Multiple Gas Analyzer #1 GC System

Separates multiple gases with a single injection

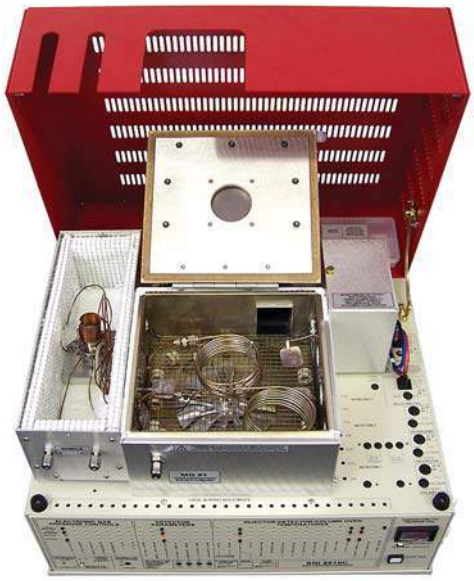
Very tolerant of user adjustments and timing variations

Simpler than other multiple gas capable systems

The basic model includes:

- **TCD Detector**
- **Two Columns - MoleSieve 13X & Silica Gel**
- **10-port Gas Sampling Valve and Loop**
- **1 channel PeakSimple Data System**

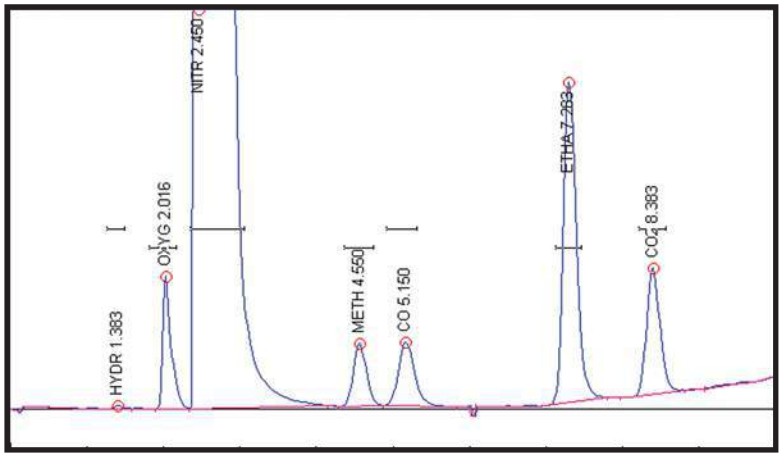
...on the compact 8610C chassis



The SRI Multiple Gas Analyzer #1 GC System (MG#1) can separate multiple gases with a single injection. It is pre plumbed and ready to resolve H_2, O_2, N_2, Methane, CO, Ethane, CO_2, Ethylene, NO_X, Acetylene, Propane, Butanes, Pentanes and C_6-C_8. The MG#1 is very tolerant of user adjustments and timing variations because it is simpler than other multi-gas capable systems. Unlike complicated and timing-critical gas analysis configurations with three or four columns and three or four valves, the SRI Multiple Gas Analyzer uses a single 10-port gas sampling valve and two packed columns: a 2 meter Molecular Sieve 13X and a 2 meter Silica Gel.

The basic Multiple Gas Analyzer #1 is equipped with a TCD detector for detection limits in the 200-500ppm range. The second option is a TCD-Methanizer-FID configuration, which provides 5ppm detection limits for CO, CO_2 and all hydrocarbons. The third option is a TCD-HID detector combination for detection limits in the 10ppm range for all analytes.

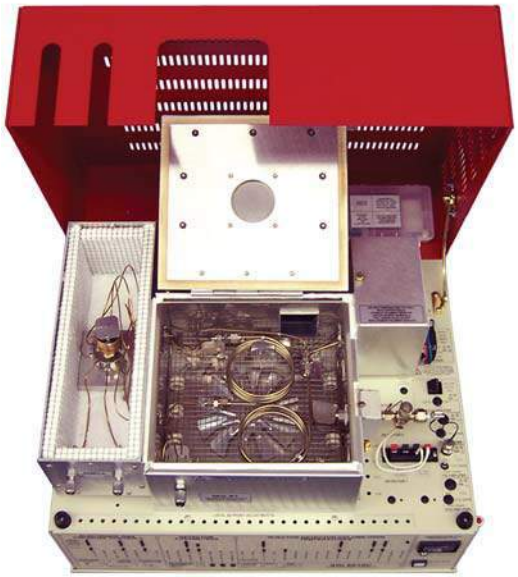
This chromatogram shows the separation of a 1% Gas Mix + 2% ethane sample on a basic TCD equipped MG#1.

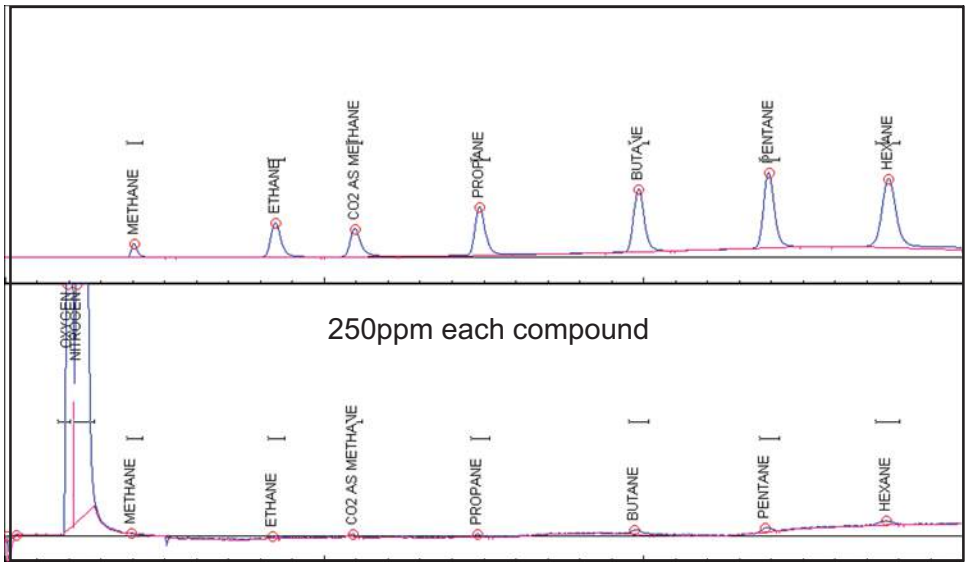


Multiple Gas Analyzer #1 GC System

The basic model includes:

- **TCD Detector**
- **FID-Methanizer**
- **Two Packed Columns**
- **10-port Gas Sampling Valve and Loop**
- **1 or 6 channel PeakSimple Data System**





The FID measures the C_1-C_6 hydrocarbons, plus CO and CO_2, which are converted to methane by the Methanizer in the FID jet.

The TCD measures hydrogen, oxygen, nitrogen, methane and other compounds whose concentrations are at least 200-500ppm.

8610-0070	**Multiple Gas Analyzer #1 with TCD detector and 1 channel PeakSimple data system**
8610-0071	**Multiple Gas Analyzer #1 with TCD, Methanizer, FID, built-in "whisper quiet" air compressor and 6 channel PeakSimple data system**
8610-0072	**Multiple Gas Analyzer #1 with TCD and HID detectors, and 6 channel PeakSimple data system**

OPTIONS & UPGRADES: 6 channel USB PeakSimple data system, additional gas sampling valve, additional detectors
(VOLTAGE: for 115VAC, use "part number-1" [ex: 8610-0070-1] for 230VAC, use "part number-2")

Multiple Gas Analyzer #2 GC System

Separates multiple gases with a single injection

Very tolerant of user adjustments and timing variations

Simpler than other multiple gas capable systems

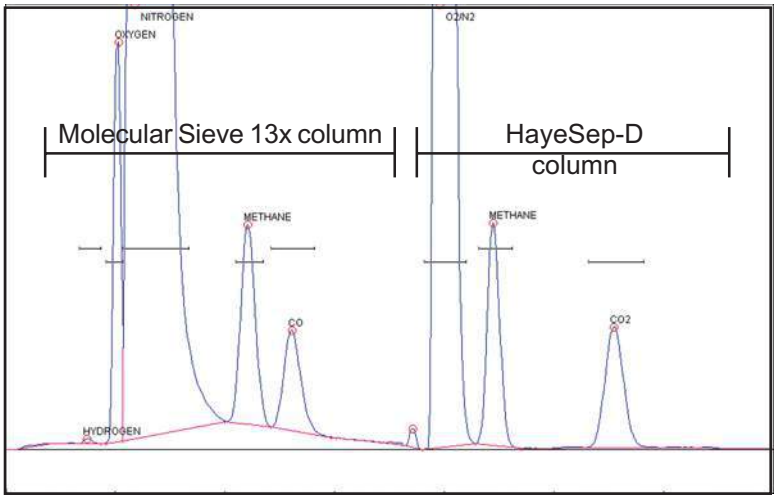
The basic model includes:

- **TCD Detector**
- **Methanizer, FID, and HID options**
- **10-port Gas Sampling Valve and Dual Loops**
- **Two Columns - MoleSieve 13X & HaySep-D**
- **1 or 6 channel PeakSimple Data System**

...on the compact 8610C chassis

The Multiple Gas Analyzer #2 GC (MG#2) system is preplumbed and ready to resolve H_2, O_2, N_2, methane, CO, ethane, CO_2, ethylene, acetylene, NOx, water, alcohols, propane, butanes, pentanes and C_6+. The MG#2 is similar to the MG#1, except that the MG#2 can measure water and alcohol in addition to the multiple gas compounds.

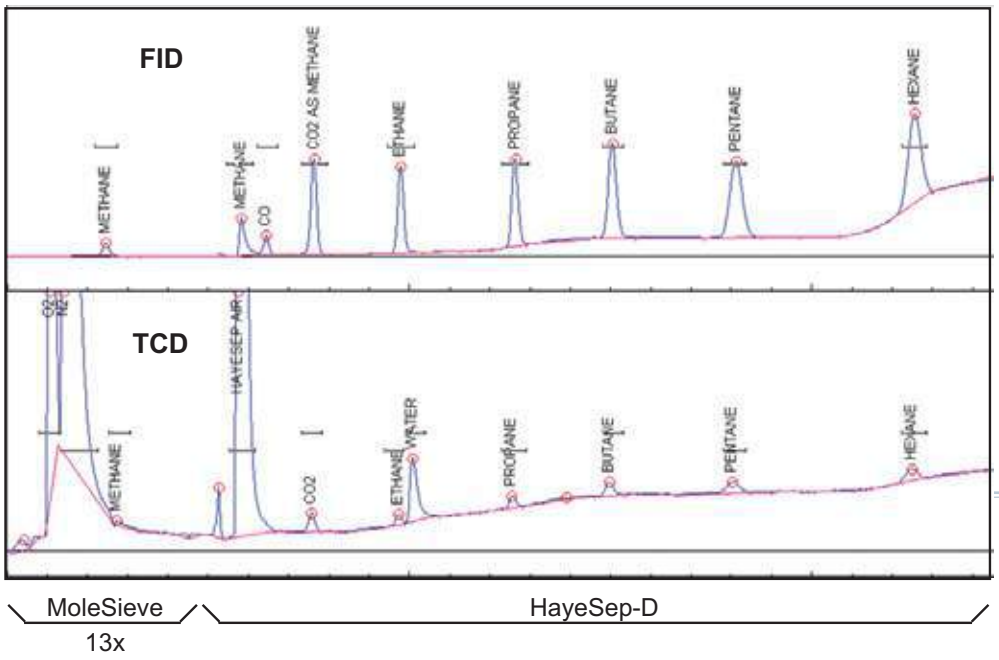
To separate such a wide variety of peaks without coelution, the MG#2 turns on the carrier gas flow to each column at different times during the run. This allows the Molecular Sieve column to complete the separation of H_2, O_2, N_2, CH_4 and CO, at which point the MoleSieve carrier flow is turned off and the HayeSep-D carrier flow is turned on. The HayeSep-D column then separates all compounds in the C_1 through C_6 range. A capillary column in parallel with the HayeSep-D can also be useful in separating the hydrocarbons out through C_{20}. Detectors can be TCD, HID, FID or any combination, depending on the exact needs of the analysis.



This chromatogram shows the separation of a 1% Gas Standard sample on a MG#2 GC equipped with a TCD detector. The first 5 peaks came off the MoleSieve column, and the following 3 peaks came off the HayeSep-D column. Note that the methane elutes twice, once from each column.

Multiple Gas Analyzer #2 GC System

These chromatograms show the separation of a 1000ppm C_1-C_6 standard plus room air on a MG#2 GC equipped with a TCD and FID detectors.



This customized MG#2 GC is equipped with:

- **TCD Detector**
- **HID Detector**
- **FID-Methanizer**
- **Two Packed Columns**
- **One Capillary Column**
- **10-port Gas Sampling Valve and Dual Loops**
- **1 channel PeakSimple Data System**

...on the compact 8610C chassis

8610-0270	**Multiple Gas Analyzer #2 GC with TCD detector and 1 channel PeakSimple data system**
8610-0271	**Multiple Gas Analyzer #2 GC with TCD, Methanizer, FID, built-in "whisper quiet" air compressor and 6 channel PeakSimple data system**
8610-0272	**Multiple Gas Analyzer #2 GC with TCD and HID detectors, and 6 channel PeakSimple data system**

OPTIONS & UPGRADES: 6 channel USB PeakSimple data system, capillary column, Thermal Desorber
(VOLTAGE: for 115VAC, use "part number-1" [ex: 8610-0270-1] for 230VAC, use "part number-2")

Multiple Gas Analyzer #3 GC System

Separates multiple gases with a single injection

Very tolerant of user adjustments and timing variations

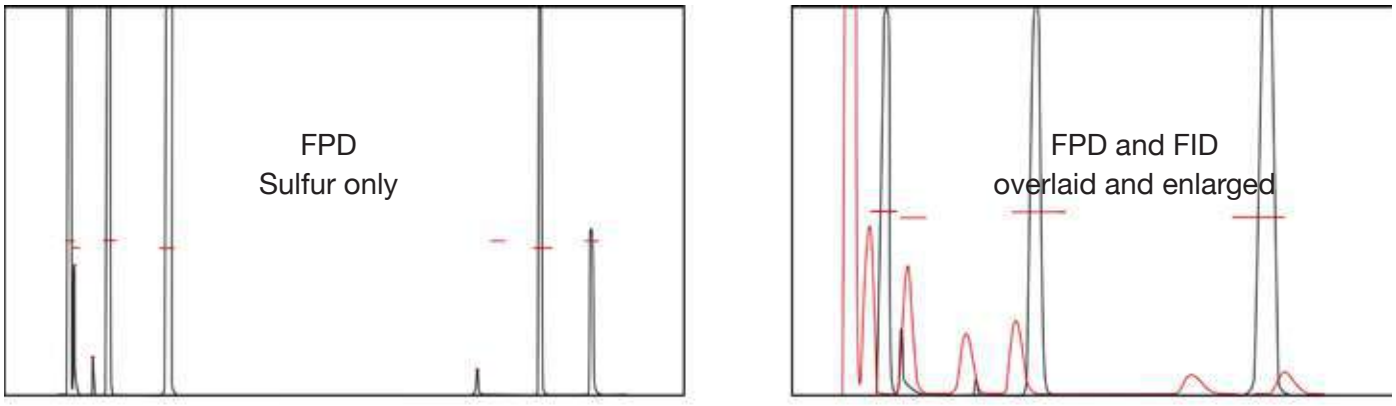
Simpler than other multiple gas capable systems

The basic model includes:

- **TCD Detector**
- **Methanizer, FID, and HID options**
- **10-port Gas Sampling Valve**
- **Two Columns - MoleSieve 13x HaySep D**
- **1 or 6 channel PeakSimple Data System**

...on the compact 8610C chassis

The SRI 8610C Gas Chromatograph Multiple Gas #3 GC configuration is a versatile low cost way of analyzing many different kinds of gas samples. The MG#3 GC configuration is almost identical to the MG#1 GC configuration except there is an additional solenoid valve which when activated by the PeakSimple data system stops the flow of carrier gas in column 1. The MG#3 GC configuration is slightly more flexible than the MG#1 because the stop flow capability allows a wider selection of columns to be used, where the MG#1 only works with silica gel as Column 1 and MoleSieve 13X as Column 2.

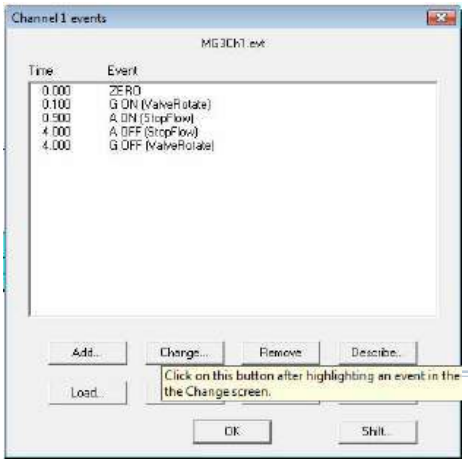


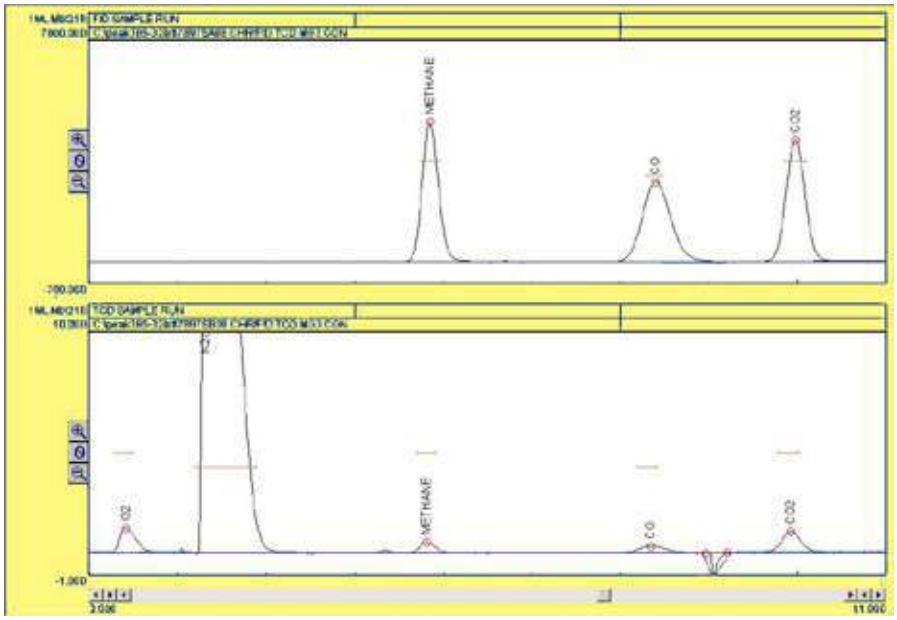
The chromatograms shown above are a mix of natural gas and sulfur compounds. The chromatogram shows the FPD response (black) overlaid with the FID response (red). You can see by the overlaid chromatograms that COS co-elutes with Propane quenching its FPD response.

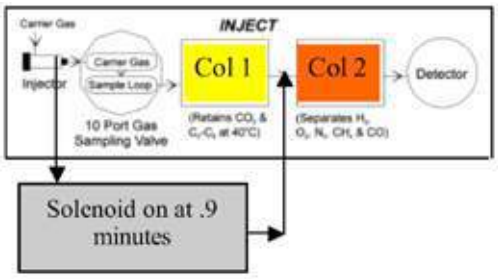
Instead, the MG#3 allows the Stop Flow solenoid to actuate at 3.5 minutes just after the Propane and COS migrate into Column 2. This traps the peaks after Propane in Column 1 while the peaks in Column 2 (Methane, Ethane, Propane, H_2S and COS) separate and elute. Unlike column 1 which does not separate COS and Propane, the peaks are well separated on Column 2 so quenching does not occur. Once Propane elutes from Column 2 (about 10 minutes) the valve rotates back to the Load position and the Stop Flow solenoid is de-energized. The peaks which were trapped on column 1 now elute to the detectors (Butanes, Pentanes, Mercaptans etc.)

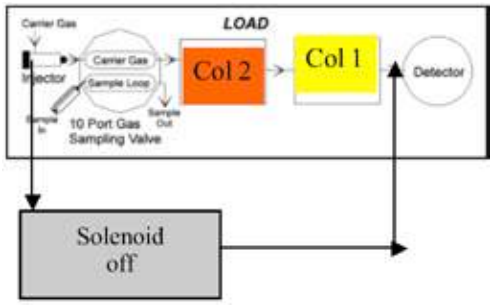
Multiple Gas Analyzer #3 GC System

Another example is Natural Gas. Set the Event table up to inject and then immediately rotate the valve back to Load after .1 minutes in the Inject position. This has the effect of performing the analysis as if Column 2 was not in the system. Column 1 is a 3' HaySep D and Column 2 is a 6' MS13X. The HaySep D does not separate Oxygen and Nitrogen or CO. Set the Stop-Flow solenoid time by finding the gap between Methane and CO_2, in this case about .9 minutes. With the Event table modified, the Oxygen, Nitrogen and Methane separate on the MS13X. Then the Stop-Flow solenoid is de-energized and valve rotated back to Load position (both at 4.00 minutes) and the remaining peaks (Ethane, Propane, Water, Butanes, and Pentanes) which were immobilized on the HaySep D (column 2) elute normally.









8610-0370	**Multiple Gas Analyzer #3 GC with TCD detector and 1 channel PeakSimple data system**
8610-0371	**Multiple Gas Analyzer #1 with TCD, Methanizer, FID, built-in "whisper quiet" air compressor and 6 channel PeakSimple data system**
8610-0372	**Multiple Gas Analyzer #1 with TCD and HID detectors, and 6 channel PeakSimple data system**

OPTIONS & UPGRADES: 6 channel USB PeakSimple data system, additional gas sampling valve, additional detectors
(VOLTAGE: for 115VAC, use "part number-1" [ex: 8610-0070-1] for 230VAC, use "part number-2")

Multiple Gas Analyzer + Sulfur GC Systems

- **FID Detector**
- **30 meter Capilary Column**
- **Built-in, “whisper quiet” Air Compressor**
- **6 Channel PeakSimple Data System**
- **On-Column Injector**

...on the compact 8610C chassis

Many analysts require natural gas analysis for BTU value calculations or drilling and mudlogging applications. Frequently, sulfur compounds are also of interest.

Because low sulfur concentrations (<50ppm) are difficult to measure, SRI has enhanced our popular Multiple Gas Analyzer GCs to simultaneously monitor low levels of sulfur compounds. The additional hardware required is an FPD/FID detector, which selectively detects sulfur down to mid-ppb range, and a room temperature Silcosteel sample loop.

Room Temperature
Silcosteel sample loop

One reason sulfur is so difficult to measure is that it disappears on contact with hot stainless steel surfaces; even limited contact with a hot stainless steel sample loop will destroy any sulfur in the gas sample. Our solution is to use a Silcosteel-lined transfer line leading to a splitter, and a 60 meter thick film capillary column. While Teflon columns are sometimes also used for sulfur analysis, the natural gas analysis (using MoleSieve and SilicaGel) requires column temperatures of 250°C or higher. Since the sulfur column is located in the same column oven, it is essential to use a column like the 60 meter capillary which can tolerate the higher temperatures.

8610-0073	**Multiple Gas Analyzer #1 + Sulfur GC with TCD, FID, and FPD/FID detectors, methanizer, built-in air compressor, 3 columns, and Silcosteel sample loop**
8610-0373	**Multiple Gas Analyzer #3 + Sulfur GC with TCD, FID-methanizer, and FPD/FID detectors, built-in air compressor, 3 columns, and Silcosteel sample loop**

OPTIONS & UPGRADES: split/splitless and PTV injectors, additional column(s), gas sampling valve, Thermal Desorber
(VOLTAGE: for 115VAC, use “part number-1” [ex: 8610-0073-1] for 230VAC, use “part number-2”)