

HEATH

Detecto-Pak™ III

User's Manual

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

INTRODUCTION

The Heath Detecto-Pak® III Flame Ionization Hydrocarbon Detector is designed to withstand normal field use and provide sensitive indication to the presence of hydrocarbon vapors.

This instruction manual is divided into nine chapters. Each chapter is designed to assure that the operator will obtain the best use of the Heath Detecto-Pak® III. Chapter One, Heath Detecto-Pak® III FEATURES, should be required reading for all operating personnel prior to using the Heath Detecto-Pak® III. Chapter Five, OPERATING THE Heath Detecto-Pak® III, outlines the steps necessary to make the instrument operational. Other chapters cover topics such as troubleshooting procedures, periodic maintenance, applications, etc.

FUNCTION

The Heath Detecto-Pak® III Flame Ionization Hydrocarbon Detector is designed to detect and measure the presence of hydrocarbons (calibrated for methane). The instrument has five sensitivity ranges: 10, 50, 100, 1,000 (1K), and 10,000 (10K) ppm. Also available is an optional unit capable of detecting up to 100,000 ppm (dilution value).

This instruction manual describes the operation of the instrument and provides limited maintenance information. The Heath Detecto-Pak® III, when properly maintained, will provide reliability and ease of operation for many years.

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 ATTEMPT TO REPAIR THE INTERNAL FUEL REGULATOR. DISASSEMBLY COULD CAUSE DAMAGE TO THE Heath Detecto-Pak® III.

WARNING

DO NOT ATTEMPT TO REPAIR THE FUEL OR CALIBRATION CYLINDER/VALVE ASSEMBLY.

WARNING

THE BATTERY MUST BE CHANGED OR CHARGED IN AN AREA KNOWN TO BE NON-FLAMMABLE TO REDUCE THE RISK OF IGNITING A FLAMMABLE ATMOSPHERE.

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FEATURES

Chapter I

Detecto-Pak® III FEATURES:

This chapter describes the features of the Detecto-Pak® III. Please refer to **Figure 1** for illustration of individual parts.

Detecto-Pak® III Complete

(Part No. 100023-0, 110 VAC) (Part No. 100023-2, 220 VAC)

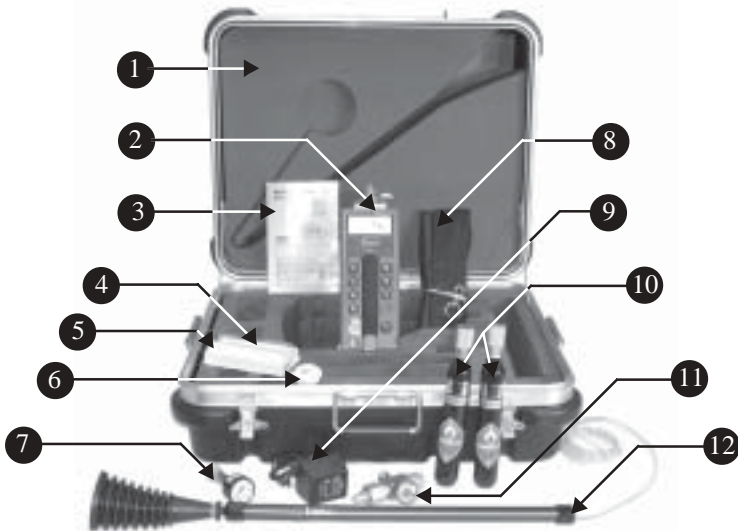


Figure 1

1. Carrying Case, System
(Part No. 0618415)
2. Instrument Only
(Part No. 0618313)
3. Instruction Manual
(Part No. 0618307)
4. Filters, Pkg/100
(Part No. 0110163)
5. "O" Ring Lubricant
(Part No. 0514885)
6. "O" Rings, (Pkg/10)
(Part No. 0514966)
7. Gauge Adapter
(Part No. 0618302)
8. Carrying Strap W/Pad
(Part No. 100472-0)
9. Battery Charger (Auto.)
(Part No. 0618305, 110VAC)
10. Fuel Cylinder (2 included)
(Part No. 0618303)
11. Fuel Transfiller
(Part No. 0514937)
12. Probe, Sample
(Part No. 0111006)

FEATURES

INSTRUMENT

Sensitivity

Ranges: 0-10, 0-50, 0-100, 0-1,000 (1K), and 0-10,000 (10K) ppm. (Optional range of 100,000 ppm(dilution value) is available.

Audible Alarm,
continuous:

Continuous alarm indicates flame is out.

Audible Alarm,
pulsating:

Pulsating alarm indicates signal level above approximately 35 to 45% full meter scale.

Fuel Cylinder

Pressure Indicator: Gauge 0-3,000 psig.

Fuel Regulator,
Internal:

Inlet Pressure, 0-1,750 psig; Outlet Pressure, 22-42 psig; factory set per instrument w/1,000 psig in fuel cylinder.

Fuel Cylinder

Holder:

Holder located inside instrument to carry fuel cylinder. See opening at end of instrument.

Weight of

Instrument:

7 lbs. (3.2 kg), Operating.

PROBE, Sample

Adjustable

Length:

25 to 41 inches (63 to 104 cm)

Weight:

12 oz. (.340 kg)

CARRYING STRAP WITH PAD

- Strap: Strap facilitates carrying instrument over shoulder.
- Pad: Pad cushions shoulder.
- Weight: 6.4 oz. (.181 kg)

GAUGE ADAPTER

- Gauge Adapter: Used to indicate outlet pressure setting of internal regulator.
- Weight: 5.6 oz. (.159 kg)

FUEL TRANSFILLER

- Fuel Transfiller: Used for refilling fuel cylinders.
- Pressure Indicator: Gauge 0-3,000 psig
- Restrictor,
Internal: Prevents pressure surge when filling cylinders.
- Purge Valve: Relieves pressure when filling cylinder is complete.
- Weight: 15.5 oz. (.439 kg)

FEATURES

CARRYING CASE, System

Dimensions: 24 x 20.5 x 11 inches
(61 x 52 x 28 cm)

Weight

(Empty): 17 lbs. (7.7 kg)

(Filled): 31 lbs. (14.1 kg)

Total weight
in shipping
carton:

34 lbs. (15.4 kg)

FUEL CYLINDERS

Color: Black, DOT Rated 3E1800

Volume:
100 cubic centimeters (approximate)

Maximum
Working

Pressure: 1,750 psig

Weight: 1 lb. (.453 kg)

“O” RINGS FOR FUEL CYLINDER VALVE

“O” Rings: Supplied as spares for Fuel Cylinder Valves.

Dimensions: .145 ID x .070 CS inches (.370 x .178 cm).

Material: Buna-N.

BATTERY CHARGER

Automatic
Reduction: 16 hours to full charge

Power: 110 VAC, 60 Hz

Output: 14.5 VDC at 60ma

INSTRUCTION MANUAL

Item refers to this Instruction Manual.

FILTRATION

Replaceable
Filters: Part No. 0110163, Pkg/100 or Part No.
0110683, Pkg/500

“O” RING LUBRICANT

Lubricant: supplied for lubrication of “O” Rings on Fuel
Cylinder Valves.

ADDITIONAL FEATURES (not shown)

Sample Intake
Rate: Pump, 2,000 cc per minute, (2 SLPM) nominal.

FEATURES

Ignition Type:	Piezo electric spark
Battery Indicator:	Needle indication (three color) on instrument ppm meter shows battery status.
Power Supply:	Internal, rechargeable NiCad Battery, 12 VDC, 60 mah.
Fuel Consumption:	Varies per instrument fuel setting, 40% Hydrogen - 60% Nitrogen at 22-42 psig.
Daily Operating Life:	Life is eight hours with fully-charged battery and two fuel cylinders filled to 1,750 psig.

OPTIONAL ACCESSORIES

Calibration Kit:	This Calibration Kit is available to field calibrate the Heath Detecto-Pak® III to ensure proper sensitivity levels. Included calibration cylinder filled to approx. 1500 ± 200 psig of 100 ± 10 ppm methane, balance air. (Part No. 0123309-0)
Calibration Cylinder Transfiller:	Used to refill above calibration gas cylinder (Part No. 0124601)
Pressure Indicator:	Gauge 0-3,000 psig

Restrictor, Internal: Prevents pressure surge when filling cylinders.

Purge Valve: Relieves pressure when filling of cylinder is complete.

Chapter II

FUEL MOTHER TANKS, FUEL CYLINDERS:

This Chapter discusses, in detail, the proper steps to take in transferring fuel to the fuel cylinder. Recommendations for ordering fuel mother tanks, along with proper storage, are also discussed.

Fuel Gas Mixture

Heath Consultants suggest only a certified mixture of 40% hydrogen/60% nitrogen gas with less than .5 ppm of hydrocarbon be used in the Detecto-Pak® III.

Transfilling Fuel Cylinders

Heath Consultants Incorporated does not sell gas. Please see your local certified gas vendor. Heath assumes no liability in the refilling of fuel cylinders. If you wish to refill your own fuel cylinders, caution must be exercised during the refilling process. It is also recommended that all safety precautions be used in the handling of high-pressure, compressed flammable gases during the refilling process.

To refill the fuel cylinders, connect the fuel transfiller to a fuel mother tank, then attach a non-contaminated fuel cylinder to the transfiller. See **(Figure 2)** and **“***NOTE***”** in this Section.

Mother Tank, Transfiller & Fuel Cylinder Connected for Transfilling



Figure 2

1. Remove the safety cap or caps from the fuel mother tank.
2. Very slowly, open valve on the fuel mother tank a very small amount (crack). Then close it immediately. This will clean (blow) any contaminants out of the valve.
3. Firmly secure the hex nut on the transfiller to the fuel mother tank valve outlet using an appropriate wrench. (Note: notches in hex nut body indicate the nut threads are “Reverse Cut” threads.)
4. Finger tighten knurled nut on transfiller to valve outlet on fuel cylinder.
5. Close bleed off valve on transfiller by turning it completely clockwise.

6. Slowly open fuel mother tank valve counterclockwise until the pressure gauge on the transfiller continues to rise, or approximately one-half of a turn open.
7. Observe transfiller pressure gauge and turn off fuel mother tank valve at 1750 psig or when the pressure gauge stops rising below 1750 psig level (determined by fuel mother tank internal pressure). **DO NOT EXCEED 1750 psig** pressure in the fuel cylinder.
8. Open bleed off valve on transfiller to eliminate pressure in transfiller.
9. Loosen knurled nut with finger pressure and remove fuel cylinder.
10. Remove transfiller from fuel mother tank, replace safety cap or caps, and safely store fuel mother tank.

Ordering Fuel Mother Tanks

Heath Consultants does not sell gas. When ordering a mother tank of fuel, it is recommended that only a certified mix of 40% hydrogen/60% nitrogen with less than .5 ppm of hydrocarbon be requested.

****NOTE****

When ordering, it is extremely important to specify CERTIFIED. This helps ensure quality gas. Not ordering CERTIFIED gas increases the risk of not securing a 40% H₂ (hydrogen)/60% N₂ (nitrogen) mix of less than (0.5) ppm hydrocarbon background. See Chapter Eight for an example of a negative effect.

Suppliers of Fuel Gas Mixtures:

The following companies can supply the proper fuel mixtures in fuel mother tanks. This list is not intended as an endorsement, and other suppliers may be available. If you are unable to locate a fuel source, please contact Heath Customer Service: 1-800-432-8487.

- Airco Scientific Gas Products
- Linde Matheson Gas Products
- Alphagaz Scott Specialty Gases
- Liquid Carbonic Air Products
- MG Industries

****NOTE**** (See Chapter Five, “**IMPORTANT**,” covering high altitude operation for special instructions.)

Storing Fuel Mother Tanks or Cylinders

The fuel mother tanks or fuel cylinders must be stored in accordance with D.O.T. and/or OSHA regulations. Simply stated, the regulations that apply are ones restricting storage of compressed, flammable gases near stored oxidizing agents such as compressed oxygen. Also applicable are regulations in regard to protecting the tanks from unauthorized tampering and/or mechanical damage.

Shipping Fuel Mother Tanks or Cylinders

Fuel mother tanks or fuel cylinders contain compressed, flammable gas and must be shipped as hazardous cargo according to D.O.T. and/or OSHA regulations. Fuel gas mixtures are flammable when mixed with air or oxygen. They must be shipped by motor freight or other freight services that permit shipment of compressed, flammable gases. In all cases, special labeling notation and documentation is required. (Refer to your Company’s Procedures or see the latest edition of “Hazardous Material Regulations of the Department of Transportation.”)

Chapter III

CALIBRATION MOTHER TANKS, CALIBRATION CYLINDERS:

This Chapter discusses, in detail, the proper steps to take in transferring calibration gas to a calibration cylinder. Also discussed are recommendations for ordering and proper storage of calibration gas mother tanks.

Calibration Gas Mixtures

The calibration gas is comprised of a mixture of 100 ppm \pm 10% methane, balance zero air. The calibration gas mixture is drawn into the instrument at the inlet of the filter housing to ensure proper sensitivity level. (See Chapter Six for a detailed explanation of this method.)

Transfilling Calibration Cylinders

Heath Consultants Incorporated assumes no liability in the refilling of calibration cylinders. If you wish to refill your own calibration cylinders, caution must be exercised during the refilling process. It is also recommended that all safety precautions be used in the handling of high-pressure compressed, flammable gases during the refilling process.

To refill the calibration cylinder, connect the calibration transfiller to a calibration mother tank, then attach a non contaminated calibration cylinder to the Transfiller. See **(Figure 3)**.

**Mother Tank, Transfiller & Calibration Cylinder
Connected for Transfilling**



Figure 3

1. Remove the safety cap or caps from the calibration mother tank.
2. Slowly open valve on the calibration mother tank a very small amount (crack). Then close it immediately. This will clean (blow) any contaminants out of the valve.
3. Firmly secure the hex nut on the calibration transfiller to the calibration mother tank valve outlet using an appropriate wrench. (Note: notches in hex nut body indicate that the nut threads are “Reverse Cut” threads.)
4. Tighten small hex nut on calibration transfiller to valve outlet on calibration cylinder.
5. Close bleed off valve on calibration transfiller by turning it completely clockwise.

6. Slowly open calibration mother tank valve counterclockwise until the pressure gauge on the calibration transfiller continues to rise, or approximately one-half of a turn open.
7. Observe calibration transfiller pressure gauge and turn off calibration mother tank valve at 1750 psig or when the pressure gauge stops rising below 1750 psig level (determined by calibration mother tank internal pressure). **DO NOT EXCEED 1750 psig** pressure in the calibration cylinder. After cylinder is filled, turn valve to “off” position
8. Open bleed off valve on calibration transfiller to eliminate pressure in calibration transfiller.
9. Loosen small hex nut and remove calibration cylinder.
10. Remove calibration transfiller from calibration mother tank, replace safety cap or caps, and safely store calibration mother tank.

Chapter IV

CHARGING SYSTEMS:

The Heath Detecto-Pak® III is supplied with a rechargeable nickel-cadmium battery. The battery is located inside the portable instrument and is designed to carry an energy supply sufficient to power the instrument for at least eight (8) hours of operation when fully charged.

Part of the charging system includes an approved, automatic electronically controlled battery charger to recharge the nickel-cadmium battery. Outside the USA, when required, a 220 VAC, 50 Hz to 110 VAC converter for your battery charger is available. Because of a wide range of 220 VAC receptacles encountered around the world, the customer must provide an adapter on the input side of the converter to fit the 220 VAC receptacle.

Nickel-Cadmium (NiCad) Rechargeable Battery

Because of electrical and chemical losses and the fact the battery discharges while being used, more energy must be put back into the NiCad battery than is drawn from it. Normally, it takes 12 to 16 hours of charging time to completely recharge a nickel-cadmium battery. If properly cared for, the nickel-cadmium battery should last throughout numerous cycles of regular use.

Battery Charger

The approved battery charger supplied with the Heath Detecto-Pak® III is an automatic, electronic type charger. After the battery charger has been plugged into the Detecto-Pak® III for 16 hours, the charger will automatically reduce itself down to float mode. The float mode will maintain a charge in the battery as long as it is

connected to the charger. We recommend that the Detecto-Pak® III be connected to the battery charger whenever it is not in use. This will ensure the battery is charged and the instrument is ready to use when required.

Charging Procedure

WARNING

THE BATTERY MUST BE CHANGED OR CHARGED IN AN AREA KNOWN TO BE NONFLAMMABLE TO REDUCE THE RISK OF IGNITING A FLAMMABLE ATMOSPHERE.

Set the Heath Detecto-Pak® III instrument ON-OFF switch to “OFF.” Plug the battery charger into a 120 VAC receptacle, then plug the battery charger output plug into the charge jack on the Detecto-Pak® III. If connected in the correct sequence, the charger is on and in the high charge mode.

CHARGING TIME: Normally, a 12 to 16 hour battery charging period is required if the instrument has been operated for 8 to 10 hours. For other charging times, use a 1.5 to 1 charge-time to use-time.

EXAMPLE: If you use the instrument for 4 hours, charge the battery for approximately 6 hours to completely recharge it, then the approved battery charger will automatically reduce the charge rate down to a float mode.

General Information - Nickel Cadmium Battery

1. We recommend that a new replacement nickel-cadmium battery be cycled two (2) times before regular use. First, fully charge the battery, then discharge the battery by operating the instrument 8 to 10 hours or until it ceases functioning. Next, Fully recharge for at least 16 hours.
2. Put the nickel-cadmium battery through a charge/discharge cycle at least once a month when the instrument is not in use. Nickel-cadmium batteries function best when frequently used.
3. Only use a Heath Consultants supplied nickel-cadmium battery and accompanying approved battery charger as they are matched for optimum performance and safety.
4. Do NOT use a nickel-cadmium battery when it is fully discharged. When the battery is depleted, it must be recharged before use.
5. Do not attempt to charge other types of batteries with a nickel-cadmium charger or try to charge the nickel-cadmium battery with a charger other than the one designed for this nickel-cadmium battery.

Chapter V

OPERATING THE HEATH DETECTO-PAK® III

This Chapter explains and contains a detailed illustration of the control panel. Operating and shutdown procedures are also discussed.

Detecto-Pak® III, INSTRUMENT ONLY, Part No. 0618313

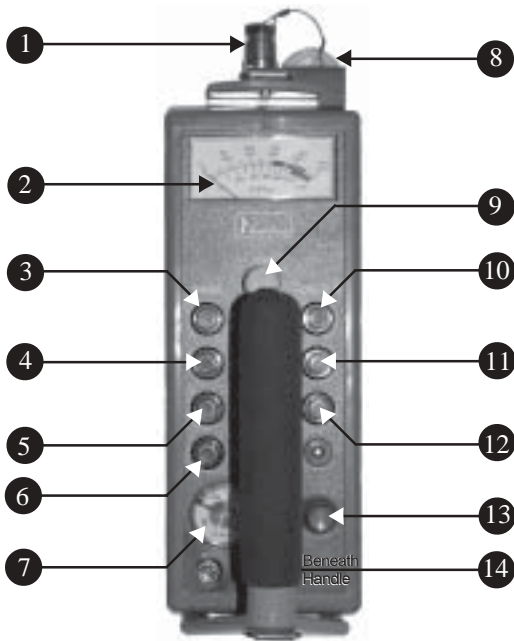


Figure 4

Side View of Heath Detecto-Pak® III



Figure 4.1

- | | |
|--------------------------------------|--------------------------|
| 1. External Pressure Gauge Connector | 8. Q.D. on Filter Holder |
| 2. Meter | 9. Zero Adjust Knob |
| 3. 10/50 ppm Switch | 10. On/Off Switch |
| 4. 100 ppm Switch | 11. Signal Alarm Switch |
| 5. 1,000 (1K) ppm Switch | 12. Battery Test Switch |
| 6. 10,000 (10K) ppm Switch | 13. Ignition Switch |
| 7. High Pressure Gauge | 14. Charging Jack |

Controls

1. **EXTERNAL PRESSURE GAUGE CONNECTOR:** Connector is used to check internal regulator output pressure with external pressure gauge assembly.
2. **METER:** Indicates the ppm concentration depending on which range switch is activated.
3. **TEN/FIFTY (10/50) PPM SWITCH:** If the 50 ppm, 100 ppm, 1,000 (1k) ppm or 10,000 (10k) ppm range switch are not depressed, the meter is reading zero to ten (0 - 10) ppm full scale, use the 0-100 meter scale and subtract one (1) zero (0) from reading. Depressing this switch overrides the 10 ppm range. The meter is now indicating zero to fifty (0 - 50) ppm full scale; use the 0-50 meter scale and read it direct.
4. **ONE HUNDRED (100) PPM SWITCH:** Depressing this switch overrides the 10 and 50 ppm ranges. The meter is now indicating zero to one hundred (0 - 100) ppm full scale; use the 0-100 meter scale and read it direct.
5. **ONE THOUSAND (1K) PPM SWITCH:** Depressing this switch overrides any previous range. The meter is now indicating zero to one thousand (1k) (0 - 1,000) ppm full scale; use the 0-100 meter scale and add one (1) zero (0) to reading.
6. **TEN THOUSAND (10K) PPM SWITCH:** Depressing this switch overrides any previous range. The meter is now indicating zero to ten thousand (10k) (0 - 10,000) ppm, (14,000 ppm full scale); use the 0-14K meter scale and read it direct.
7. **HIGH PRESSURE GAUGE:** Senses fuel pressure in the fuel cylinder.

8. **QUICK DISCONNECT (Q. D.) on Filter Holder:** This is used for quick connection and release of the Sample Probe.
9. **ZERO ADJUST KNOB:** Knob is used to adjust the zero point on the meter, which follows direction of rotation. Pull up on the knob to engage clutch.
10. **ON/OFF SWITCH:** Depressing this switch activates the instrument. If no range switch is depressed, the instrument is in the zero to ten (0 - 10) ppm range. The continuous “flame out” alarm will sound until the fuel is ignited in the detector cell.
11. **SIGNAL:** Depressing the signal switch activates the audible alarm for gas concentrations. The pulsating signal alarm sounds at approximately 35 to 45 percent full scale meter, regardless of which range is activated. As a safety factor, the signal switch does not affect the continuous “flame out” alarm. The Heath Detecto-Pak® III may flame out when exposed to high gas concentrations.
12. **BATTERY TEST SWITCH:** Pressing and holding in this switch indicates condition of battery on the instrument meter. The instrument should be operated only while the meter needle registers in the green zone. Movement into the yellow or red zone indicates that a complete recharge (12-16 hours minimum) is required.
13. **IGNITION SWITCH:** Pressing this switch causes a high voltage arc across the electrodes in the detector cell to ignite the fuel.
14. **CHARGING JACK:** Jack is used to plug the charger into the Detecto-Pak® III

Operating Procedures

The Heath Detecto-Pak® III is easy to operate. It is important that the following procedure be carefully read and followed in order to obtain the maximum benefits of its many features.

****NOTE**** **The Detecto-Pak® III should only be turned on and zero adjusted in a nonflammable (clean air) atmosphere.**

1. Carefully unpack all items from the system carrying case.
2. Always start with a fully charged battery.
3. Always start with enough fuel in the fuel cylinder to last the expected operating time. 1,750 psig in the two (2) fuel cylinders will ensure at least eight hours of operation. Do not allow pressure in the fuel cylinder to drop below 50 psig.

****NOTE**** **Fuel cylinders with negative pressure (vacuum) are supplied on the initial shipment. The operator must fill cylinders to operating fuel level before start up of the Detecto-Pak® III.**

****NOTE**** **Apply a very small amount of supplied “O” ring lubricant to small “O” ring on the stem of the cylinder valve at least once a week.**

4. Insert the fuel cylinder into the cylinder holder at the rear of the instrument. Turn the cylinder clockwise until the high pressure gauge moves upscale. Turn cylinder an additional 1/4 to 1/2 turn, or until snug. Do not overtighten the cylinder.

5. Replace the sample inlet filter if dirty, contaminated, or wet. A clean filter should always be inserted in the filter cup prior to each use. Replace filter daily or more often if required. (See Chapter Eight, Filter Replacement, for details.)
6. Attach probe assembly to the Detecto-Pak® III by firmly pressing the connector on the end of hose into the quick connector on the filter housing. Be sure to fully extend hose to prevent hose kinking and possible instrument malfunction.
7. Depress the ON/OFF switch. Continuous “flame-out” alarm will sound until the fuel is ignited in the detector cell.
8. Press Battery test switch. Meter needle should indicate in the green zone.
9. Depress 10K ppm switch and allow one (1) minute for fuel to flow through the instrument.

CAUTION

Instrument MUST be ignited in the 10K ppm range.

10. Press the igniter button. The continuous “flame out” alarm should stop within twenty five (25) seconds. This indicates the fuel in the detector cell is ignited. If continuous alarm is still on, repeat this step until the continuous alarm stops.
11. Allow five (5) minutes for the Detecto-Pak® III to warm up. Warm up may take up to fifteen (15) minutes during cold weather. It is advisable to store the Detecto-Pak® III in a warm room overnight rather than to leave it in a vehicle during cold weather.
12. Release the 10K ppm switch. Make sure all switches are undepressed. The instrument is now in the 10 ppm range.

13. Zero meter using the ZERO control knob.

CAUTION

Care should be taken so that instrument and operator are in a nonflammable (clean air) atmosphere.

14. Check pulsating signal alarm operation by pulling up on ZERO knob to engage clutch, then slowly rotate ZERO knob clockwise until pulsating alarm sounds. Allow at least five seconds after each movement of the ZERO knob for the meter to settle. The pulsating alarm should turn on at a meter reading between 35 - 45% of full scale. Return meter reading to zero.
15. To verify that the instrument is operational, the Detecto-Pak® III's sensitivity should be tested by introducing a small sample of a known hydrocarbon gas to the sample inlet. The meter should swing upscale and return to zero.
16. The Detecto-Pak® III is now operational.

High Altitude

Special procedures must be followed when using the Heath Detecto-Pak® III at high altitudes (over 3,000 feet above sea level). A slightly richer fuel mixture (42% hydrogen/58% nitrogen) and increased fuel and sample flow rate (50-55 cc/m and 850 cc/m, respectively) are required. The instrument must be calibrated at elevation and re-calibrated if the elevation changes by 1000 feet or more. DO NOT use these settings below 3000 feet as the flame ionization detector (FID) will burn too hot and possibly cause operational and/or physical problems. If an improper (hydrogen higher than 42%) fuel mix is used, the possibility of damage to the detector cell could be realized as excessive heat is generated.

Shutdown Procedures

The following procedure must be followed in order to maintain the Heath Detecto-Pak® III in good working order.

****NOTE**** **The Detecto-Pak® III should only be shut down and the battery changed or charged in a nonflammable (clean air) atmosphere.**

1. Press the 10K ppm range switch on the front panel.
2. Disconnect and remove the fuel cylinder from the instrument. Install the protective cap on the fuel cylinder valve and store the cylinder in its proper compartment in the carrying case.
3. Wait for the fuel to purge from the system tubing. The continuous “flame out” alarm will sound when the fuel is purged and the flame goes out.
4. Press the ON/OFF function switch to turn the Detecto-Pak® III’s electronics off.
5. Disconnect the probe and store the instrument and probe in their proper compartments in the carrying case, or connect the instrument to its automatic battery charger. (See Chapter Four for battery charging procedures.)

Chapter VI

CALIBRATION:

The Heath Detecto-Pak® is factory calibrated. It is recommended that the Detecto-Pak® III be calibrated once a week. However, it is recognized that the Detecto-Pak® III will be used for a wide range of applications and for varying lengths of time. Such variables may cause the operator to develop his or her own calibration schedule. The operator may see a need for a more or less frequent calibration schedule.

The Detecto-Pak® III should also be calibrated after any repair or replacement of any parts and at any time the operator suspects the instrument's calibration has changed.

In addition to calibrating the instrument on a regular basis, the instrument should be run through a diagnostic check before each use. The check should include an observation of the external sampling system.

Calibration Gas

The type of calibration gas and the concentration level of the calibration gas will be dictated by the particular detection requirements. The most reliable detection results will be obtained when the Heath Detecto-Pak® III is calibrated with a calibration gas containing the same gas component anticipated in the test area.

Additionally, the concentration of the calibration gas should represent the level nearest the critical area of detection required. That is, if an anticipated detection level of a particular gas is 100 ppm, then a calibration gas of that species at a 100 ppm \pm 10% concentration level would be the best calibration gas to use.

However, it is recognized that a variety of circumstances preclude an operator from obtaining the ideal calibration gas species and/or concentration level for the many detection needs he or she may encounter.

For this reason, methane has been accepted in the industry as a general calibration standard for flame ionization detectors such as the Detecto-Pak® III. It is recommended the Detecto-Pak® III be calibrated with 100 ppm of methane \pm 10% in air for general detecting applications.

****NOTE**** **The calibration of the Detecto-Pak® III with a particular gas species will provide reliable ppm readings for a target gas of the same species. Meter readings observed from the testing of a target gas containing a gas different from the calibration gas species may not represent the actual ppm concentration in the sampled target gas.**

Calibration Procedures (see Figures 5 & 6 on pages 30 and 32)

****NOTE**** **A calibration kit & calibration cylinders are available to calibrate the Heath Detecto-Pak® III. Any other method will not insure proper calibration levels.**

1. Calibration must be conducted in a hydrocarbon-free (clean air) atmosphere.
2. Start with the Detecto-Pak® III in operation as described under “**Operating Procedures.**”

3. Set the instrument on a flat, horizontal surface. The instrument must remain in this position throughout the calibration procedure.
4. The meter needle should be set to zero by turning the ZERO control knob.
5. Depress the 100 ppm range switch.
6. There should be no significant drift or movement of the meter needle. The needle should remain relatively stable on zero.
7. Attach calibration kit regulator assembly to calibration cylinder; turn calibration cylinder valve knob counterclockwise (one-half to one turn). **DO NOT FORCE THE KNOB ALL THE WAY COUNTER-CLOCKWISE (OPEN).**
8. Attach calibration kit outlet connector to the portable unit by pushing the connector firmly into the sample inlet quick disconnect on the filter housing.
9. Within 30 seconds, the meter needle should start moving upscale. Allow another 30 seconds before checking the meter.
10. The meter needle should register 100 (or same as calibration gas used) on the 100 ppm range.
11. If an adjustment is necessary to bring the meter needle to 100 (or same as calibration gas used) on the 100 ppm meter scale, an adjusting control is inside the bottom rear of the instrument as indicated in Figures 5 & 6. Access the calibration adjustment through the right-hand access port on the rear of the instrument located directly below the fuel cylinder holder.
12. Remove the plug from the port and use a micro-screwdriver to adjust as required.

13. Adjust control R28(see figure 6) to the proper level. Calibration is now complete.
14. Repeat Steps 1 through 10 to verify calibration.
15. If an adjustment is made to R28, you will need to recheck the pulsating signal alarm set point (35 to 45% of full meter scale). If the set point is off, then adjust signal adjust control R29(see figure 6), which is accessible through the left-hand port.
16. Turn off the calibration regulator valve and disconnect the outlet hose fitting from the portable unit sample inlet quick connect.

Location of Side Access Ports



Figure 5

Rear View of Heath Detecto-Pak™ III PC Board

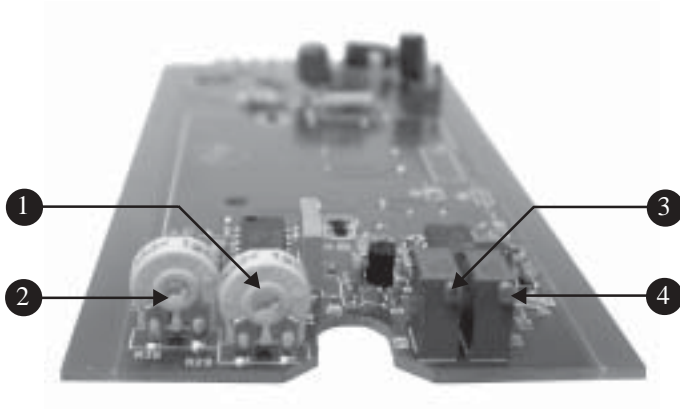


Figure 6

- | | |
|----------------------------|------------------------------|
| 1. Signal Adjust (R29) | 3. Calibration Adjust (R28) |
| 2. Flame-Out Adjust (R30)* | 4. Coarse Zero Adjust (R27)* |

**Factory Adjust Only*

Chapter VII

APPLICATIONS FOR THE Heath Detecto-Pak® III:

The Detecto-Pak® III is a non-specific hydrocarbon detector. Its use as a hydrocarbon leak detector has many applications. This Chapter lists some of the various types of inspections and areas which might be surveyed using this instrument.

Gas Distribution Systems

- Service Line Inspections
- Main Line Inspections
- Mobile Leak Surveys
- Mobile Patrols
- Inside Meter Inspections
- Business District Surveys
- Feeder Line Inspections
- Customer Leak Complaints

Gas Transmission Companies

Cross-country Pipeline Inspections
Compressor Station Inspections
D.O.T. Class 3 and 4 Inspections
Mobile Leak Surveys

LP-Gas (Propane) Companies

Main Line Inspections
Customer Leak Complaints
Service Line Inspections
Business District Surveys

Industrial/Manufacturing/Refining Facilities

Fugitive Emissions Monitoring - EPA Method 21
Industrial Hygiene Monitoring
In-plant Piping Inspections
Inside Building Piping Inspections
Tracer Gas Inspections for Gas Leaks
Confined Space Entry Testing

Telephone Companies

Inside Piping Inspections
Outside Piping Inspections
Tracer Gas Inspections for Gas Leaks
Pressurized Cable Leaks

Housing Authorities/Apartment Complexes/Mobile Home Parks/Master Meter Facilities

Inspection of On-site Gas Lines and Services
Customer Leak Complaints

Sanitary Landfill/Waste Storage/Environmental Study Areas

Hydrocarbon Contamination Inspection
Head Space Analysis Sites
Leaking Storage Tank Monitoring
Perimeter Inspections

Chapter VIII

MAINTENANCE INFORMATION:

Troubleshooting Procedures and Periodic Maintenance

This Chapter deals with troubleshooting procedures and periodic maintenance of the Heath Detecto-Pak® III.

Each instrument utilized for leak detection and evaluation should be operated in accordance with the manufacturer's operating instructions.

1. Instrument should be periodically "checked" while in use to ensure that the recommended voltage requirements are available.
2. Instrument should be tested daily or prior to use to ensure proper operation, that the sampling system is free of leakage, and that the filters are not obstructing the sample flow.
3. This instrument is equipped with an improved cell base and fuel flow system.

CELL BASE: Changes to the cell base include an improved ceramic flame orifice and redesigned flashback arresters.

FUEL FLOW SYSTEM: Changes to the fuel flow system include an improved fixed fuel flow restricter that replaces the adjustable restricter. The .005" in-line restricter has also been removed. When the instrument is calibrated and adjusted at the factory, a sticker is placed on the end of the sample inlet block and on the inside housing to indicate the proper pressure gauge set point for correct fuel flow rate.

Before calibration, and at least once daily, plug in the external pressure gauge assembly and check the gauge pressure. If it does not match the set point pressure on the sticker on the side of the instrument (using a fuel cylinder with 1000 psig of fuel), remove the plastic hole plug from the bottom of the instrument and with a 3/16" Allen wrench turn the internal regulator set screw clockwise to increase the gauge pressure or counterclockwise to decrease the gauge pressure until it matches the sticker set point pressure. Reinstall the plastic hole plug.

Troubleshooting the Instrument

In the event the Heath Detecto-Pak® III fails to perform satisfactorily, look through the following list to try to find the reason for the malfunction and its corrective action.

Some fixes are simple ones, such as refilling the fuel cylinder, recharging the battery, or replacing the filter. Other corrective actions are complicated and require mechanical and/or electronic equipment to determine their specific causes.

1. *INSTRUMENT INOPERATIVE.*

Check battery indication, and, if reading is in red zone, recharge battery as described in Chapter Four. If battery indicator reads in green zone but instrument is still not operational, proceed to item 2.

2. *FUEL WILL NOT IGNITE OR STAY LIT.*

Check internal regulator outlet pressure. Remove the protective cap from the quick connector located on the front of the portable unit. Connect the external gauge adapter to the quick connect stem on the unit by pushing in until it snaps tightly. The gauge should read as indicated on label with 1,000 psig in fuel cylinder. If an adjustment of the internal regulator is required,

Location of Underside Access Port

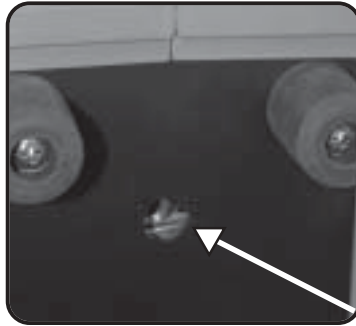


Figure 7

insert an Allen- type wrench through the underside access port (see **figure 7**) and adjust the screw.

3. *METER READOUT ERRATIC.*

Check fuel certification. Operate with previously known fuel to ensure that contamination is not causing the instrument's erratic behavior. If the 40% - 60% mix (Hydrogen - Nitrogen) is not certified, a variance in specific combustion ratios will cause the instrument to function unsatisfactorily. Also, if the hydrocarbon content in the fuel is higher than 0.5 ppm methane, reductions in sensitivity or erratic meter indications may be experienced. Also check calibration to ensure that it is not set too high. (See Chapter Six for Calibration Procedures.)

4. *PORTABLE UNIT WILL NOT OPERATE FOR FULL 8 HOURS*

The fuel cylinders may not have been filled to recommended pressure (1,750 psig maximum). Try refilling the cylinders. There may be a leak between the fuel cylinder valve and regulator. Check "O" ring on valve stem. Perhaps, the rechargeable battery may not have been fully charged. Recharge battery per instructions in Chapter Four.

Filter Replacement

1. Unscrew bottom half of white plastic filter housing.
2. Remove old filter and “O” ring. Gently tap housing upside down on a hard surface (table), if necessary, to remove residual pieces of filter. Inspect inside both halves of filter housing and remove any trapped dust or debris.
3. Insert “O” ring and then new filter into bottom half of filter housing. Smoother side of filter should be right side up or visible.
4. Replace bottom half of white plastic filter housing and tighten.

Parts List

The following list specifies Heath Detecto-Pak® III **assemblies** and specific parts available from Heath.

Part No.	Description
0111006	<u>PROBE, SAMPLE</u>
0110518	BELLOWS, RUBBER
0111129	FILTER, SCREEN PROBE
0111965	FITTING, HOSE BARBED
0112069	MODIFIED FURNITURE REST
0112070	MODIFIED FURNITURE REST VENTED
0112267	WASHER, STOP, NEOPRENE
0618343	HOSE 1/8" ID X 1/4" OD,
8300335	PLUG, QUICK-DISCONNECT, 1/8 BARB
0514965	<u>'O' RING, .145 IDX. 070 CS, BUNA-N</u>
0618320	<u>GAUGE, EXT. PRESSURE CHECK</u>
0618320	GAUGE, LO-PRESSURE, 0-60 PSI
0618321	QC BODY W/VALVE

0514942	<u>CAP, FUEL CYLINDER VALVE</u>
0514966	<u>'O' RINGS FOR FUEL CYL. VALVE\PKG 10</u>
8304219	LABEL, DO NOT EXCEED 1750 PSI
8304220	LABEL, 40% H2-60% N2
0618305	<u>CHARGER, BATTERY, (AUTO) 110VAC</u>
0618313	<u>INSTRUMENT, Detecto-Pak™ III</u>
0110164	FILTER HOLDER 1" DELRIN
0618467	ASSY-IGNITOR, Detecto-Pak™ III
0518049	FLOW RESTRICTOR, ADJUSTABLE
0518053	HOLE PLUG .375" DIA-BLACK
0518083	ALARM, STAR MICRONICS
0518088	TUBE 1/6"ID X 1/8" OD
0518110	RUBBER FEET W/WASHER
0518128	FILTER IN-LINE 5 MICRON 1/16"
0518129	RESTRICTOR, FIXED .005" 1/16"
0618304	INTERNAL REGULATOR
0518047	FITTING, HOSE BARB, 10-32X1/16
0518048	GASKET FOR 10-32 FITTINGS
0618323	QC STEMS W/VALVE
0618363	INSULATOR, METER TERM. Detecto-Pak™ III
0618314	WIRING HARNESS - DP III
0514848	CAP ELEC. 330 MF 16V
0518041	SWITCH, PUSH-BUTTON INDICATING
0518042	SWITCH, MOM PUSH-BUTTON INDIC
0618342	POT 500 OHM, 10 TURN
2913711	JACK, CHARGER, .218 ID X .10 PIN
100472-0	CARRYING STRAP
8300319	STA-STRAP, 5.5" LG., REG. TYPE
8304252	LUG, SOLDER, LOCKING, BENT, #4
100120-0	PCB ASSY., Detecto-Pak™ III
0514911	BATTERY, DP-III
0518015	ASSY-CELL TOP, P-F II/Detecto-Pak™ III
0514874	SMALL SHEET METAL SCREW
0518179	ASSY-CELL BASE, P-F II/D-P III
0514873	FLASH BACK ARRESTER P/F
0518047	FITTING, HOSE BARB, 10-32X1/16

8308102 SCREW, 2.56X.5 RD HD PHILIPS
0518070 WIRE TIE, BEADED
0110037 RES 1/4W 1K 1%
0110065 CAP PS 100 PF
0110066 DIODE, 1N4001
0111999 RES 1/8W 10K 1%
0513413 TRANS., AF PREAMP. DRIVER, 2N3906
0514813 TRIMPOT, CERMET, 500K OHM, 1-TURN
0514821 RES 1/4W 10 MEG 1%
0514827 CAP CER .1M 50V
0514828 IC, OP-AMP, QUAD, UA324PC
0514829 CAP CER .22 MF 50V
0514830 CAP CER .47 MF 50V
0514831 CAP MET POLY 1 MF 50V
0514832 CAP MET POLY .22 MF 50V
0514833 CAP POLYS 2200PF 33V
0514835 CAP ELEC. 220 MF 16V
0514842 RES 1/4W 75K 1%
0514846 RES 1/4W 475K 1%
0514847 RES 1/4W 47.5K 1%
0514895 IC, OP-AMP, LO-POWER, ICL7611DCPA
0514962 FENWAL THERMISTOR PB41D1
0514972 RES 1/4W 1 MEG 1%
0514973 RES 1/4W 274K 1%
0514977 IC, SCHMIDT TRIGGER, HEF4093BP
0514995 SOCKET, IC, DIP, 8 PIN
0518055 IC, +8 VOLT REG., MC78L08ACP
0614841 DIODE, ZENER, 9.1V, 1N5529B
0618346 RES 1/4W 333.3 MEG 1%
0618369 RES 1/4W MF 910K OHM 1%
0618370 RES 1/4W MF 6.8M OHM 1%
0618371 RES 1/4W MF 71K OHM 1%
0618372 RES 1/4W MF 1.82M OHM 1%
0618373 RES 1/4W MF 357K OHM 1%
0618376 TRIMPOT, 50K OHM, 4-TURN
0618377 TRIMPOT, 100K OHM, 4-TURN

0714808 SOCKET, IC, DIP, 14 PIN
0114493 'O' RING INSIDE FILTER HOLDER
56112002 RES 1/4W CF 0 OHM
56112429 RES 1/4W MF 150K 1%
0618326 RETAINER, BATTERIES
8308327 SCREW 6-32X3/8 SLTD FLT HD
8308328 NUT, HEX, 6-32, NYLON
0618319 RETAINER, FUEL CYLINDER
0618324 SWAGELOK STEM PROTECTOR BQC4SP
0618331 FITTING, Q.D BODY LESS VALVE
8300326 SOCKET, QUICK-DISCONNECT, 1/8MPT
0618330 ELBOW, BRASS, FEMALE MFE-18078
0618334 BRACKET, MTNG, PRESS GAUGE, D-P III
0618338 METER 0-100UADC MODEL 3125
0618339 STANDOFF, 6-32 X 3/8" BRASS
0618343 HOSE 1/8" IDX 1/4" OD, URETHANE
12130-0018 PUMP, Detecto-Pak™ III
0618354 CONNECTOR, TUBING - T
0618355 FITTING, INLET, REGULATOR, D-P III
0618315 LABEL, LOGO, Detecto-Pak™ III
0618316 LABEL, INSTRUCTION, Detecto-Pak™ III
8307484 SCREW, 6-32X2.25 LG/PLHDFLT SS EACH
8307484 SCREW, 6-32X2.25 LG/PLHDFLT SS EACH
0618378 CLUTCH, ZERO POT, Detecto-Pak™ III
0618379 KNOB, ZERO POT, Detecto-Pak™ III
0618382 SCREW, SET, 6-32X.125 LONG SS
0618385 ASSEMBLY, HANDLE, Detecto-Pak™ III
0111472 RING 3/4" NICKEL (CLIP & D)
0618356 ADAPTER, D-P III HANDLE
0618357 HANDLE, Detecto-Pak™ III
0715815 BAR, RETAINER, HANDLE, STEEL
0715824 NUT, LOCK, NYLON INSERT, 10-32
0715926 BRACKET, CARRYING HANDLE
56112716 HANDLE GRIP, FOAM
8302326 SCREW PAN HD MACH 6-32X.500 SS
8305927 SCREW, SHOULDER, SOC. HEAD, #10

8305928 WASHER, FLT.,.25X.625X.031, NYLON
0618728 JACK, 3 COND., RECORDER, Detecto-Pak™ III
0715799 FEED THRU BLOCK
2618220 GROMMET, RUBBER 3/16IDX1/2 0D
2913690 CABLE, COAX, RG-174/U
56112219 NUT, LOCK, NYLON INSERT, 4-40
56112285 BRACKET RT/ANGLE 6-32 ZIERICK
56112374 SCREW, SET, SOK HD, 8-32 X 1/2
56112424 SCREW 6-32 X 3/8" PAN HD PHILIPS
56112589 NUT, LOCK, NYLON INSERT, 6-32
8300322 HOSE BARB, 1/8 HOSEX1/8MPT, BRAS
8302255 SCREW PAN HD MACH 6-32 X .25LG
8302575 LOCK-WASHER, INT. TOOTH, #6, SS
8306554 NUT, KEP, 8-32, SS
8308119 SCREW, 8-32X.5" RD HD PHILIPS
8308344 SOLDER LUG #6 LOCKING
0123309-0 CALIBRATION KIT, W/ 100PPM METHANE/AIR
8226765 CALIBRATION KIT, "MOTHER" TANK TYPE

Chapter IX

SERVICE INFORMATION:

Warranties and Warranty Repair

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.

Furthermore, the warranty on authorized repairs in the Houston Factory Service Center (FSC) and other 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.

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, shipped prepaid, 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.

Return Authorization (RA)

The following suggestions will expedite the repair of your instrument:

1. Contact Heath Customer Service at 800-432-8487 for an RA#.
2. Package carefully, using the original shipping carton and cushions if available, and return all components.
3. Specify your complete shipping and billing addresses.
4. Specify the instrument or product name, model number, and serial numbers on all correspondence.
5. Include a brief description of the problem you are experiencing and specify the person and phone number to be contacted for information.

Customer Service, Manufacturing, and Instrument Repair Locations

CORPORATE HEADQUARTERS

Heath Consultants Incorporated

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

MANUFACTURING AND WARRANTY SERVICE FOR

THIS PRODUCT

Heath Consultants Manufacturing Division

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

SALES, CUSTOMER SERVICE, AND INSTRUMENT REPAIR

National Toll Free # 1-800-HEATH US (1-800-432-8487)

