

## B GAS INDICATOR DESCRIPTION AND USE

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### 1. GENERAL

1.01 This section describes the B Gas Indicator (AT-7862) used in testing for the presence of natural gas, gasoline vapors, and other combustible gases.

1.02 This section is reissued to incorporate the color coded meter face used on the B Gas Indicator and add minor revisions.

### 2. DESCRIPTION

2.01 The B Gas Indicator illustrated in Fig. 1 operates on the principle of the Wheatstone bridge. The arms of the bridge consist of a detector filament and three resistors. These elements, together with the indicating meter and six (flashlight) KS-14711 (Primary) Batteries, are housed in a metal case. The indicator weighs about 4 pounds. The following additional equipment is supplied with the indicator:

- Aspirator Bulb with check valve and hose
- Sampling Hose (15 feet long) and couplings
- Spare Filament Unit

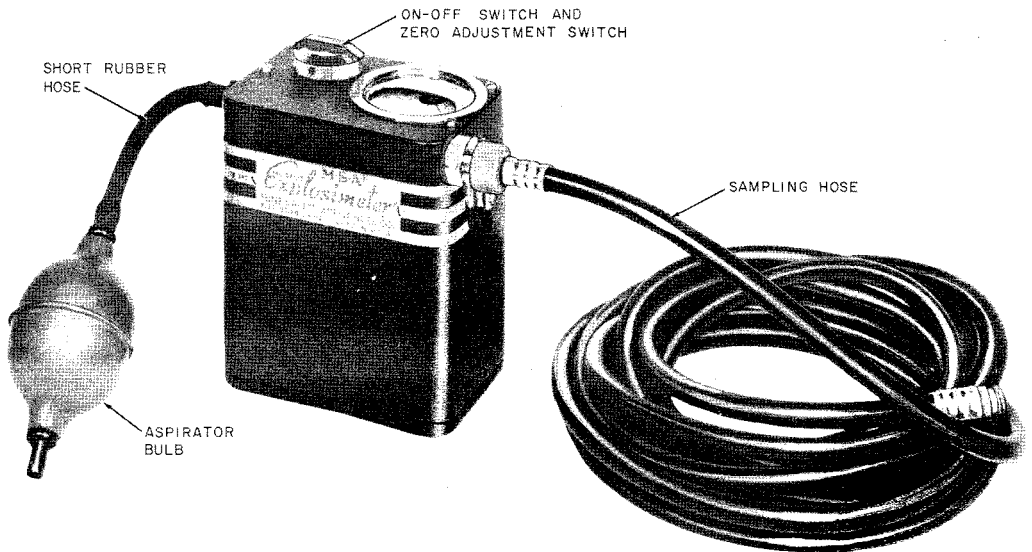


Fig. 1—B Gas Indicator

Spare Cotton Filters

Carrying Strap

An optional part (not included) is an inhibitor filter used to avoid false readings when testing for gasoline vapors. The inhibitor filter must be ordered separately.

**2.02** When a mixture of air and combustible gas is drawn into the filament chamber, the hot filament burns the gas, which raises the temperature of the filament and thereby increases its electrical resistance. The change in resistance unbalances the bridge, causing current to flow through the meter. The magnitude of the current flow is directly proportional to the percentage of combustible gas up to the lower explosive limit in the mixture drawn through the filament chamber.

### 3. TESTING AND SETTING UP INDICATOR

**3.01** The tests and indicator adjustments outlined in 3.02 through 3.09 shall be made each day before the indicator is used to test a manhole or cable vault. Some shall be made more often as indicated.

**3.02 Test for Gastightness:** Test the aspirator bulb, its short hose, and the indicator to determine if all are gastight and the bulb outlet valve is operating properly. See Fig. 2 for location of various fittings. Place one finger over the inlet fitting, squeeze and release the bulb. The bulb should remain deflated for at least 10 seconds. If it does so these items are satisfactory, proceed to 3.05 to test the filter. If the bulb inflates in less than 10 seconds, there is a leak either in the aspirator bulb, its short hose, or the indicator which must be corrected before the indicator is used. Proceed as described in 3.03.

**3.03 Aspirator Bulb Test:** Test the bulb to determine whether it is in working order, as follows:

- (1) Remove the bulb and short hose from the indicator.
- (2) Hold finger tightly over end of hose.
- (3) Squeeze and release the bulb.

**Note:** If bulb inflates in less than 10 seconds, replace the bulb before making further tests and then repeat 3.02.

(4) If bulb operates satisfactorily, (remains deflated for at least 10 seconds), reattach the short hose to the indicator and proceed as described in 3.04.

**3.04 Indicator Gastightness:** If the leaks cannot be stopped by tightening the fittings and the filament unit, return the indicator for repair in accordance with local routine. If it is corrected proceed as described in 3.05.

**3.05 Filter Tests:** Remove the inlet fitting and examine the chamber to be sure that it contains a filter. Then squeeze the bulb with the sampling hose detached. If the bulb does not inflate within 5 seconds, replace the filter and repeat the test.

**3.06 Adjustment of Indicator:** These adjustments should be made before each test and as discussed in 4.05.

- (1) Raise the left end of the ON-OFF bar on the rheostat knob and turn the knob one-quarter turn in a clockwise direction.
- (2) Flush the indicator with the sampling hose detached by squeezing the aspirator bulb about five times.
- (3) Rotate the rheostat knob until the needle comes to rest at zero (0).

**3.07 Gas Test:** The B Gas Indicator should be tested only with the B or C Gas Test Kit (081 Division of the Plant Series Practices). This test should also be made after the indicator has been subjected to a high concentration of gas as outlined in Section 620-140-501. Return defective indicators for repair in accordance with local routine. Flush indicator again after testing.

**3.08 Sampling Hose Test:** Attach the 15-foot sampling hose to the indicator, 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 should not inflate in less than 10 seconds. If the bulb inflates quickly, there

is a leak in the hose or hose fittings. If tightening the hose fitting does not stop the leak, the hose must be replaced.

**3.09 Hose Contamination Test:** Test the hose to determine whether it is contaminated by combustible gases or vapors as follows:

- (1) Adjust indicator as described in 3.06. Be sure the sampling hose is firmly attached to the indicator by tightening the knurled nut by hand.
- (2) Draw fresh air through the indicator (about eight squeezes of the bulb). The needle should rest at zero. If more than a slight fluctuation of the needle 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.

**Note:** The meter needle will fluctuate slightly each time the bulb is squeezed, an indication of normal operation. The correct reading is the point where the needle rests for a few moments after squeezing is stopped.

#### 4. OPERATION

**4.01** Before entering the manhole, place the free end of the sampling hose in the manhole (cover removed), and draw the atmosphere to be tested through the indicator until the highest reading is obtained. Make sure that the end of the sampling hose never touches water in the manhole. About eight squeezes of the bulb is sufficient.

**4.02** The graduations on the scale of the meter are in percent of the lower explosive limit of the combustible gas-air mixture being tested. The B Gas Indicator now being supplied has a nonlinear meter which expands the lower portion of the scale for easier reading. Indicators previously supplied have the standard meter. A deflection of the needle between 0 and 100 percent shows how closely the atmosphere approaches the minimum concentration required for an explosion. If the needle is deflected to the extreme right-hand side of the scale and remains there, the concentration of gas is in the explosive range.

**4.03** The meter face of the indicator is color coded, as shown in Fig. 2, with a green band from 0 to 10 percent and a red band beyond 10 percent. These colors indicate satisfactory and unsatisfactory atmospheres, respectively, as discussed in Section 620-140-501.

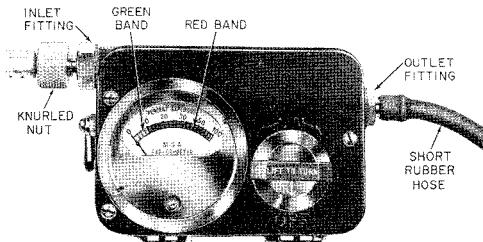


Fig. 2—Location of Fittings—B Gas Indicator

**4.04** If the needle moves rapidly to the extreme right of the scale and then returns to a position on the scale or below zero, it indicates that the concentration of combustible gas may be above the upper explosive limit. To verify this, immediately aspirate fresh air through the indicator; if the needle moves first to the extreme right and then to the left end of the scale, it indicates that the concentration of combustible gas in the sample is above the upper explosive limit.

**4.05** In making a series of tests, the balance adjustment should be checked at 3-minute intervals during the first 10 minutes of testing and every 10 minutes thereafter.

**4.06 Testing for gasoline vapors:** In some areas, frequent testing for gasoline vapor may be necessary. In this case the indicator must be equipped with an inhibitor filter. This is done as follows:

- (1) Remove the inlet fitting.
- (2) Remove the cotton filter from the chamber.
- (3) Crush the inhibitor filter.
- (4) Place the crushed filter in the chamber.
- (5) Replace the inlet fitting.

**4.07** When gasoline vapor is tested, the inhibitor filter should be used only one day. After gasoline vapor tests are completed, the hose and instrument should be thoroughly cleaned by flushing with fresh air or dry nitrogen.

**4.08** If an indicator with a cotton filter has been used to test for gasoline vapor, it should be cleaned immediately by flushing with fresh air or dry nitrogen and the cotton filter replaced. If this is not done, the lead content of the vapor may deposit on the detector filament, affecting the sensitivity of the instrument. Also the sampling tube must be purged thoroughly to prevent false readings due to vapor adherence in the tube.

**4.09 *Testing with the Indicator in the Manhole:***

The gas indicator may be used in the manhole only after a test made from the street indicates that the manhole atmosphere is satisfactory and proper ventilation (at least two minutes initially) is provided as outlined in Section 620-140-501. Before entering the manhole, tie the free end of the sampling hose without connector to the top rung of the manhole guard. Lower the other end into the manhole for subsequent use in adjusting the indicator. Adjust the setting of the needle in the manhole as follows:

- (1) Attach the sampling hose to the indicator.
- (2) Turn the set on.
- (3) Flush the indicator by squeezing the aspirator bulb about eight times.
- (4) Adjust the rheostat until the needle comes to rest at zero.
- (5) Detach the sampling hose and test for combustible gas. If gas is detected, leave manhole and continue ventilation.

**4.10** To turn off the indicator, rotate the rheostat knob counterclockwise until the arrow on the knob points to OFF and the locking bar drops into position. To prolong the life of the batteries and filament, the switch should be kept in the OFF position except when the instrument is in use.

**5. MAINTENANCE**

**5.01 *Batteries (Primary):*** Six KS-14711 Batteries are located in the bottom of the case. The

batteries should be replaced as a group. The position of the arrow on the rheostat gives an approximate indication of the condition of the batteries as follows:

- (a) The batteries are exhausted when the meter needle remains below zero and cannot be brought up to zero when the rheostat is turned to its extreme clockwise position. Remove exhausted batteries as soon as possible to avoid serious damage resulting from corroded or leaking batteries.
- (b) When batteries are nearly exhausted, the arrow on the rheostat knob will point toward the outlet side of the indicator (high percentage side of meter).
- (c) With fresh batteries in the case and the circuit balanced, the arrow on the rheostat knob should point toward the inlet side of the indicator (low percentage side of the meter).

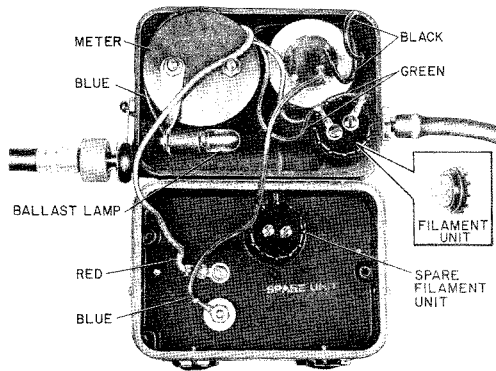
**5.02** To replace the batteries, loosen the two thumbscrews in the bottom of the case and remove the case. The batteries operate in parallel and should be installed with their tops toward the top of the battery compartment.

**5.03 *Detector Unit:*** If the meter needle moves to the extreme right side of the scale when the indicator is turned on and cannot be adjusted to zero, it indicates that the filament is burned out and should be replaced.

**5.04** To replace the filament unit, refer to Fig. 3 and proceed as follows:

- (1) Loosen the three cover mounting screws at the top of the case and remove the cover.
- (2) Disconnect the two green wires from the terminals at the base of the filament unit.
- (3) Unscrew the filament unit counterclockwise.
- (4) Screw the replacing unit tightly in the combustion chamber, making sure that the gasket is clean and properly seated.
- (5) Reconnect the two green wires to the terminals at the base of the filament unit.
- (6) Remount the cover, insert and securely tighten the three screws.

**Note:** As shown in Fig. 3, space is provided in the top of the case for a spare filament unit.



**Fig. 3—Interior of B Gas Indicator**

**5.05 Ballast Lamp:** This lamp must be kept screwed firmly in the socket. In case of failure or breakage, it should be replaced.

**5.06** The replacement of batteries, filament, filters, hoses, aspirator bulb, and ballast lamp, is the only repair work to be performed in the field.

**5.07 Filter Chamber:** The filter chamber is located in the inlet opening and is reached by unscrewing the inlet fitting. Remove the cotton filter after every four weeks in ordinary use or

immediately after encountering gasoline vapors. If inhibitor filters are used, they should be replaced after each day of testing gasoline vapors.

**5.08 Meter:** When the indicator is not in operation, the meter should rest at zero. If the mechanical adjustment of the needle has been disturbed, reset the needle by turning the small screw at the bottom of the meter using a screwdriver.

**5.09 Flow Regulating Orifice:** The orifice controlling the rate of flow through the indicator is located in the aspirator bulb coupling. It can be screwed out after the rubber tubing is removed. Clean the orifice, if clogged, by pushing a fine wire through its opening.

## 6. REPLACEMENT PARTS

**6.01 Placement Parts:** The following is a list of replacement parts available:

Lamp, Ballast

Unit, Filament

Filter, Cotton (pk of 6)

Bulb, Aspirator

Hose, 15 ft.

Tube, Bulb, Aspirator

**6.02** Orders should be worded:

(Name of Part), for B Gas Indicator