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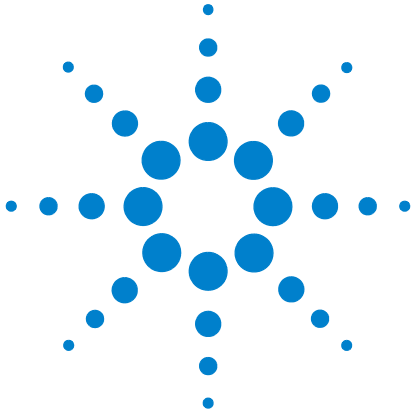

Agilent 7890A
Gas Chromatograph

Getting Familiar With Your GC

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 7890A Gas Chromatograph (GC).

In addition to this document, Agilent provides several learning products that document how to install, operate, maintain, and troubleshoot the Agilent 7890A GC. See "What Each Manual Contains" for details on those documents.

Before operating your GC, be sure to read the safety and regulatory information included on the Agilent Documentation and Utilities 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

Basic Operation

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

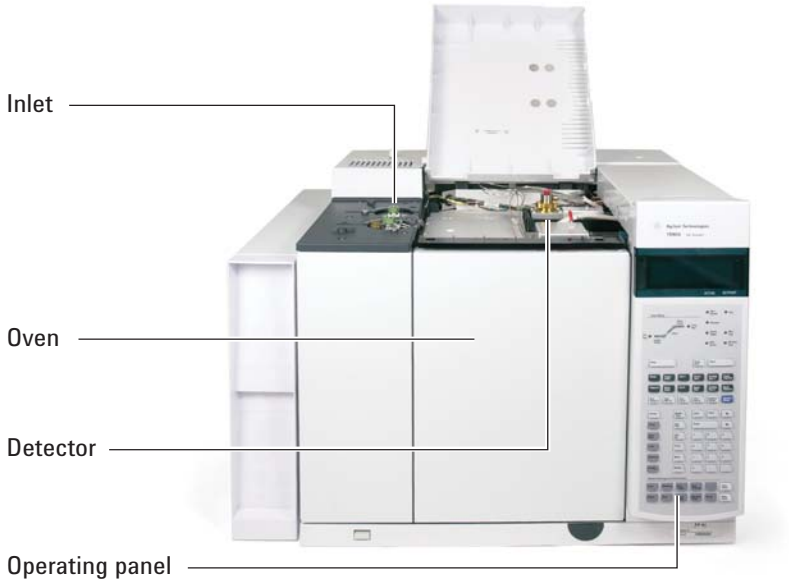
There are three major steps involved with separating and identifying components of a mixture using a GC. They are:

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.)

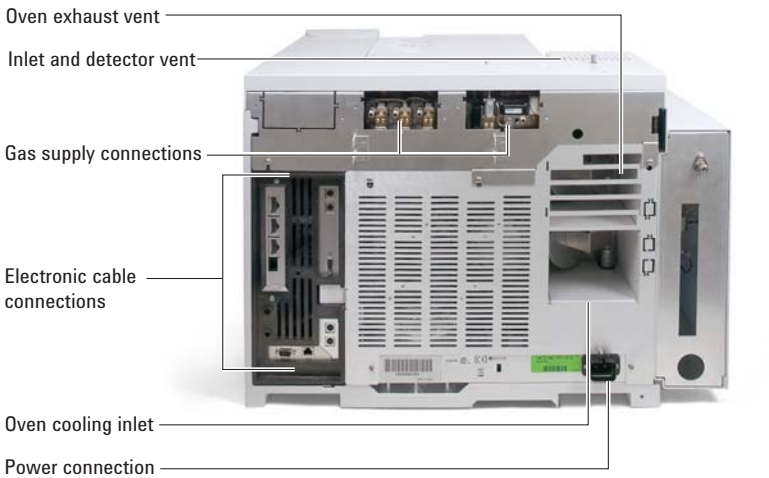
During this process, status messages from the Agilent 7890A GC are displayed, and user changes to parameter settings can be made through the operating panel.



Each part of this process is described in brief on the following pages of this document. Refer to the Operating and Advanced User Guides for more details.

The Front View of the Agilent 7890A GC

The Back View of the Agilent 7890A GC

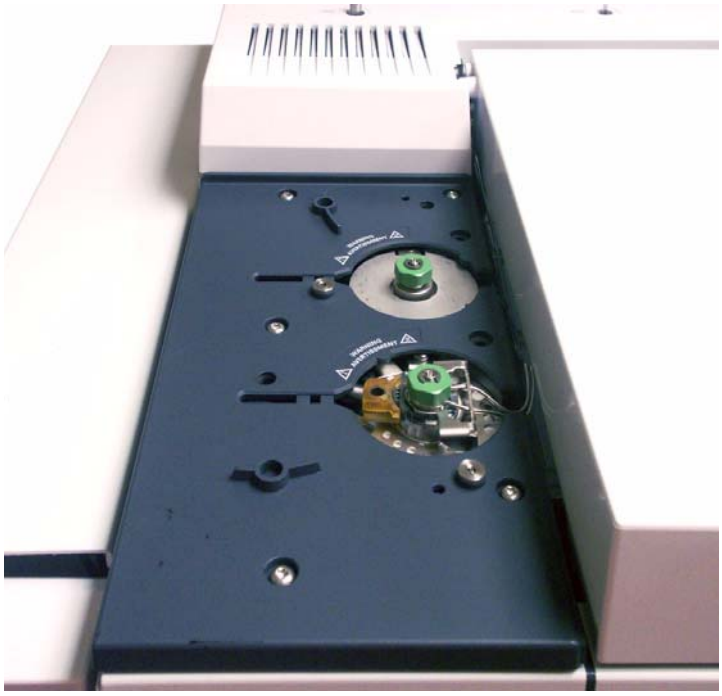


The Inlets

Inlets are where samples are injected into the GC. The Agilent 7890A GC can have a maximum of two inlets, identified as **Front Inlet** and **Back Inlet**.

A complete selection of inlets—multimode, split/splitless [0–100 psi and 0–150 psi], purged packed, cool-on-column, programmed temperature vaporization, and volatiles interface—are available.

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.

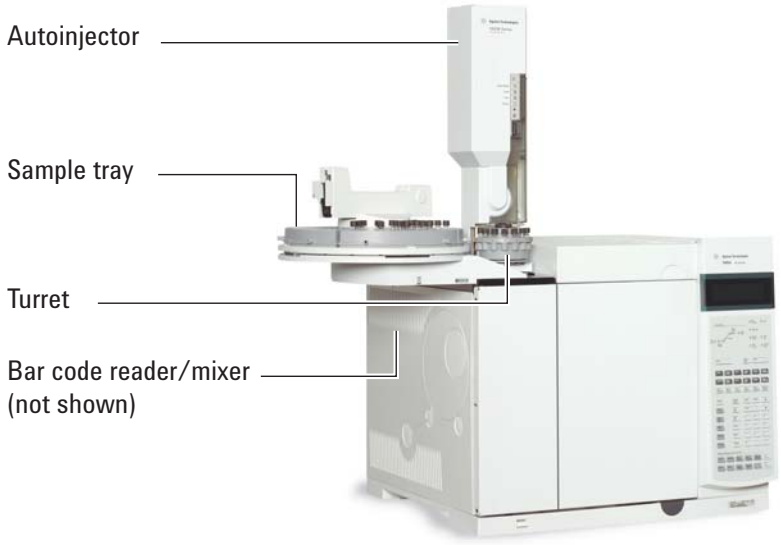


Samples can be injected into the inlets by hand using a syringe, or automatically using an automatic liquid sampler (such as the Agilent 7683B Automatic Liquid Sampler) or an automatic gas sampling device (such as the Agilent Headspace Sampler).

Automatic injectors

The optional Agilent 7683B automatic liquid sampler (ALS) with a sample tray and bar code reader (not shown) automates liquid sample processing. The modular design allows the autoinjector to be easily moved from one inlet to another or from one GC to another. The modular design also permits easy inlet maintenance.

The Agilent 7890A GC can accommodate up to two autoinjectors, identified as **Front Injector** and **Back Injector**.

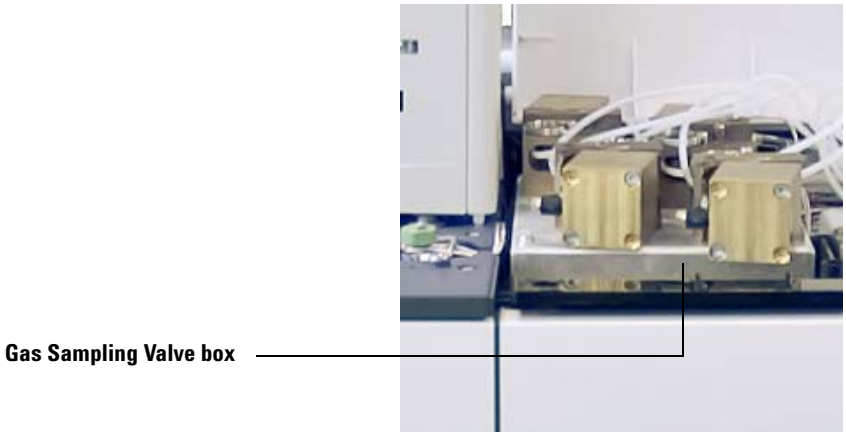


Automatic gas sampling valves

The 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 or liquids in constantly flowing streams.

The Agilent 7890A 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.

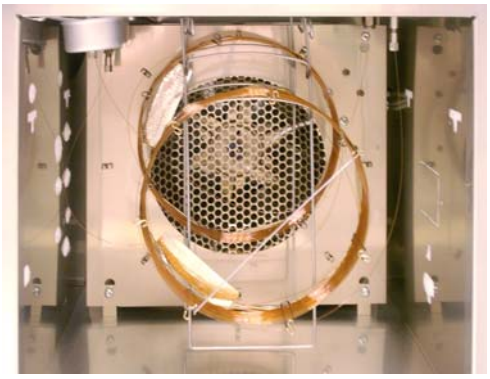


The GC Column and Oven

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.

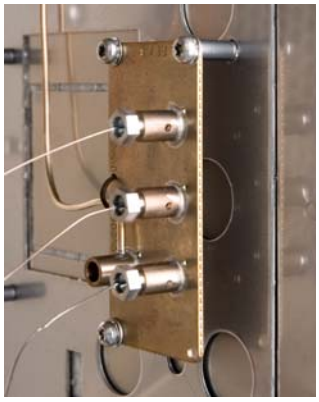
The purpose of the column and the oven is to separate the injected sample into individual compounds as it travels through the column. To aid this process, the GC oven can be programmed to speed the sample flow through the column.



Gas-Phase Microfluidics

Agilent gas-phase microfluidic devices are used for splitting, heart cutting, and reliable zero dead volume connections. The features of the microfluidic technology make traditionally difficult connections simple, reliable, and leak free.

The optional microfluidic switches, splitters, and quickswap accessories are located on the inside of the oven wall. These devices are primarily used when the analysis requires multiple sample paths between the inlet and detectors. They allow the chromatographer to design very efficient sample paths using multiple columns or detectors. In addition, analysis time can be reduced with the benefit of backflushing.



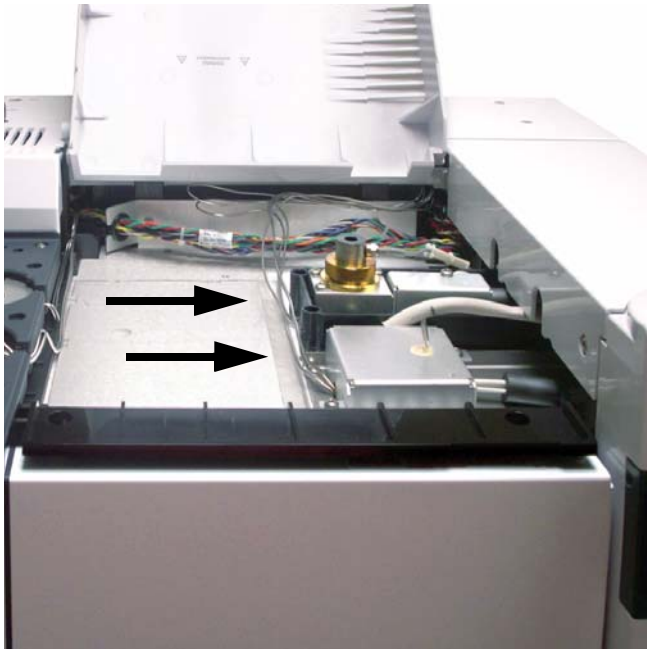
Detectors

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 the Agilent ChemStation—where it shows up as a peak on a chromatogram.

The Agilent 7890A GC can accommodate up to three detectors, identified as **Front Det**, **Back Det**, and **Aux Det.**

A complete selection of detectors: FID, TCD, NPD, µECD, MSD, ICP-MS, and an enhanced FPD are 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.

The display

The display shows details of what is currently happening in the Agilent 7890A GC and allows you to make changes to parameters as necessary.

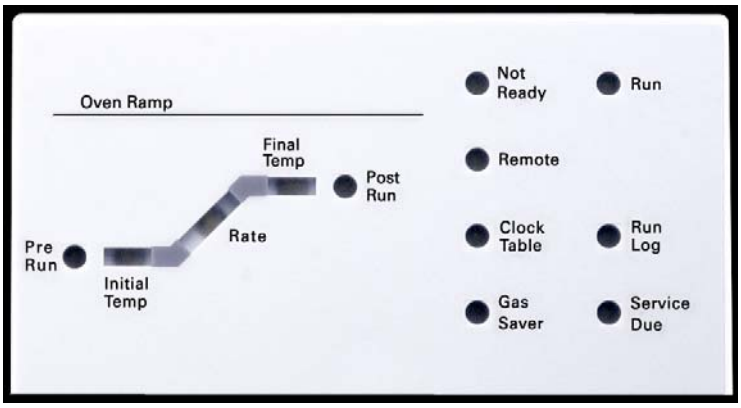
Use the scroll keys to view additional lines in the display.

A blinking asterisk (*) prompts you to press **[Enter]** to store a value or **[Clear]** to abort the entry. You cannot perform any other task until this is done.

Refer to "The keypad" of this document, or the GC Operating and Advanced User Guides for more details on how to interact with the displayed information.

Status lights

The status lights provide a basic look at what is currently happening inside the Agilent 7890A GC.



A lit LED on the status board indicates:

- The current progress of a run (**Pre Run**, **Post Run**, and **Run**).
- Items that may require attention (**Rate**, **Not Ready**, **Service Due**, and **Run Log**).
- The GC is controlled by an Agilent data system (**Remote**).
- The GC is programmed for events to occur at specified times (**Clock Table**).
- The GC is in gas saver mode (**Gas Saver**).

Beeping instrument

A series of warning beeps sound if the GC encounters a problem. For example, a series of beeps sound 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. Press **[Clear]** to stop the beeping.

A continuous beep sounds if a hydrogen flow is shut down or a thermal shutdown occurs. Press **[Clear]** to stop the beep.

One beep sounds for other types of faults, warnings, and shutdowns. A single beep means that 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 disappears when a run starts.

Fault messages indicate hardware problems that require user intervention. Depending on the type of error, the GC will beep once or not at all.

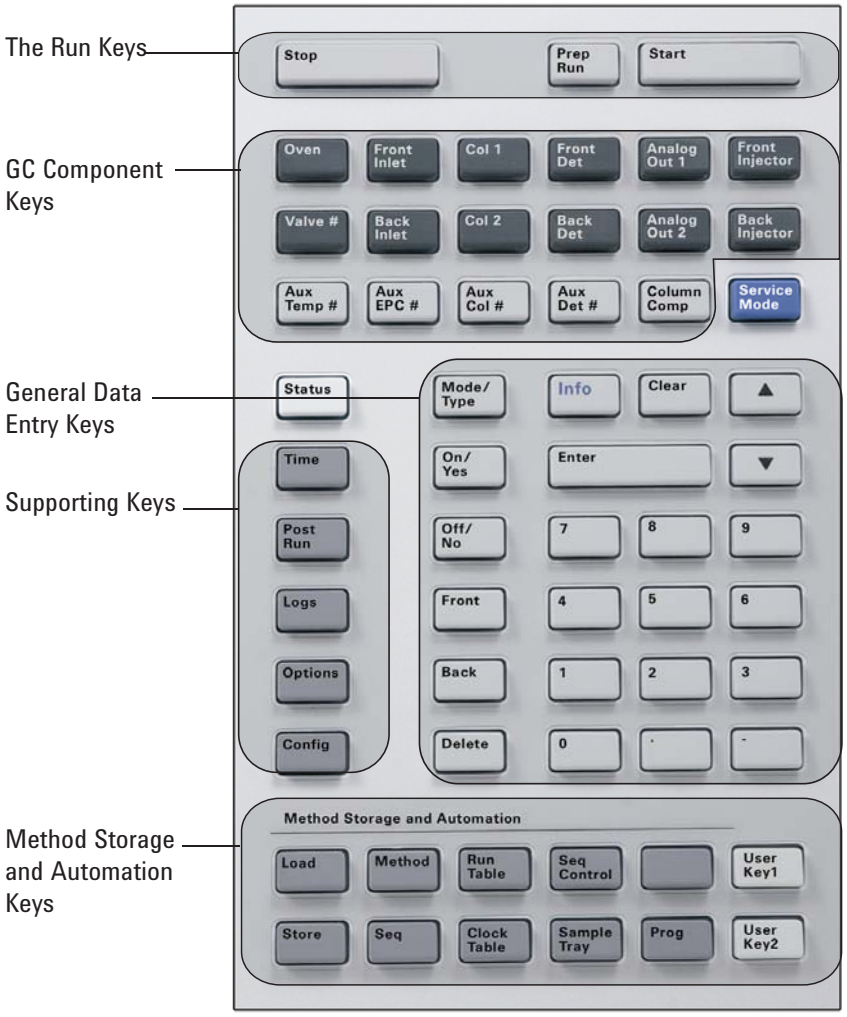
Blinking setpoint

If a gas flow, multiposition valve, or the oven is shut down by the system, **Off** or **On/Off** will blink on the appropriate line of the components parameter listing.

The keypad

All of the parameters required to operate the Agilent 7890A GC can be entered through the GC's keypad. Normally, however, most of these parameters are controlled using an attached data system, such as the Agilent ChemStation.

When the Agilent ChemStation is controlling your Agilent 7890A GC, it is possible for the ChemStation to disable editing of the GC's current method from the keypad.



2
About Methods, Sequences, and Data Analysis

What Is a Method?

A method is the group of settings required to accurately 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:

- The oven temperature program required
- The type of carrier gas required
- The type of detector to be used
- The type of inlet to be used
- The type of column to be used
- 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 ChemStation. These parameters describe how to interpret the chromatogram generated by the sample and what type of report to print.

See the Advanced Users Guide 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.
- **User-stored methods**—Up to 20 methods can be stored in the GC.

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.

- 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 the Operating Guide for details on using the keypad to load, modify, and save methods.

What Is a Sequence?

A sequence is a list of samples to be analyzed along with the method to be used for each analysis. Once defined, the sequence may run unattended, automatically processing the samples defined in the sequence.

Refer to the Operating and Advanced User Guides for details on how to create, load, modify, and save sequences using the keypad.

Automating Data Analysis, Method Development, and Sequence Development

Data compiled from samples (the output of the detectors) is digitized and can be sent to an automated data analysis system (such as the Agilent ChemStation), where it is analyzed and the results summarized in reports.

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

3
Additional Learning Products

Agilent provides several learning products that document how to set up, install, operate, maintain, and troubleshoot the Agilent 7890A Gas Chromatograph.

These documents, along with an extensive collection of additional online information, videos, books, and much more, can be found on the Agilent Documentation and Utilities DVD provided with the Agilent 7890A GC.

Read the following pages for more details.

What Each Manual Contains

Each of the Agilent 7890A GC reference manuals listed below can be found on the Agilent Documentation and Utilities DVD shipped with the Agilent 7890A GC.

Safety and Regulatory Information

Intended for all users. Describes the important safety information all users need to know before operating or maintaining the GC.

Getting Familiar with Your GC (this manual)

Intended for new users. An overview of the GC components, such as the inlets, detectors, GC controls and features, and the GC display.

Operating Guide

Intended for all users. Describes how to use the GC daily to process samples with or without an Agilent data system.

Maintaining Your GC

Intended for maintenance personnel. Describes all routine and user maintenance tasks.

Advanced User Guide

Intended for chemists and method developers. Describes the concepts and tasks needed to develop methods and determine maintenance intervals. Describes when and how to input physical details (such as date and time, column dimensions, and injector location) into the GC so that it operates efficiently.

Troubleshooting

Intended for maintenance personnel. Describes how to isolate the root cause(s) of poor performance and other symptoms and the steps to take to resolve the problem.

GC, MSD, and ALS Site Prep Checklist

Intended for anyone who needs to prepare a lab for the GC. Describes the GC's space, power, and supply requirements.

GC, MSD, and ALS Installation Checklist

Intended for the technician who installs the GC and MSD. Lists the basic installation steps.