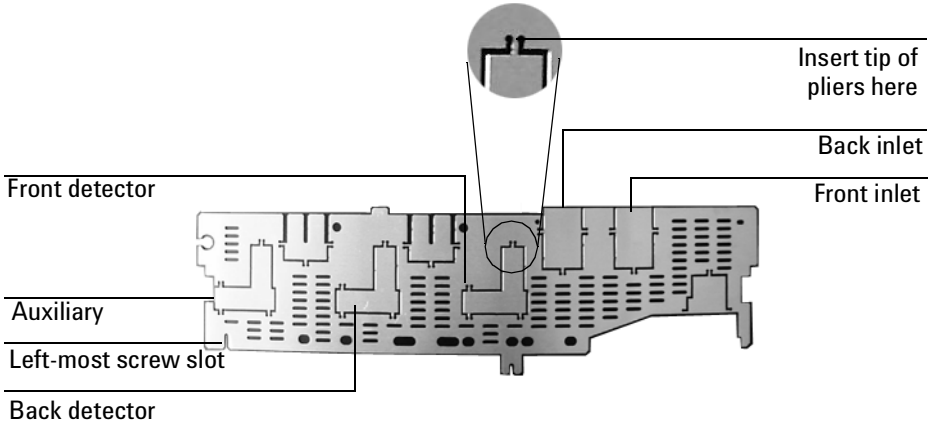


Figure 5. Top rear panel cutouts

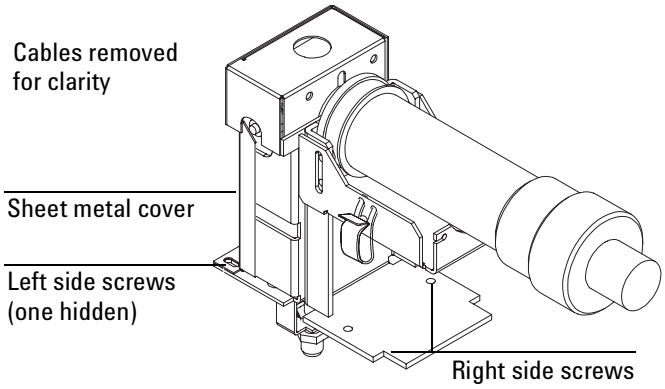
10. Place the new top rear panel on its left-most mounting screw. Use the screw as a hinge and angle the panel while sliding each manifold ID tag

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.

11. Install the RFI cover, the pneumatics cover, and the detector top cover.
12. Connect the source gas lines to the manifold.
13. Restore gas pressures and leak check all fittings.

Install the detector

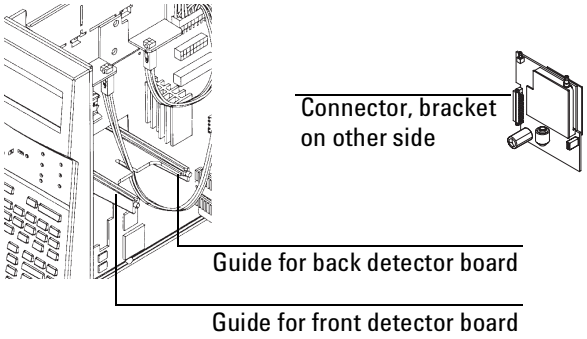
1. Place the detector in the selected location—dual wavelength must go in the back location—with the column fitting extending through the insulation into the oven. The PMT housing(s) will be parallel to the front of the GC.



2. The detector is held to the oven top by four screws, one at each corner. Insert the two screws on the right first but do not tighten them.
3. Install the two screws on the left side through the sheet metal cover—which is only present on the single wavelength FPD—and the detector base. Press the cover against the detector and tighten the screws.
4. Now tighten the screws on the right side.
5. Bend the gas lines from the pneumatics module downward to one of the T-slots in the bracket on top of the oven. Pass the lines through the slot. Form excess length into an S-curve on top of the oven.

Install the detector board(s)

There are two locations just behind the keyboard on the right side of the instrument for the detector printed circuit boards.



Caution This procedure requires precautions against electrostatic discharge. Use the grounded wrist strap (part no. 9300-1408) and connect it to a bare metal surface of the GC. Failure to heed this caution may result in damage to the instrument or to the printed circuit board.

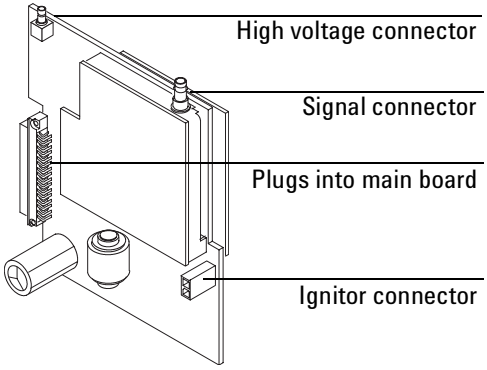
1. Insert the board in the correct guide for the location used.
   - For a single wavelength detector, the board goes in the slot for the detector position used.
   - For a dual wavelength detector, boards go in both slots. The board in the back slot becomes the master board, providing high voltage and signal processing for one PMT assembly and ignitor power for the detector burner assembly. It controls the other board.

   The board in the front slot provides high voltage and signal processing for the other PMT assembly.
2. Press the board firmly into place so that the connector on the board engages the matching connector on the GC main circuit board.
3. Secure the board with the captive screw in the bracket on its rear side.

Connect the cables to the detector board

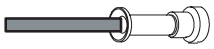
There is a metal clip on the side of the PMT housing support. Collect the cables and route them through this clip.

Detector board connector locations



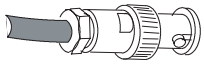
Caution With a dual wavelength FPD, it does not matter which of the two circuit boards is used for which PMT. However, the high voltage and signal cables from each PMT must go to the same board. Do not "cross-wire".

High voltage cable



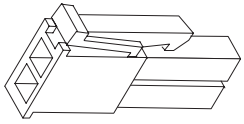
This is a black cable with a brass connector on the end. Press it down over the high voltage connector on the board until it "clicks" into place.

Signal cable



This is a black cable with a BNC connector on the end. Press it onto the signal connector on the board and turn the knurled ring to lock it in place.

Ignitor cable



This gray cable ends in a 2-pin flat connector. Press it into the ignitor connector on the board until it locks into place. There is only one way that it can be connected.

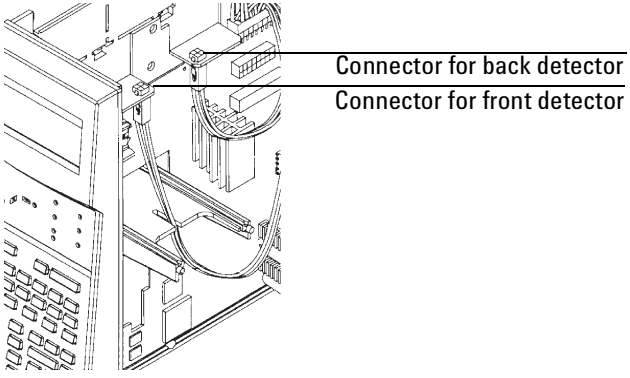
If you are installing a dual wavelength detector, there will be only one ignitor cable. Connect it to the board in the back detector slot.

Heater/sensor cables

There are two heater/sensor cables for each detector tower; one for the burner block and one for the transfer line. Both cables have woven glass sleeves, but one is much longer than the other.

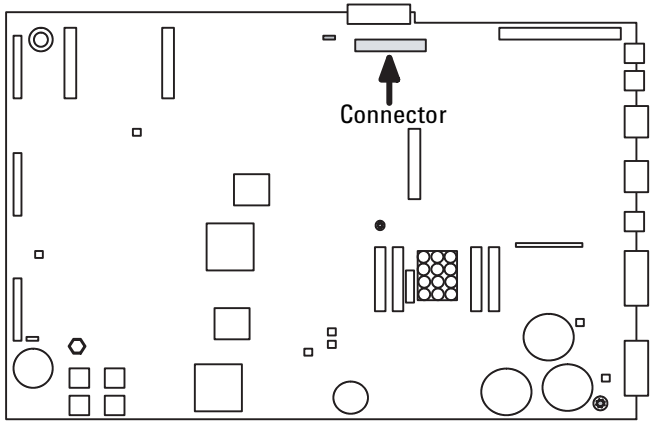
Short heater/sensor cable

Plug the short heater/sensor cable into the appropriate connector on the right side of the GC, as shown in the figure. There is only one way that the connectors will go together.

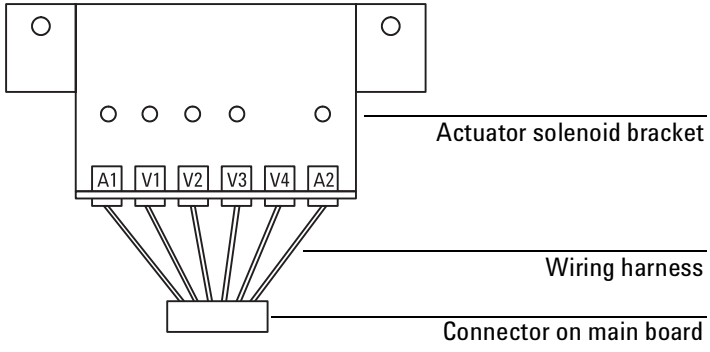


Long heater/sensor cable

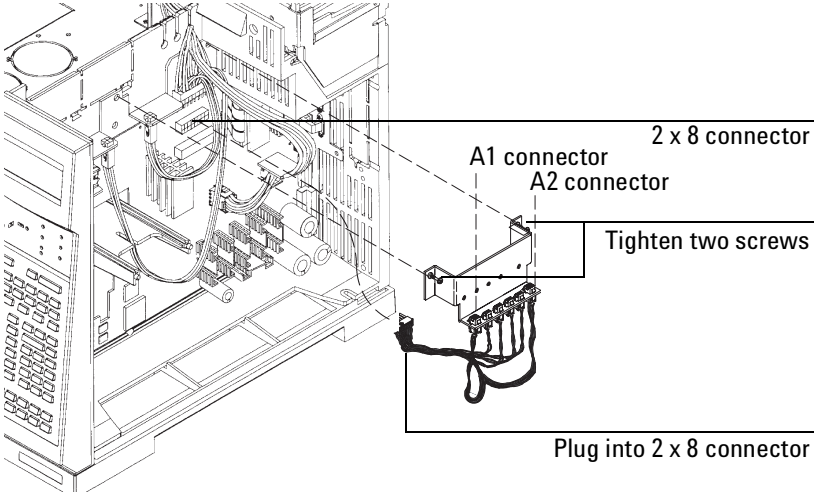
1. Examine the main board on the right side of the instrument. Locate the 2 x 8 connector indicated by the arrow.



2. If this connector has a wiring harness and bracket attached to it, skip to step 6. If nothing is attached to the connector, continue with step 3.



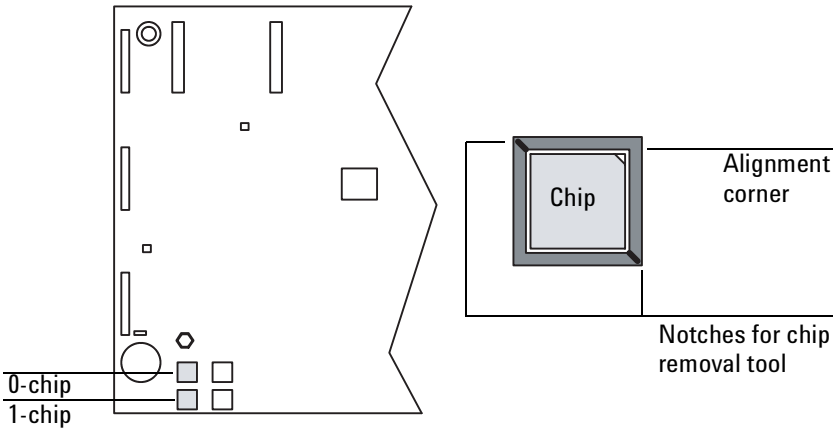
3. Attach the wiring harness to the bracket as shown. The connectors are labeled and push into the bracket from the bottom.



4. Attach the bracket to the GC frame with two screws.
5. Plug the connector on the wiring harness into the 2 x 8 connector on the main board.
6. Pass the long heater/sensor cable under the printed circuit board and guide and plug it into an auxiliary connector on the bracket.
   - Single wavelength detector in the front location. Plug the long cable into the A1 connector.
   - Single wavelength detector in the back position. Plug the long cable into the A2 connector.
   - Dual wavelength detector which must be in the back location. Plug the long cable into the A2 connector.

Replace the ROMs

Examine the right side of the instrument. On the main board, just below the large cutout on the left, are four chip sockets. The two on the left contain the operating programs (firmware) that run the GC.



These two chips must be replaced with new ones that include software for the flame photometric detector.

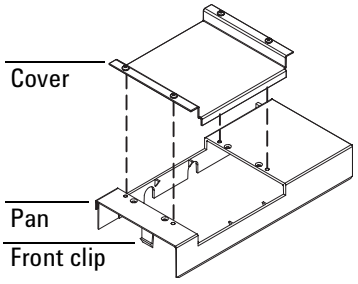
Caution This procedure requires precautions against electrostatic discharge. Use a grounded wrist strap (part no. 9300-1408) and connect it to a bare metal surface of the GC. Failure to heed this caution may result in damage to the instrument or to the PTV assembly.

1. Use a chip removal tool with a gentle rocking/pulling motion to remove the chip in the top left socket.
2. Repeat with the bottom left chip and socket.
3. The new chips are identified by a part number, a version number, and a suffix of either ".0" or ".1". They are referred to as the 0-chip and the 1-chip respectively.
4. Note that each chip has one diagonal corner. This corner must be at the top right when the chip is inserted in its socket.
5. Examine the chip for bent pins. If any are found, straighten them.

6. Install the 0-chip in the top left socket with the diagonal corner at the top right. When the chip is properly aligned, firm pressure will seat it in the socket.
7. Similarly, install the 1-chip in the bottom left socket.

Closing up

1. Re-install the right side panel. Be sure that the hook at the top rear corner is engaged.
2. The new electronics cover is in two parts.



   a. Unscrew the four captive screws and remove the pan.
   b. Align the base and lower it into place. Two clips secure it.
   c. Slide the pan—folded lip to the right—under the PMT housing(s).
   d. Align the screws with the holes and tighten all four.
3. Hold the new top cover in a vertical position, engage the pin on the left rear corner, and lower the right side onto the flat-sided pin.
4. Re-install the upper back cover.
5. Re-install the RFI cover. Note that the rear edge of the cover overlaps the top edge of the upper back cover. Align the slots and tabs, slide the cover to the left and secure with a screw.
6. The pneumatics cover is held by spring clips at each end. Align the cover and press it down until the clips engage.
7. Restore gas flows and power and check for leaks.
8. If your GC did not detect the new flame photometric detector, check these connections:
   - Detector card to main board
   - Manifold to pneumatics board
   - Heater/sensor connections
   - Ignition cable to detector card

- High-voltage cable to detector cards
- Signal cable to detector card
- Correct ROM installed on main booard

If you installed an EPC FPD but only have temperature control for the detector, check the connection between the flow manifold and the pneumatics board.

Appendix: Installing the pneumatics module (early version)

Caution

It is not necessary and not advisable to separate detectors from their pneumatics modules. Doing so can create 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 location.** Use the second slot from the left (as viewed from the back of the GC).
   - **Detector in the back location.** Use the third slot from the left (as viewed from the back of the GC). Note that a dual wavelength detector must be mounted in the back location.
2. Slide the module into the slot from the rear. The gas lines will be toward the back of the GC. Match the rib on the overhanging ledge of the pneumatics chassis with the V-groove on top of the module. Secure with one screw through the pneumatics chassis from the front.
3. The ribbon cable from the pneumatics module plugs into a connector to the left of and below the module. Fold the cable so it lies flat.
4. Bend the gas lines to lie along the top of the module. Push them into the T-slot in front of the module.

Appendix: Installing the pneumatics module (early version)

Agilent Technologies

Printed on recycled paper.

This product is recyclable.

Agilent Technologies, Inc.
Printed in USA AUG 2001

G1535-90327