Buck 310 GC

PeakSimple Software

Chromatography- Gas
Standard Operating Procedures (Preliminary)

(Detect Instrument Picture to Jump to that section of SOP)

Agilent/Varian 3800

Prepared by: Bob Morrison (STLCC-CPLS Instrumentation Specialist)
and Mike Davies (NIDUS)
Original Nov 10 , Latest Revision Nov 11(add Varian manual)

The GC is in the Bio processing Room along the front windows. It is a Varian 3800CP (pretty fancy when set up correctly) with a flame ionization detector (FID). It has not been used at the college, but it was removed from Covidien's St. Louis plant in working condition. The column will need to be replaced as well as all of the fittings. The college does not have a software package such as Galaxie or TotalChrome at BRDG Park, but the machine's on-board screen allows the user to view results and adjust settings. Hydrogen and/or helium sources will be needed as well. That's all that I know about it, but Denise Heinz may be able to help more either personally or through her company.
-Ian Rappold 5/2013

Chromatography: Gas, Buck 310

- Small size, full peformance
- Dimensions: 12.5" wide x 13.5" high x 14.5" deep
- Ambient to 400˚C programmable column oven
- Mounts up to four detectors

Hot link to BUCK 310 Product Brochure…pdf

Hot link to Quick Start Guide (SRI) …pdf

Hot link to Gasless Education guide …pdf

Hotlink to Free Technical Support at SRI
http://www.srigc.com/2005catalog/cat109.htm

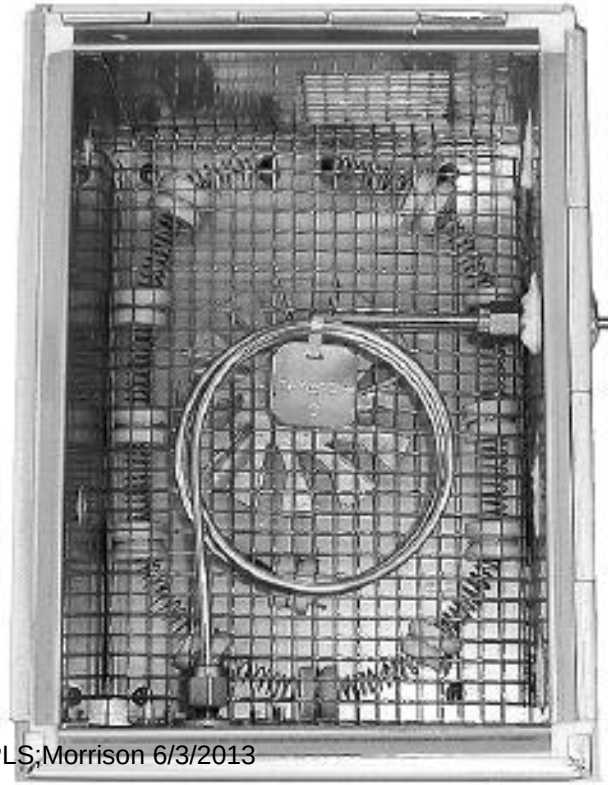
The Buck 310 portable gas chromatograph is Multi-detector system and can accommodate 2-4 detectors, depending on your combination. There are 9 specific detectors available for the Buck 310 GC. Price is for base unit, without detector(s).. Designed to be durable and portable, the compact 310-series is ideal for operation in the field, E.P.A. and A.S.T.M. methods can be easily performed on-site, even in adverse field environments. A GC with the versatility to meet your lab's specific needs. The unique architecture of the Buck GC systems allow various detector and injector combinations, so each GC can be configured to meet your specific lab requirements. Automated Analyses let the GC do the work so you don't have to -The Buck 310 offers total control of application parameters using PeakSimple software. PeakSimple allows unlimited temperature programming, electronic pressure control, carrier gas pressure, gas valve position, gas solenoid actuation, autosampler control and other options. Just program your application parameters into the computer and let the 310 do the rest. Over 12 different detector options to choose from for optimal measurement results

Chromatography: Gas, Buck310
CCD (Catalytic Combustion Detector)

CCD on Column Oven

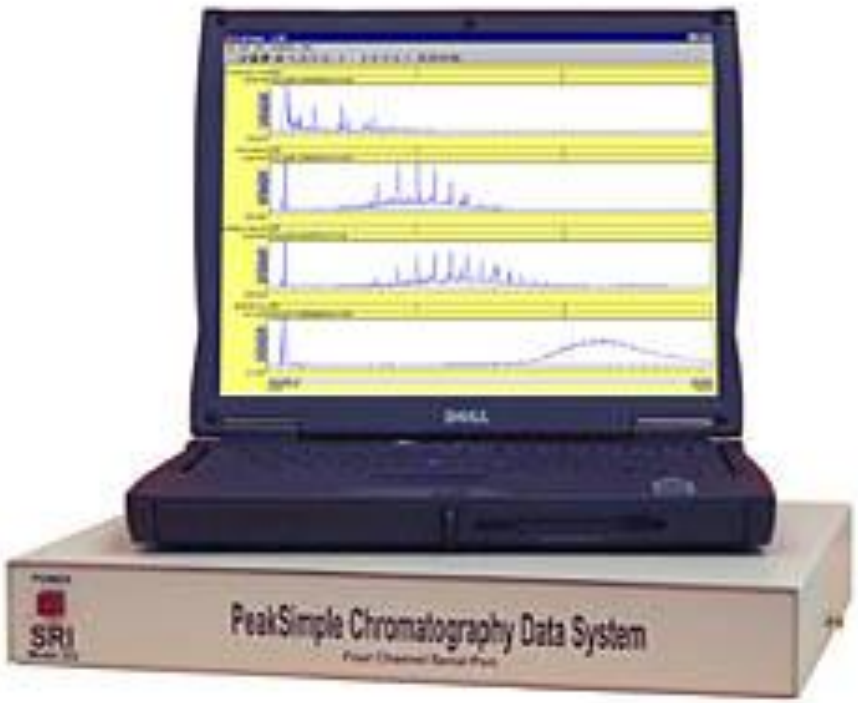
CCD Detector and protective cap (cap is removed prior to installation)

The Catalytic Combustion Detector responds to all hydrocarbons with the selectivity of an FID and the sensitivity of a TCD. The entire detector's diameter is merely one centimeter. Its sensor element consists of a tiny coil of platinum wire embedded in a catalytic ceramic bead. Each CCD detector has a pair of sensor elements. The sensors are housed in high-grade, flame-proof nylon, and protectively capped with a fine steel mesh. In SRI GCs, the CCD detector is mounted on the wall of the Column Oven in a brass housing, as shown in the top left picture. The analytical column residing in the Column Oven is connected to the detector through the oven wall; the example shown at bottom left is an SRI Gas-less™ Educational GC featuring a CCD detector and a 1m (3') Hayesep-D packed column. The CCD detector is especially suited for gas-less operation because it can operate on ambient air, requiring no high pressure cylinder gases such as hydrogen or helium. In the GC system pictured at left, a built-in air compressor supplies the carrier gas for the CCD.



The CCD detector can also be used as a hydrocarbon monitor in non-chromatographic applications where the CCD senses the total hydrocarbon content of a flowing air stream, or as a hydrogen/hydrocarbon leak detector.

Chromatography: Gas, Buck310, PeakSimple Software



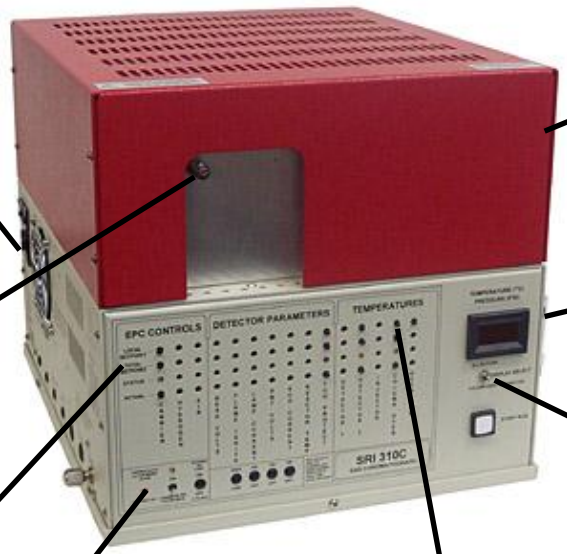
PeakSimple chromatography data systems consist of hardware and software. The hardware is available as a stand-alone data system for connection to almost any model GC, HPLC, or CE system. The same hardware is supplied as standard equipment with every SRI 8610C, 8610D, 410, and 310 GC. No hardware is installed in your computer, so a notebook or netbook PC may be used instead of a full-sized desktop PC. PeakSimple chromatography acquisition and integration software for

***http://www.srigc.com/PeakSimple.htm* (from SRI Instruments Co. Make detectors)**

PeakSimple Version 3.88 for Windows Vista downloaded and installed
On Stratagene Laptop 11/12/10 by Bob Morrison

Set Default COM 1 port ID to "1" under Edit-Overall toolbar

Chromatography Gas: Buck310



On/Off main toggle

Injection Port

LOCAL
TOTAL
STATUS

Temp Over Limit LED

Door must be closed before Oven with operate
Open door to Set “pots” before run.

Screwdriver: used to turn “pot” set screws for Temp, other parameters. See manual

Toggle Switch:
Up position to set values.
Down position, current readings displayed.

TEMP Column of buttons:
With toggle in up position, buttons will be used to adjust or calibrate oven temp to ambient level.

Chromagraphy: GAS, Basic Start Guide, Buck 310

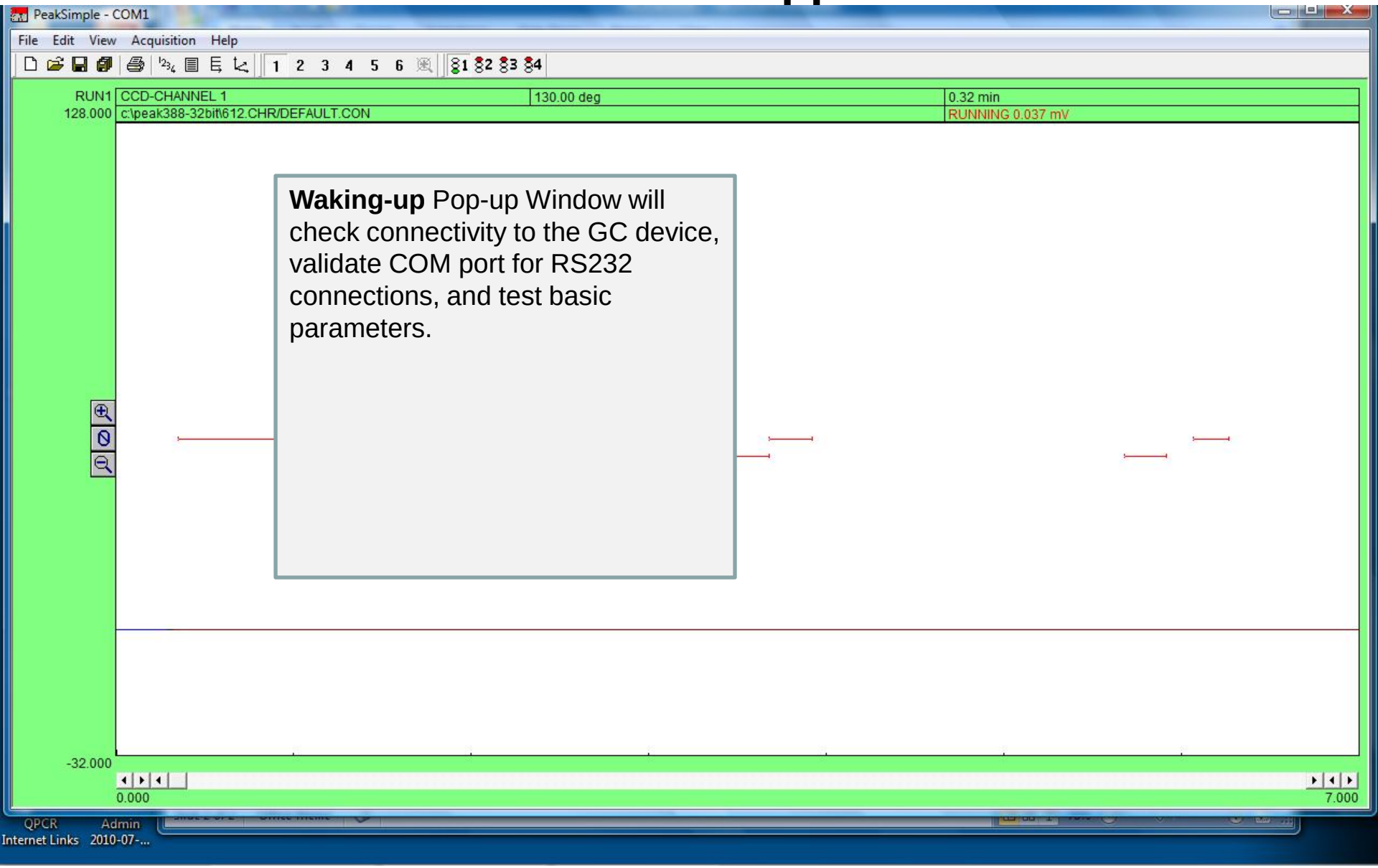
HARDWARE:

1. **On the Front panel of the GC, set the toggle switch to the UP position**
2. **Open the lid of the GC to expose the oven and "pot" set screw holes.**
3. **Retrieve the screwdriver and insert in the hole or "pot" above the TEMP column. While holding the top (LOCAL) row button, rotate the "pot to the 0000 position. This will indicate tha no increment is set above the current oven ambient/room temperature.**
4. **Close the GC lid. Press the STATUS row TEMP button and observe that the oven is at ambient temperature. The TOTAL row should show 0000 or close to it.**
5. **Turn off the GC device and proceed to the SOFTWARE setup which will control the device parameters for run and analysis.**

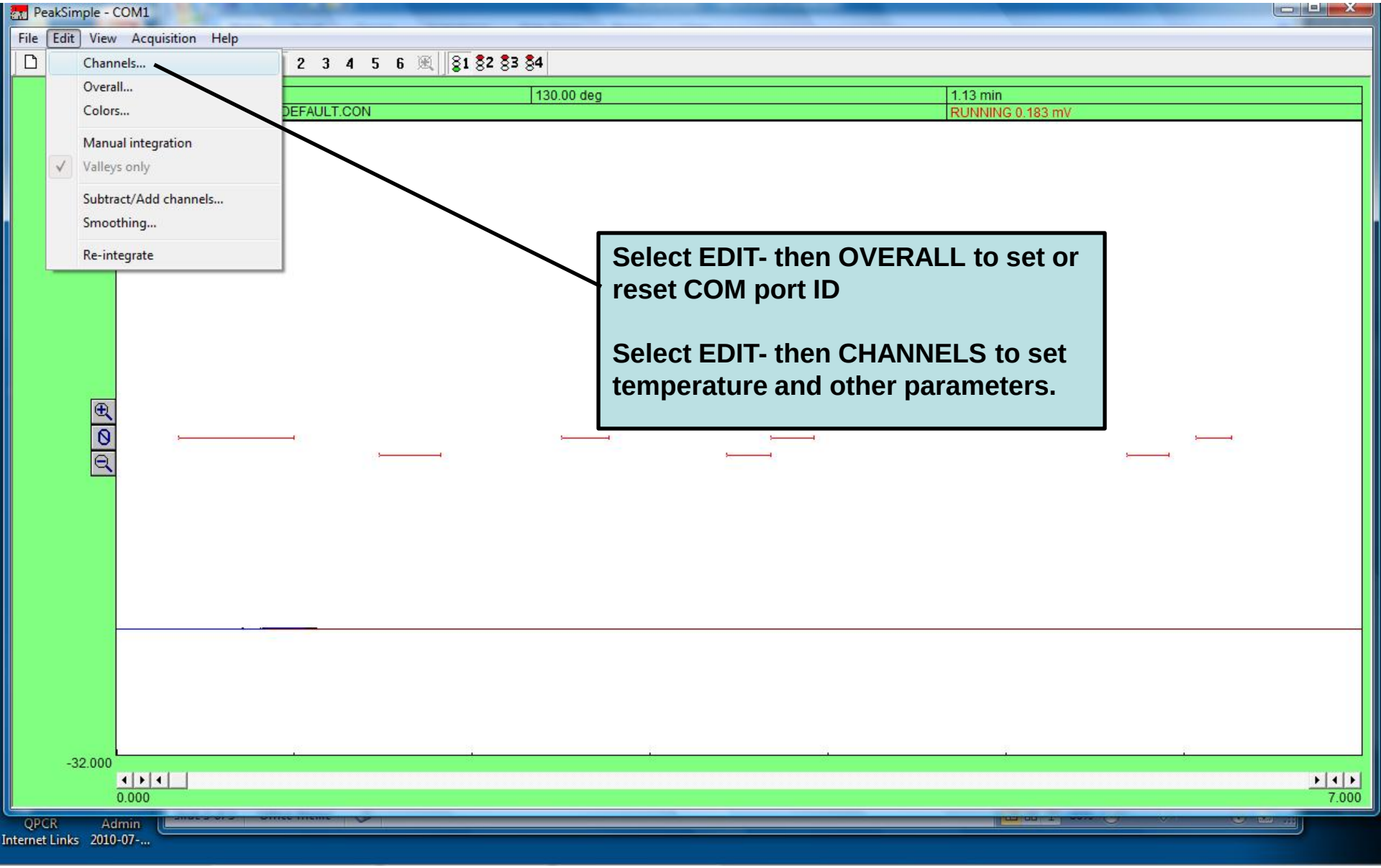
SOFTWARE:

1. **Download PeaksimpleSoftware to PC, attach RS232 line from GC device to COM port.**
2. **Turn on GC (toggle), Initiate Peaksimple Software and monitor initialization and communication process between device and software. If initialization fails, Go to PeakSimple Edit option in top toolbar, select Overall, then enter COM port ID where the RS232 connect was made. You may also need to change the type of connection (USB or Serial) on this same panel. Repeat startup process.**
3. **Select EDIT from the top toolbar, then Channels. Select the Active, Display, and Integrate options next to Channel 1. An "X" will show in the appropriate box.**
4. **From the EDIT-CHANNELS menu, Select DETAILS, then MAIN for channel 1. In the Control by section, select Temperature.**
5. **From the EDIT-CHANNELS menu, Select TEMPERATURE and enter the start , delay, and any ramp temperature conditions desired. You may optionally LOAD a saved TEMPERATURE profile or SAVE new or modified TEMPERATURE profiles for this or future runs.**

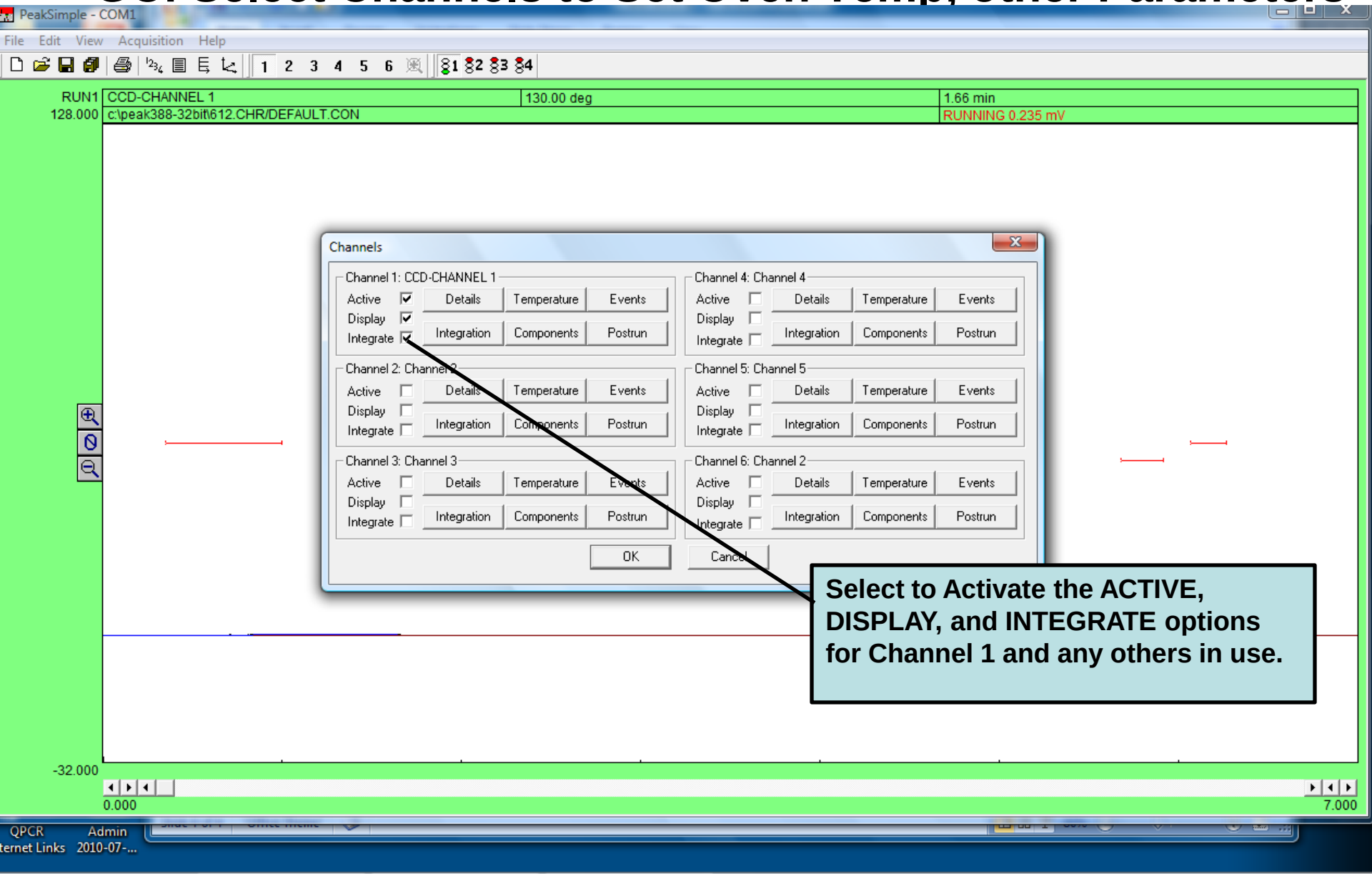
GC: Startup Screen; Initialization or “Waking-up” Pop-up Window will appear



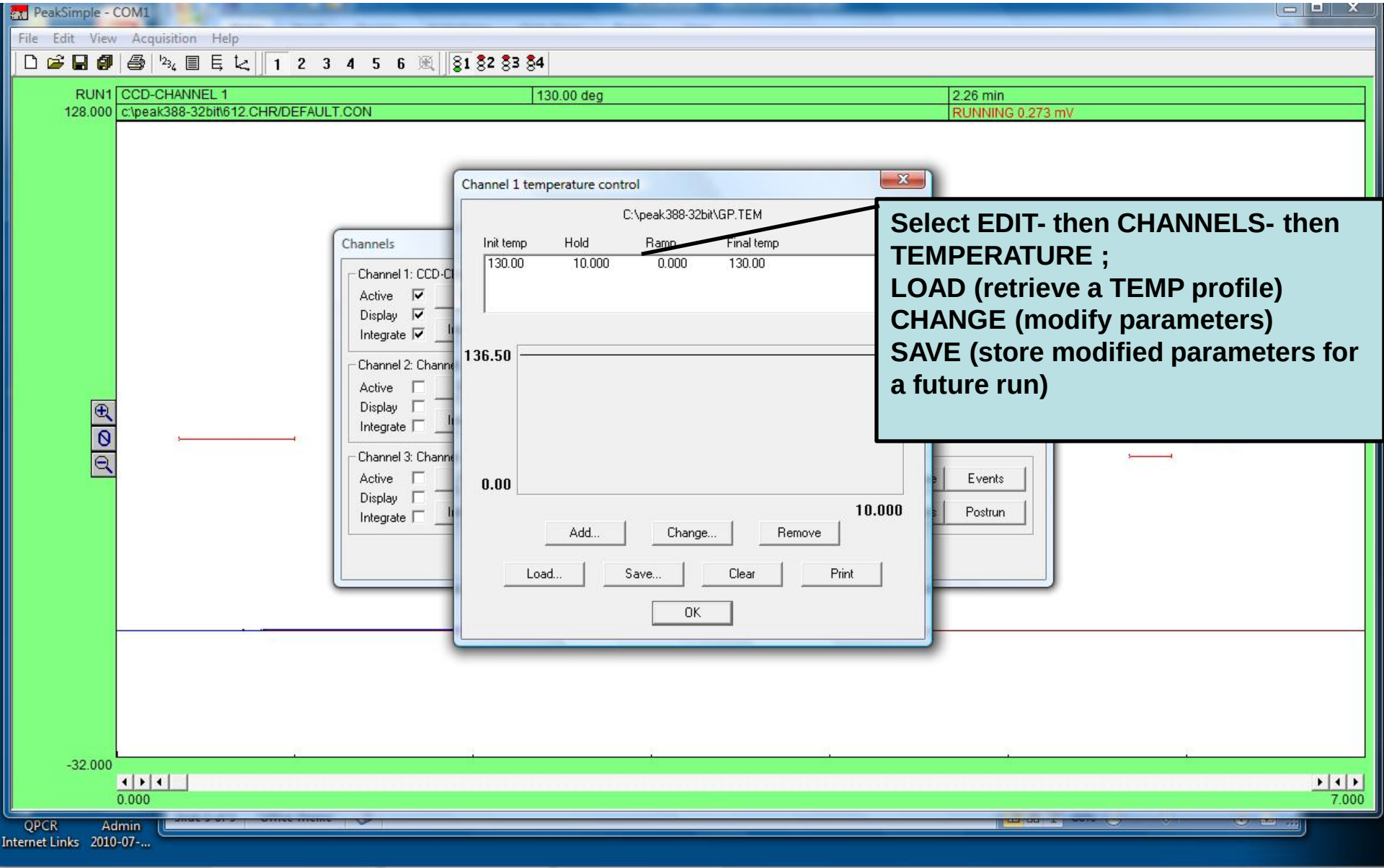
GC: Edit- Channels- to Set Oven Temp and other Parameters



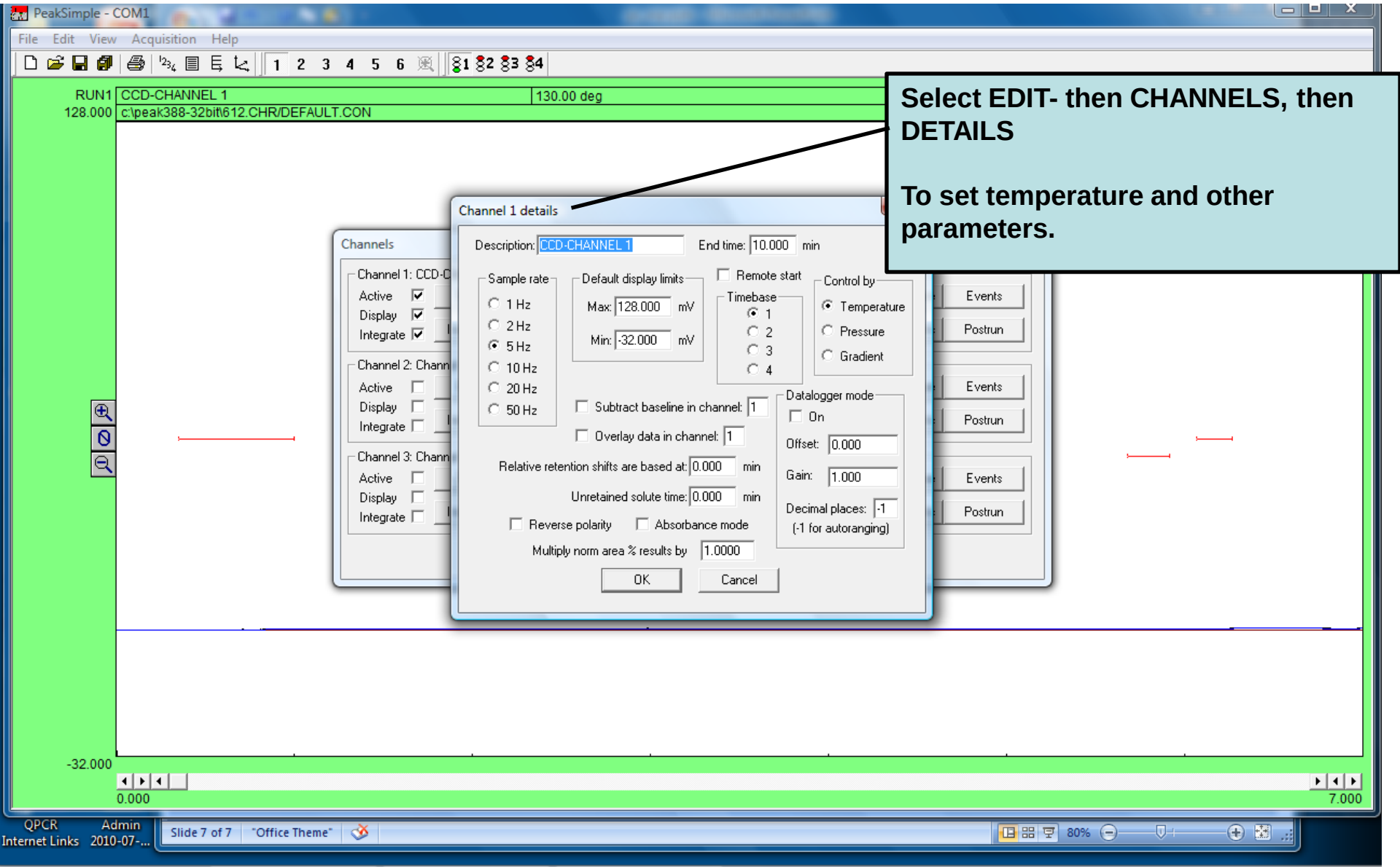
GC: Select Channels to Set Oven Temp, other Parameters



GC: On Temp Window, Load old profile or Enter new Data



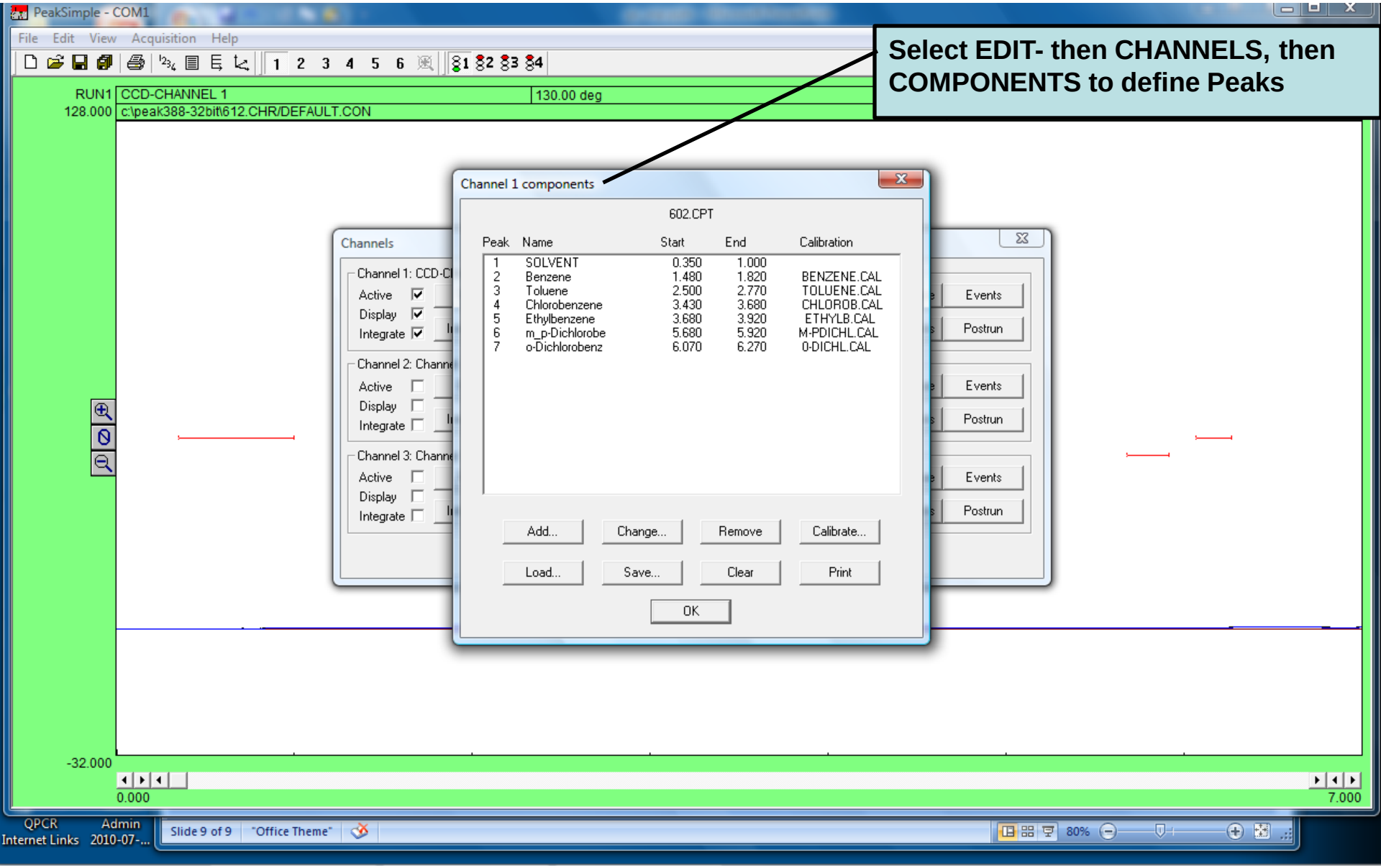
GC: Edit-Channels to enter Description and Details



Select EDIT- then CHANNELS, then DETAILS

To set temperature and other parameters.

GC: Set Channels, then Components



BNC connector for 10 base 2 Ethernet cable

Chromatography: Gas, Varian 3800

The Varian CP-3800 GC is Varian's top of line Gas Chromatograph with a flexible platform for single, dual, or three-channel configuration for maximum productivity.

Large LCD screen and straightforward user interface for easy viewing and editing of GC parameters.

Spacious column oven accommodates three or more columns.

Fast heat-up (100°C/min) and rapid cool-down column oven (400°C to 50°C in 4.5 min) allow for faster cycle times and increased productivity.

Concurrent installation and operation of up to three injectors and three detectors permanently on the GC.

Wide range of injectors and detectors to choose from for the most complicated application.

Choose from manual pneumatic control or electronic flow control for all injectors and detectors.

Wide range of autosamplers to choose from for complete sample introduction and preparation automation.

It is fully functional as a standalone GC or controlled through the Varian Star Workstation or the Galaxie Chromatography Data System.

Humidity 5% to 95% (relative)
GC System Type Modular
Depth 56 cm Height 53 cm Width 66 cm
Power Requirements 101V, 120V, 230V
Weight 43 kg

Hot Link to Varian Brochure … 18 pgs pdf

Hot Link to Varian, Basic Instructions ….pdf

Hot Link to Varian Laurier Sci User Manual

Hot Link to Varian Maintenance/Parts Brochure..pdf

Hot Link to Varian 3800 User Manual pdf format (pages included in this document)

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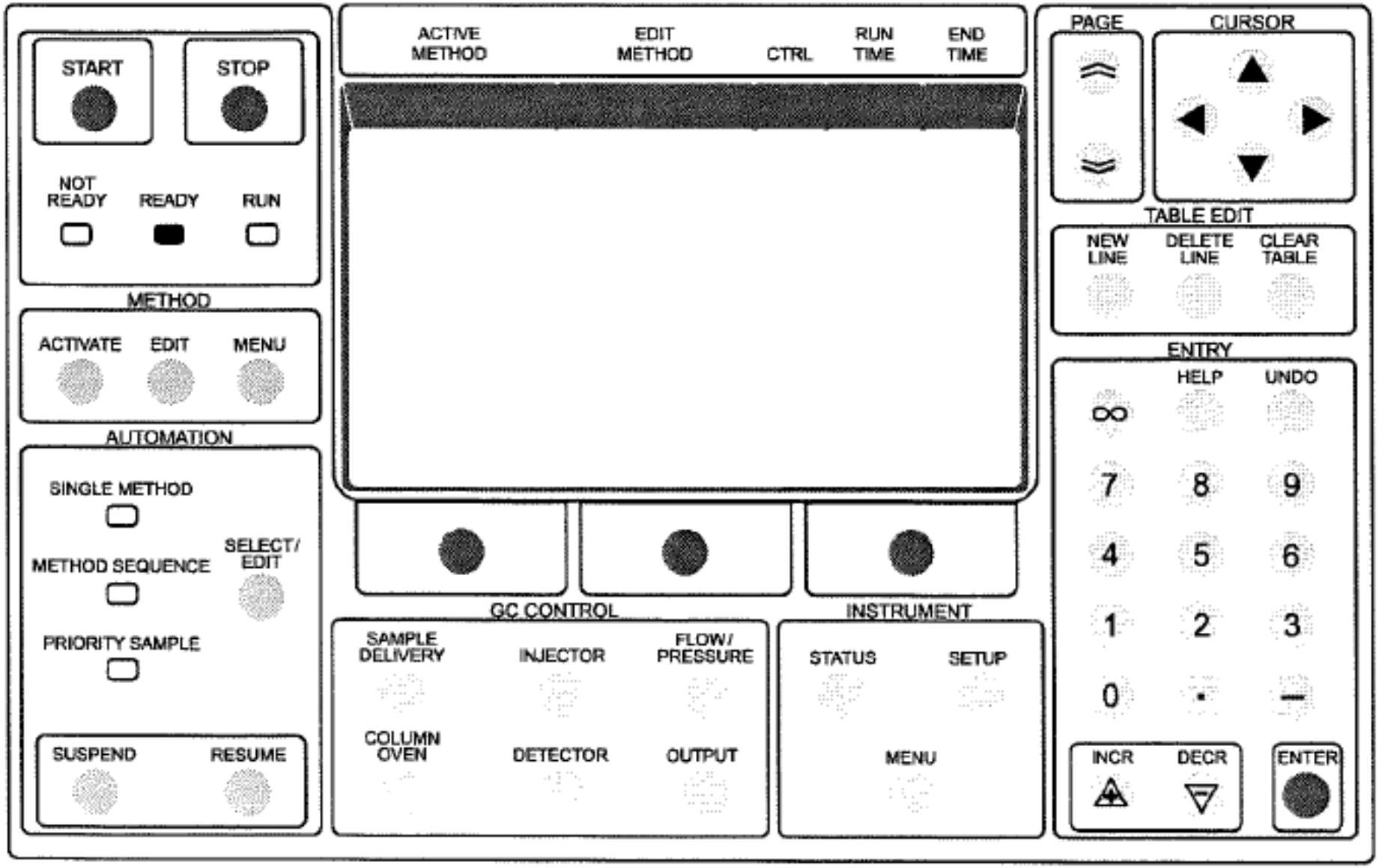
Chromatography: Gas, Varian , Manual Table of Contents.

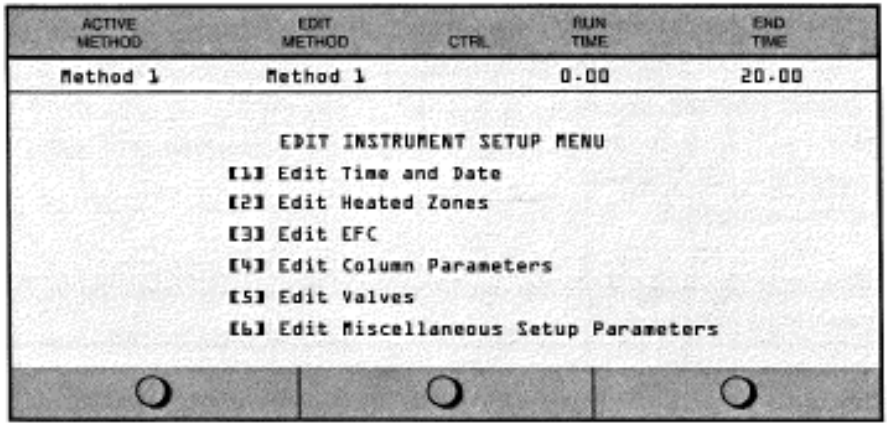
Chromatography: Gas, Varian 3800, Keyboard/Controls



Chromatagraphy: Gas, Varian 3800, Setup, pg 3

Action
1. Press **SETUP**.
2. Choose View Setup/Edit Setup using cursor keys.
3. Press **ENTER**.

"View Setup" allows you to check the current Instrument Configuration. Choose "Edit Setup" if you want to change the Instrument Configuration.



Use CURSOR keys to highlight section ...	Press ENTER to access section and modify ...
TIME AND DATE	■ Month / day / year ■ Time / hour: min: sec
HEATED ZONES	■ Device installed in each heated zone ■ Temperature limit ■ Coolant type (Column oven, zones 1-3 only)
EFC	■ Outlet pressure – atm/vacuum ■ Display units – psi, kPa, bar ■ Minimum flow – gas saver ■ Make-up gas type
COLUMN PARAMETERS	■ Length (m) ■ ID (µm) ■ Carrier gas type (He, H_2, N_2)
VALVES	■ Valve Numbers (1-7) ■ Valve Type (22 choices)
MISCELLANEOUS	■ Ready-in Contact State ■ FID Flame-out Enable ■ Micro-TCD Filament Resistance

Chromatography: Gas, Varian Manual, pg 4 Building a Method

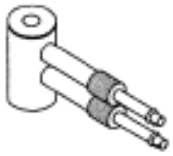
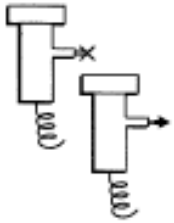
Action
1. Press **EDIT** from the Method section of the keypad.
2. Use the INCR or DECR keys to choose desired method.
3. Press **ENTER**.

Typical parameters for a GC method are:

- Column, Injector and Detector temperatures
- Flow or Pressure program, if EFC is installed
- Detector range and autozero
- Valve program, if performing a manual pneumatics splitless injection, or rotating a sampling or switching valve
- 8200 AutoSampler

Follow the method sections below to build your GC method. You can advance to any section by pressing the appropriate section key.

The Following Method Section ...	Will allow you to modify these method parameters ...
COLUMN OVEN 	■ Column temperature (isothermal or programmable) ■ Stabilization time ■ Coolant on/off ■ Enable coolant on/off temperature ■ Coolant timeout
INJECTOR 	■ Injector temperature (isothermal and programmable) ■ Coolant on/off ■ Enable coolant temperature ■ Coolant timeout ■ Split state (EFC only) ■ Split ratio (EFC only)
FLOW/PRESSURE (EFC Only)	■ Flow + Pressure (1079 + Valving) ■ Flow (1041/1061)

The Following Method Section ...	Will allow you to modify these method parameters ...
DETECTOR 	■ Detector temperature ■ Range, and autozero (time programmable) ■ Detector time constant ■ TCD filament temperature and polarity (time programmable) ■ PFPD → PMT voltage, gate width + delay, trigger level ■ TSD bead current and power (time programmable) ■ ECD contact potential and cell current ■ Detector flow (EFC only)
SAMPLE DELIVERY/ VALVE TABLE  	■ 8200 Sampling Parameters ■ Timed programmed events for splitless injections (manual 1079 only), or switching valves ■ For GCs with valves, consult your custom plumbing diagram for programming Events for a typical split and splitless injection are as follows: **Time** / **Split Valve** *Split Mode*: 0.00 min — On (Split) *Splitless Mode*: 0.00 min — Off (Splitless); 1.00 min — On (Split)

Automation

- Selects Automation Mode
- Method Automation Parameters
- Priority Sample

Activating the GC Method

Action
1. Press **ACTIVATE** from the Method section.
2. Use the INCR or DECR keys to choose desired method.
3. Press the "ACTIVATE NOW" softkey.

NOTE: If you edit the active method, you must re-activate it before running an analysis.

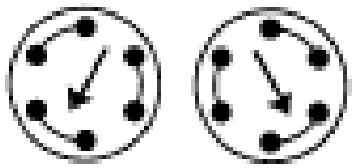
Chromatography: Gas, Manual, pg 5, Activating Method

Chromatography: Gas, Varian, Manual Pg 6, Single Injection

Making a Single Injection

Use the following procedure if performing a single injection. If you are using the Star Chromatography Workstation, refer to the instrument's Operator's Manual.

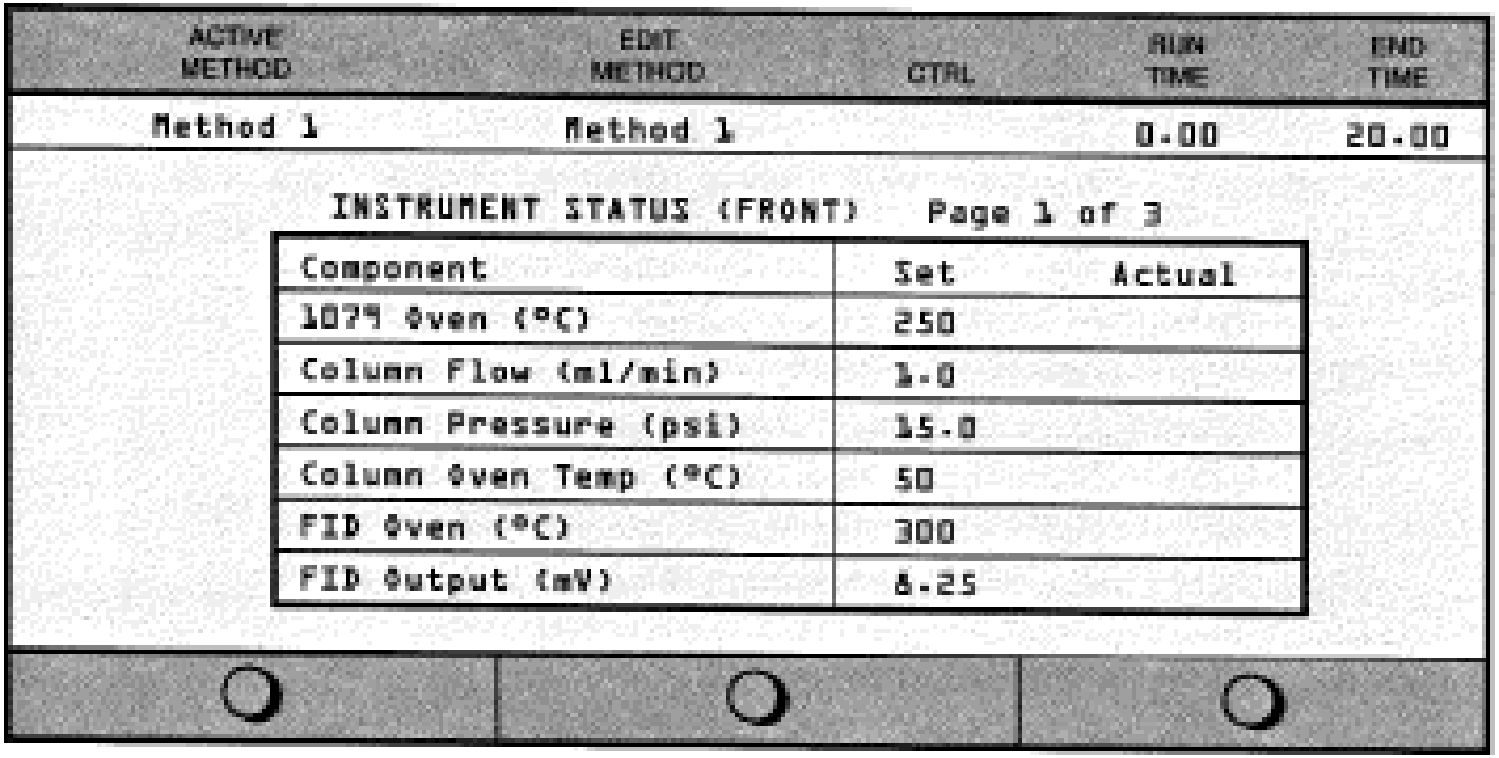
Confirm that the GC is in the Ready state. The amber "Ready" light should be illuminated.

If you are making an injection with a ...	Then ...	Result
Syringe 	Inject the sample into the injector.	The GC method will automatically start.
Gas or Liquid Sampling Valve using an air actuator 	Confirm the sampling valve is in the fill position and the loop is loaded with sample. Press **START**	The gas or liquid sampling valve will rotate to the inject position and the GC method will start.

Chromatography: Gas, Varian, Manual Pg 7 , Status

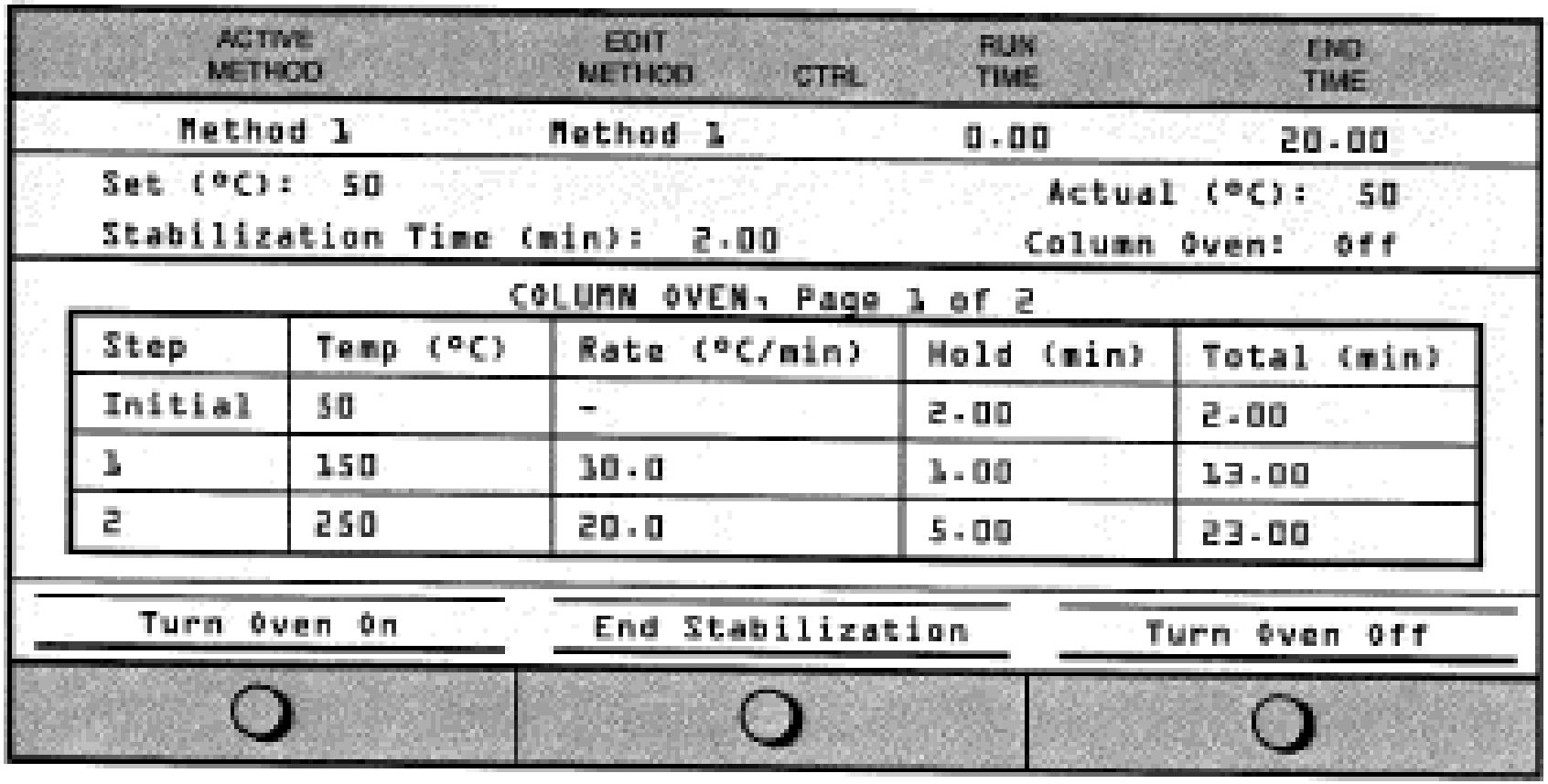
The Instrument STATUS key allows the user to view the current status of the various components of the CP-3800 instrument. Note that the current status of individual components can also be viewed by pressing the relevant key in the GC CONTROL keyboard section.

The primary status information provided using the STATUS key is the actual component temperature, carrier gas flow and pressure (if EFC is installed), and detector analog output signal. The following is an example of a status screen for a CP-3800 equipped with a 1079 injector and FID. Note that the status screen reflects the current state of the instrument. If the instrument is running a method, the status fields will update as the values change during the run at a rate of once per second. If a component is not ready or faulted, this will be indicated on the STATUS screen. Note that the status screens are presented in location order, i.e., Front, Middle and Rear.



Chromatography: Gas, Varian, Manual Pg 7, Control

When one of the six GC Control keys is pressed, the user is presented with a split display. The status information reflecting the current status of the CP-3800 appears above the bold line on the display. The information beneath the bold line is the method parameters of the EDIT METHOD Note that the EDIT METHOD and the ACTIVE METHOD may be different.



Chromatagraphy: Gas, Varian, Manual Pg 8, Hardware, Column

Column Installation

Follow these steps to install the capillary column and set gas flow rates:

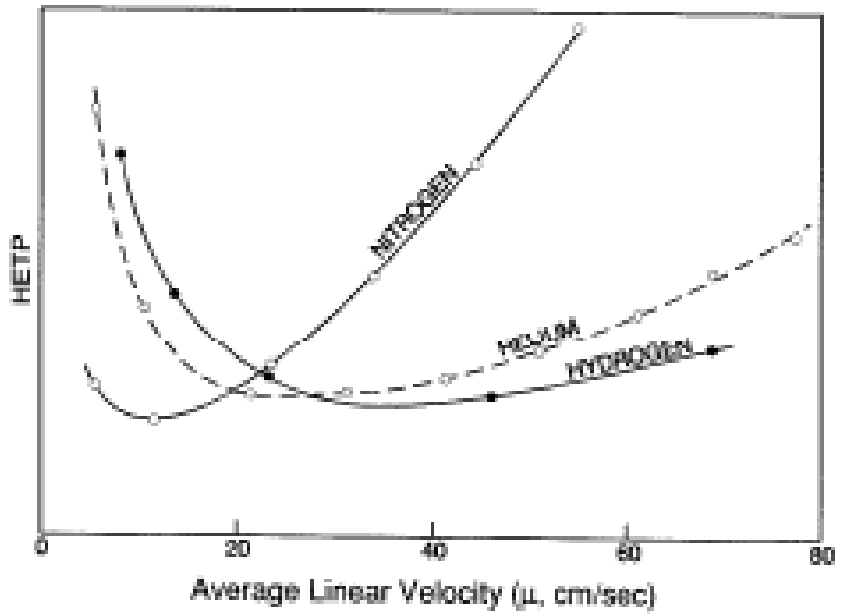
1. Cool all heated zones and replace depleted oxygen and moisture traps.
2. Replace critical injector inserts and septa.
3. Cut 2 cm from each column end.
4. Thread the nut and ferrule over the column on both ends. The ferrule should be installed with the taper end into the nut.
5. Cut 2 cm from each column end to remove ferrule fragments.
6. Mount the capillary column in the oven.
7. Install the column 7.5 cm into the 1079 injector, measured from the back of the nut. *The 1041 and 1061 do not require measuring. They are installed all the way up into the injector.*
8. Set the approximate column head pressure.
9. Set the split ratio and septum purge flows *(1079 only)*.
10. Connect the column to the detector at the appropriate distance *(see Page 18)*.
11. Check for leaks using a leak detector. *Do not use soaps or liquid-based leak detectors.*
12. Set make-up and detector gas flow rates *(see Page 10)*.
13. Set injector and detector temperatures. *Do not exceed the column's* T_{max}.
14. Condition the column at its recommended conditioning temperature for two hours.
15. Run test mixtures to confirm proper installation and column performance.
16. Calibrate instrument and inject samples.

Chromatography: Gas, Varian, Manual Pg 9, Flow Rate

After conditioning your column, the carrier gas flow rate should be set for optimum separation of sample components. Since the flow rate is dependent on column temperature in a pressure regulated system, it is important to set the carrier gas at the same column temperature for a given analysis. For convenience, the carrier gas is often set at the initial temperature of the analysis. For a slightly faster analysis and improved separation, set the optimum flow rate at the maximum temperature of the analysis. For critical or hard to separate peak pairs in the chromatogram, set the optimum linear velocity at the oven temperature where they elute.

If you have Electronic Flow Control installed in your GC, setting the column flows is as simple as entering the column dimensions and carrier gas type in SETUP and building the appropriate flow or pressure program in the Method.

If you don't have EFC installed, inject 5 µL of a non-retained gaseous substance compatible with the detector *(Page 18)*. Calculate the column velocity, then flow rate and split ratio, if applicable, using the equations below.



Column Velocity, µ (cm/sec) =

$$\frac{\text{Column length (cm)}}{\text{Unretained peak time (sec)}}$$

Column Flow Rate (mL/min) =

$$\mu\left(\frac{\text{cm}}{\text{sec}}\right) \times \pi \times r_{\text{col}}^2\left(\text{cm}^2\right) \times 60\left(\frac{\text{sec}}{\text{min}}\right)$$

Split Ratio =

$$\frac{\text{Split vent flow}\left(\text{mL/min}\right)}{\text{Column flowrate}\left(\text{mL/min}\right)}$$

Chromatagraphy: Gas, Varian 3800, Manual Pg 9, Optimum Flow Rates

Optimum Velocities and Flow Rates for Capillary Columns

Carrier Gas	Column ID (microns) 250 mL/min	250 cm/sec	320 mL/min	320 cm/sec	530 mL/min	530 cm/sec
He	1.3	45	1.7	35	2.8	21
H_2	1.6	55	2.1	43	3.4	26
N_2	0.4	14	0.5	11	0.9	7

Chromatography: Gas, Varian, Manual Pg 10, Optimum Flow Rates

Use the following guide for determining the appropriate gases for your GC system and setting detector, carrier gas, and make-up flow rates.

Detector	Flow Rates, mL/min				Gas Type	
	Carrier + Make-up	Hydrogen*	Air 1	Air 2	Carrier Gas	Make-up Gas
Micro-TCD	Max. ≤ 5 mL/min	–	–	–	H_2 or He	None
TCD	30/30 (reference gas)	–	–	–	He, N_2, H_2, Ar	Same as carrier
FID (0.020" flame tip)	30	30	300	–	He, H_2, N_2	He, N_2
ECD	30	–	–	–	N_2, Ar/CH_4 (He, H_2)**	N_2, Ar/CH_4
TSD	30	4.0	175	–	He, N_2	He, N_2
PFPD	Element specific – refer to PFPD Operator's Manual				He, H_2, N_2	–
Inlet Cylinder Pressure	80 psi ~560 kPa	40 psi ~280 kPa	60 psi ~420 kPa	60 psi ~420 kPa		
Purity (%)	99.999	99.999	Zero Grade	Zero Grade		

* Total H_2 flow including any used for carrier or makeup gas.

** He may be used only when capillary column flow rates are <10 mL/min.

Chromatography: Gas, Varian, Manual Pg 11, Filters

Carrier and detector filters should always be installed to further clean high purity gases, reduce detector noise, and protect the chromatography system from potential contamination. The following filters are recommended for GC systems:

Filter	Description	Part Number
Moisture Gas Filter	■ Installed between gas tank and GC inlet ■ Molecular sieve ■ Removes water vapor ■ Filter should be changed when indicator shows filter is spent	CP17971
Charcoal Gas Filter	■ Installed between gas tank and GC inlet ■ Activated charcoal ■ Removes organic contaminants ■ Filter should be changed when indicator shows filter is spent	CP17972
Oxygen Gas Filter	■ Installed between carrier gas filter and GC inlet ■ Removes oxygen and water vapor ■ Recommended with capillary columns ■ Required for ECD ■ Filter should be changed when indicator shows filter is spent	CP17970

Chromatography: Gas, Varian, Manual Pg 11, Ferrules

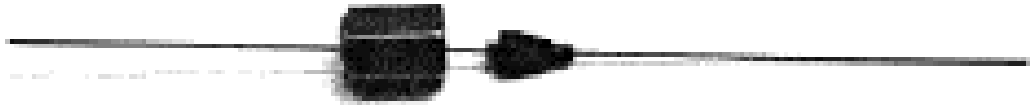
Column and Injector Ferrules for Capillary Columns

 Ferrule Size	Column ID (microns)	Ferrule		
		Polyimide (10/pk)	Graphite (10/pk)	Polyimide/Graphite (10/pk)
No hole 1/16" fitting	–	28-694503-01	–	28-694590-01
0.4 mm ID 1/16" Fitting	180-250	28-694586-01	28-694583-01	28-694580-01
0.5 mm ID 1/16" fitting	320	03-908361-01	28-694561-01	28-694581-01
0.8 mm ID 1/16" fitting	530	28-694552-01	28-694042-01	28-694582-01
5 mm ferrule for Split/Splitless Insert (1079)	–	–	03-925342-01	–

Chromatography: Gas, Varian, Manual Pg 12, Micro-TCD Ferrules

Column Ferrules for Micro-TCD

Capillary column connection to the Micro-TCD requires a special series of graphite/Vespel ferrules (see table below).



Column ID	Ferrule ID	Ferrule Part Number
0.1 mm	0.4 mm	CP85889
0.25 mm	0.4 mm	CP85889
0.32 mm	0.5 mm	CP470100
0.53 mm	0.8 mm	CP470101

Chromatography: Gas, Varian, Manual Pg 12, Injector Inserts

Capillary injector inserts have a direct effect on analysis results. They are chosen depending on the injection mode (split, splitless, on-column, flash vaporization) and sample characteristics.

- The split and splitless inserts create a homogenous mixture of sample and carrier gas, transfer a representative sample into the column and minimizing molecular weight discrimination.
- The on-column temperature programmable inserts for the 1079 provide quantitative sample transfer and retain the liquid sample during cold sample introduction.
- The flash vaporization insert (1061) provides an expansion volume for large samples and minimizes non-volatile sample components from entering the column.

Insert variations for all injection modes are available for dirty sample matrices, labile compounds, and large volume injections. Inserts should be replaced as soon as a loss in chromatographic performance is seen. Note that all the 1079 inserts are deactivated.

	Description	Part Number
1079 DIRECT ON-COLUMN	*High Performance Insert* ■ 180 to 320 µm ID columns ■ Quantitative liquid sample transfer ■ Used for cold on-column injections	01-900109-06 
	On-Column Insert ■ 530 µm ID Columns ■ Quantitative liquid sample transfer ■ Used for cold on-column injections	01-900109-07 

Chromatography: Gas, Varian, Manual Pg 13, Insert Partnos

	Description	Part Number
1079 SPLIT	*Frit Insert* ■ Linear split, adequate sample mixing, instantaneous sample vaporization. ■ 3.4 mm ID	03-918464-01 
	Unpacked Insert ■ Can be packed with quartz wool, glass beads, etc. ■ 3.4 mm ID	03-918464-00 
	Packed Insert ■ 3.4 mm ID	03-918956-00 
1079 SPLITLESS	*Open Insert* ■ The narrow bore minimizes dead volume, ensuring efficient transfer of sample to the column. (1079 is shipped with this insert installed.) ■ 2 mm ID	03-918466-00 
	Unpacked Insert ■ 3.4 mm ID	03-918464-00 
1079 SPLITLESS TEMP RAMP	*Open Insert* ■ Trace analysis. The low surface area makes it ideal for thermolabile and polar components. ■ 0.5 mm ID	03-925331-00 
	Packed Insert ■ Deactivated glass wool packing. Can be used in all three modes. For non-polar compounds above 1 ng level. ■ 2 mm ID	03-925350-00 
1079 SPME	*SPME Insert* ■ For SPME injections ■ 0.8 mm ID	03-925330-00 
1061 FLASH VAPORIZATION	■ 530 µm columns only	03-918339-00 
	■ Packed column insert	37-000813-00 

Chromatography: Gas, Varian, Manual Pg 14, Septa

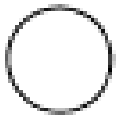
Septa allow the syringe needle to enter the GC injector, yet maintain a leak-free seal in the GC system. They are available in several different types of materials and sizes depending on injector model and analysis needs. The septum chosen for a GC analysis should exhibit low bleed, resist leaks, and be easy to pierce when performing injections.

Septa should be changed every 50 to 100 injections or when you note a change in peak retention time or ghost peaks. It is preferable to change septa routinely, rather than after leaks develop, thus minimizing instrument downtime and sample loss. Change the septum at the end of the workday, then keep the column oven temperature hot enough to prevent bleed from accumulating overnight. Using a needle guide, a syringe free of burrs, or an autosampler will prolong the septum life because a single hole will be repeatedly pierced allowing easier re-sealing.

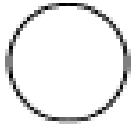
Chromatography: Gas, Varian, Manual Pg 14, Septa table

Septa	Description	Dimensions	Qty	Reference
Ultrasep-R™	■ Red silicone rubber ■ T_{max}: 350°C ■ Low bleed ■ Long injection life ■ Easy sample injection	10 mm 10 mm	25 100	00-996881-01 00-996881-02
ThermoGreen™ LB-2	■ Green silicone rubber ■ T_{max}: 300°C ■ Low bleed ■ Recommended for all 1079, GC/MS and ECD applications	11.5 mm 11.5 mm	5 50	03-920357-01 03-920357-02
Standard	■ Beige silicone rubber with Teflon® face ■ T_{max}: 250°C ■ Standard septa for Varian GCs	10 mm 10 mm 11.5 mm 11.5 mm	25 100 25 100	00-997628-02 00-997628-03 00-997630-02 00-997630-03

Size your septa here



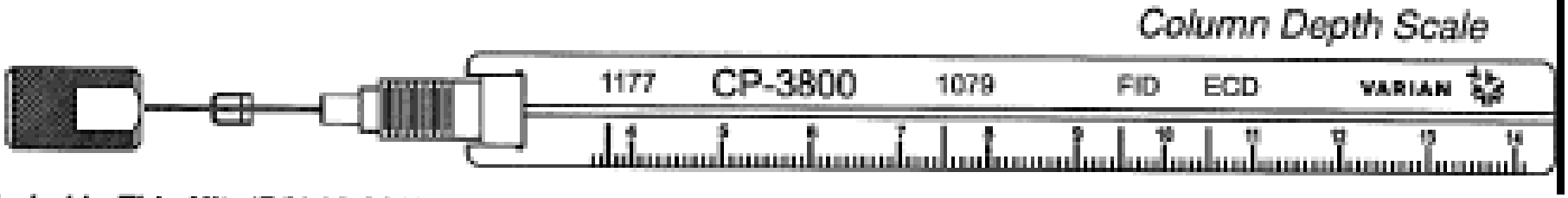
10 mm
1041 On-column
1061 Flash Vaporization



11.5 mm
1079 Injector

Chromatography: Gas, Varian, Manual Pg 15, Connect Kit

This kit simplifies the installation of capillary columns into Varian injectors and detectors. The kit contains split capillary column nuts, reusable jacketed graphite ferrules (for 250µ, 320µ, 530µ ID columns) and a column depth scale. No felt tip pen, typewriter correction fluid or tape is needed to mark column depth for any injector or detector. The split nut design allows you to remove the nut from the column when the column is stored without having to remove the ferrule. The split capillary column nuts are knurled so that all tightening can be done by hand. No tools are required.



Included in This Kit *(P/N 03-925751-90)*

Description	Quantity
Column Depth Scale	1 each
Knurled Split Nut	2 each
Graphite Jackered Ferrule (0.4 mm ID)	2 each
Graphite Jacketed Ferrule (0.5 mm ID)	2 each
Graphite Jacketed Ferrule (0.8 mm ID)	2 each

Description	Quantity	Part Number
Graphite Jacketed Ferrule (0.4 mm ID)	10 each	03-925384-04
Graphite Jacketed Ferrule (0.5 mm ID)	10 each	03-925384-05
Graphite Jacketed Ferrule (0.8 mm ID)	10 each	03-925384-06

Chromatography: Gas, Varian, Manual Pg 16, Solvents

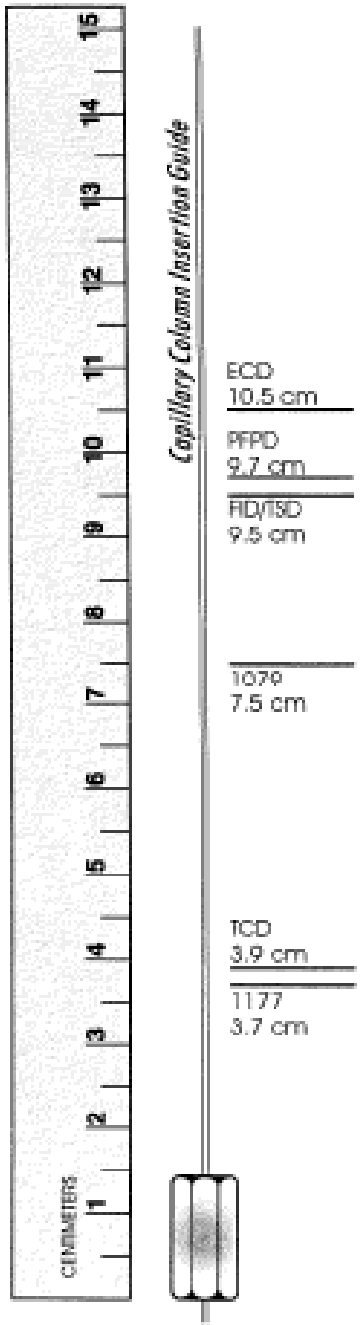
The choice of solvents for a chromatographic analysis depends on the component solubility, detector, and the polarity of the analytical column. Solvents should ideally match the polarity of the column, especially when injecting large volumes and performing on-column or splitless injections. Non-polar columns perform best with non-polar solvents. Polar columns perform best with polar solvents, however, they also perform well with non-polar solvents.

Below are recommended solvents for non-polar, intermediate, and polar phase columns.

Column Phase	Recommended Solvent	Boiling Point (°C)
Non-Polar ■ 100% Methyl ■ 5% Phenyl, 95% Methyl	■ Pentane	36.1
	■ n-Hexane	69.0
	■ Cyclohexane	80.7
	■ Isooctane	99.3
	■ Benzene	80.1
	■ Toluene	110.6
	■ Ethyl Ether	34.6
	■ Methyl tert-butyl ether	55.2
	■ Methylene Chloride	39.8
	■ Carbon Tetrachloride	76.7
	■ Carbon Disulfide	46.5
Intermediate ■ 50% Phenyl, 50% Methyl	■ Ethyl Acetate	77.0
	■ Acetone	56.5
	■ Methyl iso-butyl ketone	127.0
	■ Acetonitrile	81.6
Polar ■ Polyethylene Glycol	■ Methanol	64.7
	■ Ethanol	78.5
	■ n-Propanol	97.2
	■ n-Butanol	117.7

Injector	On-Column, 1041 Flash Vaporizing, 1061		1079 *Using* Split Insert	1079 *Using* Splitless Insert	1079 *Using* On-Column Insert	1079 *Using* High Performance Insert	
Column	*For* ■ Large Bore Capillary Columns (530 µm ID) ■ Packed Columns		*For* All Capillary Columns	*For* All Capillary Columns	*For* Large Bore Capillary Columns (530 µm ID)	*For* All Capillary Columns (180-320 µm ID)	
Sample Volume in µL	0.1 - 0.5	0.5 - 5	0.1 - 1	0.5 - 3	0.1 - 5	0.2 - 1	1 - 5
Injection Rate, in µL/sec	5	0.5 - 1	10	0.5 - 1	1 - 5	5	1
Injection Time (Needle Residence Time in min)	0.05 - 0.1	0.1 - 0.2	0	0.05 - 0.2	0	0	0
Hot Needle Time in min	0	0	0	0 - 0.1	0	0	0
Solvent Plug Size in µL	1	1	1	1	1	1	1
Column Oven	Isothermal or temp. program	Temp. program	Isothermal or temp. program	Temp. program; Initial temp. ≤20°C from the solvent boiling point	Temp. program	Temp. program; Initial temp. ≤20°C from the solvent boiling point. With larger sample volumes, solute focusing is possible with initial temp. 10-20°C above solvent boiling point.	

Chromatography: Gas, Varian, Manual Pg 17, Recommended Injector and CG Parameters



Units of Measure

Name	Abbreviation	Weight/ weight	Weight/ volume	Volume/ volume
Parts per Thousand	‰	mg/g	µg/µL mg/mL g/L	mL/L
Parts per Million	ppm	µg/g mg/kg	ng/µL µg/mL mg/L	nL/mL µL/L
Parts per Billion	ppb	ng/g µg/kg	pg/µL ng/mL µg/L	nL/L
Parts per Trillion	ppt	pg/g ng/kg	fg/µL pg/mL ng/L	pL/L

Non-Retained Compounds for GC Detectors

Detector	Recommended Non-Retained Compounds
FID	Methane, propane, butane
TCD	Air, methane, butane
ECD	Methylene chloride headspace vapors
TSD	Acetonitrile headspace vapors, butane
PFPD	Sulfur hexafluoride, methane, propane, butane
MS	Carbon dioxide
Micro-TCD	Air, methane, butane

Chromatography : Gas, Varian, Manual Pg 17, Measurements

VARIAN

Chromatography: Gas, FID Defined

FID stands for Flame Ionization Detector. What that means is that as the effluent (carrier gas and any organic compounds) comes out of the column they are ignited in a flame made of hydrogen and air. The compounds produce ions as they burn. These ions conduct electricity. Changes in current within the flame are measured and sent to the computer to be seen as peaks on the chromatogram.
FID is a good general detector for organic compounds, and is able to detect at the nanogram level.