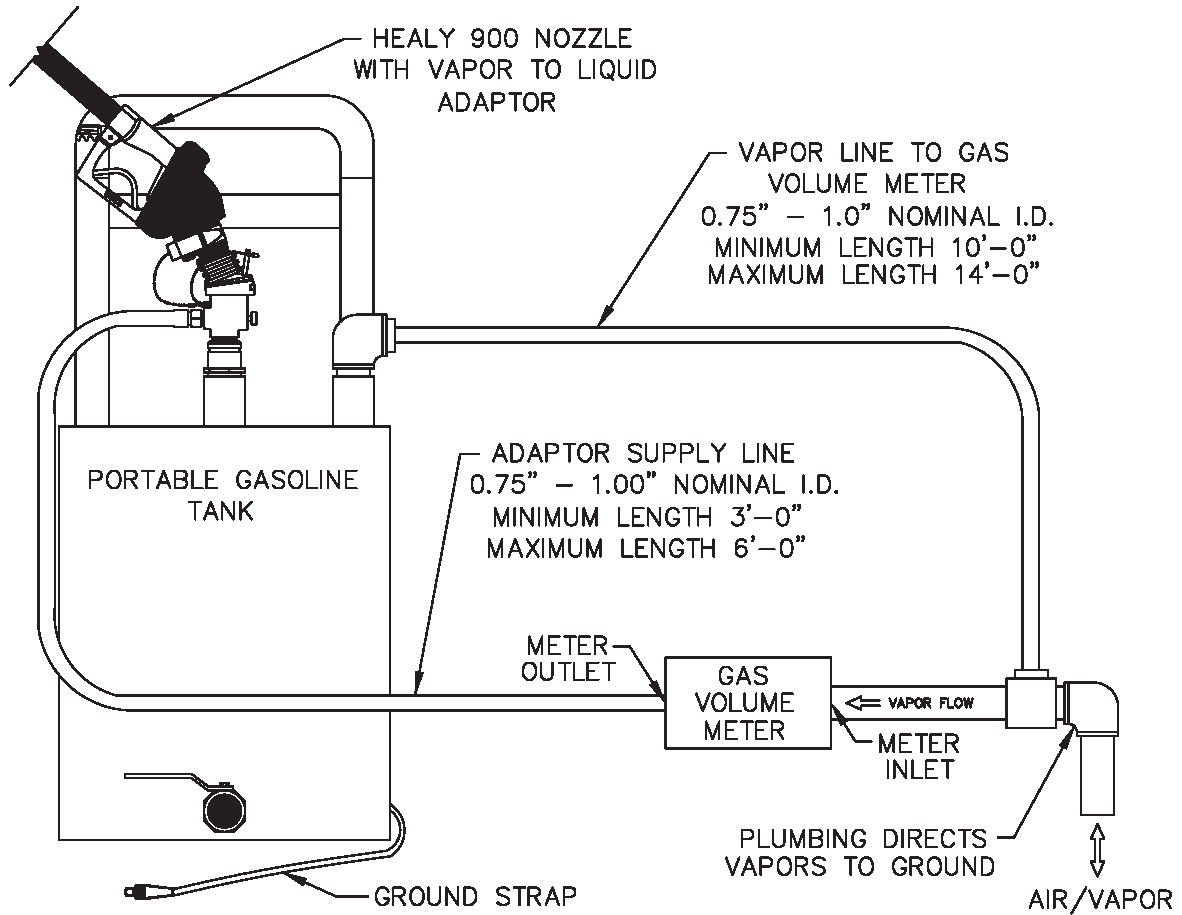
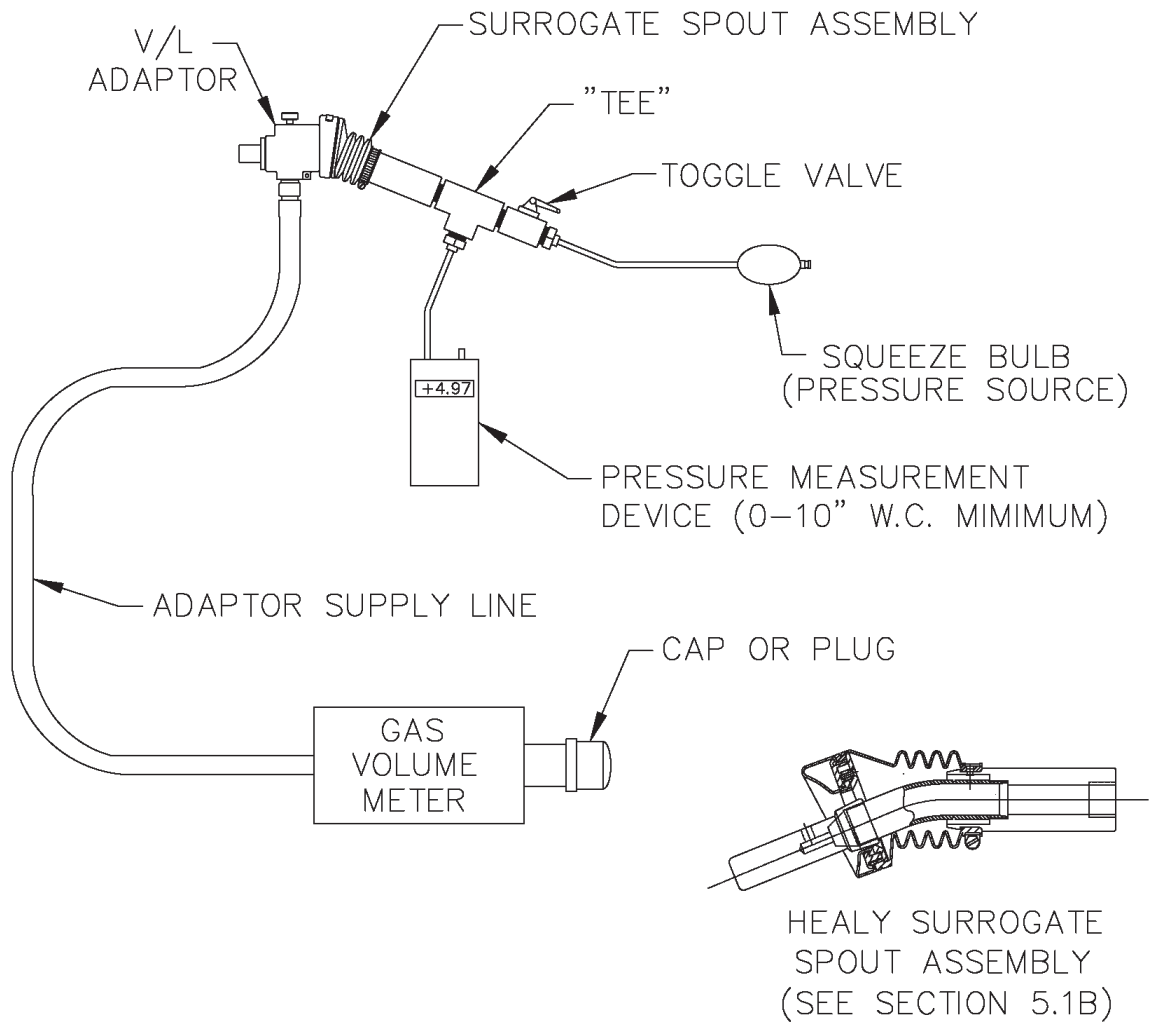


FIGURE 5-4
Assembled Vapor to Liquid Volume Ratio Test Equipment



- 6.3** Verify that the O-ring in the V/L adaptor is present and in good condition. An O-ring with nicks, tears, or other deformations shall be replaced prior to the test. The O-ring shall be properly lubricated (see Section 5.7) to ensure a vapor tight connection.
- 6.4** Conduct a pre-test leak check of the V/L adaptor, the gas volume meter and the adaptor supply hose by connecting the V/L adaptor to a surrogate spout as shown in Figure 5-5 and described in Section 5.1B. Raise the test pressure to 5.00" \pm 0.50" WC. There shall not be a pressure drop of more than 1.00" WC from the above starting pressure for 30 seconds from the start of the test. If the leak test passes, proceed with the V/L testing. If the leak test fails, proceed to isolate the source of the leak by pressurizing the test equipment again. Squirt liquid leak detector solution on interfaces and other potential leak sources and watch for the formation of bubbles. Once leak(s) are repaired, repeat the leak test procedure.
- Note:** Leak checks shall be conducted in a shaded area or away from direct sunlight. Leak checks may be conducted during V/L testing to ensure leak integrity of test equipment.
- 6.5** This test procedure shall be conducted with the storage tank pressure/vacuum (P/V) valve(s) installed and the Phase I vapor coupler(s) poppet(s) in the closed position with the adaptor dust cap(s) installed.
- 6.6** With the portable tank and V/L test equipment assembled, dispense gasoline into the portable test tank until at least 10% of the tanks total capacity has been reached. This will condition the portable tank with gasoline vapors. This conditioning shall be conducted each time the test tank is emptied prior to conducting testing at each facility.
- 6.7** All pressure measuring device(s) shall be bench calibrated using a reference gauge, incline manometer or NIST traceable standard at least once every six (6) months. Calibration shall be performed at 20, 50, and 80 percent of full scale. Accuracy shall be within five (5) percent at each of these calibration points.

FIGURE 5-5
Vapor To Liquid Adaptor and Gas Volume Meter Leak Test Assembly



7. TEST PROCEDURES

- 7.1 Carefully connect the V/L adaptor to the nozzle spout as shown in Figure 5-1, isolating the vapor path of the nozzle and ensuring a tight connection.
- 7.2 Record the initial reading from the index of the gas volume meter on the V/L Field Data Sheet at the end of this document. This initial reading shall be taken before each test. Do not use the final reading from the preceding test as the initial reading for the current test, unless it has been verified. This is necessary since the meter index may have moved due to the low pressure drop through the meter.
- 7.3 Reset the stopwatch and, if appropriate, reset the totalizer on the dispenser.
- 7.4 Holding the nozzle lever in the maximum hand-held position in order to dispense at the highest possible flow rate and begin dispensing into the portable gasoline tank. **Ensure that the nozzle spout is in contact with the grounded tank assembly during dispensing.** Start the stopwatch when the totalizer indicates dispensing has started.
- 7.5 Dispense between four and one-half (4.5) and five (5.0) gallons of gasoline.

If the nozzle being tested introduces liquid into the V/L adaptor, the gas volume meter or the adaptor supply hose, the V/L of that nozzle shall be deemed a failure.

- 7.6 Simultaneously stop both the stopwatch and gasoline dispensing.
- 7.7 The following data for each test shall be recorded on the V/L Field Data Sheet:
 - 7.7.1 Dispenser (pump) number
 - 7.7.2 Fuel grade
 - 7.7.3 Nozzle serial number (found below nozzle handguard)
 - 7.7.4 Initial gas volume meter reading, in cubic feet
 - 7.7.5 Initial totalizer reading from the dispenser, in gallons
 - 7.7.6 Final gas volume meter reading, in cubic feet
 - 7.7.7 Final totalizer reading from the dispenser, in gallons
 - 7.7.8 Elapsed time during dispensing, in seconds

Note: Units other than cubic feet, gallons, and seconds may be used, provided that Equation 9-1 is appropriately modified.

- 7.8 If the V/L Volumetric Ratio, as determined by Equation 9-1 is between 0.95 –1.15, the grade point complies with the specifications.

7.9 If the V/L Volumetric Ratio is between 0.76 – 0.94, or greater than or equal to 1.16, conduct the test two additional times. Do not make adjustments to the gasoline dispensing or vapor recovery lines until all three test runs have been completed. Only adjustments to the V/L test equipment and the connection between the V/L adaptor and the nozzle will be allowed in order to ensure measurement accuracy. All other adjustments to the vapor recovery equipment, including but not limited to the vapor collection pump and the nozzle, are not allowed. If the V/L test equipment is adjusted, then the prior test run results for that grade point tested should not be used. Calculate the numerical average of the three test runs. If the average V/L value of these three test runs is within the allowable limits, compliance has been verified. If the resulting average is outside of the specified limits, the grade point tested does not comply with the specifications of the EO.

Note: Section 1.10 of the Healy 900 Nozzle portion of the **ARB Approved Installation, Operation and Maintenance Manual** provides instructions on making nozzle V/L adjustments.

7.10 If the initial V/L Volumetric Ratio is less than or equal to 0.75, this indicates a V/L failure of the grade point tested.

7.11 To avoid a build-up of gasoline, drain any condensed gasoline from the hoses between the gas volume meter and portable tank assembly, and the V/L adaptor and gas volume meter whenever fuel is emptied from the portable tank.

8. POST-TEST PROCEDURES

8.1 Remove the V/L adaptor from the nozzle.

8.2 Drain the dispensed product into the appropriate gasoline storage tank at the facility. **Ground the portable tank assembly to the storage tank before draining.** Do not mix product grades in the portable tank assembly without approval of the facility owner and use caution to drain the portable tank into the correct facility storage tank. If blending valves are utilized to produce product grades that do not have a dedicated storage tank, product from the blended grade shall be returned to the lower octane tank.

8.3 After concluding testing at the facility, perform a post-test leak check of the V/L adaptor, the gas volume meter and the adaptor supply hose by connecting the V/L adaptor to a surrogate spout as shown in Figure 5-5 and described in Section 5.1B. Raise the test pressure to 5.00" ± 0.50" WC. There shall not be a pressure drop of more than 1.00" WC from the above starting pressure for 30 seconds from the start of the test. The data collected during the V/L testing between the last valid test equipment leak check (see Section 6.4) and the post-test leak check is invalid if the test equipment fails this post-test leak check.

Note: Leak checks shall be conducted in a shaded area or away from direct sunlight.

8.4 Prior to transportation, the inlet and outlet of the gas volume meter shall be carefully sealed to prevent foreign matter from entering the meter.

8.5 The Authority Having Jurisdiction (AHJ) may be contacted on the requirements for storage and transportation of the portable test tank. This would typically be the local fire department.

9. CALCULATING RESULTS

9.1 The V/L Volumetric Ratio shall be calculated as shown in Equation 9-1.

$$V / L = \left[\frac{y (V_f - V_i)}{G_f - G_i} \right] \times 7.481 \quad \text{[Equation 9-1]}$$

Where:

V/L	=	Vapor to Liquid Volumetric Ratio, dimensionless
y	=	Correction factor for gas volume meter. See Equation 9-3
V _i	=	Initial gas volume meter reading, cubic feet
V _f	=	Final gas volume meter reading, cubic feet
G _i	=	Initial totalizer reading from the dispenser, gallons
G _f	=	Final totalizer reading from the dispenser, gallons
7.481	=	Conversion factor from gallons to cubic feet, gallons per cubic foot

9.2 The gasoline dispensing rate during the V/L test shall be calculated as shown in Equation 9-2.

$$Q_g = \left[\frac{G_f - G_i}{t} \right] \times 60 \quad \text{[Equation 9-2]}$$

Where:

Q _g	=	Gasoline dispensing rate, gallons per minute
G _i	=	Initial totalizer reading from the dispenser, gallons
G _f	=	Final totalizer reading from the dispenser, gallons
t	=	Elapsed time during dispensing event, seconds
60	=	Conversion factor, seconds per minute

9.3 The correction factor (determined during gas volume meter calibration) for correcting observed values of the gas volume meter shall be calculated as shown in Equation 9-3.

$$y = \left[\frac{V_r}{V_m} \right] \quad \text{[Equation 9-3]}$$

Where:

y	=	Correction factor for the gas volume meter's observed reading, dimensionless
V _r	=	True volume from current calibration of gas volume meter, cubic feet
V _m	=	Corresponding observed reading from gas volume meter, cubic feet

10. REPORTING RESULTS

10.1 Report V/L test data and other information as required in the V/L Field Data Sheet at the end of this document. Districts may require the use of alternate forms, provided they include the same minimum parameters as identified in the V/L Field Data Sheet.

11. ALTERNATE PROCEDURES

11.1 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.

