



# 3701

## Sensor/Transmitter

### INSTRUCTIONS

Installation & Operation of the AMC-3701  
Solid State Multi-gas Sensor/Transmitter

- CARBON MONOXIDE (CO)
- PROPANE
- METHANE (CH<sub>4</sub>)
- AMMONIA (NH<sub>3</sub>)
- FREON
- GASOLINE

#### IMPORTANT:

**Please read these installation and operating instructions completely and carefully before starting.**

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3251405B Manual\_amc3701\_transmitter solid state multi-gas.doc

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**NOTE**

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## 1 WARRANTY

The AMC-3701 Solid State Sensor/Transmitter is warranted against defects in material and workmanship for a period of one (1) year from date of shipment. During the warranty period, The Armstrong Monitoring Corporation will repair or replace components that prove to be defective in the opinion of AMC. We are not liable for auxiliary interfaced equipment, or consequential damage. This warranty shall not apply to any product, which has been modified in any way, which has been repaired by any other party other than a qualified technician or authorized AMC representative, or when such failure is due to misuse or conditions of use.

### 1.1 LIABILITY

All AMC products must be installed and maintained according to instructions. Only qualified technicians should install and maintain the equipment. AMC shall have no liability arising from auxiliary interfaced equipment, for consequential damage, or the installation and operation of this equipment. AMC shall have no liability for labour or freight costs, or any other costs or charges in excess of the amount of the invoice for the products.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, AND SPECIFICALLY THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THERE ARE NO WARRANTIES THAT EXTEND BEYOND THE DESCRIPTION ON THE FACE THEREOF.

### 1.2 MODIFICATIONS AND SUBSTITUTIONS

Due to an ongoing development program, AMC reserves the right to substitute components and change specifications at any time without incurring any obligations.

### 1.3 PRODUCT RETURN

All products returned for warranty service will be by prepaid freight and they will only be accepted with a repair number issued by AMC. All products returned to the client will be freight collect.

## WARNING

<p><b>USING ELECTRICALLY OPERATED EQUIPMENT NEAR GASOLINE, OR COMBUSTIBLE VAPOURS MAY RESULT IN FIRE OR EXPLOSION, CAUSING PERSONAL INJURY AND PROPERTY DAMAGE. CHECK TO ASSURE THE WORKING AREA IS FREE FROM SUCH HAZARDS DURING INSTALLATION OR WHEN PERFORMING MAINTENANCE, AND USE PROPER PRECAUTIONS.</b></p>
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## 2 PRODUCT INFORMATION

### 2.1 SENSOR/TRANSMITTER

Sensor/Transmitter Unit Order Number ..... \_\_\_\_\_

Sensor/Transmitter Part Number ..... \_\_\_\_\_

Sensor/Transmitter Serial Number ..... \_\_\_\_\_

Sensor Part Number ..... \_\_\_\_\_

Sensor Serial Number ..... \_\_\_\_\_

Power Supply Requirement ..... 12 to 26 VDC @ 250 mA

### 2.2 Factory CALIBRATION

Gas Type ..... \_\_\_\_\_

Range ..... \_\_\_\_\_

Clean air, at 4 mA signal ..... \_\_\_\_\_

Gas Concentration at 20 mA signal ..... \_\_\_\_\_

#### Note:

**All Armstrong Monitoring systems must be installed and maintained according to instructions, to ensure proper operation. Only qualified technicians should install and maintain the equipment.**



## 3 PRODUCT DESCRIPTION

### 3.1 GENERAL DESCRIPTION

The AMC-3701 Solid State sensor/transmitter is designed to provide continuous, reliable surveillance of surrounding air for traces of hazardous gases (listed in Factory Calibration). This unit provides a 4 to 20 mA, variable current signal which is proportional to the gas concentration detected. Each sensor/transmitter unit is factory calibrated and ready for field installation and operation.

#### 3.1.1 BASIC REQUIREMENTS

OPERATING TEMPERATURE:	0 to +40 °C (+32 to +102 °F)
OPERATING PRESSURE:	Ambient atmospheric pressure.
HUMIDITY:	0 to 99% RH, non-condensing.
SIGNAL OUTPUT LOAD:	250 Ohms maximum.
SIGNAL OUTPUT:	Linear approximation.

#### 3.1.2 SENSOR DETAILS

SENSOR TYPE:	Solid State.
RESPONSE TIME:	Less than 10 seconds.
ACCURACY/REPEATABILITY:	Within 8%.
EXPECTED SENSOR LIFE:	10 years ( continuous operation )
INITIAL BURN-IN TIME	24 hours

#### Note:

<b>Turn off power supply before removing or replacing the sensor/transmitter or sensor.</b>
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### 3.2 HOUSING OPTION

The AMC-3701 sensor/transmitter units are supplied in standard cast aluminum housings (see Figure 1).

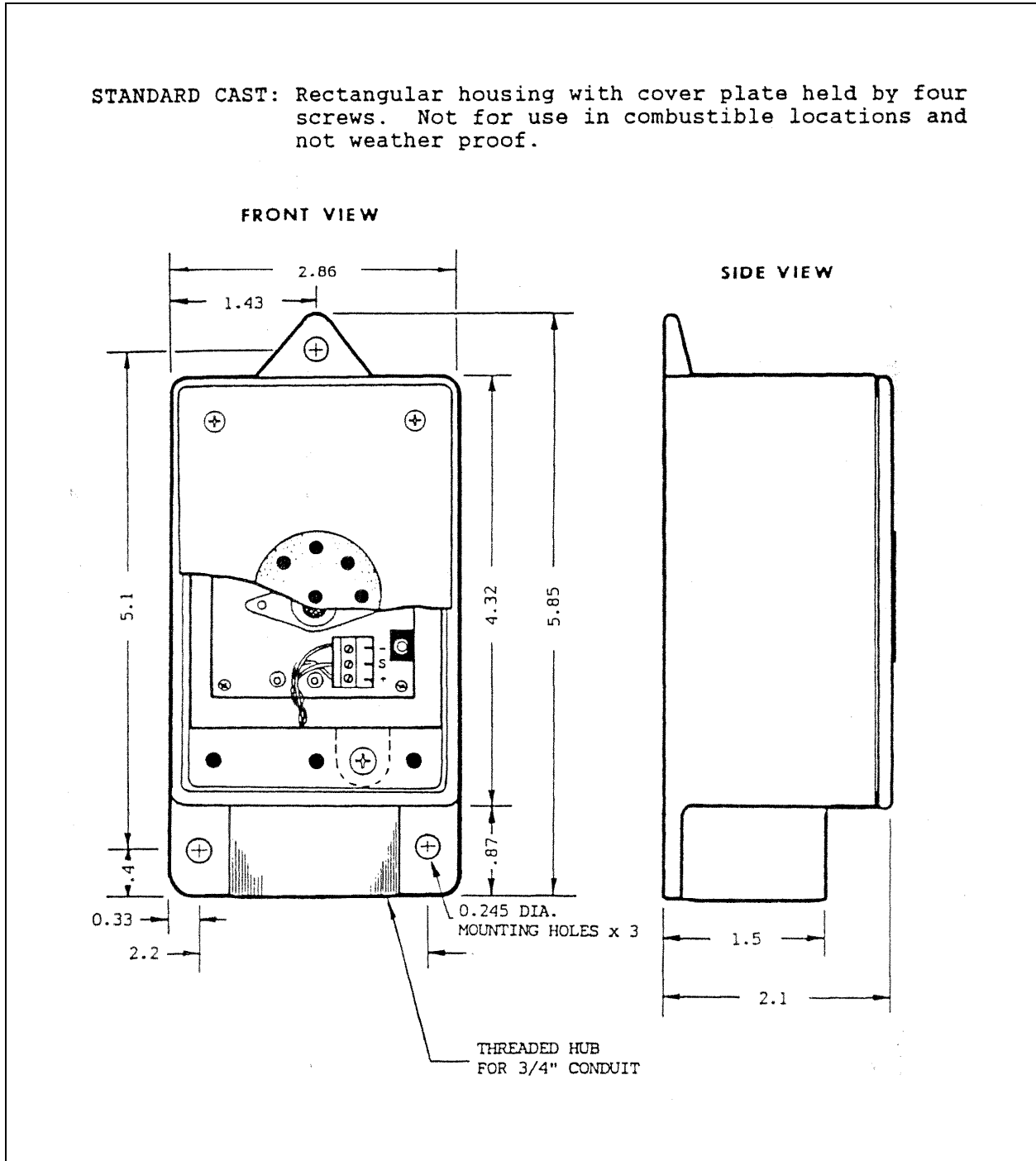


FIGURE 1: Housing option.



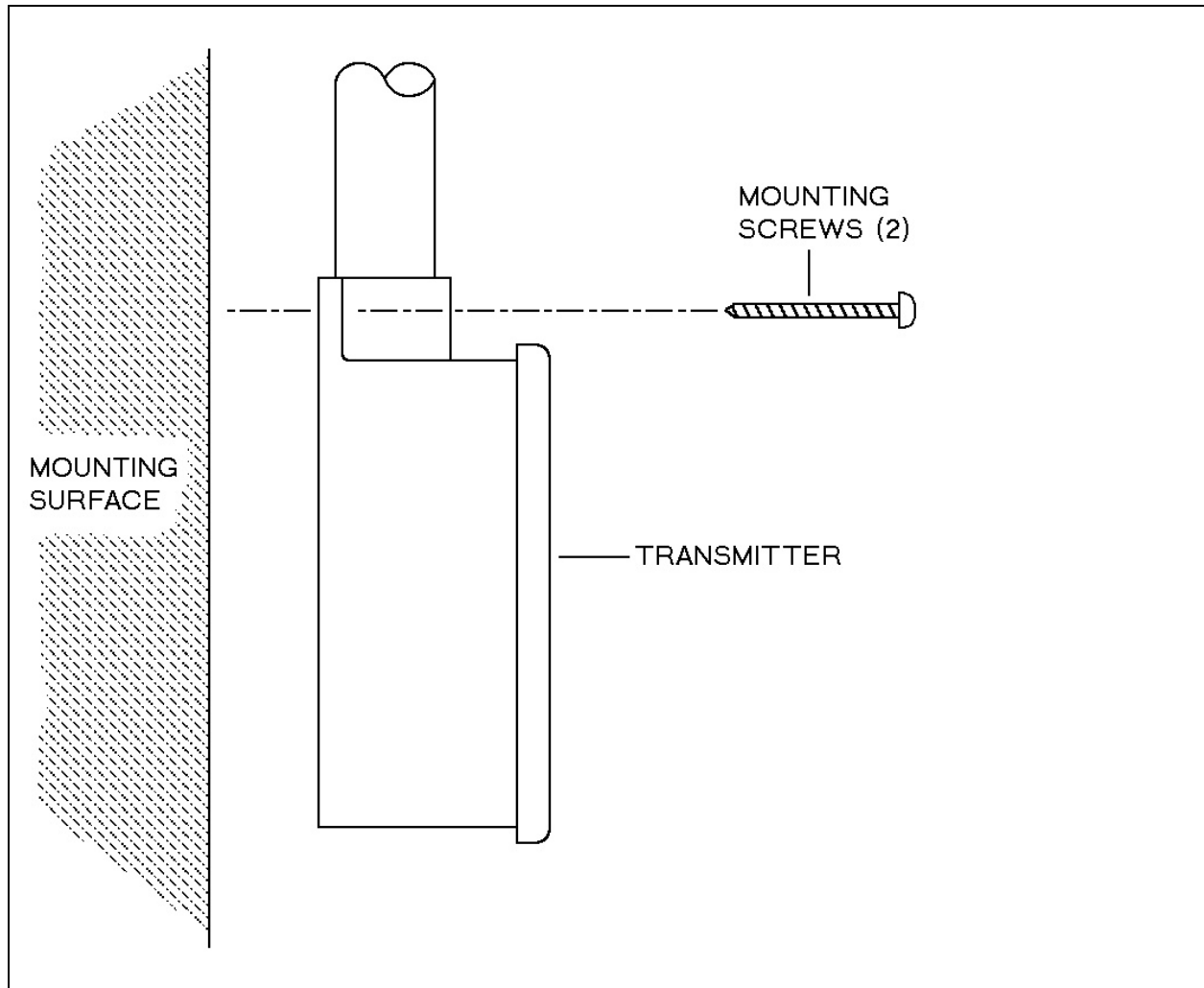
## 4 INSTALLATION

### 4.1 LOCATION AND MOUNTING

Mount the sensor/transmitter unit on a solid, non-vibrating surface or structure in an area where the local concentration of gas is unaffected by the presence of ventilation systems. The sensor housing SHOULD NOT touch the mounting surface. Mounting holes are provided on the transmitter housing (see Figures 1 & 2).

**Note:**

**Mounting arrangement of the sensor/transmitter housing depends on location of sensor/transmitter and mounting surface. Mounting hardware is not supplied.**



**FIGURE 2: Mounting of the sensor/transmitter housing**

## 4.2 CABLE SELECTION AND WIRING

Connection should be made using 3-conductor, shielded cable (shield must be grounded at the monitor). Run cable through steel conduit for best signal transmission and maximum noise rejection. Refer to Figure 5 to select cable length and wire gauge according to supply voltage.

### 4.2.1 TRANSMITTER TO AMC MONITOR WIRING

The sensor/transmitter output (-,S,+) terminal block connects to the (-,SIG,+) connections on a channel terminal block of an AMC monitor (one transmitter per channel). Refer to Figure 3.

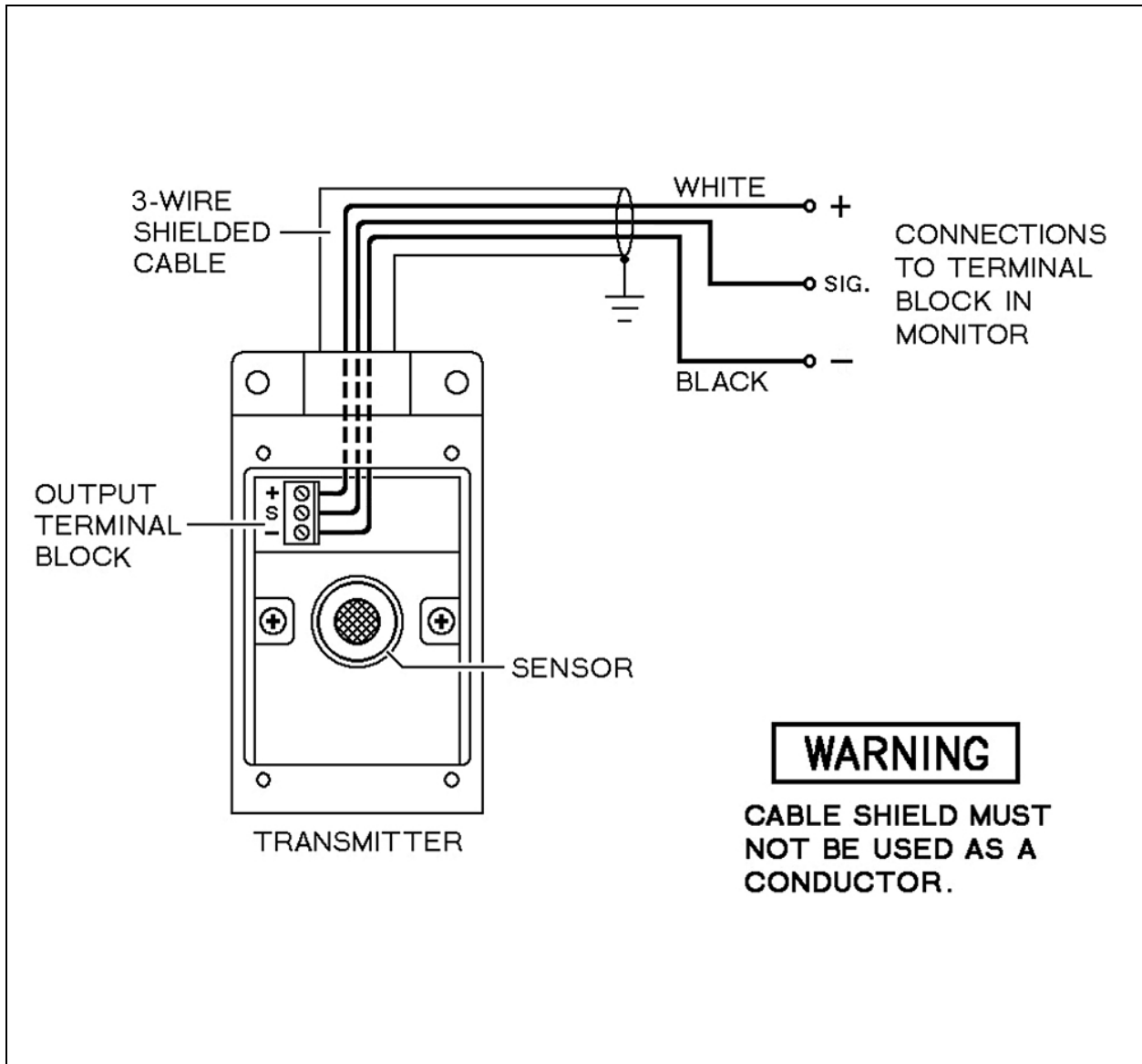


FIGURE 3: Sensor/transmitter to AMC monitor wiring layout.

#### 4.2.2 WIRING TO COMPUTER, DATALOGGER OR NON-AMC MONITOR

All Armstrong sensor/transmitters can be connected to computers or dataloggers through analog-to-digital converters, or to non-AMC monitors. The sensor/transmitter output (-,S,+) terminal block connects to a filtered DC power supply through field wiring (See Figure 4).

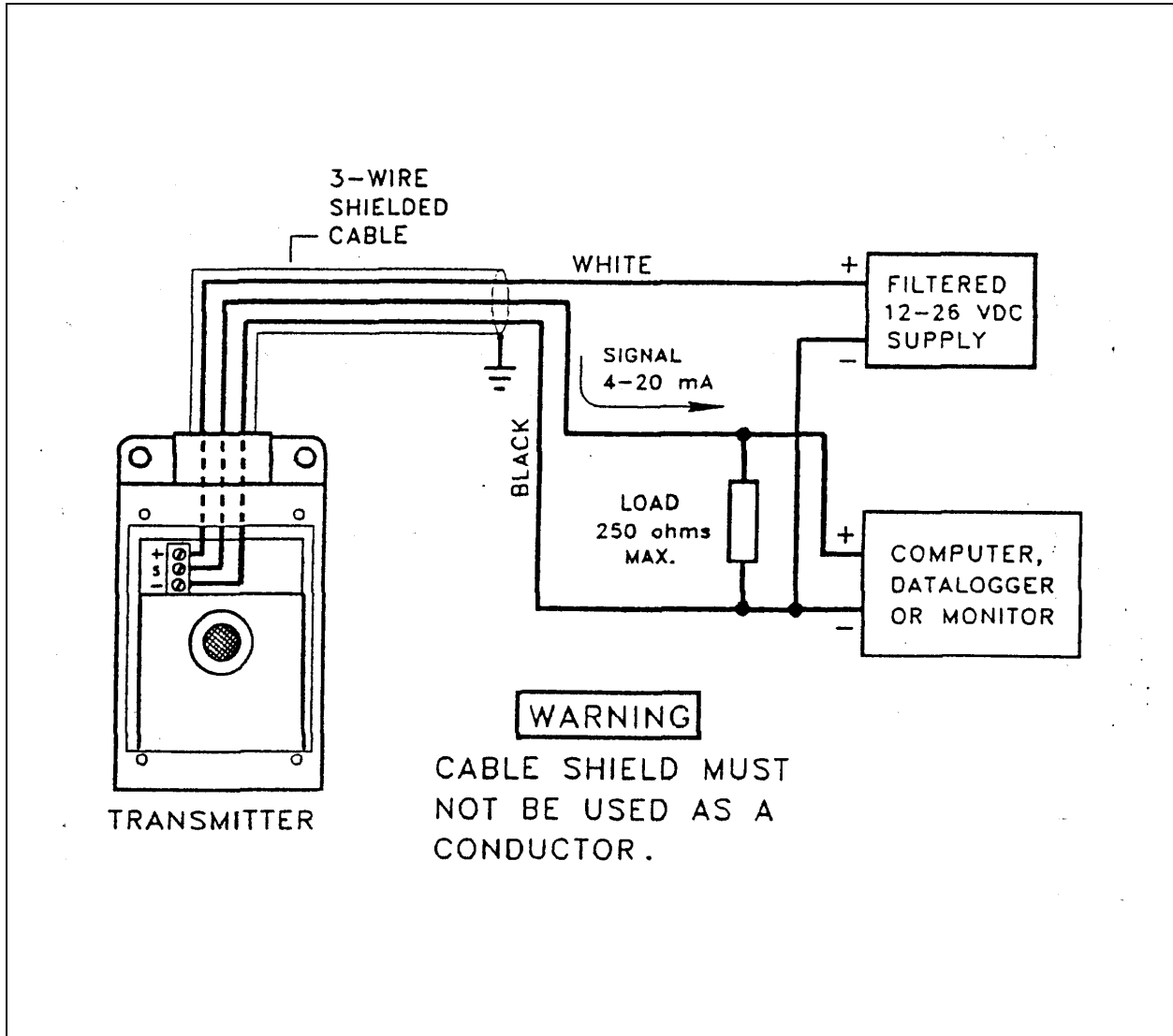


FIGURE 4: Wiring to computer, datalogger or non-AMC monitor.

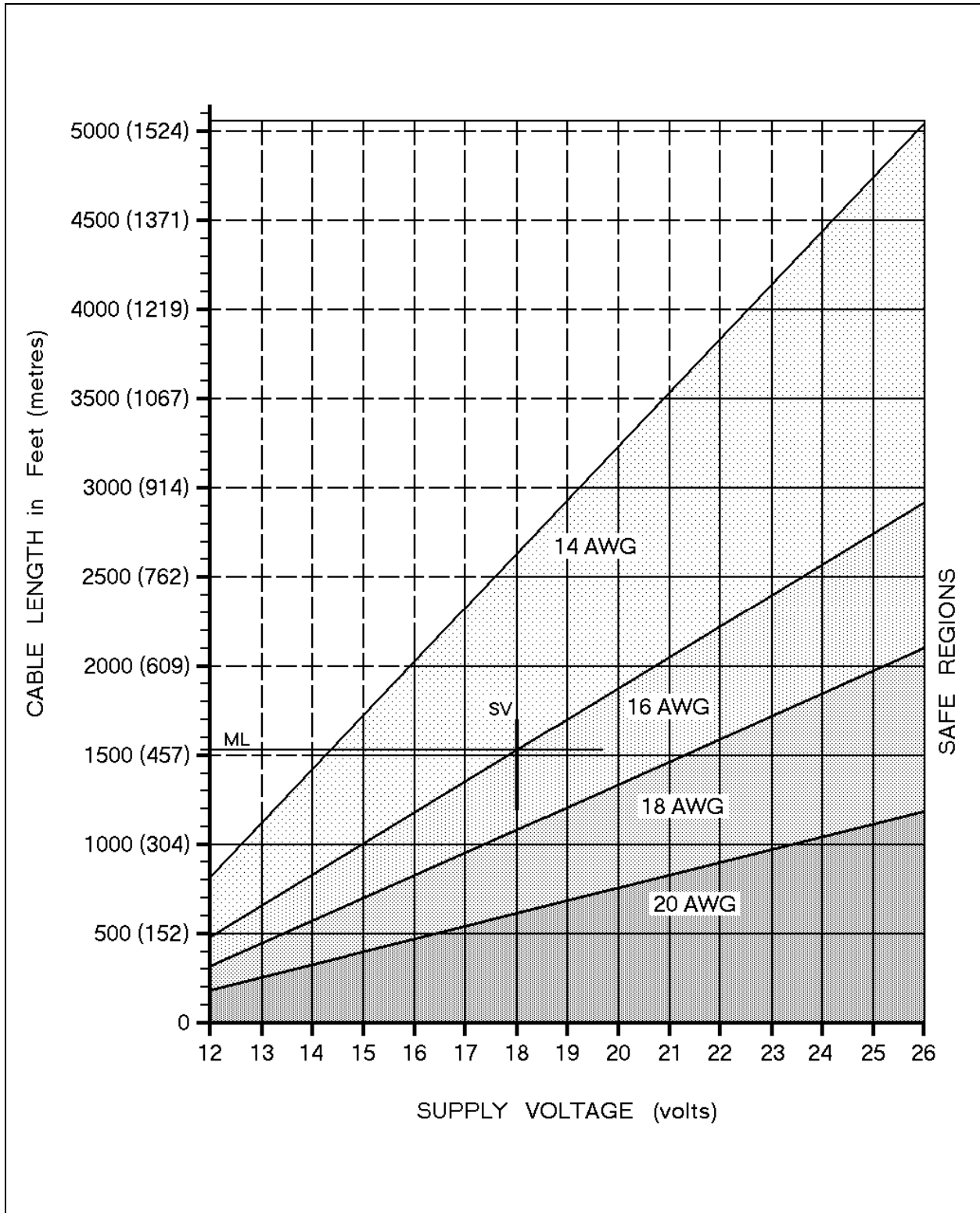


FIGURE 5: Cable selection chart.



## 5 OPERATION AND CALIBRATION

### 5.1 OPERATION

The AMC-3701 sensor/transmitter is factory calibrated for the gas listed in Factory Calibration (Section 2.2). The unit should not need recalibration when first installed and powered up, but a test for correct operation is recommended. All testing should be done after a stabilization period of 24 hours. After the stabilization period, the sensor/transmitter should be sending (in a clean air environment) a signal of approximately 4 mA to the monitor or controller. However, there are a few situations where a slightly higher or lower than normal signal may be noticed. In the case of large signal variations (in a clean environment), check for an installation problem.

### 5.2 CALIBRATION

The AMC-3701 sensor/transmitter is equipped with a remote calibration feature allowing one-man calibration at the sensor/transmitter location. The sensor/transmitter output is measured using a plug-in type "Remote Calibration Lead" (p/n 2900-01) designed to be adaptable to most multimeters. Zero and Span adjustments are made at the transmitter. Recalibration is necessary when replacing the sensor. Verification of calibration should be done at least once every 6 months for safety reasons, and for highly demanding applications monthly verification is recommended. Use Armstrong's calibration chamber (p/n AMC-CK2700-00) with calibration kit (p/n AMC-CK2602-00) and specify gas.

Factory or on-site calibration services, customer training and calibration kits can be provided. Specify the sensor/transmitter model number AMC-3701 and gas type when requesting any of the above.

#### Caution:

<p><b>Only qualified personnel should perform the actual calibration. Users are advised to consult the Armstrong Monitoring Corporation as to the recommended calibration gas concentration for the application, and any other questions.</b></p>
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### 5.2.1 SETTING UP CHAMBER AND APPLYING GAS

To set up the calibration chamber, prior to applying gas to the sensor, follow the procedure shown in Figure 6. Once the calibration chamber is set up, the gas sample can be taken and injected into the chamber for calibration following the procedures shown in Figures 7 and 8. Measure the calibration gas with the supplied syringe to obtain the desired concentration (see the following charts).

MOST GASES	
Volume of Pure Gas	Equivalent Concentration
cc	50 ppm
cc	100 ppm
0.4 cc	200 ppm
0.8 cc	400 ppm

CH4	GASOLINE	
Vol. of Pure Gas	Volume of Pure Vapours	Equivalent Concentration
5.0 cc	2.18 cc	5% LEL
10.0 cc	4.35 cc	10% LEL
20.0 cc	8.70 cc	20% LEL
40.0 cc	17.4 cc	40% LEL

NH3 & FREON	
Volume of Pure Gas	Equivalent Concentration
0.11 cc	35 ppm
0.31 cc	100 ppm
1.55 cc	500 ppm
3.10 cc	1000 ppm

PROPANE	
Volume of Pure Gas	Equivalent Concentration
2 cc	5% LEL
4 cc	10% LEL
8 cc	20% LEL
16 cc	40% LEL

**NOTE: Allow 5 minutes warm up for sensor to stabilize before injecting gas sample.**  
 (\*) For CO, measure Volume X 4 to obtain desired concentration  
 ( eg 0.1 cc X 4 = 0.4 cc for 50 ppm )

### 5.2.2 ADJUSTMENTS

There are two adjustments to be made for full recalibration, Zero and span. Refer to Figure 9 for trimmer locations.

**Zero:** When there is no gas present (clean air) the transmitter signal output should be 4 mA. This is obtained by adjusting the zero trimmer on the transmitter. It is possible, with certain conditions, that the “Zero” current will go below 4 mA.

**Span:** When the sensor is exposed to the calibration gas sample, adjust the Span trimmer on the transmitter to set the output current proportional to the gas concentration applied.

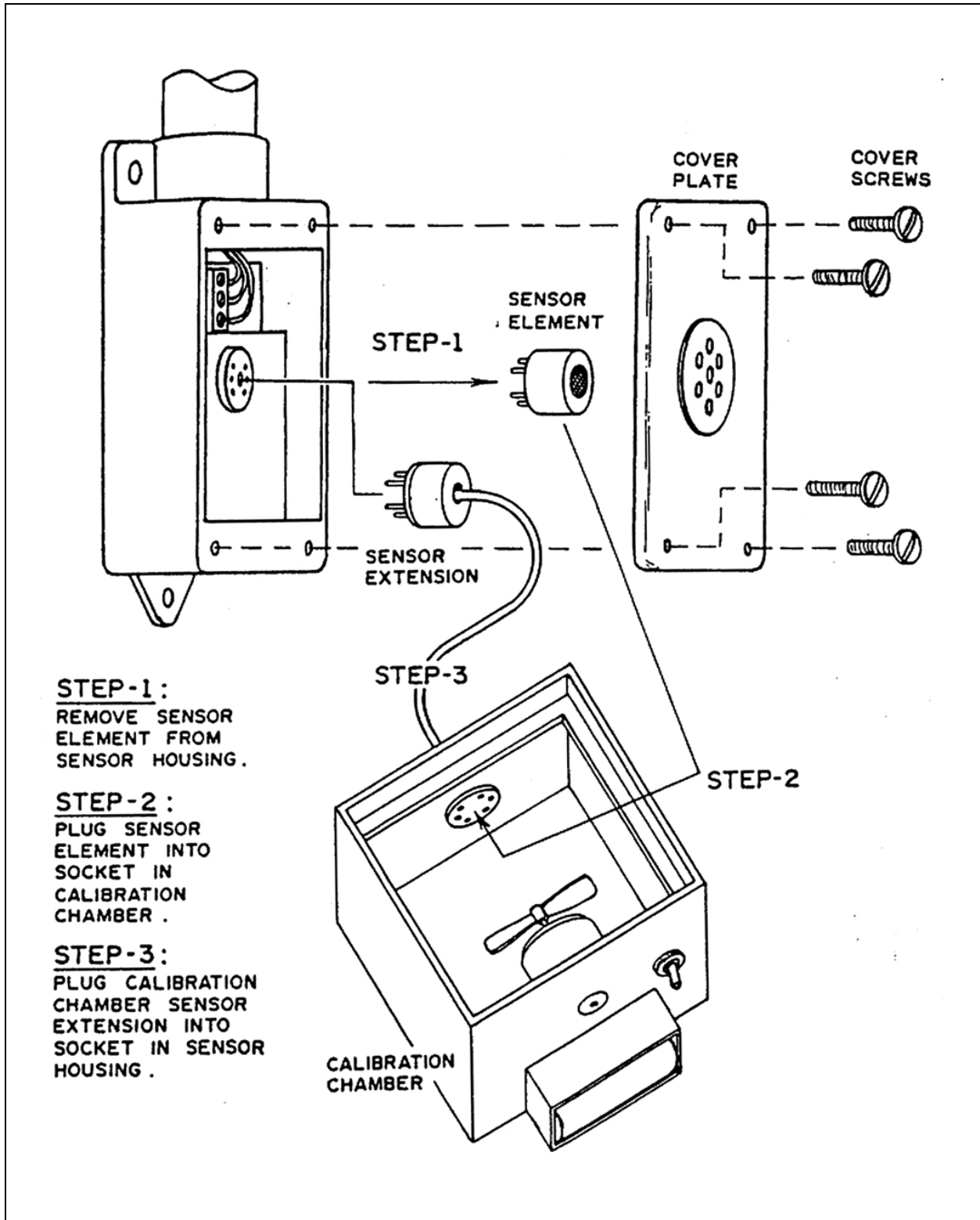


FIGURE 6: Calibration chamber set up procedure.

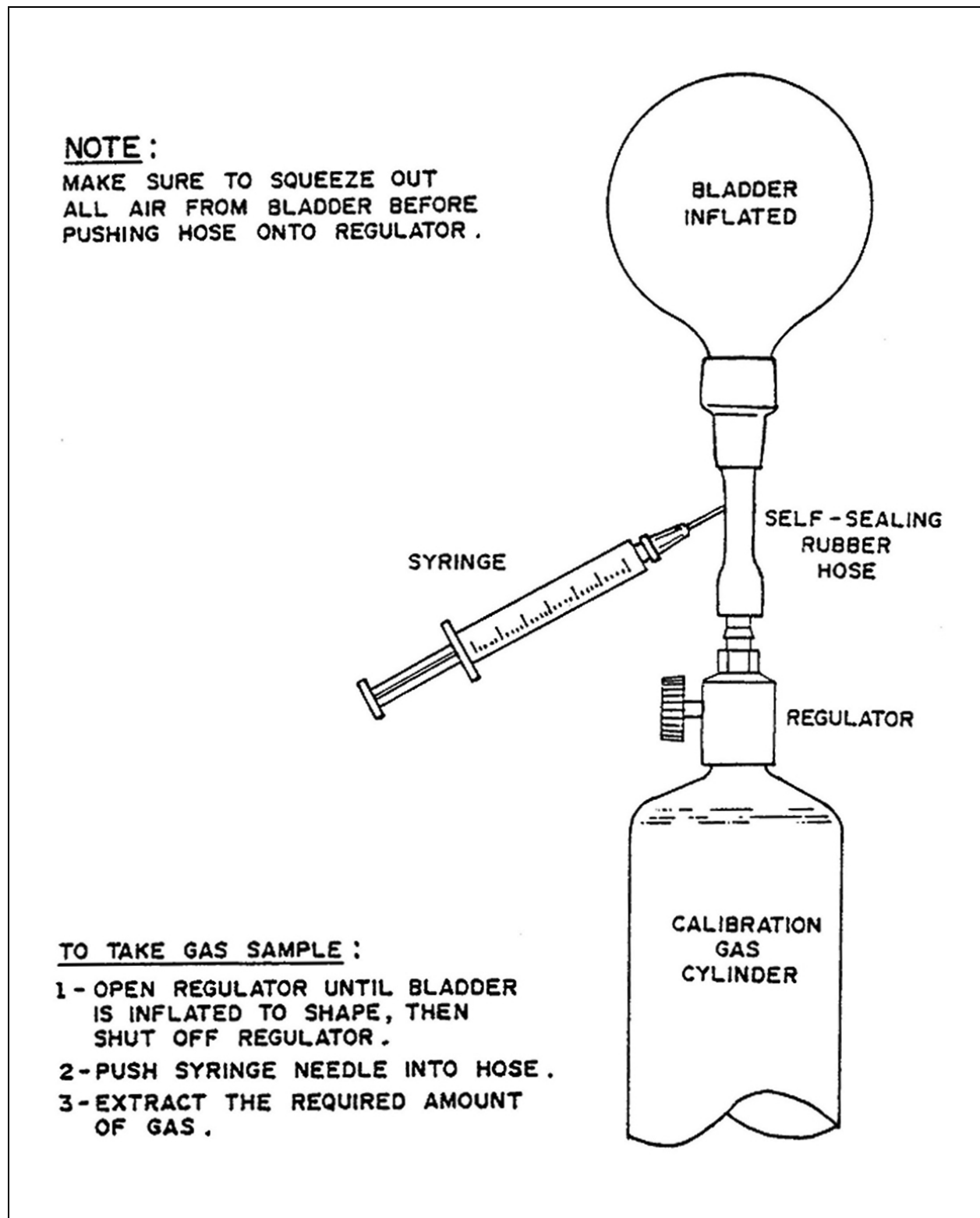


FIGURE 7: Taking gas sample.



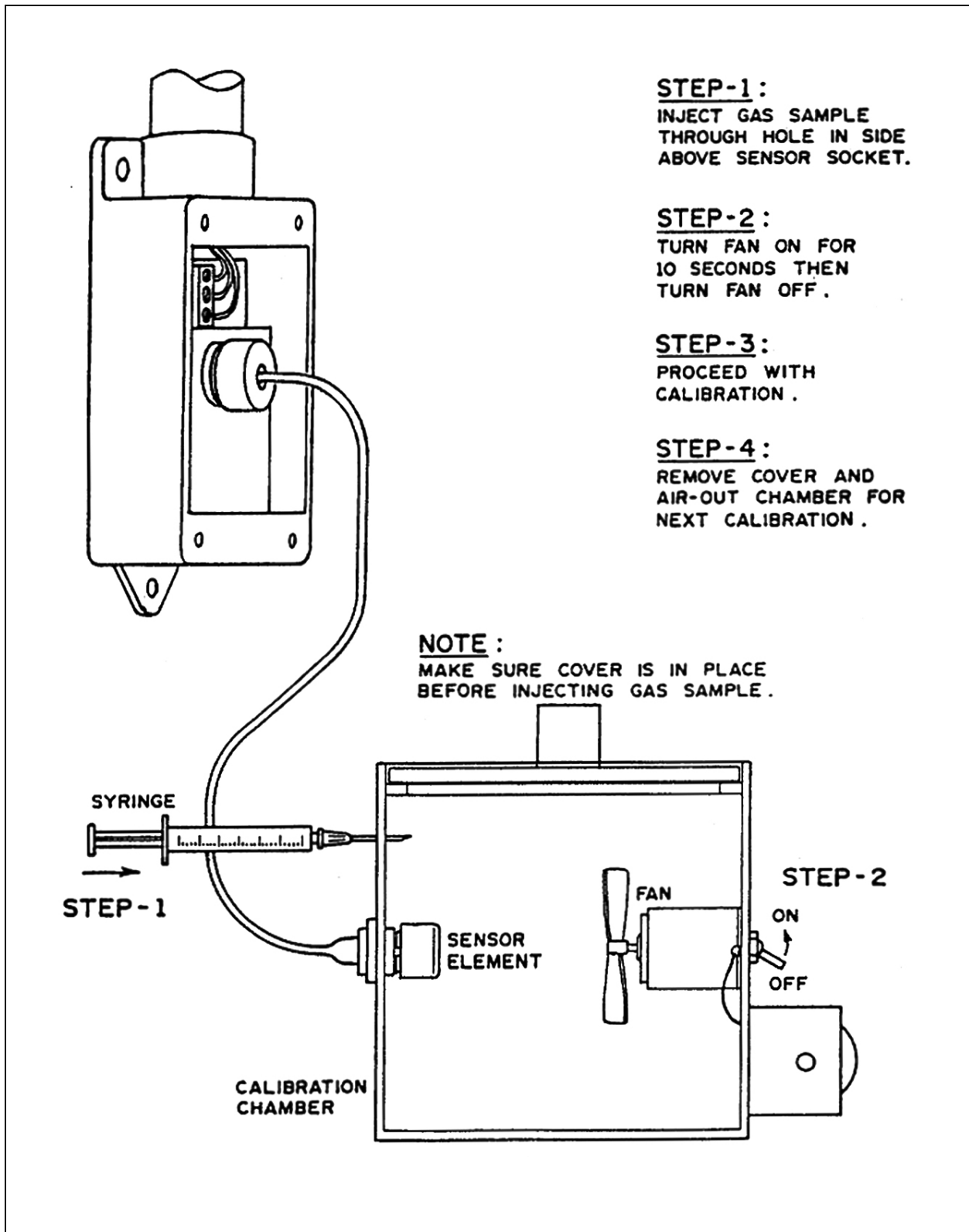


FIGURE 8: Injecting gas sample for calibration.

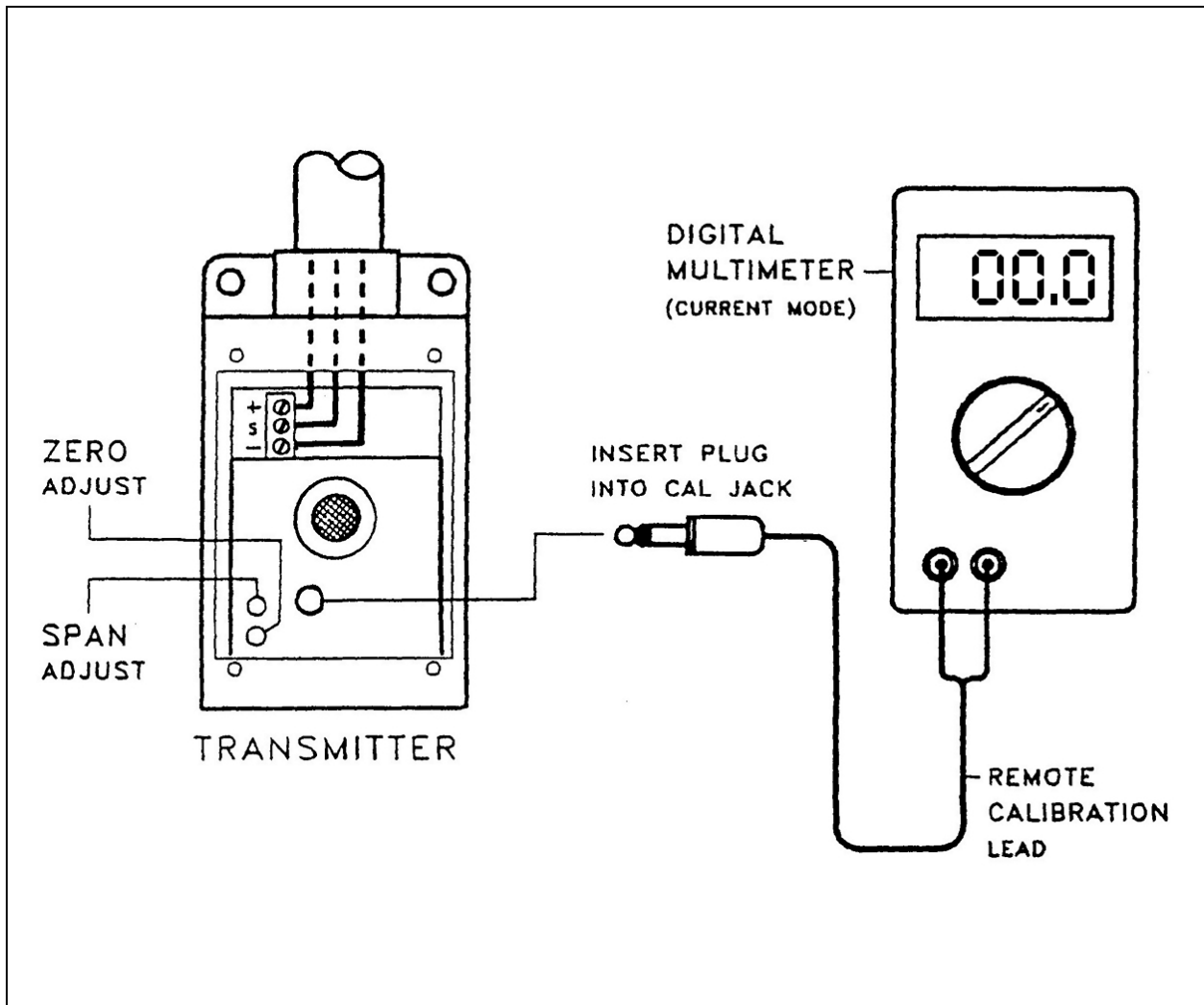


FIGURE 9: Trimmer locations and adjustments.



## 6 PREVENTIVE MAINTENANCE

### 6.1 GENERAL

The sensor/transmitter should be brushed or wiped clean once a year or more, of any dust or dirt which settles on it, depending on the accumulation.

The unit SHOULD NOT be submerged in water or other liquids. Also, hosing and other conditions that could cause a liquid to enter the sensor/transmitter should be avoided.

### 6.2 VERIFICATION OF OPERATION

To verify the operation of the sensor/transmitter unit make sure that it is still responding to gas. This test should be performed every 2 months, but for more demanding applications, verification should be performed on a weekly basis.

### 6.3 SENSOR REPLACEMENT

#### Caution:

**Turn off the main power supply before attempting the following.**

Sensor life is typically in excess of 10 years. The sensor should be replaced under the following conditions:

1. When the sensor element becomes an open circuit, the transmitter outputs a fixed 1 mA signal.
2. When the sensor no longer responds to the presence of gas or has an unstable zero signal.

When the sensor needs replacing, reorder Part No. listed in Product Information Section 2.1. To replace the sensor element, unscrew the cap (including filter and retaining ring) from the sensor housing. Unplug the used sensor element from its socket and discard, then plug in the replacement sensor element. Reinstall the retainer ring, filter and screw on cap. See Figure 10 for sensor replacement procedure.

#### Note:

**Allow 24 hours for new sensor element to stabilize (burn in) before recalibration, then follow instructions in Calibration, section 5.2 of this manual.**

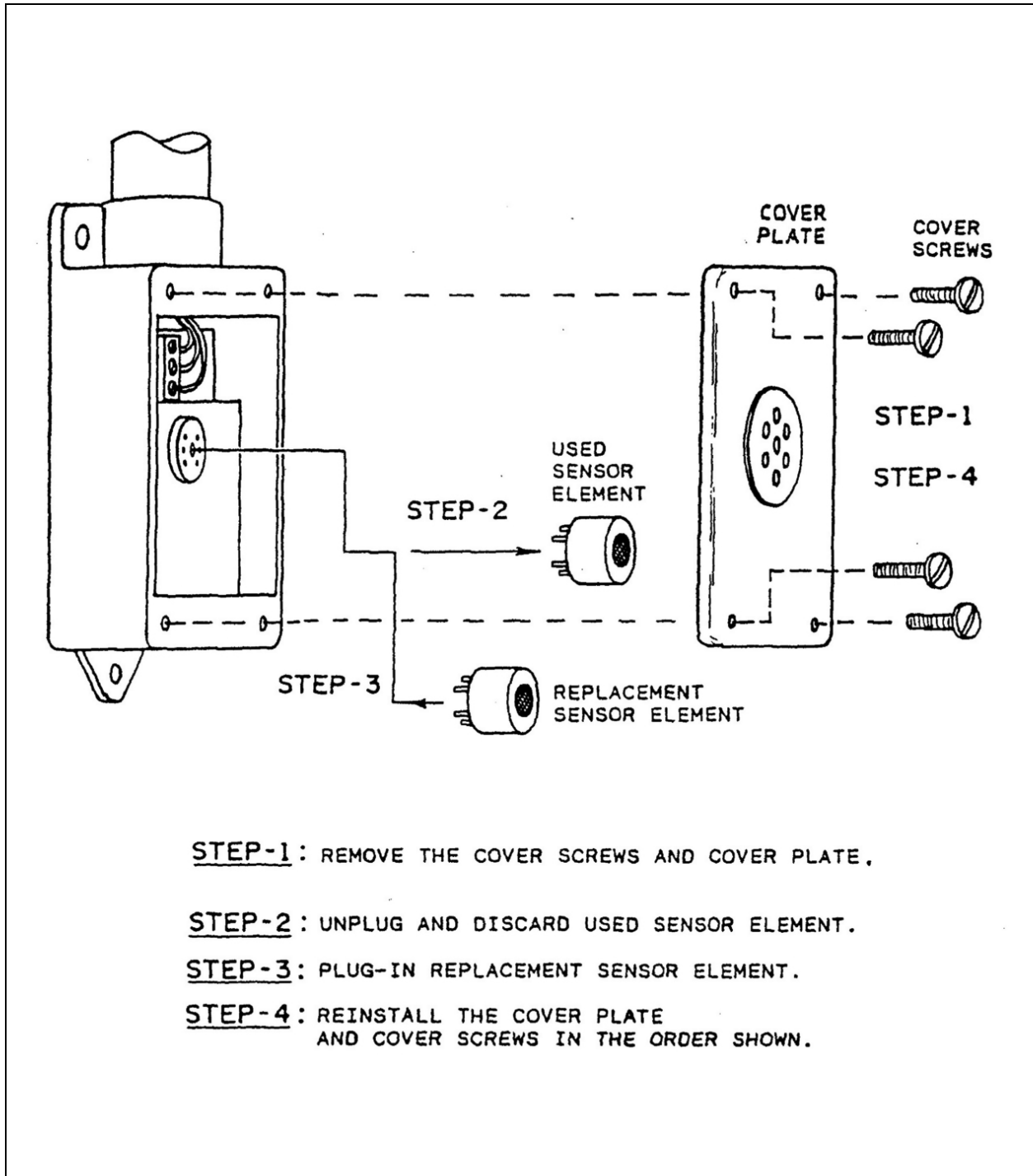


FIGURE 10: Sensor replacement procedure.