Executive Orders VR-203-K and VR-204-K
VST Phase II EVR System

EXHIBIT 8

VST ECS Hydrocarbon Sensor Verification Test Procedure

Definitions common to all certification and test procedures are in:

D-200 Definitions for Vapor Recovery Procedures

For the purpose of this procedure, the term "ARB" refers to the California Air Resources Board, and the term "ARB Executive Officer" refers to the Executive Officer of the ARB or his or her authorized representative or designate.

1. PURPOSE AND APPLICABILITY

1.1 This procedure will determine the accuracy of the VST Hydrocarbon (HC) Non-Dispersive Infrared sensor (HC sensor) using known hydrocarbon concentrations (propane) calibration gases at gasoline dispensing facilities (GDFs).

1.2 This procedure is applicable for compliance testing.

2. PRINCIPLE AND SUMMARY OF TEST PROCEDURE

Known concentrations of certified calibration gases are passed through the HC sensor as illustrated in Figure 1 or 2, and then compared with the HC average concentration as determined from the PMC Percent Hydrocarbon Diagnostic Report. The Percent Hydrocarbon Diagnostic report can be downloaded onto a laptop computer via the TLS-350 RS-232 connection. Sampling is conducted for a minimum of five (5) minutes period for each certified test gas. To prevent any HC sensor biases, this test shall be conducted with the processor in the manually “off” mode from the TLS-350 control panel for the duration of the test. This test can be performed while product is being dispensed into motor vehicles.

3. EQUIPMENT AND SUPPLIES

3.1 Gas Cylinder Regulator

Use a two stage pressure regulator with gauges indicating cylinder pressure and supply line pressure. Supply line pressure shall be set between 5 and 10 pounds per square inch gauge (psig). A Mesa Model 400 or equivalent preset flow regulator with a fixed flow rate of one (1) liter per minute (LPM) can be used as an alternative to the above two stage regulator.

3.2 Flow Meter

Use a Dwyer Model RMA, or equivalent flow meter capable of reading a gas flow rate at one (1) liter per minute (LPM). A flow meter is not required if using a fixed rate regulator as specified in step 3.1

3.3 Calibration Gases

Cylinders of calibration gases using propane in nitrogen listed below.

(1) High-Range Gas: Concentration between 10-14% by volume.
(2) Mid-Range Gas: Concentration between 2-5% by volume.
(3) Zero Gas: Nitrogen with a hydrocarbon concentration less than 0.25% by volume.

3.4 Laptop, associated cables, and software are required for RS232 connection to the TLS-350 (reference Section 16 “Pressure Management Control” of the ARB Approved Installation, Operation and Maintenance Manual for hardware and software requirements).

4. CALIBRATIONS

The calibration gases must be certified according to the following:

To an analytical accuracy of ± 2%, traceable to a reference material approved by the National Institute of Standards and Technology (NIST) and recertified at least every two years.

Information on calibration gas cylinders shall be entered into a log identifying each cylinder by serial number. Documentation of certification shall be maintained with the gas cylinders at all times and shall also be attached to Form 1. The calibration gas log shall be maintained with the gas cylinders at all times and made readily available to the district upon request. Sufficient information shall be maintained to allow a determination of the certification status of each calibration gas and shall include: (1) the date put in service, (2) assay result, (3) the dates the assay was performed, and (4) the organization and specific personnel who performed the assay.

5. PRE-TEST REQUIREMENTS

Install all required testing apparatus as illustrated in Figure 1 through 3. Connect the calibration test gas to the inlet tee of the HC sensor. Install the outlet tubing to the HC sensor outlet tee. This tubing is used to vent of the calibration gas to atmosphere.

6. TEST PROCEDURE

6.1 Manually turn off the VST membrane processor as follows:

6.1.1 On the TLS Console front panel, use the ‘mode key’ to scroll to ‘DIAG MODE’ and then use the function and step keys, as shown in Figure 4 to view the ‘VAPOR PROCESSOR MODE’ menu.

6.1.2 From the ‘VAPOR PROCESSOR MODE‘ menu, change the vapor processor mode of operation from automatic to manual mode. From the ‘VAPOR PROCESSOR STATE’ menu, verify the VP STATE is in the “off” mode. The processor shall be in the off mode for the duration of the test.

6.2 Record the start time from the TLS-350, on Form 1. The testing technician shall synchronize his/her watch with the clock on the TLS-350.

6.3 Isolate the VST HC sensor by closing the in-line ball valve upstream of the HC sensor.

6.4 Introduce the zero, mid-range and high-range gases, in that order, into the VST HC sensor sample line at a flow of 1 LPM for five continuous minutes.

6.5 Record the time before and at the end of each five minute test run on Form 1. Districts may require the use of an alternate form, provided it includes the same minimum parameters as identified in Form 1.

6.6 From the TLS-350 front panel, return the membrane processor to the automatic run mode.

6.7 Press the <MODE> key to leave the 'PMC DIAGNOSTIC' menu.

6.8 Disconnect test apparatus from the VST HC sensor inlet and outlet tees and replace plugs. Return the in-line ball valve to the open position.

7. OBTAIN HC DATA FROM PMC

The HC data can be obtained from the PMC via an RS-232 connection to a laptop computer. Once connected, the HC data can be viewed from the "Percent Hydrocarbon Diagnostic Report". This report can be printed or saved to a file. A printed copy of this report must be attached to Form 1. Instructions on accessing this report via the RS-232 connection are found in Section 16 "Pressure Management Control" of the ARB Approved Installation, Operation, and Maintenance Manual. This report will provide HC concentration readings at 15 second intervals for each of the 5-minute test runs. Calculate the average HC concentration from the **last three minutes of each test run** and record on Form 1.

8. CALCULATION

Calculate and record the difference between the average HC concentration from the PMC Percent Hydrocarbon Diagnostic Report (Step 7) and compare with each corresponding calibration gas concentration.

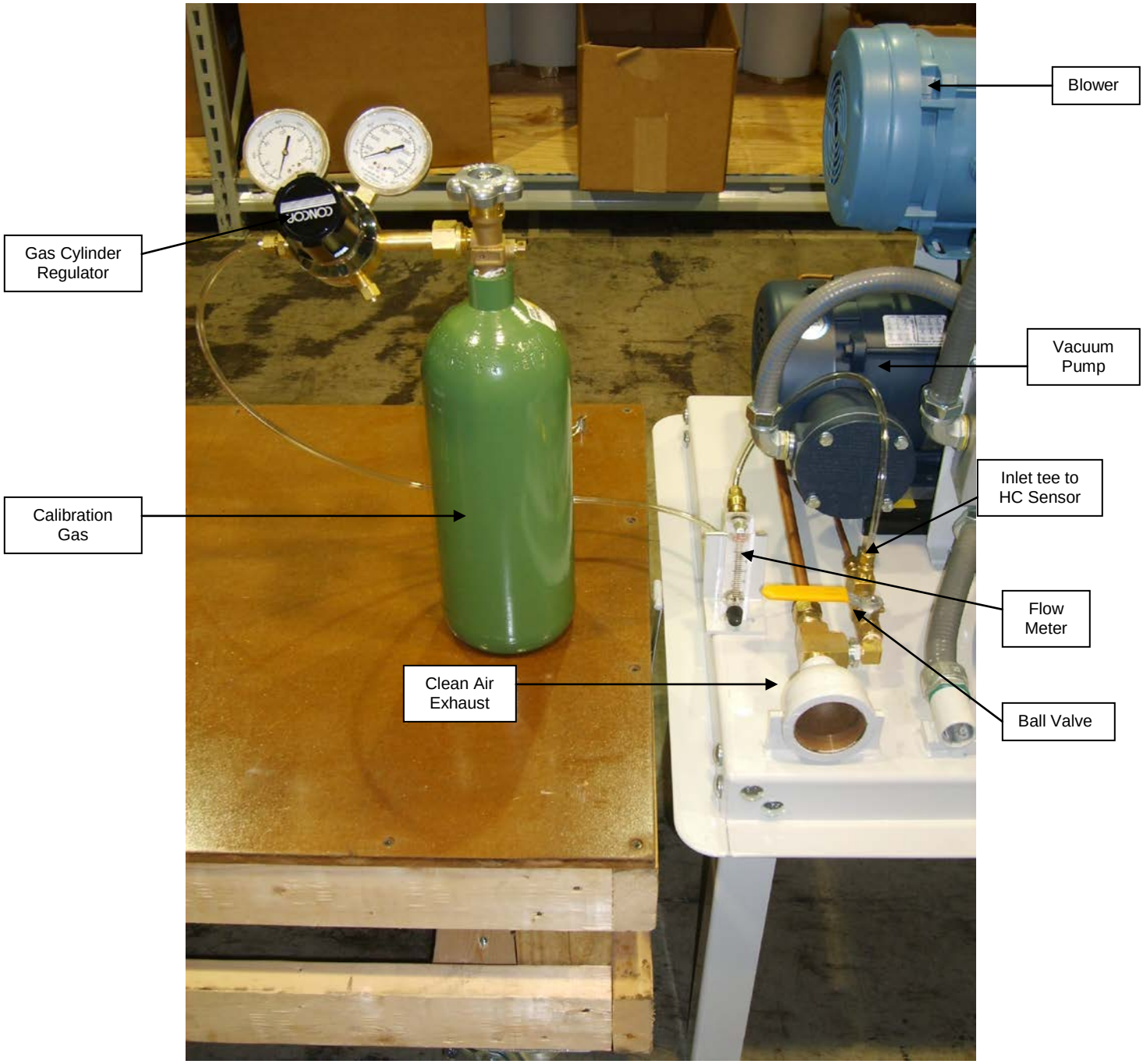
Difference = (Calibrations Gas Concentration (Step 3.3)) – (Average HC Concentration from PMC (Step 7))

The difference shall be within ±1.0% HC concentration from the calibration gas for the zero and mid-range gas and ±2.0% for the high-range gas. Record "Pass" if within specified limits or "Fail" if not within specified limits on Form 1. If any failure is recorded, the VST ECS Processor is not in compliance with Exhibit 2.

9. ALTERNATIVE TEST PROCEDURES

This procedure shall be conducted as specified. Modifications to this test procedure shall not be used to determine compliance unless prior written approval has been obtained from the ARB Executive Officer, pursuant to Section 14 of Certification Procedure CP-201.

Figure 1
Equipment Configuration for Verifying Hydrocarbon Sensor Performance



Note: Two stage pressure regulator configuration

Figure 2
Equipment Configuration for Verifying Hydrocarbon Sensor Performance

Note: Preset flow regulator configuration

Figure 3
Equipment Configuration for Verifying Hydrocarbon Sensor Performance

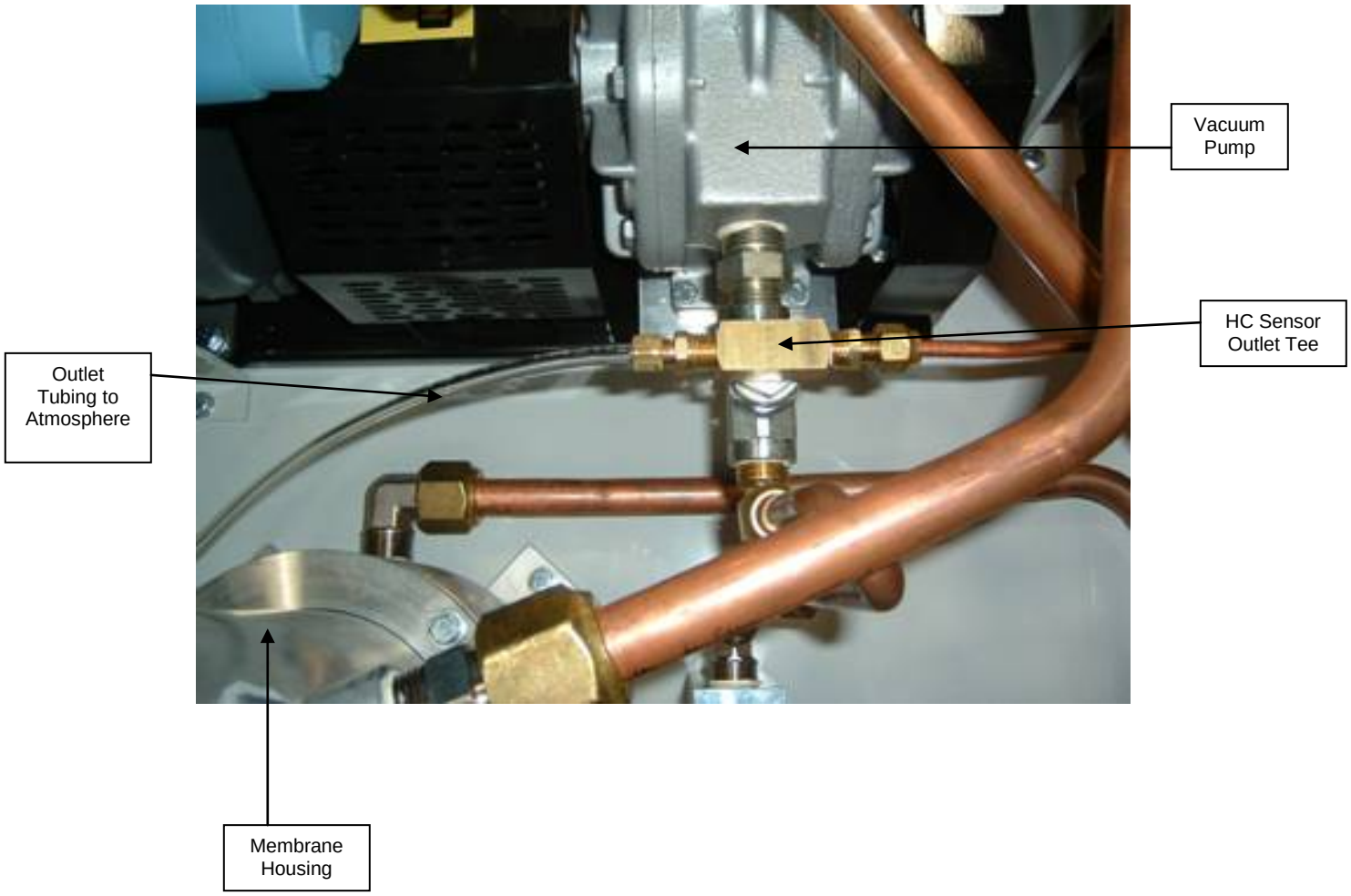
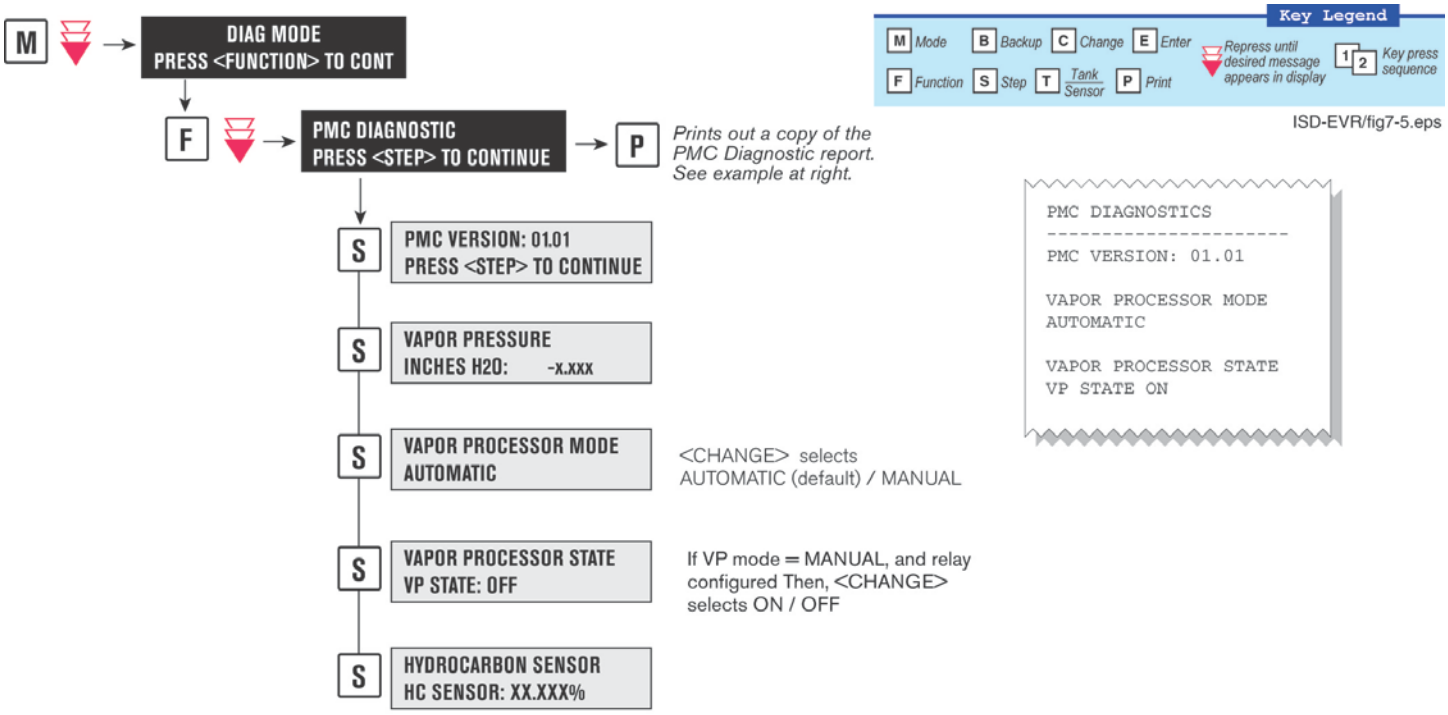


Figure 4


M
DIAG MODE
PRESS <FUNCTION> TO CONT
F
PMC DIAGNOSTIC
PRESS <STEP> TO CONTINUE
P
Prints out a copy of the PMC Diagnostic report. See example at right.
S
PMC VERSION: 01.01
PRESS <STEP> TO CONTINUE
S
VAPOR PRESSURE
INCHES H2O: -x.xxx
S
VAPOR PROCESSOR MODE
AUTOMATIC
<CHANGE> selects AUTOMATIC (default) / MANUAL
S
VAPOR PROCESSOR STATE
VP STATE: OFF
If VP mode = MANUAL, and relay configured Then, <CHANGE> selects ON / OFF
S
HYDROCARBON SENSOR
HC SENSOR: XX.XXX%
Key Legend
M Mode
B Backup
C Change
E Enter
F Function
S Step
T Tank Sensor
P Print
Repress until desired message appears in display
1 2 Key press sequence
ISD-EVR/fig7-5.eps
PMC DIAGNOSTICS
PMC VERSION: 01.01
VAPOR PROCESSOR MODE
AUTOMATIC
VAPOR PROCESSOR STATE
VP STATE ON

Form 1
Hydrocarbon Sensor Verification Data Sheet

Test Data Sheet for Performance Verification of VST NDIR Sensor	
Facility:	Test Company:
Address:	Test Personnel:
City:	VST or Veeder-Root Tech Certification # (as applicable)
State:	
Zip Code:	ICC or District Training Certification (as applicable)

Calibration Gas Concentration (% Propane). Note: Calibration gas information listed in Section 4 of Exhibit 6 shall be attached to this form.		
Zero Gas:	High-Range Gas:	Mid-Range Gas:
Serial #:	Serial #:	Serial #:

Test Results

Start Time	Stop Time	Calibration Gas Percent Concentration (Propane) (step 3.3	Average Percent HC Concentratio n from PMC (step 7)	Percent Difference (Difference shall be within ± 1% for zero and mid-range gas and within ± 2% for high-range gas) (step 8)	Pass/Fail