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LITERATURE NUMBER MPD 38131

*hydro flame™*

**SACO-2 Carbon Monoxide Detector  
 MONITOR**

**Owner's Information Manual**

ENGLISH

•Operation •Maintenance  
 Effective 5/17/01


**GENERAL INFORMATION**

The SACO-2 Carbon Monoxide Detector monitors the presence of CO (carbon monoxide) with an electrochemical sensor. It is not influenced by humidity, natural gas or LPG (liquefied petroleum gas). It will measure the concentration of CO between 1-999 PPM (parts per million) with a resolution of 1 PPM and factors in a small zero float. Typical battery life of this monitor is 500 hours when used with an alkaline battery. This device can be used by professional technicians and experts to detect CO build up in industrial and residential environments. It is able to detect CO in living areas, garage and around gas burner appliances. The detector will only indicate the presence of carbon monoxide gas at the sensor. Carbon monoxide may be present in other areas.

- The detector indicates the presence of Carbon Monoxide in two ways:
- By displaying a reading in PPM concentrations of carbon monoxide on the LCD (liquid crystal display).
  - By emitting an audible beep when carbon monoxide is present in excess of 40 PPM.

**GENERAL DESCRIPTION OF CARBON MONOXIDE**

Carbon Monoxide (CO) is an odorless, colorless gas that is formed as a result of incomplete combustion of carbon based fuels (wood, coal, gasoline, LP Gas, etc.). When fuel is burned Carbon (C) and Oxygen (O) will normally combine to form Carbon Dioxide (CO<sub>2</sub>). If there is insufficient oxygen, due perhaps to a restricted air flow, CO is formed. Internal combustion engines and propane gas fired appliances are typical sources of carbon monoxide.

 <b>WARNING</b>
<b>Actuation of this device indicates the presence of carbon monoxide (CO) which can be FATAL.</b>
<b>WHEN MONITOR BEEPS:</b> If anyone has a headache or an upset stomach call the Fire Department immediately and move to a location which has fresh air. <b>DO A HEAD COUNT TO CHECK THAT ALL PERSONS ARE ACCOUNTED FOR. DO NOT RE-ENTER PREMISES UNTIL IT HAS BEEN AIRED OUT AND THE PROBLEM CORRECTED!</b> If no one exhibits symptoms of discomfort associated with CO poisoning, simply: <ul style="list-style-type: none"> <li>• Turn off appliances and other sources of combustion - furnace, water heater, range (wood, coal or kerosene burning) stove, heater or fireplace, RV, generator, automobile.</li> <li>• Call a qualified technician and have the problem fixed before restarting appliances, the vehicle, and other sources of combustion.</li> <li>• Immediately get fresh air into premises, RV or vehicle.</li> </ul>

**EFFECTS ON HUMANS**

CO is absorbed by the lungs and reacts with blood hemoglobin to form carboxyhemoglobin (COHb), which reduces the oxygen carrying capacity of the blood. If the concentration of CO in air exceeds 2,000 ppm, which corresponds to 0.2%, it can be fatal in a matter of minutes. In smaller quantities carbon monoxide will cause a series of symptoms such as fatigue, headache, nausea, dizziness, collapse and eventually death. The progression and intensity of these symptoms depends on the time of exposure and the concentration of CO present in the environment.

Many cases of reported CO poisoning indicate that while victims are aware they are not feeling well, they become so disoriented they are unable to save themselves by either exiting the building or calling for assistance. Also young children and household pets may be the first affected.

**LEARN AND RECOGNIZE THE EFFECTS OF CO POISONING.**

CONCENTRATION OF CO IN AIR	INSTRUCTIONS
0-1 PPM	Normal background levels.
9 PPM	ASHRAE standard 62-1989 for living areas
50 PPM	OSHA enclosed space 8 hour average level
100 PPM	OSHA exposure limit
200 PPM	Slight headaches, fatigue, dizziness and nausea after 2-3 hours.
400 PPM	Frontal headaches within 1-2 hours, life threatening after 3 hours.
800 PPM	Dizziness, nausea and convulsions within 45 minutes. Unconsciousness within 2 hours. Death within 2-3 hours.

\*PPM = parts per million

U.S. Department of Labor, Occupational Safety & Health Administration (OSHA) Regulation 1917.24: "The CO content in any enclosed space shall be maintained at not more than 50 PPM (0.005%). Remove employees from enclosed space if the CO concentration exceeds 100 PPM (0.01%)."

The table above refers to healthy adults. Anyone with a health condition may find lower levels of CO more dangerous than shown in this chart.

**COMMON SOURCES OF CO**

- Common sources of potential dangerous levels of CO are:
- Poorly maintained furnaces, gas heaters or fireplaces.
  - Dirty or plugged chimneys or flue exhausts.
  - Poorly maintained gas, oil or kerosene appliances.
  - Internal combustion engines (e.g., automobiles, lawn mowers and blowers).

APPLIANCE	FUEL	TYPICAL PROBLEMS
Ranges Ovens	Natural Gas LP Gas	<ul style="list-style-type: none"> <li>• Not enough air to burn fuel</li> <li>• Improperly adjusted burner</li> <li>• Misuse as a room heater</li> <li>• System not properly vented</li> </ul>
Water Heaters	Natural Gas LP Gas	<ul style="list-style-type: none"> <li>• Not enough air to burn fuel</li> <li>• Improperly adjusted burner</li> <li>• Misuse as a room heater</li> <li>• Systems not properly vented or blocked vent</li> </ul>
Stoves Fireplaces	Natural Gas LP Gas Wood Coal	<ul style="list-style-type: none"> <li>• Not enough air to burn fuel</li> <li>• Improperly adjusted burner</li> <li>• Cracked firebox</li> <li>• System not properly vented or blocked vent</li> </ul>

## FEATURES

- The detector indicates the presence of CO by a reading on the LCD and by sounding a beeper.
- Large LCD displays CO levels between 0 and 999 PPM.
- Beeper sounds 3 times continuously between 30-400 PPM.
- Above 400 PPM, the beeper sounds 5 times continuously.
- Bright back-light allows easy screen viewing under dim lighting conditions.
- Battery life indicator (fuel gauge).
- Automatic power off after 10 minutes.
- Max mode stores and displays the maximum CO level taken during sample time.
- CO level beeper can be silenced if desired.
- Sensor malfunction checking.
- 9V battery is easy to replace.

## OPERATIONS

- |  |                            |
|--|----------------------------|
| 1 CO Sensor                                    | 9 Battery life indicator   |
| 2 LSR (light sensitive resistor)               | 10 Sensor malfunction icon |
| 3 LCD (liquefied crystal display)              | 11 Mute beeper icon        |
| 4 "MAX" reading button                         | 12 Beeper                  |
| 5 "ON/OFF" power button                        | 13 Battery connector       |
| 6 Concentration of CO reading                  | 14 Battery door            |
| 7 Sampling display or ERR - end of useful life | 15 Battery 9 volt          |
| 8 Max reading mode icon                        |                            |

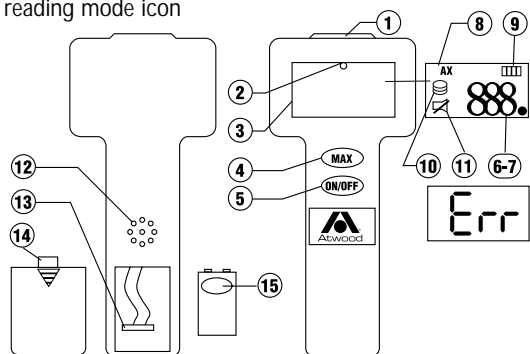


Fig. 1

## BATTERY INSTALLATION AND SELF TEST

1. Open the battery door and install the battery FIG 1.
2. Close the battery door.
3. Turn the detector on by pressing the ON/OFF button FIG 1.
4. The detector beeps twice, then performs a self-test. The display shows all the icons then shuts them off and counts down from 9 to 0.
5. Normal display will show the battery life indicator and the PPM display amount. A small solid dot will flash every 3 seconds showing that the unit is working correctly.
6. The unit will then be ready to automatically detect CO concentration levels.

## SELF TESTING

1. The detector will self-test each time the ON button is pushed.
2. If the battery power is below the level required to power the detector, the detector will emit a beep and show **Lb** (indicating low battery) in the display window and the battery icon will show level or empty bars. This indicates you must replace the battery.
3. If the detector shows **Err** and the sensor malfunction icon shows on the display, the sensor has been damaged or failed. See warranty for action.

## ESTABLISHING A BASELINE

1. Before testing for CO, the detector establishes a baseline against which the detector compares other environments.
2. Do this by turning on the detector in a clean environment.
3. If the detector reads between 0-6 PPM, it does not establish a new baseline, but starts taking CO measurement.

## MAXIMUM READING

1. To obtain the maximum reading of CO press the **MAX** button, the beeper emits one chirp and the **MAX** icon will display in the top left corner of the display.
2. The reading on the LCD refers to the maximum value, which has been detected by the unit.
3. After a few seconds the display will restore back to normal test mode and the **MAX** icon will disappear.

## MUTING THE BEEPER

1. To mute the beeper, press the **MAX** button for more than 2 seconds.
2. The mute beeper icon will appear on the bottom left corner of the LCD.
3. To re-enable the beeper, press the **ON/OFF** button, this will turn the detector off and then back on.

## AUTO BACK LIGHT

1. If the ambient light is too low (making the LCD difficult to read), the LCD back light will automatically turn on.
2. The back light will automatically turn off when there is sufficient light.

## AUTOMATIC POWER OFF

1. The detector will automatically turns off after 10 minutes of none-use.

## SPECIFICATIONS

- MEASUREMENT RANGE: .....0-999 PPM, (above 999 PPM display OL)
- SENSITIVITY: .....1 PPM
- ACCURACY: .....±2% full scale (at temperature: 70°F-78°F (21°C-64°C))
- RESPONSE: .....60 seconds @ 90% of final value
- TYPICAL SENSOR LIFE: .....more than 10 years
- BATTERY: .....9 volt
- OPERATING TEMPERATURE: ..23° F - 104° F (-5° C - 40° C)
- OPERATING HUMIDITY: .....0-97% relative humidity (non-condensing)
- WEIGHT: .....5.2 ounce (150 grams)
- DIMENSIONS: .....7 x 2.3 x 2" (180 x 60 x 50 mm) approximately
- RECOVERY TIME: .....<30 PPM = 1 min <999 PPM = >2 min.

## MAINTENANCE

1. The detector requires no calibration or servicing.
2. If detector does not operate check battery conditions and replace with new battery.
3. If detector still does not operate properly destroy and discard the CO monitor.

## STORAGE AND SHIPPING

Transportation by sea, land and air is acceptable for this product. During shipping, care should be taken to avoid collision, rain, snow and mixture of corrosive materials. During the loading and unloading, strictly prohibit the throwing of product. The product should be stored in a clean room with the ambient temperature of 23° F - 104° F (-5° C - 40° C). Relative humidity of no more than 95% and free from any corrosive vapors and harmful impurities in the air.

## WARRANTY

Atwood Mobile Products® warrants its carbon monoxide monitor to be free from defects in material and workmanship for a period of 90 days from the date of purchase by the Original Purchaser. "Original Purchaser" is that person who purchases a new carbon monoxide monitor for his own use. If there is any defect in the manufacturing of, or failure of any such monitor which is reported within the aforesaid ninety day period, Atwood will, within a reasonable time and without charge, make repairs and replacements as needed. In no case shall liability under any other remedy prescribed by law exceed the purchase price. Your monitor is not a substitute for Property, Disability, Life or other insurance coverage: appropriate insurance coverage is the owner's responsibility.