

CONTINUOUS GAS MONITOR
MODEL MX241
DESCRIPTION AND USE

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1. GENERAL

- 1.01 This section describes the MX241 continuous gas monitor. A continuous duty oxygen monitor and toxic/combustible gas monitor for testing and monitoring manholes and cable vaults. The unit has a liquid crystal display (LCD), an audio indicator (alarm buzzer), solid state circuitry, and rechargeable nickel cadmium battery pack in a stainless steel case. (See figure 1)
- 1.02 Whenever this section is reissued, the reason will be listed in this paragraph.
- 1.03 Before the operation of the MX241 continuous gas monitor, the technician must be familiar with the following procedures: THE USE OF THE CONTINUOUS GAS MONITOR DOES NOT ELIMINATE THE NEED TO VENTILATE THE MANHOLE.

SW 620-135-010 - Warning Devices - Use Guarding Work Areas
SW 620-135-100 - Outside Plant - Guarding Work Areas Description And Use
SW 620-140-501 - Testing And Ventilating Manholes
SW 620-102-010 - Outside Plant - Precautions - Underground And Buried Work

PROPRIETARY

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Fig. 1 - Model MX241 Gas Monitor

2. DESCRIPTION

- 2.01 The MX241 is a continuous-duty oxygen monitor and combustible gas monitor. A 3-1/2 digit liquid crystal display shows the percentage of oxygen in the air or the percent of lower explosive limit (LEL) of combustible gases present.
- 2.02 An audible alarm in the MX241 will sound to warn the user if the oxygen percentage falls below 19.5 or if the percent LEL of combustibles exceeds 10. These alarms are constantly sensing the atmosphere.
- 2.03 The alarm will also sound when the instrument has exhausted its battery power or when a sensor has malfunctioned. For a malfunction, the display will be blank except for a digit 1 on the far left. The display for low battery will be the same, with the addition of a small arrow pointing to the phrase LOW BATT on the faceplate.

- 2.04 Combustible gas detection is accomplished by means of a catalytic diffusion-type sensor that consists of two wound platinum wire elements covered with porous refractory. One element is active; the other is a reference. The combustible gas concentration as a percent of the LEL is shown by the display when the pushbutton switch in the right side of the case is pressed. An integral audible alarm, which will sound if the concentration of combustible gases exceeds a set point, is provided.
- 2.05 Oxygen monitoring is accomplished by means of a micro fuel cell that provides a current proportional to the concentration of oxygen in the air. The interaction of electrodes and electrolyte within the fuel cell depends on the presence of oxygen. The LCD constantly displays the concentration of oxygen as a percent of the total atmospheric volume. An alarm will sound if the concentration of oxygen in the air is reduced below 19.5%.

3. CAUTION STATEMENTS

- 3.01 Certain conditions or failure to observe certain necessary procedures will impair the performance of the instrument. These are outlined below to be read and understood by any person using the instrument.
- (a) Oxygen deficient atmosphere will cause erroneous low determinations of the combustible gas content of the air.
 - (b) Oxygen-enriched atmosphere will cause erroneous high determinations of the combustible gas content of the air.
 - (c) If the monitor has been exposed to 100% or greater LEL return the unit to the local work facility for recalibration.
 - (d) Silicone compound vapors and sulfur compound vapors will cause erroneous combustible determinations. Verify the calibration of an instrument that has been used where these vapors were present before that instrument is re-used. The sensor should be replaced by qualified repair technicians if the instrument cannot be properly calibrated.
 - (e) Any rapid up-scale reading followed by a declining or erratic reading, or reading greater than 100% LEL, may indicate a gas concentration beyond the accurate response range of the sensor. Either take immediate corrective action to eliminate this potential hazard or withdraw from the work area.
 - (f) Readings that are either negative or greater than 100% LEL, may indicate an explosive concentration of combustible gas. These readings may also indicate instrument malfunction. Leave the work site immediately. Re-check work site with another instrument before proceeding with work.

(g) Obstructions of the screened sensor ports will cause erroneous low readings. These screens must be kept clean. Refer to paragraph 6.02 to clean or replace screens.

(h) Calibration for oxygen should be made at the approximate temperature at which the unit will be used.

4. TESTING AND SETTING UP MONITOR

4.01 The tests and monitor adjustments described in paragraphs 4.02 through 4.04 shall be made each day before the monitor is used to test a manhole or cable vault. Some shall be made more often as indicated.



Fig. 2 - Hand Aspirator Assembly

4.02 **ASPIRATOR BULB TEST:** Test the bulb to determine whether it is in working order, as follows:

- (a) Remove the bulb and short hose from the indicator.
- (b) Hold finger tightly over end of hose.
- (c) Squeeze and release the bulb.

NOTE: If bulb inflates in less than 10 seconds, replace the bulb before making further tests and then repeat test in paragraph 4.02.

- (d) If bulb operates satisfactorily (remains deflated for at least 10 seconds), reattach the short hose to the monitor and proceed.

- 4.03 SAMPLING HOSE TEST: Attach the 10-foot sampling hose to the monitor; constrict or plug the free end of the hose to prevent air from being drawn in the end. Squeeze the aspirator bulb and place a finger firmly over the outlet valve of the bulb. The bulb inflates quickly, there is a leak in the hose and it must be replaced.
- 4.04 HOSE CONTAMINATION TEST: Test the hose to determine whether it is contaminated by combustible gases or vapors, as follows.

Draw fresh air through the monitor (about eight squeezes of the bulb). The display should read zero. If more than a slight fluctuation of the digital display occurs, the inside of the hose may be contaminated with gas from a previous test. The hose generally can be cleared by aspirating fresh air through it or by flushing with nitrogen. This test should be repeated if the hose has been subjected to a heavy concentration of gas. Replace if conditions can not be corrected.

5. OPERATION

- 5.01 To turn on the MX241 gas monitor, unscrew the knurled collar on the carrying strap mounting post. The calibration cover may be pulled away from the instrument case top. A pin on the calibration cover disengages from the on/off switch inside the case, and the instrument turns on. Spin the calibration cover so that its pin is in the access hole for the span and oxygen adjustment potentiometer. Tighten down the knurled collar. The instrument is now ready for use. The readout will continually display the percent of oxygen present. Combustible gases are also constantly monitored. The display may be switched from oxygen to combustibles by depressing the recessed switch to the right of the readout on the side of the case. On the CO260, this switch turns on display back lighting, for reading in darkened areas. Before proceeding to use the instrument, make sure that the batteries are charged and that the instrument has been properly calibrated.

WARNING: Under no circumstances should the calibration of an MX241 gas monitor be performed in the field. DO NOT make any attempt to adjust the MX241 gas monitor calibration potentiometers. Return to instrument to local work center for recalibration.

- 5.02 Before entering the manhole, place the free end of the sampling hose in the manhole (cover removed); draw the atmosphere to be tested through the monitor until the highest oxygen and lowest LEL and CO reading is obtained. Make sure that the end of the sampling hose never touched water in the manhole. About eight squeezes of the bulb is sufficient. See Figure 2.

- 5.03 The digits on the scale of the meter are in percent of the lower explosive limit (LEL) of the combustible gas-air mixture being tested. A reading between 0 and 100 percent shows how closely the atmosphere approaches the minimum concentration required for an explosion. Readings above the alarm level of 10% LEL indicate an explosive potential.
- 5.04 Testing with the monitor in the manhole. The gas monitor may be used in the manhole only after a test made from the street indicates that the manhole atmosphere is satisfactory and the manhole has been properly ventilated as described in section 620-140-501. THE USE OF A CONTINUOUS GAS MONITOR DOES NOT ELIMINATE THE NEED FOR PROPER VENTILATION.
- 5.05 Before entering the manhole:
- (a) Verify to see if monitors are on. (Monitors are to be in the on position for the entire work operation while in the manhole.)
 - (b) Test for oxygen and combustible gas. If gas is detected, do not enter manhole and continue ventilation.

Readings below 19 1/2% oxygen and above 10% combustible indicate unsatisfactory atmosphere. Follow the procedure as outlined in Section 620-140-501.

6. MAINTENANCE

- 6.01 CHARGING BATTERIES: A completely discharged battery's full potential will be restored by 14 hours of charging. There is no danger of overcharging the batteries when using the constant current battery chargers supplied with the instrument. (See Figure 3) Instrument in off position during charging operation.

Apparent reductions in battery capacity may result from repetitive use patterns. A fully charged battery that does not deliver energy for at least 8 hours of continuous monitoring may have developed a "memory" condition. To eradicate this, entirely discharge and fully recharge the battery. The memory effect can be avoided by using the monitor for varied periods of time.

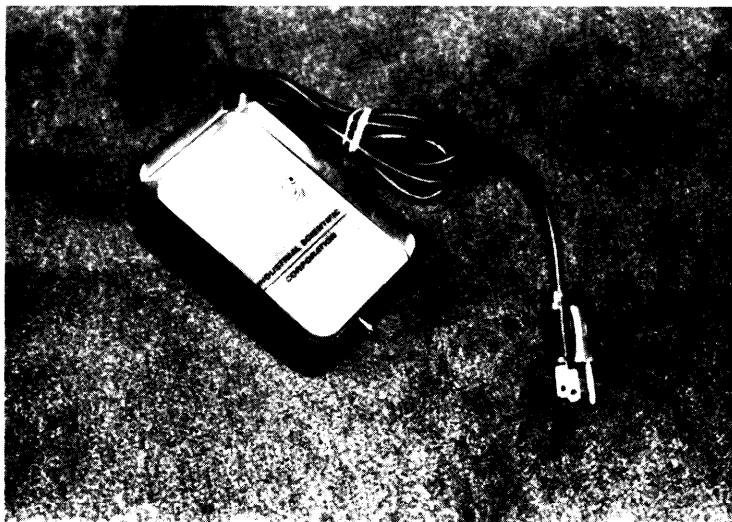


Fig. 3 - Single Unit Instrument Charger

- 6.02 CLEANING AND REPLACING SCREEN: The stainless steel screens protect the audible alarm and detectors from direct impact. The screens can be removed by taking out the three screws which hold the cover on the beveled surface of the instrument. Once removed, the screens can be cleaned by shaking them or by using forced air pressure. Solvents should not be used since they may interfere with the detectors.
- 6.03 CALIBRATION PROCEDURE: The instrument calibration potentiometers are accessed through holes in the end of the case top. To reveal these holes, loosen the knurled collar on the strap mounting post and swing aside the potentiometer access cover. After calibration is completed, place the potentiometer access cover in its operating position and tighten the knurled collar. Do not make adjustment to these potentiometer until you have become familiar with the complete calibration procedure.