Warning: Limitation of Liability

The ultimate responsibility of the consequences of use of toxic compounds rests with the user. Photovac's role is as a supplier of instrumentation to assist in the early detection of hazardous conditions involving such compounds.

It is vitally important to ensure that the PetroPRO is maintained in accordance with Photovac's instructions and that proper calibration is regularly performed.

As with any complex device, the PetroPRO is subject to failure and, while Photovac has taken, and continues to take, all possible precautions to (a) reduce the possibility of failure, and (b) warn the user in the event of failure, circumstances may occasionally occur in which there is a failure despite such precautions on Photovac's part. Photovac regrets that it cannot accept liability for damages of any kind caused as a result of either failure of the user to follow instructions or of the PetroPRO to perform.

Photovac PetroPRO
Portable Gas Chromatograph

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Part No. MX794010 Rev. B

Release History

Part No.	Revision	Publication Date
MX794010	B	March 2006

User Assistance

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1 Notices and Warnings

FCC Warning

This equipment has been tested and found to comply with the limits for a Class B Digital Device, pursuant to Subpart B, Class B of Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at their expense.

PETROPRO Intrinsic Safety (I/S) Notice

THE PETROPRO IS CLASSIFIED FOR USE IN CLASS I, DIVISION 1, GROUPS A, B, C, D HAZARDOUS LOCATIONS. T4 (135°C) RATING.

The PETROPRO has been certified to comply with the UL 913 *Standard for Intrinsically Safe Apparatus and Associated Apparatus for use in Class I, Division 1, Groups A, B, C, D Hazardous (Classified) Locations*, Sixth Edition when powered by MX700308 Battery Pack.

The PETROPRO has been certified to comply with *CSA Standard 22.2 No. 157-92 - Intrinsically Safe and Non-Incendive Equipment for Use in Hazardous Locations* when powered by MX700308 Battery Pack.

THE PETROPRO IS NOT INTENDED TO DETECT COMBUSTIBLE LEVELS OF GASES. THE PETROPRO IS CLASSIFIED FOR USE IN ATMOSPHERES CONTAINING COMBUSTIBLE LEVELS OF GASES.

PETROPRO EST CLASSIFIÉ POUR USAGE DANS LES EMPLACEMENTS DANGEREUX DE CLASSE I, DIVISION 1, GROUPES A, B, C, D. ÉVALUATION T4 (135ºC).

PETROPRO est conforme à la norme des UL 913 *Standard for Intrinsically Safe Apparatus and Associated Apparatus for use in Class I, Division 1, Groups A, B, C, D Hazardous (Classified) Locations*. Quatrième édition.

PETROPRO est conforme à la norme de *CSA Standard 22.2 No. 157-92 - Intrinsically Safe and Non-Incendive Equipment for Use in Hazardous Locations*.

PETROPRO EST NE PAS INTENDER POUR DÉTECTER DES NIVEAUX DE COMBUSTION DES GAZ. CET APPAREIL EST CLASSIFIÉ POUR USAGE DANS DES ATMOSPHÈRES CONTENANT DES NIVEAUX DE COMBUSTION DES GAZ.

WARNING

WARNING

1. *All maintenance and servicing of this device, including battery charging, must be performed in a safe area away from hazardous locations.*
2. *Disconnect all power before servicing.*
3. *Do not open UV Lamp Cap when unit is energized.*
4. *Only use the AC Adapter in a safe area away from hazardous locations*
5. *Only use the Serial Port in a safe area away from hazardous locations.*
6. *Do not refill the internal carrier gas cylinder in hazardous locations.*

CAUTION

To reduce the risk of fire or injury to persons, read and follow these instructions:

1. *There are no operator replaceable parts inside the PETROPRO except the battery pack, UV lamp and sample inlet filter.*
2. *For replacement battery pack use only Photovac Part No. MX700308.*
3. *There are no operator serviceable parts inside the PETROPRO.*
4. *Do not dispose of the battery pack in a fire. The cells may explode. The battery pack must be disposed of properly. Check with local codes for possible special disposal instructions.*
5. *Do not open or mutilate the battery pack. If the PETROPRO is used in a manner not specified, the protection provided by the PETROPRO may be impaired.*
6. *Exercise care in handling battery packs in order not to short the terminals with conducting materials such as rings, bracelets and keys. The battery or conductor may overheat and cause burns.*
7. *Do not defeat proper polarity orientation between the battery pack and battery charger.*
8. *Charge the battery pack using the AC adapter provided with or identified for use with this product only in accordance with the instructions and limitations specified in this manual. For AC adapter use only Part No. MX760051 (115 Volts AC), MX760052 (220 Volts AC). When using the AC adapter do not block access to AC outlet in use with adapter. AC adapter is not to be used in a hazardous area.*

 WARNING	**AVERTISSEMENT**

1. *Tous les calibrage, entretien et entretien de ce dispositif, y compris la batterie chargeant, doivent être assurés dans un secteur sûr parti des endroits dangereux*
2. *Débranchez toute la puissance avant l'entretien.*
3. *N'ouvrez pas le chapeau UV de lampe quand l'unité active.*
4. *Utilisez seulement l'adapteur à C.A. dans un secteur sûr parti des endroits dangereux*
5. *Employez seulement la porte série dans un secteur sûr parti des endroits dangereux.*

ATTENTION

Pour ramener le risque du feu ou des dommages aux personnes, lisez et suivez ces instructions :

1. *Il n'y a aucune pièce remplaçable d'opérateur à l'intérieur du PETROPRO excepté le paquet de batterie, la lampe UV et le filtre d'admission témoin.*
2. *Pour le numéro de la pièce MX700308 de Photovac d'utilisation de paquet de batterie de rechange seulement.*
3. *Il n'y a aucune pièce utile d'opérateur à l'intérieur du PETROPRO.*
4. *N'ayez pas le paquet de batterie dans un feu. Les cellules peuvent éclater. Le paquet de batterie doit être débarassé correctement. Vérifiez avec des codes locaux les instructions spéciales possibles de disposition.*
5. *N'ouvrez pas ou ne mutilez pas le paquet de batterie. Si le PETROPRO est employé en quelque sorte non indiqué, la protection fournie par le PETROPRO peut être altérée.*

6. *Le soin d'exercice en manipulant la batterie emballe pour ne pas court-circuiter les bornes avec les matériaux de conduite tels que des anneaux, des bracelets et des clefs. La batterie ou le conducteur peut surchauffer et causer des brûlures.*
7. *Ne défaites pas l'orientation appropriée de polarité entre le paquet de batterie et le chargeur de batterie.*
8. *Chargez le paquet de batterie à l'aide de l'adapteur à C.A. fourni en ou identifié pour l'usage avec ce produit seulement selon les instructions et les limitations indiquées en ce manuel. Pour l'adapteur à C.A. employez seulement le numéro de la pièce MX760051 (115 volts à C.A.), MX760052 (220 volts à C.A.). À l'aide de l'adapteur à C.A. ne bloquez pas l'accès à la sortie à C.A. en service avec l'adapteur. L'adapteur à C.A. ne doit pas être employé dans un secteur dangereux.*

The following accessories are for use with the PETROPRO in a hazardous location:

Les accessoires suivants peuvent également être utilisés avec l'appareil dans un emplacement dangereux:

MX396018	Long Sample Probe
MX396010	Gas Bag Adapter
MX380305	Three Meter Sample Line
MX380308	Carrying Strap
MX794010	PETROPRO User Manual
MX794001	User Reference Card

Do not use any other accessories with the PETROPRO in a hazardous location. Substitution of components may affect safety rating.

Ne pas utiliser d'autres accessoires avec cet appareil dans un emplacement dangereux. La substitution des composantes peut nuire à la sécurité d'emploi.

2 Introduction

About this Manual

This manual provides detailed instructions for setup, operation and maintenance of the PetroPRO Portable Gas Chromatograph.

Before unpacking the instrument, please read Warnings and Safety Practices on page 19. This section describes possible hazards that might injure the user, damage the instrument, or compromise its operation. Some general safety information is also provided.

The PetroPRO manual uses a few conventions for key names on the keypad and for text that is shown on the display.

UPPERCASE	Fixed keys are noted by uppercase text.
"Display Text"	Text that appears on the PetroPRO display is in quotation marks.
"Soft Keys"	Soft key names are also shown in quotation marks

In the text you will find various warnings and notes.

WARNING

A warning indicates an operation that could cause personal injury if precautions are not followed.

CAUTION

A caution indicates an operation that could cause instrument damage if precautions are not followed.

Note: *A note indicates significant information*

Warnings and Safety Practices

Please read the Notices and Warnings section of this user's manual before operating the PetroPRO.

Approved Models of PetroPRO

This manual provides operational information for the PetroPRO. The PetroPRO is intrinsically safe and approved for use in hazardous locations. Refer to the Notices and Warnings section of this manual for details of each approval.

Through this manual, notes are provided to inform you of the limitations of usage for the PetroPRO.

Internal Carrier Gas Cylinder

WARNING

This device contains a high pressure aluminum alloy cylinder maximum pressure - 1800 psi.
Improper use, filling, storage, or disposal of the cylinder contained within this device may result in death, personal injury and property damage.

1. Do not alter this cylinder or the high pressure components of this device, in any way.
2. Do not over pressurize this cylinder (device).
3. Do not expose pressurized cylinder (device) to temperatures in excess of 54 °C (130 °F).
4. Cylinders exposed to a fire or heated to temperatures in excess of 177 °C (350 °F) should be condemned or hydrostatically tested prior to filling.
5. Do not remove the warning label.

Handling Compressed Gases

WARNING

Cylinders of compressed gas, such as the carrier gas and calibration gas, must be handled with care.

Please observe the following handling procedures:

1. Ensure each tank is clearly labeled.
2. Do not store cylinders in hazardous locations. Store cylinders in an upright position away from possible sources of heat or sparks.
3. Do not heat the cylinders or expose them to direct sunlight. The cylinders may rupture at high temperatures.
4. Do not mutilate cylinders.
5. Do not drag or roll cylinders. Large cylinders should only be moved on carts designed for compressed gas cylinders. Do not move cylinders without the valve protection cap in place.
6. Always secure cylinders before removing the cylinder valve protection cap.
7. Always secure the calibration gas cylinder before connecting the regulator and adapter tubing.
8. Use only the specified regulator for the carrier and calibration gas cylinders.
9. Never transport PetroPRO while it is connected to a cylinder.
10. Never plug, obstruct or tamper with safety relief devices.
11. Wear safety glasses and ear protection when working with compressed gases.

Regulators for Compressed Gases

1. Use only the specified regulator for carrier and calibration gas. Confirm regulator type and material with your specialty gas supplier.
2. Use the carrier gas filling station only for refilling the internal carrier gas cylinder.
3. Mark each regulator with its intended service and never use a regulator for more than one service.
4. Do not change gas service, or adapt equipment without consulting your gas supplier.
5. Ensure regulator construction materials are compatible with the gas, and that the cylinder pressure gauge will withstand the cylinder pressure. A stainless steel diaphragm is suggested as this will reduce the potential for the carrier gas to be contaminated by the regulator itself.
6. Never use the regulator as a shut-off valve. Close the cylinder valve when it is not in use.
7. Do not subject the regulator to an inlet pressure greater than recommended.
8. Do not move or detach the regulator when it is pressurized or when it is in use.
9. Before connection, ensure the cylinder valve and the regulator CGA connection are clean.
10. When connecting a regulator to a large gas cylinder turn the valve on the cylinder clockwise to close the cylinder. Turn the regulator off. Open the cylinder valve slowly and check for leaks. Adjust the delivery pressure and then open the regulator outlet valve.

Excessive Heat and Cold

The normal operating temperature range is 0° to 40° C (32° to 105° F) with 0 to 95% (non-condensing) relative humidity.

Exposure to excessive heat and cold outside the operating and/or storage temperature specifications may result in erroneous readings. Do not expose the instrument to intense sunlight for prolonged periods.

Unpacking the Instrument

Remove the PetroPRO from its shipping box. The following basic accessories are included with the PetroPRO:

Carrying strap	MX380308
PetroPRO tool kit	MX754010
PetroPRO user manual	MX794010
User reference card	MX794001
AC adapter, North America 115 volts AC	MX380302 or
AC adapter, Europe 220 volts AC	MX380331

Ensure that all of the accessories have been included with the instrument. If any items are missing or damaged, contact Photovac immediately at 781-290-0777.

Support Equipment and Consumables

Calibration

The following items are required for calibration:

1. Calibration Gas Regulator (Part No. MX704210)
2. Calibration gas can be purchased from Photovac (Part No. MX754110). The Calibration Gas for the PetroPRO consists of:
    - Balance Air
    - +/- 5% Certified Master Gas
    - 34 Liters @ 500 psig
    - Size Scotty® 34 Extra-Life™

    And contains the following gas concentration levels:
    - 0.5 PPM Benzene
    - 0.8 PPM Toluene
    - 1.6 PPM Ethylbenzene
    - 1.6 PPM m-Xylene

.

If the Threshold Limit Value (TLV) of the compounds are exceeded, you should use a gas bag for sampling and calibration. To determine the TLV of the compounds contained in the calibration gas mixture, refer to the Material Safety Data Sheet (MSDS) supplied with your calibration cylinder.

Overview 3

PetroPRO Layout

Figure 1. PetroPRO Layout

Instrument Overview

The PetroPRO portable gas chromatograph measures the concentration of four specific compounds; benzene, toluene, ethylbenzene, and m-xylene. The PetroPRO automatically displays and datalogs these concentrations.

A sample analysis is started by pressing the START/STOP key on the PetroPRO once the PetroPRO oven has reached operating temperature. The concentrations can be read directly from the display while the analysis is in progress. All readings are automatically datalogged at the end of the analysis. The PetroPRO has sufficient internal memory to store a minimum of 100 analyses.

The PetroPRO can be Passcode Protected to limit the operator basic functions such as: start or stop analyses, calibrate the instrument, and view logged readings on the instrument display. The Passcode Protected mode prevents the operator from accidentally making changes to the operating characteristics of the PetroPRO.

The PetroPRO has eight keys, five (5) fixed function keys and three (3) soft function keys. The keys are used to operate, configure and calibrate the PetroPRO. All information entered with the keys and stored in the PetroPRO memory is retained when the instrument is switched off. The clock and calendar continue to operate and do not need to be reset when the PetroPRO is turned on.

General Operation

The PetroPRO portable gas chromatograph is a microprocessor-controlled air monitor for measuring benzene, toluene, ethylbenzene, and m-xylene at part per billion (ppb) and part per million (ppm) concentrations.

A microprocessor controls the components of the instrument and interprets and records the signal generated by the photoionization detector (PID). Recorded data and setup information entered into the microprocessor's memory are retained when the PetroPRO is turned off.

A pump pulls the air sample under test into the sample inlet at the beginning of each analysis. The sample is then run through the analytical column by the carrier gas. The analytical column separates the sample into its individual chemical compounds. At the end of the analytical column the carrier gas will elute each compound into the PID. The PID converts the concentration of each compound into an electrical signal. The microprocessor compares this signal to the signal generated during a calibration and calculates a concentration which is displayed on the PetroPRO in ppb or ppm. Depending on the values entered using the PetroPRO keypad, an alarm status may be displayed and an audio alarm may be heard.

The PetroPRO is designed to detect only benzene, toluene, ethylbenzene, and m-xylene. However there are other ionizable compounds which may have similar characteristics to these four compounds. It is possible that other compounds can pass through the PetroPRO column and PID. These other unknown compounds may come off the column at the same time as benzene, toluene,

ethylbenzene, or m-xylene. If the concentration of an unknown compound is above the measurement range of the PetroPRO the instrument will display an off-scale warning at the end of the analysis. In addition, the analysis results will list offscale unknown compounds, along with benzene, toluene, ethylbenzene, and m-xylene in the order they come off the column.

If the concentration of the unknown compound is exceptionally high it may affect the reported concentration of benzene, toluene, ethylbenzene, or m-xylene. The user of the PetroPRO must be aware of the possibility that compounds identified as benzene, toluene, ethylbenzene, or m-xylene may, in fact, be other photoionizable compounds.

The PetroPRO must be calibrated with a gas mixture containing benzene, toluene, ethylbenzene, and m-xylene. Contact Photovac Technical Support for further information on the required concentration of the calibration mixture or to purchase the Photovac PetroPRO calibration gas mix, Part No. MX754110. For further information on the PetroPRO Calibration gas refer to the Calibration Gas section on page 43.

Photoionization Detector

The PetroPRO Photoionization Detector is shown in Figure 2. The PID measures the concentration of photoionizable chemicals in the gas stream (carrier gas and sample) and produces an electrical signal for the microprocessor.

An ultraviolet (UV) lamp generates photons which ionize specific molecules in the gas stream. The permanent air gases (argon, carbon dioxide, nitrogen, oxygen, water vapor etc.) require a relatively high energy for ionization, and are not ionized by the UV photons. Many of the compounds considered pollutants, including most hydrocarbons, are ionized.

The gas stream is directed into the PID cell and the UV lamp ionizes the hydrocarbon molecules in the stream.

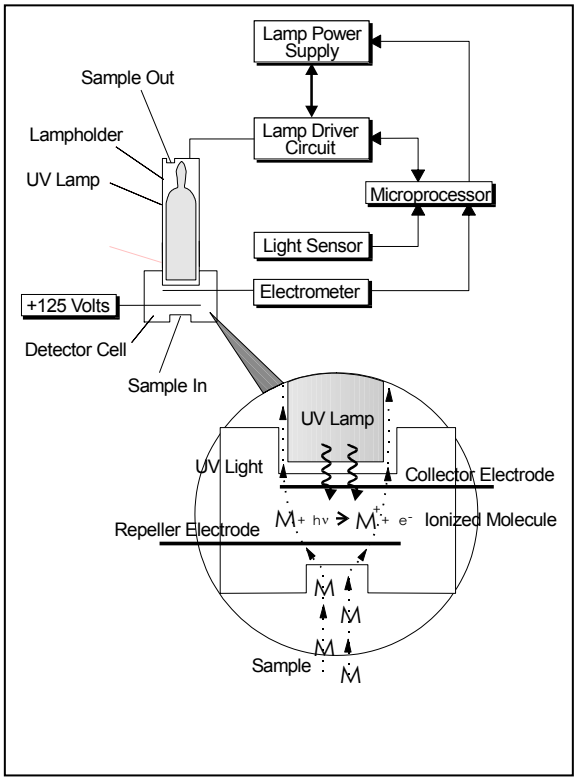

Figure 2. Photoionization Detector

The ionized molecules in the detector cell are subjected to a continuous electric field between the repeller electrode and the collector electrode. The ions move in the electric field, generating a current which is proportional to the concentration of the ionized molecules in the detector cell. An electrometer circuit converts the current to a voltage which is then fed to the microprocessor.
The UV lamp is operated by a lamp driver circuit and power supply, and is controlled by the microprocessor based on a feedback signal from a light sensor.

Beginning Operation 4

Battery Charging

Before beginning operation of the PetroPRO, the battery must be charged. The battery pack is a Nickel Cadmium rechargeable cell with intelligent charger and is 24% cadmium by weight.

A discharged battery pack can be easily removed and replaced with a fully charged battery pack (Part No. MX704010). If the PetroPRO is connected to the PetroPRO AC charger (Part No. MX380302 or MX380331), the PetroPRO will operate without a battery connected.

WARNING

The PetroPRO is not classified for use in hazardous locations when connected to the AC charger (Part No. MX380302 or MX380331).
You must use the 220 volt AC charger (Part No. MX380331) to comply with the requirements of the applicable Council Directives.

Charging the Battery Pack from an AC Source

CAUTION

Use only the AC adapter specified for use with the PetroPRO. Using another AC adapter will result in damage to the battery pack, the PetroPRO or the adapter itself.

1. To charge the battery pack, plug the AC adapter into the jack located on the front panel of the PetroPRO.
2. If you are using the European AC adapter, ensure the correct plug is installed on the line cord. If it is not correct for the wall outlet in your area, then it must be replaced.
3. The LED on the front panel of the PetroPRO beside the AC adapter jack indicates the charge state. A red light indicates that the PetroPRO battery pack is being charged. A flashing red light indicates that the battery pack will start charging

shortly. A green light indicates that the battery pack is fully charged.

Note: *The LED will not be lit when the PetroPRO is not connected to the AC adapter.*

4. When the battery pack is fully charged, disconnect the AC adapter from the wall outlet and then from the front panel of the PetroPRO.

Leaving the AC adapter connected to the PetroPRO will not harm the battery, adapter or instrument in any way. If the PetroPRO is to be left unused for extended periods of time, leave it connected to the AC adapter so the battery will be fully charged and ready for operation.

A fully charged battery will provide 8 hours of PetroPRO operation. Battery life is shorter if the instrument is turned on and off frequently or if backlighting is turned on.

Note: *Warming up the PetroPRO oven while connected to AC power will increase battery life substantially.*

Charging a fully discharged battery pack will take approximately 6 hours. The PetroPRO battery pack can also be charged when it is not connected to the instrument.

1. Plug the PetroPRO AC adapter into the AC jack on the front of the battery pack. The LED on the PetroPRO battery pack indicates the charge state. A red light indicates that the PetroPRO battery pack is being charged. A green light indicates that the battery pack is fully charged.
2. When the battery pack is fully charged, disconnect the AC adapter from the wall outlet and then from the battery pack.

Charging Battery Pack from a DC Source

The PetroPRO battery pack can be charged using a DC adapter (Part No. MX380313). This allows battery charging from a 12 volt DC power source. The DC adapter is a six foot long cable with “cigarette lighter” style plug.

To re-charge your battery pack:

1. Remove the battery pack as outlined in *Removing and Replacing the Battery Pack* on page 82
2. Plug the DC power cord into a vehicle auxiliary 12 VDC or cigarette lighter socket.
3. The LED on the PetroPRO battery pack indicates the charge state. A red light indicates that the PetroPRO battery pack is being charged. A flashing red light indicates that the battery pack will start charging shortly. A green light indicates that the battery pack is fully charged.

Note: *The LED will not be lit when the PetroPRO is not connected to the DC adapter.*

4. Charging a fully discharged battery pack will take approximately 6 hours.
5. When the battery pack is fully charged, remove the DC power cord, first from the vehicle auxiliary 12 VDC or cigarette lighter socket, then from the battery
6. Replace the battery pack in the PetroPRO as outlined in *Removing and Replacing the Battery Pack* on page 82

Filling the PetroPRO with Carrier Gas

CAUTION	*The PetroPRO lamp and oven will not operate without carrier gas in the internal cylinder.*

Prior to performing analyses, it is essential to fill the PetroPRO internal carrier gas cylinder. Carrier gas is used to run samples through the analytical column and PID. The carrier gas is also used to control the internal pneumatics.

The carrier gas must be ultra zero air containing less than 0.1 ppm total hydrocarbons. The carrier gas cylinder must have a CGA 590 fitting.

Note: *The PetroPRO user is responsible for supplying carrier gas for their instrument. Photovac does not supply or sell carrier gas but can direct you to suggested suppliers of carrier gas. Contact Photovac Technical Support for further assistance.*

WARNING

Do not fill the internal carrier gas cylinder in a hazardous location.

To fill the PetroPRO with carrier gas:

1. Make certain that the valve on the carrier gas cylinder is closed prior to connecting anything to the cylinder.
2. Connect the PetroPRO carrier gas fill device (Part No. MX380319) to the cylinder of carrier gas. See Figure 3 below.

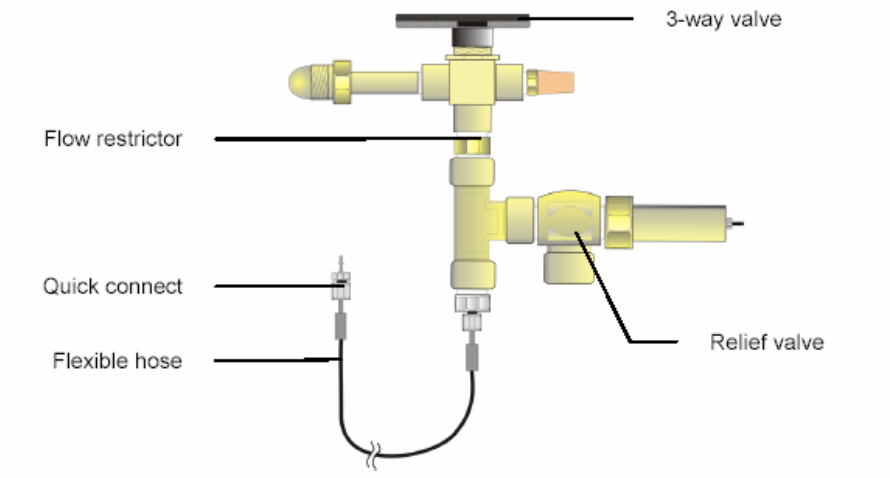

Figure 3. Filling the PetroPRO using Carrier Gas Fill Device

3. Attach the quick disconnect fitting on the carrier gas fill station to the refill port on the PetroPRO.
4. Open the valve on the top of the carrier gas cylinder.
5. Turn the black handle on the carrier gas fill station until the arrow is pointed toward the cylinder. The PetroPRO internal carrier gas cylinder should begin to fill. Observe the PetroPRO carrier gas cylinder pressure gauge, located on the left side of the PetroPRO, begin to increase.

Note: *Venting carrier gas from the carrier gas fill station can often cause a loud hissing or rapid popping sound. This is normal.*

6. When the internal carrier gas cylinder pressure gauge reaches 1600-1700 psig, the pressure relief valve on the fill station will begin to vent.

WARNING

The internal cylinder pressure MUST NOT exceed 1800 psig.

7. Turn the black valve on the carrier gas fill station away from the cylinder to stop the flow of gas from the cylinder.
8. The pressure in the fill line will gradually vent and there will be a slight hissing sound.

CAUTION

Do not remove the quick disconnect until the fill line pressure has completely vented. Failure to do so could result in the quick disconnect hitting an object or person and causing injury.

9. Once the carrier gas fill station has vented, it is safe to remove the quick disconnect from the PetroPRO. To do this, push the collar on the PetroPRO refill port back toward the instrument.
10. Close the valve on the cylinder of carrier gas.
11. It is now safe to power up the PetroPRO.

Note: *The PetroPRO will sound an audible alarm and flash the Alarm LED indicator when the Carrier Gas pressure is below an acceptable level for analysis. The PetroPRO will not perform an analysis until the Carrier Gas is filled to an acceptable level.*

Purging the Internal Carrier Gas Cylinder

If the internal cylinder has been empty for any period of time, it must be purged to eliminate the possibility of system contamination.

WARNING

Do not purge the cylinder in hazardous locations.

1. Fill the internal cylinder with the carrier gas fill station. See section Filling the PetroPRO with Carrier Gas.
2. Loosen the knurled knob for the purge valve. The knurled knob is located beneath the sample inlet and labeled *Purge*.
3. When the cylinder is empty, close the purge valve. The knurled knob can be tightened by hand.
4. Fill the cylinder and empty it again.
5. Close the purge valve and fill the cylinder.
6. Run a sample of clean air to ensure no contamination has entered the system.

Note: *The knurled knob for the purge valve is also used to empty the internal carrier gas cylinder before shipment or air travel.*

Using an External Tank of Carrier Gas

The PetroPRO may be connected to an external cylinder of carrier gas for continuous operation. This is normally done so the PetroPRO can be left on at all times and ready to sample. In order to connect the PetroPRO to an external tank of carrier gas, the customer must supply a two stage regulator. The two stage regulator should have a CGA590

connection and the second stage of the regulator must be set at 100 psig (690 kPa).

1. Connect the two stage regulator to a tank of ultra zero air carrier gas.
2. Use the Photovac PetroPRO Carrier Gas Connection Kit, MX380309, and connect one end to the output of the secondary stage of the regulator. The quick disconnect end should be connected to the PetroPRO.
3. Open the valve on the carrier gas cylinder and set the second stage of the regulator to 100 psig.
4. The gauge on the left side of the PetroPRO will rise to 100 psig and stop.
5. *The PetroPRO must remain connected to the two stage regulator and the cylinder of carrier gas.*
6. It is now safe to power up the PetroPRO.
7. To use the PetroPRO as a portable unit, follow the instructions found in Filling the PetroPRO with Carrier Gas on Page 34.

Powering On the PetroPRO

Verify that the PetroPRO is plugged into the AC charger or the battery pack is fully charged.

WARNING

The PetroPRO is not classified for use in hazardous locations when connected to the AC charger (Part No. MX380302 or MX380331).

Verify that the PetroPRO has been filled with carrier gas or is permanently connected to the output of a two stage regulator.

Press the POWER key for two seconds until the Photovac logo splash screen appears on the PetroPRO display. The PetroPRO will run a diagnostic check and display the version number of the internal EPROM and the serial number of the PetroPRO.

User Interface

Graphic Display

The PetroPRO has a graphic display for instrument status, reporting concentrations of detectable compounds and to guide the operator through the configuration options. All functions of the PetroPRO are reported or controlled using the display and keypad.

The PetroPRO uses a 128 x 64 bit graphic display (The compounds detected and their concentrations are shown on the display). In order to accommodate a range of compounds the display will report concentration in either parts per billion (PPB) or parts per million (PPM).

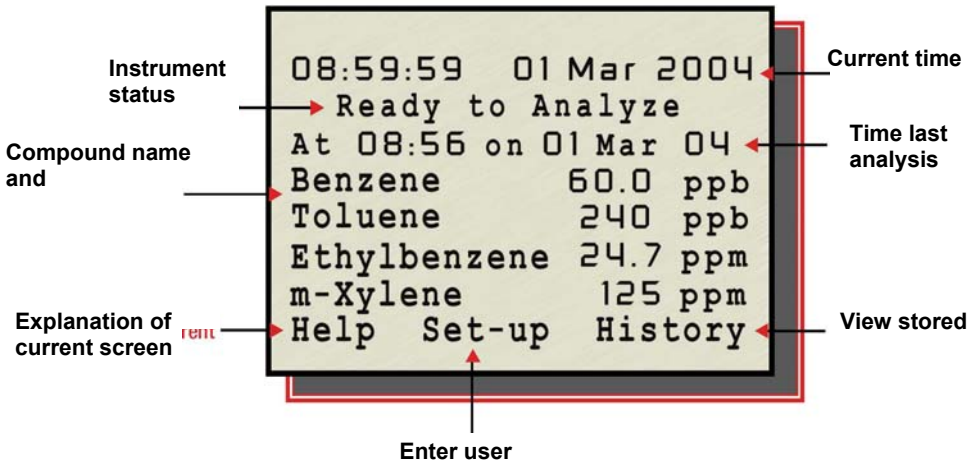

Figure 4. PetroPRO Display

The display reports the concentration just after the compound passes through the PID. The PetroPRO is designed for ease of use with a logically organized internal menu and user interface. Please see the PetroPRO User Menu section in the Beginning Operation chapter for further details.

Keypad

Fixed Keys

The PetroPRO has five (5) fixed keys: POWER, START/STOP, CALIBRATE, ENTER, and EXIT. See Figure 1. PetroPRO Layout on page 26 for fixed key locations on front panel.

The POWER key will turn the PetroPRO on or off depending on whether the PetroPRO is powered up or powered down.

The START/STOP key will begin and end the analysis of a sample.

The CALIBRATE key will begin a calibration analysis.

The ENTER key will select a menu choice and take the user to the next step in the menu.

The EXIT key will take the user out of a menu choice and return them to the previous step in the PetroPRO internal menu.

Soft Keys

The PetroPRO has three (3) soft keys under the graphic LCD display which show the available functions of the soft keys in any screen. The function of the soft keys will change as the displayed menu screen changes. The function of each soft key is shown on the display just above the key itself.

Operating Mode Selection

The initial screen that appears on the PetroPRO indicates one of two operating modes: **Quick** or **Standard**.

The user can toggle between either mode at start-up by pressing the soft key under each mode name. See figure 4.1 below.

Figure 5. Operating Mode Selection

The **Quick** mode provides a rapid analysis of the environment for BTEX compounds. This quick analysis is used where there is little in the way of interference compounds in the sampling environment. Benzene detection is displayed in less than 60 seconds and the entire BTEX analysis is displayed in less than 3 minutes.

The **Standard** mode provides a longer analysis time, set up to compensate for unexpected levels of interferences in the environment or in "spill" areas where a longer analysis time will provide a more accurate detection of the compounds of interest. Benzene detection is displayed in less than 80 seconds and the entire BTEX analysis is displayed in approximately 5 minutes.

Note: ***Once a mode is selected, the PetroPRO will continue to operate in that mode until the alternate mode is selected regardless of any time interval between instrument shut-off and start-up.***

Note: ***If the mode is changed while the PetroPRO is operating, the user must re-calibrate the instrument before doing sample runs.***

User Menu

The PetroPRO is designed for ease of use with a logically organized internal menu and user interface. See Figure 6. User Menu on page 42 for PetroPRO User Menu diagram.

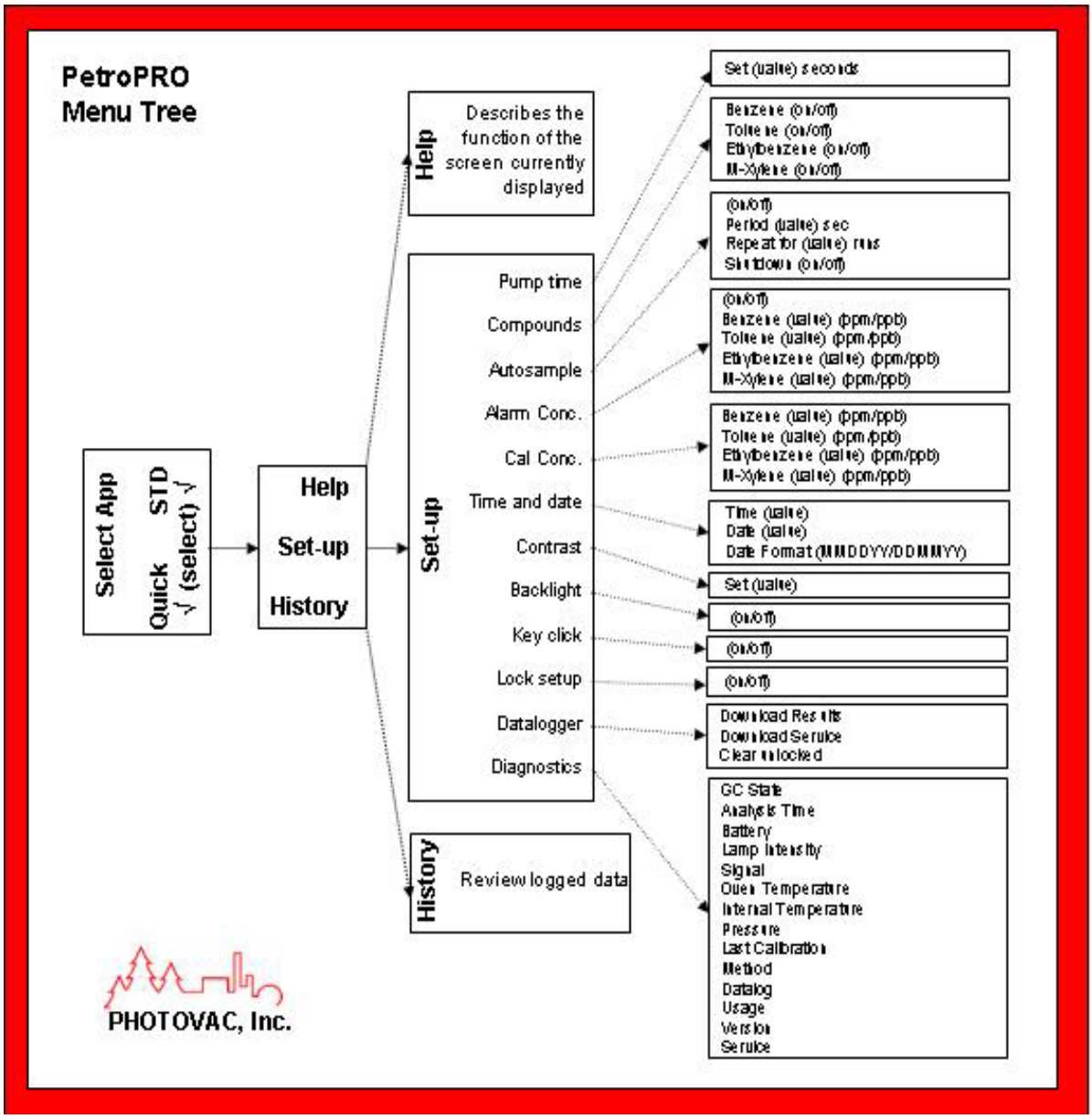

Figure 6. User Menu

Default Display

For either operating mode, the standard default screen shows the latest sample results with the current time and date. The default display will vary depending on the status of the column oven temperature in the PetroPRO.

If the PetroPRO's column oven temperature is below the preset operating temperature, the PetroPRO display will show the message "Warming Up: XX Min".

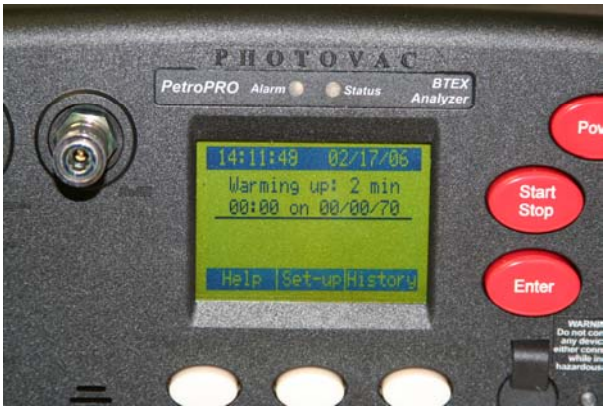

Figure 7. Warming Up

The XX value displayed will count down the number of minutes left for the oven temperature to reach the preset temperature. When the oven temperature is equal to the preset temperature, the display will show "Ready to Analyze".

Calibration Gas

The PetroPRO is used to analyze air samples. Therefore a pressurized supply of commercially prepared and analyzed calibration gas must be used for calibration of the PetroPRO.

Calibration gas can be purchased from Photovac (Part No. MX754110). The Calibration Gas for the PetroPRO consists of:

- Balance Air
- +/- 5% Certified Master Gas

- 34 Liters @ 500 psig
- Size Scotty® 34 Extra-Life™

And contains the following gas concentration levels:

- 0.5 PPM Benzene
- 0.8 PPM Toluene
- 1.6 PPM Ethylbenzene
- 1.6 PPM m-Xylene

If the Threshold Limit Value (TLV) of the compounds are exceeded, you should use a gas bag for sampling and calibration. To determine the TLV of the compounds contained in the calibration gas mixture, refer to the Material Safety Data Sheet (MSDS) supplied with your calibration cylinder

The exact concentration will be determined by your application. Other concentrations and other gases may be obtained from your local gas supplier. If you cannot locate a local gas supplier, contact Photovac's Technical Support Department.

Calibration Procedure

The PetroPRO should be calibrated at the start of each day of operation and after every eight hours of operation. If the Compounds are changed, then calibration is required. Calibration is also required after any maintenance is performed.

WARNING

Observe proper handling procedure for all gases!

Note: ***Changing the compounds selected in the Compounds screen of the PetroPRO will require the user to calibrate before the PetroPRO will take samples.***

Note: ***Changing the operating mode (Quick or Standard) while the PetroPRO is operating will require the user to calibrate before the PetroPRO will take samples.***

CAUTION	*Do not apply pressure directly to the sample inlet. The PetroPRO Flow Match Regulator has been selected to ensure that no pressure is applied to the sample inlet during calibration. Applying pressure to the sample inlet may damage the PetroPRO sample inlet system.*

Calibrating the PetroPRO with the Flow-Match Regulator

CAUTION	To ensure proper calibration, Photovac strongly recommends that the calibration gas be supplied to the PetroPRO directly from the calibration gas cylinder, via proper regulator, rather than using a "gas bag."

1. Connect the regulator to the calibration gas cylinder.
2. When the regulator is connected properly, you can read the cylinder contents from the regulator gauge.
3. Ensure that the Flow Match Regulator output tubing is connected to the PetroPRO inlet.

Figure 8. Calibration with Flow Match Regulator

4. To begin calibration on the PetroPRO, press the CALIBRATE key while the PetroPRO display reads “Ready to Analyze”.
5. The calibration screen will appear. This screen displays the concentration of each compound that is expected in the calibration gas. If these concentrations are not correct, refer to Setting the Calibration Concentrations on page 56.
6. Ensure the calibration gas cylinder is upright and open the regulator by turning the valve counter clockwise. Open the regulator until the ball is 1/8” from its rest position just above the green.
7. Press the START/STOP key on the PetroPRO. The sample pump will activate for 10 seconds. When the pump stops running turn the regulator off and disconnect the tubing from the sample inlet.
8. The calibration analysis will take approximately 4 to 5 minutes to complete. At the end of the calibration analysis, the “Calibration Successful” display appears. Press EXIT to return to the default screen.

Note: *If any error messages are displayed during or after calibration, refer to the Troubleshooting section of this manual.*

Analyzing Samples

Air samples are pumped into the PetroPRO using the internal suction pump. Samples can be directly taken from ambient air into the PetroPRO or samples can be drawn from a gas sample bag. To run an analysis on an air sample:

1. Connect the gas sample bag to the PetroPRO sample inlet using the gas bag adapter or connect the long sample probe to the PetroPRO inlet to take an ambient air sample.
2. Press the START/STOP key.
3. The "Sampling" message will appear on the PetroPRO display. The screen will show the remaining pump time before the sample is injected into the PetroPRO.
4. Once the pump stops, the PetroPRO has a two-second sample pressure stabilization interval before sample injection. The sample is then injected onto the analytical column and the screen will display "Analyzing" and count down the time remaining until the analysis is completed.
5. As the each compound passes by the detector, the PetroPRO will identify the compound and display its concentration on the screen. As additional compound concentrations are reported, the display will continuously scroll the concentrations.
6. If the PetroPRO over-range levels of compounds, BTEX or other unknowns, warning messages will appear as follows:

CAUTION	*Warning! An off-scale response was seen: * is a concentration estimate; *** is possible off-scale BTEX; and UNKNOWN is an off-scale level of other compound(s).*

7. At the end of the analysis, the PetroPRO will again display the "Ready to Analyze" message.

Note: *A new analysis cannot be started until the message "Ready to Analyze" is displayed.*

Alarm Indication

The PetroPRO will sound an alarm tone and flash the Alarm LED indicator when an alarm function is enabled and an alarm concentration level is exceeded.

The alarm indication can turned off by pressing the Alarm Acknowledge soft key or the Enter key.

Stopping an Analysis

An analysis can be stopped at any time during the analysis by pressing the START/STOP key. However, a new analysis can not be started until the Finishing time elapses, which takes approximately two to five minutes depending on the compounds selected for analysis.

Note: *Anytime an analysis is stopped before the PetroPRO has completed a full run, the next analysis should be a blank run (zero air sample) in order to flush out any remaining compounds that did not reach the detector. Failure to do this could result in false positive results on subsequent runs.*

Using a Gas Bag

To fill a Tedlar gas bag:

1. Turn the knurled plastic knob counter clockwise to unlock it. Use the knurled collar on the valve tube to gently push the valve tube down, toward the bag.

2. Turn the knurled plastic knob clockwise to lock the valve tube in place.

3. Turn the regulator knob counter clockwise about half a turn to start the flow of gas. Fill the gas bag about half full and then close the regulator.

4. Open the syringe port and empty the bag. Flush the bag a few times with the calibration gas and then fill it.

5. To close the gas bag valve, turn the knurled plastic knob counter-clockwise to unlock it. Gently pull the valve tube up to close the valve. Turn the knurled plastic knob clockwise to tighten it against the valve tube.
6. Once the bag has been filled, use the bag and sample as soon as possible.

Note: *Do not use gas bags to sample unstable or highly reactive compounds. Do not use Tedlar® bags for storage of hazardous materials.*

View History

Stored data can be viewed on the PetroPRO display by using "History".

1. From the default screen, press the "History" soft key.
2. The History screen will appear on the display. The History screen displays stored results from previous analyses plus the time and date for each analysis. All analysis results are automatically stored sequentially in the PetroPRO's memory.
3. To view results, press the "▲" key for the previous analysis or the "▼" key for the next analysis.
4. To lock the displayed results so they won't be cleared from the datalog. Press Enter, then ▲ or ▲ to display the lock (🔒) symbol. Press Enter to confirm setting.
5. To unlock the displayed results and allow it to be cleared from the datalog. Press Enter, then ▲ or ▲ to display the unlock (🔓) symbol. Press Enter to confirm setting.
6. To return to the Normal Screen from History, Press Exit.

Time and Date Entry

1. After the display shows the default screen, press the "Setup" soft key.
2. After the "Setup" screen appears, press the "▼" soft key until Time/Date is highlighted.
3. Press the ENTER key and the Time/Date entry screen appears. This screen displays the clock time, calendar and the date format.
4. Select "Time" with the "▲" or "▼" key then press ENTER.
5. Use the "▲" or "▼" key to change the underlined number. Press the ENTER key to confirm the new number and move the cursor to the next number to change. Continue to do this until the display shows the correct time. Press ENTER to confirm the new Time when all the digits have been changed.
6. Use the "▲" or "▼" keys to select the "Date" and press the ENTER key to change the date.
7. Use the "▲" or "▼" key to change the underlined number. Press the ENTER key to confirm the new numbers and move the cursor under the next number to change. Continue to do this until the display shows the correct date. Press ENTER to confirm the new Date when all the digits have been changed.
8. To set the time and date format to either the North American or International format, Select "Date Fmt" using the "▲" or "▼" key.
9. Press ENTER to confirm the format choice and then press the EXIT key twice to return to the default screen.

Backlight

To turn the display backlight on or off:

1. Press the 'Setup" key then press the "▼" key repeatedly until Backlight is highlighted on the display.
2. Press the ENTER key to access Backlight.
3. Use the "Arrow" keys to toggle Backlight either On or Off.
4. Press the ENTER key to confirm the backlight selection.
5. Press the EXIT key until the default screen appears.

Note: *Use of the Backlight will consume battery power. Use backlight only when necessary in low light environments.*

Display Contrast

To adjust the display's contrast for different ambient light conditions:

1. Press the "Setup" key then press the "▼" key until Contrast is selected.
2. Press the ENTER key to modify the Display Contrast.
3. Use the "Arrow" keys to increase or decrease the contrast of the display. The "▲" key will make the display lighter and the "▼" key will make the display darker.
4. Press the ENTER key to confirm the new display contrast value.
5. Press the EXIT key twice to return to the default screen appears.

Key click

To turn on or off an audible sound or key click each time a PetroPRO key is pressed:

1. Press the 'Setup" key then press the "▼" key repeatedly until Key click is highlighted on the display.
2. Press the ENTER key to modify the Key click.
3. Use the "Arrow" keys to toggle the Key click On or Off.
4. Press the ENTER key to confirm that the Key click is either On or Off.
5. Press the EXIT key twice to return to the default screen appears.

Advanced Operation 5

Autosample

In Autosample the user can program the PetroPRO to automatically start a selected number of analyses, choose the time between analyses and select whether or not the PetroPRO will power down at the end of the runs.

To program the PetroPRO for Autosample:

1. Press the "SetUp" soft key and then press the "▼" key until Autosample is selected.
2. Press the ENTER key.
3. Use the "▲" or "▼" key to set Autosample to On or Off.
4. Press ENTER to confirm the On or Off setting.
5. Use the "▲" or "▼" key to select Period.
6. Press ENTER to confirm that you will be changing the Period.

Note: *The period is measuring from the start time of one analysis to the start time of the next analysis and includes the analysis run time. If the analysis time is 120 seconds and you want to take a sample every five minutes, set the Period to 300 seconds.*

7. Use the "▲" or "▼" keys to change the underlined number.
8. Press ENTER to confirm the underlined number and move the underline cursor to the next number.
9. Confirm the new Period by pressing the ENTER key.
10. To set the number of analyses to run, Select Repeat For using the "▲" or "▼" keys then press ENTER.
11. Use the "▲" or "▼" keys to change the underlined number.
12. Press the ENTER key to confirm the underlined number and move the underline to the next number. Repeat until the desired numbers of analyses are chosen.

Note: *Remember that the PetroPRO's datalogger memory will store greater than 100 analyses. When the datalogger memory is full, the PetroPRO will stop analyzing. Refer to Datalogger instructions later in this section for download and clearing memory of datalogs*

13. To set the PetroPRO to power down after Autosampling, select Shutdown with the "▲" or "▼" keys and press ENTER.

Note: *The PetroPRO will power down once the configured Autosample analyses have been.*

14. Use the "▲" or "▼" keys to set On.
15. Press ENTER to confirm the power down choice.
16. Press the EXIT key twice to return to the default screen.
17. To begin the Autosample run, press the START/STOP.

Alarm Setup

To set the alarm concentrations for each compound:

1. Press "Setup" then press the "▼" key until Alarm Conc. is selected.
2. Press the ENTER key.
3. The Alarm concentration screen will be displayed showing the set points for the concentration alarm for each compound.
4. To turn all the concentration alarms on or off, press the "Arrow" keys to select Alarm and press ENTER.
5. Press the "▲" or "▼" keys to turn alarms on or off, then press the ENTER key to confirm.
6. To change the alarm concentration for an individual compound, select the compound with the "Arrow" keys.
7. Press ENTER to confirm the compound name.
8. Use the "Arrow" keys to change the underlined number. Press the ENTER key to confirm the number and advance the underline to the next digit.
9. Use the "Arrow" keys to choose ppm or ppb.

Note: *If the concentration is displayed in ppb, then no number after the decimal point can be entered; only 0 is allowed. To enter a decimal ppm concentration, first select PPM (not PPB) then enter the numbers.*

10. Press the ENTER key to confirm the units.
11. Press the EXIT key twice to return to the default screen.

Calibration Gas Concentration Setup

1. From the default screen, press the "Setup" soft key. Use the "▼" key until Cal conc. is selected on the PetroPRO display. Then press the ENTER key. This Cal conc. screen will show the concentration of the calibration gas for each compound. Use the "▼" key to scroll through the compound list. If these values do not match the concentrations in your calibration gas cylinder, the value(s) must be changed.

Note: *PetroPRO users must supply their own calibration gas cylinder or purchase a calibration gas cylinder from Photovac.*

2. To change a compound's calibration gas value, select a compound with the "▲" or "▼" key then press ENTER.
3. Use the "▲" or "▼" key to change the underlined number. Press ENTER to confirm the change and place the cursor at the next number.
4. Continue until the numbers have been changed to match the value of the compound in the cylinder of calibration gas.
5. To modify the concentration units between PPM and PPB, highlight the PPM or PPB with the cursor and press either the "▲" or "▼" key.

Note: *If the concentration is displayed in ppb, then no numeral can be entered after the decimal point, only 0 is allowed. To enter a decimal ppm concentration, select and enter ppm units, then enter the numbers*.

6. When the correct units are displayed, press the ENTER key to store the units change.
7. Continue to do this for all compounds as needed until the calibration concentrations on the PetroPRO display match the concentrations on the calibration gas certification or cylinder.
8. Then press the EXIT key twice to return to the default display.

Lock Set Up

The feature will lock the "Setup" function and prevent the user from viewing or modifying the menus found under "Setup". Once Lock Set Up is turned on the user will be prompted to enter the passcode "**121323**"to unlock "Setup" and once again access the Setup menu.
To enable Lock Set Up:

1. Press the "Setup" key then press the "▼" key until "Lock Setup" is highlighted.
2. Press the ENTER key.
3. Use the "▼" key until "on" appears. Press the ENTER key.
4. Press the EXIT key until the default screen appears.
5. Note that the "Setup" soft key has been replaced by a "Pass" soft key.
6. To unlock, press the "Pass" soft key.
7. You will be prompted to enter the passcode "**121323**". Once the passcode is entered, the default screen appears with the "Set-up" soft key showing.

Datalogger

The PetroPRO will store the results for a minimum of 100 analyses in its memory. The concentration is stored for each detected compound in each analysis along with the time and date stamp at the beginning of the run. The datalog analysis results can be downloaded to a PC using the Photovac PRO Comm PC Software. Refer to Section 6, *PRO Comm PC Software* for detailed instructions on how to save and print the analysis results using the PC Software.

Note: *When the datalogger is full the PetroPRO will not store any additional readings. The PetroPRO will display this message: "The datalogger is full. Please go to the Datalogger screen and clear some analyses from memory." The user can clear the datalogger memory by selecting "Clear Unlocked". The PetroPRO will not perform further analyses when the datalogger memory is full.*

Download Results

To download the analysis results from the PetroPRO datalogger:

1. Connect PetroPRO to the COM1 port on your PC using the communication cable. Refer to Section 6 *PRO Comm PC Software* for detailed instructions on how to connect the communication cable.
2. Run and configure the Photovac PRO Comm PC Software on your PC. Refer to Section 6 *PRO Comm PC Software* for detailed instructions.

   Note: *The Photovac PRO Comm PC Software must be running and properly configured on your PC before starting download of analysis results on the PetroPRO.*

3. Then on PetroPRO, press Set-up, then select Datalogger and press Enter.
4. To download all the Analysis results: Select "Download Results" with ▲ and ▼ keys. Press Enter on PetroPRO to start downloading. Downloading may take a few minutes.
5. When data no longer scrolls in the Photovac PRO Comm PC Software window, downloading is finished.
6. Once the download is complete, press the EXIT key twice until the default screen appears.

Clear Unlocked

Only the unlocked results will be deleted from the PetroPRO's internal memory. To clear only the unlocked stored results:

1. Press the "Setup" soft key and then the "▼" key until Datalogger is selected.
2. Press ENTER.
3. Use the "Arrow" keys to select Clear Unlocked.
4. Press the ENTER key. All unlocked analysis results stored in the PetroPRO datalogger will be permanently deleted. Locked results will remain in the PetroPRO memory until they are unlocked or the Clear All option is selected. To lock or unlock analysis results see the *View History* section on page 49.

Note: Clearing *results may take several minutes.*

Download Service

Download Service is only available for Photovac service personnel to download additional diagnostic information for use in troubleshooting and repair of the PetroPRO.

Diagnostics

The diagnostics screen displays certain sensor readings and analytical method settings used by the PetroPRO.

Note: *The values in Diagnostics mode are read-only and are not adjustable.*

To access Diagnostics:

1. Press the 'Setup" key in the default screen.
2. Press the "▼" key until Diagnostics appears on the display.
3. Press the ENTER key to confirm entry into the diagnostics mode.
4. Press the "▼" or "▲" key to select the diagnostic parameter to read. A brief explanation for each parameter is given below.
5. To exit the Diagnostic mode, press the EXIT key twice until the default screen is displayed.

GC State	The current state of the valves in the analytical engine. When the PetroPRO is turned on but not running a sample, the GC state is backflush. When the PetroPRO is analyzing a sample, it will read inject for the first few seconds of the analysis, then change to backflush again.
Analysis Time	A countdown of the total amount of time remaining in an analytical run. This time is displayed in seconds when the PetroPRO is running a sample. When the PetroPRO is not running a sample, the analysis time is blank.
Battery Voltage	The voltage level that the battery is delivering to the PetroPRO. The maximum voltage when the PetroPRO is fully charged may be up to 9.8 volts. The maximum voltage can vary depending the age of the battery and the PetroPRO. The minimum battery voltage required to operate the PetroPRO is 6.5 volts.

Lamp Intensity	The UV lamp output detected by a photodiode located near the lamp. The lamp intensity is measured in millivolts (mV). The minimum acceptable lamp intensity is 200 mV. The maximum lamp intensity can be > 1000 mV.
Signal	The electrical output of the photoionization detector as measured in millivolts. The signal varies between < 0 mV and 2500 mV. The typical signal is 20 mV to 500 mV when no analysis is in progress. The signal voltage will vary considerably when the PetroPRO is running a sample.
Oven Temperature	The factory set temperature of the sample loop, column and detector.
Ambient Temperature	The temperature measured inside the PetroPRO. Since the temperature sensor is mounted inside the PetroPRO, it senses changes to ambient temperature slowly. The purpose of the sensor is to provide a background temperature reading to confirm that the ambient temperature is lower than the oven temperature.
Pressure	For service use only
Last Cal	The date that the PetroPRO was last calibrated. For maximum accuracy and repeatability, the PetroPRO should be calibrated at least once every eight hours of use.
Method	The analytical method loaded into the PetroPRO's memory at the factory. The default method for the PetroPRO is BTEX. Contact Photovac Technical Support for further information.
Datalog	The number of readings stored in the PetroPRO memory.
Usage	The number of days that the unit has been powered up since the last factory reset. The PetroPRO usage can only be reset by Photovac. Resetting the PetroPRO will void the warranty. Contact Photovac Technical Support for additional information.
Version	The PetroPRO EPROM firmware version number.
Service	The PetroPRO Service mode is passcode protected for use by Photovac Service personnel only.

PRO Comm PC Software 6

Overview

The PetroPRO Analysis results can be downloaded using the Photovac PRO Comm PC software application. Follow the instructions below to install the Photovac PRO Comm PC software on your PC. Using the Photovac PRO Comm PC software you can view, print and save the Analysis Results. The following sections provide detailed instructions on how to:

1) Connect the Download cable to the PetroPRO and PC Serial Port.
2) Install and run the Photovac PRO Comm PC software
3) Download Analysis Results from the PetroPRO to the Photovac PRO Comm PC software
4) View, Print and Save the Analysis Results

Installing the PRO Comm PC Software

To install the Photovac PRO Comm PC Software insert CD into CD-Rom drive. The installation program should automatically run and display the following window. To run the installation program manually select “Run: from the “Start” menu. Then click “Browse” and navigate to your CD-Rom drive and select “Setup.exe” and click “Open”. Next click “OK” to run the installation program.

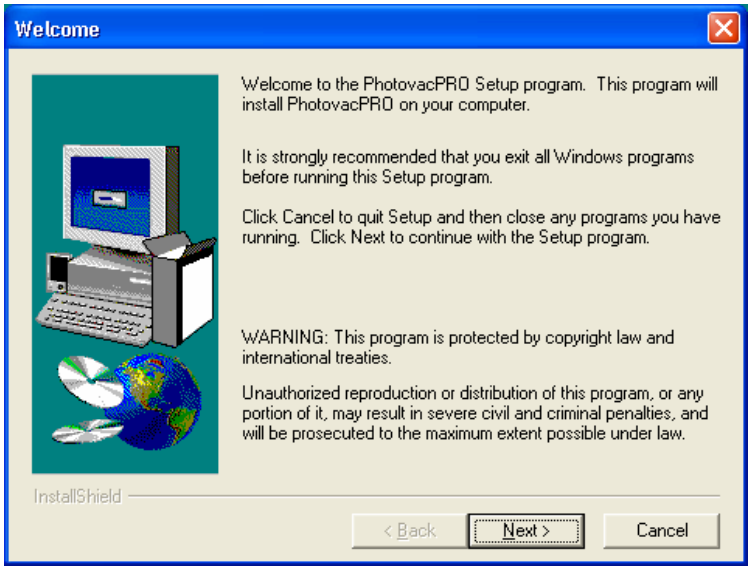

Figure 9. PRO Comm Software Installation

Click “Next” to continue then follow the installation instructions to complete the installation of the Photovac PRO Comm PC Software.

Connecting the Download Cable

The download cable must be connected from your computer Serial Port to the PetroPRO Serial Port. Plug the nine (9) pin serial port connector into one of the Serial Port connectors on the rear of your PC as shown in the figure below. Be sure to secure the connector by tightening the screws. If there is only one Serial Port on your computer the the cable was connected to Port 1. Otherwise you should note if you connected the cable or Port 1 or Port 2, which should be identified on your computer next to the connector.

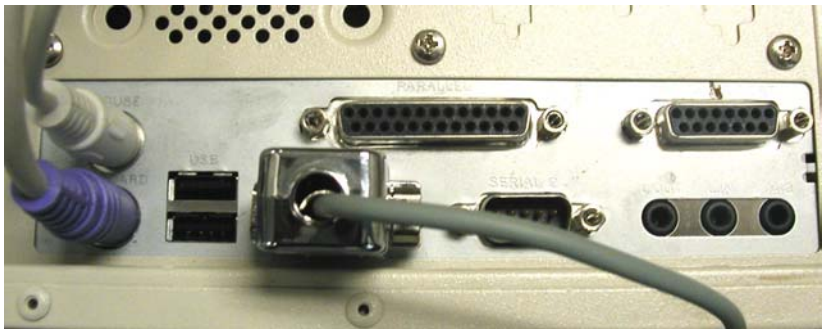

Figure 10. Connecting the Download Cable to the PC

Next plug the round connector on the other end of the cable to the Serial Port connector on the front panel of the PetroPRO as shown in the figure below.

Figure 11. Connecting the Download Cable to the PetroPRO

Now you are ready to run the Photovac PRO Comm PC software and download the PetroPRO analysis results stored in the datalogger.

Configuring the Photovac PRO Comm software

The Photovac PRO Comm PC software application must be running on your PC to download the Analysis results from the PetroPRO. To run the Photovac PRO Comm PC software using the PC mouse left button select and double-click the Photovac PRO Comm ICON on your desktop. The software will then start running and display the following screen.

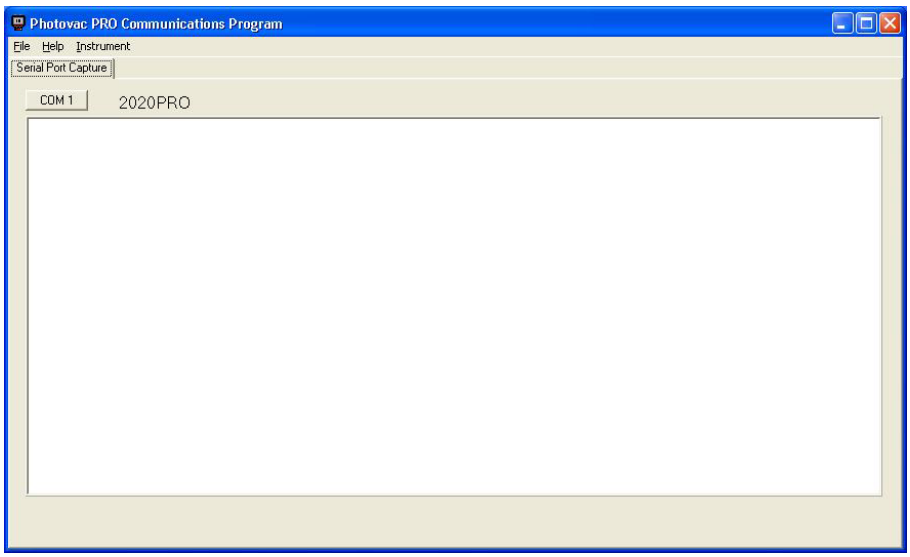

Figure 12. Configuring the PRO Comm PC Software

Before downloading results you must select the PetroPRO Instrument model and the PC communication port being used.

Select the PetroPRO Instrument Model from the Instrument pull down menu shown in the figure below.

Figure 13. Selecting the PetroPRO Instrument

To select the proper Serial Port use the mouse left button to select the COM port setup as shown in the figure below.

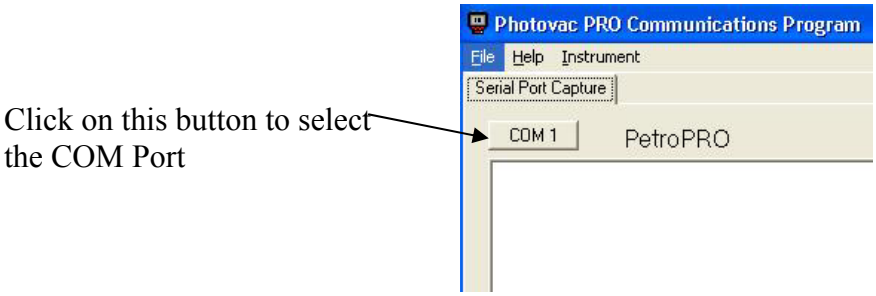

Figure 14. Configuring the PC Com Port

The COM port setup window will be displayed.

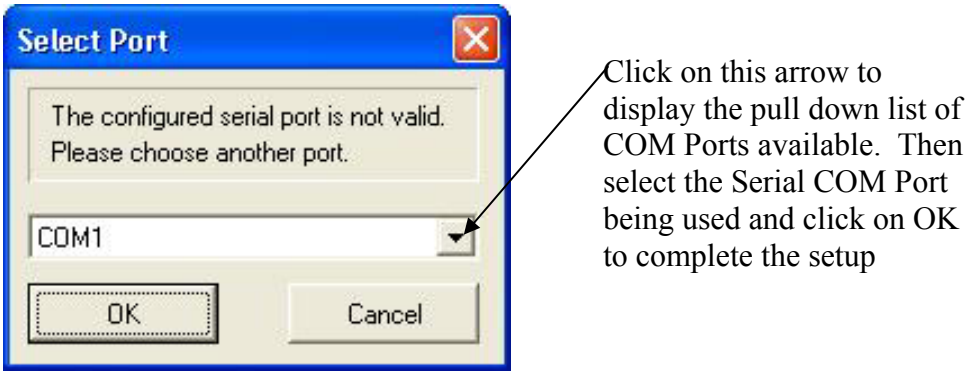

Figure 15. Selecting the Com Port

Downloading Analysis Results

Once the Photovac PRO Comm PC software application is running and setup you can now download the results from the PetroPRO as follows.

1) Power on the PetroPRO.
2) Select "Set-up" using the keypad.
3) Then select "Data logger …" using the "▲" or "▼" key then press ENTER.
4) Next select "Download results" using the "▲" or "▼" key then press ENTER. This will start the download of the Analysis results.

Once the download has been initiated from the PetroPRO the Analysis Results will start displaying in the Photovac PRO Comm PC software window as shown in the figure below.

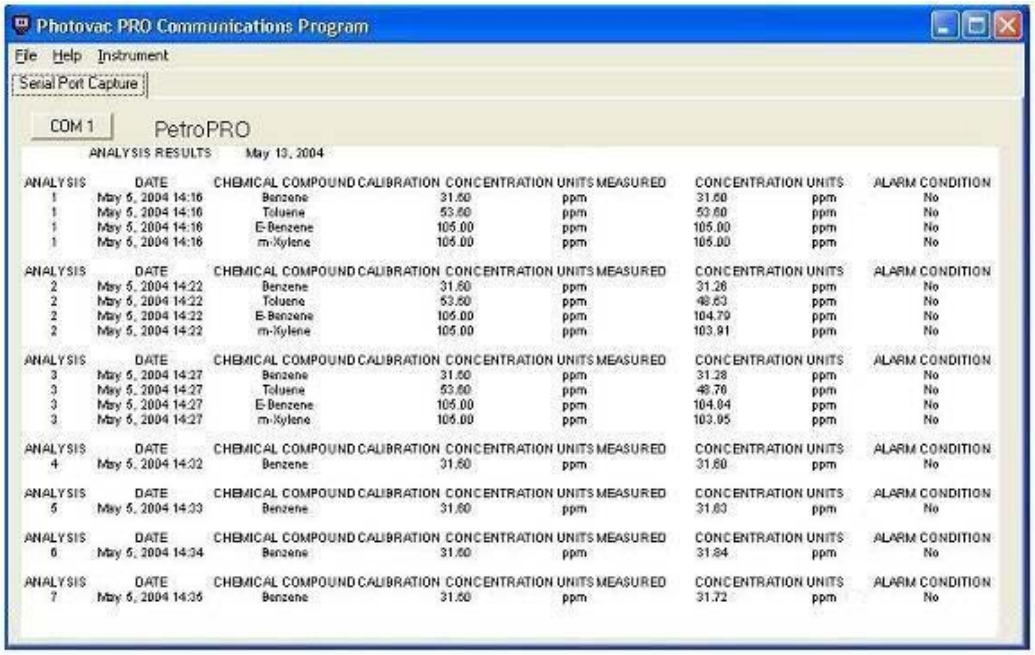

Figure 16. Downloading Analysis Results

The date at the top of the window is the date the analysis results were downloaded. The results are listed by date with the oldest first the most recent last. You can use the scroll bar on the right to scroll down or up and view all of the analysis results.

Printing and Saving the Analysis Results

The PetroPRO analysis results can be printed and saved be selecting "File" on the toolbar as shown in the figure below.

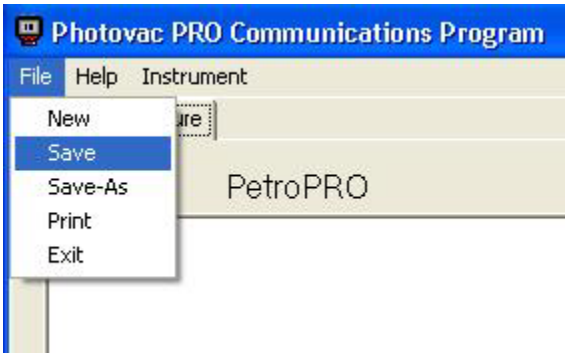

Figure 17. Saving Analysis results as Text File

To Save the analysis results as a text file select "Save" from the pull down menu. Then navigate to the directory you want to save the file in. Enter the file name and click the "Save" button as shown in the figure below.

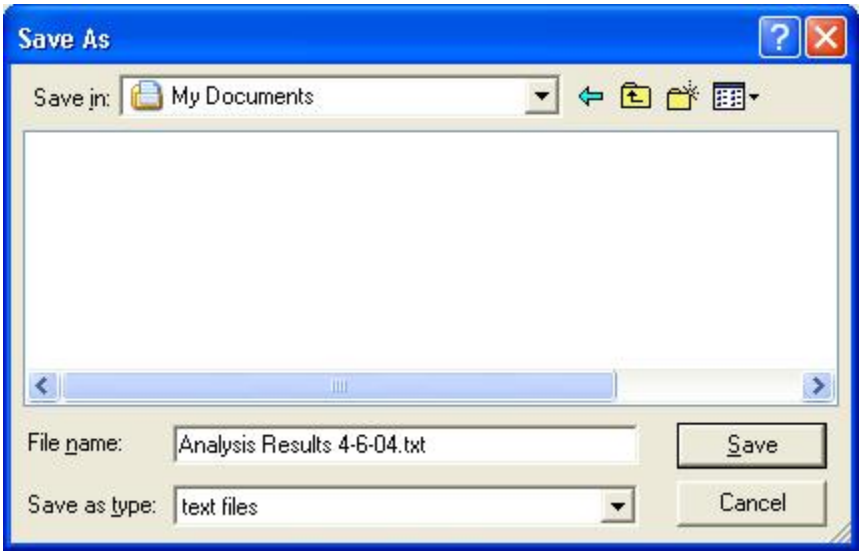

Figure 18. Selecting Location and Filename

The PetroPRO analysis results can be saved in several standard file formats such as an Excel format by selecting "File" on the toolbar as shown in the figure below.

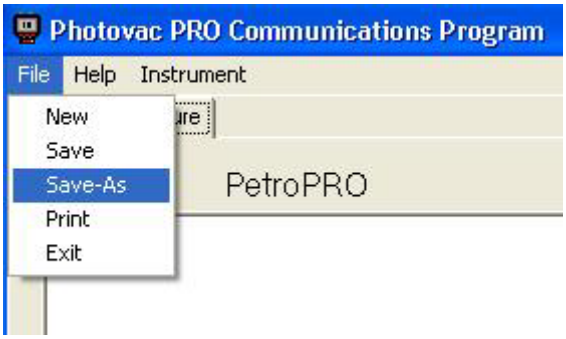

Figure 19. Saving Analysis Results as an Excel File

To Save the analysis results as an Excel file select "Save-As" from the pull down menu. Then navigate to the directory you want to save the file in. Enter the file name and click the "Start Export" button as shown in the figure below.

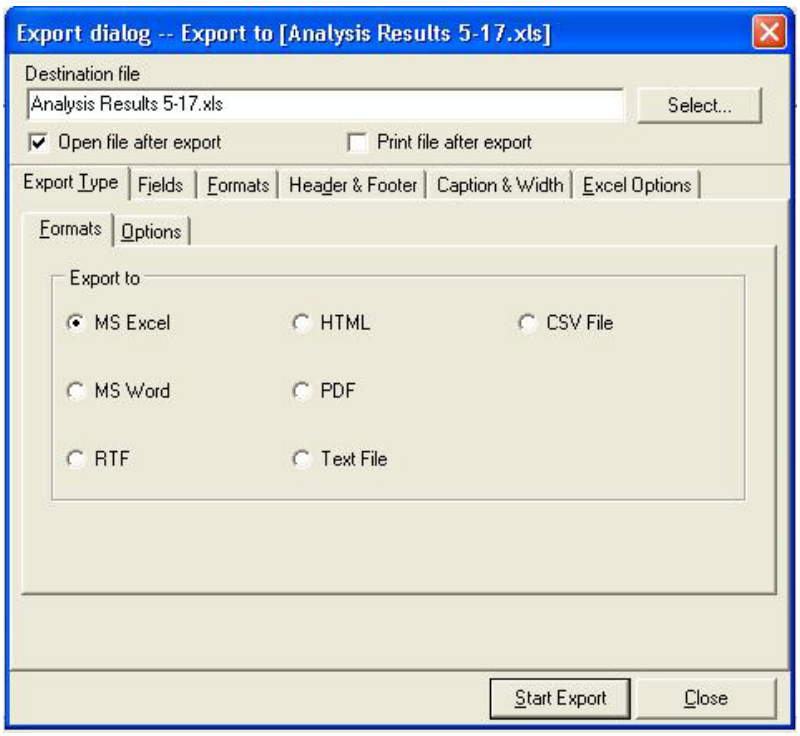

Figure 20. Selecting Location, Format and Filename

To Print the analysis results select "Print" from the pull down menu. The printer driver window will be displayed. Select the printer settings you prefer and click the "OK" button to print.

Select "New" from the pull down menu to clear the analysis results from the Photovac PRO Comm PC software window and start a new download of analysis results.

Select "Exit" from the pull down menu to close the Photovac PRO Comm PC software application when you are finished downloading analysis results.

On-line Help

The Photovac PRO Comm PC software provides online help which can be accessed by selecting "Help" from the Toolbar as shown in the figure below.

Figure 21. Using On-line Help

Select “Help” from the pull down menu and detailed help instructions will be displayed.

Select “About” from the pull down menu to display information on the version of the Photovac PRO Comm PC software you are running.

Connecting Accessories 7

The following accessories are for use with the PetroPRO:

MX396018	Long Sample Probe
MX380014	Gas Bag Adapter
MX380305	Three Meter Sample Line
MX380308	Carrying Strap
MX380313	DC Power Cord
MX754010	PetroPRO Tool Kit

Long Sample Probe

A long sample probe (Part No. MX396018), also referred to as the telescoping probe, may be connected to the PetroPRO sample inlet for remote and difficult to access sampling areas.

Figure 23. PetroPRO with Telescoping Sample Probe

To use the long sample probe:

1. Connect the probe to the PetroPRO's sample inlet port. Use the compression fitting supplied with the probe.

NOTE: *You must calibrate the instrument with the sample probe connected to the sample inlet port. Connect the calibration gas to the end of the probe.*

2. To extend the probe, loosen the knurled nut at the top of the wand. Pull the extension out and then tighten the knurled nut to lock the extension in place.
3. To reduce the probe, loosed both knurled nuts and push the extensions back into the probe. Tighten the knurled nuts down to lock in place.

CAUTION	*When using the telescoping sample probe, be especially careful not to aspirate liquids or solids as they will damage the PetroPRO.*

Three Meter Sample Line

A three meter (9 feet) sample line (Part No. MX380305) may be connected to the PetroPRO for remote sampling or for sampling a location that is difficult to reach.

1. Connect the sample line to the PetroPRO sample inlet port using the fittings supplied with the sample line.
2. Place the other end of the sample line at the sampling location.

NOTE: *You must calibrate the instrument with the three meter sample line connected to the sample inlet port. Connect the calibration gas to the end of the probe.*

CAUTION	*When using the three meter sample line, be especially careful not to aspirate liquids or solids as they will damage the PetroPRO.*

DC Power Cord

The PetroPRO can be connected to a car battery through the cigarette lighter with the DC power cord (Part No. MX380313). While the

PetroPRO is connected to the car battery, the PetroPRO battery is being charged.

WARNING

The PetroPRO is not classified for use in hazardous locations with the DC power cord.

Figure 24. DC Power Cord

To connect your PetroPRO to a DC power supply:

1. Turn the instrument off by pressing the POWER key for five seconds.
2. Connect the DC power cord to the PetroPRO AC adapter port on the front panel.
3. Connect the other end of the DC power cord to the cigarette lighter in the car.
4. Turn the instrument on again by pressing the POWER key.

Shoulder Strap

Use the carrying/ shoulder strap (Part No. MX380308) for field operation to facilitate transporting the instrument and for single-handed operation. The PetroPRO has two connection points for the carrying strap. Snap one end of the carrying strap to one connector on the PetroPRO. Snap the other end of the carrying strap to the other connector point on the instrument. Then adjust the shoulder pad and strap length for comfort.

Figure 25. Shoulder Strap

Tool Kit

The PetroPRO Tool kit (Part No. MX754010) includes the following tools stored in a convenient accessory pouch.

1. 5/32” Hex Driver
2. 7/64” Hex Driver
3. Photovac Multi-Tool

Routine Maintenance 8

Maintenance Schedule

The PetroPRO is an easy-to-use portable gas chromatograph designed for the analysis of specific compounds. In keeping with simple user interface of the PetroPRO, there are only a few important maintenance items that the user is responsible for. Performing these tasks at the recommended intervals will help improve instrument reliability, extend the ultimate life of the instrument and prevent possible instrument damage.

Table 1 outlines the general maintenance required of the PetroPRO. Replacement of some items will vary with usage.

Do not perform any maintenance procedures on PetroPRO in a hazardous location.

WARNING

Item/ Operation	Frequency
Replace sample inlet filter	Once a week or as required
Clean UV lamp window	Once a week or as required
Replace UV lamp	Once a year or as required
Replace calibration gas (commercial cylinder)	Once a year or as required
Purge internal carrier gas cylinder	As required
Charge battery pack	As required

Table 1. Maintenance Schedule

Replacing the Sample Inlet Filter

The 1.0 micron inlet filter is designed to keep particulates out of the sample path on the PetroPRO and prevent small amounts of moisture

from entering the PetroPRO sample path. The inlet filter is not designed to block liquids from entering the PetroPRO.

CAUTION	*The PetroPRO is designed to sample only gases. Aspirating liquids into the PetroPRO will cause severe damage and void the warranty.*

Replace the sample inlet filter on a weekly basis, or more frequently if the PetroPRO is used in a dusty or wet environment. You must replace the filter if PetroPRO has been exposed to liquid water. If you are sampling hot gases or vapors, condensation in the sample line may also affect the filter. Replace the sample inlet filter if the pump sounds labored. If you need to order additional inlet filters (Part No. MX396015), contact Photovac.

To change the inlet filter:

1. Turn the instrument off.
2. If you are using a three meter sample line or extension probe, remove the probe from the sample inlet port.
3. Unscrew the inlet filter cap on the upper left of the PetroPRO's front panel.
4. Remove the used inlet filter. Inspect the used filter. If it is visibly coated with particulates the filter should be changed more frequently. Discard the used filter.
5. Take a new inlet filter and install the filter in the cap with the shiny side (Teflon side) facing down inside the sample inlet cap and the mesh side is facing toward the PetroPRO.
6. Handle the filter disk only by the edges. The mesh may be damaged or contaminated by excessive handling. Use forceps or tweezers if possible.
7. Screw the filter cap back onto the PetroPRO and hand tighten.

CAUTION	*Do not operate PetroPRO without an inlet filter.*

Removing the UV Lamp

1. Ensure the PetroPRO is turned off.

WARNING

You must turn the instrument off before removing the lamp cover.

2. Remove the lamp access cover using the hex driver supplied with the tool kit.
3. Use the multi-tool provided to remove the lamp housing cover.
4. Tilt PetroPRO slightly and remove the UV lamp.

CAUTION

Do not touch the detector cell. Any dust or dirt in the detector cell should be blown out with a gentle jet of Ultra Zero air.

Cleaning the UV Lamp

During normal operation of the photoionization detector, the lamp window will become coated with UV-absorbing material from the sample stream. This reduces the lamp's effective light output and results in a substantial drop in the detector response. Removal of the lamp and proper cleaning of the lamp window can often restore the detector sensitivity.

Since some UV inhibiting deposits are invisible to the eye, regular cleaning of the lamp window is strongly recommended. It is best to

clean the lamp frequently, once a week or more depending on the detector usage, to prevent a heavy build-up of deposits that may be difficult to remove.

The UV Lamp Cleaning Kit (Part No. MX380336) includes aluminum oxide powder (3.0 micron powder) and cotton swabs. Additionally, you will require:

1. Approximately 10 mL of methanol. When ordering methanol, specify purge and trap grade.
2. Lint free tissues.

To clean the lamp:

1. Remove the lamp as outlined in the Removing the UV Lamp on page 80.
2. Allow the lamp to cool to room temperature to avoid thermal shock which could crack the lamp window.
3. Dampen a cotton swab in methanol. Using small circular motions, rub the cotton tip on the lamp window. Do not exert excessive force. The window can be permanently damaged by excessive force.
4. Continue cleaning for approximately one minute.
5. If the lamp is excessively dirty, dampen a cotton swab in methanol and dab it into the aluminum oxide cleaning compound. Allow a small amount of the cleaning compound to adhere to the cotton tip. Using small circular motions, rub the cleaning compound on the lamp window. Do not exert excessive force. The window can be permanently damaged by excessive force.
6. Continue cleaning for approximately one minute.
7. Dampen a new cotton swab with methanol and remove any trace of cleaning compound from the lamp window.
8. Wipe the window and the lamp with a dry, lint free tissue to remove any trace of cleaning compound and methanol. All traces of cleaning compound and methanol must be removed.

9. Without touching the lamp window, replace the lamp as described in Installing a New Lamp on page 82.

Installing a New Lamp

1. Without touching the lamp window, place the new lamp into PetroPRO lamp holder, window side first.

NOTE: *Do not insert any object, other than the UV lamp, into the lamp holder.*

2. Replace the lamp housing cover and then replace the access cover.

3. Calibrate the PetroPRO and then continue normal operation.

Removing and Replacing the Battery Pack

WARNING

Do not remove or recharge the battery pack in a hazardous location.

CAUTION

If you do not turn off the PetroPRO prior to removing the battery pack, you will reset the instrument and you may lose all logged data and the instrument setup

To remove the battery pack, use the Allen tipped screwdriver from the PetroPRO tool kit (Part No. MX754010) and loosen the four captive screws on the corners of the battery pack. When the screws are loose, the battery can be pulled off the back of the PetroPRO.

Figure 26. Battery Pack Removed

To reinstall the battery pack, slide the battery pack onto the back of the PetroPRO taking care to properly align the pins on the back of the PetroPRO with the jacks on the battery pack. Firmly seat the battery pack against the back of the PetroPRO and tighten the four captive screws. Then turn on the PetroPRO and verify that the instrument works normally.

9 Troubleshooting

General Information

If you have an operation or service-related question about the PetroPRO, consult this manual first. If you cannot find the answer in this documentation, contact Photovac Technical Support.

When you call, please have your PetroPRO in front of you. Please have the following information ready:

1. A description of what happened and what you were doing when the problem occurred.
2. Any corrective action that you have tried.
3. The exact wording of any messages that appeared on the display.

Do not service the PetroPRO in a hazardous location.

WARNING

Troubleshooting Guide

Warming up	Column oven is warming up.	Wait for column oven to warm up. Plug PetroPRO into AC adapter or use an external 12 VDC source for faster warm-up. *Note: The PetroPRO is not classified for use in hazardous locations when connected to the AC or DC adapter.*

Ready to analyze	Column oven is at operating temperature and UV lamp is on.	PetroPRO is ready for analytical operation. Press Calibrate or Start-Stop.
Shutdown Please press Enter to confirm the Shutdown	The Power key has been pressed while PetroPRO is on.	To turn PetroPRO off, press Enter. To keep PetroPRO on, press Exit.
Log Full The datalogger is full. Please go to the Datalogger Screen and clear some analyses from memory.	The PetroPRO datalogger is full of saved analyses. No analyses can be started until there is room in the datalogger.	Go to the PetroPRO Datalogger Screen. Download the datalogger to a PC if desired, and clear the unlocked analyses or all the analyses.
System Uncalibrated Please calibrate the PetroPRO with all the selected compounds before starting an analysis	A sample analysis was attempted without calibrating PetroPRO.	Calibrate PetroPRO with all the selected compounds. Ensure calibration gas is connected. Press Exit then Calibrate then Start-Stop.
Calibration Complete The PetroPRO has been successfully calibrated.	Calibration was successful.	Press Exit then begin sampling by pressing Start-Stop.
Calibration Failed One or more compounds were not detected clearly in the cal gas. Please calibrate again.	PetroPRO carrier gas tank is empty.	Ensure there is sufficient carrier gas. Fill the internal tank according to instructions on page ??, or connect a supply of carrier gas according to instructions on page??.

	No calibration gas flow.	Ensure that the calibration gas is actually being admitted to PetroPRO. (flow from cal gas regulator, gas bag valve is open, or inlet filter cap is loose).
	Inlet filter is dirty or clogged.	Replace inlet filter according to instructions on page 78.
	Contamination in calibration gas.	Ensure calibration gas and gas bag are clean.
	Calibration gas is incorrect or deteriorated.	Use fresh, correct calibration gas.
System Not Ready The PetroPRO is not ready to analyze. Please wait for the instrument to warm up.	Column oven is warming up	Wait for column oven to warm up. Plug PetroPRO into AC adapter or use an external 12 VDC source for faster warm up.
	Column oven and UV lamp are not turned on because PetroPRO is in History-only mode.	To leave History-only mode, press Power then Enter to turn PetroPRO off. Then press Power to turn PetroPRO on again.

Response Off-Scale Warning! The PetroPRO response was off-scale. The History Screen has been updated.	An off-scale peak has been detected which may be one of the selected compounds.	Look at the PetroPRO History Screen to identify which compound may have been present in the sample at an off-scale concentration.
Battery Low The PetroPRO battery needs recharging. Please connect 12V supply immediately to continue operation.	The PetroPRO battery pack has discharged.	Connect the PetroPRO AC adapter to recharge the battery pack. While the AC adapter is connected, the battery pack may be replaced with a charged battery pack.
Carrier Gas Low The PetroPRO carrier gas pressure is below and acceptable level	The carrier gas has been consumed.	Connect the carrier gas refill station and fill the PetroPRO carrier gas cylinder.
Lamp Failure The detector UV lamp has failed. Please replace the lamp, then calibrate.	The detector UV lamp intensity is too low, or the lamp could not be started.	Turn the Power off and then on again. If the fault persists, replace the lamp as instructed in page 80.

Table 2. Troubleshooting

Appendices 10

Specifications

Hardware

Size:	13” (330 mm) long x 10.5” (265 mm) wide x 5” (125 mm) tall
Weight:	15.1 pounds (6.9 kg)
Keypad:	Five dedicated keys (Power, Start/Stop, Calibrate, Enter and Exit) and three menu keys
Display:	Six line graphic LCD
Datalogger Memory:	Greater than 100 analyses
Serial Output:	RS-232, 38.4K baud, 8 data bits, no parity, 1 Stopbit for connection to Windows-based PC
Audio Output:	95 decibels @ 2048 Hz, on Alarm
Inlet: Connection	1/4” (6.35 mm) compression fitting
Battery Charge/ Discharge Time	<6 hours/ 7.5 hours (8 hours if instrument warmed up with external AC or DC power source)
Battery Type	Nickel Cadmium rechargeable cell with intelligent charger. The battery pack is 24% cadmium by weight. Battery must be charged in a known non-hazardous area.
Intrinsic Safety	Class I, Division 1, Groups A, B, C, & D ATEX II 2 G EEx ib IIC T4 (TA = 0°C to +40°C)

Table 3. Hardware Specifications

Analytical

Analysis Time Quick Mode	Benzene < 60 seconds BTEX < 180 seconds
Analysis Time Standard Mode	Benzene < 80 seconds BTEX < 360 seconds
Detection Limits	Benzene – 5 PPB LDL / 100 PPM UDL Toluene – 3 PPB LDL / 200 PPM UDL Ethylbenzene – 10 PPB LDL / 200 PPM UDL m-Xylene – 10 PPB LDL / 200 PPM UDL
Precision	+/- 5%
Operating Temperature Range	0°C to 40°C (32°F to 105°F)
Operating Humidity Range	0 to 95% relative humidity (non-condensing)
Storage Temperature Range	-10 to 65°C (14 to 149°F)
Storage Humidity Range	0 to 95% relative humidity (non-condensing)
Detector	Photoionization detector with standard 10.6 eV UV lamp
Carrier Gas	Built-in cylinder for Ultra Zero Air, 8 hours continuous operation

Table 4. Analytical Specifications

NOTE: *Specifications subject to change without notice.*

Warranty Information

The PetroPRO is warranted for one year against defects in materials and workmanship.

Photovac warranties that its manufactured product will be free from defects in materials and workmanship for a period of one (1) year from the date of receipt by the Customer. This may be voided if, in the opinion of Photovac, the product has been abused or treated in a negligent manner so as to cause damage or failure. Negligent use includes, but is not limited to, exposure of the internal parts of the equipment to water. Damage caused thereby is expressly excluded from this Warranty.

Consumable supplies and parts routinely replaced are not warranted.

Photovac and its vendors disclaim any implied warranty of merchantability or fitness for a particular purpose. Photovac and its vendors will not be liable for any indirect, special, incidental, or consequential damages, irrespective of whether Photovac or the vendor has advance notice of the possibility of such damages.

Photovac's sole liability under this warranty is limited to the repair or replacement of the product at Photovac's discretion at its Service/Repair facility and return to the Customer.

When Photovac is made aware of a problem that would be eligible for remedy under Warranty, it will issue a Return Authorization Number to the Customer. No return will be accepted unless such authorization has been obtained. The customer is responsible for insurance and shipping to the designated Photovac Service/Repair facility.

Contacting Photovac

To place an order, check the status of an order, obtain current pricing and availability	781-290-0777 salesadmin@photovac.com
Service and repair of your instrument	781-290-0777 customerservice@photovac.com
Technical Support Department	781-290-0777 techsupport@photovac.com
Customer Service	781-290-0777 customerservice@photovac.com
Worldwide:	Photovac, Inc. 300 Second Avenue Waltham, MA 02451 USA Tel.: 781-290-0777 Fax: 781-290-4884 www.photovac.com customerservice@photovac.com

Table 5. Contact Information