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# Agilent 7820A Gas Chromatograph

## Operating Guide

Agilent Technologies

# Notices



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## Safety Notices

**CAUTION**

A **CAUTION** notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in damage to the product or loss of important data. Do not proceed beyond a **CAUTION** notice until the indicated conditions are fully understood and met.

**WARNING**

**A WARNING notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in personal injury or death. Do not proceed beyond a WARNING notice until the indicated conditions are fully understood and met.**

# Contents

# 1 Introduction



This document provides an overview of the individual components that make up the Agilent 7820A Gas Chromatograph (GC).

# Where to Find Information

In addition to this document, Agilent provides several learning products that document how to install, operate, maintain, and troubleshoot the Agilent 7820A GC.

Before operating your GC, be sure to read the safety and regulatory information included on the Agilent GC and GC/MS User Manuals & Tools DVD. The most common safety hazards when working on the GC are:

- Burns caused by touching heated areas on or in the GC
- Release of pressurized gas containing hazardous chemical compounds caused by opening inlets
- Glass cuts or puncture wounds caused by sharp capillary column ends
- Use of hydrogen as a GC carrier gas

## Online User Documentation

Now your Agilent instrument documentation is in one place, at your fingertips.

The Agilent GC and GC/MS User Manuals & Tools DVD that ships with your instrument provides an extensive collection of online help, videos, and books for current Agilent gas chromatographs, mass selective detectors, and GC samplers. Included are localized versions of the information you need most, such as:

- Getting Familiar documentation
- Safety and Regulatory guide
- Site Preparation information
- Installation information

- Operating guides
- Maintenance information
- Troubleshooting details

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# Chromatography Using a GC

Chromatography is the separation of a mixture of compounds into individual components.

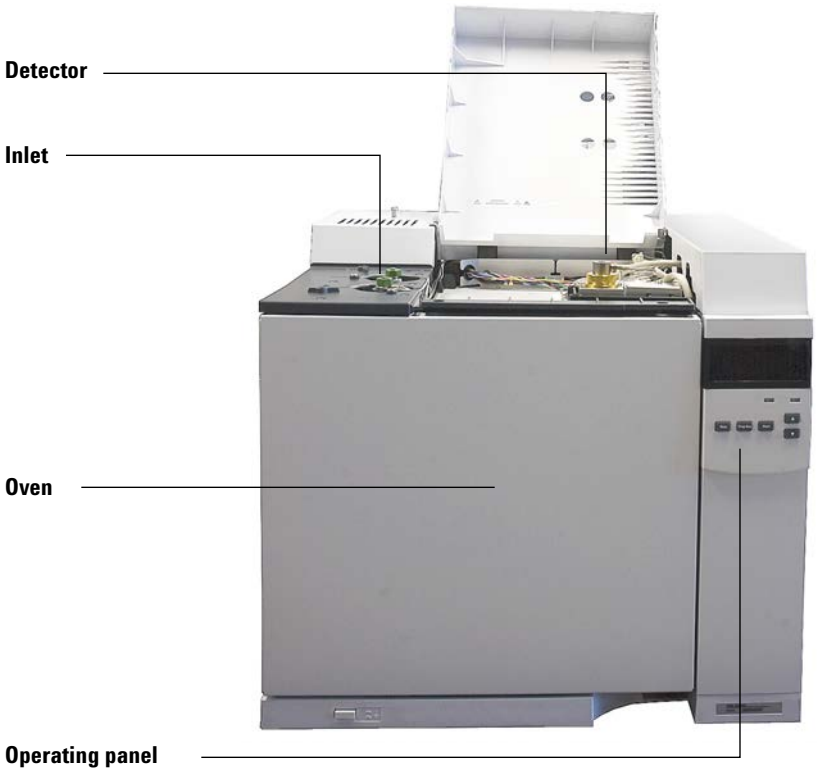
There are three major steps involved with separating and identifying components of a mixture using a GC. They are:

1 **Injecting** a sample into the GC. (This takes place at the inlet.)

2 **Separating** the sample into individual components. (This takes place inside the column in the oven.)

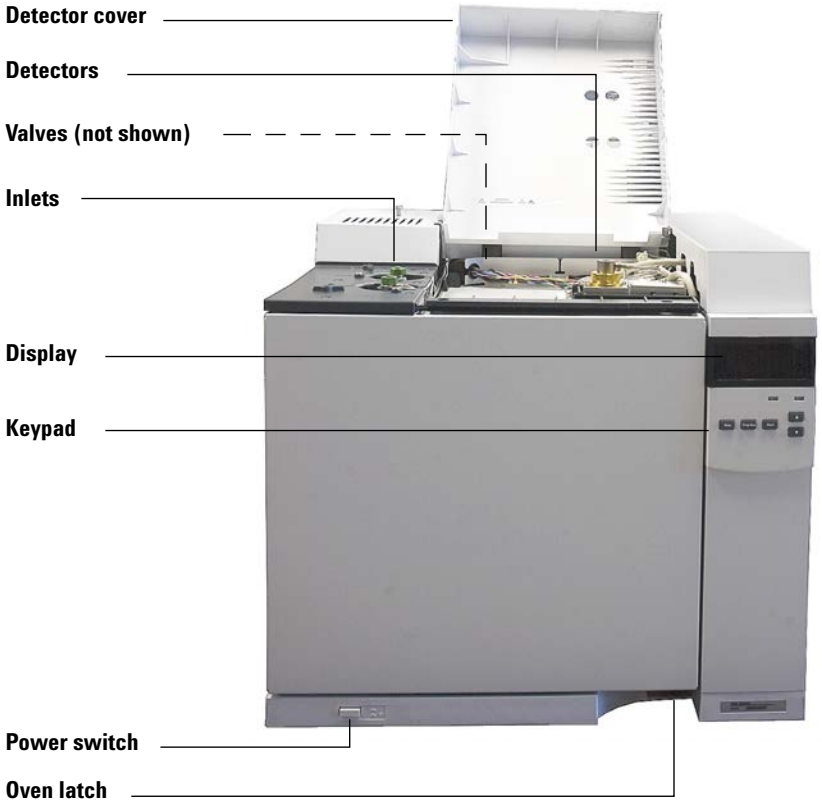
3 **Detecting** what compounds were in the sample. (This is done in the detector.)

During this process, status messages from the Agilent 7820A GC are shown on the display. User changes to parameter settings can be made through the software keypad.

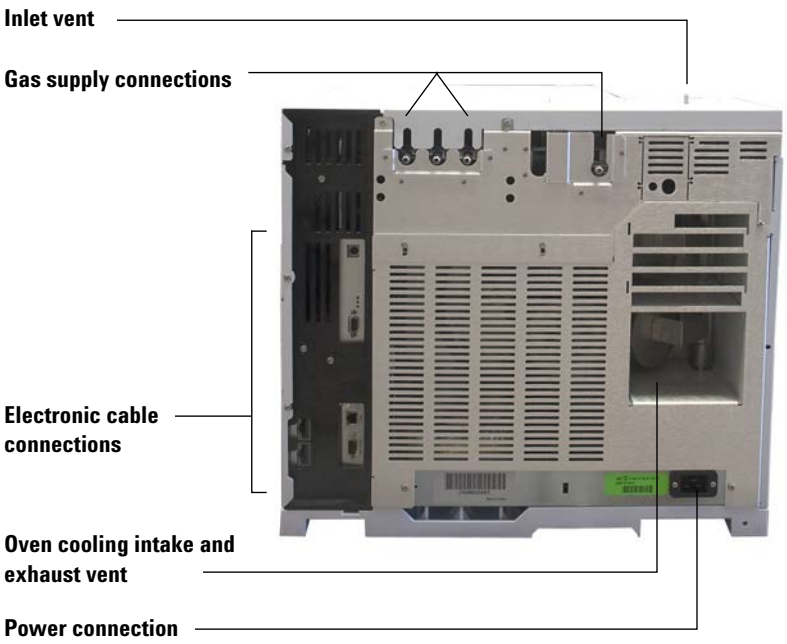



Each part of this process is described in brief on the following pages of this document. Refer to the Advanced Operating Manual and the Getting Started manual for more details.

# The Front View of the Agilent 7820A GC



# The Back View of the Agilent 7820A GC



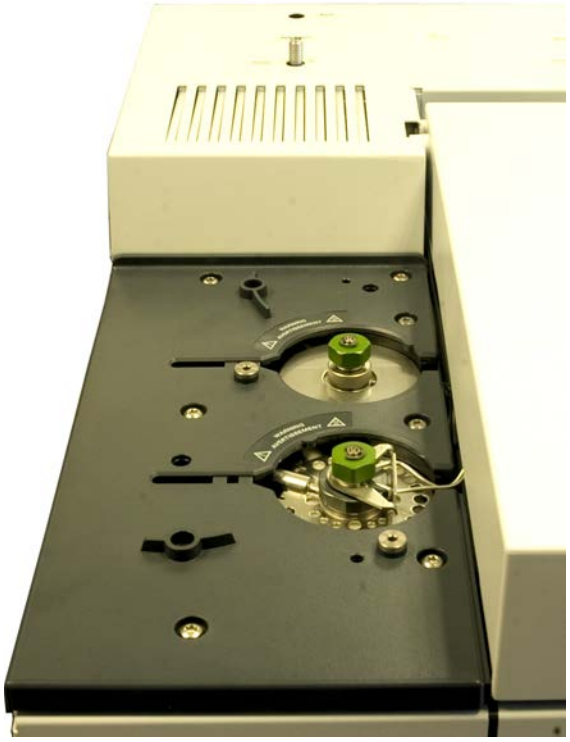
# The Inlets

Inlets are where samples are injected into the GC. The Agilent 7820A GC can have a maximum of two inlets, identified as **Front Inlet** and **Back Inlet**.

The following inlet types are available:

- Split/splitless inlet
- Purged packed inlet
- Packed column inlet
- Cool on column inlet

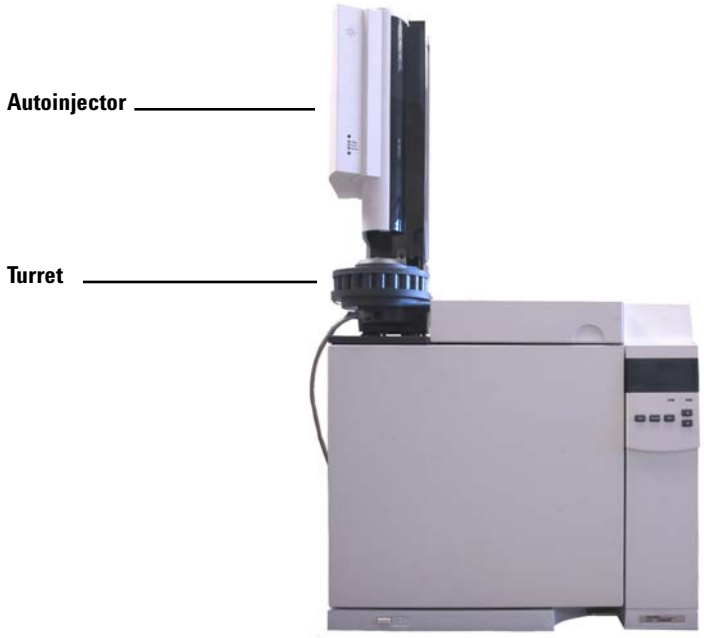
The type of inlet chosen is based on the type of analysis being done, the type of sample being analyzed, and the column being used.



Samples can be injected into the inlets by hand using a syringe, or an automatic sampling device (such as an Agilent Automatic Liquid Sampler or Agilent Headspace Sampler).

## Automatic injectors

The Agilent 7820A GC can accommodate up to two autoinjectors, identified as **Front Injector** and **Back Injector**.




## Automatic gas sampling valves

The optional sampling valves are simple mechanical devices that introduce a sample of fixed size into the carrier gas stream. Valves are most frequently used to sample gases in constantly flowing streams.

The Agilent 7820A GC can accommodate up to two gas sampling valves, identified as **Valve # 1** and **Valve #2**.

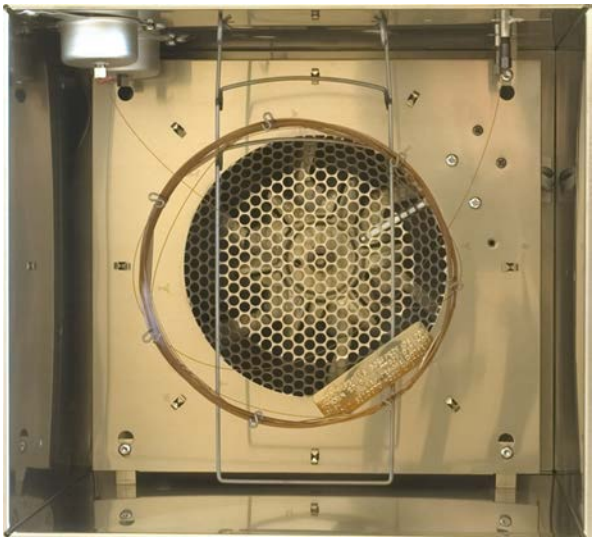
The valves are located inside the gas sampling valve box.

## The GC Column and Oven

GC columns are located inside a temperature-controlled oven. Generally, one end of the column is attached to the inlet, while the other end is attached to the detector.

Columns vary in length, diameter, and internal coating. Each column is designed for use with different compounds.

The purpose of the column and the oven is to separate the injected sample into individual compounds as it travels through the column. To aid this process, the GC oven can be programmed to speed the sample flow through the column.



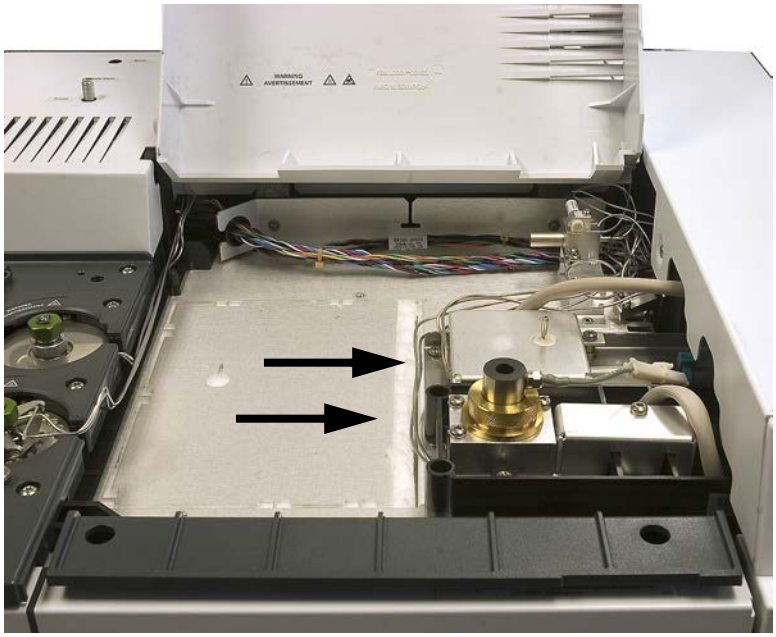
# Detectors

Detectors identify the presence of compounds as they exit the column.

As each compound enters the detector, an electrical signal proportional to the amount of compound detected is generated. This signal is generally sent to a data analysis system—such as Agilent OpenLAB CDS ChemStation edition—where it shows up as a peak on a chromatogram.

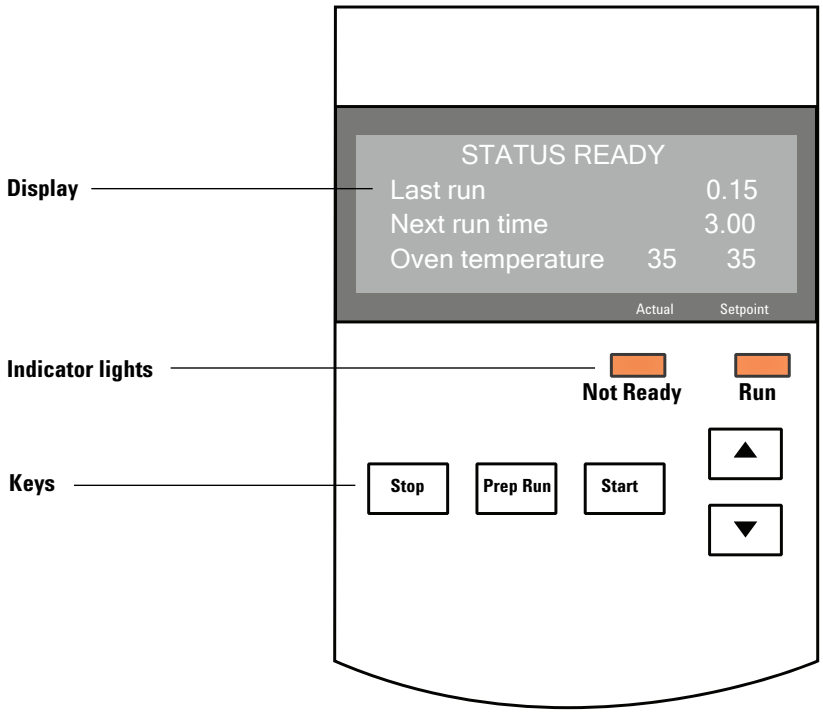
The Agilent 7820A GC can accommodate up to two detectors, identified as **Front Det** and **Back Det.**

A complete selection of detectors (FID, TCD, NPD, FPD, FPD+, μECD, and MSD) is available. The type of detector chosen is based on the type of analysis required.



# The Operating Panel

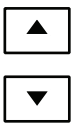
The operating panel consists of the display, status lights, and keypad. See "Software Keypad Operation" and the Advanced Operation Manual, along with the complete suite of documentation included on the *Agilent GC and GC/MS User Manuals & Tools* DVDs that are included with your GC shipment for more detailed information.




## The display

The display shows details of what is currently happening in the Agilent 7820A GC.

The cursor, <, shows the current active line. The display shows current temperatures, flows, pressures, and information about GC readiness. Use the scroll keys to select a different line in the display and to view additional lines in the display.



## Indicator Lights

The GC has two status indicators below the display, **Not Ready** and **Run**.

| | |
|---|---|
| **Not Ready** | *Lights* when the GC is not yet ready to process a sample and *blinks* when a fault occurs. Scroll to see which parameters are not ready or what faults have occurred. |
| **Run** | *Lights* when the instrument is executing a chromatographic run. *Blinks green* when in pre-run state, for example when a split/splitless inlet is purging. |

When the GC is ready to begin a run, the display screen shows **STATUS Ready for Injection**. Alternatively, when a component of the GC is not ready to begin a run, the **Not Ready** indicator lights. Scroll to see a message explaining why the GC is not ready.

## Alert Tones

*A series of warning beeps* sounds before a shutdown occurs. After a short time the component with the problem shuts down, the GC emits one beep, and a brief, numbered message is displayed. For example, a series of beeps sounds if the front inlet gas flow cannot reach setpoint. The message **Front inlet flow shutdown** is briefly displayed. The flow shuts down after 2 minutes. See “Correcting Problems”.

*A continuous tone* sounds if a hydrogen flow is shut down or a thermal shutdown occurs.

**WARNING** **Before resuming GC operations, investigate and resolve the cause of the hydrogen shutdown. See Hydrogen Shutdown in the Troubleshooting manual for details.**

*One beep* sounds when a problem exists, but the problem will not prevent the GC from executing the run. The GC will emit one beep and display a message. The GC can start the run and the warning will disappear when the run starts.

Other messages indicate hardware problems that require user intervention. Depending on the type of error, the GC emits no beep or a single beep.

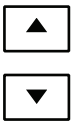
## The keypad

The GC has three operating keys.

**[Stop]** Immediately terminates the run. If the GC is in the middle of a run, the data from that run may be lost. Refer to the Advanced Operation Manual for information on how to restart the GC after pressing **[Stop]**.

**[Prep Run]** Activates processes required to bring the GC to the starting condition dictated by the method (such as turning off the inlet purge flow for a splitless injection or restoring normal flow from gas saver mode).

**[Start]** Starts a run after manually injecting a sample. (When you are using an automatic liquid sampler or gas sampling valve, the run is automatically activated at the appropriate time.)



Scrolls up and down through the display one line at a time. Use to view:

- Remaining run time
- Next run time
- Current status messages (what the GC is doing)
- Current temperatures, pressures, and flows
- Valve state
- GC firmware revision
- GC IP address
- System date and time

# 1 Introduction

# 2
# Operating Basics



This section describes a few basic tasks that an operator performs when using the Agilent 7820A GC.

# Overview

Operating the GC involves the following tasks:

- Installing the software keypad.
- Setting up the GC hardware for an analytical method.
- Starting up the GC. See "To Start Up the GC".
- Preparing the automatic liquid sampler. Install the method-defined syringe; configure solvent and waste bottle usage and syringe size; and prepare and load solvent, waste, and sample vials.
  - For the 7693A ALS, see its Installation, Operation, and Maintenance manual.
- Loading the analytical method or sequence into the GC control system.
  - See the Agilent data system documentation.
  - For standalone GC operation see "To load a method" and "To load a stored sequence".
- Running the method or sequence.
  - See the Agilent data system documentation.
  - For standalone GC operation, see "To manually inject a sample with a syringe and start a run", "To run a method to process a single ALS sample", and "To start running a sequence".
- Monitoring sample runs from the GC control panel or the Agilent data system program. See "About GC Status in the Software Keypad" or the Agilent data system documentation.
- Shutting down the GC. See "To Shut Down the GC for Less Than a Week" or "To Shut Down the GC for More Than a Week".

Operation requires an available PC with the software keypad installed. See "Software Keypad Operation" for details.

# Instrument Control

The Agilent 7820A GC is typically controlled by an attached data system such as Agilent OpenLAB CDS EZChrom Compact. Alternately, the GC can be controlled entirely from a software keypad, with output data being sent to an attached integrator for report generation.

**Agilent data system users** – Please refer to the online help included in the Agilent data system for details on how to load, run, or create methods and sequences using the data system.

**Standalone GC users** – If you are running your GC without an attached data system, see the following for details on loading methods and sequences from the software keypad:

- "To Install the Software Keypad"
- "To load a method"
- "To load a stored sequence"

For details on running methods and sequences from the software keypad see:

- "To manually inject a sample with a syringe and start a run"
- "To run a method to process a single ALS sample"
- "To start running a sequence"

Refer to the Advanced User Guide for details on how to create methods and sequences using the software keypad.

# To Start Up the GC

Successful operation begins with a properly installed and maintained GC. The utility requirements for gases, power supply, venting of hazardous chemicals, and required operational clearances around the GC are detailed in the Agilent GC, GC/MS, and ALS Site Preparation Guide Site Preparation Guide.

1 Check gas source pressures. For required pressures, see the Site Preparation Guide.

2 Turn on the carrier and detector gases at their sources and open the local shutoff valves.

3 Turn on the GC power. Wait for **Power on successful** to display.

4 Install the column.

5 Check that the column fittings are leak free. See the Troubleshooting manual.

6 Load the analytical method. See "To load a method".

7 Wait for the detector(s) to stabilize before acquiring data. The time required for the detector to reach a stable condition depends on whether the detector was turned off or its temperature was reduced while the detector remained powered.

**Table 1** Detector stabilization times

| Detector type | Stabilization time starting from a reduced temperature (hours) | Stabilization time starting from detector off (hours) |
|---|---|---|
| FID | 2 | 4 |
| TCD | 2 | 4 |
| uECD | 4 | 18 to 24 |
| FPD | 2 | 12 |
| FPD+ | 2 | 12 |
| NPD | 4 | 18 to 24 |

## To Shut Down the GC for Less Than a Week

1 Wait for the current run to finish.

2 If the active method has been modified, save the changes.

**WARNING** **Never leave flammable gas flows on if the GC will be unmonitored. If a leak develops, the gas could create a fire or explosion hazard.**

3 Turn off all gases, except the carrier gas, at their sources. (Leave the carrier gas on to protect the column from atmospheric contamination.)

4 Reduce detector, inlet, and column temperatures to between 150 and 200 °C. If desired, the detector can be turned off. See the following table to determine if it is advantageous to shut down the detector for a short time period. The time required to return the detector to a stable condition is a factor. See Table 1.

## To Shut Down the GC for More Than a Week

See  for procedures for installing columns, consumables, and so on.

1. Load a GC maintenance method and wait for the GC to become ready. For more information about creating maintenance methods, see the Maintaining Your GC manual. (If a maintenance method is not available, set all heated zones to 40 °C.)
2. Turn off the main power switch.
3. Shut off all gas valves at the gas source.

**WARNING** **Be careful! The oven, inlet, and/or detector may be hot enough to cause burns. If they are hot, wear heat-resistant gloves to protect your hands.**

4. When the GC is cool, remove the column from the oven and cap both ends to keep out contaminants.
5. Cap the inlet and detector column fittings and all GC external fittings.

# Correcting Problems

If the GC stops operation because of a fault, check the display for any messages. Press [**Status**] and scroll to view any additional messages.

1. Use the software keyboard or data system to stop the alert tone. Click **[Clear]** on the software keyboard or turn off the offending component in the data system. (For details on the software keyboard, see "Software Keypad Operation".)
2. Resolve the problem, for example, by changing gas cylinders or fixing the leak. See the Troubleshooting Guide for details.
3. Once the problem is fixed, you may need to either power cycle the instrument, or use the software keyboard or data system to turn the problem component off, then on again. For shutdown errors, you will need to do both.

# 3
# Software Keypad Operation



This section describes the basic operation of the Agilent 7820A GC Remote Controller (software keypad). This software provides a keypad interface that allows you to connect to and control a 7820A GC. For additional information on keypad functionality, see the Advanced Operation Manual.

## To Install the Software Keypad

Agilent provides 7820A GC Remote Controller software on the Agilent GC and GC/MS User Manuals & Tools DVD. To install the software, insert the DVD into your PC's DVD drive, then follow the online instructions for installing the 7820A GC documentation. After installation, you can open the software keypad from a desktop icon or from the Start menu.

The software keypad requires a LAN connection to the GC.

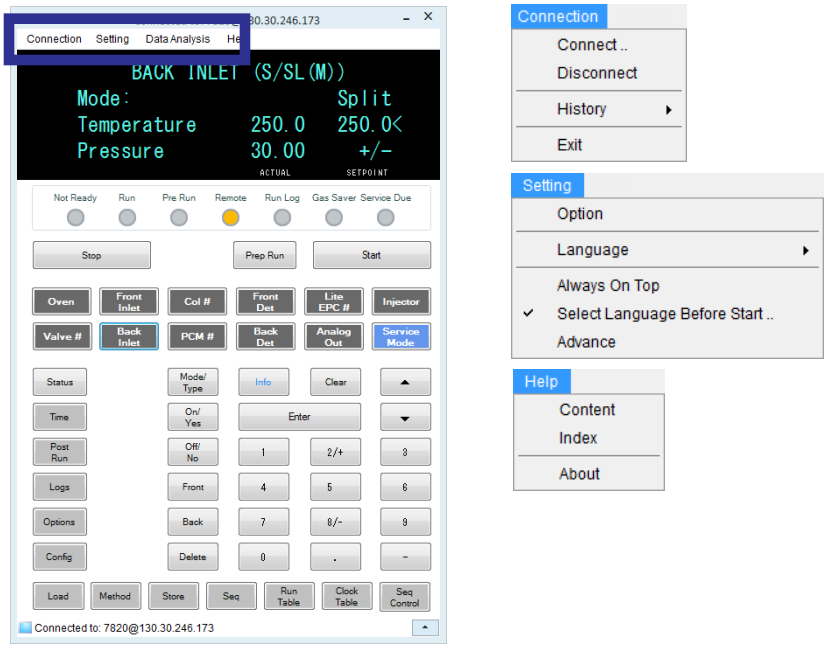
# The Software Keypad

Use the software keypad to:

- Operate the GC without an Agilent data system
- View instrument error conditions
- Prepare the GC for maintenance
- Clear fault conditions

The software keypad can control only one 7820A Series GC at a time. It can connect to any 7820A GC on the PC's network.

**CAUTION** Use only one software keypad at a time to connect to a given GC.




## To connect to a GC

1. Go to **Connection > Connect**.
2. Select **IP** to enter/select an IP address, or **Name** to select a GC using a previously assigned name.
3. From the **Target** list, either enter or select the GC IP address or name.
4. Click **Connect**.

The software keyboard window title displays the name or IP address of the connected GC. This information also appears at the bottom of the window.

If desired, you can enable **AutoConnect** to always connect to the selected GC when launching the software keypad.

## To disconnect from a GC

Select **Connection > Disconnect**.

## Other program settings

### Settings > Option > Connection

The **Connection** tab provides options for displaying user-friendly names for GCs and for enabling automatic connection to a GC when the software loads.

Enable **AutoConnect** to connect to the default GC when starting the software keypad. You can also set this feature from **Connection > Connect**.

Use **Connection History** to assign the default GC that appears in the **Connect** list. The connection history lists each GC to which you have connected.

To assign a name that will appear in the **Connect** list, select the GC, then click **Change Name**. Enter the name in the **Name** field, then click **Save Name**.

To make a GC appear as the first entry in the **Connect** list, select it in the history then click **Set as Default**.

To permanently delete all saved names and all connection history, click **Clear History**.

### Settings > Option > ShortCuts

The **ShortCuts** tab allows you to enable, disable, and customize keyboard shortcuts usable with the software.

To enable keyboard shortcuts, select **Enable shortcut on main panel**.

Once shortcuts are enabled, you can use the default shortcuts, or select and modify them as desired. To change a shortcut, select it then click **Change**. Press the keystrokes for the new shortcut, then click **Store** to save it and **OK** to close the **Option** dialog. Shortcuts must be unique. Click **Default** to restore the factory shortcut values.

### Settings > Option > Log

Select the **Log** tab to display the log entries compiled by the software keypad. The software logs connection events, communication errors, and similar events.

### Settings > Language

Use **Settings > Language** to select the language for the software keypad user interface. After a brief pause, the UI reloads in the new language. This setting changes only the software keypad language, not the language of the GC.

You can also turn off language selection during program startup by deselecting **Settings > Select Language Before Startup**.

## To minimize or expand the software keypad

Click ▲ or ▼ in the bottom right corner of the window to toggle keypad display.

## To troubleshoot a connection

If the software keypad cannot connect to the GC, check the following:

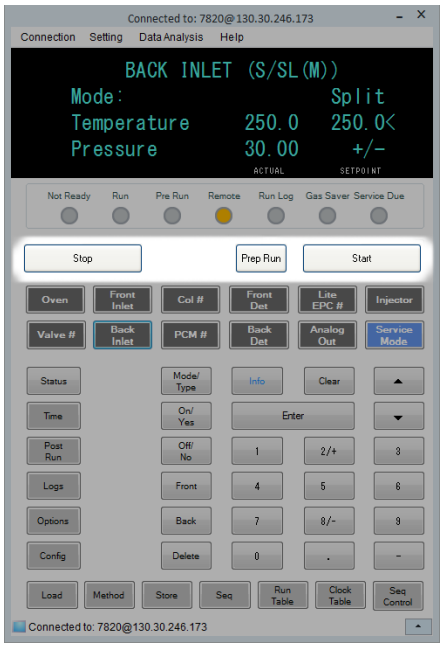
- Verify GC is turned on.
- Verify LAN cabling is connected properly.
- Verify entered IP address is correct for GC. On the GC front panel, press ▲ or ▼ to scroll to the **IP** entry. This the GCs current IP address.
- Verify basic communications to the GC by using the **ping** command. See the Troubleshooting manual.
- Verify that no one else is currently controlling the GC.
- Make sure your PC is able to communicate with the GC. The PC IP address must be set for a similar network and subnet. For example, if the GC IP address reads 192.168.0.26 (the default value), then your PC IP address must be 192.168.0.xx, where xx is any number from 0 to 25 or 27 to 255. If the PC is set for a different LAN than the GC, you must change the PC IP address. Refer to Windows help for details. This operation may require administrative privileges on the PC.

## To get help

To open the keypad software help, go to **Help > Contents**.

# The Run Keys

These keys are used to start, stop, and prepare the GC to run a sample.




**[Prep Run]** Activates processes required to bring the GC to the starting condition dictated by the method (such as turning off the inlet purge flow for a splitless injection or restoring normal flow from gas saver mode). See the Advanced Operation Manual for details.

**[Start]** Starts a run after manually injecting a sample. (When you are using an automatic liquid sampler or gas sampling valve, the run is automatically activated at the appropriate time.)

**[Stop]** Immediately terminates the run. If the GC is in the middle of a run, the data from that run may be lost. Also see "To resume an aborted sequence" on page 52.

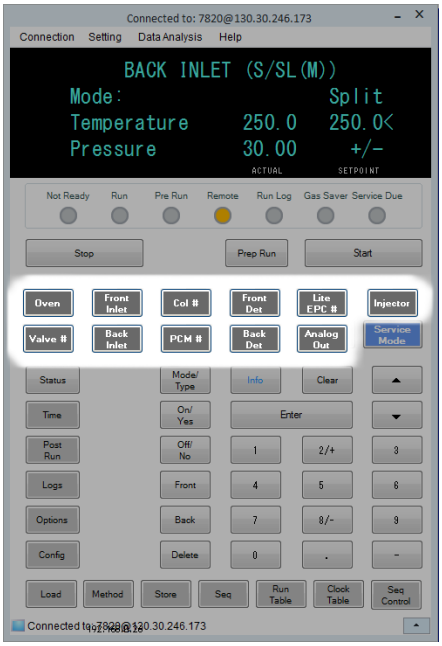
# The GC Component Keys

These keys are used to set the temperature, pressure, flow, velocity, and other method operating parameters.

**To display the current settings**, press any one of these keys. More than three lines of information may be available. Use the scroll keys to view additional lines, if necessary.

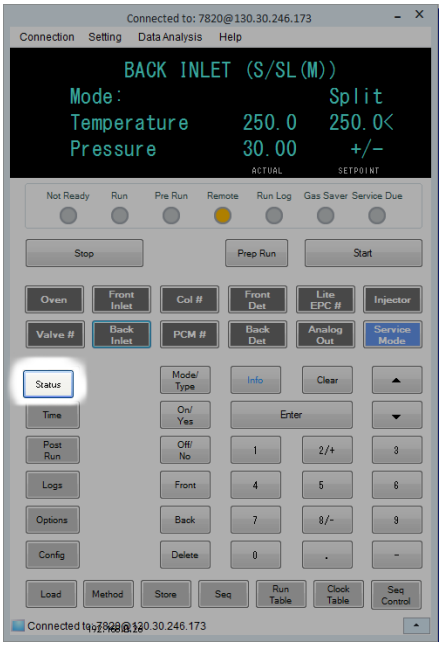
**To change settings**, scroll to the line of interest, enter the change, and press **[Enter]**.

**For context-sensitive help**, press **[Info]**. For example, if you press **[Info]** on a setpoint entry, the help provided would be similar to: *Enter a value between 0 and 350.*




| | |
|---|---|
| [**Oven**] | Sets oven temperatures, both isothermal and temperature programmed. |
| [**Front Inlet**]<br>[**Back Inlet**] | Controls inlet operating parameters. |
| [**Col #**] | Controls column pressure, flow, or velocity. Can set pressure or flow ramps. |
| [**PCM #**] | Controls column pressure, flow, or velocity for accessory pneumatic control module(s). Can set pressure or flow ramps. |
| [**Front Det**]<br>[**Back Det**] | Controls detector operating parameters. |
| [**Lite EPC #**] | Provides pneumatics to an inlet, detector, or other device. Use to configure the detector EPC for use. Can be used for pressure programming. |
| [**Injector**] | Edits injector control parameters such as injection volumes and sample and solvent washes. |
| [**Valve #**] | Allows control of a sampling valve and/or switching valves (on or off). |
| [**Analog Out**] | Assigns a signal to the analog output. The analog output is located on the back of the GC. |

# The Status Key




[**Status**]

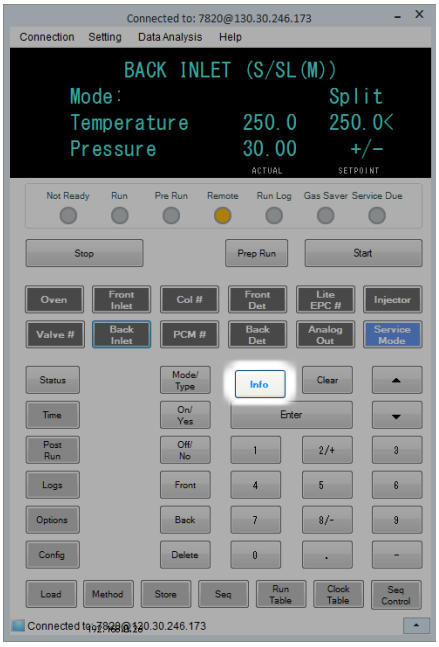
Displays “ready,” “not ready,” and “fault” information.

When the **Not Ready** status light is *blinking*, a fault has occurred. Press [**Status**] to see which parameters are not ready and what fault has occurred.

The order in which items appear in the scrolling display window for [**Status**] can be modified. You may, for example, want to display the things you most frequently check in the top three lines so that you do not need to scroll to see them. To change the order of the **Status** display:

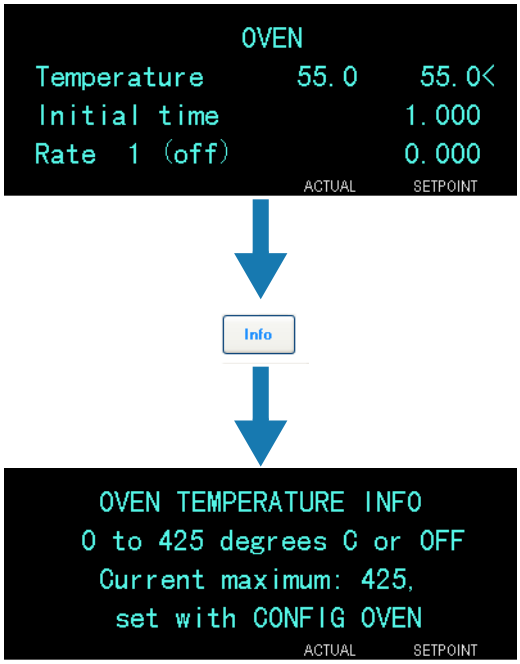
1. Press [**Config**] [**Status**].
2. Scroll to the setpoint you want to appear first and press [**Enter**]. This setpoint will now appear at the top of the list.
3. Scroll to the setpoint you want to appear second and press [**Enter**]. This setpoint will now be the second item on the list.
4. Continue as above until the list is in the order you require.

# The Info Key

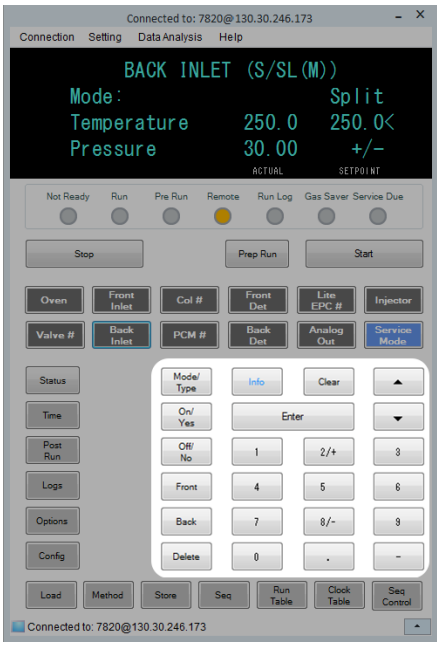



[**Info**]

Provides help for the currently shown parameter. For example, if **Oven Temp** is the active line in the display (has a **<** next to it), [**Info**] will display the valid range of oven temperatures. In other cases, [**Info**] will display definitions or actions that need to be performed.



# The General Data Entry Keys




[**Mode/Type**] Accesses a list of possible parameters associated with a component's non-numeric settings. For example, if the GC is configured with a split/splitless inlet with EPC and the [**Mode/Type**] key is pressed, the options listed will be split, splitless, pulsed split, or pulsed splitless.

[**Clear**] Removes a misentered setpoint before pressing [**Enter**]. It can also be used to return to the top line of a multiline display, return to a previous display, cancel a function during a sequence or method, or cancel loading or storing sequences and methods.

[**Enter**] Accepts changes you enter or selects an alternate mode.

▲ ▼ Scrolls up and down through the display one line at a time. The **<** in the display indicates the active line.

**Numeric Keys** Are used to enter settings for the method parameters. (Press [**Enter**] when you are finished to accept the changes.)

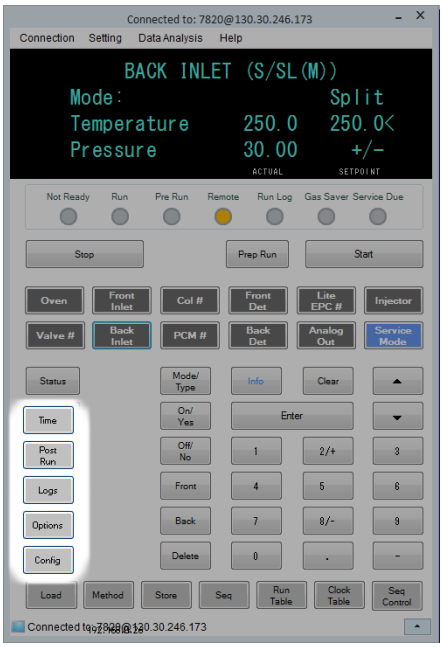
For EPR (electronic pneumatics regulation) equipped GCs, the 2/+ and 8/- keys are used to adjust parameters settings up and down, respectively.

[**On/Yes**] [**Off/No**] Are used when you are setting up parameters, such as the warning beep, method modification beep, and key click or for turning on or off a device like a detector.

**[Front] [Back]** Are mostly used during configuration operations. For example, when configuring a column, use these keys to identify the inlet and detector to which the column is attached.

[**Delete**] Removes methods, sequences, run table entries, and clock table entries. [**Delete**] also aborts the adjust offset process for nitrogen-phosphorus detectors (NPD) without interrupting other detector parameters. See the Advanced Operation Manual for more details.

## The Supporting Keys




**[Time]** Displays the current date and time on the first line.

The two middle lines show the time between runs, the elapsed time and time remaining during a run, and the last run time and post-time during a post-run.

The last line always displays a stopwatch. While on the stopwatch line, press [**Clear**] to set the clock to zero and [**Enter**] to start or stop the stopwatch.

**[Post Run]** Is used to program the GC to do something after a run, such as bakeout or backflush a column. See the Advanced Operation Manual for details.

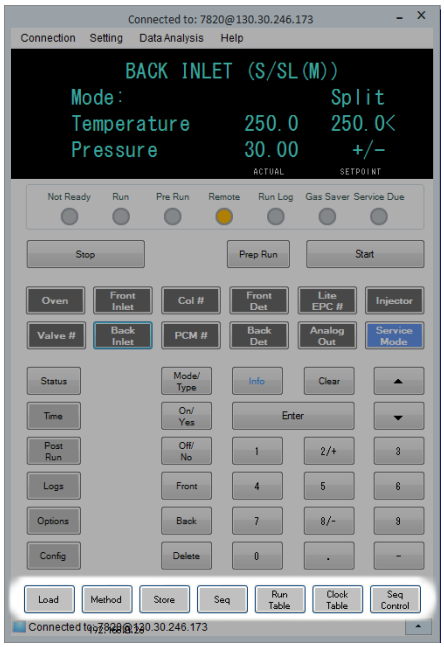
**[Logs]** Toggles between two logs: the Run Log and the System Event Log. The information in these logs can be used to support Good Laboratory Practices (GLP) standards.

**[Options]** Accesses the instrument parameters setup option, such as keypad and display. Scroll to the desired line and press **[Enter]** to access the associated entries. See “Options” on page 141.

**[Config]** Is used to set up components that are not automatically detectable by the GC but are essential to running a method, such as column dimensions, carrier and detector gas types, makeup gas configurations, and column plumbing to inlets and detectors. These settings are part of, and are stored with, the method.

To view the current configuration for a component (such as the inlet or detector), press **[Config]**, then the component key of interest. For example, **[Config][Front Det]** opens front detector configuration parameters.

# Method Storage and Automation Keys




These keys are for loading and storing methods and sequences locally on your GC. They cannot be used to access methods and sequences stored by your Agilent data system.

[**Load**] [**Method**] [**Store**] [**Seq**]

Are used together to load and store methods and sequences on your GC.

For example, to load a method, press [**Load**] [**Method**] and select one from the list of methods stored in the GC. See "To load a method" on page 57.

[**Run Table**] Is used to program special events you require during a run. A special event could be switching a valve, for example. See the Advanced Operation Manual for details.

[**Clock Table**] Is used to program events to occur at a time of day, as opposed to during a run, and to access the Instrument Schedule. The clock table events could, for example, be used to start a shutdown run at 5:00 p.m. every day. page 106See the Advanced Operation Manual for details.

[**Seq Control**] Starts, stops, pauses, or resumes a sequence, or views the status of a sequence. See "Loading, Storing, and Running Sequences from the Software Keypad" on page 51.

# Keypad Functionality When the GC Is Controlled by an Agilent Data System

When an Agilent data system controls the GC, the data system defines the setpoints and runs the samples. The **Remote** indicator on the software keypad lights when a data system is controlling the GC.

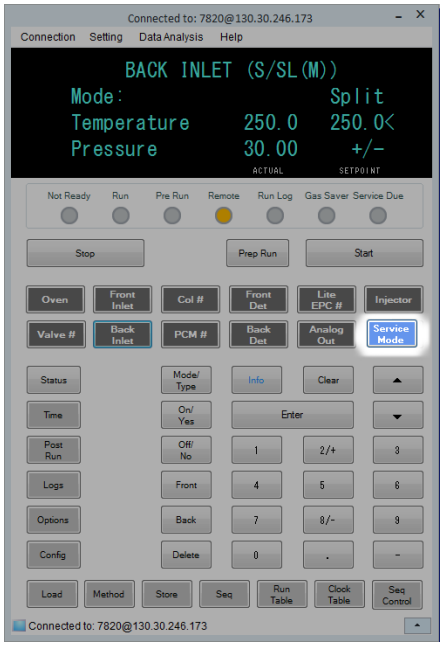
**CAUTION** Using the software keypad to change setpoints when a data system controls the GC can cause erroneous data. When using the software keypad, the GC does not automatically communicate setpoint changes to the connected data system.

When an Agilent data system controls the GC, the software keypad should be used:

- To view run status by selecting [**Status**]
- To view the method settings by selecting the GC component key
- To display the last and next run times, the run time remaining, and the post-run time remaining by repeatedly selecting [**Time**]
- To abort a run by selecting [**Stop**]
- To find which computer is controlling the GC by pressing **[Options] > Communication**, then scrolling. The name of the computer controlling the GC is listed after the **Enable DHCP** setting, along with the number of hosts connected to the GC.

Pressing [**Stop**] during a GC run immediately ends the run. The data system may retain the data already collected, but no further data is collected for that sample. Agilent data systems may allow the next run to begin, depending on the data system and its settings for handling errors.

# The Service Mode Key

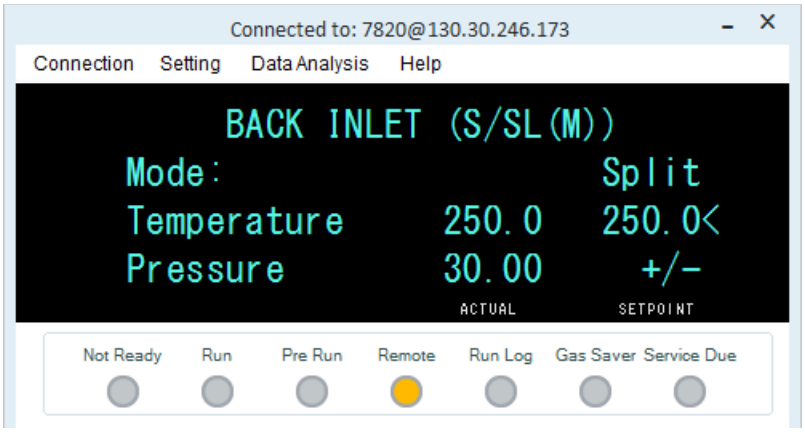



[**Service Mode**] Is used to access maintenance functions and settings, service counters, and diagnostics for the GC. See the Advanced Operation Manual for details.

# About GC Status in the Software Keypad

When the GC is ready to begin a run, the display screen shows **STATUS Ready for Injection**. Alternately, when a component of the GC is not ready to begin a run, the **Not Ready** indicator on the software keypad is lit. Press [**Status**] to see a message explaining why the GC is not ready.

## Indicators




A lit indicator means:

- The current progress of a run (**Pre Run** or **Run**).
- Items which may require attention (**Not Ready**, **Service Due**, and **Run Log**).
- The GC is controlled by an Agilent data system (**Remote**).
- The GC is in gas saver mode (**Gas Saver**).

## Error conditions

If a problem occurs, a status message appears. If the message indicates broken hardware, more information may be available. Press the applicable component key (for example, **Front Det**, **Oven**, or **Front Inlet**).

## Blinking setpoint

If the system shuts down a gas flow or the oven, **Off** will blink on the appropriate line of the component's parameter listing.

If there is a detector pneumatics shutdown or failure in another part of the detector, the detector **On/Off** line of the detector's parameter list blinks.

For any flow or pressure parameter, and for oven temperature, go to the blinking parameter, then press [**Off/No**] to clear the fault. Resolve the problem if possible, then press [**On/Yes**] on the parameter to use it again. If the problem is not fixed, the fault will recur.

If the shutdown includes safety concerns, for example a shutdown for hydrogen carrier gas flow, you must power cycle the GC. See the Troubleshooting manual for more information.

# About Logs

Two logs are accessible from the keypad: the run log and the system event log. To access the logs, press **[Logs]** then scroll to the desired log and press [**Enter**]. The display will indicate the number of entries the log contains. Scroll through the list.

## Run log

The run log is cleared at the start of each new run. During the run, any deviations from the planned method (including keypad intervention) are listed in the run log table. When the run log contains entries, the **Run Log** indicator lights.

## System event log

The system event log records significant events during the GC's operation. Some of the events also appear in the run log if they are in effect during a run.

# 4 Running a Method or a Sequence from the Software Keypad



This section explains how to load, store, and run a method or sequence using the software keypad, without the use of an Agilent data system. The keypad can be used to select and run a method or automated sequence stored in the GC and run it. In this case, the data generated from the run is normally sent to an integrator for the data analysis report.

For information on creating a method or sequence using keypad entry, see Chapter 5, “Methods and Sequences."

# Loading, Storing, and Running Methods from the Software Keypad

## To manually inject a sample with a syringe and start a run

1. Prepare the sample syringe for injection.
2. Load the desired method. (See "To load a method".)
3. Press **[Prep Run]**.
4. Wait for **STATUS Ready for Injection** to be displayed.
5. Insert the syringe needle through the septum and all the way into the inlet.
6. Simultaneously depress the syringe plunger to inject the sample and press **[Start]**.

## To run a method to process a single ALS sample

1. Prepare the sample for injection.
2. Load the sample vial into the assigned location in the ALS turret.
3. Load the desired method. (See "To load a method".)
4. Press **[Start]** on the GC keypad to initiate the ALS syringe cleaning, sample loading, and sample injection method. After the sample is loaded into the syringe, the sample is automatically injected when the GC reaches the ready state.

## To abort a method

1. Press **[Stop]**.
2. When you are ready to resume running analyses, load the appropriate sequence or method. (See "To load a method" or "To load a stored sequence".)

# Loading, Storing, and Running Sequences from the Software Keypad

A sequence can specify up to five subsequences to be run, as well as post-run sequences, if defined. Each sequence is stored as a number (from 1 to 9).

## To start running a sequence

1 Load the sequence. (See "To load a stored sequence".)

2 Press **[Seq Control]**.

3 Verify the status of the sequence:

- **Running**—the sequence is running
- **Ready/wait**—the instrument is not ready (due to oven temperature, equilibration times, and so forth.)
- **Paused**—the sequence is paused
- **Stopped**—proceed to step 4
- **Aborted**—the sequence stopped without waiting for the run to finish (See "Aborting a sequence".)
- **No sequence**—the sequence is off or not defined

4 Scroll to the **Start sequence** line and press **[Enter]** to change the status to **Running**.

The **Run** indicator will light and stay lit until the sequence is completed. The sequence continues to run until all subsequences are executed or until the sequence is aborted.

### Ready wait

If a sequence is started but the instrument is not ready (due to oven temperature, equilibration times, and so forth), the sequence will not start until all instrument setpoints are ready.

## To pause a running sequence

1 Press **[Seq Control]**.

2 Scroll to **Pause sequence** and press **[Enter]**.

The sequence stops when the current sample run is complete. The sequence status changes to **paused**, and you are given the option to resume or stop the paused sequence.

## To resume a paused sequence

1 Press **[Seq Control]**.

2 Scroll to **Resume sequence** and press **[Enter]**.

The sequence resumes with the next sample.

## To stop a running sequence

1 Press **[Seq Control]**.

2 Scroll to **Stop sequence** and press **[Enter]**.

The sequence stops at the end of the currently running subsequence unless **[Seq] > Repeat sequence** is **On**.A stopped sequence can only be restarted from the beginning.

## To resume a stopped sequence

1 Press **[Seq Control]**.

2 Scroll to **Resume sequence** and press **[Enter]**.

The sequence restarts from the beginning of the sequence.

## Aborting a sequence

When a sequence is aborted, it stops immediately without waiting for the current run to finish.

The following will cause a sequence to abort:

- The **[Stop]** key is pressed.
- A sampler error occurs, producing an error message.
- The GC detects a configuration mismatch during a method load.
- A running sequence tries to load a method that doesn't exist.
- The sampler is turned off. You can correct the problem and then resume the sequence. The aborted sample run will be repeated.

## To resume an aborted sequence

1 Correct the problem. (See "Aborting a sequence".)

2 Press **[Seq Control]**.

3 Scroll to **Resume sequence** and press **[Enter]**.

The aborted sample run will be repeated.

# 5
# Methods and Sequences

## What Is a Method?

A method is the group of settings required to analyze a specific sample.

Since every type of sample reacts differently in the GC—some samples require a higher oven temperature, others require a lower gas pressure or a different detector—a unique method must be created for each specific type of analysis.

## What Is Saved in a Method?

Some of the settings saved in a method define how the sample will be processed when the method is used. Examples of method settings include:

**NOTE** For GCs equipped with EPR (electronic pneumatics regulation), detector, column, and inlet flows are not saved with the method.

- The oven temperature program
- The type of carrier gas and flows
- The type of detector and flows
- The type of inlet and flows
- The type of column
- The length of time to process a sample

Data analysis and reporting parameters are also stored in a method when it is created on an Agilent data system, for example Agilent OpenLAB CDS EZChrom Compact. These parameters describe how to interpret the chromatogram generated by the sample and what type of report to print.

See the Advanced Operation Manual for more details on what can be included in a method.

## What Happens When You Load a Method?

There are two kinds of methods:

- **The active method**—This is sometimes referred to as the current method. The settings defined in this method are the settings the GC is currently maintaining.
- **Stored methods**—Up to 9 user-created methods can be stored in the GC, along with a default method.

For EPC (electronic pneumatics control) equipped GCs, **when a method is loaded** from the GC or Agilent data system, the setpoints of the active method are immediately replaced with the setpoints of the method loaded.

For EPR (electronic pneumatics regulation) equipped GCs, **when a method is loaded** from the GC or Agilent data system, the manually set parameters **are not** replaced with the setpoints of the method loaded.

- The method loaded becomes the active (current) method.
- The **Not Ready** light will stay lit until the GC reaches all of the settings specified by the method that was just loaded.

Refer to "Running a Method or a Sequence from the Software Keypad for details on using the keypad to load, modify, and save methods.

# Creating Methods

A method is the group of setpoints needed to run a single sample on the GC, such as oven temperature programs, pressure programs, inlet temperatures, sampler parameters, and so forth. A method is created by saving a group of setpoints as a numbered method using the **[Store]** key.

Components for which setpoint parameters can be stored are shown in Table 2.

**Table 2** Setpoint parameter components

| Component | Component |
|---|---|
| Oven | Analog Out |
| Valve 1–2 | Front and back injector (see the ALS operating manual) |
| Front and back inlet | Aux temp |
| Columns 1 to 4 | Post run |
| Front and back detector | Run table |

The GC also saves ALS setpoints.

- See the 7693A Installation, Operation, and Maintenance manual for details on its setpoints.
- See 7650 Installation, Operation, and Maintenance manual for details on its setpoints.

Current setpoint parameters are saved when the GC is turned off, and loaded when you turn the instrument back on.

## To program a method

1. Individually select each component for which setpoint parameters are appropriate for your method. (See Table 2.)
2. Examine the current setpoints and modify as desired. Repeat for each component as appropriate.
3. Examine the current setpoints for the ALS, if appropriate, and modify as desired.
4. Save the setpoints as a stored method. (See "To store a method" on page 57.)

## To load a method

1 Press **[Load]**.

2 Press **[Method]**.

3 Enter the number of the method to be loaded (1 through 9).

4 Press **[On/Yes]** to load the method and replace the active method. Alternatively, press **[Off/No]** to return to the stored methods list without loading the method.

## To store a method

1 Ensure that the proper parameters are set.

2 Press [**Method**].

3 Scroll to the method to store, then press [**Enter**].

4 Press [**On/Yes**] to store the method and replace the active method. Alternatively, press **[Off/No]** to return to the stored methods list without storing the method.

## Method mismatch

This section applies *only* to a standalone (not connected to a data system) GC. When a data system, such as OpenLAB CDS or MassHunter, controls the GC, methods are stored in the data system and can be edited there. See your data system documentation for more information.

Suppose your standalone GC is equipped with a single FID. You have created and saved methods that use this detector. Now you remove the FID and install a TCD in its place. When you try to load one of your stored methods, you observe an error message saying that the method and the hardware do not match.

The problem is that the actual hardware is no longer the same as the hardware configuration saved in the method. The method cannot run because it does not know how to operate the recently-added TCD.

On inspecting the method, you find that the detector-related parameters have all been reset to the default values.

Method mismatch occurs only for electronic devices in the GC, such as inlets, detectors, and EPC modules. The GC does generate a mismatch for consumables such as columns, liners, and syringes.

### Correcting a method mismatch on a standalone GC

This problem can be avoided if you follow this procedure for any hardware change, even including the simple replacement of a defective detector board.

1. Before changing any hardware, press **[Config][hardware module]**, where **[hardware module]** is the device you intend to replace, for example, [**Config**][**Front Detector**].
2. Press **[Mode/Type]**. Select **Remove module** and press **[Enter]**. The module is now **Unconfigured**.
3. Turn the GC off.
4. Make the hardware change that you intended (in this example, remove the FID and its flow module and replace them with the TCD and its module).
5. Turn the GC on. Press **[Config][hardware module]**, for example, [**Config**][**Front Detector**]
6. Press **[Mode/Type]**. Select **Install module** and press **[Enter]**. The GC will install the new hardware module, which corrects the active method (but not the stored one!).
7. Save the corrected method using the same number (which overwrites the stored method) or a new number (which leave the original method unchanged).

## What Is a Sequence?

A sequence is a list of samples to be analyzed along with the method to be used for each analysis.

Refer to "Running a Method or a Sequence from the Software Keypad" and "Creating Sequences" for details on how to create, load, modify, and save sequences using the keypad.

## Creating Sequences

A sequence specifies the samples to be run and the stored method to be used for each. The sequence is divided into a priority sequence (ALS only), subsequences (each of which uses a single method), and post-sequence events

- **Priority sequence** — allows you to interrupt a running ALS or valve sequence to analyze urgent samples. (See "About the priority sequence" on page 60.)
- **Subsequences** — contain the stored method number and information that defines a set of vials (or valve positions) to be analyzed using a particular method. Sampler and/or valve subsequences can be used in the same sequence.
- **Post sequence** — names a method to be loaded and run after the last run in the last subsequence. Specifies whether the sequence is to be repeated indefinitely or halted after the last subsequence.

Samples in each subsequence are specified as either ALS locations or sampling valve positions (gas sampling valves).

Nine sequences with up to two subsequences each can be stored.

## About the priority sequence

The priority sequence consists of a single sampler or valve subsequence and a special **Use priority** parameter, which can be activated at any time, even when a sequence is running. This feature allows you to interrupt a running sequence without having to edit it.

If **Use priority** is **On**, then:

1. The GC and ALS complete the current run, then the sequence pauses.
2. The GC runs the priority sequence.
3. The GC resets the **Use priority** parameter to **Off**.
4. The main sequence resumes where it paused.

## To program a sequence

1. Press **[Seq]**. (Press again, if necessary, to display subsequence information.)
2. Create a priority sequence, if desired. (See "To program a priority sequence" on page 61.) If you might want to use a priority sequence, you must program it now. (Once the sequence starts, you cannot edit it without stopping it.)
3. Scroll to the **Method #** line of **Subseq 1** and enter a method number. Use **1** to **9** for the stored methods, **0** for the currently active method, or **[Off/No]** to end the sequence.
4. Press **[Mode/Type]** to select a valve or injector type. (See "To program a valve subsequence" on page 62 or "To program an ALS subsequence" on page 61.)
5. Create the next subsequence or scroll to **Post Sequence**. (See "To program post sequence events" on page 62.)
6. Save the completed sequence. (See "To store a sequence" on page 62.)

## To program a priority sequence

1 Press **[Seq]**. (Press again, if necessary, to display subsequence information.)

2 Scroll to **Priority Method #** and enter a method number. Use **1** to **9** for the stored methods, **0** for the currently active method, or **[Off/No]** to end the sequence. Press **[Enter]**.

The active method, 0, will change during the sequence if the subsequences use stored methods. Therefore, method 0 should be chosen for the priority sequence only if all subsequences use method 0.

3 Press **[Mode/Type]** and select the injector type.

4 Program the ALS subsequence. (See "To program an ALS subsequence" on page 61.)

5 Store the completed sequence. (See "To store a sequence" on page 62.)

Once a priority subsequence exists in a sequence, you can activate it when the urgent samples are ready to be processed by:

1 Press **[Seq]**. (Press again, if necessary, to display subsequence information.)

2 Scroll to **Use Priority** and press **[On/Yes]**.

When the priority samples are completed, the normal sequence resumes.

## To program an ALS subsequence

1 See step 1 through step 3 of "To program a sequence" on page 60.

2 Press **[Mode/Type]** and select the injector type.

3 Enter injector sequence parameters:

- **Number of Injections/vial**—the number of repeat runs from each vial. Enter **0** if no samples are to be injected. For example, you could enter **0** to perform a blank (no injection) run to clean the system after running a dirty sample.
- **Samples**—the range (first–last) of sample vials to be analyzed.

4 Proceed with step 5 of "To program a sequence" on page 60.

## To program a valve subsequence

1. See step 1 through step 3 of "To program a sequence" on page 60.
2. Press **[Mode/Type]** and select **Valve**.
3. Enter the valve sequence parameters :
   - **#inj/position**—number of injections at each position (0–99)
   - **Position rng**—first–last valve positions to sample (1–32)
   - **Times thru range**—number of times to repeat the range (1–99)
   - **# injections**—number of injections for each sample
4. Proceed with step 5 of "To program a sequence" on page 60.

## To program post sequence events

1. See step 1 through step 4 of "To program a sequence" on page 60.
2. Scroll to the **Method #** line of **Post Sequence** and enter a method number. Use **1** to **9** for the stored methods, or **0** if there is no method to be loaded (keep the active method loaded).
3. Press **[On/Yes]** at **Repeat sequence** to keep repeating the sequence (useful for valve sequences). Otherwise, press **[Off/No]** to halt the sequence when all subsequences are finished.

## To store a sequence

1. Press **[Store][Seq]**.
2. Enter an identifying number for the sequence (1–9).
3. Press **[On/Yes]** to store the sequence. Alternatively, press **[Off/No]** to cancel.

   A message is displayed if a sequence with the number you selected already exists.

   - Press **[On/Yes]** to replace the existing sequence or **[Off/No]** to cancel.

Sequences can also be stored from within the stored sequence list (**[Seq]**) by scrolling to the appropriate sequence number and pressing the **[Store]** key.

### To load a stored sequence

1 Press **[Load][Seq]**.

2 Enter the number of the sequence to be loaded (1–9).

3 Press **[On/Yes]** to load the sequence or **[Off/No]** to cancel the load.

An error message is displayed if the specified sequence number has not been stored.

### To determine sequence status

Press **[Seq Control]** to display the current status of the active sequence. There are six possible sequence status modes:

- Start/running
- Ready wait
- Paused/resume
- Stopped
- Aborted
- No sequence

## Automating Data Analysis, Method Development, and Sequence Development

The output of the detectors is digitized and can be sent to an automated data analysis system (such as Agilent OpenLAB CDS), where it is analyzed and the results summarized in reports.

The Agilent data system also can be used to create and store methods and sequences that are sent to the GC through a network.

# Recoverable Errors

Some types of errors, such as an ALS missing vial error or a headspace sampler vial size mismatch, may not always justify stopping an entire sequence. These errors are called *recoverable errors*, since you may be able to recover from them and continue running a sequence, if desired. Agilent data systems now provide features to allow you to control how the system will react to these types of errors. When using an Agilent data system, the data system will now control whether or not the sequence pauses, aborts completely, continues with the next sample, and so on, for each type of recoverable error.

Note that the data system only controls what happens to the *next* run in the sequence, not the *current* run, except when set to immediately abort. (In that case, the data system typically aborts the current run and the sequence.)

For example, pressing [**Stop**] on the GC always halts the current run. However, the data systems can allow you to choose whether to continue with the next run or to pause or to abort the whole sequence.

For details on how this feature works in your data system, refer to its help and documentation.

# 6
# Chromatographic Checkout



This section described the general procedure for verifying performance against the original factory standards. The checkout procedures described here assume a GC that has been in use for some period of time. Therefore the procedures ask that you perform bakeouts, replace consumable hardware, install the checkout column, and so forth. For a new GC installation, refer to Installation and First Startup manual for the steps you can skip in this case.

# About Chromatographic Checkout

The tests described in this section provide basic confirmation that the GC and detector can perform comparably to factory condition. However, as detectors and the other parts of the GC age, detector performance can change. The results presented here represent typical outputs for typical operating conditions and are not specifications.

The tests assume the following:

- Use of an automatic liquid sampler. If not available, use a suitable manual syringe instead of the syringe listed.
- Use of a 10-µL syringe in most cases. However, a 5-µL syringe is an acceptable substitute.
- Use of the septa and other hardware (liners, jets, adapters, and so forth) described. If you substitute other hardware, performance can vary.

# To Prepare for Chromatographic Checkout

Because of the differences in chromatographic performance associated with different consumables, Agilent strongly recommends using the parts listed here for all checkout tests. Agilent also recommends installing new consumable parts whenever the quality of the installed ones is not known. For example, installing a new liner and septum ensures that they will not contribute any contamination to the results.

When the GC is delivered from the factory, these consumable parts are new and do not need replacement.

**NOTE** For a new GC, check the installed inlet liner. The liner shipped in the inlet may not be the liner recommended for checkout.

1 Check the indicators/dates on any gas supply traps. Replace/recondition expended traps.

2 Install new consumable parts for the inlet and prepare the correct injector syringe (and needle, as needed).

**Table 3** Recommended parts for checkout by inlet type

| Recommended part for checkout | Part number |
|---|---|
| **Split splitless inlet** | |
| Syringe, 10-µL | 5181-1267 |
| O-ring | 5188-5365 |
| Septum | 5183-4757 |
| Liner | 5062-3587 or 5181-3316 |
| **Purged packed column inlet** | |
| Syringe, 10-µL | 5181-1267 |
| O-ring | 5080-8898 |
| Septum | 5183-4757 |
| **Packed column inlet** | |
| Syringe, 10-µL | 5181-1267 |
| O-ring | 5080-8898 |
| Septum | 5183-4757 |

**Table 3** Recommended parts for checkout by inlet type (continued)

| Recommended part for checkout | Part number |
|---|---|
| **Cool on-column inlet** | |
| Septum | 5183-4758 |
| Septum nut | 19245-80521 |
| Syringe, 5-µL on-column | 5182-0836 |
| 0.32-mm needle for 5-µL syringe | 5182-0831 |
| 7693A ALS: Needle support insert, COC | G4513-40529 |
| Insert, fused silica, 0.32-mm id | 19245-20525 |

# To Check FID Performance

FID performance is checked differently depending on the inlet being used. For GCs equipped with a packed column inlet (PCI), use "To check FID performance with a packed column inlet (PCI)". For all other inlet types, use "To check FID performance with a purged packed, split splitless or cool-on column inlet" on page 73.

## To check FID performance with a packed column inlet (PCI)

1 Gather the following:
   - Evaluation column, 10% OV-101, 5 ft, OD 1/8, ID 2 mm (G3591-81093)
   - FID MDL sample (5188-5953)
   - Chromatographic-grade isooctane
   - 4-mL solvent and waste bottles or equivalent for autoinjector
   - 2-mL sample vials or equivalent for sample
   - Inlet and injector hardware (See "To Prepare for Chromatographic Checkout.")

2 Verify the following:
   - Packed column jet installed. If not, select and install a packed column jet.
   - Packed column adapter installed (adaptable FID only). If not, install it.
   - Chromatographic-grade gases plumbed and configured: helium as carrier gas, nitrogen, hydrogen, and air.
   - Empty waste vials loaded in sample turret.
   - 4-mL solvent vial with diffusion cap filled with isooctane and inserted in Solvent A injector position.

3 Replace consumable parts (liner, septum, traps, syringe, and so forth) as needed for the checkout. See "To Prepare for Chromatographic Checkout."

4 Install the evaluation column. (See the procedure for the PCI in the Maintenance manual.)
   - Bake out the evaluation column for at least 30 min at 180 °C. (See the procedure for the PCI in the Maintenance manual.)
   - Be sure to configure the column.

5 Check the FID baseline output. The output should be between 5 pA and 20 pA and relatively stable. (If using a gas generator or ultra pure gas, the signal may stabilize below 5 pA.) If the output is outside this range or unstable, resolve this problem before continuing.

6 If the output is too low:

- Check that the electrometer is on.
- Check that the flame is lit.
- Check that the signal is set to the correct detector.

7 Create or load a method with the parameter values listed in Table 4.

**Table 4** FID Checkout Conditions - Packed Column Inlet

| | |
|---|---|
| **Column and sample** | |
| Type | 10% OV-101, 5 ft, OD 1/8, ID 2 mm (G3591-81093) |
| Sample | FID MDL sample (5188-5953) |
| Column flow | 20 mL/min |
| Column mode | Flow mode |
| **Packed column inlet** | |
| Temperature | 250 °C |
| **Detector** | |
| Temperature | 300 °C |
| H2 flow | 30 mL/min |
| Air flow | 400 mL/min |
| Makeup flow ($N_2$) | OFF |
| Mode | Constant makeup flow OFF |
| Flame | On |
| Lit offset | Typically 2 pA |
| **Oven** | |
| Constant temperature | 180 °C |
| Time | 15 min |
| **ALS settings (if installed)** | |
| Sample washes | 2 |
| Sample pumps | 6 |

**Table 4** FID Checkout Conditions (continued)- Packed Column Inlet

| | |
|---|---|
| Sample wash volume | 8 µL |
| Injection volume | 1 µL |
| Syringe size | 10 µL |
| Solvent A pre washes | 2 |
| Solvent A post washes | 2 |
| Solvent A wash volume | 8 µL |
| Injection mode (7693A) | Normal |
| Airgap Volume (7693A) | 0.20 |
| Viscosity delay | 0 |
| Inject Dispense Speed (7693A) | 6000 |
| Plunger speed (7683) | fast |
| PreInjection dwell | 0 |
| PostInjection dwell | 0 |
| **Manual injection** | |
| Injection volume | 1 µL |
| **Data system** | |
| Data rate | 5 Hz |

8 If using a data system, prepare the data system to perform one run using the loaded checkout method. Make sure that the data system will output a chromatogram.

   If not using a data system, create a one sample sequence using the GC keypad.

9 Start the run.

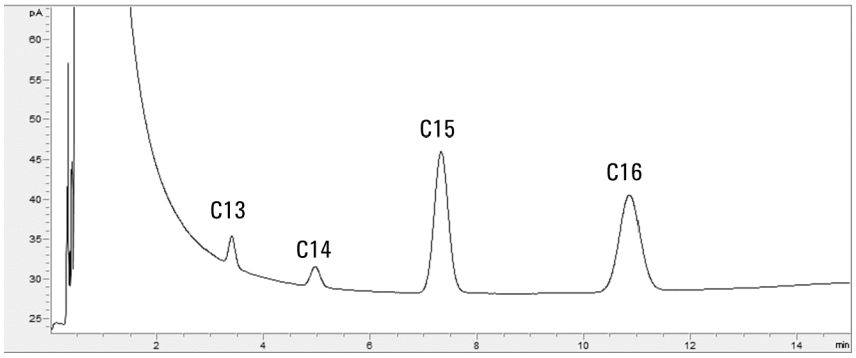
   If performing an injection using an autosampler, start the run using the data system or press **[Start]** on the GC.

   If performing a manual injection (with or without a data system):

   **a** Press **[Prep Run]** to prepare the inlet for splitless injection.

   **b** When the GC becomes ready, inject 1 µL of the checkout sample and press **[Start]** on the GC.

   **c** The following chromatogram shows typical results for a new detector with new consumable parts installed and nitrogen makeup gas.


pA
60
55
50
45
40
35
30
25
C13
C14
C15
C16
2
4
6
8
10
12
14
min

## To check FID performance with a purged packed, split splitless or cool-on column inlet

1 Gather the following:
   - Evaluation column, HP-5 30 m × 0.32 mm × 0.25 µm (19091J-413)
   - FID performance evaluation (checkout) sample (5188-5372)
   - Chromatographic-grade isooctane
   - 4-mL solvent and waste bottles or equivalent for autoinjector
   - 2-mL sample vials or equivalent for sample
   - Inlet and injector hardware (See "To Prepare for Chromatographic Checkout.")

2 Verify the following:
   - Capillary column jet installed. If not, select and install a capillary column jet.
   - Capillary column adapter installed (adaptable FID only). If not, install it.
   - Chromatographic-grade gases plumbed and configured: helium as carrier gas, nitrogen, hydrogen, and air.
   - Empty waste vials loaded in sample turret.
   - 4-mL solvent vial with diffusion cap filled with isooctane and inserted in Solvent A injector position.

3 Replace consumable parts (liner, septum, traps, syringe, and so forth) as needed for the checkout. See "To Prepare for Chromatographic Checkout."

4 Install the evaluation column. (See the procedure for the SS, PP, or COC in the Maintenance manual.)
   - Bake out the evaluation column for at least 30 min at 180 °C. (See the procedure for the SS, PP, or COC in the Maintenance manual.)
   - Be sure to configure the column.

5 Check the FID baseline output. The output should be between 5 pA and 20 pA and relatively stable. (If using a gas generator or ultra pure gas, the signal may stabilize below 5 pA.) If the output is outside this range or unstable, resolve this problem before continuing.

6 If the output is too low:
   - Check that the electrometer is on.

- Check that the flame is lit.
- Check that the signal is set to the correct detector.

7 Create or load a method with the parameter values listed in Table 5.

**Table 5** FID Checkout Conditions

| | |
|---|---|
| **Column and sample** | |
| Type | HP-5, 30 m × 0.32 mm × 0.25 µm (19091J-413) |
| Sample | FID checkout 5188-5372 |
| Column flow | 6.5 mL/min |
| Column mode | Constant flow for EPC equipped GCs. Constant pressure mode (30 psi) for EPR equipped GCs. |
| **Split/splitless inlet** | |
| Temperature | 250 °C |
| Mode | Splitless |
| Purge flow | 40 mL/min |
| Purge time | 0.5 min |
| Gas saver | Off |
| **Purged packed column inlet** | |
| Temperature | 250 °C |
| **Cool on-column inlet** | |
| Temperature | Oven Track |
| Septum purge | 15 mL/min |
| **Detector** | |
| Temperature | 300 °C |
| H2 flow | 30 mL/min |
| Air flow | 400 mL/min |
| Makeup flow (N2) | 25 mL/min |
| Lit offset | Typically 2 pA |
| **Oven** | |
| Initial temp | 75 °C |
| Initial time | 0.5 min |

**Table 5** FID Checkout Conditions (continued)

| | |
|---|---|
| Rate 1 | 20 °C/min |
| Final temp | 190 °C |
| Final time | 0 min |
| **ALS settings (if installed)** | |
| Sample washes | 2 |
| Sample pumps | 6 |
| Sample wash volume | 8 (maximum) |
| Injection volume | 1 µL |
| Syringe size | 10 µL |
| Solvent A pre washes | 2 |
| Solvent A post washes | 2 |
| Solvent A wash volume | 8 |
| Solvent B pre washes | 0 |
| Solvent B post washes | 0 |
| Solvent B wash volume | 0 |
| Injection mode (7693A) | Normal |
| Airgap Volume (7693A) | 0.20 |
| Viscosity delay | 0 |
| Inject Dispense Speed (7693A) | 6000 |
| PreInjection dwell | 0 |
| PostInjection dwell | 0 |
| **Manual injection** | |
| Injection volume | 1 µL |
| **Data system** | |
| Data rate | 5 Hz |

8 If using a data system, prepare the data system to perform one run using the loaded checkout method. Make sure that the data system will output a chromatogram.

   If not using a data system, create a one sample sequence using the GC keypad.

9 Start the run.

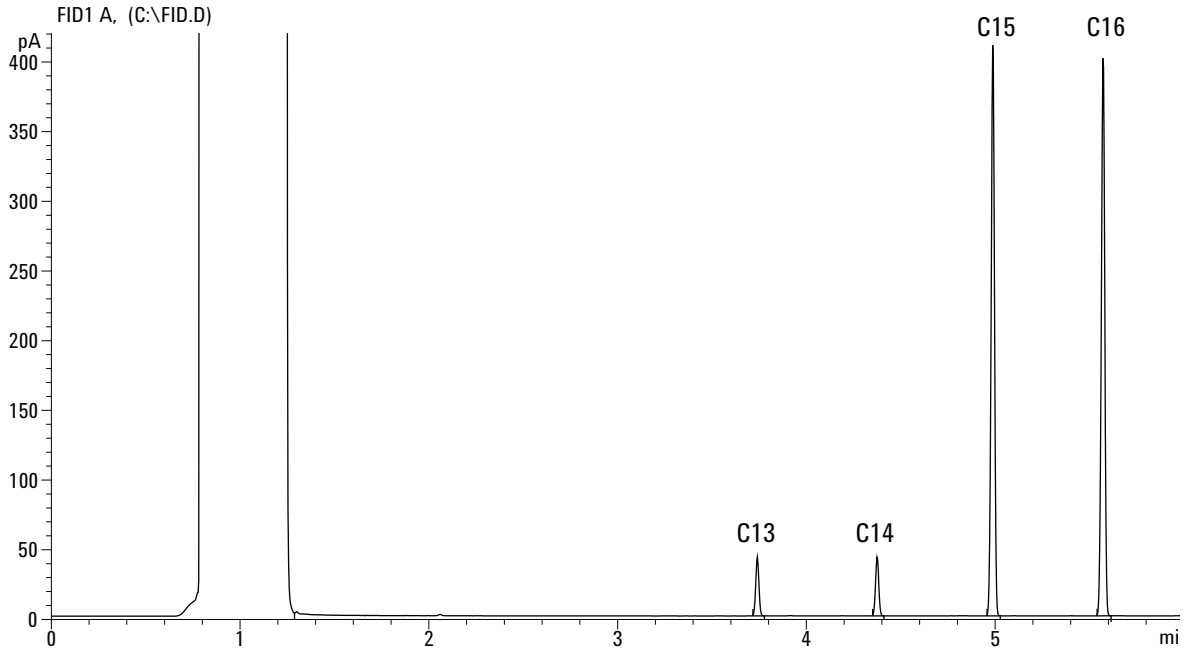
If performing an injection using an autosampler, start the run using the data system or press **[Start]** on the GC.

If performing a manual injection (with or without a data system):

**a** Press **[Prep Run]** to prepare the inlet for splitless injection.

**b** When the GC becomes ready, inject 1 µL of the checkout sample and press **[Start]** on the GC.

**c** The following chromatogram shows typical results for a new detector with new consumable parts installed and nitrogen makeup gas.



# To Check TCD Performance

TCD performance is checked differently depending on the inlet being used. For GCs equipped with a packed column inlet (PCI), use "To check TCD performance with a packed column inlet (PCI)". For all other inlet types, use "To check TCD performance with a purged packed, split splitless or cool-on column inlet" on page 81.

## To check TCD performance with a packed column inlet (PCI)

1 Gather the following:
   - Evaluation column, 10% OV-101, 5 ft, OD 1/8, ID 2 mm (G3591-81093)
   - FID/TCD performance evaluation (checkout) sample (18710-60170)
   - 4-mL solvent and waste bottles or equivalent for autoinjector
   - Chromatographic-grade hexane
   - 2-mL sample vials or equivalent for sample
   - Chromatographic-grade helium as carrier, makeup, and reference gas
   - Inlet and injector hardware (See "To Prepare for Chromatographic Checkout.")

2 Verify the following:
   - Chromatographic-grade gases plumbed and configured: helium as carrier gas and reference gas.
   - Empty waste vials loaded in sample turret.
   - 4-mL solvent vial with diffusion cap filled with hexane and inserted in Solvent A injector position.

3 Replace consumable parts (liner, septum, traps, syringe, and so forth) as needed for the checkout. See "To Prepare for Chromatographic Checkout."

4 Install the evaluation column. (See the procedure for the PCI in the Maintenance manual.)
   - Bake out the evaluation column for at least 30 min at 180 °C. (See the procedure for the PCI in the Maintenance manual.)
   - Configure the column

5 Create or load a method with the parameter values listed in Table 6.

**Table 6** TCD Checkout Conditions - Packed Column Inlet

| | |
|---|---|
| **Column and sample** | |
| Type | 10% OV-101, 5 ft, OD 1/8, ID 2 mm (G3591-81093) |
| Sample | FID/TCD checkout 18710-60170 |
| Column flow | 20 mL/min |
| Column mode | Flow mode |
| **Packed column inlet** | |
| Temperature | 250 °C |
| **Detector** | |
| Temperature | 300 °C |
| Reference flow (He) | 20 mL/min |
| Makeup flow (He) | OFF |
| Baseline output | < 30 display counts on Agilent OpenLAB CDS ChemStation Edition (< 750 µV) |
| **Oven** | |
| Constant temp | 180 °C |
| Time | 15 min |
| **ALS settings (if installed)** | |
| Sample washes | 2 |
| Sample pumps | 6 |
| Sample wash volume | 8 µL |
| Injection volume | 1 µL |
| Syringe size | 10 µL |
| Solvent A pre washes | 2 |
| Solvent A post washes | 2 |
| Solvent A wash volume | 8 µL |
| Injection mode (7693A) | Normal |
| Airgap Volume (7693A) | 0.20 |
| Viscosity delay | 0 |
| Inject Dispense Speed (7693A) | 6000 |
| Plunder speed (7683) | fast |

**Table 6** TCD Checkout Conditions (continued)- Packed Column Inlet

| | |
|---|---|
| PreInjection dwell | 0 |
| PostInjection dwell | 0 |
| **Manual injection** | |
| Injection volume | 2 µL |
| **Data system** | |
| Data rate | 5 Hz |

6 Display the signal output. A stable output at any value between 12.5 and 750 µV (inclusive) is acceptable.

- If the baseline output is < 0.5 display units (< 12.5 µV), verify that the detector filament is on. If the offset is still < 0.5 display units (< 12.5 µV), your detector requires service.
- If baseline output is > 30 display units (> 750 µV), there may be chemical contamination contributing to the signal. Bakeout the TCD. If repeated cleanings do not give an acceptable signal, check gas purity. Use higher purity gases and/or install traps.

7 If using a data system, prepare the data system to perform one run using the loaded checkout method. Make sure that the data system will output a chromatogram.

8 Start the run.

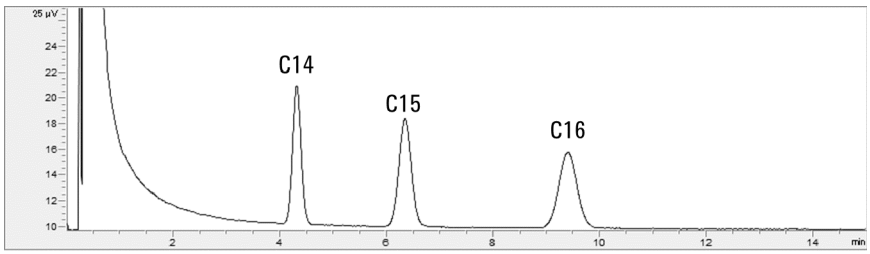
If performing an injection using an autosampler, start the run using the data system or press **[Start]** on the GC.

If performing a manual injection (with or without a data system):

**a** Press **[Prep Run]** to prepare the inlet for splitless injection.

**b** When the GC becomes ready, inject 1 µL of the checkout sample and press **[Start]** on the GC.

**c** The following chromatogram shows typical results for a new detector with new consumable parts installed.


25 µV
24
22
20
18
16
14
12
10
C14
C15
C16
2
4
6
8
10
12
14
min

## To check TCD performance with a purged packed, split splitless or cool-on column inlet

1 Gather the following:
   - Evaluation column, HP-5 30 m × 0.32 mm × 0.25 µm (19091J-413)
   - FID/TCD performance evaluation (checkout) sample (18710-60170)
   - 4-mL solvent and waste bottles or equivalent for autoinjector
   - Chromatographic-grade hexane
   - 2-mL sample vials or equivalent for sample
   - Chromatographic-grade helium as carrier, makeup, and reference gas
   - Inlet and injector hardware (See "To Prepare for Chromatographic Checkout.")

2 Verify the following:
   - Chromatographic-grade gases plumbed and configured: helium as carrier gas and reference gas.
   - Empty waste vials loaded in sample turret.
   - 4-mL solvent vial with diffusion cap filled with hexane and inserted in Solvent A injector position.

3 Replace consumable parts (liner, septum, traps, syringe, and so forth) as needed for the checkout. See "To Prepare for Chromatographic Checkout."

4 Install the evaluation column. (See the procedure for the SS, PP, or COC in the Maintenance manual.)
   - Bake out the evaluation column for at least 30 min at 180 °C. (See the procedure for the SS, PP, or COC in the Maintenance manual.)
   - Configure the column

5 Create or load a method with the parameter values listed in Table 7.

**Table 7** TCD Checkout Conditions

| **Column and sample** | |
|---|---|
| Type | HP-5, 30 m × 0.32 mm × 0.25 µm (19091J-413) |
| Sample | FID/TCD checkout 18710-60170 |

**Table 7** TCD Checkout Conditions (continued)

| | |
|---|---|
| Column flow | 6.5 mL/min |
| Column mode | Constant flow for EPC equipped GCs. Constant pressure mode (30 psi) for EPR equipped GCs. |
| **Split/splitless inlet** | |
| Temperature | 250 °C |
| Mode | Splitless |
| Purge flow | 60 mL/min |
| Purge time | 0.75 min |
| **Purged packed column inlet** | |
| Temperature | 250 °C |
| **Cool on-column inlet** | |
| Temperature | Oven track |
| Septum purge | 15 mL/min |
| **Detector** | |
| Temperature | 300 °C |
| Reference flow (He) | 20 mL/min |
| Makeup flow (He) | 2 mL/min |
| Baseline output | < 30 display counts on Agilent OpenLAB CDS ChemStation Edition (< 750 µV) |
| **Oven** | |
| Initial temp | 40 °C |
| **Initial time** | 0 min |
| Rate 1 | 20 °C/min |
| Final temp | 90 °C |
| Final time | 0 min |
| Rate 2 | 15 °C/min |
| Final temp | 170 °C |
| Final time | 0 min |
| **ALS settings (if installed)** | |
| Sample washes | 2 |
| Sample pumps | 6 |

**Table 7** TCD Checkout Conditions (continued)

| | |
|---|---|
| Sample wash volume | 8 (maximum) |
| Injection volume | 1 µL |
| Syringe size | 10 µL |
| Solvent A pre washes | 2 |
| Solvent A post washes | 2 |
| Solvent A wash volume | 8 |
| Solvent B pre washes | 0 |
| Solvent B post washes | 0 |
| Solvent B wash volume | 0 |
| Injection mode (7693A) | Normal |
| Airgap Volume (7693A) | 0.20 |
| Viscosity delay | 0 |
| Inject Dispense Speed (7693A) | 6000 |
| PreInjection dwell | 0 |
| PostInjection dwell | 0 |
| **Manual injection** | |
| Injection volume | 1 µL |
| **Data system** | |
| Data rate | 5 Hz |

6 Display the signal output. A stable output at any value between 12.5 and 750 µV (inclusive) is acceptable.

- If the baseline output is < 0.5 display units (< 12.5 µV), verify that the detector filament is on. If the offset is still < 0.5 display units (< 12.5 µV), your detector requires service.
- If baseline output is > 30 display units (> 750 µV), there may be chemical contamination contributing to the signal. Bakeout the TCD. If repeated cleanings do not give an acceptable signal, check gas purity. Use higher purity gases and/or install traps.

7 If using a data system, prepare the data system to perform one run using the loaded checkout method. Make sure that the data system will output a chromatogram.

8 Start the run.

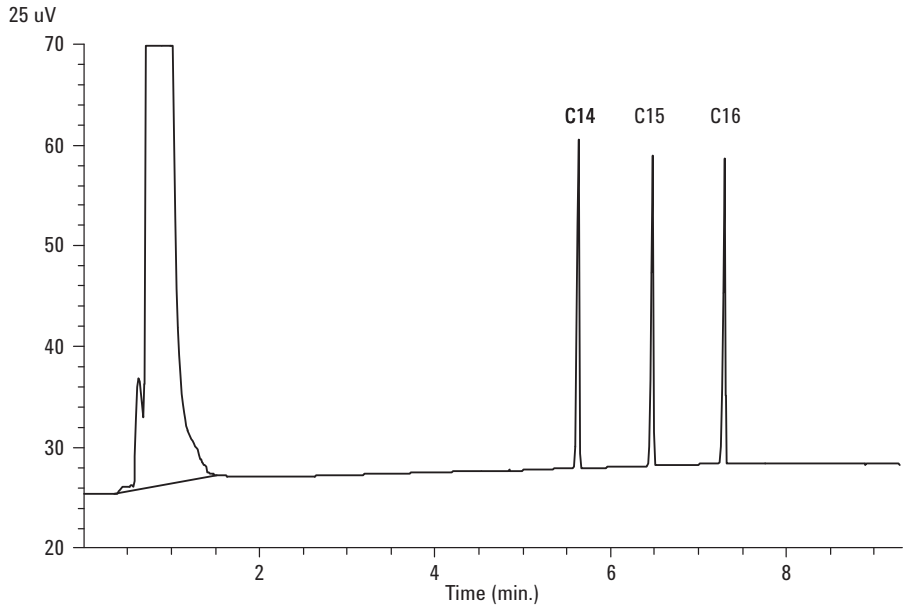
If performing an injection using an autosampler, start the run using the data system or press **[Start]** on the GC.

If performing a manual injection (with or without a data system):

**a** Press **[Prep Run]** to prepare the inlet for splitless injection.

**b** When the GC becomes ready, inject 1 µL of the checkout sample and press **[Start]** on the GC.

**c** The following chromatogram shows typical results for a new detector with new consumable parts installed.



## To Check NPD Performance

1 Gather the following:
   - Evaluation column, HP-5 30 m × 0.32 mm × 0.25 µm (19091J-413)
   - NPD performance evaluation (checkout) sample (18789-60060)
   - 4-mL solvent and waste bottles or equivalent for autoinjector.
   - Chromatographic-grade isooctane
   - 2-mL sample vials or equivalent for sample.
   - Inlet and injector hardware (See "To Prepare for Chromatographic Checkout.")
2 Verify the following:
   - Capillary column jet installed. If not, select and install a capillary column jet.
   - Capillary column adapter installed. If not, install it.
   - Chromatographic-grade gases plumbed and configured: helium as carrier gas, nitrogen, hydrogen, and air.
   - Empty waste vials loaded in sample turret.
   - 4-mL vial with diffusion cap filled with isooctane and inserted in Solvent A injector position.
3 Replace consumable parts (liner, septum, traps, syringe, and so forth) as needed for the checkout. See "To Prepare for Chromatographic Checkout."
4 If present, remove any protective caps from the inlet manifold vents.
5 Install the evaluation column. (See the procedure for the SS, PP, or COC in the Maintenance manual.)
   - Bake out the evaluation column for at least 30 min at 180 °C. (See the procedure for the SS, PP, or COC in the Maintenance manual.)
   - Be sure to configure the column
6 Create or load a method with the parameter values listed in Table 8.

**Table 8** NPD Checkout Conditions

| | |
|---|---|
| **Column and sample** | |
| Type | HP-5, 30 m × 0.32 mm × 0.25 µm (19091J-413) |
| Sample | NPD checkout 18789-60060 |
| Column mode | Constant flow |
| Column flow | 6.5 mL/min (helium) |
| **Split/splitless inlet** | |
| Temperature | 200 °C |
| Mode | Splitless |
| Purge flow | 60 mL/min |
| Purge time | 0.75 min |
| **Purged packed column inlet** | |
| Temperature | 200 °C |
| **Cool on-column inlet** | |
| Temperature | Oven track |
| Septum purge | 15 mL/min |
| **Detector** | |
| Temperature | 300 °C |
| H2 flow | 3 mL/min |
| Air flow | 60 mL/min |
| Makeup flow (N2) | Makeup + column = 10 mL/min |
| Output | 30 display units (30 pA) |
| **Oven** | |
| Initial temp | 60 °C |
| Initial time | 0 min |
| Rate 1 | 20 °C/min |
| Final temp | 200 °C |
| Final time | 3 min |
| **ALS settings (if installed)** | |
| Sample washes | 2 |
| Sample pumps | 6 |

**Table 8** NPD Checkout Conditions (continued)

| | |
|---|---|
| Sample wash volume | 8 (maximum) |
| Injection volume | 1 µL |
| Syringe size | 10 µL |
| Solvent A pre washes | 2 |
| Solvent A post washes | 2 |
| Solvent A wash volume | 8 |
| Solvent B pre washes | 0 |
| Solvent B post washes | 0 |
| Solvent B wash volume | 0 |
| Injection mode (7693A) | Normal |
| Airgap Volume (7693A) | 0.20 |
| Viscosity delay | 0 |
| Inject Dispense Speed (7693A) | 6000 |
| PreInjection dwell | 0 |
| PostInjection dwell | 0 |
| **Manual injection** | |
| Injection volume | 1 µL |
| **Data system** | |
| Data rate | 5 Hz |

7 If using a data system, prepare the data system to perform one run using the loaded checkout method. Make sure that the data system will output a chromatogram.

8 Start the run.

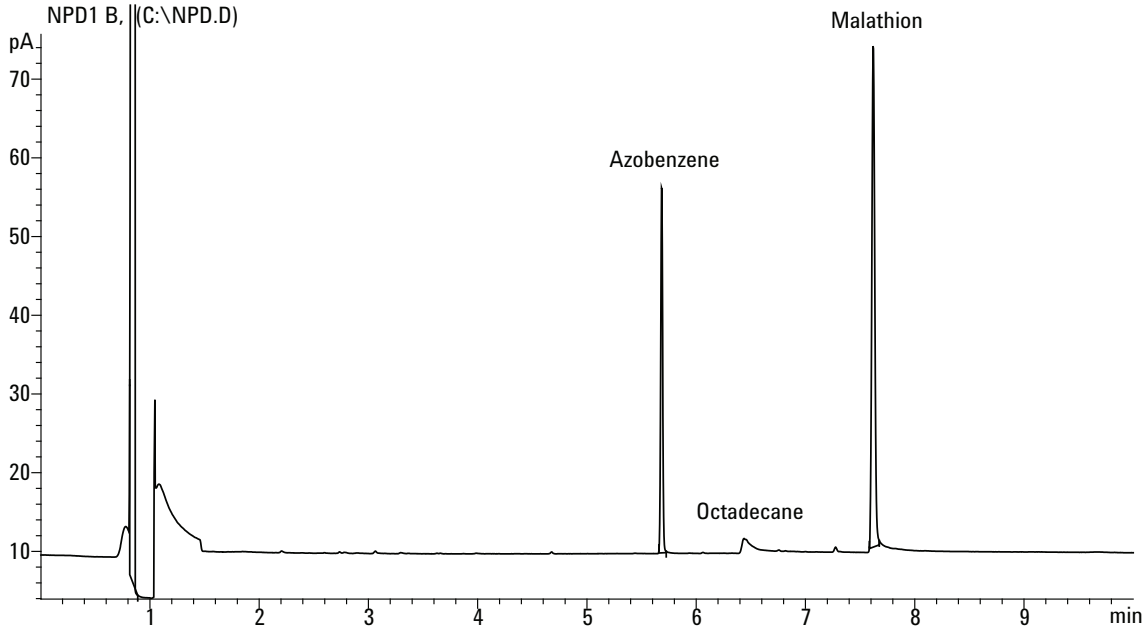
If performing an injection using an autosampler, start the run using the data system, or creating a one sample sequence and pressing **[Start]** on the GC.

If performing a manual injection (with or without a data system):

**a** Press **[Prep Run]** to prepare the inlet for splitless injection.

**b** When the GC becomes ready, inject 1 µL of the checkout sample and press **[Start]** on the GC.

**c** The following chromatogram shows typical results for a new detector with new consumable parts installed.



## To Check uECD Performance

1 Gather the following:
   - Evaluation column, HP-5 30 m × 0.32 mm × 0.25 µm (19091J-413)
   - uECD performance evaluation (checkout) sample (18713–60040, Japan: 5183-0379)
   - 4-mL solvent and waste bottles or equivalent for autoinjector.
   - Chromatographic-grade isooctane
   - 2-mL sample vials or equivalent for sample.
   - Inlet and injector hardware (See "To Prepare for Chromatographic Checkout.")

2 Verify the following:
   - Clean fused silica indented mixing liner installed. If not, install it.
   - Chromatographic-grade gases plumbed and configured: helium for carrier gas, nitrogen for makeup.
   - Empty waste vials loaded in sample turret.
   - 4-mL vial with diffusion cap filled with hexane and inserted in Solvent A injector position.

3 Replace consumable parts (liner, septum, traps, syringe, and so forth) as needed for the checkout. See "To Prepare for Chromatographic Checkout."

4 Install the evaluation column. (See the procedure for the SS, PP, or COC in the Maintenance manual.)
   - Bake out the evaluation column for at least 30 minutes at 180 °C. (See the procedure for the SS, PP, or COC in the Maintenance manual.)
   - Be sure to configure the column.

5 Display the signal output to determine baseline output. A stable baseline output at any value between 0.5 and 1000 Hz (OpenLAB CDS ChemStation Edition display units) (inclusive) is acceptable.
   - If the baseline output is < 0.5 Hz, verify that the electrometer is on. If the offset is still < 0.5 Hz, your detector requires service.

- If the baseline output is > 1000 Hz, there may be chemical contamination contributing to the signal. Bakeout the uECD. If repeated cleanings do not give an acceptable signal, check gas purity. Use higher purity gases and/or install traps.

6 Create or load a method with the parameter values listed in Table 9.

**Table 9** uECD Checkout Conditions

| | |
|---|---|
| **Column and sample** | |
| Type | HP-5, 30 m × 0.32 mm × 0.25 µm (19091J-413 |
| Sample | µECD checkout (18713-60040 or Japan: 5183-0379) |
| Column mode | Constant flow |
| Column flow | 6.5 mL/min (helium) |
| **Split/splitless inlet** | |
| Temperature | 200 °C |
| Mode | Splitless |
| Purge flow | 60 mL/min |
| Purge time | 0.75 min |
| **Purged packed column inlet** | |
| Temperature | 200 °C |
| **Cool on-column inlet** | |
| Temperature | Oven track |
| Septum purge | 15 mL/min |
| **Detector** | |
| Temperature | 300 °C |
| Makeup flow (N2) | 30 mL/min (constant + makeup) |
| Baseline output | Should be < 1000 display counts. In Agilent OpenLAB CDS ChemStation Edition (< 1000 Hz) |
| **Oven** | |
| Initial temp | 80 °C |
| Initial time | 0 min |
| Rate 1 | 15 °C/min |

**Table 9** uECD Checkout Conditions (continued)

| | |
|---|---|
| Final temp | 180 °C |
| Final time | 10 min |
| **ALS settings (if installed)** | |
| Sample washes | 2 |
| Sample pumps | 6 |
| Sample wash volume | 8 (maximum) |
| Injection volume | 1 µL |
| Syringe size | 10 µL |
| Solvent A pre washes | 2 |
| Solvent A post washes | 2 |
| Solvent A wash volume | 8 |
| Solvent B pre washes | 0 |
| Solvent B post washes | 0 |
| Solvent B wash volume | 0 |
| Injection mode (7693A) | Normal |
| Airgap Volume (7693A) | 0.20 |
| Viscosity delay | 0 |
| Inject Dispense Speed (7693A) | 6000 |
| PreInjection dwell | 0 |
| PostInjection dwell | 0 |
| **Manual injection** | |
| Injection volume | 1 µL |
| **Data system** | |
| Data rate | 5 Hz |

7 If using a data system, prepare the data system to perform one run using the loaded checkout method. Make sure that the data system will output a chromatogram.

8 Start the run.

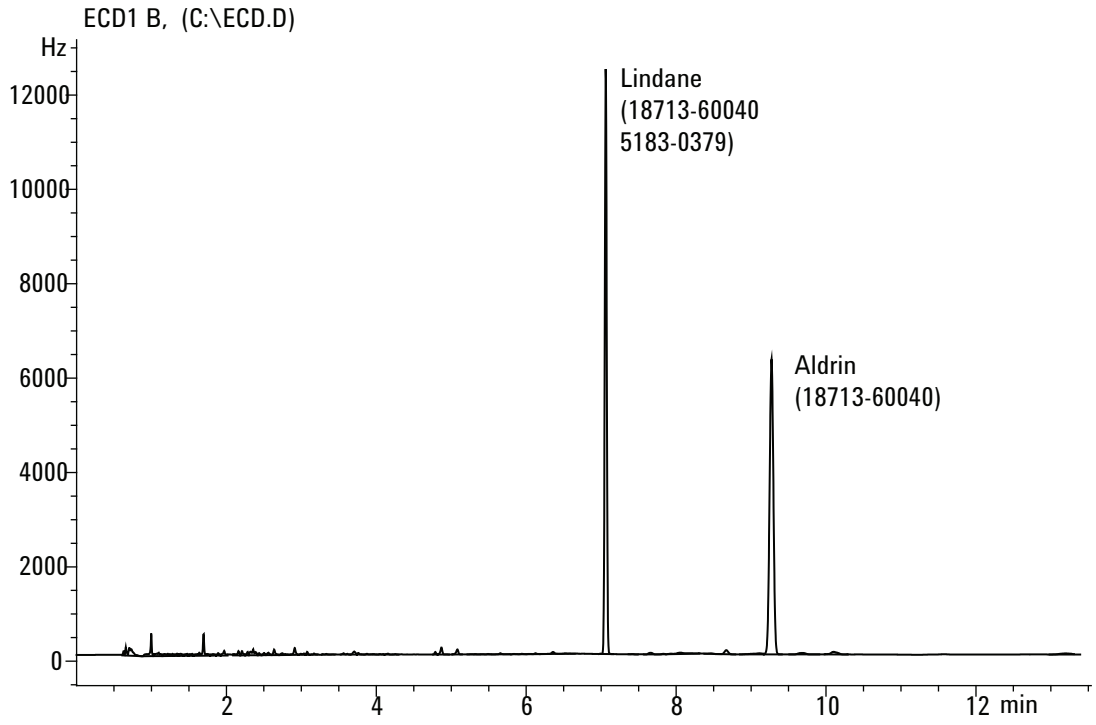
If performing an injection using an autosampler, start the run using the data system or press **[Start]** on the GC.

If performing a manual injection (with or without a data system):

**a** Press **[Prep Run]** to prepare the inlet for splitless injection.

**b** When the GC becomes ready, inject 1 µL of the checkout sample and press **[Start]** on the GC.

**9** The following chromatogram shows typical results for a new detector with new consumable parts installed. The Aldrin peak will be missing when using the Japanese sample 5183-0379.



# To Check FPD$^+$ Performance (Sample 5188-5953)

To check FPD$^+$ performance, first check the phosphorus performance, then the sulfur performance.

## Preparation

1 Gather the following:

- Evaluation column, HP-5 30 m × 0.32 mm × 0.25 µm (19091J-413)
- FPD performance evaluation (checkout) sample (5188-5953), 2.5 mg/L (± 0.5%) methylparathion in isooctane
- Phosphorus filter
- Sulfur filter and filter spacer
- 4-mL solvent and waste bottles or equivalent for autoinjector.
- 2-mL sample vials or equivalent for sample.
- Chromatographic-grade isooctane for syringe wash solvent.
- Inlet and injector hardware (See "To Prepare for Chromatographic Checkout.")

2 Verify the following:

- Capillary column adapter installed. If not, install it.
- Chromatographic-grade gases plumbed and configured: helium as carrier gas, nitrogen, hydrogen, and air.
- Empty waste vials loaded in sample turret.
- 4-mL vial with diffusion cap filled with isooctane and inserted in Solvent A injector position.

3 Replace consumable parts (liner, septum, traps, syringe, and so forth) as needed for the checkout. See "To Prepare for Chromatographic Checkout."

4 Verify that the **Lit Offset** is set appropriately. Typically, it should be about 2.0 pA for the checkout method.

5 Install the evaluation column. (See the procedure for the SS, PP, or COC in the Maintenance manual.)

- Set the oven, inlet, and detector to 250 °C and bake out for at least 15 minutes. (See the procedure for the SS, PP, or COC in the Maintenance manual.) Be sure to configure the column.

## Phosphorus performance

1 If it is not already installed, install the phosphorus filter.

2 Create or load a method with the parameter values listed in Table 10.

**Table 10** FPD$^+$ Checkout Conditions (P)

| | |
|---|---|
| **Column and sample** | |
| Type | HP-5, 30 m × 0.32 mm × 0.25 µm (19091J-413) |
| Sample | FPD checkout (5188-5953) |
| Column mode | Constant pressure |
| Column pressure | 25 psi |
| **Split/splitless inlet** | |
| Temperature | 200 °C Split/splitless |
| Mode | Splitless |
| Purge flow | 60 mL/min |
| Purge time | 0.75 min |
| **Purged packed column inlet** | |
| Temperature | 200 °C |
| **Cool on-column inlet** | |
| Temperature | Oven track |
| Septum purge | 15 mL/min |
| **Detector** | |
| Temperature | 200 °C (On) |
| Hydrogen flow | 60 mL/min (On) |
| Air (Oxidizer) flow | 60 mL/min (On) |
| Mode | Constant makeup flow OFF |
| Makeup flow | 60 mL/min (On) |
| Makeup gas type | Nitrogen |
| Flame | On |
| Lit offset | Typically 2 pA |
| PMT voltage | On |
| Emission Block | 125 °C |

**Table 10** FPD+ Checkout Conditions (continued)(P)

| | |
|---|---|
| **Oven** | |
| Initial temp | 70 °C |
| Initial time | 0 min |
| Rate 1 | 25 °C/min |
| Final temp 1 | 150 °C |
| Final time 1 | 0 min |
| Rate 2 | 5 °C/min |
| Final temp 2 | 190 °C |
| Final time 2 | 4 min |
| **ALS settings (if installed)** | |
| Sample washes | 2 |
| Sample pumps | 6 |
| Sample wash volume | 8 (maximum) |
| Injection volume | 1 µL |
| Syringe size | 10 µL |
| Solvent A pre washes | 2 |
| Solvent A post washes | 2 |
| Solvent A wash volume | 8 |
| Solvent B pre washes | 0 |
| Solvent B post washes | 0 |
| Solvent B wash volume | 0 |
| Injection mode (7693A) | Normal |
| Airgap Volume (7693A) | 0.20 |
| Viscosity delay | 0 |
| Inject Dispense Speed (7693A) | 6000 |
| PreInjection dwell | 0 |
| PostInjection dwell | 0 |
| **Manual injection** | |
| Injection volume | 1 µL |
| **Data system** | |
| Data rate | 5 Hz |

3 Ignite the FPD flame, if not lit.

4 Display the signal output and monitor. This output typically runs between 40 and 55 but can be as high as 70. Wait for the output to stabilize. This takes approximately 1 hour.

If the baseline output is too high:

- Check column installation. If installed too high, the stationary phase burns in the flame and increases measured output.
- Check for leaks.
- Bake out the detector and column at 250 °C.
- Wrong flows set for installed filter.

If the baseline output is zero, verify the electrometer is on and the flame is lit.

5 If using a data system, prepare the data system to perform one run using the loaded checkout method. Make sure that the data system will output a chromatogram.

6 Start the run.

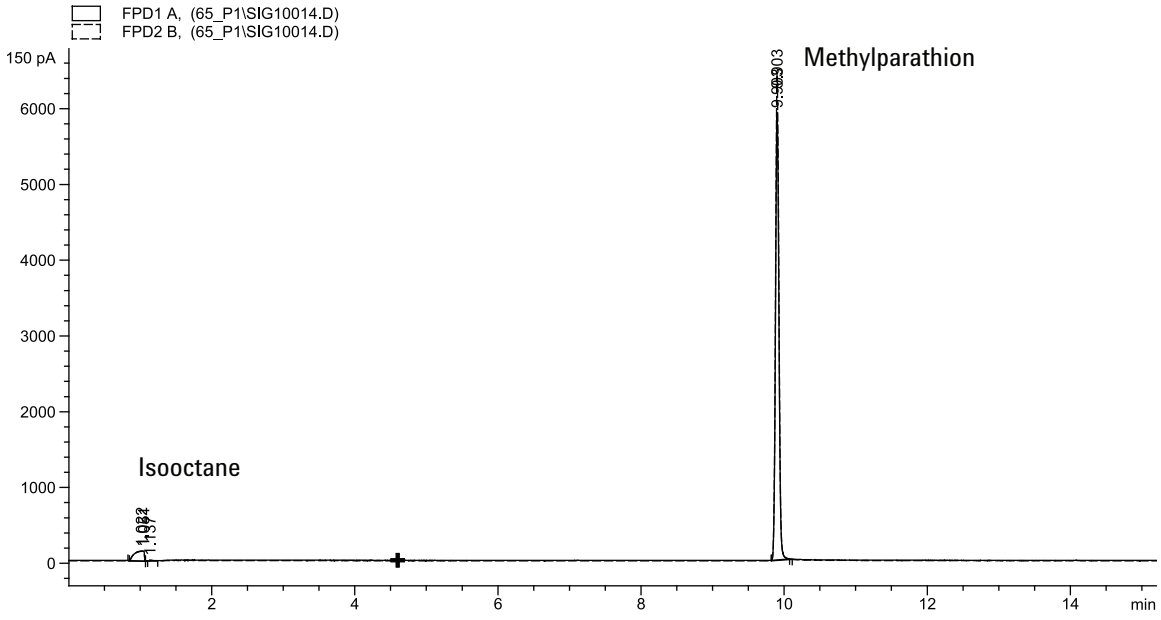
If performing an injection using an autosampler, start the run using the data system or press **[Start]** on the GC.

If performing a manual injection (with or without a data system):

a Press **[Prep Run]** to prepare the inlet for splitless injection.

b When the GC becomes ready, inject 1 µL of the checkout sample and press **[Start]** on the GC.

c The following chromatogram shows typical results for a new detector with new consumable parts installed.




## Sulfur performance

1 Install the sulfur filter and filter spacer.

2 Ignite the FPD flame if not lit.

3 Display the signal output and monitor. This output typically runs between 50 and 60 but can be as high as 70. Wait for the output to stabilize. This takes approximately 1 hour.

   If the baseline output is too high:

   - Check column installation. If installed too high, the stationery phase burns in the flame and increases measured output.
   - Check for leaks.
   - Bake out the detector and column at 250 °C.
   - Wrong flows set for installed filter.

   If the baseline output is zero, verify the electrometer is on and the flame is lit.

4 If using a data system, prepare the data system to perform one run using the loaded checkout method. Make sure that the data system will output a chromatogram.

5 Start the run.

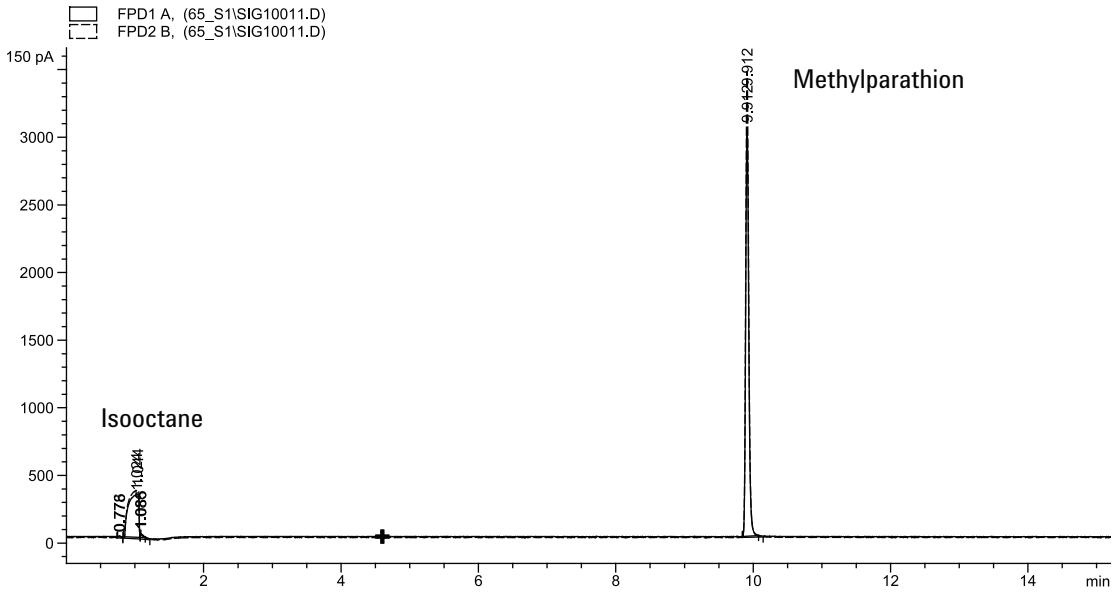
If performing an injection using an autosampler, start the run using the data system or press **[Start]** on the GC.

If performing a manual injection (with or without a data system):

**a** Press **[Prep Run]** to prepare the inlet for splitless injection.

**b** When the GC becomes ready, inject 1 µL of the checkout sample and press **[Start]** on the GC.

**6** The following chromatogram shows typical results for a new detector with new consumable parts installed.



# To Check FPD$^+$ Performance (Sample 5188-5245, Japan)

To verify FPD$^+$ performance, first check the phosphorus performance, then the sulfur performance.

## Preparation

1 Gather the following:

- Evaluation column, DB5 15 m × 0.32 mm × 1.0 µm (123-5513)
- FPD performance evaluation (checkout) sample (5188-5245, Japan), composition: n-Dodecane 7499 mg/L (± 5%), Dodecanethiol 2.0 mg/L (± 5%), Tributyl Phosphate 2.0 mg/L (± 5%), tert-Butyldisulfide 1.0 mg/L (± 5%), in isooctane as solvent
- Phosphorus filter
- Sulfur filter and filter spacer
- 4-mL solvent and waste bottles or equivalent for autoinjector.
- 2-mL sample vials or equivalent for sample.
- Chromatographic-grade isooctane for syringe wash solvent.
- Inlet and injector hardware (See "To Prepare for Chromatographic Checkout.")

2 Verify the following:

- Capillary column adapter installed. If not, install it.
- Chromatographic-grade gases plumbed and configured: helium as carrier gas, nitrogen, hydrogen, and air.
- Empty waste vials loaded in sample turret.
- 4-mL vial with diffusion cap filled with isooctane and inserted in Solvent A injector position.

3 Replace consumable parts (liner, septum, traps, syringe, and so forth) as needed for the checkout. See "To Prepare for Chromatographic Checkout."

4 Verify the lit offset is set appropriately. Typically, it should be about 2.0 pA for the checkout method.

5 Install the evaluation column. (See the procedure for the SS, PP, or COC in the Maintenance manual.)

- Set the oven, inlet, and detector to 250 °C and bake out for at least 15 minutes. (See the procedure for the SS, PP, or COC in the Maintenance manual.)
- Configure the column.

## Phosphorus performance

1 If it is not already installed, install the phosphorus filter.

2 Create or load a method with the parameter values listed in Table 11.

**Table 11** FPD$^+$ Phosphorus Checkout Conditions

| | |
|---|---|
| **Column and sample** | |
| Type | DB-5MS, 15 m × 0.32 mm × 1.0 µm (123-5513) |
| Sample | FPD checkout (5188-5245) |
| Column mode | Constant flow |
| Column flow | 7.5 mL/min |
| **Split/splitless inlet** | |
| Temperature | 250 °C |
| Mode | Splitless |
| Total purge flow | 69.5 mL/min |
| Purge flow | 60 mL/min |
| Purge time | 0.75 min |
| **Purged packed column inlet** | |
| Temperature | 250 °C |
| **Cool on-column inlet** | |
| Temperature | Oven track |
| Septum purge | 15 mL/min |
| **Detector** | |
| Temperature | 200 °C (On) |
| Hydrogen flow | 60.0 mL/min (On) |
| Air (oxidizer) flow | 60.0 mL/min (On) |
| Mode | Constant makeup flow Off |
| Makeup flow | 60.0 mL/min (On) |

**Table 11** FPD$^+$ Phosphorus Checkout Conditions (continued)

| | |
|---|---|
| Makeup gas type | Nitrogen |
| Flame | On |
| Lit offset | Typically 2 pA |
| PMT voltage | On |
| Emission Block | 125 °C |
| **Oven** | |
| Initial temp | 70 °C |
| Initial time | 0 min |
| Rate 1 | 10 °C/min |
| Final temp | 105 °C |
| Final time | 0 min |
| Rate 2 | 20 °C/min |
| Final temp 2 | 190 °C |
| Final time 2 | 7.25 min for sulfur<br>12.25 min for phosphorus |
| **ALS settings (if installed)** | |
| Sample washes | 2 |
| Sample pumps | 6 |
| Sample wash volume | 8 (maximum) |
| Injection volume | 1 µL |
| Syringe size | 10 µL |
| Solvent A pre washes | 2 |
| Solvent A post washes | 2 |
| Solvent A wash volume | 8 |
| Solvent B pre washes | 0 |
| Solvent B post washes | 0 |
| Solvent B wash volume | 0 |
| Injection mode (7693A) | Normal |
| Airgap Volume (7693A) | 0.20 |
| Viscosity delay | 0 |
| Inject Dispense Speed (7693A) | 6000 |
| PreInjection dwell | 0 |

**Table 11** FPD+ Phosphorus Checkout Conditions (continued)

| | |
|---|---|
| PostInjection dwell | 0 |
| **Manual injection** | |
| Injection volume | 1 µL |
| **Data System** | |
| Data rate | 5 Hz |

3 Ignite the FPD flame, if not lit.

4 Display the signal output and monitor. This output typically runs between 40 and 55 but can be as high as 70. Wait for the output to stabilize. This takes approximately 1 hour.

If the baseline output is too high:

- Check column installation. If installed too high, the stationery phase burns in the flame and increases measured output.
- Check for leaks.
- Bake out the detector and column at 250 °C.
- Wrong flows set for installed filter

If the baseline output is zero, verify the electrometer is on and the flame is lit.

5 If using a data system, prepare the data system to perform one run using the loaded checkout method. Make sure that the data system will output a chromatogram.

6 Start the run.

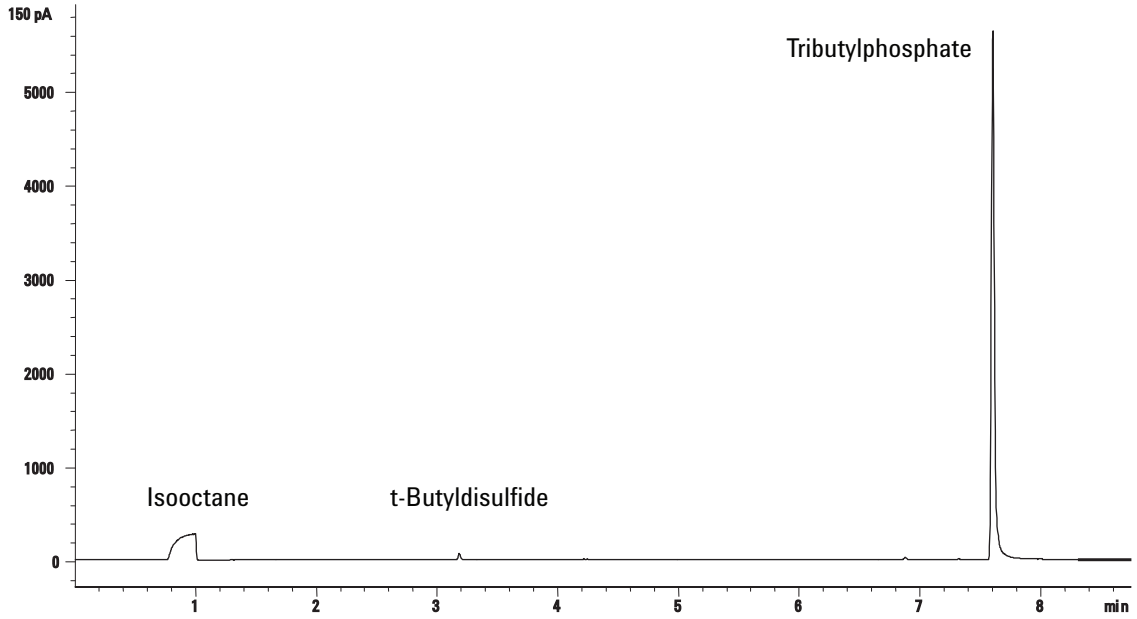
If performing an injection using an autosampler, start the run using the data system or press **[Start]** on the GC.

If performing a manual injection (with or without a data system):

a Press **[Prep Run]** to prepare the inlet for splitless injection.

b When the GC becomes ready, inject 1 µL of the checkout sample and press **[Start]** on the GC.

7 The following chromatogram shows typical results for a new detector with new consumable parts installed.




## Sulfur performance

1 Install the sulfur filter.

2 Ignite the FPD flame, if not lit.

3 Display the signal output and monitor. This output typically runs between 50 and 60 but can be as high as 70. Wait for the output to stabilize. This takes approximately 2 hours.

If the baseline output is too high:

- Check column installation. If installed too high, the stationery phase burns in the flame and increases measured output.
- Check for leaks.
- Bake out the detector and column at 250 °C.
- Wrong flows set for installed filter

If the baseline output is zero, verify the electrometer is on and the flame is lit.

4 If using a data system, prepare the data system to perform one run using the loaded checkout method. Make sure the data system will output a chromatogram.

5 Start the run.

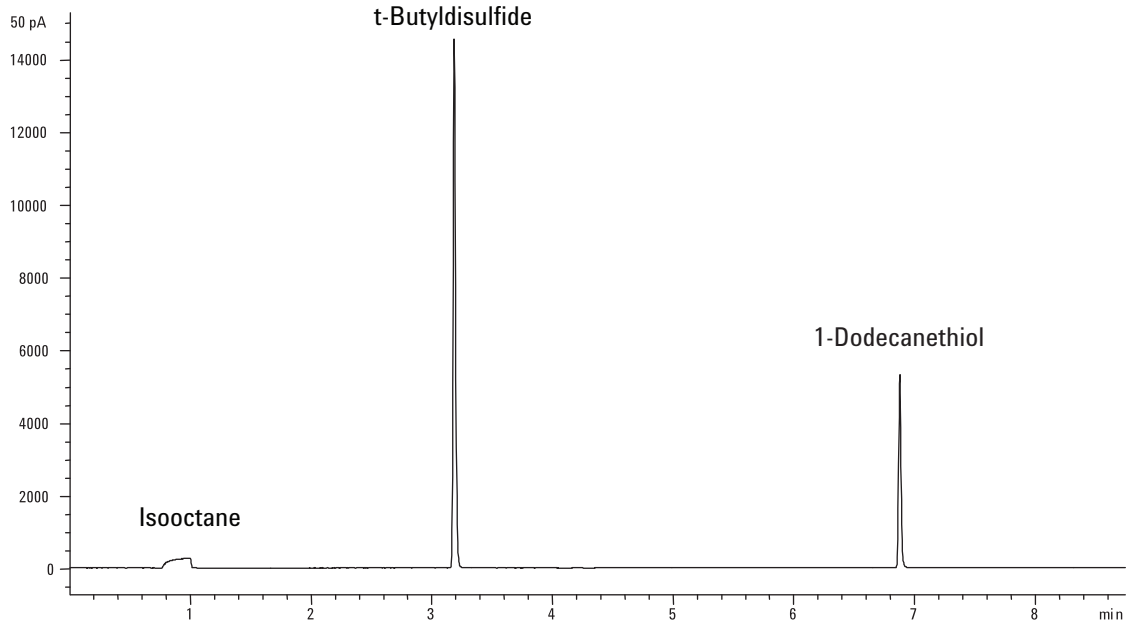
If performing an injection using an autosampler, start the run using the data system or press **[Start]** on the GC.

If performing a manual injection (with or without a data system):

a Press **[Prep Run]** to prepare the inlet for splitless injection.

b When the GC becomes ready, inject 1 µL of the checkout sample and press **[Start]** on the GC.

6 The following chromatogram shows typical results for a new detector with new consumable parts installed.



# To Check FPD Performance (Sample 5188-5953)

To check FPD performance, first check the phosphorus performance, then the sulfur performance.

## Preparation

1 Gather the following:
   - Evaluation column, HP-5 30 m × 0.32 mm × 0.25 µm (19091J-413)
   - FPD performance evaluation (checkout) sample (5188-5953), 2.5 mg/L (± 0.5%) methylparathion in isooctane
   - Phosphorus filter
   - Sulfur filter and filter spacer
   - 4-mL solvent and waste bottles or equivalent for autoinjector.
   - 2-mL sample vials or equivalent for sample.
   - Chromatographic-grade isooctane for syringe wash solvent.
   - Inlet and injector hardware (See "To Prepare for Chromatographic Checkout.")

2 Verify the following:
   - Capillary column adapter installed. If not, install it.
   - Chromatographic-grade gases plumbed and configured: helium as carrier gas, nitrogen, hydrogen, and air.
   - Empty waste vials loaded in sample turret.
   - 4-mL vial with diffusion cap filled with isooctane and inserted in Solvent A injector position.

3 Replace consumable parts (liner, septum, traps, syringe, and so forth) as needed for the checkout. See "To Prepare for Chromatographic Checkout."

4 Verify that the **Lit Offset** is set appropriately. Typically, it should be about 2.0 pA for the checkout method.

5 Install the evaluation column. (See the procedure for the SS, PP, or COC in the Maintenance manual.)
   - Set the oven, inlet, and detector to 250 °C and bake out for at least 15 minutes. (See the procedure for the SS, PP, or COC in the Maintenance manual.)
   - Be sure to configure the column.

## Phosphorus performance

1 If it is not already installed, install the phosphorus filter.

2 Create or load a method with the parameter values listed in Table 12.

**Table 12** FPD Checkout Conditions (P)

| | |
|---|---|
| **Column and sample** | |
| Type | HP-5, 30 m × 0.32 mm × 0.25 µm (19091J-413) |
| Sample | FPD checkout (5188-5953) |
| Column mode | Constant pressure |
| Column pressure | 25 psi |
| **Split/splitless inlet** | |
| Temperature | 200 °C Split/splitless |
| Mode | Splitless |
| Purge flow | 60 mL/min |
| Purge time | 0.75 min |
| **Purged packed column inlet** | |
| Temperature | 200 °C |
| **Cool on-column inlet** | |
| Temperature | Oven track |
| Septum purge | 15 mL/min |
| **Detector** | |
| Temperature | 200 °C (On) |
| Hydrogen flow | 75 mL/min (On) |
| Air (Oxidizer) flow | 100 mL/min (On) |
| Mode | Constant makeup flow OFF |
| Makeup flow | 60 mL/min (On) |
| Makeup gas type | Nitrogen |
| Flame | On |
| Lit offset | Typically 2 pA |
| PMT voltage | On |
| **Oven** | |

**Table 12** FPD Checkout Conditions (continued)(P)

| | |
|---|---|
| Initial temp | 70 °C |
| Initial time | 0 min |
| Rate 1 | 25 °C/min |
| Final temp 1 | 150 °C |
| Final time 1 | 0 min |
| Rate 2 | 5 °C/min |
| Final temp 2 | 190 °C |
| Final time 2 | 4 min |
| **ALS settings (if installed)** | |
| Sample washes | 2 |
| Sample pumps | 6 |
| Sample wash volume | 8 (maximum) |
| Injection volume | 1 µL |
| Syringe size | 10 µL |
| Solvent A pre washes | 2 |
| Solvent A post washes | 2 |
| Solvent A wash volume | 8 |
| Solvent B pre washes | 0 |
| Solvent B post washes | 0 |
| Solvent B wash volume | 0 |
| Injection mode (7693A) | Normal |
| Airgap Volume (7693A) | 0.20 |
| Viscosity delay | 0 |
| Inject Dispense Speed (7693A) | 6000 |
| PreInjection dwell | 0 |
| PostInjection dwell | 0 |
| **Manual injection** | |
| Injection volume | 1 µL |
| **Data system** | |
| Data rate | 5 Hz |

**3** Ignite the FPD flame, if not lit.

4 Display the signal output and monitor. This output typically runs between 40 and 55 but can be as high as 70. Wait for the output to stabilize. This takes approximately 1 hour.

   If the baseline output is too high:

   - Check column installation. If installed too high, the stationery phase burns in the flame and increases measured output.
   - Check for leaks.
   - Bake out the detector and column at 250 °C.
   - Wrong flows set for installed filter.

   If the baseline output is zero, verify the electrometer is on and the flame is lit.

5 If using a data system, prepare the data system to perform one run using the loaded checkout method. Make sure that the data system will output a chromatogram.

6 Start the run.

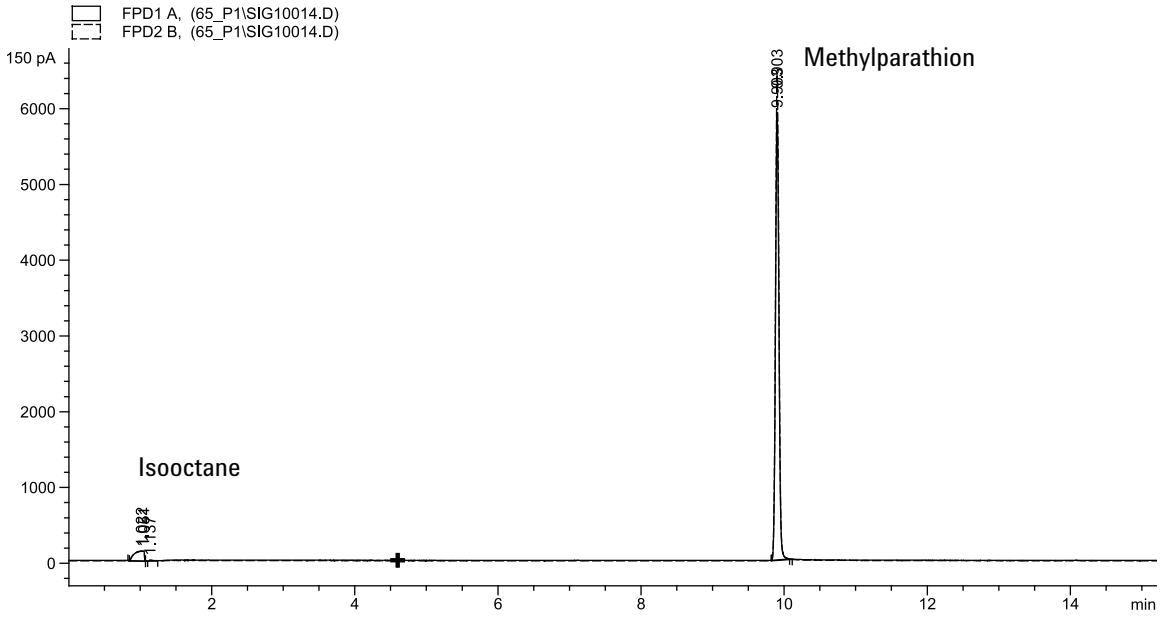
   If performing an injection using an autosampler, start the run using the data system or press **[Start]** on the GC.

   If performing a manual injection (with or without a data system):

   a Press **[Prep Run]** to prepare the inlet for splitless injection.

   b When the GC becomes ready, inject 1 µL of the checkout sample and press **[Start]** on the GC.

   c The following chromatogram shows typical results for a new detector with new consumable parts installed.




## Sulfur performance

1 Install the sulfur filter and filter spacer.

2 Make the following method parameter changes.

**Table 13** Sulfur method parameters (S)

| Parameter | Value ( mL/min) |
|---|---|
| H2 flow | 50 |
| Air flow | 60 |

3 Ignite the FPD flame if not lit.

4 Display the signal output and monitor. This output typically runs between 50 and 60 but can be as high as 70. Wait for the output to stabilize. This takes approximately 1 hour.

If the baseline output is too high:

- Check column installation. If installed too high, the stationery phase burns in the flame and increases measured output.
- Check for leaks.
- Bake out the detector and column at 250 °C.

- Wrong flows set for installed filter.

If the baseline output is zero, verify the electrometer is on and the flame is lit.

5 If using a data system, prepare the data system to perform one run using the loaded checkout method. Make sure that the data system will output a chromatogram.

6 Start the run.

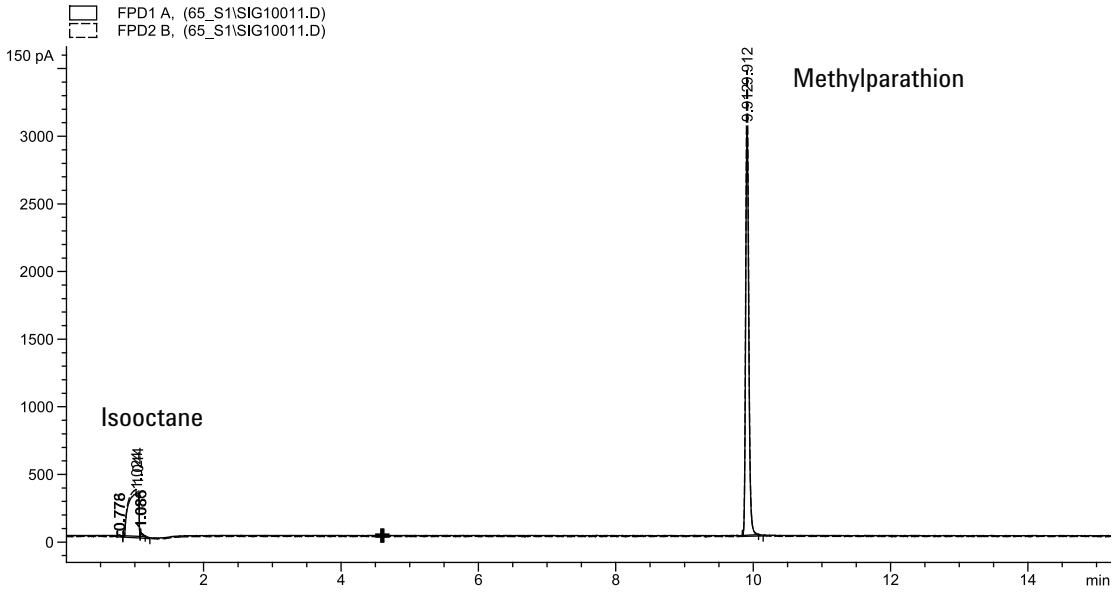
If performing an injection using an autosampler, start the run using the data system or press **[Start]** on the GC.

If performing a manual injection (with or without a data system):

a Press **[Prep Run]** to prepare the inlet for splitless injection.

b When the GC becomes ready, inject 1 µL of the checkout sample and press **[Start]** on the GC.

7 The following chromatogram shows typical results for a new detector with new consumable parts installed.



# To Check FPD Performance (Sample 5188-5245, Japan)

To verify FPD performance, first check the phosphorus performance, then the sulfur performance.

## Preparation

1 Gather the following:

- Evaluation column, DB5 15 m × 0.32 mm × 1.0 µm (123-5513)
- FPD performance evaluation (checkout) sample (5188-5245, Japan), composition: n-Dodecane 7499 mg/L (± 5%), Dodecanethiol 2.0 mg/L (± 5%), Tributyl Phosphate 2.0 mg/L (± 5%), tert-Butyldisulfide 1.0 mg/L (± 5%), in isooctane as solvent
- Phosphorus filter
- Sulfur filter and filter spacer
- 4-mL solvent and waste bottles or equivalent for autoinjector.
- 2-mL sample vials or equivalent for sample.
- Chromatographic-grade isooctane for syringe wash solvent.
- Inlet and injector hardware (See "To Prepare for Chromatographic Checkout.")

2 Verify the following:

- Capillary column adapter installed. If not, install it.
- Chromatographic-grade gases plumbed and configured: helium as carrier gas, nitrogen, hydrogen, and air.
- Empty waste vials loaded in sample turret.
- 4-mL vial with diffusion cap filled with isooctane and inserted in Solvent A injector position.

3 Replace consumable parts (liner, septum, traps, syringe, and so forth) as needed for the checkout. See "To Prepare for Chromatographic Checkout."

4 Verify the lit offset is set appropriately. Typically, it should be about 2.0 pA for the checkout method.

5 Install the evaluation column. (See the procedure for the SS, PP, or COC in the Maintenance manual.)
   - Set the oven, inlet, and detector to 250 °C and bake out for at least 15 minutes. (See the procedure for the SS, PP, or COC in the Maintenance manual.)
   - Configure the column.

## Phosphorus performance

1 If it is not already installed, install the phosphorus filter.

2 Create or load a method with the parameter values listed in Table 14.

**Table 14** FPD Phosphorus Checkout Conditions

| | |
|---|---|
| **Column and sample** | |
| Type | DB-5MS, 15 m × 0.32 mm × 1.0 µm (123-5513) |
| Sample | FPD checkout (5188-5245) |
| Column mode | Constant flow |
| Column flow | 7.5 mL/min |
| **Split/splitless inlet** | |
| Temperature | 250 °C |
| Mode | Splitless |
| Total purge flow | 69.5 mL/min |
| Purge flow | 60 mL/min |
| Purge time | 0.75 min |
| **Purged packed column inlet** | |
| Temperature | 250 °C |
| **Cool on-column inlet** | |
| Temperature | Oven track |
| Septum purge | 15 mL/min |
| **Detector** | |
| Temperature | 200 °C (On) |
| Hydrogen flow | 75.0 mL/min (On) |
| Air (oxidizer) flow | 100.0 mL/min (On) |
| Mode | Constant makeup flow Off |

**Table 14** FPD Phosphorus Checkout Conditions (continued)

| | |
|---|---|
| Makeup flow | 60.0 mL/min (On) |
| Makeup gas type | Nitrogen |
| Flame | On |
| Lit offset | Typically 2 pA |
| PMT voltage | On |
| Emission Block | 125 °C |
| **Oven** | |
| Initial temp | 70 °C |
| Initial time | 0 min |
| Rate 1 | 10 °C/min |
| Final temp | 105 °C |
| Final time | 0 min |
| Rate 2 | 20 °C/min |
| Final temp 2 | 190 °C |
| Final time 2 | 7.25 min for sulfur<br>12.25 min for phosphorus |
| **ALS settings (if installed)** | |
| Sample washes | 2 |
| Sample pumps | 6 |
| Sample wash volume | 8 (maximum) |
| Injection volume | 1 µL |
| Syringe size | 10 µL |
| Solvent A pre washes | 2 |
| Solvent A post washes | 2 |
| Solvent A wash volume | 8 |
| Solvent B pre washes | 0 |
| Solvent B post washes | 0 |
| Solvent B wash volume | 0 |
| Injection mode (7693A) | Normal |
| Airgap Volume (7693A) | 0.20 |
| Viscosity delay | 0 |
| Inject Dispense Speed (7693A) | 6000 |

**Table 14** FPD Phosphorus Checkout Conditions (continued)

| | |
|---|---|
| PreInjection dwell | 0 |
| PostInjection dwell | 0 |
| **Manual injection** | |
| Injection volume | 1 µL |
| **Data System** | |
| Data rate | 5 Hz |

3 Ignite the FPD flame, if not lit.

4 Display the signal output and monitor. This output typically runs between 40 and 55 but can be as high as 70. Wait for the output to stabilize. This takes approximately 1 hour.

If the baseline output is too high:

- Check column installation. If installed too high, the stationery phase burns in the flame and increases measured output.
- Check for leaks.
- Bake out the detector and column at 250 °C.
- Wrong flows set for installed filter

If the baseline output is zero, verify the electrometer is on and the flame is lit.

5 If using a data system, prepare the data system to perform one run using the loaded checkout method. Make sure that the data system will output a chromatogram.

6 Start the run.

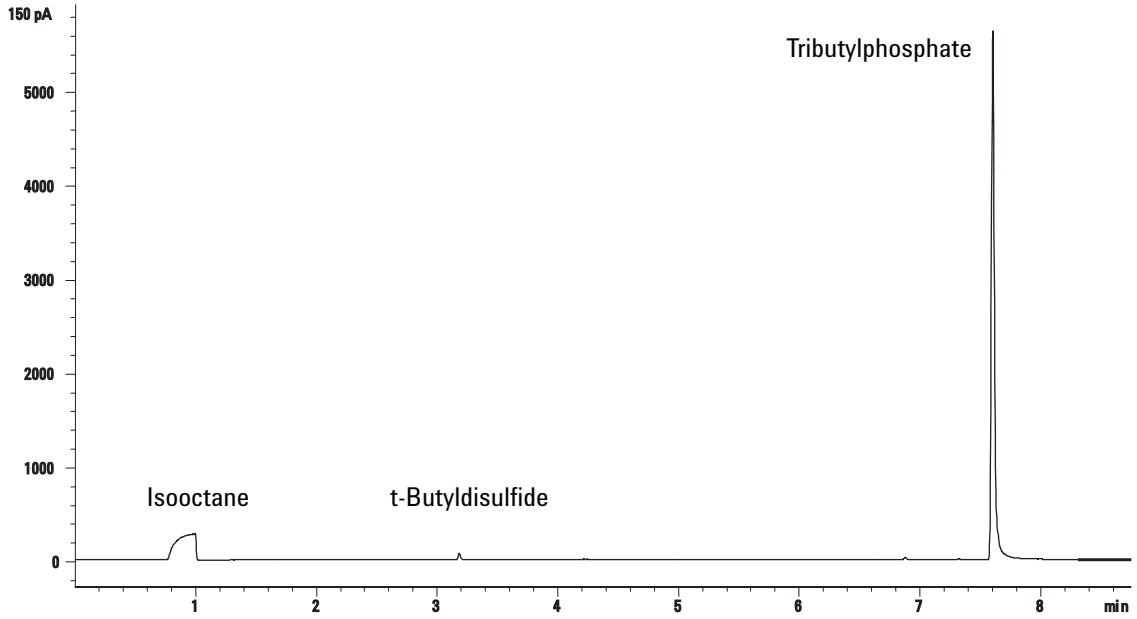
If performing an injection using an autosampler, start the run using the data system or press **[Start]** on the GC.

If performing a manual injection (with or without a data system):

a Press **[Prep Run]** to prepare the inlet for splitless injection.

b When the GC becomes ready, inject 1 µL of the checkout sample and press **[Start]** on the GC.

7 The following chromatogram shows typical results for a new detector with new consumable parts installed.




## Sulfur performance

1 Install the sulfur filter.

2 Make the following method parameter changes.

**Table 15** Sulfur method parameters

| Parameter | Value ( mL/min) |
|---|---|
| H2 flow | 50 |
| Air flow | 60 |

3 Ignite the FPD flame, if not lit.

4 Display the signal output and monitor. This output typically runs between 50 and 60 but can be as high as 70. Wait for the output to stabilize. This takes approximately 2 hours.

If the baseline output is too high:

- Check column installation. If installed too high, the stationery phase burns in the flame and increases measured output.
- Check for leaks.
- Bake out the detector and column at 250 °C.

- Wrong flows set for installed filter

If the baseline output is zero, verify the electrometer is on and the flame is lit.

5 If using a data system, prepare the data system to perform one run using the loaded checkout method. Make sure the data system will output a chromatogram.

6 Start the run.

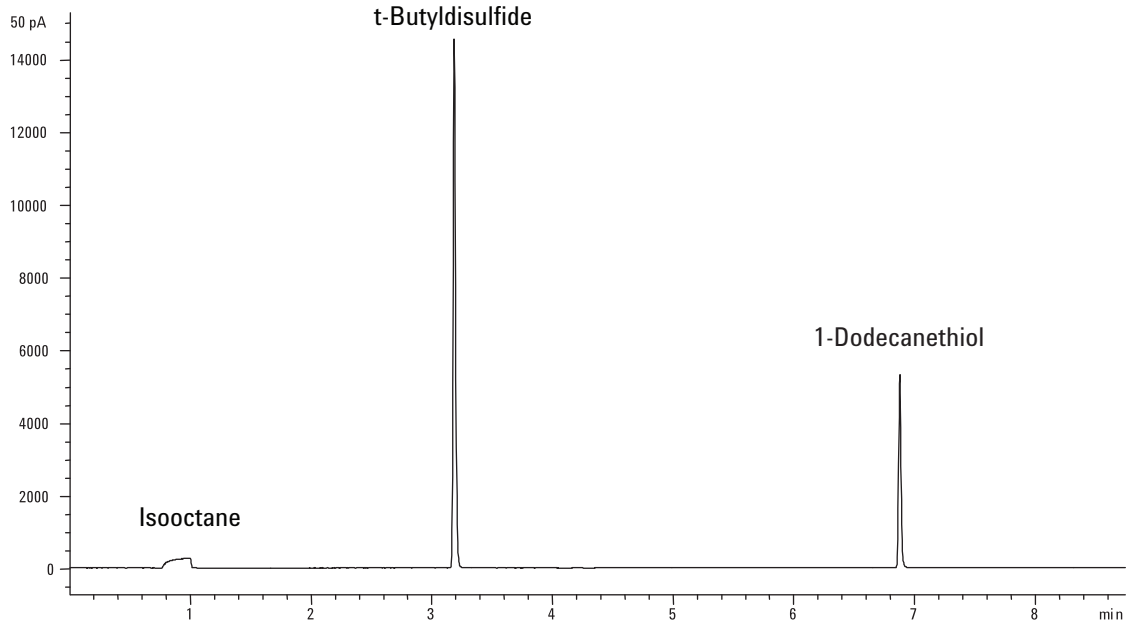
If performing an injection using an autosampler, start the run using the data system or press **[Start]** on the GC.

If performing a manual injection (with or without a data system):

a Press **[Prep Run]** to prepare the inlet for splitless injection.

b When the GC becomes ready, inject 1 µL of the checkout sample and press **[Start]** on the GC.

7 The following chromatogram shows typical results for a new detector with new consumable parts installed.



# 7 Configuration

# About Configuration

Configuration is a two-part process for most GC accessory devices that require power and/or communication resources from the GC. In the first part of the configuration process, a power and/or communication resource is assigned to the device. The second part of the configuration process allows setting of any configuration properties associated with the device.

## Assigning GC resources to a device

A hardware device requiring but not assigned GC resources is given a mode of **Unconfigured** by the GC. Once you assign GC resources to a device, the GC gives the device a mode of **Configured,** allowing you to access other property settings (if any) for the device.

To assign GC resources to a device with an **Unconfigured** mode:

1 Unlock the GC configuration. Press **[Options]**, select **Keyboard & Display** and press **[Enter]**. Scroll down to **Hard Configuration Lock** and press **[Off/No]**.

2 Press **[Config]** on the GC keypad and select a device from the list, then press **[Enter]**.

The **[Config]** key opens a menu similar to this:

**Oven**
**Front inlet**
**Back Inlet**
**Column #**
**Front detector**
**Back detector**
**Analog out**
**Valve Box**
**Thermal Aux 1**
**PCM A**
**PCM B**
**Status**
**Time**
**Valve #**
**Injector**
**Instrument**

In many cases you can move directly to the item of interest by pressing **[Config]**[*device*].

3 When the Configure Device Display opens, the cursor should be on the **Unconfigured** field. Press **[Mode/Type]** and follow the GC prompts to assign resources to the device.

4 After assigning resources, the GC prompts for you to power cycle the GC. Turn the GC power switch off and then on.

When the GC starts, select the device just assigned the GC resources for further configuration if needed. When accessed, its mode should indicate **Configured** and the other configuration properties are displayed.

## Setting configuration properties

A device's configuration properties are constant for an instrument hardware setup unlike method settings which can change from sample run to sample run. Two example configuration settings are the gas type flowing through a pneumatic device and the operation temperate limit of a device.

To change the setting configuration properties for a **Configured** device:

1 Press **[Config]** on the GC keypad and select a device from the list, then press **[Enter]**.

In many cases you can move directly to the item of interest by pressing **[Config]**[*device*].

2 Scroll to the device setting and change the property. This can involve making a selection from a list using **[Mode/Type]**, using **[On/Yes]** or **[Off/No]**, or entering a numeric value. Press **[Info]** for help on changing numeric settings, or see the section of this document describing the specific configuration of the device.

# General Topics

## To Unlock the GC Configuration

Accessory devices including inlets, detectors, pressure controllers (PCM), and temperature control loops (Thermal AUX) have electrical connections to a power source and/or the communication bus in the GC. These devices must be assigned GC resources before they can be used. Before assigning resources to a device, you must first unlock the GC configuration. If you try to configure an **Unconfigured** device without unlocking the GC configuration, the GC displays the message **CONFIGURATION IS LOCKED Go to Keyboard options to unlock**.

It is also necessary to unlock the GC configuration if you are removing the GC resources from a **Configured** device. This action returns the device state to **Unconfigured**.

To unlock the GC configuration:

1 Press **[Options]**, select **Keyboard & Display** and press **[Enter]**.

2 Scroll down to **Hard Configuration Lock** and press **[Off/No]**.

The GC configuration remains unlocked until the GC is power cycled off and on.

## Ignore Ready =

The states of the various hardware elements are among the factors that determine whether the GC is Ready for analysis.

Under some circumstances, you may not wish to have a specific element readiness considered in the GC readiness determination. This parameter lets you make that choice. The following elements allow readiness to be ignored: inlets, detectors, the oven, PCM, and auxiliary EPC modules.

For example, suppose an inlet heater is defective but you don't plan to use that inlet today. By setting **Ignore Ready = TRUE** for that inlet, you can use the rest of the GC. After the heater is repaired, set **Ignore Ready = FALSE** or the run could start before that inlet's conditions are ready.

To ignore an element's readiness, press **[Config]**, then select the element. Scroll to **Ignore Ready** and press **[On/Yes]** to set it to **True**.

To consider an element's readiness, press **[Config]**, then select the element. Scroll to **Ignore Ready** and press **[Off/No]** to set it to **False**.

## Information displays

Below are some examples of configuration displays:

**[ EPC1 ] = (INLET) (SS)** EPC #1 is used for an inlet of type split/splitless. It is not available for other uses.

**[ EPC3 ] = (DET-EPC) (FID)** EPC #3 is controlling detector gases to an FID.

**FINLET (OK) 68 watts 21.7** This heater is connected to the front inlet. Status = OK, meaning that it is ready for use. At the time that the GC was turned on, the heater was drawing 68 watts and the inlet temperature was 21.7 °C.

**[ F-DET ] = (SIGNAL) (FID)** The signal board for the front detector is type FID.

## Unconfigured:

Accessory devices requiring GC power or communication must be assigned these GC resources before they can be used. To make this hardware element usable, first "To Unlock the GC Configuration" on page 120 then go to the **Unconfigured** parameter and press **[Mode/Type]** to install it. If the hardware element you are configuring requires selection of additional parameters, the GC asks for that selection. If no parameters are required, press [**Enter**] at the GC prompt to install that element. You are required to power the GC off and then power the GC on to complete this configuration.

After restarting the GC, a message reminding you of this change and its effect on the default method is displayed. If needed, change your methods to accommodate the new hardware.

# Oven

See “Unconfigured:” on page 121 and “Ignore Ready =” on page 120.

**Maximum temperature** Sets an upper limit to the oven temperature. Used to prevent accidental damage to columns. The range is 70 to 425 °C. See the column manufacturer’s recommendations.

**Equilibration time** The time after the oven approaches its setpoint before the oven is declared **Ready**. The range is 0 to 999.99 minutes. Used to ensure that the oven contents have stabilized before starting another run.

**Limit ballistic power** Reduce oven power when heating at maximum rate to limit the current drawn from the power line.

## To configure the oven

1 Press **[Config][Oven]**.

2 Scroll to **Maximum temperature**. Enter a value and press **[Enter]**.

3 Scroll to **Equilibration time**. Enter a value and press **[Enter]**.

# Front Inlet/Back Inlet

See “Unconfigured:” on page 121 and “Ignore Ready =” on page 120.

## To configure the Gas type

The GC needs to know what carrier gas is being used.

1 Press **[Config][Front Inlet]** or **[Config][Back Inlet]**.

2 Scroll to **Gas type** and press **[Mode/Type]**.

3 Scroll to the gas you will use. Press **[Enter]**.

This completes carrier gas configuration.

# Column #

**Length** The length, in meters, of a capillary column. Enter **0** for a packed column or if the length is not known.

**Diameter** The inside diameter, in millimeters, of a capillary column. Enter **0** for a packed column.

**Film thickness** The thickness, in microns, of the stationary phase for capillary columns.

**Inlet** Identifies the source of gas for the column.

**Outlet** Identifies the device into which the column effluent flows.

**Thermal zone** Identifies the device that controls the temperature of the column.

## To configure a single column

You define a capillary column by entering its length, diameter, and film thickness. You then enter the device controlling the pressure at the Inlet (end of the column), the device controlling the pressure at the column Outlet, and the Thermal zone that controls its temperature.

With this information, the instrument can calculate the flow through the column. This has great advantages when using capillary columns because it becomes possible to:

- Enter split ratios directly and have the instrument calculate and set the appropriate flow rates.
- Enter flow rate or head pressure or average linear velocity. The instrument calculates the pressure needed to achieve the flow rate or velocity, sets that, and reports all three values. (Split/splitless inlet only.)
- Perform splitless injections with no need to measure gas flows.
- Choose any column mode. If the column is not defined, your choices are limited.

Except for the simplest configurations, such as a column connected to a specific inlet and detector, we recommend that you begin by making a sketch of how the column will be connected.

To configure a column:

1 Press **[Config][Col #]** then enter the number of the column to be configured.

2 Scroll to the **Length** line, type the column length, in meters, followed by **[Enter]**.

3 Scroll to **Diameter**, type the column inside diameter in microns, followed by **[Enter].**

4 Scroll to **Film thickness**, type the film thickness in microns, followed by **[Enter].** The column is now *defined*.

If you do not know the column dimensions—they are usually supplied with the column—or if you do not wish to use the GC calculating features, enter **0** for either **Length** or **Diameter**. The column will be *not defined*.

5 Scroll to **Inlet**. Press **[Mode/Type]** to select a gas pressure control device for this end of the column. Selections include the installed GC inlets and installed PCM channels.

Select the appropriate gas pressure control device and press **[Enter]**.

6 Scroll to **Outlet**. Press **[Mode/Type]** to select a gas pressure control device for this end of the column.

Select the appropriate gas pressure control device and press **[Enter]**.

- When a detector is selected, the outlet end of the column is controlled at 0 psig for the FID, TCD, FPD, FPD+, NPD, and uECD or vacuum for the MSD.
- Selecting **Other** enables the **Outlet pressure** setpoint. If the column exhausts into a nonstandard detector or environment (neither ambient pressure nor complete vacuum), select **Other** and enter the outlet pressure.

7 Scroll to **Thermal zone**. Press **[Mode/Type]** to see the available choices. In most cases this will be **GC oven,** but you may have an MSD transfer line heated by an auxiliary zone, valves in a separately-heated valve box or other configurations.

Select the appropriate **Thermal zone** and press **[Enter]**.

8 Scroll to **Column ID lock**. If using an optional barcode scanner, this will be set to **On** by the data system. Normally, set to **Off** when not using a barcode scanner.

This completes configuration for a single capillary column.

### Additional notes on column configuration

Packed columns should be configured as column not defined. To do this, enter **0** for either column length or column diameter.

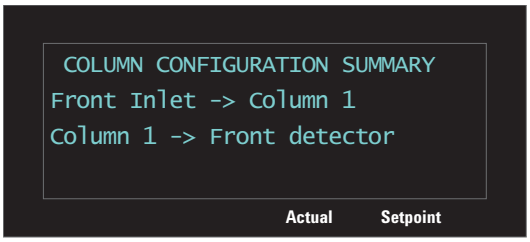
You should check configurations for all columns to verify that they specify the correct pressure control device at each end. The GC uses this information to determine the flow path of the carrier gas. Only configure columns that are in current use in your GC's carrier gas flow path. Unused columns configured with the same pressure control device as a column in the current flow path cause incorrect flow results.

It is possible, and sometimes appropriate, to configure both installed columns to the same inlet.

Some pneumatic setpoints change with oven temperature because of changes in column resistance and in gas viscosity. This may confuse users who observe pneumatics setpoints changing when their oven temperature changes. However, the flow condition in the column remains as specified by the column mode (constant flow or pressure, ramped flow or pressure) and the initial setpoint values.

## To view a summary of column connections

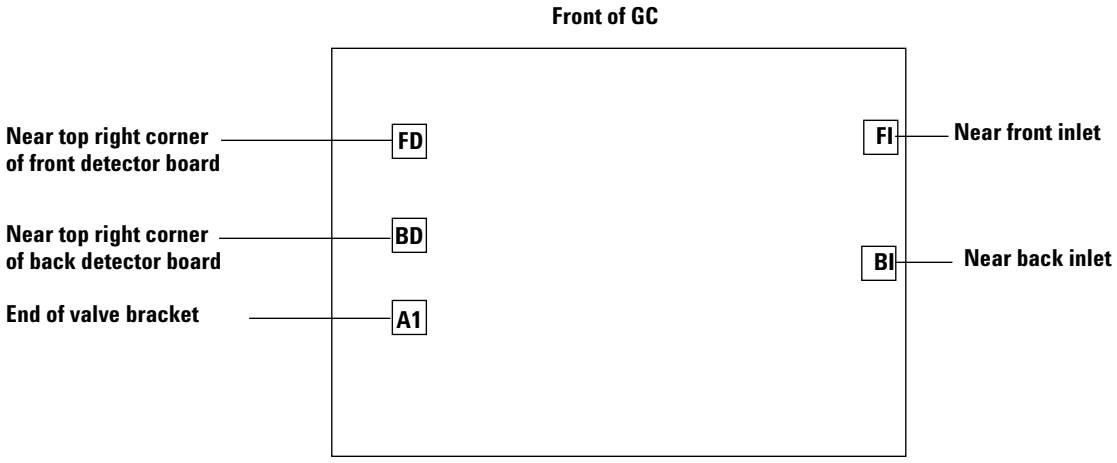
To view a summary of column connections, press [**Config**][**Col #**], then press [**Enter**]. The GC lists the column connections, for example:



# About Heaters

Inlets, detectors, valve boxes, and so on are heated. When configuring a device, it is sometimes necessary to know the connector used for that device's heater. Use the information in this section as needed when configuring a device.

The GC provides five heater connectors on the GC mainframe:




All heater connectors are square, 4-conductor receptacles mounted on brackets. Note that access to the detector and valve connectors generally requires removing GC covers, and should be performed only by Agilent-trained service personnel.

The Table 16 describes the heater locations that are available for each module.

**Table 16** Possible heater connections by module

| Module | Possible heater connections |
|---|---|
| Front inlet | FI or None |
| Back inlet | BI or None |
| Front detector | FD |
| Back detector | BD |
| Valve box | A1 |
| Aux heater 1 | A1 |

A front FPD or FPD+ uses heater connectors FD and A1. A back FPD or FPD+ uses heater connectors BD and A1.

# Front Detector/Back Detector

See Ignore Ready = and “Unconfigured:” on page 121.

## To configure the makeup/reference gas

The makeup gas line of your detector parameter list changes depending on your instrument configuration.

1 If you have an inlet with the *column not defined,* the makeup flow is constant. If you are operating with *column defined*, you have a choice of two makeup gas modes. Press **[Config]**[*device*], where [*device*] is one of the following:

- **[Front Det]**
- **[Back Det]**

2 Scroll to **Makeup gas type** (or **Makeup/reference gas type**) and press **[Mode/Type]**.

3 Scroll to the correct gas and press **[Enter]**.

## Lit offset

The GC monitors the difference between the detector output with the flame lit and the output when the flame is not lit. If this difference falls below the setpoint, the GC assumes that the flame has gone out and tries to reignite it. See the *Advanced Operation* manual for details on how to set the **Lit Offset**:

FID

FPD

FPD+

If set too high, the lit detector baseline output can be below the **Lit Offset** setpoint, causing the GC to erroneously try to reignite the flame.

## To configure the FPD or FPD+ heaters

The flame photometric detector (FPD and FPD+) uses two heaters, one in the transfer line near the base of the detector and one near the combustion chamber. When configuring the FPD or FPD+ heaters, select **Install Detector 2 htr** rather than the default **Install Detector (FPD or FPD+)**. This two heater configuration controls the detector body using the detector heated zone, and the transfer line using Thermal Aux 1 for a front detector or Thermal Aux 2 for a back detector.

## To ignore the FID, FPD, or FPD+ ignitor

**WARNING** **In general, do not ignore the ignitor for normal operation. Ignoring the ignitor also disables the Lit Offset and autoignition features, which work together to shut down the detector if the detector flame goes out. If the flame goes out under manual ignition, GC will continue to flow hydrogen fuel gas into the detector and lab.**

**Use this feature only if the ignitor is defective, and only until the ignitor is repaired.**

If using an FID, FPD, or FPD+, you can ignite the flame manually by setting the GC to ignore the ignitor.

1 Press **[Config][Front Det]** or **[Config][Back Det]**.

2 Scroll to **Ignore Ignitor.**

3 Press **[On/Yes]** to ignore the ignitor (or **[Off/No]** to enable the ignitor.

When **Ignore Ignitor** is set to **True**, the GC does not try to light the flame using the ignitor. The GC also completely ignores the **Lit Offset** setpoint and does not attempt autoignition. This means that the GC cannot determine if the flame is lit, and will not shut down the fuel gas.

# Analog Out

## Fast peaks

The GC allows you to output analog data at two speeds. The faster speed—to be used only with the FID, FPD, FPD+, and NPD—allows minimum peak widths of 0.004 minutes (8 Hz bandwidth), while the standard speed—which can be used with all detectors— allows minimum peak widths of 0.01 minutes (3.0 Hz bandwidth).

To use fast peaks:

1 Press **[Config][Analog Out]**.

2 Scroll to **Fast peaks** and press **[On/Yes]**.

The *fast peaks* feature does not apply to digital output.

If you are using the *fast peaks* feature, your integrator must be fast enough to process data coming from the GC. Integrator bandwidth should be at least 15 Hz.

# Valve Box

See “Unconfigured:” on page 121 and “Ignore Ready =” on page 120.

The valve box mounts on top of the column oven. It may contain up to two valves mounted on heated blocks. The block can accommodate two valves.

Valve positions on the blocks are numbered. We suggest that valves be installed in the blocks in numeric order.

All heated valves in a valve box are controlled by the same temperature setpoint.

## To assign a GC power source to a valve box heater

1 Unlock the GC configuration, press **[Options]**, select **Keyboard & Display** and press **[Enter]**. Scroll down to **Hard Configuration Lock** and press **[Off/No]**.

2 Press **[Config]**, scroll to **Valve Box** and press **[Enter]**.

3 With **Unconfigured** selected, press **[Mode/type]**, select one of the following and press **[Enter]**.

- **Install heater A1** - for a valve box containing a single heater plugged into the connector labeled A1 on the valve box bracket.
- **Install heater A2** - for a valve box containing a single heater plugged into the connector labeled A2 on the valve box bracket.

The valve box bracket is located inside the GC right side electrical compartment in the upper right location.

4 When prompted by the GC, turn the power off then on again.

This completes the configuration of the valve box. To set the valve box temperature for your method press the **[Valve #]** key, and scroll to **Valve Box**.

# Thermal Aux

See “Unconfigured:” on page 121 and “Ignore Ready =” on page 120.

The GC provides one additional channel of temperature control, Thermal Aux 1.

## To assign a GC power source to an Aux thermal zone

Devices such as valve boxes and transfer lines have heaters which can be plugged into one of several connectors on the GC. Before use, you must configure these devices so that the GC knows the type of device plugged into the connector (inlet heater, detector heater, transfer line heater, and so on) and how to control it.

This procedure assigns the heater power source from heater plug A1 to the Thermal Aux 1 temperature control zone.

1 Unlock the GC configuration. Press **[Options]**, select **Keyboard & Display** and press **[Enter]**. Scroll down to **Hard Configuration Lock** and press **[Off/No]**.

2 Press **[Config]** and scroll to **Thermal Aux 1**.

3 With **Unconfigured** selected, press **[Mode/Type]**, and select:

- **Install Heater A1** to configure a valve box heater plugged into the valve box bracket plug labeled A1.

4 Press **[Enter]** after making the selection.

5 For devices such as a valve box, inlet, or detector, configuration is complete. When prompted by the GC, turn the power off then on again. Skip the rest of the steps in this procedure.

   For other devices, next configure the specific device type: Press [**Clear**] to skip the reboot for now.

6 Press **[Config]** and scroll to **Thermal Aux 1** or **Back inlet** depending on where the MSD heater was assigned, and press **[Enter]**.

7 Scroll to **Auxiliary type**, press **[Mode/Type]**, scroll to and select the desired device type, and press **[Enter]**. Types may include:

- **Nickel catalyst**
- **MSD transfer line**
-

8 When prompted, reboot the GC to implement the changes.

## To configure a MSD transfer line heater

1 Check that a power source for the MSD heater was assigned. See "To assign a GC power source to an Aux thermal zone" on page 132.

2 Press **[Config]** and scroll to **Thermal Aux 1** or **Back inlet** depending on where the MSD heater was assigned, and press **[Enter]**.

- For a single channel GC, select **Back inlet**.
- For a dual channel GC, select **Thermal Aux 1**.

3 Scroll to **Auxiliary type**, press **[Mode/Type]**, scroll to and select the **MSD transfer line**, and press **[Enter]**.

## To configure a nickel catalyst heater

1 Check that a power source for the Nickel Catalyst heater was assigned. See "To assign a GC power source to an Aux thermal zone" on page 132.

2 Press **[Config]** and scroll to **Back inlet**, and press **[Enter]**.

3 Scroll to **Auxiliary type**, press **[Mode/Type]**, scroll to and select **Nickel catalyst**, and press **[Enter]**.

# PCM A/PCM B

See “Unconfigured:” on page 121 and “Ignore Ready =” on page 120.

A pressure control module (PCM) provides one channel of gas control.

This channel is a simple forward-pressure regulator that maintains a constant pressure at its output. With a fixed downstream restrictor, it provides constant flow.

## To assign a GC communication source to a PCM

1. Unlock the GC configuration, press **[Options]**, select **Keyboard & Display** and press **[Enter]**. Scroll down to **Hard Configuration Lock** and press **[Off/No]**.
2. Press **[Config]**, scroll to a **PCMx** and press **[Enter]**.
3. With **Unconfigured** selected, press **[Mode/Type]**, select **Install EPC**x and press **[Enter]**.
4. When prompted by the GC, turn the power off then on again.

To configure the other parameters on this PCM, see To configure a PCM.

## To configure a PCM

1. Press **[Config]**, scroll to the **PCMx** and press **[Enter]**.
2. Scroll to **Gas type**, press **[Mode/Type]**, make a selection and press **[Enter]**.

The pressure control mode is set by pressing **[PCM #]**. Select **Mode:**, press **[Mode/Type]**, select the mode and press **[Enter]**.

# Status

The **[Status]** key has two tables associated with it. You switch between them by pressing the key.

## The Ready/Not Ready status table

This table lists parameters that are *Not Ready* or gives you a *Ready for Injection* display. If there are any *faults*, *warnings*, or *method mismatches* present, they are displayed here.

## The setpoint status table

This table lists setpoints compiled from the active parameter lists on the instrument. This is a quick way to view active setpoints during a run without having to open multiple lists.

## To configure the setpoint status table

You can change the order of the list. You might want the three most important setpoints to appear in the window when you open the table.

1. Press **[Config][Status]**.
2. Scroll to the setpoint that should appear first and press **[Enter]**. This setpoint will now appear at the top of the list.
3. Scroll to the setpoint that should appear second and press **[Enter]**. This setpoint will now be the second item on the list.
4. And so on, until the list is in the order you wish.

# Time

Press **[Time]** to open this function. The first line always displays the current date and time, and the last line always displays a stopwatch. The two middle lines vary:

**Between runs** Show last and next (calculated) run times.

**During a run** Show time elapsed and time remaining in the run.

**During Post Run** Show last run time and remaining Post Run time.

## To set time and date

1. Press **[Config][Time].**
2. Select **Time zone (hhmm)** and enter the local time offset from GMT using a 24 hour format.
3. Select **Time (hhmm)** and enter the local time.
4. Select **Date (ddmmyy)** and enter the date.

## To use the stopwatch

1. Press **[Time]**.
2. Scroll to the **time=** line.
3. To begin the timed period press **[Enter]**.
4. To stop the timed period press **[Enter]**.
5. Press **[Clear]** to reset the stopwatch.

# Valve #

Up to 2 valves can be mounted in a temperature-controlled valve box.

## To configure a valve

1. Press **[Config][Valve #]** and enter the number of the valve you are configuring. The current valve type is displayed.
2. To change the valve type, press **[Mode/Type]**, select the new valve type, and press **[Enter]**.

### Valve types

- **Sampling** Two-position (load and inject) valve. In load position, an external sample stream flows through an attached (gas sampling) or internal (liquid sampling) loop and out to waste. In inject position, the filled sampling loop is inserted into the carrier gas stream. When the valve switches from Load to Inject, a run starts if one is not already in progress. See the Advanced Operation manual for details.
- **Not installed** Self-explanatory.

# Front injector/Back injector

The injectors are normally plugged into the **Front ALS Port** on the GC when used for injections into the front inlet, and the **Back ALS Port** on the GC when used for injections into the back inlet. However, the GC will detect an injector's location (front or back inlet) automatically, so both connectors work for an injector on either inlet.

To configure the 7693A sampler system, see the 7693A Installation, Operation, and Maintenance manual. To configure the 7650A sampler system, see the 7650A Installation, Operation, and Maintenance manual.

## Instrument

1 Press **[Config]**. Scroll to **Instrument** and press **[Enter]**.

2 Scroll to **Serial #**. Enter a serial number and press **[Enter]**. This function can only be done by Agilent service personnel.

3 Scroll to **Auto prep run**. Press **[On/Yes]** to enable **Auto prep run**, **[Off/No]** to disable it. See the Advanced Operation manual for details.

4 Scroll to **Zero Init Data Files**.

- Press **[On/Yes]** to enable it. When it is On, the GC immediately begins to subtract the current detector output from all future values. This applies only to digital output, and is useful when a non-Agilent data system has problems with baseline data that is non-zero.
- Press **[Off/No]** to disable it. This is appropriate for all Agilent data systems.

5 Scroll to **Require Host Connection**. Set **On** to consider whether or not the remote host reports Ready as part of GC readiness.

6 Press **[Clear]** to return to the **Config** menu or any other function to end.

# 8
# Options

# About Options

The **[Options]** key is used for a group of functions that are usually set on installation and seldom changed afterward. It accesses this menu:

**Calibration**
**Communication**
**Keyboard and Display**

# Calibration

Press [**Calibration**] to list the parameters that can be calibrated. These include:

- Inlets
- Detectors
- ALS
- Columns
- Oven
- Atmospheric pressure

In general, you will only need to calibrate the EPC or EPR modules and capillary columns. ALS, oven, and atmospheric pressure calibration should only be performed be trained service personnel.

The calibration displays are discussed in the Agilent 7820A Service Manual.

## Maintaining EPC and EPR calibration—inlets, detectors, and PCM

The EPC and EPR gas control modules contain flow and/or pressure sensors that are calibrated at the factory. Sensitivity (slope of the curve) is quite stable, but zero offset requires periodic updating.

### Flow sensors

The split/splitless, packed column and purged packed inlet modules use flow sensors. If the **Auto flow zero** feature (see page 143) is on, they are zeroed automatically after each run. This is the recommended way. They can also be zeroed manually–see “To zero a specific flow or pressure sensor.”

### Pressure sensors

All EPC and EPR control modules (with the exception of the packed column inlet with EPR) use pressure sensors. They must be zeroed individually. There is no automatic zero for pressure sensors.

### Auto flow zero

A useful calibration option is **Auto flow zero**. When it is **On**, after the end of a run the GC shuts down the flow of gases to an inlet, waits for the flow to drop to zero, measures and stores the flow sensor output, and turns the gas back on. This takes about two seconds. The zero offset is used to correct future flow measurements.

To activate this, select **Calibration** on the **Options** menu, then choose either **Front inlet** or **Back inlet**, press **[Enter]**, and turn **Auto flow zero** on.

### Zero conditions

Flow sensors are zeroed with the carrier gas connected and flowing.

Pressure sensors are zeroed with the supply gas line disconnected from the gas control module.

### Zero intervals

**Table 17** Flow and Pressure Sensor Zero Intervals

| Sensor type | Module type | Zero interval |
|---|---|---|
| Flow | All | Use Auto flow zero and/or Auto zero septum purge |
| Pressure | Inlets | |
| | Packed columns | Every 12 months |
| | Small capillary columns (id 0.32 mm or less) | Every 12 months |
| | Large capillary columns (id > 0.32 mm) | At 3 months, at 6 months, then every 12 months |
| | Auxiliary channels | Every 12 months |
| | Detector gases | Every 12 months |

## To zero a specific flow or pressure sensor

1 Press **[Options]**, scroll to **Calibration**, and press **[Enter]**.

2 Scroll to the module to be zeroed and press **[Enter]**.

3 Set the flow or pressure:

**Flow sensors**. Verify that the gas is connected and flowing (turned on).

**Pressure sensors**. Disconnect the gas supply line at the back of the GC. Turning it off is not adequate; the valve may leak.

4 Scroll to the desired zero line.

5 Press **[On/Yes]** to zero or **[Clear]** to cancel.

6 Reconnect any gas line disconnected in step 3 and restore operating flows

## Column calibration

As you use a capillary column, you may occasionally trim off portions, changing the column length. If measuring the actual length is impractical, and if you are using EPC or EPR with a defined column, you can use an internal calibration routine to estimate the actual column length. Similarly, if you do not know the column internal diameter or believe it is inaccurate, you can estimate the diameter from related measurements.

Before you can calibrate the column, make sure that:

- You are using a capillary column
- The column is defined
- There are no oven ramps
- The column gas source (usually the inlet) is **On** and non-zero

Also note that column calibration fails if the calculated column length correction is $\geq$ 5 m, or if the calculated diameter correction is $\geq$ 20 µm.

### Calibration modes

There are three ways to calibrate the column length and/or diameter:

- Calibrate using an actual measured column flow rate
- Calibrate using an unretained peak time (elution time)
- Calibrate both length and diameter using flow rate and elution time

**CAUTION** When you measure the column flow rate, be sure to convert the measurement to normal temperature and pressure if your measurement device does not report data at NTP. If you enter uncorrected data, the calibration will be wrong.

### To estimate the actual column length or diameter from an elution time

1. Set oven ramp 1 to 0.00, then verify that the column is defined.
2. Perform a run using an unretained compound and record the elution time.
3. Press **[Options]**, scroll to **Calibration** and press **[Enter]**.
4. From the calibration list, select the column and press **[Enter]**. The GC displays the current calibration mode for the column.
5. To recalibrate or to change calibration mode, press **[Mode/Type]** to see the column calibration mode menu.
6. Scroll to **Length** or **Diameter** and press **[Enter]**. The following choices appear:
   - **Mode**
   - **Measured flow**
   - **Unretained peak**
   - **Calculated length** or **Calculated diameter**

- **Not calibrated**

7 Scroll to **Unretained peak** and enter the actual elution time from the run performed above.

8 When you press **[Enter]**, the GC will estimate the column length or diameter based on the elution time input and will now use that data for all calculations.

### To estimate the actual column length or diameter from the measured flow rate

1 Set oven ramp 1 to 0.00, then verify that the column is defined.

2 Set the oven, inlet, and detectors temperatures to 35 °C and allow them to cool to room temperature.

3 Remove the column from the detector.

**CAUTION** When you measure the column flow rate, be sure to convert the measurement to normal temperature and pressure if your measurement device does not report data at NTP. If you enter uncorrected data, the calibration will be wrong.

4 Measure the actual flow rate through the column using a calibrated flow meter. Record the value. Reinstall the column.

5 Press **[Options]**, scroll to **Calibration** and press **[Enter]**.

6 From the calibration list, select the column and press **[Enter]**. The GC displays the current calibration mode for the column.

7 To recalibrate or to change calibration mode, press **[Mode/Type]** to see the column calibration mode menu.

8 Scroll to **Length** or **Diameter** and press **[Enter]**. The following choices appear:

- **Mode**
- **Measured flow**
- **Unretained peak**
- **Calculated length** or **Calculated diameter**
- **Not calibrated**

9 Scroll to **Measured flow** and enter the corrected column flow rate (in mL/min) from the run performed above.

10 When you press **[Enter]**, the GC will estimate the column length or diameter based on the elution time input and will now use that data for all calculations.

### To estimate the actual column length and diameter

1 Set oven ramp 1 to 0.00, then verify that the column is defined.

2 Perform a run using an unretained compound and record the elution time.

3 Set the oven, inlet, and detectors temperatures to 35 °C and allow them to cool to room temperature.

4 Remove the column from the detector.

**CAUTION** When you measure the column flow rate, be sure to convert the measurement to normal temperature and pressure if your measurement device does not report data at NTP. If you enter uncorrected data, the calibration will be wrong.

5 Measure the actual flow rate through the column using a calibrated flow meter. Record the value. Reinstall the column.

6 Press **[Options]**, scroll to **Calibration** and press **[Enter]**.

7 From the calibration list, select the column and press **[Enter]**. The GC displays the current calibration mode for the column.

8 To recalibrate or to change calibration mode, press **[Mode/Type]** to see the column calibration mode menu.

9 Scroll to **Length & diameter** and press **[Enter]**. The following choices appear:

- **Mode**
- **Measured flow**
- **Unretained peak**
- **Calculated length**
- **Calculated diameter**
- **Not calibrated**

10 Scroll to **Measured flow** and enter the corrected column flow rate (in mL/min) from the run performed above.

11 Scroll to **Unretained peak** and enter the actual elution time from the run performed above.

12 When you press **[Enter]**, the GC will estimate the column length or diameter based on the elution time input and will now use that data for all calculations.

# Communication

## Configuring the IP address for the GC

For network (LAN) operation, the GC needs an IP address. It can get this from a DHCP server, or it can be entered directly from the keyboard. In either case, see your LAN administrator.

### To use a DHCP server

1 Press **[Options]**. Scroll to **Communications** and press **[Enter]**.

2 Scroll to **Enable DHCP** and press **[On/Yes]**. When prompted, turn the GC off and then on again.

### To set the LAN address at the keyboard

1 Press **[Options]**. Scroll to **Communications** and press **[Enter]**.

2 Scroll to **Enable DHCP** and, if necessary, press **[Off/No]**. Scroll to **Reboot GC**. Press **[On/Yes]** and **[On/Yes]**.

3 Press **[Options]**. Scroll to **Communications** and press **[Enter]**.

4 Scroll to **IP**. Enter the numbers of the GC IP address, separated by dots, and press **[Enter]**. A message tells you to power cycle the instrument. Do *not* power cycle yet. Press **[Clear]**.

5 Scroll to **GW**. Enter the Gateway number and press **[Enter]**. A message tells you to power cycle the instrument. Do *not* power cycle yet. Press **[Clear]**.

6 Scroll to **SM** and press **[Mode/Type]**. Scroll to the appropriate subnet mask from the list given and press **[Enter]**. A message tells you to power cycle the instrument. Do *not* power cycle yet. Press **[Clear]**.

7 Scroll to **Reboot GC**. Press **[On/Yes]** and **[On/Yes]** to power cycle the instrument and apply the LAN setpoints.

# Keyboard and Display

Press **[Options]** and scroll to **Keyboard and Display**. Press **[Mode/Type]**.

The following parameters are turned on and off by pressing the **[On/Yes]** or **[Off/No]** keys.

**Keyboard lock** These keys and functions are operational when the keyboard lock is On:

**[Start]**, **[Stop]**, and **[Prep Run]**

**[Load][Method]** and **[Load][Seq]**

**[Seq]**—to edit existing sequences

**[Seq Control]**—to start or stop sequences.

When **Keyboard lock** is On, other keys and functions are not operational. Note that an Agilent data system can independently lock the GC keyboard. To edit GC setpoints using the GC keyboard, turn off both the GC keyboard lock and the data system keyboard lock.

**Hard configuration lock** **On** prevents keyboard configuration changes; **Off** removes lock.

**Key click** Click sound when keys are pressed.

**Warning beep** Allows you to hear warning beeps.

**Warning beep mode** There are 9 different warning sounds that may be selected. This allows you to give multiple GCs individual “voices”. We suggest you experiment.

**Method modified beep** Turn on for high pitched beep when method setpoint is modified.

Press **[Mode/Type]** to change the pressure units and radix type.

**Pressure units** psi—pounds per square inch, $lb/in^2$

bar—absolute cgs unit of pressure, $dyne/cm^2$

kPa—mks unit of pressure, $10^3\ N/m^2$

**Language** Select English or Chinese or Japanese.

**Radix type** Determines the numeric separator type—1.00 or 1,00

**Display saver** If **On**, dims the display after a period of inactivity. If **Off**, disabled.

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# 9
# Configuration Tasks



This section describes a several configuration tasks that may be required as part of normal operation.

## About the GC IP Address

From the factory, the GC is set to:

| | |
|---|---|
| IP address | 192.168.0.26 |
| Subnet Mask | 255.255.255.0 |
| Gateway | 192.168.0.1 |

The installation procedures assume that you will connect to the GC using this address. However, after installation you may need to change the GC IP address or set it to use DHCP.

## To set the IP address at the GC

1. Start the software keyboard. From the Windows® Start program menu, **Agilent > All Programs > Agilent Technologies > 7820A GC Remote Controller**.
2. Connect to the GC. Go to **Connection > Connect...**. In the **Target** field, enter the current GC IP address.

   If the connection fails, see "To troubleshoot a connection".
3. Click **[Options]**. Scroll to **Communications** and click **[Enter]**.
4. Verify DHCP is Off. Scroll to **Enable DHCP**. If **Enable DHCP** is **Off**, skip to the next step.

   If **Enable DHCP** is **On**, turn it off by clicking **[Off/No]**. Scroll to **Reboot GC**. Click **[On/Yes]** and **[On/Yes]**. After reboot, click **[Options]**. Scroll to **Communications** and click **[Enter]**.
5. Scroll to **IP**. Use the numeric keypad to enter the numbers of the GC IP address, separated by dots, and click **[Enter]**. A message tells you to power cycle the instrument. Do not power cycle yet. Click **[Clear]**.
6. Scroll to **GW**. Enter the Gateway number and click **[Enter]**. A message tells you to power cycle the instrument. Do not power cycle yet. Click **[Clear]**.
7. Scroll to **SM** and click **[Mode/Type]**. Scroll to the appropriate subnet mask from the list given and click **[Enter]**. A message tells you to power cycle the instrument. Do not power cycle yet. Click **[Clear]**.
8. Scroll to **Reboot GC**. Click **[On/Yes]** and **[On/Yes]** to power cycle the instrument and apply the LAN setpoints.
9. Ping the GC using the IP address entered above. See the Troubleshooting manual for details or if the GC does not respond.

## To Use DHCP to Provide the GC IP Address

To set the GC to use DHCP:

1. Turn off the GC.
2. While pressing and holding **[Prep Run]** and **[Stop]** on the GC keypad, turn on the GC. This will set the GC to use DHCP to obtain an IP address.
3. Ping the GC using the static IP address or hostname assigned to the GC by your network administrator. See the Troubleshooting manual for details or if the GC does not respond.

You can also set the GC to use DHCP using the software keypad.

1. Click **[Options]**. Scroll to **Communications** and click **[Enter]**.
2. Set **Enable DHCP** to **On** (press **[On/Yes]**).
3. Reboot the GC.

## To restore the default GC IP address

During installation and sometimes during operation, you may need to reset the GC IP address or change its IP addressing mode.

To restore the default IP address, press and hold the **[Prep Run]** key while power cycling the GC. After reboot, the GC IP address will return to:

| | |
|---|---|
| IP address | 192.168.0.26 |
| Subnet Mask | 255.255.255.0 |
| Gateway | 192.168.0.1 |

# To Reconfigure an EPC Module for Another Detector

Your GC may include EPC (electronic pneumatics control) flow modules, EPR (electronic pneumatics regulation) flow modules, or a mix of both. Additionally, Agilent previously manufactured universal electronic pneumatics control (UEPC) modules. UEPC modules are configurable flow module that supply gas flows to the detectors installed in the GC.

The 7820A GC is a single channel instrument. If your GC only includes a single flow module, it can supply gases to only one detector at a time.

If you have one detector flow module and two detectors, and wish to switch the detector used, you can reconfigure the flow module as described below.

If you have two detectors and two flow modules, you do not need to perform this procedure.

To reconfigure the GC to use a detector flow module with another detector:

1. Determine the gas types needed for the new detector. The new detector may require changes to the gas supply plumbing.
2. Prepare the tubing and gas supplies before beginning. See the Installation Guide for gas plumbing details and the Site Preparation Guide supply requirements.
3. Connect to the GC with the software keypad.
4. Cool down the detector in use. The detector must be cool in order to prevent damage during the changeover.
5. If changing the carrier gas, or if you will need to disconnect or shut off the carrier gas supply in order to change detector gases, cool down the inlet and oven.
6. Turn off the detector flows. If changing detector gas types, also shut off detector gas supplies.
7. Close any online data system session for this GC.
8. Remove the detector cover.
9. Remove the pneumatics cover to expose the detector flow modules. See Figure 1 and Figure 2.

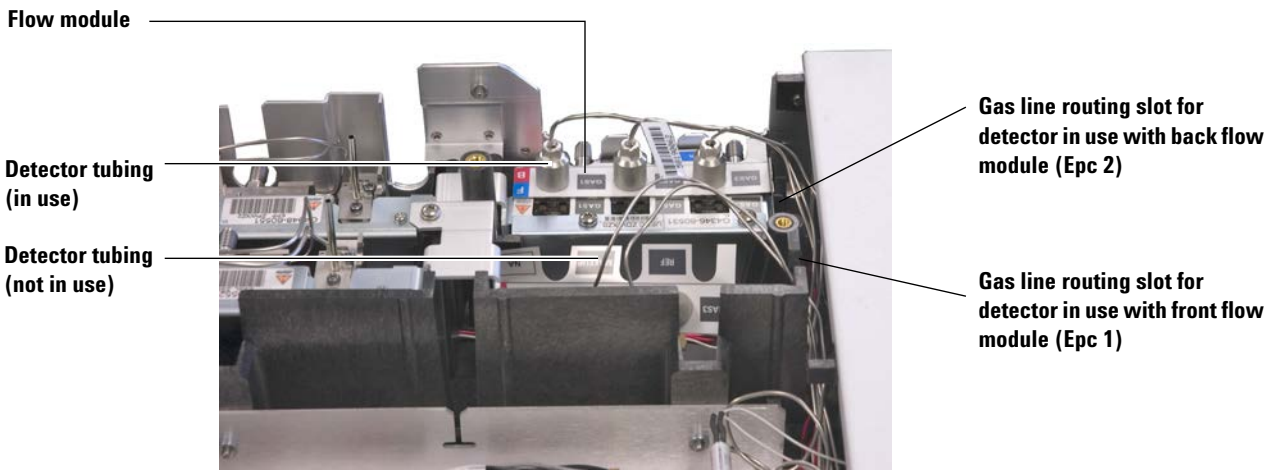
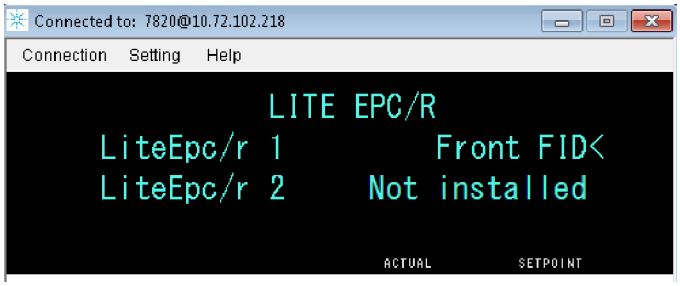



**Figure 1** Example back detector UEPC flow module with FID tubing attached


**Figure 2** Example EPC flow module with FID tubing attached

10 Click **[Config][Lite EPC#]**.

11 Scroll to the EPC module to reconfigure.




12 Click **[Mode/Type]**.

13 Scroll to the desired detector to use, then click **[Enter]**. The choices are:

- Front detector
- Back detector
- Not installed (do not use the flow module for a detector)

14 Follow the prompts in the software keypad display. Click **[Enter]** to continue when prompted. As a minimum, you will be prompted to close any online data session, then to reboot the GC.

After the GC reboots, the software keypad will temporarily loose communication with the GC. When the GC completes reboot, click **Reconnect**, or simply wait a few moments.

15 Turn off the new detector and its gas flows. Turning off the detector and its flows protects the detector and prevents shutdown errors while you connect any new gas supplies.

**CAUTION** When handling the detector flow tubing, avoid bending the tubing at sharp angles.

16 For GCs equipped with the UEPC module, do the following:

a Loosen the thumbscrews that secure the old detector tubing to the flow module.

b Lift the old detector tubing from the flow module. See Figure 1.

**CAUTION** Be careful not to cross-thread the knurled nuts onto the supply fittings.

c Locate the new detector's tubing.

d Place the new tubing over the flow manifold fittings, then fully tighten the thumbscrews.

e Make sure the gas type label is shown clearly.

17 For GCs equipped with EPC or EPR modules, do the following:

a Remove the Torx screws securing the detector tubing weldments to the flow module.

b Lift the old detector tubing from the flow module. See Figure 2.

c Locate the new detector's tubing.

d Place the new tubing weldments over the flow manifold fittings, positioning them so they align with the corresponding guide pins on the flow module.

e Install the Torx screws and secure by tightening finger tight.

18 Carefully arrange the new detector tubing so that it fits through the correct routing slot. See Figure 1.

19 Route the tubing for the unused detector tubing through the other routing slot, and gently push its fittings into the open manifold space. See Figure 1.

20 If the detector gas types differ between the new detector and the old detector, connect the new gas supplies to the detector flow module.

- Refer to the label on the detector tubing for the expected gas type for each flow module fitting.
- Turn on the supply gases and check for supply gas leaks at the fittings.
- Set source gas pressures. [Typically, set helium, hydrogen, and nitrogen supplies to 400 kPa (60 psi), and detector air to 550 kPa (80 psi).]

21 Click **[Lite EPC#]**. The new detector should be listed as the owner of the flow module.

22 Use the software keypad to configure any new gases (carrier or detector). For example, click **[Config][Back Det]**, then scroll to **Makeup gas type**.

23 Turn on the detector gas flows using the software keypad.

24 Reinstall the covers.

After reconfiguring the flow module, you will need to update any configuration settings in your Agilent data system. You will also need to resolve your method to use the new detector and column configuration, or create a new method.

**NOTE** If using Agilent EZChrom Elite Compact, you may wish to create a new instrument for the GC when configured for the second detector.

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