

SnapShot

Handheld Gas Chromatograph/Photoionization Detector

User's Manual



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WARNING

THIS EQUIPMENT GENERATES, USES AND CAN RADIATE RADIO FREQUENCY ENERGY AND IF NOT INSTALLED AND USED IN ACCORDANCE WITH THE INSTRUCTION MANUAL, MAY CAUSE INTERFERENCE TO RADIO COMMUNICATIONS. IT HAS BEEN TESTED AND FOUND TO COMPLY WITH THE LIMITS FOR DOC STANDARD C108.8 AND FOR A CLASS A COMPUTING DEVICE PURSUANT TO SUBPART J OF PART 15 OF FCC RULES, WHICH ARE DESIGNED TO PROVIDE REASONABLE PROTECTION AGAINST SUCH INTERFERENCE WHEN OPERATED IN A COMMERCIAL ENVIRONMENT. OPERATION OF THIS EQUIPMENT IN A RESIDENTIAL AREA IS LIKELY TO CAUSE INTERFERENCE IN WHICH CASE THE USER AT HIS OWN EXPENSE WILL BE REQUIRED TO TAKE WHATEVER MEASURES MAY BE REQUIRED TO CORRECT THE INTERFERENCE.

Chapter 1

Introduction

1.1 About This Manual

This manual provides detailed instructions for setup, operation and maintenance of the Photovac Snapshot™ Handheld Gas Chromatograph.

Before unpacking the instrument, please read Section 1.2 Warnings and Safety Practices. This section describes possible hazards that might injure the user, damage the instrument or compromise its operation. Some general safety information is also provided.

To help you learn to use SnapShot quickly this manual is organized by tasks beginning with setup and operation in Chapters 1 and 2. Connecting accessories is covered in Chapter 3. Routine maintenance is covered in Chapter 4. Troubleshooting techniques are covered in Chapter 5. Chapter 6 provides a technical description of SnapShot.

The SnapShot manual uses a few conventions for key names on the SnapShot keypad and for text that is shown on the SnapShot display. Key names are denoted by uppercase text. "**Arrow** keys" is the collective name for the UP ARROW and DOWN ARROW keys. Text that appears on the SnapShot display is in quotation marks. In Chapter 3 computer keyboard names are denoted by angle brackets, e.g. <Ctrl>. Text that must be typed in using the computer keyboard is shown in italics.

In the text you will find various warnings and notes.

Warning: A warning indicates an operation which could cause personal injury if precautions are not followed.

Note: A note indicates an operation which could cause instrument damage if precautions are not followed. A note also indicates significant information and is provided with various procedures.

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may explode. Check with local codes for possible special **disposal** instructions.

3. Do not open or mutilate the battery pack. Released electrolyte is corrosive and may cause damage to the eyes or skin. It may be toxic if swallowed.
4. 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.
5. Do not defeat proper polarity orientation between the battery pack and battery charger.
6. Charge the battery pack using the charger provided with or identified for use with this product only in accordance with the instructions and limitations specified in this manual. For battery charger use only Photovac Part No. **365000** (North America), **365008** (United Kingdom), **365009** (Europe).

Excessive Heat

Do not expose the instrument to intense sunlight for prolonged periods. This may result in a rise in instrument temperature and loss of oven control.

Exposure to excessive heat may result in instrument contamination.

Application Module Care

When removing and replacing the application module, move the instrument to a clean, dust-free environment. If you are using more than one application module, store the modules that are not in use in a clean, dust-free location. See Section **3.3** for details.

Calibration Gas

Adequate ventilation must be provided when Snapshot is being calibrated.

If compound threshold limit values (**TLVs**) are exceeded, you should use a gas bag for sampling and calibration.

To determine the TLV of the compounds contained in the calibration gas, refer to the Material Safety Data Sheet (**MSDS**) supplied with your calibration gas cylinder. See Section 2.12 for details of calibration using a gas bag.

A supply of carrier gas must always be available for SnapShot. Six carbon dioxide (CO_2) or nitrogen (N_2) cylinders are supplied with the instrument. Replacement cylinders may be obtained in sets of six. (Photovac Part No. **365005** for CO_2 and **365029** for N_2).

SnapShot may be used with a serial printer. The printer must be an **Epson® FX-80**, Epson **FX-850**, a Kodak™ Diconix™ **150**, a Diconix **180** (Photovac Part No. **380129**), or the printer must be **100%** compatible with one of **these**. The printer must have an **RS232** port available.

1.5 Battery Charging

Before beginning operation of SnapShot, the battery pack must be charged.

1. If the instrument has been turned on, turn it off by pressing the **OFF** key and stop the flow of carrier **gas** by turning the **carrier** gas shut-off valve fully clockwise. See Figure 1.
2. Press the release button on the bottom of SnapShot and remove the battery pack by sliding it backwards.
3. Ensure the correct plug is installed on the battery charger line cord. If it is not correct for the wall outlet in your area then it must be replaced. See Appendix 3.

Note: Use only a SnapShot battery charger. Using another battery charger will result in damage to the battery pack or charger.

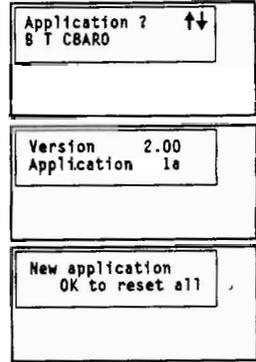
4. Plug the charger into the jack **located** on the front of the battery pack.
5. Plug the charger into an AC outlet.

The LED, on the battery pack, indicates the charge state. Red indicates the **battery is** being charged. Green indicates the battery is fully charged and ready for use.



to select the application you need. Use the Arrow keys to select the desired application and then press ENTER.

3. The software version number and the application number will be now be displayed.
4. If this is a new application module or a new application from the same module, Snapshot will display the message **"New application! OK to reset all"**. Press Enter to send the new application information from the module to Snapshot.



Note: When a new application is selected, the datalogger and all setup information will be cleared.

5. Open the carrier gas shut-off valve. Turn the valve

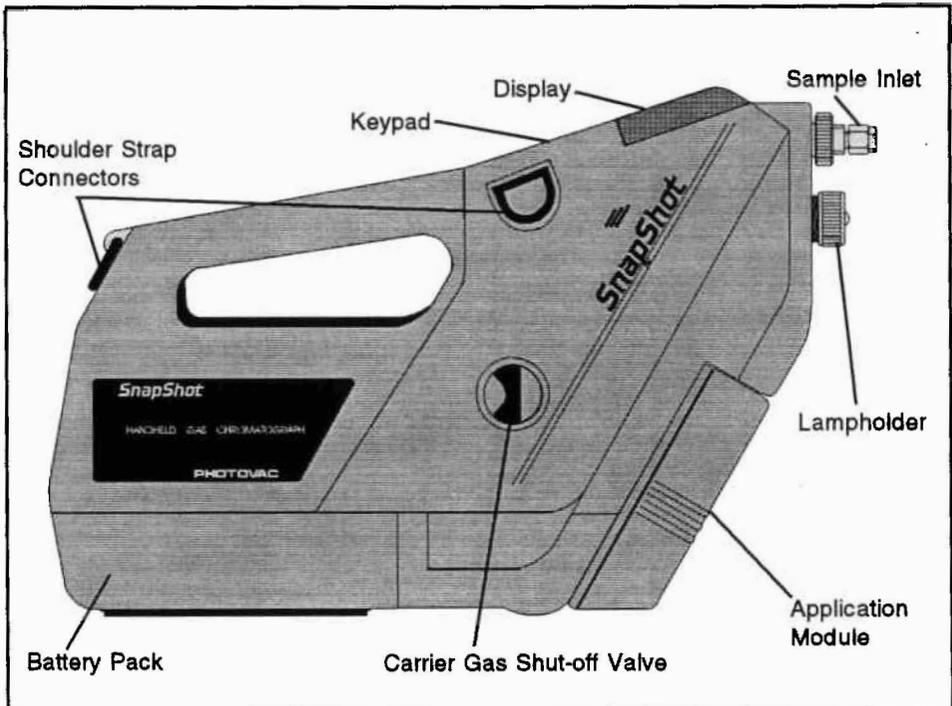


Figure 1 SnapShot Layout

9. After the lamp has been tuned, SnapShot will purge the column and heat the isothermal column oven. The instrument status will be "**Chck**" while the oven heats. The status will then change to "**Purg**" while the column is purged for the duration of one analysis.

When the instrument status changes to "**Redy**" Snapshot is ready for operation. A new cylinder will provide approximately 8 hours of operation. If the instrument is not in use you can stop the flow of carrier gas by turning the carrier gas shut-off valve clockwise. Snapshot will automatically turn the lamp off when the carrier gas supply is shut off.

The carrier gas shut-off valve does not control the actual flow rate. The flow rates are set automatically by the application module. Flow rates will differ from one application module to another.

Note: Do not remove the carrier gas cylinder from Snapshot until the cylinder is empty. You will know the cylinder is empty when a "Chck" status is displayed. Press the TUTOR key. The message will be "Carrier pressure is now low".



All information entered from the keypad and stored in Snapshot's memory is retained when SnapShot is switched off. The clock and calendar continue to operate and do not need to be reset the next time the instrument is used.

Snapshot's normal display provides the instrument status, run number, time, date and detected concentrations of the compounds. The instrument status tells you what SnapShot is doing. Each status has a priority as listed in Table 1.

Priority	Status	Description
1	"Tune"	SnapShot is tuning its lamp. When the lamp has been turned on and is tuned to the maximum intensity the "tune" status will clear.
2	"Chck*"	One or more faults is occurring. Press the TUTOR key for details. See Section 5.2.
3	"Batt"	Indicates the battery is low. Replace the battery pack with a fully charged one.
4	" Alrm "	Detected concentration exceeds the preset alarm level for one or more compounds.
5	"Purg"	Indicates the column is being purged. An analysis cannot be started until the column has purged itself completely.
6	"Cal"	Indicates the next analysis will be a calibration run. When the calibration run has started, the instrument status will change to the analysis countdown. After the calibration run has been completed, the "Cal" status will again be displayed momentarily to indicate that SnapShot has been calibrated.
7	"Play"	SnapShot is playing back previously recorded data.

Table 1 SnapShot Instrument Status

GRAPH	Prints graph of recorded data	CLEAR	Erases the last number pressed
PLAY	Replays recorded data on display	EXIT	Cancels key with no more changes
CAL	Sets up next analysis as cal	ENTER	Confirms display then continues
UP/DOWN ARROW	Option or Play speed select		

Table 2 Continued

If there are no options to the function, the key acts immediately. The BATT key is one example. If there are options, the current option is displayed. You are prompted to display the other options by pressing the arrow keys. Pressing ENTER confirms that the displayed value is correct and moves to the next key option.

If the function requires numeric input, the current value is displayed. You can change the value by pressing the numeric keys. Pressing ENTER confirms that the displayed value is correct and moves to the next key option.

Some functions have multiple steps for options and/or numeric inputs. These are arranged so that the most frequently changed inputs are displayed first. Once the desired changes have been made you can bypass the rest of the steps by pressing EXIT.

Each key function is described in more detail in the following sections. Leave **SnapShot** on and try each key in turn.

2.3 BATT Key

Press the BATT key to open a window that displays the battery voltage. The voltage will be 8.5 volts when the instrument is fully charged. When the voltage drops below 7 volts, a **"Batt"** status will be displayed and the battery pack must be removed and recharged. See Section 4.1.



The Event Number is the first option to appear. It can be any number up to 999. Use the Event Number to identify a particular sampling location or application module. The Event Number is printed on the tabular reports.

Event Number?	4	:28
		ppm
CBARO	15	ppm
	16	ppm

1. Use the numeric keypad to enter the Event Number.
2. Press ENTER to confirm the Event Number and move to the next option.
3. Press CLEAR to make any changes to the number you have entered.

The next option is the Period. This option is used to set up SnapShot for auto analyzing. The Period is the duration for which SnapShot will cycle continuously. When the Period ends SnapShot will turn itself off. Setting the Period to any value greater than 0 will enable auto analyzing and SnapShot will start an analysis immediately.

Period? (Hours)	3	:04
		ppm
CBARO	15	ppm
	16	ppm

If the Period is set to 0, auto analyzing has been turned off. If auto analyzing has been turned off, the Cycle Time option will be bypassed.

The next option is the Cycle Time. This is the duration of each analysis including purging time (if any). If the Cycle Time that you enter is shorter than the analysis time that has been preset by the application module, a window will open and tell you the minimum cycle time. If you change the Cycle Time during an analysis, the new Cycle Time will not take effect until the next analysis.

Cycle?(Minutes)	10	:04
		ppm
CBARO	15	ppm
	16	ppm

The datalogger can be turned on and off using the Datalogger option. If the datalogger is turned off, no data will be logged and analysis information will be lost. If the datalogger is turned on, SnapShot will record a maximum of 500 runs. After this, data will be overwritten one analysis at a time.

Datalogger? ↑↓	On	:04
		ppm
CBARO	15	ppm
	16	ppm

The Date and Time options are next on the SETUP key. The date and time entered here are used on the normal display and on the tabular and graphical printouts.

Date? (YY/MM/DD)	93/07/23	:04
		ppm
CBARO	15	ppm
	16	ppm

1. Use the keypad to enter the correct date. Press ENTER to confirm the date and press ENTER to

2.9 ALARM Key

Press the **ALARM** key to obtain a window which allows you to turn the audible alarm indicator "On", turn it "Off" or set it to "Momentary". You will also set the alarm concentration for each compound with this key.

1. Use the Arrow keys to move between "On", "Off" and "Momentary".
2. Press ENTER to select the displayed setting and move to the next option.

If the audible alarm has been turned on and the detected concentration for one or more compounds exceeds the set alarm level, an audible tone will sound until another analysis has been completed and the alarm condition has passed. The audible tone can also be turned off by pressing the **ALARM** key. The **ALARM** key acts to acknowledge the alarm when the audible alarm is sounding.

If "Momentary" has been **selected**, a 5 second tone will sound at the end of an analysis in which an alarm condition has been encountered.

Enter the alarm level for each compound. If you try to set the alarm level to a value that is greater than the upper limit for that compound, a window will open showing you the upper and lower limits for the specified compound. Set the alarm level to a value between the upper and lower limits.

If the detected concentration of a compound exceeds the alarm level, an asterisk (*) will appear beside the concentration on the display.

2.10 PLAY Key

The **PLAY** key plays back previously recorded data. To begin playback operation:

1. Press **PLAY**.



Alarm	↑	:04
Momentary	↓	ppm
CBARO	15.2	ppm
	16.9	ppm

Benzene?	1.0000	:04
		ppm
CBARO	15	ppm
	16	ppm

Lower	0.1 ppm	:04
Upper	50.0 ppm	ppm
CBARO	15	ppm
	16	ppm

Rdy 039	Nov 01	11:24
Benzene	3.4	ppm
Toluene	34*	ppm
CBARO	16	ppm



2.12 CAL Key

SnapShot will calibrate itself with compounds of known concentrations contained in a calibration gas mixture. In order to calibrate Snapshot, all compounds specific to the application must be contained in the calibration gas.

Note: Only compounds from the application module must be contained in the calibration gas; no extra compounds and no substituted compounds are allowed.

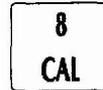
When you are selecting the calibration gas mixture, keep in mind the upper and lower concentration limits of the application module. Use the SETUP key to determine these values. Snapshot will not allow you to enter a calibration concentration above the upper limit or below the lower limit. If you try to enter such a value, a warning message will be displayed.

On some application modules, compounds have been grouped together for ease of operation. During calibration all the compounds that are contained in the group are identified and a calibration concentration must be entered for each one. It is only during calibration that you will see the individual components of the group. When ordering calibration gas, you must request all application compounds, including the individual components of the group.

Try to obtain each compound at a concentration that is close to the value you are expecting to see. For example, if you are using **SnapShot** for 10 parts per million (ppm) benzene, try to obtain calibration gas that contains 10 ppm benzene.

If the calibration gas is toxic and cannot be vented into the air, a gas bag containing calibration gas may be connected directly to Snapshot's inlet. You should also use a gas bag if the concentration of the calibration compounds is greater than the TLV. See Section 1.2

1. Connect the regulator to the calibration gas cylinder. See Section 1.4 for specifications on the type of regulator that is required.



5. Ensure that the third branch of the calibration adapter tee is left unobstructed to vent the excess flow.

If you are using a gas bag for calibration:

1. Connect the regulator to the calibration gas cylinder. See Section 1.4 for specifications on the type of regulator that is required.
2. Use the gas bag adapter to connect the gas bag to the regulator outlet.
3. Open the valve on the gas bag and then open the valve on the calibration gas cylinder.
4. Fill the gas bag about half full and then close the calibration gas cylinder.
5. Disconnect the gas bag from the adapter and empty it in a well ventilated area. Preferably the gas bag should be emptied outdoors or in a fumehood.
6. Flush the bag a few more times with the calibration gas and then fill it. Close the valve on the gas bag.

To calibrate SnapShot:

1. If Snapshot is auto analyzing, press the SETUP key and disable the auto analyzing option by entering 0 as the Period. If the instrument is in the middle of a run it will stop auto analyzing after it has finished the current analysis.

Note: The calibration gas **must** contain all the compounds from the application module in order for Snapshot to calibrate itself correctly. If you are using an application module with a compound group, all **compounds** contained in the group must also be contained in the calibration gas.



During calibration all the compounds that are contained in the group are identified and a calibration concentration must be entered for each one. It is only during calibration that you will see the **indi-**

SnapShot must be calibrated at least once a day. It **must** also be calibrated if the **W** lamp window is cleaned or if the **W** lamp or sample inlet filter is replaced. You should calibrate SnapShot immediately before the analysis of critical samples.

If you are using a gas bag to calibrate the instrument, the gas bag must be refilled with fresh calibration gas each time a calibration is performed.

If another application module is installed at any time, SnapShot **must** be calibrated with calibration gas specific to the new application module.

If another application within the same module is selected, SnapShot must be calibrated again.

There are currently several different application modules available for SnapShot. When you calibrate SnapShot **all** compounds from the application module must be contained in the calibration gas.

To obtain calibration gas specific to your application module, contact EQUIPCO at **(888)234-5678**.

2.13 TABLE Key

SnapShot will print a table of the data from one or more runs.

1. Turn SnapShot off.

Note: You must turn the instrument off before connecting or disconnecting the printer cable.

2. Connect an Epson **FX-80**, **FX-850**, Kodak Diconix **150**, Diconix **180** or a printer that is **100%** compatible with one of these printers to SnapShot with the **RS232** printer cable (Photovac Part No. **365011**).
3. Turn SnapShot on again and press the **SETUP** key. Ensure the correct baud rate has been set.



6. Press the TABLE key. Enter the start and stop run numbers. Snapshot will now tell you how many pages will be printed.
7. Press ENTER to send the information to the printer.

2 Pages will be printed		:37 ppm
CBARO	15	ppm
	16	ppm

While the instrument is printing, the message "Please wait printing now" will be displayed. While printing is in progress Snapshot is still analyzing and recording data if the datalogger is turned on.

Please wait printing now		:37 ppm
CBARO	15	ppm
	16	ppm

The printout should look like the table in Figure 5 and the following information will be printed.

- a. The date of the analysis. The start date will be printed first and then it will only be printed if it changes.
- b. The time of each analysis.
- c. The first Event number will be printed and then this number will only be printed if it changes.
- d. The run number for each analysis.
- e. The highest priority status for each run.
- f. The concentration for each compound.
- g. Compounds that have exceeded their alarm level will be indicated with an asterisk (*).

The data will be printed one line of the table per run.

2.14 GRAPH Key



Use the GRAPH key to print a graph of recorded data for each compound. One compound will be printed per page.

1. Turn Snapshot off.

2. Connect an Epson FX-80, FX-850, Kodak Diconix 150, Diconix 180 or a printer that is 100% **compatible** with one of these printers to SnapShot with the RS232 printer cable (Photovac Part No. 365011).
3. Turn SnapShot on again and press the SETUP key. Ensure the correct baud rate has been set.
4. Use the PLAY key to determine the **start** and stop run numbers for the graph.
5. Ensure there is paper in the printer and that it has been aligned properly.
6. Press the GRAPH key. Enter the start and stop **run** numbers. SnapShot will now tell you how many pages will be printed.
7. Press ENTER to send the information to the printer.

3 Pages will be printed	:40 ppm
CBARO	15 ppm
	16 ppm

SnapShot will begin printing the desired graph output. While the instrument is printing, the message "Please wait printing now" will be displayed. **While** printing is in progress SnapShot is still **analyzing and** recording data if the datalogger is turned on.

Please wait printing now	:40 ppm
CBARO	15 ppm
	16 ppm

The printout should look like the graph in Figure 6. The following information will be printed:

- a. The compound name.
- b. The starting time, ending time and the date for graphed information.
- c. A compound concentration versus time bar graph.

2.15 START/STOP Key

The carrier gas must be turned on before the lamp will begin tuning. SnapShot will beep once when the carrier gas has been turned on and then beep again when the lamp has tuned itself.

If the instrument has just been turned on, allow 5 minutes for the oven to heat up and for the column to purge itself



2. Move to the Period option. Type in the length of the period. See Section 2.7. Press ENTER.

Note: When you enter the period, SnapShot will begin analyzing immediately. Ensure the instrument is calibrated and ready to analyze before entering a Period.



3. Now enter the Cycle Time. This is the duration of each run and includes the analysis time and the purging time, if any. **If you** try to enter a Cycle Time that is shorter than the analysis time, SnapShot will display the minimum Cycle Time.

Minimum Cycle	:46
1s 10 min	ppm
	15 ppm
CBARO	16 ppm

4. Press EXIT to leave the Setup option.

When the analysis is complete, if there is time remaining in the cycle, SnapShot will purge the column.

Pressing **START/STOP** does not disable auto analyzing. If you press **START/STOP** after an analysis has started, you will abort the current analysis. The column will be purged for the duration of the Cycle Time and then another analysis will begin.

SnapShot will continue to auto analyze and record data (if the datalogger is turned on) until the end of the period. At the end of the period SnapShot will turn itself off.

If the battery pack requires replacement during the period you will have to adjust the period duration after the battery pack has been replaced.

For example, if you set a 5 hour period, the battery pack will require replacement after 4 hours. When the instrument is re-started with the new battery pack, set the Period duration to 1 hour to complete the 5 hour period.

To disable auto analyzing:

1. Press the SETUP key.
2. Move to the Period option and enter 0 as the period.

Chapter 3

Accessories

3.1 Printer

SnapShot will print to an Epson **FX-80**, an Epson **FX-850**, a Kodak Diconix **150**, a Diconix **180** or a printer that is **100%** compatible with one of these. The printer must have an **RS232** serial interface.

1. Turn SnapShot off.

Note: You must turn the instrument off before connecting or disconnecting the printer cable.

2. Connect the **RS232** printer cable (**Photovac** Part No. **365011**) to the **RS232** port on the back of the SnapShot and then to the serial port on the printer.

3. Turn SnapShot on.

4. Determine the baud rate for your printer. Refer to the printer user's manual for details.

5. Press the **SETUP** key and select the Baud Rate option. Use the Arrow keys to select the baud rate corresponding to the printer. The baud rate in the **SETUP** option must match the baud rate of the printer.

If this arrangement does not produce the desired results, see Sections **5.4** and **5.5**.

3.2 Computer

SnapShot will send information stored in its datalogger to a computer. This option may be used if you need to prepare reports based on SnapShot's recorded data. This feature

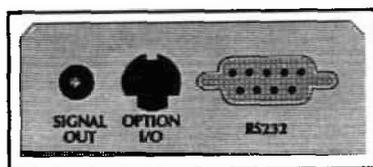


Figure 7 SnapShot Rear Ports

Note: The instructions below will provide you with the most basic information for using Snapshot with communications software. Please refer to the software user's manual for specific details of operation.



The following instructions are for Crosstalk XVI Version 3.71. The commands may vary with the version of Crosstalk you are using. To initiate communications between Snapshot and the computer:

1. Start Crosstalk. The Status Screen will appear. See Figure 8.
2. At the bottom of the Status Screen **there will** be a highlighted bar with the word Command?. If the word Command? does not appear press <Esc> on the computer keyboard.

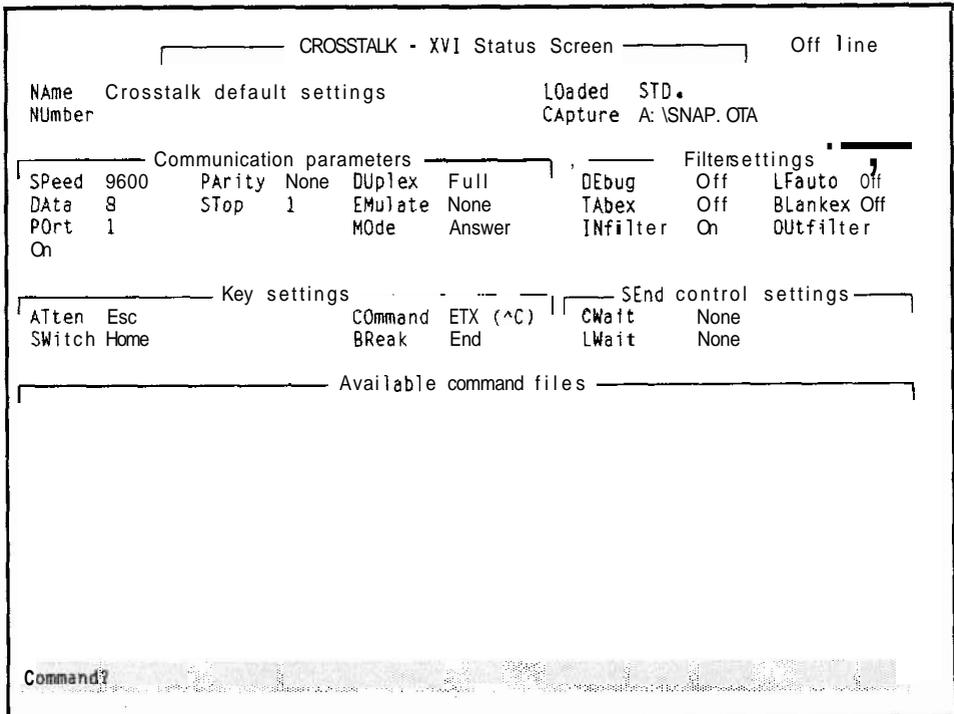


Figure 8 Crosstalk Status Screen

9. Turn SnapShot on and press the SETUP key on SnapShot and ensure the baud rate is set to 9600. The value you **set** here **must** be the same as the baud rate set in Crosstalk.
10. Type PO and press **<Enter>**. Type in **1** if you connected SnapShot to Com1 or type in **2** if you connected SnapShot to Com2 and press **<Enter>**. If you connected SnapShot to another serial port enter the corresponding number.
11. Type MO and press **<Enter>**. Type in **A** to change the mode to answer.
12. In order to capture the data and store them on a disk you must turn the Crosstalk capture command on and specify a disk to which the data can be stored. Type CA and press **<Enter>**. Now type in the disk drive and the name of the **file** where you want the data stored. For example if you want to store the data in a file called Snap on a floppy disk in drive A, then type **A:\Snap.dta** and press **<Enter>**.
13. If the word Command? does not appear at the bottom **of the** Crosstalk Capture Screen, press **<Esc>**.
14. You have now set up Crosstalk to communicate with SnapShot. Type GO L to **begin** the downloading session. The Status Screen will disappear and the Capture Screen will appear.
15. Press the SnapShot TABLE key and set the start and stop run numbers. After SnapShot tells you how many pages **will** be printed, press ENTER (on SnapShot). The logged data will begin to appear on the computer screen.

When all the data have been sent, press **<Esc>**. Type CA off and press **<Enter>**. This will turn the capture option off and write the captured file to the disk drive you specified in step #12.

16. Press **<Home>** to return to the Status Screen.
17. Type QU and press **<Enter>**. This will end your communications session.

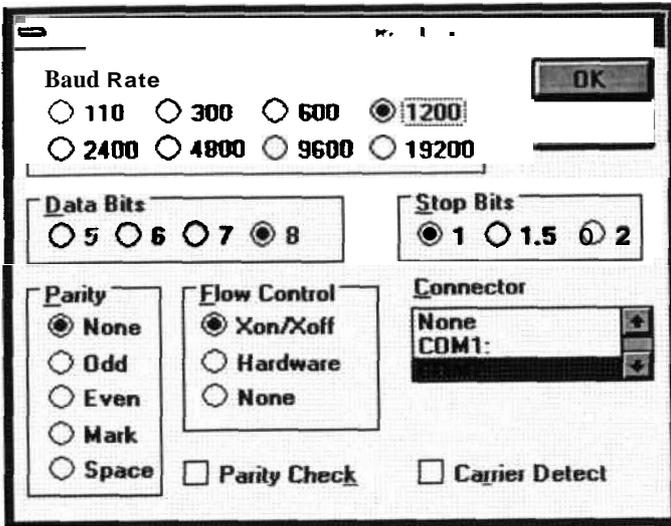


Figure 9 *Communications Dialog Box*

4. Open the Transfers Window and select the Receive Text File option. A Receive Text File Dialog Box will open. See Figure 10.
5. Type in the desired path and filename for the data that are to be downloaded. Ensure the path is correct.

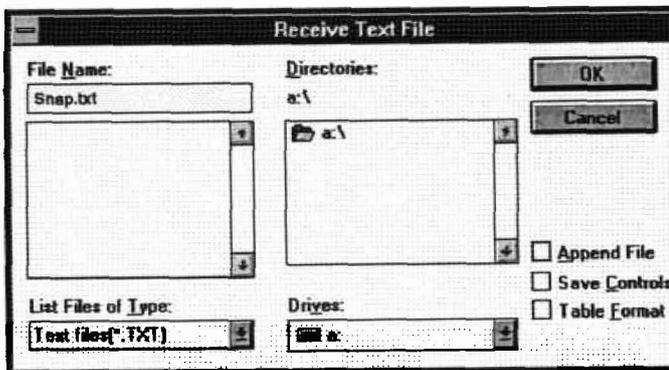


Figure 10 *Receive Text File Dialog Box*

listed, it cannot be run on that application module. To determine which compounds can be analyzed on the column press the SETUP key. See Section 2.7.

When the application module is installed and the **instrument** is turned on, the column oven will begin to heat up. The column oven will maintain a constant column temperature and will eliminate retention time drift. The actual oven temperature will depend on the application module.

Some modules contain more than one application. If you are using one of these modules, you will select an application when you first turn on the instrument.

Note: When a new application is selected, the datalogger and all setup information will be cleared. Print or save the contents of the **datalogger** before loading a new application.



To switch between applications:

1. Turn the instrument off by pressing the OFF key. You do not need to turn the **carrier** gas off.

Note: You must turn the instrument off before connecting or disconnecting a new module.



2. Turn the Snapshot on by pressing the ON key. The instrument will power up and display the message "Please turn on carrier gas flow". Press ENTER.
3. You will now be prompted to select the application you need. Use the Arrow keys to select the desired application and then press ENTER.
4. The software version number and the application number will be now be displayed.
5. If this is a new application module or a new application from the same module, SnapShot will display the message "New application! OK to reset all?". Press ENTER to send the new application information from the application module to SnapShot.

```

Application ?  ↑↓
B T C8ARG
    
```

```

Version      2.00
Application  1a
    
```

```

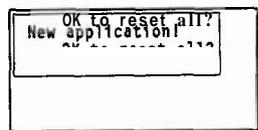
New application
OK to reset all?
    
```

6. Ensure the carrier gas is turned on and allow carrier gas to flush the column for one hour before beginning operation.

Note: If you have installed an ethylene oxide application module, you will need to replace the CO₂ carrier gas cylinder with an N₂ cylinder. See Section 4.2.



7. Turn the instrument on. The message "New application! OK to reset all?" will appear on the display. Press ENTER. SnapShot will overwrite compound information from the old application module with the compound **information** from the newly installed application module.



8. Calibrate the instrument with calibration gas containing all the compounds from the application. See Section 2.12.

If more than one application module is being used with SnapShot, store the modules that are not in use with plugs in the ports. When the module is connected to the SnapShot store the plugs in the supplied bag. They will remain clean and ready for use.

The application modules will retain their data indefinitely and do not have to be connected to SnapShot on a regular basis.

For specific information about your application, contact EQUIPCO at (888) 234-5678.

Photovac may be able to develop a custom application module for your application. A custom application module is identified by the SnapShot serial number printed on the module label. This module must be used only with the SnapShot bearing this serial number.

3.4 Shoulder Strap

Snap one end of the shoulder strap to the connector bail on the back of SnapShot's handle. Snap the other end to one of the shoulder strap connectors beside the display.

Chapter 4

Routine Maintenance

4.1 Battery Charging

When the instrument status displays “**Batt**”, the battery pack requires charging. A fully charged battery powers SnapShot for approximately 4 hours. If the instrument is to be used for more than 4 hours, **carry** a spare battery pack. When the first one has been discharged, replace it with the spare.

Upon return from field work, recharge both battery packs as outlined in Section 1.5. Two chargers are required to do this overnight. Use only the Snapshot battery charger.

Note: Do not leave battery packs uncharged for an extended period of time. This will result in damage to the battery packs.

The charger automatically charges at a high charge rate until the battery pack is fully charged and then maintains the full charge with a low continuous charge rate indefinitely so there is no danger of over-charging. A red **LED** on the battery pack indicates that the battery is charging. When the LED turns green, the battery is fully charged and ready for use.

On average the battery pack will provide 4 hours of continuous operation. Battery life depends upon the application and is shorter if the backlighting is turned on, if the ambient temperature is much lower than the application module set point, or if the instrument is turned on and off repeatedly.

Note: Leaving Snapshot for more than 3 months without turning it on may result in the loss of recorded data and setup parameters. If Snapshot is not used for long periods of time, turn the instrument on for a few hours every few months to avoid loss of data.



3

5. If the cylinder is almost empty, the sound of venting gas will hardly be noticeable. If the cylinder is nearly full, the venting sound will be quite pronounced. If you are unsure or are in a noisy environment, wait one minute before proceeding. If possible, move to a quieter location to replace the carrier gas cylinder.
6. Remove the cylinder by continuing to turn it counterclockwise five or six turns further. If venting gas is heard at any point, stop turning and wait for the cylinder to empty completely.

To install a full carrier gas cylinder:

1. Ensure the instrument is turned on and the carrier gas shut-off valve is open.
2. Insert a new cylinder into the base of the instrument and turn it clockwise until resistance is felt. You will have to turn the cylinder about five or six turns.

Ensure you are using N_2 cylinders for the ethylene oxide application module. You can determine which type of cylinder is installed by the color of the grip. The N_2 cylinders have a red grip and the CO_2 cylinders have a black grip.

3. Using the cylinder wrench, continue to turn until the resistance declines as the seal is pierced, and the cylinder "seats". This will take another one to one and a half turns. Snapshot will beep once when the cylinder has seated properly and carrier gas is flowing. Do not use excessive force.

Note: Do not remove the cylinder to see if it has seated properly. The cylinder will vent itself upon removal from SnapShot.



4. Snapshot will now begin to tune the lamp. If a "Check" status message is displayed press the TUTOR key to determine the source of the fault. If there is a "Carrier pressure is now low" fault, the cylinder has not been installed properly. See Section 5.2.

9. Turn SnapShot on and allow it to warm up.
10. Calibrate SnapShot and then continue normal operation. See Section 2.12 for details of calibration.

4.4 Replacing the UV Lamp

When a lamp fault occurs, the UV lamp most likely requires replacement. To replace the UV lamp:

1. Turn SnapShot off.
2. Turn the carrier gas shut-off valve fully clockwise.
3. Locate the lampholder below the detector inlet fitting. See Figure 1.
4. Unscrew the lampholder and pull it out.
5. The lamp should be in the long white Teflon tube. If it is not, carefully tip SnapShot forward into your hand and the lamp will slide out.
6. Without touching the window, place the o-ring onto the new lamp (**Photovac** Part No. **380029**) about **0.5 cm** ($\frac{1}{8}$ ") from the window end of the new lamp. See Figure 11.
7. Place the new lamp in the white Teflon tube of the lampholder. Screw the lampholder into place.
8. Turn SnapShot on and allow it to warm up.
9. Calibrate SnapShot and then continue normal operation. See Section 2.12 for calibration information.

4.5 Replacing the Sample inlet Filter

Replace the sample inlet filter every 3 to 6 months of use. If the **working** environment is dusty, the filter may require replacement more often. To replace the filter:

Chapter 5

Troubleshooting

5.1 General

If you have a service-related question about Snapshot, consult this manual first. If you cannot find the answer in this documentation, contact EQUIPCO at (888) 234-5678.

When you call you should have your Snapshot in front of you. You should also have this manual at hand. Lastly, 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 has been taken.
3. The exact wording of any messages that appeared on the screen.

5.2 Snapshot Fault Messages

When a "Chck" status is displayed Snapshot's operation is compromised by a fault condition. Press the TUTOR key to obtain a description of the fault.

The faults below are listed by priority. If more than one fault is occurring at a time, the fault with the highest priority will be displayed first. Press the TUTOR key again and if there is another fault its description will be displayed.

Use the basic corrective action listed here to correct minor faults.

Fault: **Ambient drifted! Calibrate now**

Cause: The ambient temperature has changed by

Ambient drifted!	:02
Calibrate now	ppm
CBARO	15 ppm
	16 ppm

appears then replace the UV lamp. See Section 4.4.

Fault: Calibration error occurred

Cause: Calibration gas is not being supplied correctly.

Action: Ensure the calibration gas cylinder valve is open all the way.

Action: Ensure there is calibration gas in the cylinder. Open the cylinder and check the contents gauge.

Action: If pressurized calibration gas is **being used**, ensure the delivery pressure is maintained at 5 psig (35 **kPa**). Ensure the delivery pressure does not exceed 5 psig (35 **kPa**). If you are using the Photovac calibration gas regulator, it has been preset to deliver 250 **mL/min**. Use a flowmeter to check the flow rate.

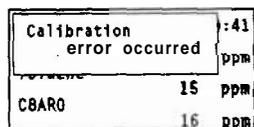
Action: If a gas sampling bag is being used, ensure the valve on the bag is open before connecting it to Snapshot.

Action: Before beginning a calibration with the **START/STOP** key, turn on the calibration gas and allow the adapter tee and adapter tubing to be flushed with calibration gas.

Action: There is an undetermined problem. Contact the EQUIPCO Service Department at (888)234-5678.

Cause: Calibration gas does not contain all of the compounds for the application.

Action: In order for Snapshot to calibrate itself correctly, all the compounds from the application module must be contained in the calibration gas.



Fault: Carrier pressure is now low

Carrier pressure is now low	:41 ppm
CBARO	15 ppm
	16 ppm

Cause: Carrier gas cylinder is empty.

Action: Replace the carrier gas cylinder. See Section 4.2.

Cause: The carrier gas shut-off valve has not been opened.

Action: Ensure the carrier gas shut-off valve is turned fully counterclockwise. The carrier shut-off valve is located on the side of the instrument. See Figure 1.

Cause: The cylinder has not been installed properly.

Action: Rotate the cylinder one quarter turn counterclockwise. If you hear the sound of venting gas, then the seal on the cylinder has been broken. Use the cylinder wrench to tighten the cylinder until you hear Snapshot beep. Then turn the cylinder a further one to one and a half turns. This should start the flow of carrier gas.

If you do not hear venting gas when you loosen the cylinder, the seal has not been broken. Use the cylinder wrench to tighten the cylinder until you hear Snapshot beep. If you cannot tighten the cylinder any further and the seal has not been broken, the cylinder may be defective. See the instructions below.

Cause: The cylinder is defective.

Action: Carefully remove the cylinder and properly dispose of it. Inspect the new cylinder before installing it into Snapshot. The seal on the cylinder must be intact. **Do not** touch the seal. See Section 4.2 for installation instructions.

Action: Turn SnapShot off and install the desired application module. SnapShot cannot be operated without an application module.

Fault: Module change detected

Cause: The application module has been changed before SnapShot was turned off.

Fault! Module change detected	:58
	ppm
CBARO	15 ppm
	16 ppm

Action: Turn SnapShot off, then on again. The new application module will be **intial**-ized. In the future, do not remove an application module until after you have turned the instrument off.

Fault: Detector signal is saturated

Cause: The detector signal has gone **offscale** for more than 15 seconds indicating possible column contamination.

Detector signal is saturated	:58
	ppm
M-Xylene	15 ppm
	16 ppm

Action: Allow the column to purge itself for a few minutes. Then begin another analysis.

Fault: Checksum did not verify

Cause: Internal software problem.

Action: Contact the EQUIPCO Service Department at (888)234-5678.

Fault! Checksum did not verify	:58
	ppm
CBARO	15 ppm
	16 ppm

Fault: Please check module.

Cause: SnapShot cannot send calibration information to the application module. There may be a loose connection between SnapShot and the application module.

Action: Turn SnapShot off and remove the application module and then reconnect it. Ensure the 15-pin connector is securely attached. Turn SnapShot on again.

Fault! Please check module	:58
	ppm
CBARO	15 ppm
	16 ppm

Action: Calibrate the instrument as outlined in Section 2.12. After the instrument has been calibrated start a run using the calibration gas as a sample. All the compounds should be displayed. If they are not contact the EQUIPCO Service Department at **(888)234-5678**.

Cause: Wrong type of carrier gas being used. Sensitivity may be reduced.

Action: If you are using an application module for ethylene oxide, you must use nitrogen as the carrier gas. Ensure an N₂ cylinder is installed. The N₂ cylinders have a red grip and the CO₂ cylinders have a black grip.

Cause: Lamp window is dirty. Sensitivity may be reduced.

Action: Clean the lamp window. See Section 4.3.

Cause: There is an undetermined problem.

Action: Contact the EQUIPCO Service Department at **(888)234-5678**.

Problem: Pressing START/STOP key has no effect.

Cause: There is a fault condition other than a "Calibration Error" or an "Ambient has Drifted" fault. If an analysis cannot be started due to a fault condition then the message "Fault condition prevents start" will be displayed.

Action: Press the TUTOR key to determine the source of the fault. Correct the fault. See Section 5.2. When the fault message has cleared and the status has returned to "Redy", press the **START/STOP** key.

If a "Calibration Error" or "Ambient has Drifted" fault has occurred, Snapshot will

Fault condition prevents start	:58 ppm
CSARO	15 ppm
	16 ppm

Action: Make sure that the printer is "on line", as shown on its control panel.

Action: Check the ribbon, the print wheel or cartridge, and the paper supply.

Cause: Printer is not configured properly.

Action: Many printers have a set of configuration (DIP) switches. Generally, Snapshot expects these switches to be set in the factory default settings.

Many printers have switches for enabling automatic line feeds when receiving a carriage return. These switches should be set to carriage returns only, which is normally the factory default setting.

Some printers have switches or control panels that enable you to **set** the printer for **different** modes, such as sans serif, letter quality, or compressed text. Do **not** use these controls with SnapShot. If you do use them, you may cause your tabular or graphed output to be printed incorrectly.

You need to set the correct baud rate and parity. If the baud rate or parity is incorrect, the printer may not print or the output may be garbled.

Cause: Printer is not compatible.

Action: When a device such as Snapshot is used to download information to a printer, the information is sent as a series of codes. These codes must be formatted in such a way that the printer can interpret them and print the information properly.

There are several industry standards for the formatting of printer codes, also known as printer protocols. Epson **FX-80**, IBM®

Action: If the baud rate is correct it is possible that the transfer rate is too high and information is being lost. Lower the baud rate of the computer (through the communication software) or the printer (DIP switch settings) and set Snapshot accordingly.

5.5 Serial Communication

If, after having followed the procedure in Section 3.2, communications cannot be established with a computer, the problem may lie with the hardware connections or the printer cable configuration.

1. If you are not using a Snapshot printer cable, ensure the RS232 cable you are using is configured correctly. See Figure 12.

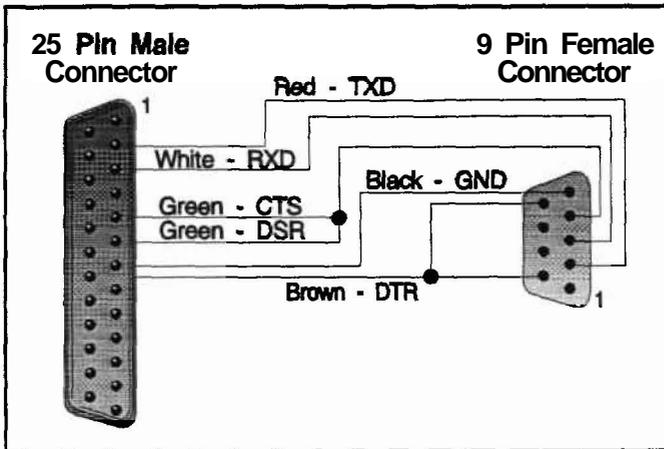


Figure 12 Printer Cable Pinouts

2. Ensure Snapshot is connected to the serial port of the computer.

Pin Snapshot IBM-AT IBM-XT

Rxd

Table 3 Pin Definitions

Pins 2 and 3 should be mismatched between SnapShot and the computer. Ensure this is the case. It is also possible that the cable being used, may switch pins 2 and 3 even **if it** is not necessary, **i.e.** the cable is a null modem. IBM-AT cables are usually null modems, since a null modem is required for connection to a printer.

If you are using an IBM-AT and **find** that a null modem is not required, it is possible that an IBM-XT serial port has been added to an expansion slot and thus does not require a null modem. The opposite may be the case if an **IBM-AT** serial port was added to an IBM-XT expansion slot, in which case the null modem is required.

4. Ensure all hardware is **working** properly.

Use a printer to test both SnapShot and the cable. Connect SnapShot to the printer and ensure that this arrangement produces the desired results. If a correct printout is obtained, SnapShot and the printer cable are okay.

desorbed at different rates. Thus, the components within the sample are separated and emerge (elute) from the column in a characteristic time known as the Retention Time. As each component enters the detector, a signal voltage is generated, processed and shown on the display. See Figure 15.

The Retention Time of each peak gives an indication of what the contaminant is, while the size (area or height) of the peak indicates how much is present. SnapShot does not display the actual peaks.

Chromatography is a comparative technique of analysis. The identities and concentrations reported by SnapShot are based on those of previously analyzed standards.

In each sample analysis, peak retention times are compared to retention times of compounds stored in the application module. If they match (within the peak recognition window stored in the application module), the peak is identified as the corresponding compound of interest.

The ratio of peak area to known compound concentration is the sensitivity (response to concentration ratio, measured in **mVS/ppm**) for the compound. To calculate the peak's concentration, its integrated area is divided by the sensitivity stored in the application module. The application module calculates the sensitivity for each compound each time the instrument is calibrated. Calibration must be performed for each compound of interest on a regular basis to ensure the sensitivity is accurate.

SnapShot automatically compensates for response changes by analyzing the calibration gas periodically. Application module retention times and compound sensitivities are updated whenever SnapShot is calibrated. SnapShot also calculates the new retention time to old retention time ratio for each compound in the calibration gas.

Although the isothermal oven contained in the application module increases retention time and sensitivity stability, these values may drift. If the instrument is not calibrated at least once daily, compounds may not be detected.

length carries **10.6** electron volts (**eV**) of energy. The UV light is emitted from the lamp and is directed at the carrier gas eluting from the column. When light of **this** energy hits the eluting molecules, they may become ionized. See Figure 16.

The lamp generates photons which ionize' specific molecules in the gas stream. Many of the chemicals considered pollutants, including most hydrocarbons, are ionized. 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.

Whether or not a certain molecule is ionized depends upon its Ionization Potential (IP). If the IP of a molecule is less than **10.6 eV** it will most likely be ionized **efficiently**. If the IP is greater than **10.6 eV**, it is not likely to be ionized well. Most of the permanent air gases including water vapor have **IPs** over **12 eV**. This means that the carrier gas and the sample matrix are not ionized.

After the compounds have been ionized by the lamp, the ionized particles 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.

2. Warranty

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

Photovac Incorporated warrants that its manufactured products (except Detector **W** Lamps which carry specific warranties) 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 Warranty applies to proper use of the equipment by the customer and may be voided if, in the opinion of Photovac Incorporated, 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.

Photovac and its vendors disclaim any implied warranties 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.

When Photovac is made aware of a problem in Snapshot which 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.

If, upon receipt of the equipment, Photovac determines that repair or replacement should be done under Warranty, Photovac's sole liability shall be for labor and materials necessary to put the equipment into proper order and return it to the Customer as promptly as possible. In lieu of repair or replacement, Photovac may at its sole discretion, issue credit for any **product or** part returned which Photovac's examination shall disclose to its satisfaction to have been defective. Photovac is in no way responsible for any inconvenience or loss, consequential or incidental, caused to the Customer as a result of the equipment being out of commission.

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