

# Heath CGI

(Combustible Gas Indicator)

## User's Manual

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Heath Consultants Incorporated  
Houston, TX  
713/844-1300  
Fax: 713/844-1309  
**1-800-HEATH-US**  
**[www.heathus.com](http://www.heathus.com)**



*Heath...Leadership, Innovation, Performance  
Then, Now and Tomorrow*

**WARNING**

EXPLOSIVE GAS MIXTURES CAN CAUSE SERIOUS INJURY OR DEATH. INHALATION OF VAPORS CAN CAUSE HEALTH IMPAIRMENT.

**WARNING**

IT IS ESSENTIAL THAT USERS OF THIS INSTRUMENT READ, UNDERSTAND, AND FOLLOW THE INSTRUCTIONS FOR OPERATION AND MAINTENANCE AND THE PRECAUTIONS CONTAINED IN THIS MANUAL TO INSURE THE INSTRUMENT IS USED IN A PROPER AND SAFE MANNER.

**WARNING**

DO NOT USE FOR THE DETECTION OF TOXIC GASES.

**WARNING**

DO NOT USE ON MIXTURES OF ACETYLENE OR HYDROGEN WITH OXYGEN.

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## Heath CGI Kit



- |   |   |
|---|---|
| 1. Instrument Only<br>(Part No. 2107247A)                   | 5. Carbon Absorbent Filter<br>(Part No. 0618302)  |
| 2. 5' Hose Assembly<br>(Part No. 2127265)                   | 6. Aspirator Bulb w\tube<br>(Part No. 21130-0401) |
| 3. 36" Brass sampling probe w/ Filter<br>(Part No. 0111006) | 7. Instruction Manual<br>(Part No. 2117254)       |
| 4. Water Trap with 1/8" Hose<br>(Part No. 2027437)          | 8. Carrying Case, vinyl<br>(Part No. 21120-0252)  |

### INTRODUCTION:

The Heath CGI is a compact battery-operated portable combustible gas or vapor INDICATOR that can be used for taking an atmospheric sample and indicating the presence and concentration of combustible gases or vapors in the sample, particularly natural or propane gas or vapor, for the location of leaks. Samples of the atmosphere under test are drawn through the Heath CGI by means of a rubber aspirator bulb and analyzed for combustible gas or vapor content on a heated platinum filament in a wheatstone bridge measuring circuit. A built-in meter indicates gas or vapor content in units of combustibility and/or percent by volume.

Power for operation of the Heath CGI is provided by two replaceable batteries(not included). A sampling probe and sampling extension hose permit withdrawal of samples from bar-holes and other remote locations. The Heath CGI fits in a compact leather case with an over-the-shoulder carrying strap.

### Heath CGI Kit

The Heath CGI Kit comes complete with the instrument, sampling hose, sampling probe, hydrophobic water trap, and heavy hydrocarbon filter.

The Heath CGI is designed expressly for looking for gas or vapor leaks by the bar-hole method. It is also suitable and recommended for testing tanks, manholes, vessels, and other confined spaces to determine the presence of combustible gases or vapors in pressure cylinders, pipelines, and other closed systems. It is a valuable aid to the safety of operations wherever combustible gases or vapors are handled.

## Chapter II

### OPERATION:

Before taking the Heath CGI on a job, check the battery voltage. To check the battery voltage, turn the “OFF/VOLT ADJ/5%/100%” function switch to the “VOLT ADJ” position. The meter indicator should rise to the “V” position line at the 70 mark on the 0 - 100 “%GAS” meter scale. Lift and turn the “VOLT ADJ” control knob clockwise to determine the maximum setting. If it cannot be set beyond the “V” mark, the batteries need to be replaced.

### CAUTION

**DO NOT ATTEMPT TO USE THE INSTRUMENT IF THE READING CANNOT BE SET UP TO THE “V” MARK.**

### Preliminary Adjustments

If the voltage is satisfactory, continue with the following preliminary adjustments:

1. With the sampling inlet in a clean atmosphere, (clean air) squeeze and release the aspirator bulb several times to purge any remaining gas or vapor from the Heath CGI.
2. Check the zero setting by turning the function switch to the “5%” position. Confirm the operation of the “5%” pilot light/meter illuminating lamp. The meter should read close to zero. Lift and turn the “5%” “ZERO ADJ” knob to bring the reading to exactly zero on the meter.
3. Connect the sampling hose to the Heath CGI inlet on the left side. Connect the sampling probe to the other end of the sampling hose.
4. Admit a low concentration sample of combustible gas or vapor to the end of the sampling probe and confirm that the meter

rises upscale. Purge the Heath CGI with clean air and verify the reading returns to zero. (Refer to step 2 above.)

5. Turn the function switch to the “100%” range position. Confirm the operation of the “100%” light/meter illuminating lamp. Note that the meter settles on or close to zero. (If it does not, see Maintenance section.)
6. Admit a sample of gas or vapor to the Heath CGI inlet and note that the meter rises upscale once more. Purge the Heath CGI with clean air and verify that the meter returns to zero.

### Operating Procedure

The Heath CGI is now adjusted and ready to use. It may be turned “OFF” and carried to the job. To make a gas or vapor test, proceed as follows:

1. Turn the CGI on by turning the function switch knob pointer to the “VOLT ADJ” position. Adjust the voltage if necessary, then turn the function switch knob pointer to the “5%” position.
2. Hold the sampling probe within the space to be tested. Squeeze and release the aspirator bulb several times while watching the meter and observe the maximum reading on the “0 - 5 % GAS” meter scale.
3. If the meter reading rises rapidly to the top of the scale or rises rapidly and begins to drop off, a rich gas or vapor mixture may have been detected. Turn the function switch pointer to the “100%” position and continue to sample, observing the meter reading on the “0 - 100 % GAS” meter scale.
4. Purge the CGI with clean air to return the meter to zero before turning the function switch pointer back to the “5%” position.

## Chapter III

### INTERPRETATION:

#### “5%” Range

Other combustible gases or vapors will read approximately correct in terms of **COMBUSTIBILITY** but for maximum accuracy a calibration curve for the specific substance should be consulted. Typical calibration curves for various gases or vapors are shown in Section IX. Curves are drawn in terms of percent Lower Explosive Limit (**LEL**) for both coordinates. Concentrations may also be interpreted in terms of volume percent by multiplying the percent LEL in the sample (determined from the meter reading and the curve) by the published figure for LEL in volume percent, as noted on the curve. Thus a 40% LEL reading on methane (natural gas) represents 42% LEL, which indicates a concentration by volume of 2.1% (42% of 5.0 = 2.1).

The maximum concentration of methane allowable in a space where one may work or where welding operations are carried out is primarily a matter of local regulation and of judgment based on knowledge of conditions. A maximum reading of .5% gas or vapor by volume (10% LEL) is usually allowed. If 1% gas or vapor by volume (20% LEL) is selected, this is often spoken of as a safety factor of five, as the concentration must be increased five times before explosive conditions are reached. **OSHA** regulations generally specify 1% gas or vapor by volume (20% LEL).

#### “100%” Range

In the “100%” range, readings are read directly in percent by volume of gas or vapor, from 0 to 100%. The primary use of the “100%” range is in leak location from gas or vapor pipelines. Bar-holes are driven at intervals along the surface over a buried pipeline, and tested with the Heath CGI in the “5%” range. A

sampling probe is inserted into the bar-hole and the aspirator bulb is squeezed and released three or four times. A gas or vapor reading on the 0 - 5 meter scale indicates that some gas or vapor leakage exists.

As bar-holes progressively closer to the leak are tested, higher and higher readings are obtained. When readings above 5 on the 0 - 5 meter scale are obtained, turn the function switch to the “100%” position and note the reading. Any concentration up to 100 on the 0 - 100 meter scale can be read this way.

If a series of bar-holes all give readings above the “5%” range, it is unnecessary to go through the “5%” step, and readings may be taken directly on the “100%” range.

Other gases or vapors, including propane and petroleum vapors, can also be read on the “100%” range. The calibration generally will not be correct but comparative readings may be made to determine changes in concentration or variations from one point to another.

## Chapter IV

### OPERATING PRINCIPLE:

The Heath CGI is essentially two instruments combined in one. It is a combustible gas or vapor INDICATOR, using the catalytic detection principle to respond to combustible gases or vapors up to 5% by volume, and a thermal conductivity INDICATOR, using the cooling effect of the gas or vapor sample to produce readings up to 100% by volume. Both detection methods employ the wheatstone bridge measurement principle and use the same batteries, meter, and sampling system. The detection methods are discussed further below.

#### “5%” Range

This range uses a catalytic platinum filament, initially heated by battery current to a point where it will cause catalytic oxidation of any combustible gas or vapor that come in contact with the active surface. This oxidation produces a definite heat of combustion, corresponding to the concentration of gas or vapor. The heat in turn produces an increase in temperature, hence in electrical resistance, of the filament. This resistance change produces a deflection on the meter corresponding to the gas or vapor concentration.

The catalytic method is applicable to the detection of gas or vapor in air up to the point where the heat of combustion no longer increases with an increase in gas or vapor content. Beyond this point, an increase in gas or vapor will produce a decrease in the reading. As a practical matter, the catalytic method is useful only up to the gas or vapor LEL (around 5% by volume for natural gas). It works only in a background of air, as oxygen is required to support catalytic oxidation.

#### “100%” Range

This range uses a thermal conductivity filament, initially heated by the battery current to a point where it assumes a definite temperature and resistance, corresponding to the heat added by the current and the heat removed by conduction through the surrounding atmosphere. If the Heath CGI is initially set up on clean air, then as a gas or vapor is sampled the greater cooling ability of the gas or vapor causes the filament to become cooler and assume a lower electrical resistance. The resistance change produces a meter reading which can be calibrated in units of percent gas or vapor by volume.

The thermal conductivity phenomenon is a continuous one from 0 to 100% gas or vapor by volume, so any concentration can be read without limitation. It is a relatively insensitive method, so it is used only for the higher concentrations above the LEL. It is not dependent on combustion, hence it is applicable regardless of the oxygen content of the sample.



## Chapter V

### MAINTENANCE:

#### Calibration and Adjustment

In addition to the normal operating controls found on the top panel, the following auxiliary controls are available. They are single turn, miniature, slotted-shaft potentiometers which are mounted on the circuit board and are accessible when the top panel is removed and inverted. To remove the top panel, loosen the two captive retaining screws found on each end of the panel.

1. **“SPAN (L)”**, is used to set the meter to the correct value while sampling a known concentration of combustible gas or vapor in the range up to 5% by volume. Calibration gas or vapor samples for this range are available from Heath Consultants Inc. See Section VII., C, for reference.
2. **“ZERO (H)”**, a zero adjustment potentiometer connected in the 100% wheatstone bridge. It is used to balance the bridge while the filament is surrounded by a gas or vapor-free atmosphere (clean air). After the Heath CGI has been set up and adjusted for voltage and zero on the **“5%”** function switch position, move the function switch to the **“100%”** position. The meter should settle to zero after a few moments. If it does not, then remove the top panel and turn the **“ZERO (H)”** control to bring the meter reading to zero.
3. **“SPAN (H)”**, the response should be set to give a 100 reading on the 0 - 100 meter scale while sampling a 100% gas or vapor sample. Connect the sampling probe to the Heath CGI, adjust the voltage, turn the function switch to the **“100%”** position, and check the zero. Admit straight 100% gas or vapor to the Heath CGI by drawing it in from a container filled with 100% gas or vapor. When the sampling system is full of gas or vapor, shut off the flow of gas or vapor and adjust the **“SPAN (H)”**

potentiometer until the meter reads 100 on the 0 - 100 meter scale. Calibration gas or vapor samples for this range are available from Heath Consultants Inc. See Chapter VII., for reference.

#### Filament Replacement

Two pairs of filaments are used in the Heath CGI. Catalytic filaments for the **“5%”** range, and Thermal Conductivity filaments for the **“100%”** range. Each pair consists of an active or measuring filament and a reference or compensating filament. The active and reference catalytic elements and the active thermal element are all housed within a cindered bronze porous metal cup which acts as a flame arrestor to retain explosions when sampling explosive gas or vapor/air mixtures. The flame arrestor is installed within a cavity in the Heath CGI housing so that a sample drawn into the Heath CGI will pass through the flame arrestor and reach the elements.

The reference thermal element is mounted outside the flame arrestor so that, when installed in the CGI, it is enclosed in an isolated cavity and does not encounter the sample. All four elements and the flame arrestor are permanently assembled onto an anodized aluminum plate with holes in each corner so that it can be retained within the CGI by means of four screws. Short wires with lugs are provided to connect to terminals on the circuit board and the wires and terminals are color-coded for proper connection.

The entire filament/flame arrestor assembly must be replaced as a unit if any portion becomes defective or damaged. To replace:

1. Loosen the two panel hold-down screws. Remove and invert the top panel.
2. Loosen (do not remove) the six screws holding terminals T1-T6 for the colored lead wires. Pull the wires from the terminals.

3. Remove the four screws, one in each corner of the plate.
4. Remove the complete plate and filament/flame arrestor assembly. Inspect the cavity and gasket and be sure that the cavity and incoming passage is clear and dry.
5. Install the new filament/flame arrestor in the same position with the gasket in place.

**CAUTION**

**WHILE HANDLING THE NEW ASSEMBLY, BE VERY CAREFUL NOT TO TOUCH OR OTHERWISE DAMAGE THE EXPOSED THERMAL REFERENCE FILAMENT. LINE IT UP CAREFULLY WITH THE CAVITY IN THE PANEL BEFORE PUSHING THE ASSEMBLY INTO POSITION.**

6. Connect the lead wires to the corresponding color-coded terminals and fasten the screws securely. Be sure to observe the color coding. Note that there are two red wires, T2 and T6, which electrically are connected in common. Each should be connected to the red-coded terminal, T2 or T6, that is most readily accessible.
7. **THE INSTRUMENT MUST BE RECALIBRATED AFTER FILAMENT REPLACEMENT.**

**Batteries**

The Heath CGI is powered by two standard size D alkaline-type batteries (not included). The alkaline type cells will give 4 to 6 hours of operating life. Ordinary carbon-zinc dry cells can be substituted. If dry cells are used, they will be adequate for 45 minutes of continuous operation, longer on intermittent use. When the meter indicator cannot be set as high as the “V” line with the

function switch in the “VOLT ADJ” position and the “VOLT ADJ” knob all the way clockwise, the batteries require replacement.

To replace the batteries, remove the Heath CGI from its leather case and loosen the coin-slotted captive screw found in center of the bottom plate. Remove the plate, exposing the batteries in their spring-contact holders. Pull the old batteries out and install new ones in the same position, observing the polarity as marked on the holder.

**Sampling System**

1. The sampling probe provided with the Heath CGI Kit is a 36" brass sampling probe, with a dust filter and bayonet fitting. The sampling probe has four holes drilled into its sides approximately three to six inches from the bottom of the sampling probe. Periodically inspect these openings to ensure they are unobstructed and free of dirt and mud. The bottom of the sampling probe is plugged with a screw to prohibit water from being drawn up from the bottom of a bar-hole. The hex shape dust filter chamber is located at the top of the sampling probe. To check the dust filter, unscrew the cap with the bayonet fitting. Remove the cotton filter and inspect. If it is dirty or wet, replace with unscented cotton balls, which are available locally.

The operator of the Heath CGI should be familiar with the speed of inflation of the aspirator bulb. If the bulb rate slows down, this may indicate that the sampling probe is clogged with dirt or mud, or that water may have been drawn into the sampling probe. An optional 36" Lexan sampling probe is available from Heath Consultants Inc.

2. The sampling hose is a five foot length of neoprene tubing. It is resistant to contamination from hydrocarbon fuel gases or

vapors (natural gas, propane gas, or vapor) however, repeated exposure to heavy hydrocarbon vapors (gasoline, hexane, alcohol's) may contaminate the tubing. To check for contamination, remove the hose from the unit and test it in a gas or vapor free air. The instrument should read zero. Attach the hose and test again in gas or vapor-free air. If the meter moves upscale, then the hose is contaminated. Replace the hose immediately.

3. The Heath CGI Kit comes with a heavy hydrocarbon filter filled with activated charcoal which absorbs heavy hydrocarbon vapors. The filter allows the operator to distinguish between light and heavy hydrocarbon vapors.

To use the filter, first identify the area to be tested, and locate a gas or vapor concentration of approximately 5% gas or vapor, within the range of the 5 meter scale. Make a test without the filter and note the reading. Place the filter in-line and re-test, noting the reading obtained when using the filter. If the readings are substantially the same, then the gas or vapor detected is a light hydrocarbon. If the reading is zero or close to zero, then a heavy hydrocarbon has been detected. If the reading with the filter is diminished, but not zero, a mixture of both light and heavy hydrocarbons has been detected. Refer to company procedures for guidance in reporting these indications.

The Heavy Hydrocarbon Filter should be used to test bar-holes, manholes, and other openings in the suspected area. When testing in the area is finished, dispose of the filter. Make sure that a new filter is used for each test area. It is possible for the charcoal in the filters to become contaminated and give false readings where no hydrocarbons exist.

4. The Heath CGI Kit also includes a hydrophobic water stop which contains a micropore filter that does not allow water to pass through it. The water stop will prevent water from being

drawn into the Heath CGI. The Heath CGI should always be operated with the water stop in-line. Because dust and dirt will collect on the water stop and reduce its effectiveness, make sure a clean dust filter is always installed in the sampling probe. If water is drawn up to the water stop, discontinue aspirating and remove the hose from the Heath CGI. Remove the water stop and blow air back through hose and sampling probe to remove water. Reassemble, replace the water saturated cotton dust filter, and continue testing carefully to avoid water. When the water stop becomes coated with dirt or mud, replace it. Replacements are available from Heath Consultants Inc.

### **Meter/Indicator Lamps**

Either the “5%” or the “100%” lamp is on whenever the Heath CGI is on. This indicates which range is in use, and provides illumination to permit reading the meter in dark places. If the lamp fails, it should be replaced as follows:

1. Remove the four screws holding the top plate to the top panel.
2. Remove the top plate, exposing the lamps.
3. Un-solder the lamp wires at the terminals and solder the new lamp in the same position.

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## Chapter VI

### PRECAUTIONS AND NOTES ON OPERATION:

#### Heated Samples

When sampling spaces such as hot tanks that are warmer than the Heath CGI, remember that condensation can occur as the sample passes through the cool sampling line of the Heath CGI. Water vapor condensed in this way can block the sample flow system and corrode the flame arrestor. A water trap or filter should be used to control this.

If heated hydrocarbon vapors of the heavier hydrocarbons (flash point 90 degrees F or above) are present, they may also condense in the sampling line and fail to reach the filament. Thus an erroneous low reading may be obtained. Special techniques are required to handle such samples, and consultation with Applications Engineers at Heath Consultants Inc. is advised.

#### Filament Poisoning

Certain substances have the property of desensitizing the catalytic surface of the platinum filament used in the “5%” range. These substances are termed “catalyst poisons” and can result in reduced sensitivity or failure to give a reading of samples containing combustible gases or vapors. **The most commonly encountered catalyst poisons are silicone vapors. Samples containing such vapors, even in small proportions, should be avoided.**

Calibration checks on known gas or vapor samples are necessary, especially if the possibility exists of exposure to silicones. A calibration check on a known gas or vapor mixture is the most dependable indication of normal sensitivity. A convenient calibration test kit is available and described under “Accessories”.

#### Rich Mixtures

In using the “5%” (catalytic) range, when high concentrations of gas or vapor are sampled, especially those above the LEL, considerable heat is liberated at the filament. This heat may cause damage to the filament or tend to shorten its life, so sustained testing of samples beyond the meter range should be avoided. When rich mixtures are encountered, switch to the “100%” range and continue testing. When sampling rich mixtures using the “5%” range the following Heath CGI action may be expected:

1. Mixtures up to 100% LEL (5% natural gas or methane) indicate as a full scale reading on the 5% meter scale.
2. Mixtures between the LEL and the Upper Explosive Limit (U E L) will read above 5% on the meter scale.
3. Mixtures above the LEL will be indicated by the meter first going above 5% on the scale, then possibly coming back down on the scale, depending upon the concentration. Very rich mixtures may give a zero reading.
4. Since the “100%” range gives a means of reading gas or vapor concentrations up to 100% (undiluted) gas or vapor, there is no need to expose the catalytic filament repeatedly to concentrations beyond its useful range.

#### Oxygen Deficient Mixtures

Samples which do not have the normal proportion of oxygen may tend to read low on the “5%” range if there is not enough oxygen to react with all combustible gas or vapors present in the sample. Generally, samples containing 10% oxygen or more have enough

oxygen to give a full reading on any combustible gas or vapor sample up to the LEL.

Oxygen deficiency does not affect the “100%” range since it does not depend on oxidation or combustion but only on the cooling effect (thermal conductivity) of the gas or vapor.

### **Oxygen Enriched Mixtures**

Samples having more than the normal proportion of oxygen will give a normal reading. However, they should be avoided because the flame arrestor used is not dense enough to arrest flames from combustible gases or vapors in oxygen which can be much more intense than those in air. **DO NOT ATTEMPT TO USE THE Heath CGI ON SAMPLES OF COMBUSTIBLE GAS OR VAPOR IN OXYGEN.**

### **ACCESSORIES:**

#### **Sampling Probe**

A 36" LEXAN, non-conductive sampling probe is available from Heath Consultants Inc. A non-conductive sampling probe is advised when testing electrical manholes, cable vaults, and conduits.

#### **Sampling Extension Hoses**

Sampling extension hoses are available in five foot extension lengths for testing deep manholes or remote openings. When using an extension hose, squeeze and release the aspirator bulb one extra time for each additional five foot of tubing.

#### **Calibration Test Kits**

1. Natural Gas (Methane) Kit.

Dependable results from the Heath CGI are best assured by frequent tests for response. This Calibration Test Kit provides a convenient means for making such tests. It consists of cylinders of compressed gas mixtures, a demand regulator, and a hose for coupling to the Heath CGI (Heath Part No. 0123309). One gas cylinder is filled with a mixture of 2.5% methane gas in air (Heath Part No. 0123179). A mixture of 2.5% methane/air should produce a reading of 2.5% on the “5%” meter scale.

To make a response test, first turn the Heath CGI on and set the range switch to the “5%” position. Adjust the meter to zero if needed. Couple the demand regulator to the 2.5% methane/air gas cylinder and connect the hose to the Heath

CGI inlet. Open the cylinder valve slowly, aspirate, and watch the meter reading carefully, noting the maximum reading. A normal reading should be between 2.2 and 2.8% on the **“0 - 5% GAS”** meter scale.

If it is not, re-calibrate the Heath CGI to a reading corresponding to that marked on the cylinder.

A second gas cylinder is filled with 100% methane gas (Heath Part No. 0123519) for testing the Heath CGI on the **“100%”** range. Turn the Heath CGI on and in the **“100%”** range. Adjust the zero if needed. Connect the demand regulator to the 100% methane gas cylinder and attach the hose to the Heath CGI inlet. Open the cylinder valve, aspirate, and note the highest reading obtained. Normal readings should be between 95 and 100% on the **“0 - 100% GAS”** meter scale. If they are not within this range, then re-calibrate the unit to read 100% on the **“0 - 100% GAS”** meter scale.

## 2. Propane Kit.

This Calibration Test Kit consists of cylinders of compressed gas or vapor mixtures, a Dispenser Valve Adapter (Heath Part No. 09140000200), a Plastic Test Bag with Fittings (Heath Part No. 09140009607), and a hose for coupling to the Heath CGI inlet. Gas cylinders are filled with a mixture of 1.1% propane gas in air (Heath Part No. 0717473), which should produce a reading of 1.0 to 1.2% on the **“0 - 5% GAS”** meter scale.

To make a response test, first turn on the Heath CGI and turn the range switch to the **“5%”** position. Adjust the zero if needed. Couple the dispenser valve adapter to the cylinder, install the plastic test bag onto the dispenser valve adapter, and connect the hose to the Heath CGI inlet. Squeeze and release the aspirator on the Heath CGI until the plastic test bag is completely empty. Open the adapter control valve slowly

and fill the test bag about half full, aspirate, and watch the meter reading carefully, noting the maximum reading. A normal reading should be between 1.0 and 1.2% on the **“0 - 5% GAS”** meter scale. If it is not, re-calibrate the Heath CGI to a reading corresponding to that marked on the cylinder.

A second gas cylinder is filled with 100% propane gas for testing the Heath CGI on the **“100%”** range (Heath Part No. 0717474). Turn the Heath CGI on and in the **“100%”** range. Adjust the zero if needed. Connect the dispenser valve adapter to the 100% propane cylinder, install the plastic test bag onto the dispenser valve adapter, and connect the hose to the Heath CGI inlet. Squeeze and release the aspirator on the Heath CGI until the plastic test bag is completely empty.

Open the cylinder valve, aspirate, and note the highest reading obtained. Normal readings should be between 95 and 100% on the **“0 - 100% GAS”** meter scale. If they are not within this range, then re-calibrate the unit to read 100% on the **“0 - 100% GAS”** meter scale.

**Chapter VIII**

**PARTS:**

**Parts List**

**Heath Part No. Part Description**

21220-0201	Storage Case
21120-0252	Carrying Case, vinyl
21130-0401	Aspirator Bulb with tube
2027437	Water Trap with 1/8" Hose
0124615	Carbon Absorbent Filter
21133-1301	Filter element, cotton, pkg. of 24
8303416	Battery, alkaline, size D
21151-0101	Lamp, Meter illuminating
12162-0107	Filament/flame arrestor assembly: including catalytic and thermal conductivity filaments, wired and ready for installation.
2117254	Instruction Manual
2127265	5' Hose Assembly
0123309	Demand Regulator for Lecture bottle

0123179	Lecture Bottle, 2.5% Methane
0123519	Lecture Bottle, 100% Methane
09140000200	Dispenser Valve Adapter
09140009607	Test Bag With Fittings
0717473	Test Gas Cylinder - 1.1% Propane
0717474	Test Gas Cylinder - 100% Propane
2020505	36" Brass sampling probe w/ Filter
2023051	36" Lexan sampling probe w/ Filter

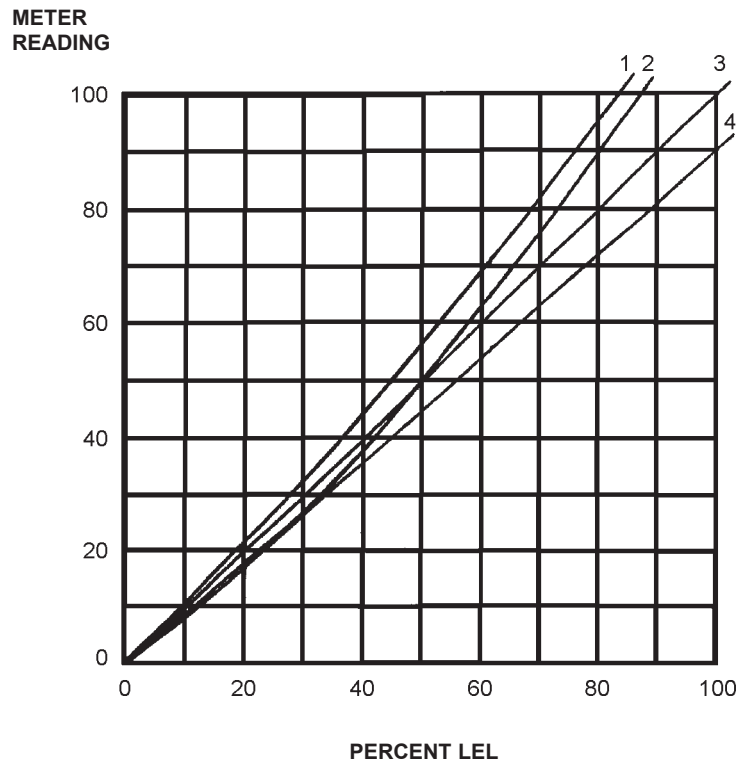


## Chapter IX

### CALIBRATION CURVE:

#### TYPICAL GASES & VAPORS

GAS	LEL (VOLUME PERCENT)	CURVE NO.
METHANE	5.0	2
HYDROGEN	4.1	2
PROPANE	2.2	3
TOLUENE	1.2	4
NATURAL GAS	4.7	1



## Chapter X

### SERVICE INFORMATION:

#### Warranties and Warranty Repairs

All instruments and products manufactured by Heath Consultants Incorporated are warranted to be free from defects in material and workmanship for one (1) year from the date of shipment.

In addition, the Heath Locating product - Surelock product is warranted for two (2) years and the Plunger Bar (handles) is warranted for 90 days.

Furthermore, the warranty on authorized repairs in Houston FSC and regions is ninety (90) days materials and thirty (30) days labor. This repair warranty does not extend any other applicable warranties.

Our warranty covers only failures due to defects in materials or workmanship which occur during normal use. It does not cover failure due to damage which occurs in shipment, unless due to improper packing, or failures which result from accident, misuse, abuse, neglect, mishandling, misapplication, alteration, modification or service by anyone other than a Heath warranty repair location.

Battery and damage from battery leakage and all expendable items such as filters and Plunger Bar rods are excluded from this warranty. Also, O-rings, gaskets and seals for the Petro-Tite product line are excluded from warranty coverage. In addition "wetted" parts in various Petro-Tite products are warranted for 30 days only.

Heath's responsibility is expressly limited to repair or replacement of any defective part, provided the product is returned to an authorized warranty repair location, shipping charges pre-paid and



adequately insured. Return shipping charges and insurance will be paid by Heath warranty expense.

We do not assume liability for indirect or consequential damage or loss of any nature in connection with the use of any Heath product.

There are no other warranties expressed, implied or written except as listed above.

The following suggestions will expedite the repair of your instrument:

Package carefully, using the original shipping carton, if available, return all components.

Specify your complete shipping and billing addresses.

Specify the instrument or product name, model number and serial numbers on all correspondence.

Include a brief description of the problem you are experiencing and specify person to be contacted for information.

**Customer Service, Manufacturing, and Repair**

**CORPORATE HEADQUARTERS**

**Heath Consultants Incorporated**

9030 Monroe Road  
Houston, Texas 77061  
Phone:(713) 844-1300  
Fax : (713) 844-1309  
1-800-432-8487  
www.heathus.com

**MANUFACTURING AND WARRANTY SERVICE FOR  
THIS PRODUCT**

**Heath Consultants Incorporated Manufacturing Division**

9030 Monroe Road  
Houston, Texas 77061  
Phone:(713) 844-1350  
Fax : (713) 844-1309  
1-800-432-8487  
www.heathus.com



