

## G GAS INDICATOR

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### 1. GENERAL

**1.01** This section describes the G Gas Indicator (AT-8226) used in testing for the presence of natural gases, gasoline vapors and other similar combustible gases.

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

### 2. DESCRIPTION

**2.01** The G Gas Indicator, shown in Fig. 1, is a single-filament, hot-wire gas indicator. It consists of a Wheatstone bridge type detecting element, an indicating meter with a light to facilitate reading at night, and a battery holder housed in a plastic case. An aspirator bulb, a 15-foot length of sampling hose, and carrying straps are provided with the indicator. The indicator weighs about 4 pounds.

**2.02** The electrical circuit is a balanced Wheatstone bridge in which one leg is a platinum element known as a filament. There are two filaments housed in a single block as shown in Fig. 2. One sealed chamber houses a spare filament covered with a plastic cap. The other chamber houses the active filament and is arranged so that air or gas can be drawn through it. When a combustible air-gas mixture is drawn through the chamber containing the active filament, the mixture ignites on the surface of the active filament, increasing

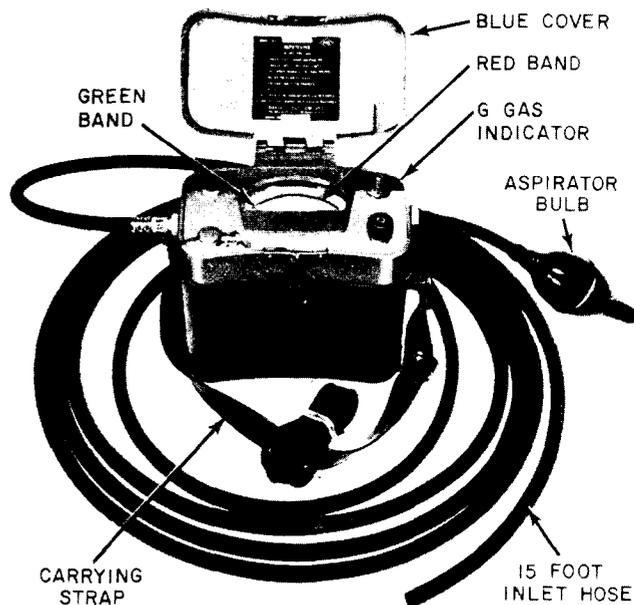


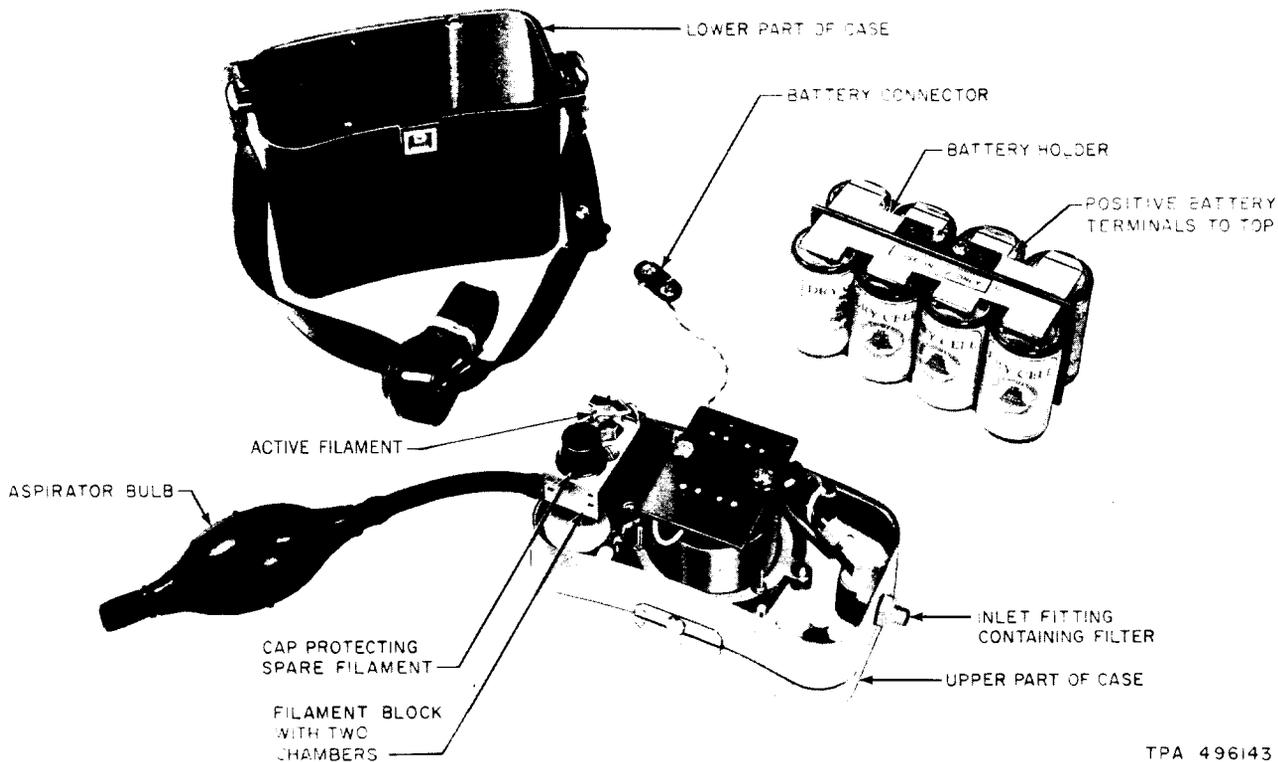
Fig. 1—G Gas Indicator

its temperature and thereby increasing its electrical resistance. The change in resistance unbalances the bridge, causing current to flow through the meter. The amount of current which flows through the meter is directly proportional to the percentage of gas (by volume) present up to the lower flammability limit (often called lower explosive limit). The current necessary to operate the indicator is supplied by the eight type D flashlight batteries contained in the battery holder, as shown in Fig. 2.

### 3. TESTING AND SETTING UP INDICATOR

**3.01** The tests outlined in 3.02 through 3.10 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. 3 for location of various fittings. Place one finger over the inlet fitting, squeeze and release the bulb. The bulb



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Fig. 2—G Gas Indicator (inside view)

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 and 3.04.

**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 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 leak 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:** Examine the inlet fitting 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 the Indicator:** These adjustments should be made before each test and as discussed in 4.06. The location of the ON-OFF switch, zero adjustment knob, and indicating

meter are shown in Fig. 3. Adjust the G Gas Indicator in free air as follows:

- (1) Operate the ON-OFF switch to ON.
- (2) Squeeze the bulb about five times to flush the indicator.
- (3) Lift the knob marked 0 and adjust the meter pointer to zero.

**3.07 Gas Test:** The G 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 the 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 through 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. Next be sure the sampling hose is firmly attached to the indicator by tightening the 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.

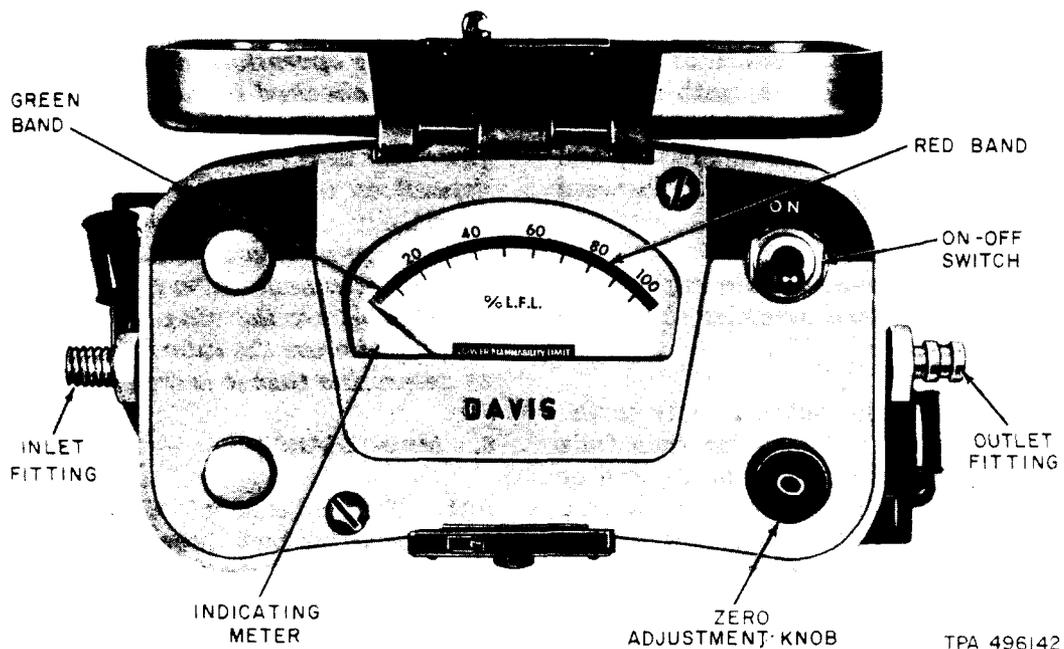


Fig. 3—G Gas Indicator (top view)

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**3.10** To turn off the indicator, operate the ON-OFF switch to the OFF position or close the cover of the case. To prolong the life of the batteries, the ON-OFF switch should be in the OFF position except when the indicator is being adjusted or tests are being made.

### 4. OPERATION

**4.01 *Placing Sampling Hose:*** 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 (about eight squeezes of the bulb is sufficient). Make sure that the free end of the sampling hose never touches water in the manhole.

**4.02** If, in testing the atmosphere an indication of gas is obtained and the needle does not move beyond the graduated scale, keep aspirating until the highest reading is obtained. The needle will fluctuate slightly at each aspiration, indicating that the instrument is functioning properly.

**4.03** ♦The graduations of the scale of the meter are in percent of the lower flammability limit (often called lower explosive limit) of the combustible gas in the atmosphere being tested.♦ A deflection of the needle between 0 and 100 shows how closely the atmosphere approaches the minimum concentration required for an explosion.

**4.04** ♦The meter face of the indicator is color coded, as shown in Fig. 3, 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.♦

**4.05** *If the needle moves to the right-hand end of the scale and remains there, the atmosphere is explosive.*

**Note:** If the needle moves rapidly to the right-hand end of the scale and then falls back to a point on the scale or to zero or below, it indicates that the mixture is very rich and may be above the upper flammability 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 flammable gas is above the upper flammability limit.

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

### **4.07 *Testing With the Indicator in the Manhole:***

The gas indicator may be used in the manhole provided 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 to the top rung of the manhole guard. The other end should be lowered 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 zero adjustment knob until the needle comes to rest at zero.
- (5) Detach the sampling hose and test for combustible gas (if atmosphere is unsatisfactory, leave manhole and continue ventilation).

**4.08** *The operation of the indicator shall not be checked by sampling the vapors from a gasoline container or with acetylene or propane gas. The lead content of gasoline vapors may deposit on the detector filament affecting the sensitivity of the instrument. Acetylene and propane gases could cause damaging flashback in the instrument. Also these gases and vapors could adhere to the sampling hose causing false readings unless the tube is purged and checked to determine that it is free of contamination.*

### 5. MAINTENANCE

**5.01** The replacement of batteries, filaments, aspirator bulb, hose, filters and other parts listed in 6.01 are the only repairs to be made in the field.

**5.02** To open the case for replacement of batteries or filaments, remove the captive flathead screws positioned diagonally on the face of the

instrument, and remove the upper portion which contains the meter and switches.

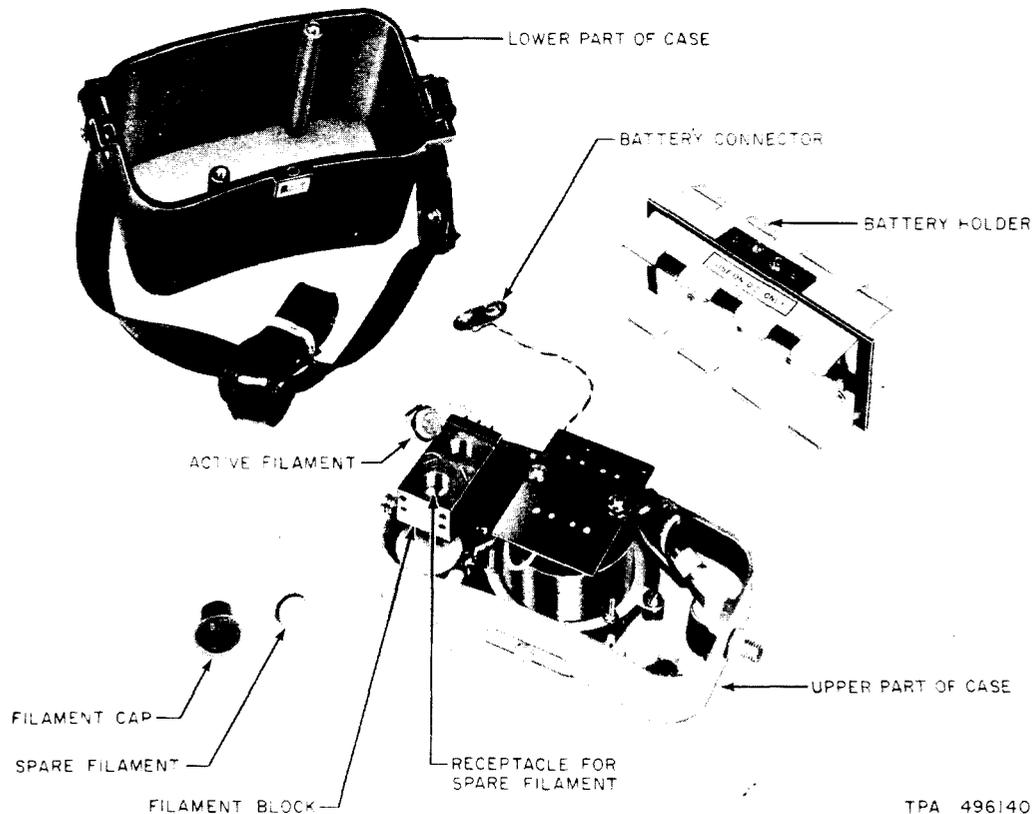
**5.03** The eight flashlight dry batteries are contained in the battery holder shown in Fig. 4. To remove them, first unsnap the battery connector from the battery holder and remove the holder from the lower part of the case. Pull the batteries out of the spring clips securing them in the battery holder and replace them with KS-14711 Dry Batteries or any quality commercial leak resistant batteries. In an emergency, KS-6522 Dry Batteries may be used but should be removed at the conclusion of the testing. The batteries should be replaced as a group when the meter pointer can no longer be adjusted to zero. Remove dead batteries from the indicator as soon as possible to avoid serious damage which may result from corroded and leaking batteries.

**5.04** The filament block is located as shown in Fig. 4. A filament needs replacement if, with the ON-OFF switch in ON position (with

batteries in good condition), the needle of the meter cannot be adjusted to zero. If the needle remains at the right-hand end of the scale, the filament is burned out. To change the filament proceed as follows:

- (1) Loosen the screws holding the pigtails in the filament block.
- (2) Remove the filament. (The filament is hand-tight in the filament block with an O ring seal and may be removed without the use of tools.)
- (3) The spare filament is replaced in the filament block by reversing (1) and (2). Since polarity is not a factor, the leads cannot be reversed.

**5.05 Filter:** The inlet fitting filter is located at the outer end of the inlet fitting and consists of a small wad of absorbent cotton. If the filter is dirty or clogged, remove it with a pair of long-nose pliers or tweezers and replace with a new filter.



**Fig. 4—G Gas Indicator (inside view showing filaments)**

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**6. REPLACEMENT PARTS**

**6.01** The standard listing of replacement parts is given below.

Fitting, Inlet

Fitting, Outlet

Ring, "O"

pk Plug, Cotton

Filament

Bulb, Aspirator

Hose, Aspirator, 6 inch

Hose, 15 foot

Lamp, Miniature No. 359

Straps, Carrying

Battery, Dry, KS-14711

**Note 1:** "O" Ring for inlet and outlet fittings.

**Note 2:** Aspirator Bulb provided with check valve and 6 inch hose.

**6.02** Orders should be worded:

Battery, Dry, KS-14711

Lamp, Miniature No. 359 all others

(Name of Part) for G Gas Indicator