

## E GAS INDICATOR DESCRIPTION AND USE

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### 1. GENERAL

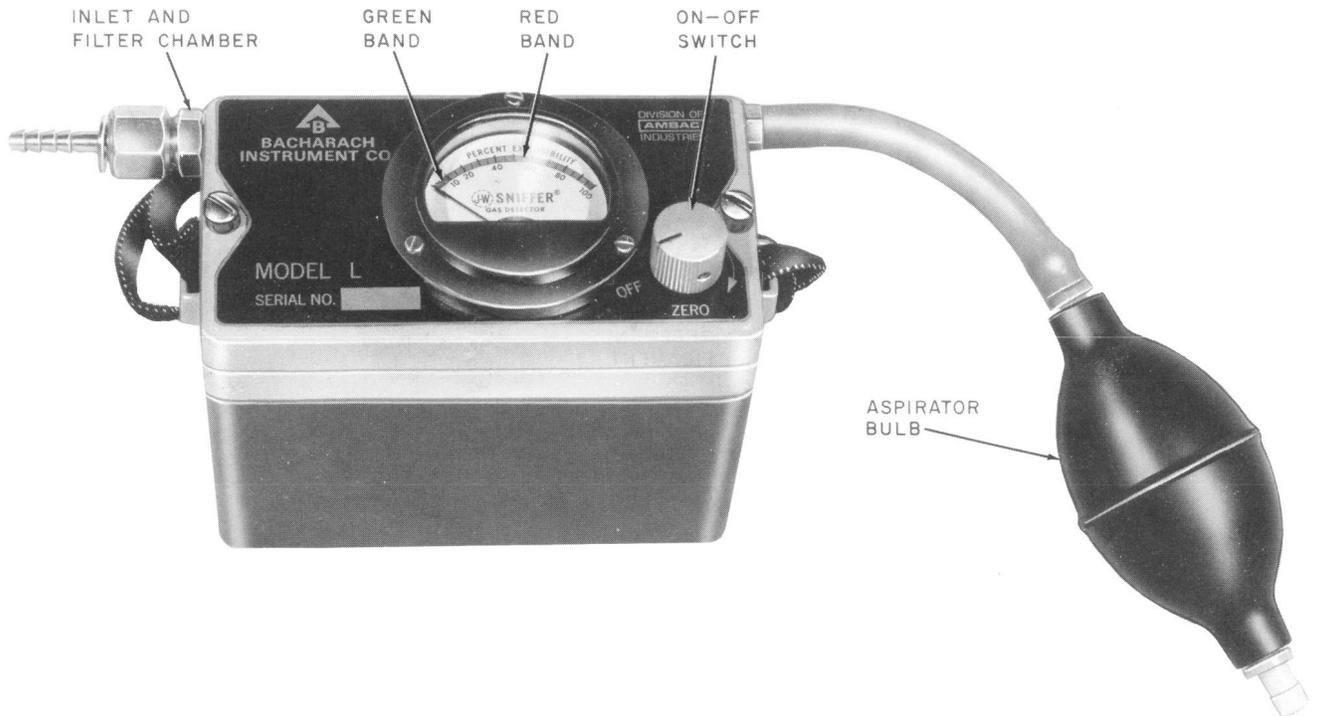
**1.01** This section describes the E gas indicator used in testing for the presence of natural gas, gasoline vapors, and similar combustible gases.

**1.02** This section is reissued to introduce and describe a new model of the E gas indicator. Since this is a general revision, arrows ordinarily used to indicate changes have been omitted.

### 2. DESCRIPTION

**2.01** The E gas indicator, illustrated in Fig. 1, weighs about 6 pounds. The following items are furnished with the indicator.

- (a) Aspirator bulb
- (b) Sampling hose, 15 feet long.



**Fig. 1—E Gas Indicator**

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**2.02** The indicator consists of the following items housed in a plastic and metal case (see Fig. 1 and 2).

- (a) Active filament
- (b) Reference filament
- (c) Zero adjustment
- (d) Gas detector meter
- (e) Battery holder.

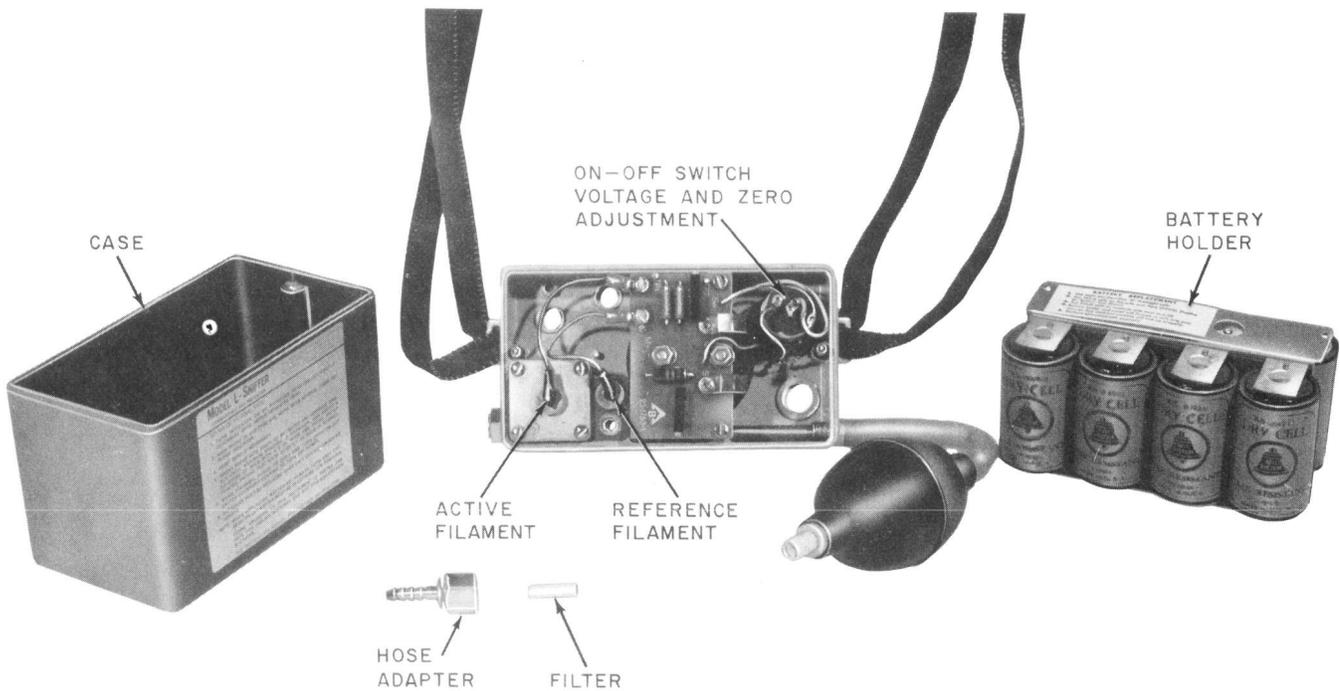
**2.03** The indicator operates on the principle of the Wheatstone bridge. When a mixture of air and combustible gas is drawn into the active filament chamber, the hot filament burns the gas, raises its temperature, and thereby increases its

electrical resistance. The change in resistance unbalances the bridge, causing current to flow through the meter. The magnitude of current flow is directly proportional to the percentage of combustible gas up to the lower explosive limit in the mixture passing through the filament chamber.

**2.04** The meter face of the indicator is color coded, as shown in Fig. 1, 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.

**3. TESTING AND SETTING UP INDICATOR**

**3.01** The tests described in 3.02 through 3.09 shall be made each day before the indicator is used. Some shall be made more often as indicated.



**Fig. 2—E Gas Indicator Disassembled**

**Note:** See instructions on back of case (Fig. 3).

**3.02 Test for Gastightness:** To test the aspirator bulb and the indicator to determine if both are gastight and the bulb outlet valve is operating properly:

- (1) Place one finger over the inlet fitting, squeeze and release the bulb.
- (2) The bulb should remain deflated for at least 10 seconds. If it does so, these items are satisfactory.
- (3) 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 or the indicator which must be corrected before the indicator is used.
- (4) 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 from the indicator.
- (2) Hold finger tightly over the open end of the bulb.
- (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 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 filter to be sure it is in place. Squeeze the bulb with the sampling hose detached. If the bulb does not inflate within 5 seconds, replace the filter and repeat the test.

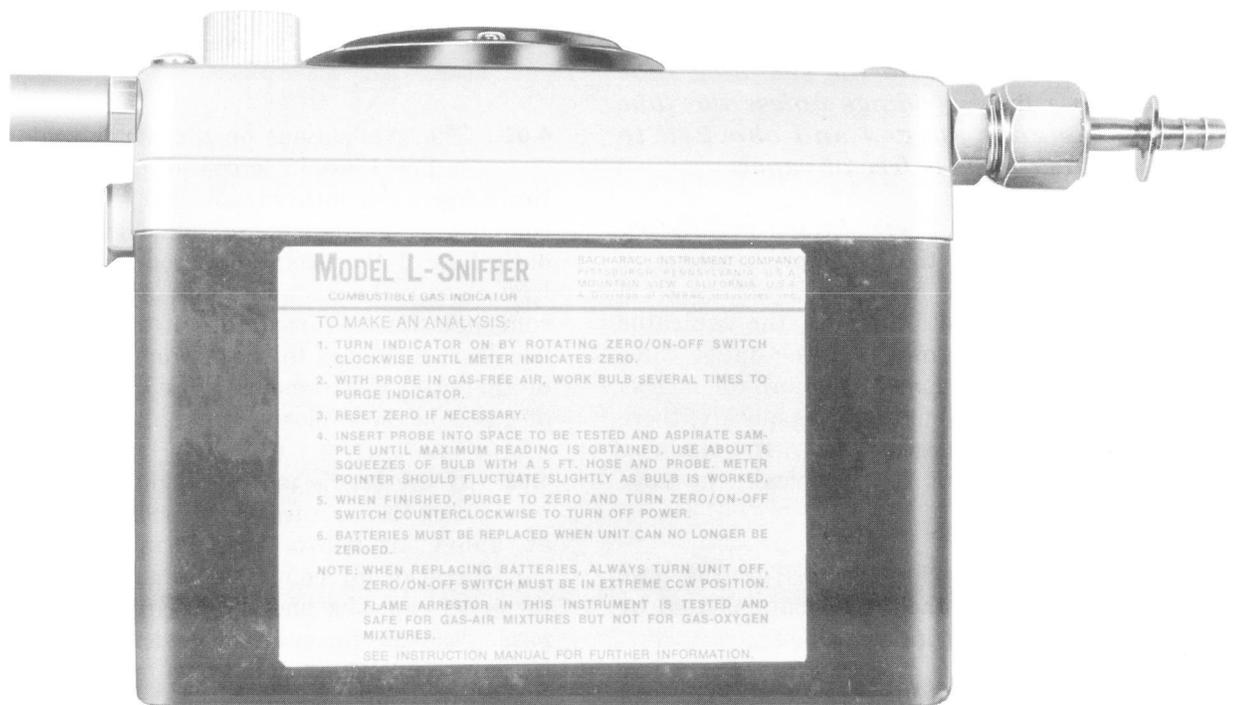


Fig. 3—E Gas Indicator—Operating Instructions

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

- (1) Flush the indicator by grasping the bulb in the hand and squeezing it five times.
- (2) To turn the instrument on, rotate the zero switch clockwise. When the batteries are good the meter needle can be advanced to the red band. With the needle in the red band, slowly turn the zero switch counterclockwise until the needle is in the green band on zero.

**3.07 Gas Test:** The E gas indicator should be tested only with the B or C gas test kit (Section 081-700-120). 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 test.

**Caution:** *The operation of the indicator should not be checked by sampling the vapors from a gasoline container. The lead content of the vapor may deposit on the detector filament, affecting the sensitivity of the instrument. Also, the gasoline vapors will adhere to the sampling tube and cause false readings unless the tube is thoroughly purged and checked to determine that it is free of vapor.*

**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 finger firmly over the outlet valve of the bulb. The bulb should not inflate in less than 30 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 nut by hand.

- (2) Draw fresh air through the indicator (about eight squeezes of the bulb). The needle should rest in green band 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:** Due to change in filament temperature 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** Place the free end of the sampling hose in the manhole (cover removed) and draw a sample of air 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.

**Note:** When additional hose is used, squeeze the bulb once for every 2 feet of additional hose.

**4.02** The graduations on the meter scale, shown in Fig. 1, are in percent of the lower explosive limit (decimal equivalents on older units) of combustible gases usually found in manholes. A deflection of the needle between 0 and 100 shows how closely the sample 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** If the needle moves rapidly across the scale and then returns to a position on the scale at, above, or below zero, it indicates that the concentration of combustible gas may be above the upper explosive limit. To verify this, immediately pass fresh air through the indicator; in so doing, 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.

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

The indicator, after being set up, may be used in a manhole, provided a preliminary test made from the street indicates that the manhole atmosphere is satisfactory and proper ventilation 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. (See note, 4.01)
- (4) Adjust the zero-on/off switch until the needle is at zero.
- (5) Detach the sampling hose and test for combustible gas (if atmosphere is unsatisfactory, leave manhole and continue ventilation).

As the zero adjustment is not affected when the indicator is turned off and on in making a series of tests, it need not be checked before each of the tests made in the manhole, provided the indicator is turned off after each test. The balance adjustment should be checked at 3-minute intervals during the first 10 minutes of testing and every 10 minutes thereafter.

**5. MAINTENANCE**

**5.01 Batteries:** The eight KS-14711 batteries are held in the battery holder located in the bottom of the case. To replace the batteries, remove the cover of the instrument and pull the battery holder out. The battery holder removed is shown in Fig. 2. Never remove holder by pulling on the contacts; if the holder sticks in the case, hold it upside down and tap it gently on a solid surface. After new batteries have been installed, replace the holder. The holder can be replaced in only one position. This eliminates the possibility of replacing the holder incorrectly in the case, resulting in an inoperable indicator. The batteries should be replaced as a group. The batteries are

exhausted when the needle does not move into the red band when the zero switch is rotated fully clockwise.

**5.02 Filaments:** There are two filaments in the E gas indicator.

- (a) The active filament is integral with the flame arrester and in the unit that comes in contact with the sample under test. It should last many months in normal service. Replacement is indicated when it is no longer possible to bring the needle to zero by turning the zero switch (with batteries in good condition). Another indication for replacement of active filament occurs when the needle flies violently upscale with the set on, or if zero adjustment is impossible.
- (b) The reference (or inactive) filament should rarely require replacement, but replacement may be required after very long service, or if the indicator has been dropped or otherwise damaged.

**5.03 Replacing the Active Filament:** To replace the filament flame arrester assembly (active unit), proceed as follows:

- (1) Remove the four screws holding the brass plate to the underside of the panel.
- (2) Remove the filament lead from the subpanel terminal.
- (3) Place new filament in place, making sure that the gasket is in its proper place.
- (4) Tighten the four screws evenly.
- (5) Reconnect the filament lead.

**5.04 Meter:** Erratic movement of the needle is an indication that the meter may be in trouble. Another sign of trouble is a tendency for the needle to stick or jump in its movement. The meter cannot be repaired in the field.

**5.05** Replacement of the batteries, filaments, filter, hose, aspirator bulb, and other parts listed in 6.01 are the only repairs to be done in the field.

**6. REPLACEMENT PARTS**

**6.01** The following items are available as replacement parts.

- Assembly, Holder, Battery
- Battery (Primary), KS-14711
- Bulb, Aspirator and Valve Assembly
- Coupling, Filter, Barbed
- Filament, with Flame Arrester
- Filament, Reference or Active
- Filter, Cellulose (package of 25)
- Hose, 15-Foot
- Nut, Filter Coupling

Tube, Aspirator

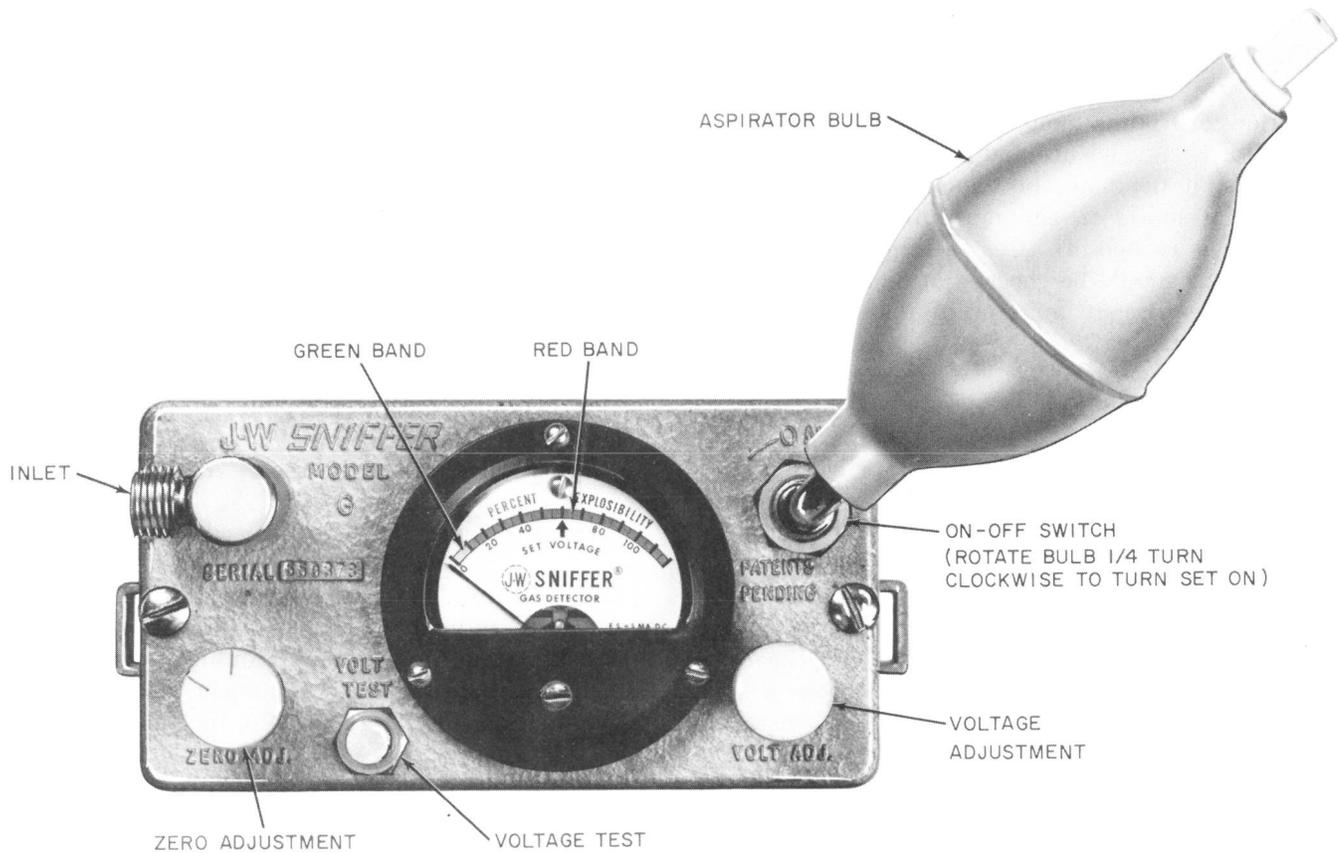
Washer, Flat, Filter Coupling

**6.02** Orders should be worded:

- Replacement Parts
- (Name of Part), for E Gas Indicator
- Replacement Cotton Filters
- PK Filter, Cellulose, for E Gas Indicator, Pk of 25

**7. SUPERSEDED E GAS INDICATOR**

**7.01** The superseded E gas indicator (Fig. 4 and 5) uses a separate filter chamber (not shown in illustration), a voltage adjustment, a separate zero adjustment and has the on-off switch attached to the bulb.



**Fig. 4—Superseded E Gas Indicator**

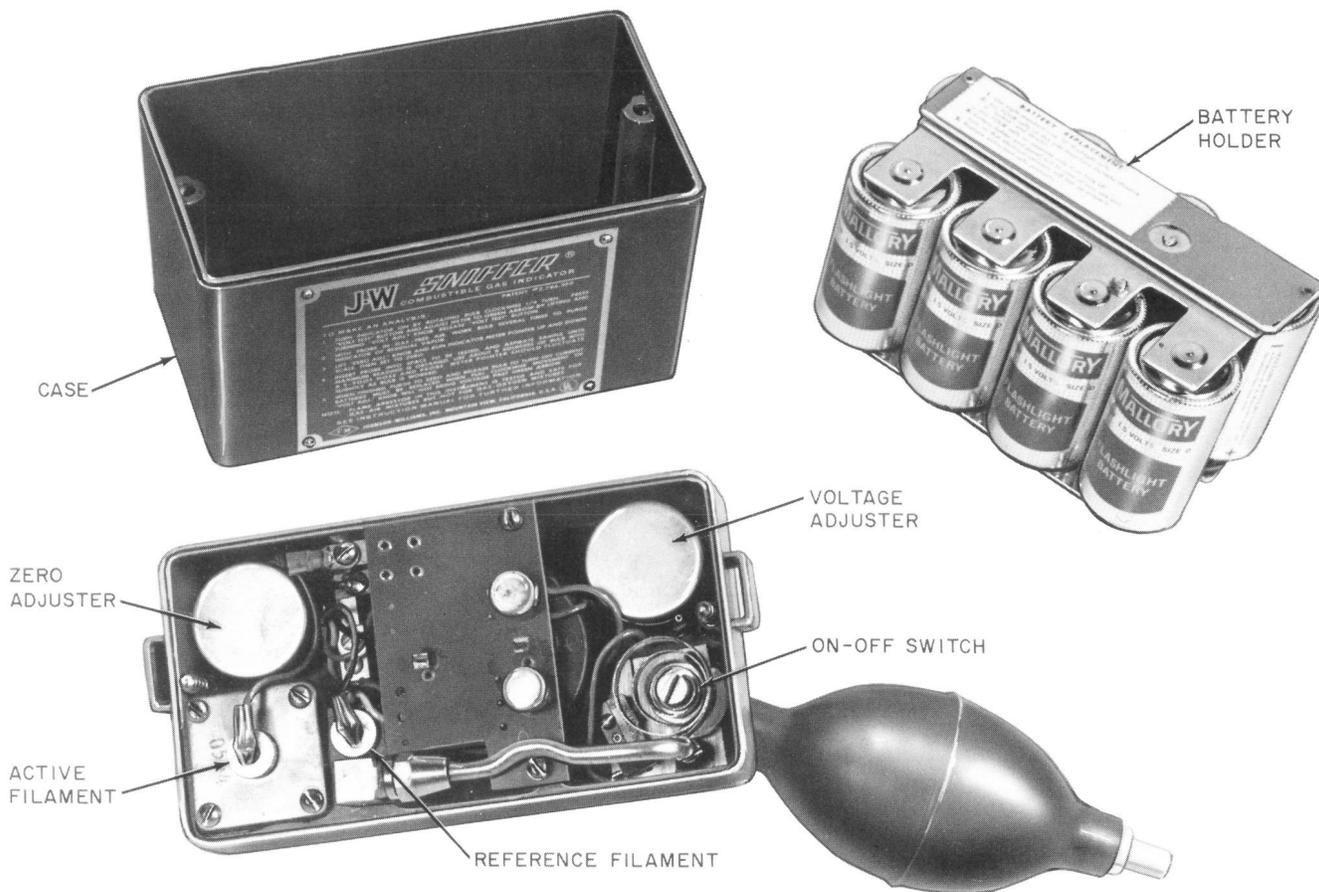


Fig. 5—Superseded E Gas Indicator Disassembled

7.02 The superseded instrument is tested the same as the new one except the voltage must be adjusted separately.

7.03 Operate the superseded indicator per Part 4.

7.05 The superseded indicator is maintained per Part 5.

**8. REPLACEMENT PARTS FOR SUPERSEDED INDICATOR**

8.01 The following items are available as replacement parts.

Battery (Primary), KS-14711

Bulb, Aspirator

Chamber, Filter

Filament, with Flame Arrester

Filter, Cotton (package of 24)

Gasket, Chamber, Filter

Holder, Battery

Hose, 15-Foot

Unit, Filament, Reference

8.02 Orders should be worded:

Replacement Parts

(Name of Part), for E Superseded Gas Indicator

Replacement Cotton Filters

Pk Filter, Cotton, for E Gas Indicator, Pk of 24