

Operating Manual

**Series 210AHC
Aromatic Hydrocarbon Gas Analyzer
w/ Electronic Pressure Control,
Auto-Zero and Backflush to Vent**

Series 210-04000011: 115 V, 50/60 Hz

Series 212-04000011: 230 V, 50/60 Hz

Effective for serial number BB28110 and higher

July 2023

Rev. 4

**READ INSTRUCTIONS
BEFORE OPERATING**



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Please protect yourself and your employees by following these operating instructions. We encourage our customers to write or call for any additional information relative to the use or repair of this instrument.

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WARRANTIES THE SERIES 210AHC ANALYZER SOLD BY GOW-MAC® INSTRUMENT CO. IS WARRANTED FOR A PERIOD OF ONE (1) YEAR AGAINST DEFECTS IN MATERIALS AND WORKMANSHIP. THE TERMS OF THIS WARRANTY ARE AS FOLLOWS:

1. The warranty period begins with the shipping date of the equipment to the original purchaser.
2. Certain parts such as batteries, fuses, glass accessories, septa, columns, etc., are expendable in normal use, and their service life is unpredictable. Such items are not covered by this warranty.
3. Filaments of thermal conductivity detectors are not covered by this warranty.
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12. Statements made by any person, including representatives of GOW-MAC® which are inconsistent or in conflict with the terms of this warranty shall not be binding upon GOW-MAC® unless reduced to writing and approved by an officer of the Company.
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IMPORTANT WARNING

THIS MANUAL MUST BE CAREFULLY READ BY ALL INDIVIDUALS WHO HAVE OR WILL HAVE THE RESPONSIBILITY FOR INSTALLING, USING, OR SERVICING THE PRODUCT.

Like any piece of complex equipment, the AROMATIC HYDROCARBON ANALYZER will perform as designed only if it is installed, used and serviced in accordance with the manufacturer's instructions. OTHERWISE IT COULD FAIL TO PERFORM AS DESIGNED AND PERSONS WHO RELY ON THIS PRODUCT FOR THEIR SAFETY COULD SUSTAIN SEVERE BODILY INJURY OR DEATH.

The warranties made by GOW-MAC Instrument Co. with respect to the product are voided if the product is not installed, used and serviced in accordance with the instructions in this manual.

Please protect yourself and your employees by following these operating instructions. We encourage our customers to write or call for any additional information relative to the use or repair of this instrument.

Technical Support

GOW-MAC Instrument Co.
277 Brodhead Road
Bethlehem, PA 18017 U.S.A.

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GENERAL WARNINGS AND SAFETY

1. The Series 210AHC Aromatic Hydrocarbon Analyzer should be installed, operated and maintained in strict accordance with its labels, cautions, warnings, instructions, and within the limitations stated.
2. The Aromatic Hydrocarbon Analyzer housing must be located in a non-hazardous area.

3. **Ultra Violet Ray Hazards**  

The PID in this analyzer emits ultraviolet energy. The Ultraviolet Ray (UV) is harmful to the naked eye. When checking the system it is important that the detector discharge is viewed using a UV absorbing filter such as borosilicate glass or polystyrene.

4. Use genuine GOW-MAC replacement parts when performing any maintenance procedures provided in this manual. Failure to do so may seriously impair instrument performance. Repair or alteration of the Aromatic Hydrocarbon Analyzer, beyond the scope of these instructions or by anyone other than GOW-MAC or a GOW-MAC Representative could cause the product to fail to perform as designed, and persons who rely on this product for their safety could sustain severe bodily injury or death.
5. DISCONNECT the instrument from **ALL** power sources **BEFORE** removing instrument housing and exposing potentially dangerous voltages.
6. **DO NOT** overload the AC outlet with other electrical equipment.
7. Adhere to the color coding descriptions when hooking up electrical connections.
8. Repair or replace faulty or frayed wiring.
9. Make sure that the actual line voltage is the value for which the instrument was designed. Make sure that the power cord is plugged into the correct voltage source.
10. Perform periodic leak checks on all gas connections.
11. **DO NOT** allow flammable and/or toxic wastes to accumulate.
12. Keep combustibles away from gas cylinders and eliminate ignition sources.
13. Maintain adequate ventilation around Aromatic Hydrocarbon Analyzer, especially above and behind the analyzer.
14. Dispose of wastes properly.



GENERAL PRECAUTIONS FOR HANDLING AND STORING HIGH PRESSURE GAS CYLINDERS



Compressed gases have properties that can cause serious accidents, injuries, and even death if proper precautions and safety practices are not followed. Therefore, during handling and use of these gases, be certain to use applicable safety precautions described by your local compressed gas supplier, the Compressed Gas Association, and/or O.S.H.A. regulations.

1. Read the label on all cylinders **BEFORE** using to identify the cylinder contents. If the label is illegible, return the cylinder to the supplier. **DO NOT ASSUME THE CONTENTS.**
2. Secure cylinders in storage and in use to an immovable structure to prevent accidental falling or movement. Read the relevant safety codes.
3. Store or move cylinders **ONLY** in the vertical position and with cylinder caps installed. **DO NOT** move or transport cylinders with regulators attached.
4. Store cylinders in a well ventilated area away from heat or ignition sources.
5. When installing tubing, provide **ONLY** approved, adequate pressure reducing regulators and pressure relief devices to prevent over-pressurizing of tubing and equipment.
6. Never drop cylinders or permit them to strike each other violently.
7. Cylinders may be stored in the open but, in such cases, should be protected against extremes of weather and from damp ground (to prevent rusting). In areas where extreme temperatures are prevalent, store cylinders in the shade.
8. The valve protection cap should be left on each cylinder until cylinder has been secured against a wall or bench, or placed in a cylinder stand and is ready for use.
9. Avoid dragging, rolling or sliding cylinders even for a short distance. Move cylinders by using a suitable hand truck.
10. Never tamper with safety devices in valves or cylinders.
11. Do not store full and empty cylinders together. Serious suck-back can occur when an empty cylinder is attached to a pressurized system.
12. No part of a cylinder should be subjected to a temperature higher than 52° C (125° F). Do not permit flame to come in contact with any part of a compressed gas cylinder.

PRINCIPLE OF OPERATION

The Series 210AHC Aromatic Hydrocarbon Analyzer is designed to continuously and selectively measure concentrations of benzene in carbon dioxide. The analyzer is comprised of a flow system, detector and data display. The Series 210AHC is intended as a specific process analyzer for hands-free operation.

The main principle of instrument operation is operator-free, continuous analysis. Design considerations have incorporated simplicity with reliability in order to allow the automatic sampling, introduction, speciation, detection and quantitation of aromatic species.

Calibration, calibration validation, data acquisition and data analysis are performed automatically by the on-board software system, to be described in an addendum to this manual.

1.1 Detector

The Series 210AHC utilizes a photoionization detector (PID). Aromatic hydrocarbons are introduced to an ultraviolet source, absorb the radiated photons and ionize according to the following reaction:



The ultraviolet source emits energy, which is in excess of the ionization potential of the aromatic species, but less than the ionization potential of the transport and balance gases. Thus, only the aromatic species of interest are ionized, making the detector transparent to transport and balance gas effects.

1.2 Flow System

The flow system combines transport, calibration and sample gas movement with discreet injection and speciation capability.

- A. Transport gas, calibration gas and sample enter through clearly labeled compression fittings on the rear of the instrument. Refer to *Chapter 3: Operating Controls*. Transport, calibration and sample gases are externally regulated by the user with house controls or by using the GOW-MAC calibration/sample gas flow control accessory. The transport and sample/calibration gas flows can be monitored by the flow meters on the front panel of the instrument.
- B. The sample introduction system is comprised of two pneumatically actuated valves. See *Flow Diagram located in back of manual*. The first valve is for the selection of the calibration or the sample gas. The second is a 10-port valve configured for gas sampling discreet, constant-volume injections, and backflush to vent of the speciation module. Both valves can be controlled by the on-board software system.

- C. The speciation system is a proprietary module for the precise identification of benzene. It resides in a constant-temperature oven, with output directly to the detector. The temperature of the oven is pre-set at the factory for operational use. The software system incorporates a conditioning step for routine elevated temperature conditioning of the speciation system.

1.3 Electronics

- A. Electrometer: Converts the picoampere signal from the PID to a voltage via a monolithic operational amplifier.
- B. PID Polarization Power Supply: Provides a constant 160 VDC to the detector plates. This sets up an electric field, which accelerates the ions and electrons through the collector gap, resulting in a detection current, which is proportional to the concentration of the ionized species.
- C. High Voltage Power Supply: Provides up to 2 kV to the PID lamp.



ELECTRICAL SHOCK HAZARD. SWITCH “OFF” POWER TO THE ANALYZER BEFORE ATTEMPTING TO CONNECT OR DISCONNECT THE DETECTOR.

- D. 4-20 mA Output: Provides 4-20 mA signal output at terminal pairs 1 through 8 and is accessible at the back panel of the instrument case. The benzene peak output is on terminal pair 1. Pairs 2 through 8 are not used in the benzene application.
- e. External Events and Diagnostics In/Out: Accessible at the back panel of the instrument case (refer to *Chapter 4: Installation* for details).

2 SPECIFICATIONS

Gas Connections:	1/8" Swagelok®
Transport Gas Flow Rate:	approximately 30 cc/min. (refer to the <i>Quality Control Final Instrument Inspection Report</i> located on page 5)
Transport Gas Pressure Required:	60 psig
Sample Pressure Required:	5 psig (20 psig max.)
Calibration Gas Pressure Required:	5 psig (20 psig max.)
Valve Actuator Gas	50 to 75 psig air or nitrogen
	Pressure switch signals for "Not Ready" status when pressure is below 15 psig
Detector Temperature:	Factory pre-set
Oven Temperature Regulation:	Factory pre-set with software controlled conditioning
Sensitivity:	< 5 ppb benzene
Linear Range:	< 5 ppb to 120 ppb (1 x 10 ³)
User Interface:	Keypad Numerical, non-tactile Display Vacuum fluorescent 256 x 128 dot graphic 115 x 57 mm viewing area
Power Required:	400 VA
Dimensions:	16.9" W x 12.25" H x 23" D (42.9 x 31.1 x 58.4 cm)
Mounting:	EIA Standard 19" rack (7U height) or bench top
Weight:	Net: 50 lbs. (23 kg) Shipping: 60 lbs. (28 kg)

OPERATING CONTROLS

The operator should become thoroughly familiar with Figures 3-1, 3-2 and the following descriptions of the controls BEFORE continuing.

3.1 Front Panel, Series 210 AHC

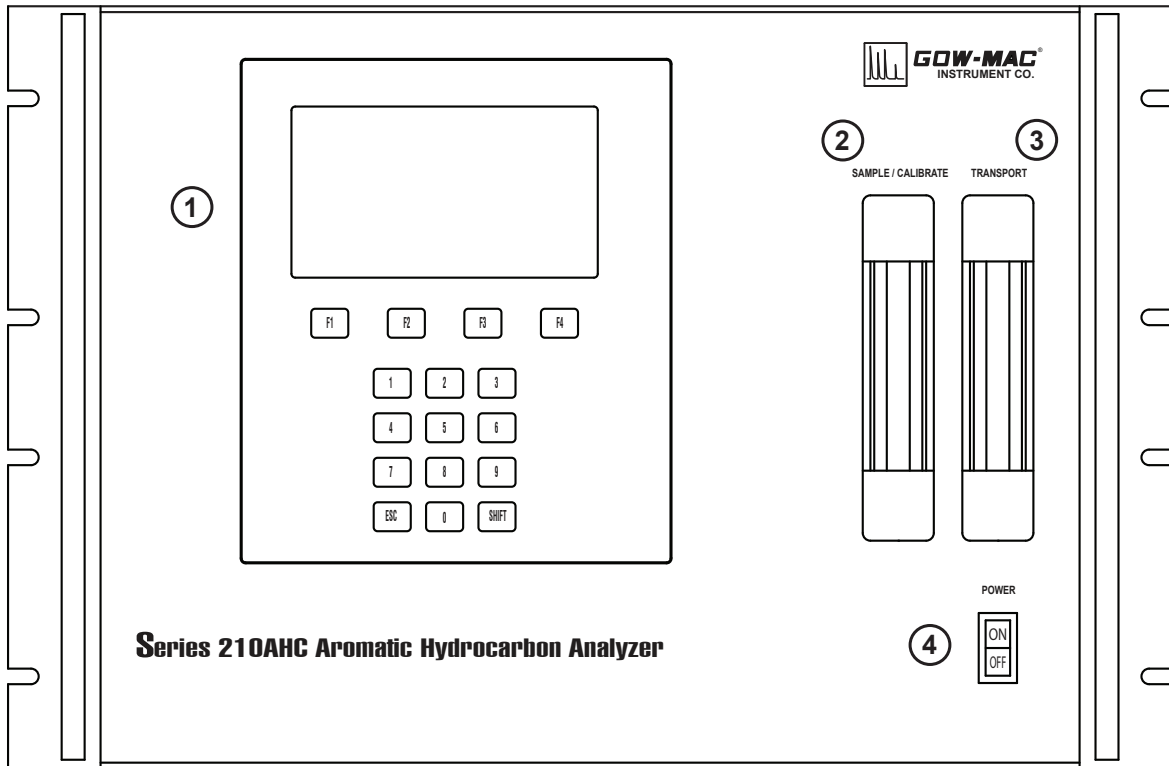


Figure 3-1
Series 210AHC Front Panel

1. **Display:** Displays sample concentrations in ppb and process messages.
2. **Sample Flow Meter:** Indicates the calibration gas or sample flow rate in cc/min.
3. **Transport Gas Flow Meter:** Indicates the transport gas flow rate in cc/min.
4. **Power “ON/OFF” Switch:** Activates or deactivates AC power to the instrument. The back panel Power Switch must also be “ON”.

3.2 Back Panel Series 210AHC

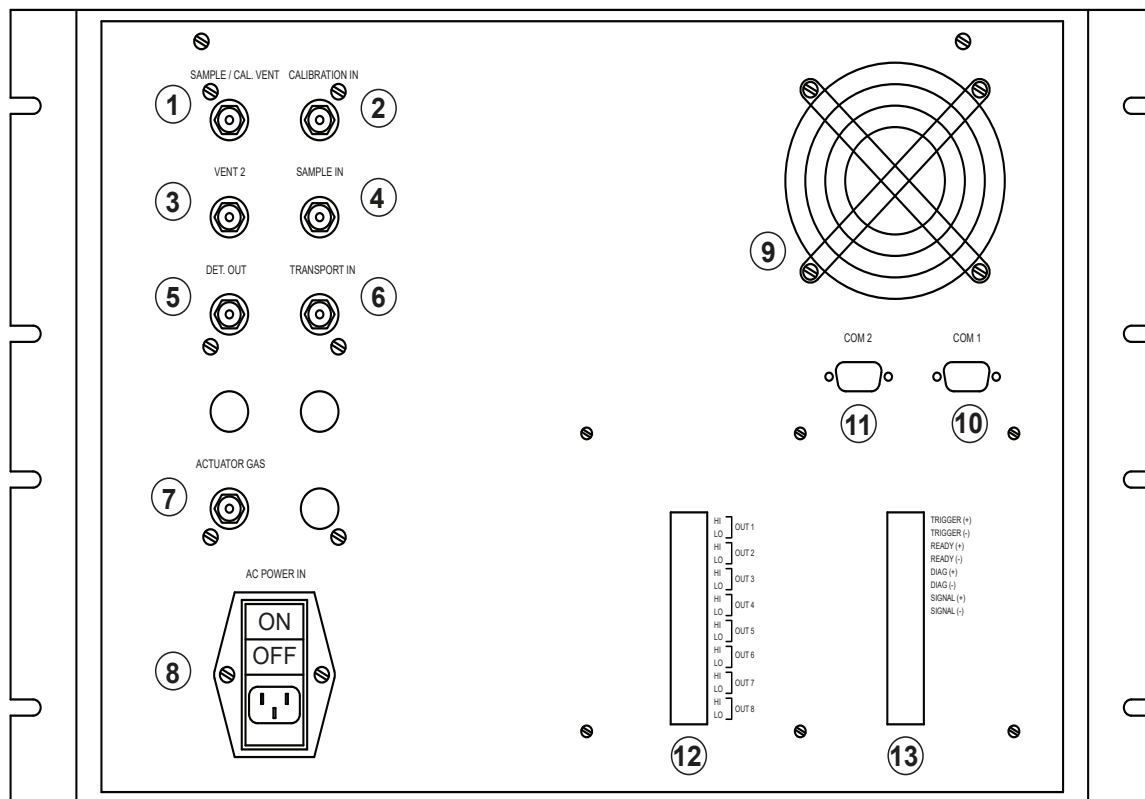


Figure 3-2
Series 210AHC Back Panel

1. **Sample/Cal Vent:** Sample or Calibration gas vent during sample loop purge. Vent to atmospheric pressure.
2. **Calibration Gas Inlet:** 1/8" Swagelok® compression fitting. Refer to Table 4-1 for supply pressure.
3. **Vent 2:** Refer to Flow Diagram; 1/8" Swagelok® compression fitting)
 - a. Vent of Transport Gas during Inject mode
 - b. Vent of Speciation Module during Backflush mode
 - c. Vent to atmospheric pressure
4. **Sample Inlet Connection:** 1/8" Swagelok® compression fitting. Refer to Table 4-1 for supply pressure.
5. **Detector Out:** Detector effluent. 1/8" Swagelok® compression fitting.
6. **Transport Gas Inlet:** 1/8" Swagelok® compression fitting. Refer to Table 4-1 for supply pressure.
7. **Valve Actuator Gas Inlet:** 1/8" Swagelok® compression fitting - refer to Table 4-1 for supply pressure
8. **AC Power IN:** Power cord connection with power switch and fuse holder. Front panel Power Switch must also be "ON".

9. Cooling Fan

10. COM 1: DB9 connector used for RS-232 output or optional MODBUS converter output, RS-485.

11. COM 2: DB9 Connector used for H2 pressure sensor and indicator.

12. Terminal Strip: Dedicated 4-20 mA outputs. (4 mA = 0 ppb, 20 mA = 100 ppb)

13. Terminal Strip: Interface connections for Diagnostic, Signal, Ready and Trigger functions

4.1 Equipment Required

- A. Hydrogen Transport Gas: The transport gas may be supplied via high-pressure cylinder, or by a hydrogen generator. Transport hydrogen must be certified to a minimum purity of 99.999%.
- B. Calibration Standard: A gravimetrically prepared cylinder or permeation device may be used for calibration of the analyzer. The cylinder standard may contain any inert balance gas, including carbon dioxide. The standard, or permeation device, must be certified to a concentration of 90 to 120 ppb benzene. **Traceability to NIST is highly recommended.**



All support gases supplied to the GOW-MAC 210AHC analyzer should be accompanied by certificates of analysis from the vendor.

- C. Sample: Carbon dioxide samples may be provided to the instrument in a manner most convenient to the user's application, i.e., from cylinders, bulk storage facilities, rail cars and/or delivery trucks. Sample filtration to 100 microns or less is required.
- D. Valve Actuator Gas: Air or nitrogen to drive rotary actuators on the gas-handling valves. Instrument air or nitrogen from a cylinder is recommended. If plant air from compressors must be used, an oil separator, water dryer, and 40 micron (or smaller) particle filter are required.
- E. Pressure Regulation: All gas regulation is carried out external to the instrument. Dual-stage regulators are recommended in order to ensure consistency of input flows to the sampling system. "Inerting" of wetted surfaces is also recommended to prevent loss of analyte molecules during transport to the instrument. **GOW-MAC Instrument Company can provide stream selection and regulation as an accessory package to the instrument. Call our Sales Department for details.**

Table 4-1 Inlet Gas Pressures, psig		
GAS	RECOMMENDED	MAXIMUM
Transport	60	80
Sample	5	20
Calibration	5	20
Valve Actuator	50	75

F. AC power source:

Model 210AHC: 115 V, 50 Hz

Model 212AHC: 230 V, 60 Hz



OPERATING INSTRUCTIONS FOR ALL MODELS ARE THE SAME, EXCEPT FOR LINE VOLTAGE REQUIREMENTS. TO PREVENT DAMAGE TO THE INSTRUMENT, MAKE SURE THAT THE AC ELECTRICAL OUTLET IS THE CORRECT VOLTAGE FOR YOUR INSTRUMENT BEFORE PLUGGING IT INTO THE OUTLET.

- G. Several pieces of INERT tubing cleaned as described later in this section. Inert tubing is recommended for the Calibration/Sample lines due to the inherent reactivity of aromatic compounds to reactive, untreated sites on tubing walls.

4.2 Unpacking and Inspection

- A. When unpacking the instrument, check it carefully for evidence of shipping damage or rough handling. Check to ensure that all components ordered have either been supplied or back-ordered. **Report any damage or discrepancies immediately to GOW-MAC Instrument Company.**
- B. Remove all plastic and/or paper shipping caps and restraints before operating.
- C. Fill out and return the yellow **Warranty-Registration Card** included in this manual to ensure that the warranty will be validated and that you will be kept informed of any improvements or other items of interest.

4.3 Location

- A. The Aromatic Hydrocarbon Analyzer should be placed in a location that is secure, vibration free, and protected from abrupt temperature changes and drafts (ambient operating air temperature range should be between 20-30° C (68 to 86° F) for optimum results. Irregular changes in the instruments' surroundings may upset the temperature stability in the course of an analysis or preparation.
- B. There must be full access and easy viewing of the front panel of the analyzer. In addition, provisions should be made for access to the rear panel (gas, electrical and software interfaces), and for removal of the top panel for maintenance activities described in Chapter 7. The instrument dimensions are shown in Figure 4-1.

The Series 210AHC can be installed in a cabinet designed for 19-inch wide panels and with standard EIA hole spacing. When the oven and control sections are connected, the instrument requires 12.25 inches (7 U) of vertical space. For accessibility, the instrument can be installed with telescoping slides. General Devices Model CTRS-124 slides (GOW-MAC p/n 142-139, purchased separately) can be attached to the analyzer. If installing with slides, the tubing connected at the back panel should be coiled to allow pulling the instrument out while keeping all gases connected. This will shorten start-up time following in-rack maintenance. Support the tube coils to minimize bending stress on the rear panel fittings.

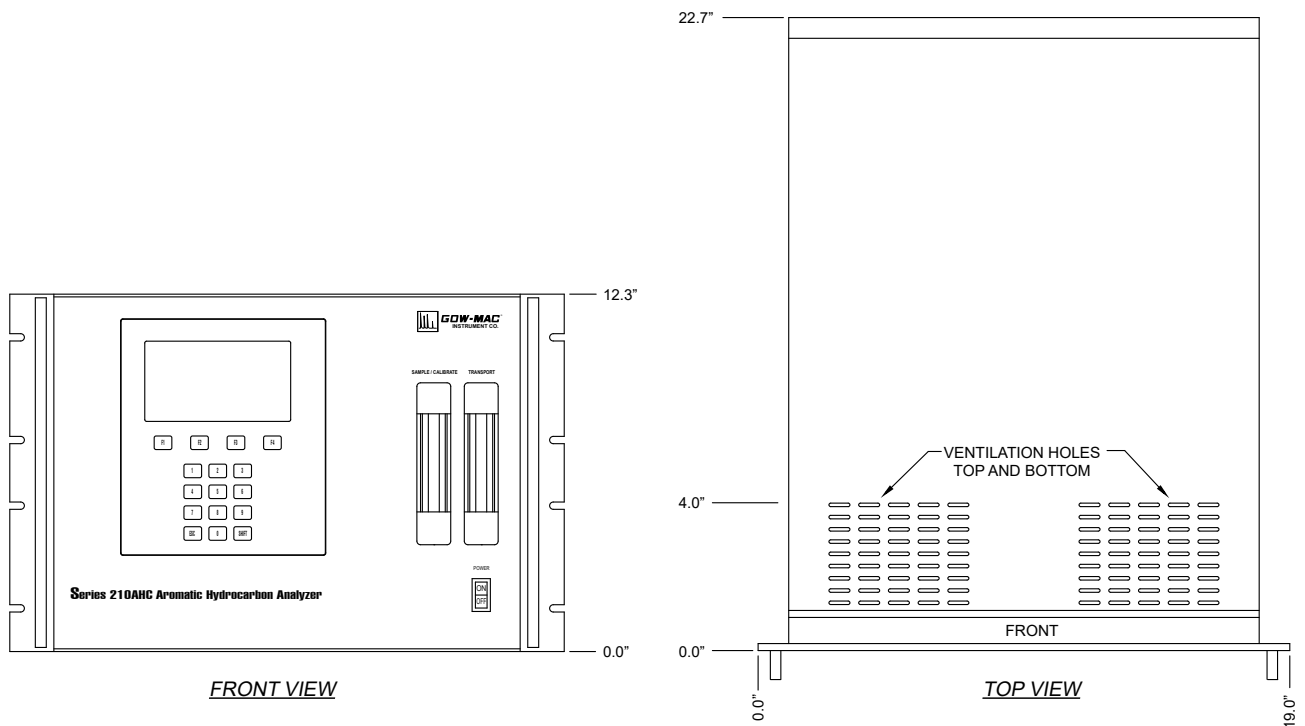


Figure 4-1

- C. Allow adequate space for the safe and compliant installation of necessary gas cylinders. **Cylinders should be secured to the wall or a table at all times.**



FOLLOW THE “GENERAL WARNINGS AND CAUTIONS” AND “GENERAL PRECAUTIONS FOR HANDLING AND STORING HIGH PRESSURE GAS CYLINDERS” LOCATED AT THE FRONT OF THIS MANUAL; CONTACT YOUR LOCAL GAS SUPPLIER TO ENSURE PROPER HANDLING OF CYLINDERS.

- D. An electrical outlet (AC) should be near the location where the analyzer is to be installed. If the outlet is not a 3-pin type, make sure that a good ground connection is available, since a good ground is necessary for proper operation. The AC outlet should be connected to a circuit that is not heavily loaded with other electrical equipment. Input voltage to the instrument should be steady for optimum operating stability. If the AC line voltage varies, consideration should be given to the installation of a stabilizing transformer and/or an uninterruptible power supply at the AC outlet.



Both the GC and the recording device should be connected to the same duplex service outlet to prevent ground loops.

4.4 Electrical Connections



ALL SWITCHES SHOULD BE IN THE "OFF" POSITION BEFORE ANY ELECTRICAL CONNECTIONS ARE MADE.

- A. *Power Cable Connection:* The power cord (provided) is connected from the AC Power IN, located on the back of the analyzer, to an AC outlet.
- B. *4 - 20 mA Terminal Strip:* 4-20 mA signal output dedicated to benzene is available at terminal pair #1 (of 6). The signal is proportional to the benzene concentration.

$$4 \text{ mA} = 0 \text{ ppb}$$

$$20 \text{ mA} = 100 \text{ ppb}$$

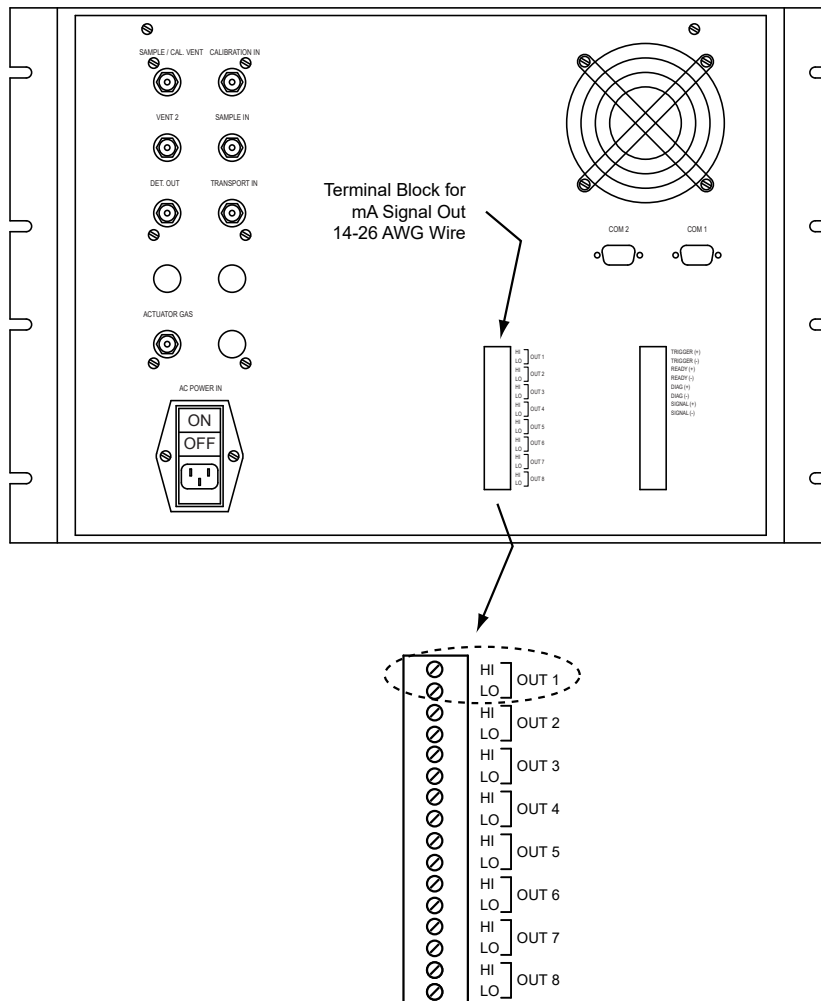


Figure 4-2
4-20 mA Terminal Strip

C. *Trigger, Ready, Diagnostic and Signal Functions Strip*: Refer to Figure 4-3 and Table 4-2. Wire size to fit the terminal blocks is 14-26 AWG.

TRIGGER (+ and -): requires an open contact or TTL voltage to the analyzer in order to start an analysis sequence.

Input High = ON: 5.0 V DC or Open Contact

Input Low = OFF: 0.8 VDC or Closed Contact

READY (+ and -): contact closure (Closed = Ready, Open = Not Ready) from the analyzer to an external device.

DIAG (+ and -): Diagnostic Out - used in diagnosing problems with the instrument and/or assists in set-up.

SIGNAL (+ and -): millivolt output used for reference and checking/setting the zero level.

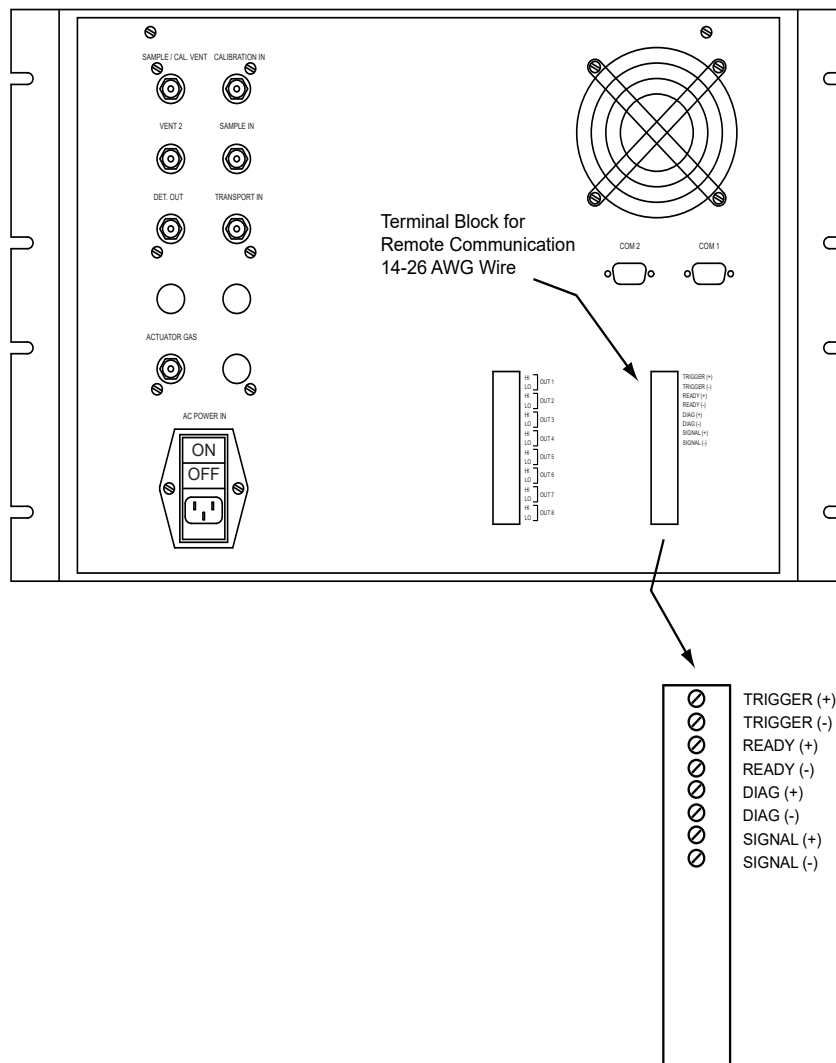


Figure 4-3
Trigger, Ready, Diagnostic and Signal Functions Terminal Block

Table 4-2			
Control Signals & Diagnostic Signal Outputs			
TRIGGER	Input High (+)	2.0 VDC Minimum 5.0 VDC Nominal or Open Contact 5.5 VDC Maximum	
	Input Low (-)	0.8 VDC Maximum or Closed Contact	
READY	Ready (+)	Closed Contact	<u>Contact Rating</u> D/C Volts Only Maximum 24 V @ 500 mA
	Not Ready (-)	Open Contact	
DIAG	(+) Output High	Diagnostic Output	
	(-) Output Low		
SIGNAL	(+) Output High	0-2.5 mV	
	(-) Output Low		

4.5 Gas Connections

GOW-MAC recommends SilcoSteel or equal tubing for **sample, calibration, and transport** gas transfer to the 210 AHC. Silcoteel's passivated wetted surface is clean enough to use as supplied.

Copper tubing cleaned for oxygen service may also be used for **transport** gas transfer to the 210 AHC.

Copper, chemical-cleaned stainless steel, or plastic tubing is suitable for the **valve actuator** gas supply line.

Gas connections between cylinder/source regulators and the 210 AHC should be made in the following order. Refer to Figure 4-4 for gas supply and venting information.

- A. Connect one end of each transfer tube to the gas source.
- B. Install a 100 micron (or smaller) particle filter on the **sample** line in a location that will be accessible for filter maintenance.



Hydrogen must be properly vented. Eliminate ALL ignition sources before purging with hydrogen.

- C. Purge the tubing with gas flow for 3 to 4 minutes.
- D. Connect the free tube end to its corresponding inlet fitting on the 210 AHC.
- E. Leak test all tube connections in accordance with section 4.6.

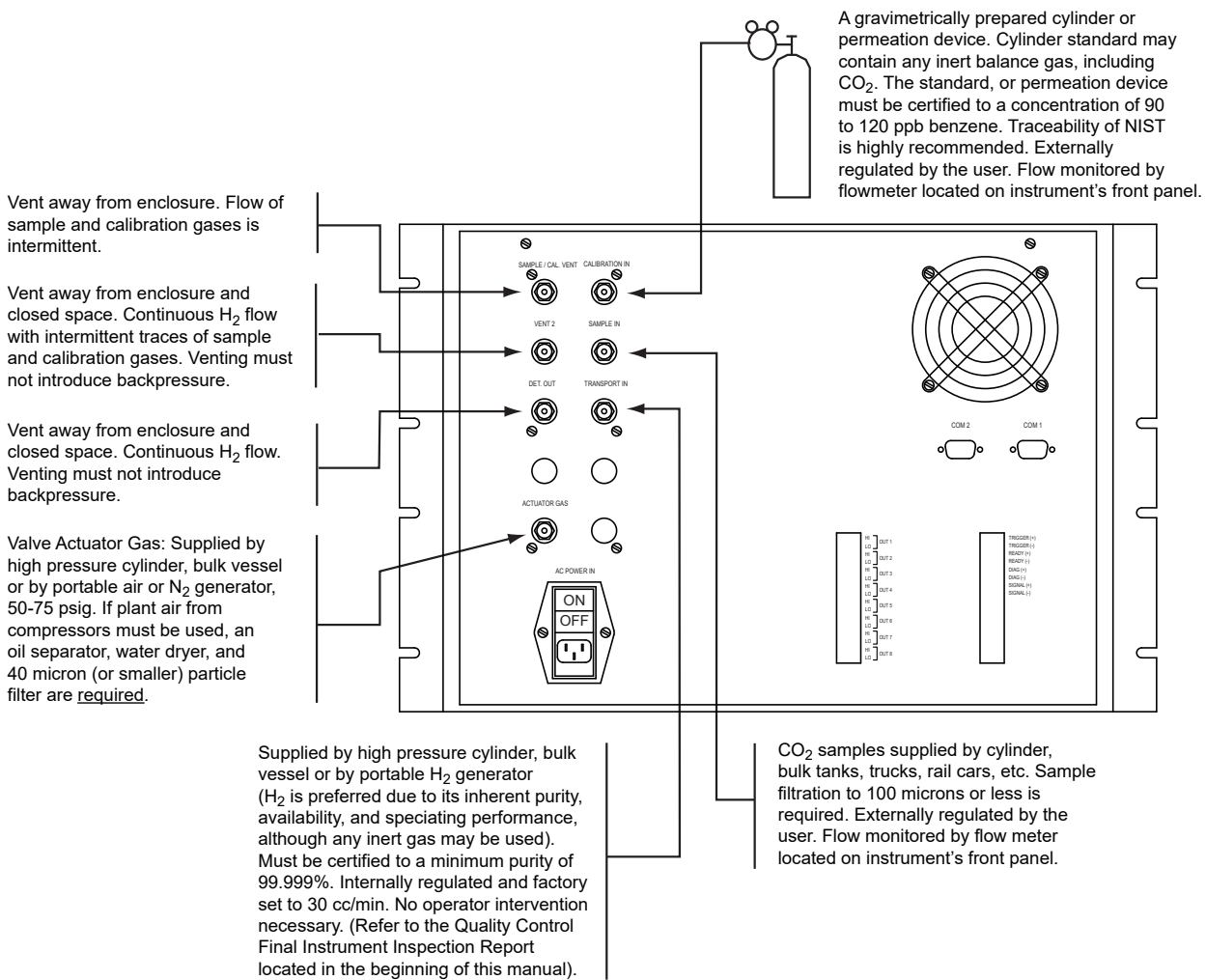


Figure 4-4
Gas Connections

4.6 Leak Testing

After all connections have been made, it is **IMPORTANT** that they be tight and free from leaks. Leaks in the system will cause baseline drift, noise, and may reduce sensitivity.



**LEAKS IN THE HYDROGEN LINE ARE HAZARDOUS.
HYDROGEN IS AN EXTREMELY EXPLOSIVE GAS.**

The lower explosive limit (LEL) of hydrogen in air is 4% and the upper explosive limit (UEL) in air is 75%. **CARE MUST BE EXERCISED** in handling this gas and the system must be free of leaks.



HYDROGEN SHOULD BE TURNED OFF AT THE SOURCE WHEN NOT IN USE.

This instrument has been completely leak-tested and checked out prior to shipping. It is possible that leaks have developed during shipment. The most likely source of leaks will be subsequent connections or reconnections made by the user.



All connections should be leak-tested with the gases flowing before the instrument is operated.

Each gas must be flowing to check for leaks. Use Table 4-1 to set pressures on the cylinders or external pump (if so equipped). The use of soap or other organic substances to check for leaks IS NOT recommended. They will contaminate the system. The easiest way to locate leaks in the system is with the GOW-MAC Model 21-070 Mini Gas Leak Detector. Contact GOW-MAC Instrument Co. for information and pricing regarding this product.



Leak checks should be run periodically and are a MUST when new tubing and fittings are installed.

INITIAL START-UP PROCEDURE: Gas Flows

The correct way to setup a Series 210 AHC for initial installation, or after an extended shutdown is as follows:



GOW-MAC offers an Installation Kit (P/N 59-AHC-I-M) that includes a Digital Flow Meter, Multi-Meter, and necessary fittings and tubing to install the unit.

5.1 Set Gas Flows/Pressures

Make the necessary hydrogen, sample, and calibration gas connections to the respective bulkhead fittings on the rear of the analyzer. Refer to Section 4.5, "Gas Connections".

A. Transport Gas

- i. Initiate the flow of hydrogen transport gas to the system. Set the outlet pressure of the hydrogen source as prescribed in Table 4-1.
- ii. Set EPC pressure and TRANSPORT GAS flows as described in Section 6.2.B.
- iii. Observe the TRANSPORT GAS flow meter on the front of the instrument.

B. Sample Gas

Initiate flow of sample gas to the analyzer. Set SAMPLE pressure as prescribed in Table 4-1 using *cylinder regulator*. Flow can be checked at either the front panel or at VENT located on the back panel when the sample loop is being purged with sample gas.

C. Calibration Gas

Initiate flow of calibration gas to the analyzer. Set CALIBRATION pressure as prescribed in Table 4-1 using *cylinder regulator*. Flow can be checked at either the front panel or at VENT located on the back panel when the sample loop is being purged with calibration gas.

D. Valve Actuation Gas

Introduce gas as specified in Chapter 4.



Refer to Appendix A: 210AHC Keypad Commands and Appendix B: “Quick Start Reference Flow Chart” for assistance.

6.1 Power-up

- A. Go to the back panel of GC. Find the power receptacle and confirm the fuse holder arrows are in alignment >< for your power supply (120 V or 240 V).
- B. Put the power switch in the “OFF” position (O).
- C. Connect the female end of the power cables into the receptacle.
- D. Connect the male end to AC power source.



It is very important that the Transport Gas has been connected and turned on BEFORE applying any power to the instrument.

- E. Turn “ON” (I) both power switches. (One above power cord on rear; one on front panel.)
- F. The instrument is now ready to operate.
- G. Upon power up, instrument displays

Load Last Program
Enter To Load
ESC Then Enter To Skip

- i. Push “**ENTER**” (F4) to restore last program settings and proceed to “Run Calibration Gas” (Chapter 6.3.F).

Or

- ii. Push “**ESC**”, then “**ENTER**” (F4) to begin reprogramming the instrument.

6.2 Programming

Wait for System Is Ready to appear on screen.

From Main Page: manually ZERO instrument (Set Baseline) by pressing “SHIFT**”, then “**ESC**”**.



NOTE

Be sure SHIFT is displayed on the screen anytime you press the **Shift** button. If it is not, press “**SHIFT**” again.

The instrument will automatically zero itself before a calibration.



Allow for purge and temperature stability; then re-zero the instrument. Flow and temperature settings will be set to factory default values. Refer to the Application Sheet provided with each particular instrument.

A. Set-up (Discovery Mode)

[Be sure to **thoroughly** purge instrument before Set-up.]

Enter SET UP / DISCOVERY MODE by pressing “**F2**” (SET UP).

i. Status Page

In “HOME” or “SET-UP” MODES, view programmed settings (Zone Temperatures, Valve positions, EPC Pressure settings) on STATUS PAGE by pressing “**SHIFT**”, then “**1**”.

Display on Screen:

Z1-Detector :(XXX°C)
Z2-Oven :(XXX°C)
Vx = (0=OFF; 1=ON)
P1= (XXX PSIG)

Press “**ESC**” to exit Status Page.



See Application Sheet and Flow Diagram provided with each particular instrument for specific parameters and settings

Table 6-1 Other SET-UP MODE options:	
Setup Mode Options Summary	Press to Select
Set Temperatures	“0”
Set Valves	“1”
Set Pressures	“2”
Prog. Valve Switching	“SHIFT”, then “7”
Clear all programming parameters	“ENTER” (F4), then “7”
See below for detailed instructions	

B. Setting Parameters

Clear all previous parameters by pressing "**ENTER**" (F4), then "**7**". "Clearing Settings" appears briefly on the screen.

i. Temperatures

- a. Press "**0**" to enter Set Temperature mode.

Display reads: Please Wait...

SET TEMPERATURE
Select 1: Detector Temp =
Select 2: Oven Temp =

- b. Select desired Zone to program. Press "**1**" or "**2**" on keypad:

Zone1 = Detector
Zone2 = Oven

- c. Press "**ENTER**" (**F4**) to set the temperature of the selected zone or "**ESC**" then "**Enter (F4)**" to end.

Enter temperature in format XXX; e.g. 070 for 70 °C

Display reads: Temperature Set

- d. Press "**0**" again to set another zone temperature, or "**ESC**" to return to SET UP MODE. (Pressing "**ESC**" will not be acknowledged on the screen)

ii. Valves

Press "**1**" to manually set valves 1 thru 6 to desired positions (as applicable to your instrument). Setting valves manually is not necessary for normal programmed operation of the instrument.



CW = On
CCW = Off

For valve position descriptions, refer to Table 6-2.

Valves default to "CCW / Off" position, if not set.

- a. Press "**SHIFT**", then the **valve #** on keypad to set that valve to the "CCW / OFF" position (Default Position).

Or

Press the **valve #** on the keypad to set that valve to the "CW / ON" position.

If the valve is not currently in the position you wish to set it, you will hear it switch after your keypad entry.



All instruments may not be equipped with all valves.



See Application Sheet and Flow Diagram provided with each particular instrument for specific parameters and settings.

Table 6-2		
Valve Position Key (CCW is the default position)		
Valve 6	On (CW)	Sample Gas
	Off (CCW)	Calibration Gas
Valve 3 (Sample Valve)	On (CW)	BEGIN INJECTION SEQUENCE
	Off (CCW)	Purging Sample Loop
Valve 5	On (CW)	Shutoff (Cut) Valve OPEN
	Off (CCW)	Shutoff (Cut) Valve CLOSED

- b. Press “**ESC**” to exit Valve Setting and return to SET UP MODE.

Display reads: Set Valves End

- iii. EPC Pressure /Flows



See Application Sheet and Flow Diagram provided with each particular instrument for specific parameters and settings.

- a. Set incoming Transport Gas pressure to 60 psi.
- b. With Valve 3 in the DEFAULT “OFF/CCW” position (Purge), use a flow meter to measure purge flow out of VENT 2 at the rear of the instrument. (Refer to valve setting instructions on previous page.) This purge flow (Transport 1) should be between 30 and 100 mL/min. (Pre-set)
- c. Press “**ESC**” to ensure return to SET UP MODE. (Pressing “ESC” will not be acknowledged on the screen)

- d. In Setup Mode, Press “**2**” to set EPC 1 pressure. (Transport 2 - Inject Flow)

Display reads: Please Wait...
SET PRESSURE
Select 1= EPC 1

- e. Select EPC 1 by pressing “**1**” on keypad.

Display reads: Set EPC 1 Pressure
ENTER to Set EPC
ESC then ENTER to End

- f. Press “**ENTER**” (F4) to set EPC 1 Pressure. (Transport 2 - Inject Flow)

- g. Use keypad to set EPC 1 pressure to get approximately 30 mL/min inject flow rate using entry format “XX”. i.e. To set pressure to 14 psig, enter “**14**”.

Use a flow meter to measure inject flow rate at the “Detector Out” vent at the rear of instrument.



See Application Sheet and Flow Diagram provided with each particular instrument for specific parameters and settings.

Screen briefly displays: Pressure Set when entered.

- h. When finished setting flows, press “**ESC**” to exit Pressure Setting and return to SET UP MODE. (Pressing “**ESC**” will not be acknowledged on the screen)

iv. Valve Switching Times

To set Valve Switching Times, press “**SHIFT**”, then “**7**”.



Be sure “SHIFT” is displayed on the screen anytime you press the Shift Button. If it is not, press “SHIFT” again.

Display reads: Please wait...

Sample Valve Setting.
ENTER to Set Sample Valve
ESC then Enter to Skip

- a. Press “**ENTER**” (F4) to set Sample Valve CW-1 (Valve 3 injection time).

Enter times in format: XX:XX; e.g. 00:01

- b. Set Sample Valve CCW-1 (Valve 3 switch to purge time)

Enter times in format: XX:XX; e.g. 20:13

- c. Screen displays:
Sample Setting 2.
ENTER to Set Sample Valve
ESC then Enter to Skip

This function is not used in this application.

Press "**ESC**" then "**ENTER**" (F4) to skip.

Programmed times are displayed on the screen.



See Application Sheet and Flow Diagram provided with each particular instrument for specific parameters and settings.

Press "**ENTER**" (F4) to continue.

- d. Press "**ESC**" to exit and return to SET UP MODE. (Pressing "**ESC**" will not be acknowledged on the screen)
- v. Peak Discovery Mode

This mode is used to accurately determine the elution time and peak-width of all components of interest in the analyzed sample.

To enter Peak Discovery Mode, press "**F1**" (PEAK DM).

Display reads: Please Wait...

 Enter Discovery Mode
 Press ENTER to Continue

- a. Press "**ENTER**" (F4) to start CAPTURE.

On Screen:

S = Baseline Voltage Reading (Represented by Solid Line)
Press "**ZERO**" (F4) to reset baseline to zero.

Analysis Run Timer: Reset by each injection. Runs on 24 hour clock.

T = Threshold Voltage Setting (Represented by Dotted Line)
The Threshold Setting must be HIGHER than Baseline Voltage (S). Press **Threshold** (F3) if dotted line falls below Baseline Voltage Level.

- b. Delete previous peak data and clear screen by pressing "**SHIFT**", then **F4** (Zero).

After pressing the "**SHIFT**" key you MUST see the word "SHIFT" on the display. If you do not see "SHIFT", press the "**SHIFT**" key again.

- c. Wait for a stable baseline (solid line).

- i. The first 10 points establish the zero baseline.
- ii. Before first expected peak start time, turn Detection ON by pressing “**SHIFT**”, then “**9**”. If unsure of peak start times, several peak setup runs may be required until approximate peak start times are known.
- d. Inject sample or standard by pressing “**3**”.
 - i. Injection process will begin. Timer automatically re-sets.
Screen displays valve position/ injection sequence.
- e. Use ZERO, THRESHOLD, Detection ON and Detection OFF to accurately capture peak retention times and peak widths.



Turn Detection ON by pressing “**SHIFT**”, then “**9**”. Turn Detection OFF by pressing “**9**”.

- i. ZERO - will return current “S” value to zero voltage level.

DETECTION must be ON to utilize this function (“**SHIFT**”, then “**9**”).
- ii. THRESHOLD (T) - Dotted-line which appears initially 0.0060 V above baseline voltage reading (S). The purpose of the THRESHOLD line is to accurately determine Peak START, END, and WIDTH data to be entered in the PEAK TABLE in “Peak Table”, under Calibration (Section 6.3.D) of these instructions.
- iii. Peak START time is established when voltage reading (S) initially crosses *above* THRESHOLD line.
- iv. Peak END time is established when voltage reading (S) crosses *below* THRESHOLD line, after a Peak Start time has been initiated.
- v. Peak Width (PW) is calculated as the difference in seconds between Peak START and END times.
- vi. Pressing **THRESHOLD** (F3) will move dotted line 0.0010 V above the baseline voltage reading (S). For accurate peak integrations, the Threshold Value should be as close to the baseline voltage level as possible, but still above noise and baseline fluctuations. Up to 14 recorded peaks, whether baseline fluctuations or actual peaks will be documented and displayed on the screen. Through practice in the use of ZERO, THRESHOLD, Detection ON and Detection OFF, the skilled operator will record the most accurate peak data possible to precisely locate and quantify peaks of interest for integration in the “Peak Table”, under Calibration (Section 6.3.D) of these instructions.
- f. When all peaks of interest have been captured, press “**ESC**” to exit CAPTURE MODE (Peak Discovery Mode).

Display reads:

Capture ending
Please wait...

- i. Wait for SYSTEM is READY message.
- g. Press **END** (F2) to exit SET UP MODE.
- h. Review peaks captured (up to 14 peaks):
 - i. Press **PK DSPLY** (F3) to enter "Peak Display Mode".
 - ii. Use corresponding keypad numbers to review peaks captured in the table on the screen (Table 6-4).

Table 6-4: Peak Display		
Press		Peak #
"1" thru "8"	To View	1 thru 8
"SHIFT", then "1"		9
"SHIFT", then "2"		10
"SHIFT", then "3"		11
"SHIFT", then "4"		12
"SHIFT", then "5"		13
"SHIFT", then "6"		14

- iii. Make sure all components of interest have been accurately recorded with regard to peak start time, width, shape and resolution. Note peak shapes, start, and end times with respect to the threshold line.
- iv. Record PEAK START Times and PEAK WIDTHs to be entered in "Peak Table", under Calibration (Section 6.3.D) of these instructions.
- v. To precisely capture an entire peak for accurate integration, it may be necessary to increase the size of the "window" that will locate the peak. To do this, subtract a few seconds from the PEAK START Time recorded on screen, AND increase the PEAK WINDOW size by adding a corresponding number of seconds on both the front and back of the window.

Example:

Peak 1 data recorded on screen:

Start Time= 02:46; Peak Width=007

After reviewing this peak in Peak Display Mode, we determined that to accurately integrate this peak, we would like the integration to begin 3 seconds earlier, and end 3 seconds later than displayed. Therefore, we will record the Peak Start Time as 02:43 (02:46 – 3 sec.).

To increase the size of the window to capture our new peak size, we must add 3 seconds to both the beginning and the end of the peak window, making our new Peak Width = 013 (007+3+3). So, for Peak 1, we would enter into the Calibration Table in Sec. II:

Start Time = 02:43; Peak Width = 013



Care must be taken not to increase the peak window more than necessary, as baseline noise could be added to the peak size; or another peak could overlap into the peak window. A minimum of 3 seconds must be allotted between peak windows for integration. The distance between peaks can be adjusted if necessary by altering flow rates and oven temperatures.

- i. When done reviewing peaks and recording Peak Start Times and Peak Widths of components of interest, Press “0” on keypad to exit “Peak Display Mode”.
- j. Press “**SHIFT**”, then “**ENTER**” (F4) to clear data from screen. Peaks can still be viewed in Peak Display Mode if desired.

However —

While in SET UP MODE, pressing “**SHIFT**”, then “**ENTER**” (F4) will PERMANENTLY DELETE all peak data.

- k. Go back to SET UP MODE (Section 6.2.A) to repeat capture run if the precision of any of the peaks of interest is not acceptable, or you wish to verify the precision of your first capture analysis.



Before repeating capture run, return to SET-UP Mode and permanently delete previous peak data by pressing “**SHIFT**”, then “**ENTER**” (F4).

6.3 Calibration



See Application Sheet and Flow Diagram provided with each particular instrument for specific parameters and settings.

A. Peak Table

Press F1 to enter Peak Table.

- i. Press “**ENTER**” (F4) to continue as instructed on screen.

- ii. Snapshot of Current Time Position (from injection) is displayed.

Press "**ENTER**" (F4) to continue.

- iii. Current "Valve Switching Times" are displayed.

Press "**ENTER**" (F4) to continue.

B. Event Timer Reset

- i. Press "**ENTER**" (F4) to initialize Event Timer

Or

- ii. Press "**ESC**" then "**ENTER**" (F4) to skip, as instructed on screen.

C. Sample Valve Settings

At this point, you have an opportunity to program or change Valve 3 inject /purge times, if desired.

- i. Press "**ENTER**" (F4) to program / change valve switching times.
(XX:XX format; max= 59:59)

OR

- ii. Press "**ESC**" then "**ENTER**" to skip, as instructed on screen, if no changes need to be made.

Screen displays:

Sample Setting 2.
ENTER to Set Sample Valve
ESC then Enter to Skip

This function is not used in this application.

Press "**ESC**" then "**ENTER**" (F4) to skip.

Programmed times are displayed on the screen.

Press "**ENTER**" (F4) to continue.

D. Set Peak Table

Here the information on the components of interest obtained in "Peak Display Mode" is programmed into the instrument in the "Peak Table".



See Application Sheet and Flow Diagram provided with each particular instrument for specific parameters and settings.

Screen displays:

Enter Peak Table

Enter to Set Peak Info
ESC then ENTER to skip.

- i. Press "**ENTER**" (F4) to continue to peak table programming.

Screen Displays:

Enter # of Peaks
Add 1 Marker Peak for Backflush Operation



A "Marker Peak" is added to set a Backflush time, and indicate to the instrument the end of the analysis run.

- ii. Enter # of Peaks on keypad.

For one (1) component of interest, press "**2**" (one component, plus a marker peak)

- iii. Hit "**ENTER**" (F4) to accept entry, or "**ESC**" then "**ENTER**" (F4) to re-enter number of peaks, as instructed on screen.

- iv. Enter Peak #1 Start Time (XX:XX format; max = 59:59)

Press "**ENTER**" (F4) to accept entry, or "**ESC**" then "**ENTER**" (F4) to re-enter.

- v. Enter Peak #1 Width (XXX format)

Press "**ENTER**" (F4) to accept entry, or "**ESC**" then "**ENTER**" (F4) to re-enter.

- vi. Enter Polarity of Peak #1 (Push "**1**" on keypad)

Press "**ENTER**" (F4) to accept entry, or "**ESC**" then "**ENTER**" (F4) to re-enter.

- vii. Repeat steps "iii through vi." for Peak #2 and any additional peaks (as appropriate for your application).

As a guideline for Marker Peak, use **two times the end time** of Peak 1 as the Start Time for the Marker; and a Peak Width of 005.

For example, if Peak 1 Start Time is 01:00, and the Peak Width 060 (seconds), the Peak 1 end time would be 02:00. The Marker Peak Start Time would then be 06:00 (02:00 x 2 = 4:00. Four (4) minutes after Peak 1 end = 06:00); and the Peak Width would be 005. This is only a guideline, and can be adjusted as necessary.

- viii. After information for the last peak is entered into the Peak Table and accepted,

Screen displays:

Peak Event Table

ESC Then Enter To Abort
ENTER to Accept

- xi. Press "**ENTER**" (F4) to accept Peak Table information just entered, or "**ESC**" then "**ENTER**" (F4) to re-enter.

Screen displays:

Processing Please wait...

Wait until message clears. (~5 min.) **AND** Screen displays:

System is Ready
Peak Event Table Complete

Press "SHIFT" then "6" TO PROGRAM Concentrations

E. Input Standard Concentrations, Peak Labels, Run Control, and Trigger

- i. Press "**SHIFT**", then "**6**" on keypad

Enter Standard Concentration of each peak in XXX.XX format.



See Application Sheet and Flow Diagram provided with each particular instrument for specific parameters and settings.

Enter "000.00" for Marker Peak concentration, if applicable.

After last peak concentration is entered, Screen displays:

ENTER to LABEL PEAKS
ESC then ENTER to End

- ii. Press "**ENTER**" (F4) to Label Peaks or "**ESC**", then "**ENTER**" (F4) to skip naming peaks.

- iii. Enter Peak Labels in format XXXXX.

Select five (5) alpha/numeric, or blank characters to identify each peak. Use "**4**" and "**6**" on keypad to cycle through characters. Holding in "**4**" and "**6**" keys will cycle through characters faster.

Press "**ENTER**" (F4) to select each character, one at a time. FIVE characters must be selected for each component.

- iv. After the last character of the last component is entered,

Screen displays:

Run Control:
1-Auto 0-Manual

“AUTO” will allow sampling to run continuously without operator input. “MANUAL” will stop and wait for operator input after one sample run.

Use keypad to enter “**1**” for “AUTO”; enter “**0**” for “MANUAL”.



To exit “AUTO” run control mode, Press “ENTER” (F4), then “SHIFT”.
Instrument will operate in “MANUAL” mode after current run.

e. Set Trigger:

TRIGGER ON, if selected, will delay run start until input is received (terminals un-shorted).

Press “**1**” to turn TRIGGER ON; Press “**0**” to turn TRIGGER OFF.

Screen will display:

Please Wait

Wait until message clears. (~5 min.)

f. As instructed on screen, press “**ENTER**” (F4) to END.

Display reads:

Prog. Complete

Wait until screen displays:

SYSTEM IS READY

F. Run Calibration Gas

Press “**SHIFT**”, then “**4**” to enter “Calibration Mode”.

a. Calibration gas will be automatically analyzed twice and evaluated. The calibration is the average of the two runs.

b. If the precision of the calibration runs are within 10%, “**CAL VALIDATED**” is displayed on-screen.

If the Calibration is not validated, display will indicate “**VAL Failed**”. Rerun Calibration Gas if Cal is not validated by pressing “**SHIFT**”, then “**4**”. Repeat until “**CAL VALIDATED**” is displayed on-screen.

G. Calibration Check

Press "**ENTER**" (F4), then "**SHIFT**", then "**5**" to check the calibration. The Calibration Gas will be analyzed as a Sample, and the results will be displayed on screen for evaluation.

If satisfactory results are achieved on Calibration Check, proceed to "RUN SAMPLE".

H. Run Sample

To make a Sample Run, press "**SHIFT**", then "**5**".

Screen Displays:

Zeroing Please Wait

- a. Analysis results will be displayed on screen when completed. Sampling will run continuously if "AUTO" Run Control was selected (Section 6.3.E.iv).
- b. To EXIT "AUTO" run control mode, press "**ENTER**" (F4), then "**SHIFT**". Instrument will stop after one analysis run.

6.4 Serial Input/Output

The following commands have to be entered while the instrument's "HOME" screen is visible. If any other screen is visible there will be unexpected instrument behavior and would require that any corrections are made from the instrument keypad.

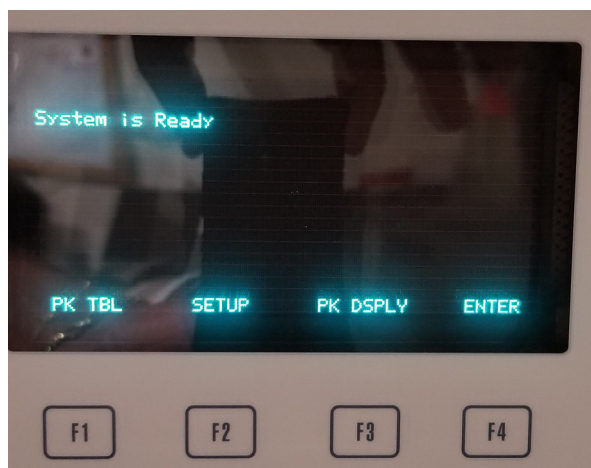


Figure 1: HOME SCREEN

The commands are as follows:

SHIFT: "E" "0x45"

ENTER: "F" "0x46"

RUN: "E" "5" "0x45" "0x35"

1. TRIGGER, TRIGGERED, RUN MODE, 00:04:37, BENZE, 102.26, RUN END,

CALIBRATE: "E" "4" "0x45" "0x35"

1. CAL MODE, CAL FAILED, CAL END,
2. CAL MODE, CALIBRATED, CAL END,

AS FOUND: "F" (wait) "E" "5" "0x46" "0x45" "0x35"

1. TRIGGER, TRIGGERED, AsfMODE, 00:04:37, BENZE, 102.20, Asf END,

Serial messages definitions:

1. CAL MODE,: Start of a calibration
2. CAL END,: End of a calibration
3. CAL FAILED,: Result of calibration run
4. CALIBRATED,: Result of calibration run
5. RUN MODE,: Start of a sample run
6. Asf MODE,: Start of an as-found-as-left run
7. 00:04:37,: Duration of the reported run
8. BENZE,: Sample component name
9. 102.20,: Sample reported concentration
10. Asf END,: End of an as-found-as-left run
11. RUN END,: End of a sample run
12. TRIGGER,: Waiting for trigger
13. TRIGGERED,: A run has been triggered

6.5 H2 Pressure Sensor and Indicator

Description of changes: Added H2 Pressure Sensor and Indicator Option.

Serial Number of firmware revision: V12102018

Startup:

The 'READY' signal will be NOT READY as Normal; (contact open)

The NO FLOW/PRESSURE indication will show that there is no FLOW/PRESSURE until it is set manually or by restoring the flow setting with the restore function (Contact Closed). The Instrument will be NOT READY and the FLOW/PRESSURE indicator will show no flow / pressure. Once the system setting has been restored the instrument will periodically check for the programmed Pressure setting +/- 1psig.

The instrument will be not ready as normal.

There will be a display of the set pressure on the display located at the middle right of the display.

Operation:

If the programmed pressure is not greater than 0.5 less than the programmed pressure the instrument will not allow calibration, calibration check or a run to start and finish. The display will also indicate no pressure near the top left of the display.

Once the pressure is greater than the set pressure minus 0.5 psig all normal operation will be allowed. The display will indicate the pressure set. The displayed value will only be an integer value.

The Pressure/Flow is checked periodically if a run has not been initiated.

If a run has been initiated, at the start of the run the pressure will be checked. If the pressure is above the set pressure minus 0.5 the run will begin as normal. If the pressure is below this point the run will end and the ready signal will become not ready (open contact) and the pressure / flow indicator will become closed indicating a pressure / flow problem.

If the instrument is waiting for trigger the pressure will be check when the trigger has been applied.

If the pressure has been restored initiating a run will allow the instrument to continue running. There will be no need to place the instrument back in auto mode. The previous programming will be retained.

Note: Whenever a low pressure/flow signal has been initiated there will be a message put out of the serial port. The message will be: LOW PSIG,

There may be a slight hesitation in key response when issuing commands. This is because of the time it takes to check the pressure.

Connection: (COM 2) D-connector pins 1&2, D/C Volts Only, Maximum 24 Vdc @ 500 mA



It is ***HIGHLY*** recommended that GOW-MAC Instrument Co. be consulted prior to any maintenance activity being undertaken. GOW-MAC service professionals will ensure the necessity of the maintenance, and will protect the user against any possible warranty violations and/or unnecessary instrument downtime.

7.1 Changing the Oven Assembly

The oven assembly contains the speciation device, which allows identification of the aromatic species amidst the many other impurities in the carbon dioxide (CO₂) matrix.

Figure 7-1 illustrates the oven assembly.

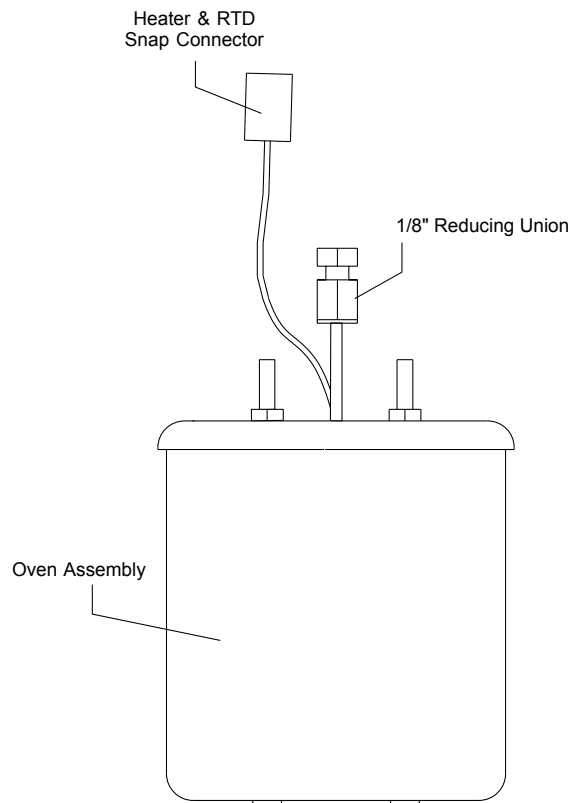


Figure 7-1
Aromatic Hydrocarbon Analyzer Oven Assembly

- A. Turn instrument power OFF by flipping power switches located on **both** the back and front panels of the analyzer.
- B. Remove the top cover of the instrument. Four (4) Phillips-head screws at each corner secure the top cover. The screws must be removed completely.
- C. Disconnect the 1/8"-side of the reducing union to the GAS IN and GAS OUT lines atop the oven assembly (Figure 7-2).

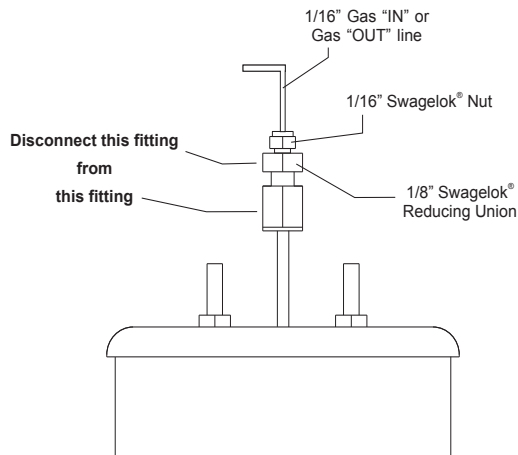


Figure 7-2

- D. Disconnect the oven temperature control line via the white plastic "Snap" connector (Figure 7-3).

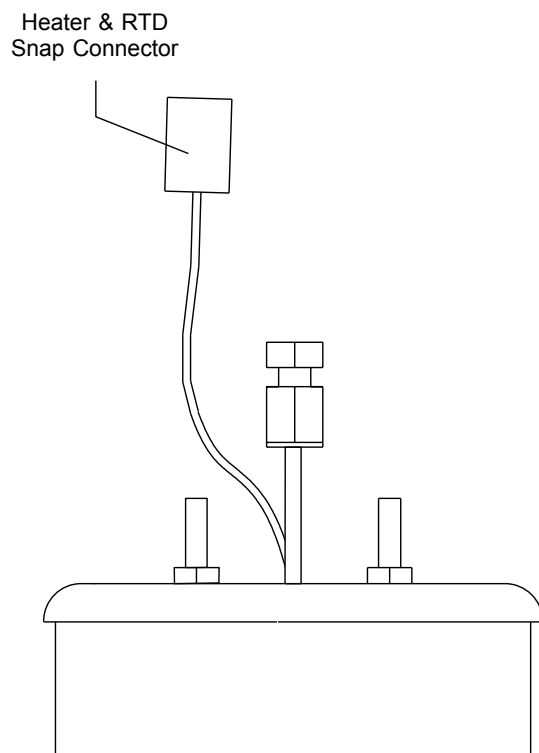


Figure 7-3

- E. Loosen the four thumbscrews adjacent to the corners of the oven module, and slide the front and rear securing brackets away from the oven module (See Figure 7-4).

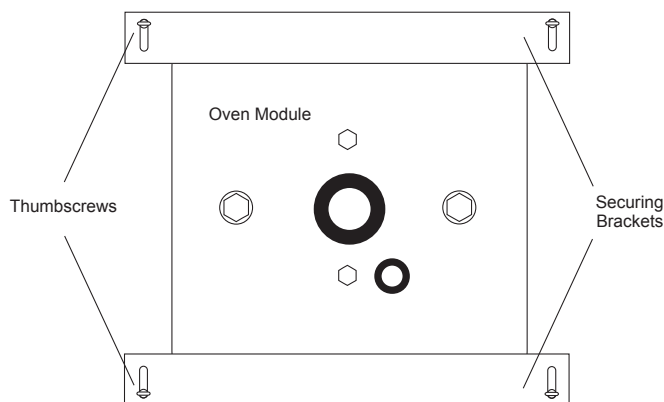


Figure 7-4

- F. Remove the oven module.
- G. Insert new oven module.
- H. Slide front and rear securing brackets over top of oven module and hand-tighten the four thumbscrews.
- I. Reconnect the oven control wire via the white plastic “Snap” connector.
- J. Reconnect both 1/8” Swagelok® fittings.
- Hand-tighten each fitting.
 - Tighten slightly further with wrenches.
 - Leak-check both connections. The use of soap or other organic substances to check for leaks ***IS NOT*** recommended. They will contaminate the system if there is a leak. The easiest way to locate leaks in the system is with the GOW-MAC Model 21-070 Mini Gas Leak Detector. Contact GOW-MAC Instrument Co. for information and pricing regarding this product.
- K. Replace the top cover to the instrument.

7.2 Speciation Oven Bake Out



**CONSULT FACTORY *PRIOR* TO
PERFORMING THIS OPERATION!!!
(610) 954-9000**

“Baking-Out” is a method of removing contamination from the Speciation Oven. It is the next troubleshooting option after allowing time for the system to clear out by itself. The amount and type of contamination usually will determine whether or not a Bake-Out is necessary.



If a Bake-Out is required, the following steps are in an important sequence that positions the valves so bake-off effluent bypasses the detector and flows through Vent 2:

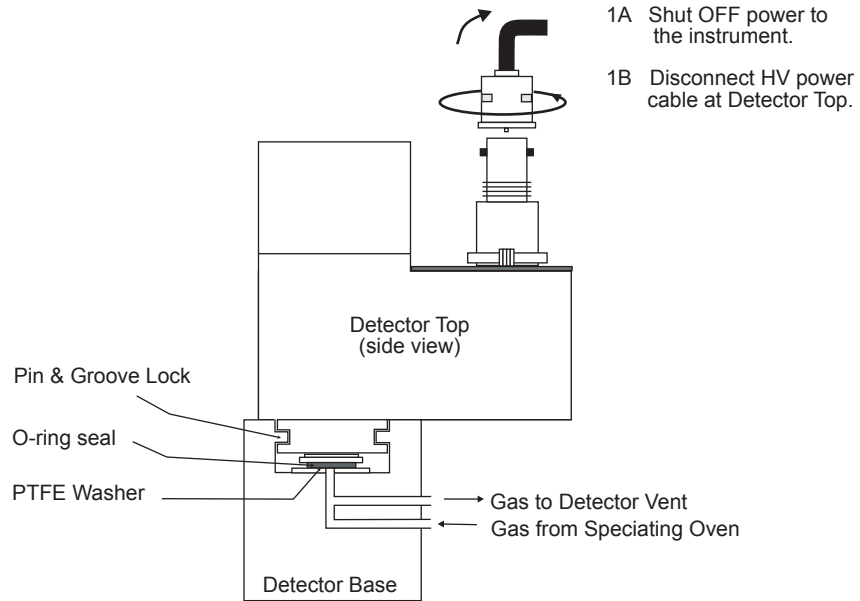
1. Make sure Transport Gas is connected and flowing. (See “Set-up” in Section 6.2.A)
2. Enter SETUP/ DISCOVERY MODE by pressing “**F2**” (SET UP).
3. Press “**1**” to manually set valves.
4. Push “**SHIFT**”, then “**3**” to set Valve 3 (Sample Valve) to “OFF” (Purge) position.
5. Press “**ESC**” to exit Valve Setting and return to SET UP MODE.
6. Press “**0**” to enter Set Temperature mode.
7. Select Zone 2 to program oven temperature.
8. Press “**ENTER**” (F4) to set the temperature.
9. Set the oven temperature to 180 °C in format XXX.
10. Press “**ESC**” to return to SET UP MODE.
11. Enter STATUS MODE by pressing “**SHIFT**” then “**1**”.
12. Be sure V3 is in “OFF” position, and the oven reaches 180 °C.
13. Bake-out oven for at least six hours (6). OVERNIGHT bake-out is preferred in severe cases.
14. After Bake-Out, See “Set-up” in Section 6, p.32 to reprogram instrument to application parameters.



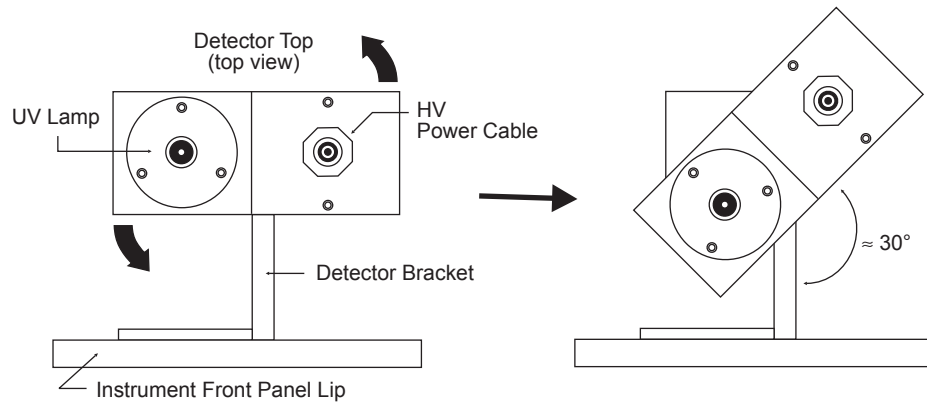
See Application Sheet and Flow Diagram provided with each particular instrument for specific parameters and settings.

7.3 Changing and/or Cleaning Lamp

Step 1

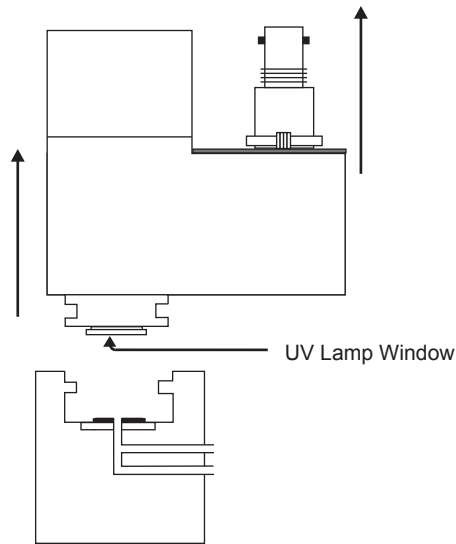


Step 2



! * WEAR GLOVES SUPPLIED IN KIT!

Step 3




With GLOVED hands, CAREFULLY rock and lift the Detector Top upward until free from detector base.

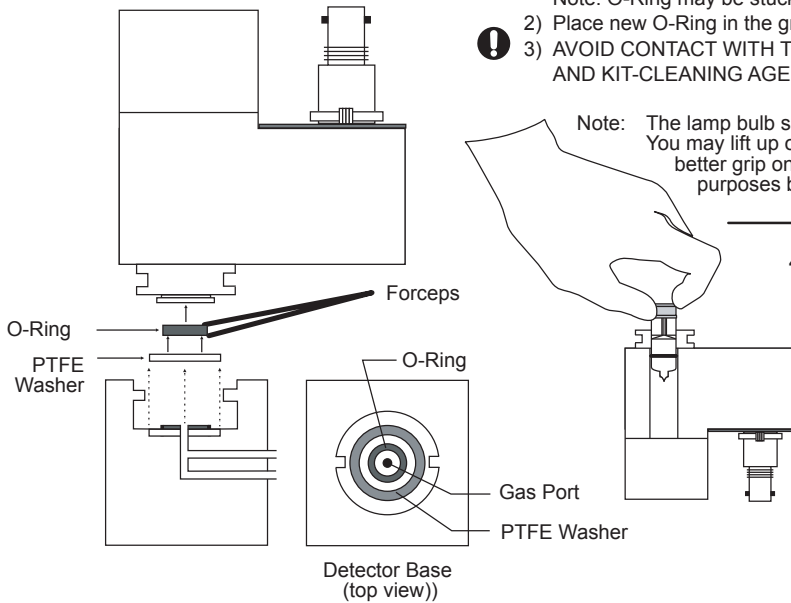
Take special care NOT TO TOUCH the UV Lamp Window! 

Step 4

4A If Cleaning Lamp Window:

- 1) Using forceps, remove and discard the old O-Ring.
Note: O-Ring may be stuck on window.
- 2) Place new O-Ring in the groove in the center of the Detector Base.
- 3) AVOID CONTACT WITH THE UV LAMP WINDOW! USE SPECIAL GLOVES AND KIT-CLEANING AGENTS TO CLEAN WINDOW.

Note: The lamp bulb should never be removed from its' the Detector Top. You may lift up on the window's rim until the bulb "pops" up to get a better grip on the sides of the bulb for window cleaning  but DO NOT remove the bulb.



4B If Replacing an old Detector Top with a New Detector Top

- 1) Wearing gloves, place new O-Ring in groove in center of Detector Base.
- 2) Check that lamp window is clean and lint free in the new replacement Detector Top.
AVOID CONTACT WITH THE UV LAMP WINDOW! USE SPECIAL GLOVES AND KIT-CLEANING AGENTS TO CLEAN WINDOW IF NECESSARY.
- 3) Align new Detector Top with old Detector Base. Gently rock and push together. Twist Detector Top clockwise to lock.
- 4) Reconnect HV power cable.

7.4 Service

ONLY trained GOW-MAC personnel should undertake service and maintenance of the Series 210AHC Aromatic Hydrocarbon Analyzer beyond the activities described in this manual. Optional service arrangements with GOW-MAC Instrument Company include:

- A. *Service Agreement*: provides uninterrupted service, repair or replacement of the analyzer as an extension to the warranty.
- B. *Loaner Agreement*: a working instrument is provided while the user's primary unit is under repair at the GOW-MAC facility.
- C. *On-site service calls*: Available for a daily rate plus parts and expenses portal-to-portal.

Contact GOW-MAC Instrument Company for a complete description of service and maintenance options.

GOW-MAC Instrument Co.
277 Brodhead Road
Bethlehem, PA 18017 USA
Tel: (610) 954-9000
Fax: (610) 954-0599
E-mail: sales@gow-mac.com

TROUBLESHOOTING

<u>PROBLEM</u>	<u>CAUSE</u>	<u>REMEDY</u>
Lamp will not light	Power not supplied	Ensure AC power to instrument connected.
	Instrument OFF	Turn both BACK and FRONT power switches ON
Excessive noise from speciation system	Contaminants bleeding	Initiate BAKE-OUT (see Sect. 7.2)
	Dirty lamp window	Clean window per instructions found in Maintenance Kit
	Contaminated transport gas	Replace transport gas. Ensure >99.999% pure
	Contamination of flow system	Clean or replace tubing and regulators
No output	Lamp not lit	Check lamp power connections and seating. Replace if necessary (Call GOW-MAC).
Poor sensitivity	Insufficient sample	Increase sample flow rate.
	Dirty lamp window	Clean window per instructions found in Maintenance Kit
	Aging lamp	Replace lamp assembly (Call GOW-MAC)
Signal drift	New lamp	Allow new lamp to stabilize for at least 30 minutes.
	Contaminants bleeding from speciation system	Initiate BAKE-OUT (see Sect. 7.2)
Poor calibration validation/Erroneous results	Speciation system malfunction	Initiate BAKE-OUT (see Sect. 7.2). If persists, replace oven assembly per Sect. 7.1.
	Transport flow setting incorrect	Check flow from DET OUT and adjust to the rate located on the <i>Quality Control Final Inspection Report</i> .

PROBLEM**CAUSE****REMEDY**

Gas flows insufficient.

Supply pressures too low
or too high

Adjust supply pressures (see
Section 5 - Installation)

“NOT READY” signal on
the instruments “READY”
signal output

Valve actuation gas pressure
is below 15 psig

Increase and maintain actuation
pressure in the range 50-75 psig

9 REPLACEMENT PARTS

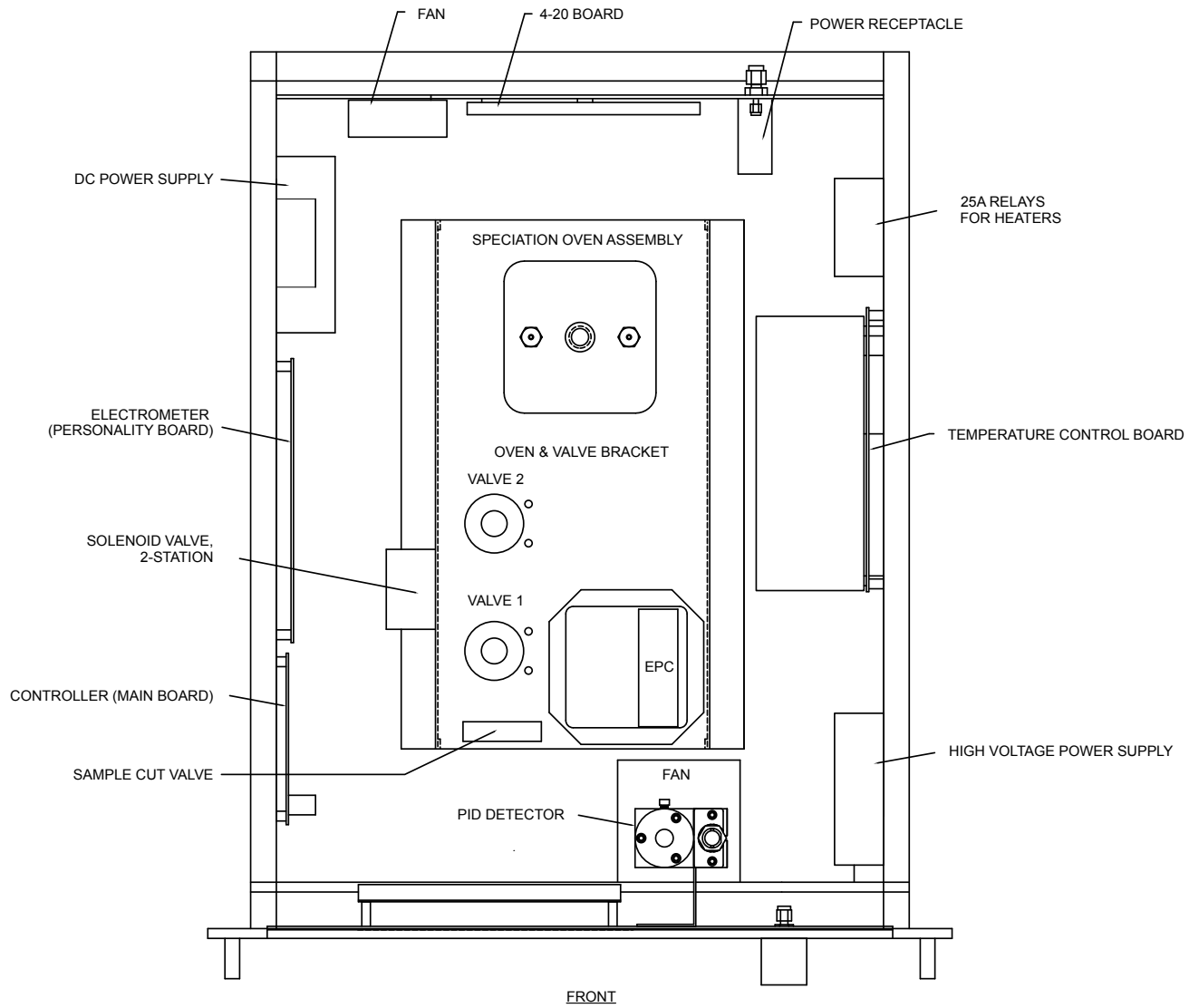


Figure 9-1

Description	Part Number
Photoionization Detector (PID), complete.....	12-PID-GM
Photoionization Detector Top with Lamp.....	12-PID-TOP
Speciation Oven Assembly (115 V).....	152-423
Speciation Oven Assembly (230 V)	152-423-230
Switch, Pressure, for valve actuation gas, normally open, 15 psig set	120-130
Switch, Power, lighted rocker (front panel)	120-149
Switch, Membrane (front panel).....	120-240
Fuse.....	Refer to wiring schematic
Relay, solid state, 25 A.....	122-114
Power Supply, Quad	123-124
Power Supply, high voltage	123-249-24
PCB, controller	123-278-4
PCB, personality for PID.....	123-287-6
PCB, 4-20 mA output.....	123-298
Temperature Controller, 2 channel, RS485	123-310
Power supply, Polarization (115 V).....	123-121
Power supply, Polarization (230 V).....	123-121-230
Fan, 24 V	124-107
Cord, AC input power	127-378
Display, Vacuum, fluorescent.....	128-260
Receptacle with power switch and fuse holder (back panel).....	129-345
Valve, Sample Cut w/cable and connector (24 V)	155-147
Heated Zone Cable, Detector (120 V).....	155-148
Heated Zone Cable, Detector (230 V).....	155-148-230
Flowmeter, H ₂ , 10 - 95 sccm @ STP (Transport)	180-139
Flowmeter, CO ₂ , 10 - 120 sccm @ STP (Sample/Calibration)	180-140
Valve, 4-port, low temperature with actuator	180-404A
Valve, 10-port, low temperature with actuator	180-410A
Sample Loop, 5.0 mL, 1/8" silcosteel	180-457SI
Electronic Pressure Controller.....	180-830
Valve, solenoid, 2-station, 24 Vdc	180-893-2

10 DRAWINGS

Drawing	B-19820	Flow Diagram
Drawing	D-19824	Wiring Schematic (115/230 V)

Appendix A: Series 210AHC Keypad Commands

210 AHC Keypad Commands	
CLEAR PROGRAMMING DATA	ENTER, 7
ZERO INSTRUMENT	SHIFT, ESC
RUN CALIBRATION GAS	SHIFT, 4
CALIBRATION CHECK	ENTER, SHIFT, 5
RUN SAMPLE	SHIFT, 5
SET UP MODE	F2
TEMPERATURE	0
VALVES---MUST ESC TO EXIT	1
PRESSURES	2
PROGRAM VALVE SWITCHING	SHIFT, 7
EXIT SET UP MODE	END
STATUS PAGE	SHIFT, 1
EXIT STATUS PAGE	ESC
PEAK DISCOVERY MODE	PEAK DM (F1)
CLEAR DATA AND SCREEN	SHIFT, ENTER (F4)
DETECTION ON	SHIFT, 9
DETECTION OFF	9
INJECT STANDARD	3
PEAK DISPLAY MODE	PK DISPLY (F3)
EXIT PEAK DISPLY	0
ENTER STANDARD CONCENTRATIONS, PEAK LABELS, AUTO/MAN AND TRIGGER	SHIFT, 6
EXIT AUTO RUN	ENTER (F4), SHIFT

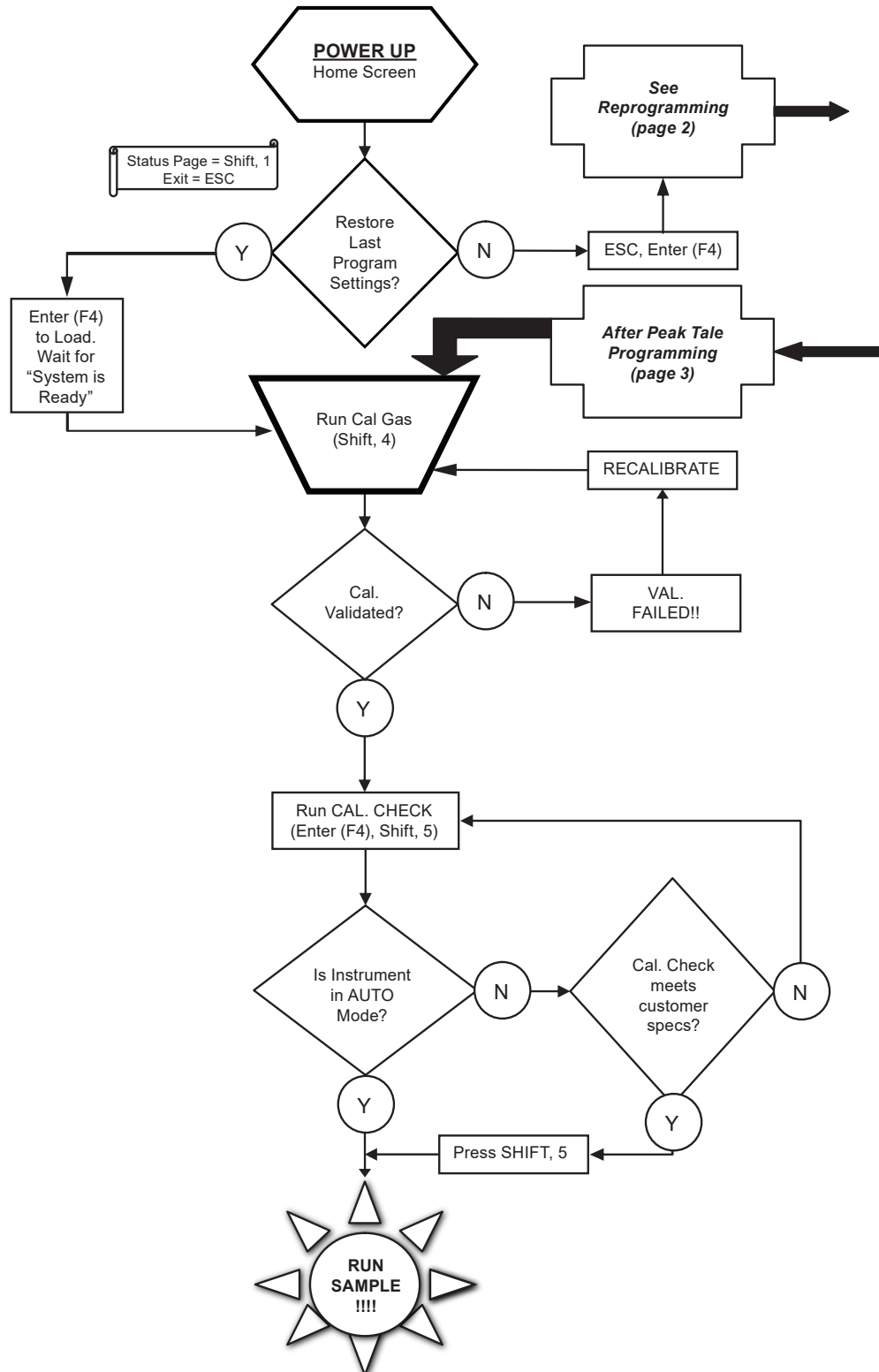
Appendix B: Series 210AHC Quick Start Reference Flow Chart

Series 210AHC Quick Start Reference Flow Chart

Start-Up

(page 1)

(refer to operating manual for detailed instructions)

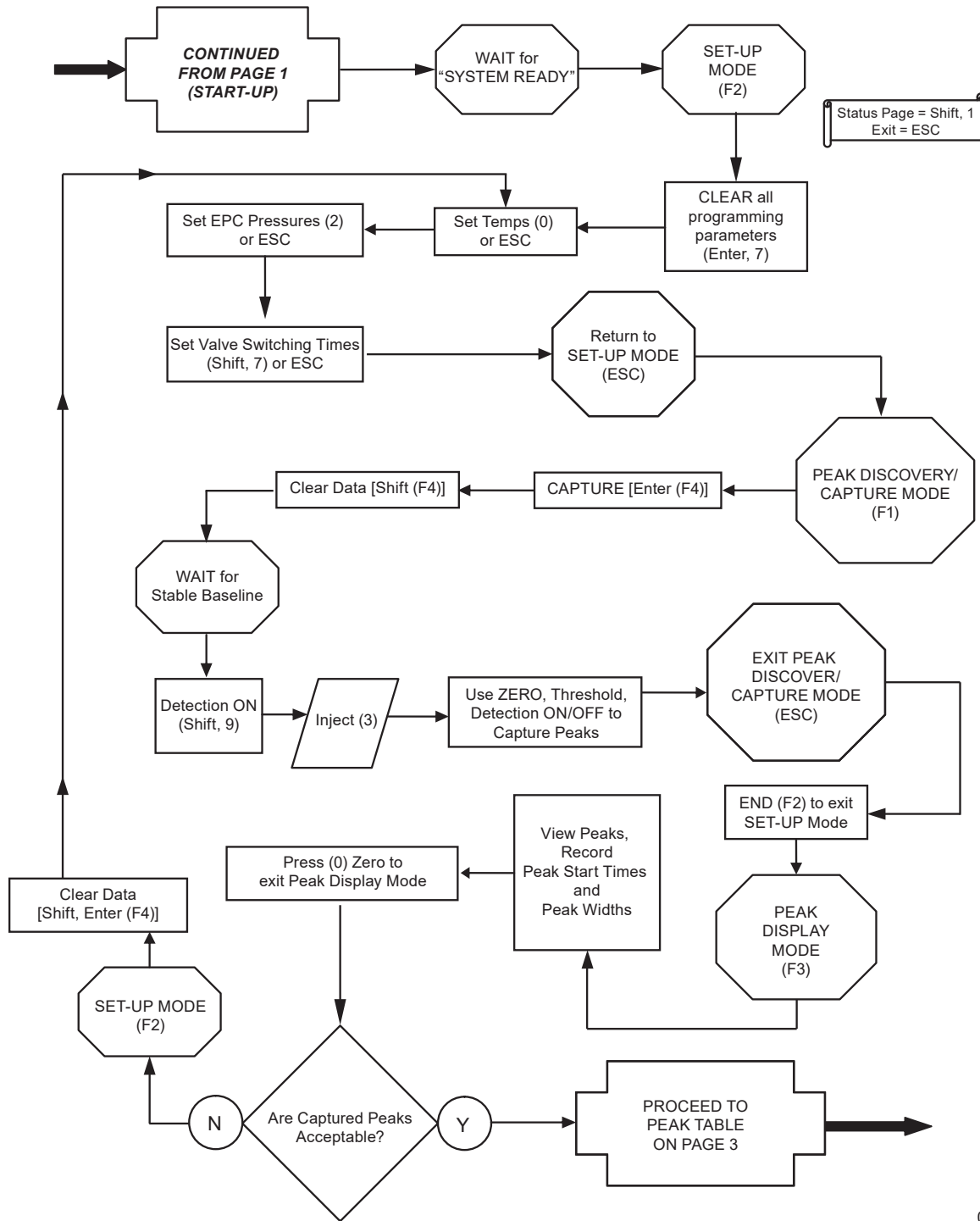


0817

Series 210AHC Quick Start Reference Flow Chart Reprogramming

(page 2)

(refer to operating manual for detailed instructions)

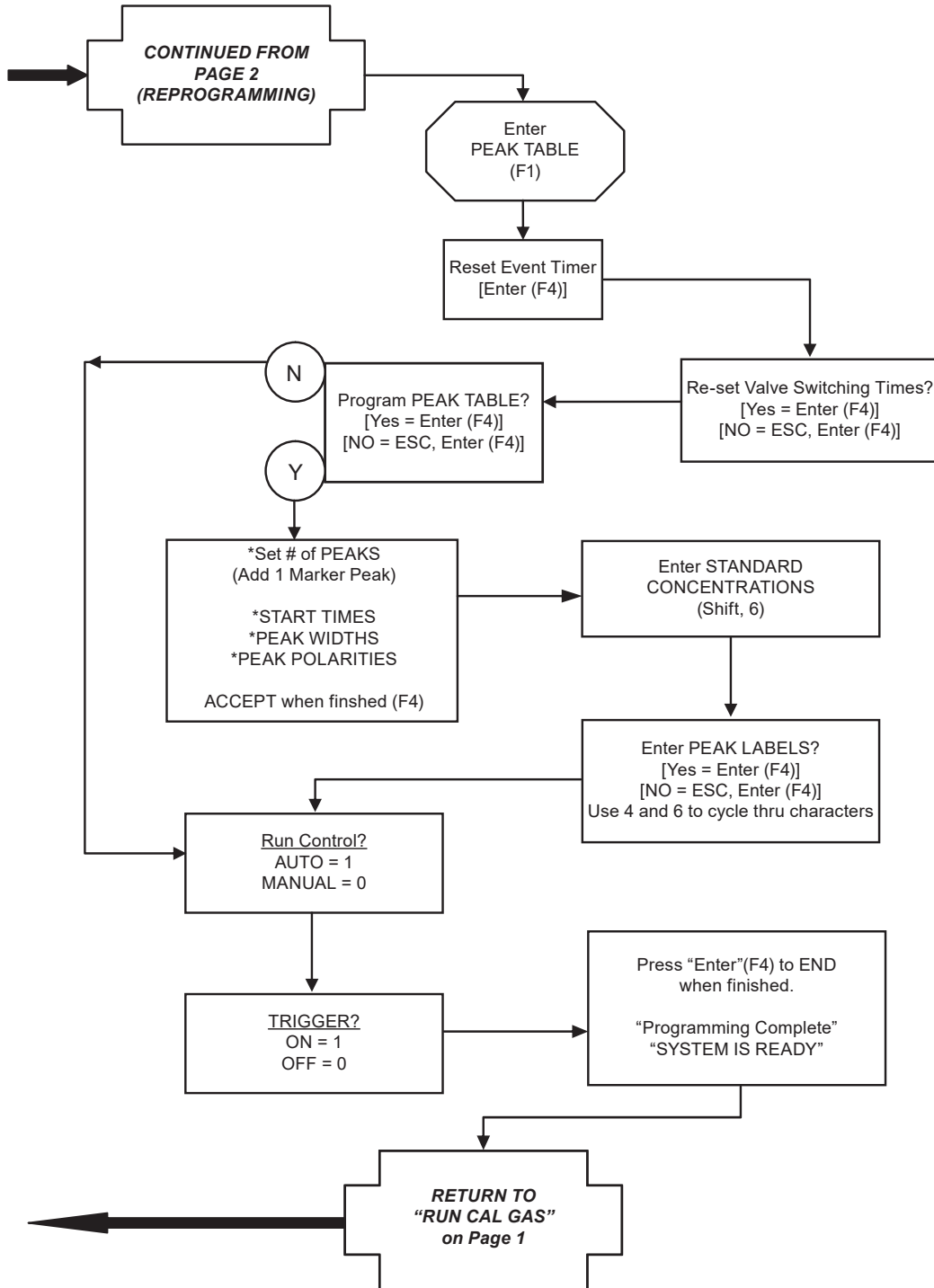


0817

Series 210AHC Quick Start Reference Flow Chart Peak Table

(page 3)

(refer to operating manual for detailed instructions)



0817

Health and Safety Declaration for the Return of GOW-MAC Instrument Co. Equipment

In order to protect our employees from exposure to various hazards, the following statements and/or questions **MUST** be answered by you. Fill out this document in its entirety and either fax or e-mail it to GOW-MAC Instrument Co., Attn: Repair Dept, **BEFORE** returning the product.

The instrument/device/part being returned **will not** be accepted into GOW-MAC's facility until we receive this completed document. Once the product has been approved for return by our Chemical Safety Officer, an acknowledgement will be promptly issued to you with notification of your **Return Materials Authorization (RMA) number** and the procedure to follow for returning the product. *All applicable regulations should be followed when returning instrumentation, devices, and or parts.*

Customer to Record the Following:

Model # / Part #: _____

Serial #: _____

Service Technician spoken to: _____

Today's Date: _____

If this form is not approved by our chemical safety officer, the instrument/device/part WILL NOT be permitted into our facility for servicing!

A) Briefly list the application(s) for which the instrument/device/part was used, as well as any and all chemicals, gases, and/or materials analyzed and their concentrations. (**MUST** be filled in): _____

B) Is there the possibility of internal or external contamination on or in this instrument/device/part?
 Yes – see below No – proceed to C.

Please check the appropriate box.

- Chemicals or Substances That Are Hazardous to Health
- Blood, Body Fluids, (e.g. Urine, Secretions), Pathological Specimens
- Regulated Medical Wastes
- Infectious Substances or other Bio-Agents (e.g. Protein, Enzymes, Antibodies)
- Radioactive Isotopes used in the area. Detail type (ECD, Isotopic Labels, etc) and Activity in Micro Curies
- Biodegradable Material That Could Become Hazardous
- Other Hazards _____

If any of the above boxes are checked the following statements and/or questions must be answered.

1. Specifically describe where (on or in) the instrument/device/part there could be any residual contamination (for example: blood spill on the surface). _____
2. Provide details of these hazards. Include names, Material Safety Data Sheets (MSDS), and concentration of contaminants, where possible. _____
3. Describe the method of decontamination used. Attach Procedure. _____

C) I declare that the above information is true and complete to the best of my knowledge. I acknowledge that any inconsistencies between the condition of the instrument and the statements made on this form will delay the repair process.

Authorized signature _____ Date: _____

Name (Printed) _____ Phone number: _____

Company name: _____ Fax number: _____

Shipping address: _____

City: _____ State/Country: _____ Zip : _____

E-mail address: _____

BEFORE item can be shipped, fax completed form to: (610) 954-0599 or e-mail it to: repairs@gow-mac.com

For GOW-MAC Use Only: <input type="checkbox"/> Passed Safety Inspection. OK to proceed to Repair Dept. <input type="checkbox"/> Failed Safety Inspection. DO NOT proceed to Repair Dept.	Signed: _____ Chem. Safety Off. RMA No: _____	Date ____/____/____ Comments: () None () On Back >>>>
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REP-005
Health-Safety Declaration Doc REV 6 (0212).docx
Rev. 6 2/15/2012, gsj

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