# 1030
## 2-Channel Gas Monitor

# INSTRUCTIONS
## AMC-1030

**INSTALLATION AND OPERATING INSTRUCTIONS**
**FOR THE AMC-1030 2 CHANNEL GAS MONITOR**

## IMPORTANT:

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

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# TABLE OF CONTENTS

# 1 WARRANTY

The AMC-1030 Solid State Sensor/Transmitter is warranted against defects in material and workmanship for a period of two (2) years 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

**USING ELECTRICALLY OPERATED EQUIPMENT NEAR GASOLINE, OR GASOLINE 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.**

# 2 PRODUCT INFORMATION

Monitor Serial Number…….. _____

Power Supply Requirement…….. 120 VAC, 60 Hz

Operating Temperature……. 0 TO 40 C

Relative Humidity…… 0 – 99% non-condensing

| Sensor or Transmitter | | | Type of Gas | Alarm Trip Points | | Signal Voltage (volts) |
|---|---|---|---|---|---|---|
| No. | Part No | Serial No. | | LO/S1 | HI/S2 | |
| S1 | | | | | | |
| S2 | | | | | | |

## 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

The AMC-1030 monitor is a one or two channel gas monitoring system designed to provide continuous, reliable surveillance of surrounding air for traces of hazardous gases. This unit provides independently adjustable alarms for increasing level detection or decreasing level (oxygen) detection. Each channel can monitor a different gas depending on the sensor(s) or transmitter(s) used. The monitor comes with the following features as shown in Figure 1.

1. POWER TERMINALS: For line voltage connections of 120 VAC, 60 Hz.

2. TRANSFORMER: A Class II step down transformer supplies the internal circuitry and remote sensor / transmitter(s) at low voltages.

3. MAIN TERMINAL BLOCK: Provides wiring connection points as follows:
   - 1,2 - Audio alarm indicator
   - 3,4 - Acknowledge switch
   - 5,6 - 12 VAC power input
   - 7,8,9 - Sensor1 input
   - 10,11,12 - Sensor2 input

4. AUDIO ALARM INDICATOR: The buzzer will activate a distinctive tone for high alarm, low alarm and fail alarm conditions.

5. DISPLAY: Indicates status of sensor(s). During normal operation the dash (-) is displayed. An alarm condition will display the letter ‘A’, ‘L’ or ‘H’ (indicating alarm) or ‘F’ (sensor failure) followed by the number ‘1’ or ‘2’ (indicating channel). Example: The display sequence for one sensor in ‘ Low Alarm ‘ and the other in ‘ Fail ‘ is “ L, 1, F, 2, blank “.

6. RELAY SETUP JUMPERS: Used to independently configure the LO/1 and HI/2 relays as Energised or Non-Energised.

7. TEST SWITCH: The test switch is provided to electronically simulate alarms in order to test audio and relay functions.

8. ALARM ADJUST: Sets the LO/1 & HI/2 alarm of sensor 1/2 trip point. (See Figure 5)

9. SENSOR SIGNAL ADJUST: Sets the signal of sensor S1/S2. (See Figure 5)

10. PROGRAMMING SWITCHES: Allows user to configure the alarm delay and timer circuits, audio alarm activation and acknowledge switch function.

11. RELAYS: Up to three DPDT relays are provided for Low Alarm or Sensor 1, High Alarm or Sensor 2 and for Fail.

12. ACKNOWLEDGE SWITCH: The optional acknowledge switch is provided to silence the audio alarm and reset the relays to the non-alarm state. (See Section DIP SWITCH PROGRAMMING)

13. ON-BOARD SENSOR: Allows local detection of gas on one channel.

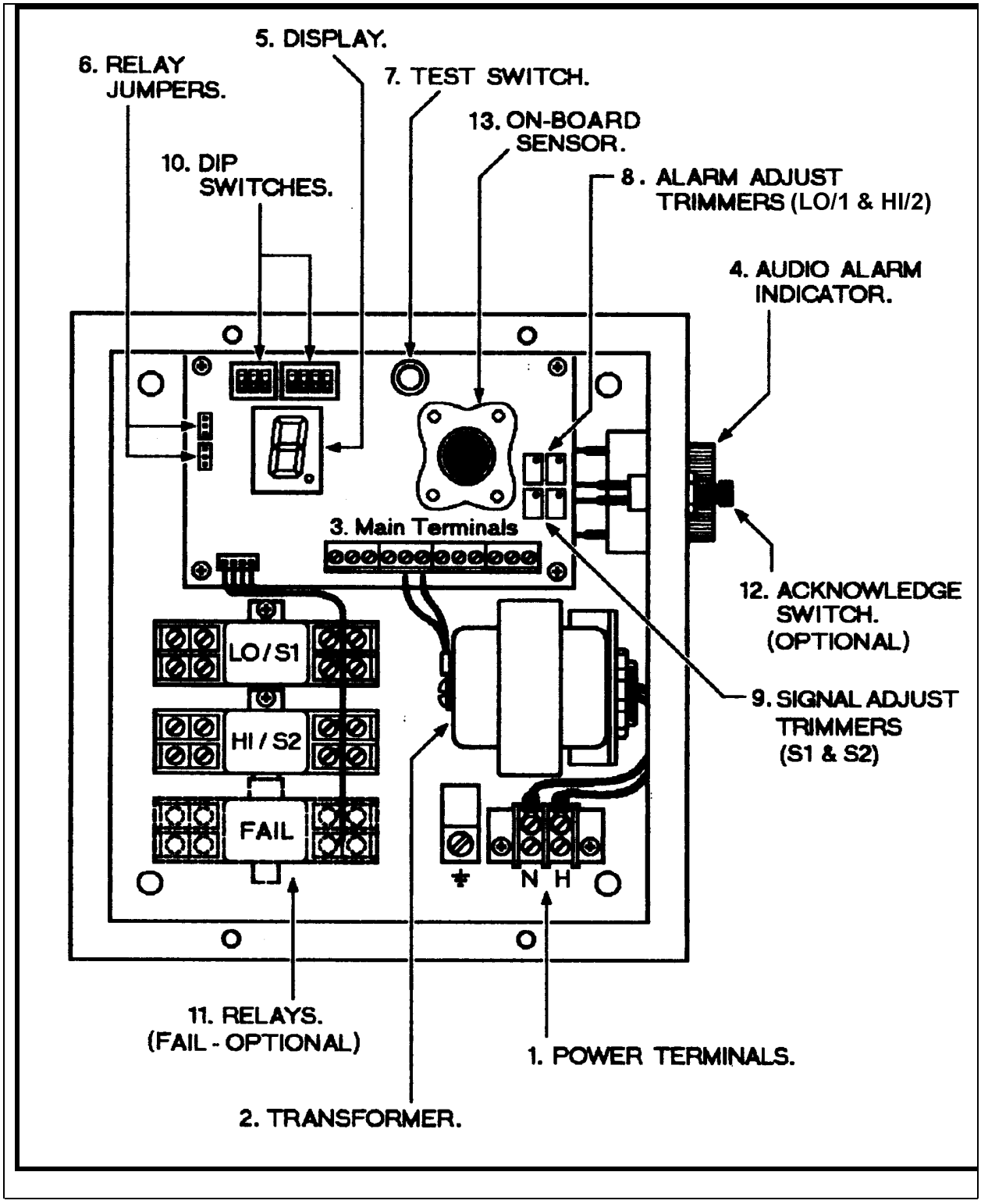


**Figure 1: Internal features of the AMC-1030 monitor**

# 4 INSTALLATION

## 4.1 LOCATION AND MOUNTING

Care should be taken to securely fasten the AMC-1030 monitor unit on a solid, non-vibrating surface or structure at eye level. If the internal sensor is used, install the unit in an area where the local concentration of gas is unaffected by the presence of ventilation systems and away from sources of interference gases. Mount the monitor in a NONHAZARDOUS area where the unit can be observed periodically. See Figure 2 for mounting hole locations.

### Note:

**All cable entry must be through the bottom of the monitor enclosure only. Other entry locations will allow foreign materials to enter the enclosure and possibly cause damage to the internal components. Mounting hardware is not supplied.**

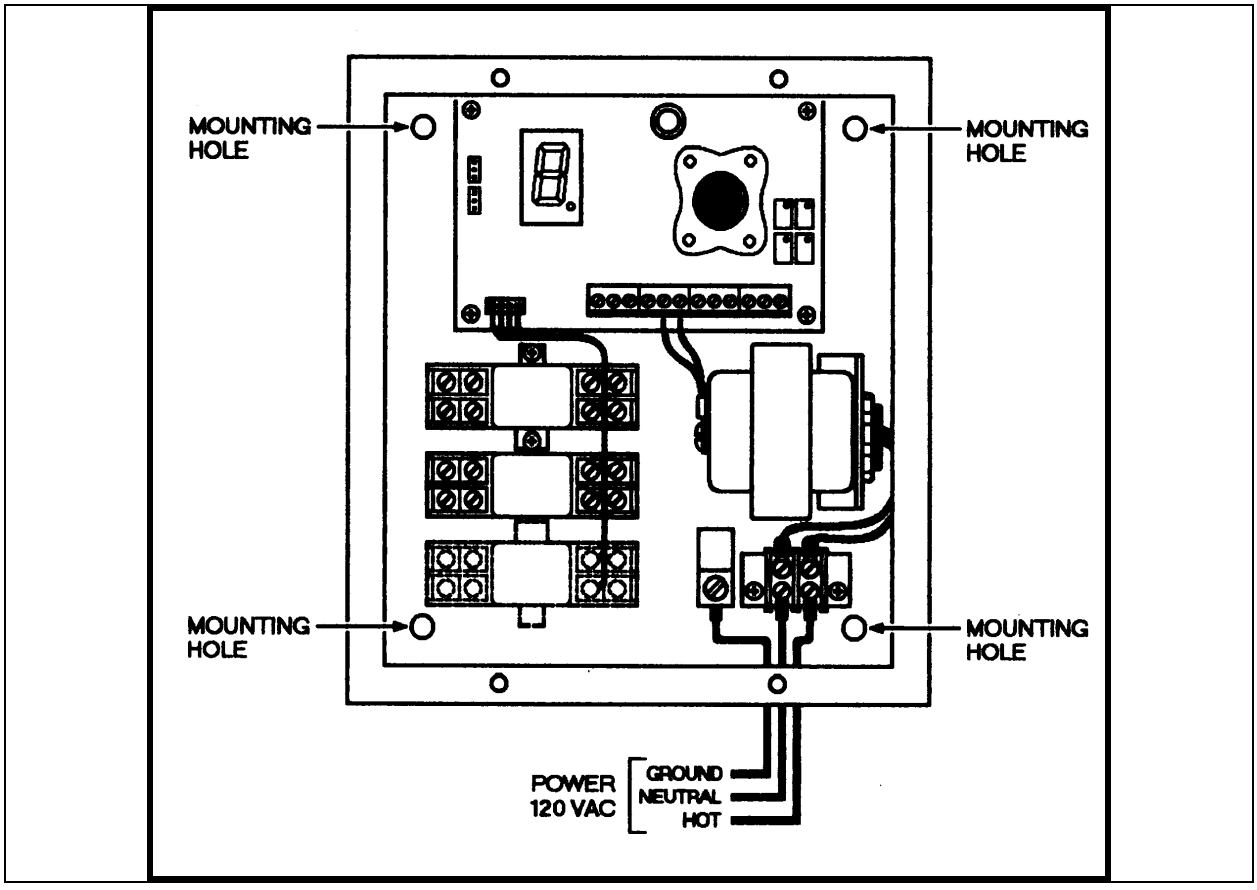


**Figure 2: Locations of mounting holes and power supply connections**

## 4.2 CABLE SELECTION

Connections from the monitor to the sensor should be made using shielded 2 or 3 conductor cable dependant on the model of remote sensor or transmitter used. For best signal transmission and maximum noise rejection run the cable through steel conduit and ground the cable shield at the monitor. Refer to the cable selection chart in the appropriate remote sensor or transmitter manual for the selection of the required cable wire gauge dependant on the cable length between the monitor and sensor.

## 4.3 WIRING OF THE MONITOR

POWER SUPPLY: The monitor operates on 120 VAC, 60 Hz. A Class II step down transformer runs the internal circuitry at low voltages. The power supply connections are made at the power terminal block located inside the monitor. ( See Figure 2)

RELAYS: There are up to three DPDT relays provided that operate with High/Senor-2 alarm, Low/Sensor-1 alarm and Fail. The relay contacts are rated for 1/3 HP @ 120 VAC / 240 VAC, 10 Amps @ 28 VDC / 120 VAC/ 240 VAC resistive. For relay contact arrangement refer to Figure 3.

SENSOR/ TRANSMITTER Each remote sensor or transmitter connects to a set of sensor terminals (- S# +) on the main terminal block located on the circuit card. Two sets of sensor terminals, Sensor-1 (S1) and Sensor-2 (S2) are provided. For wiring refer to Figure 4.

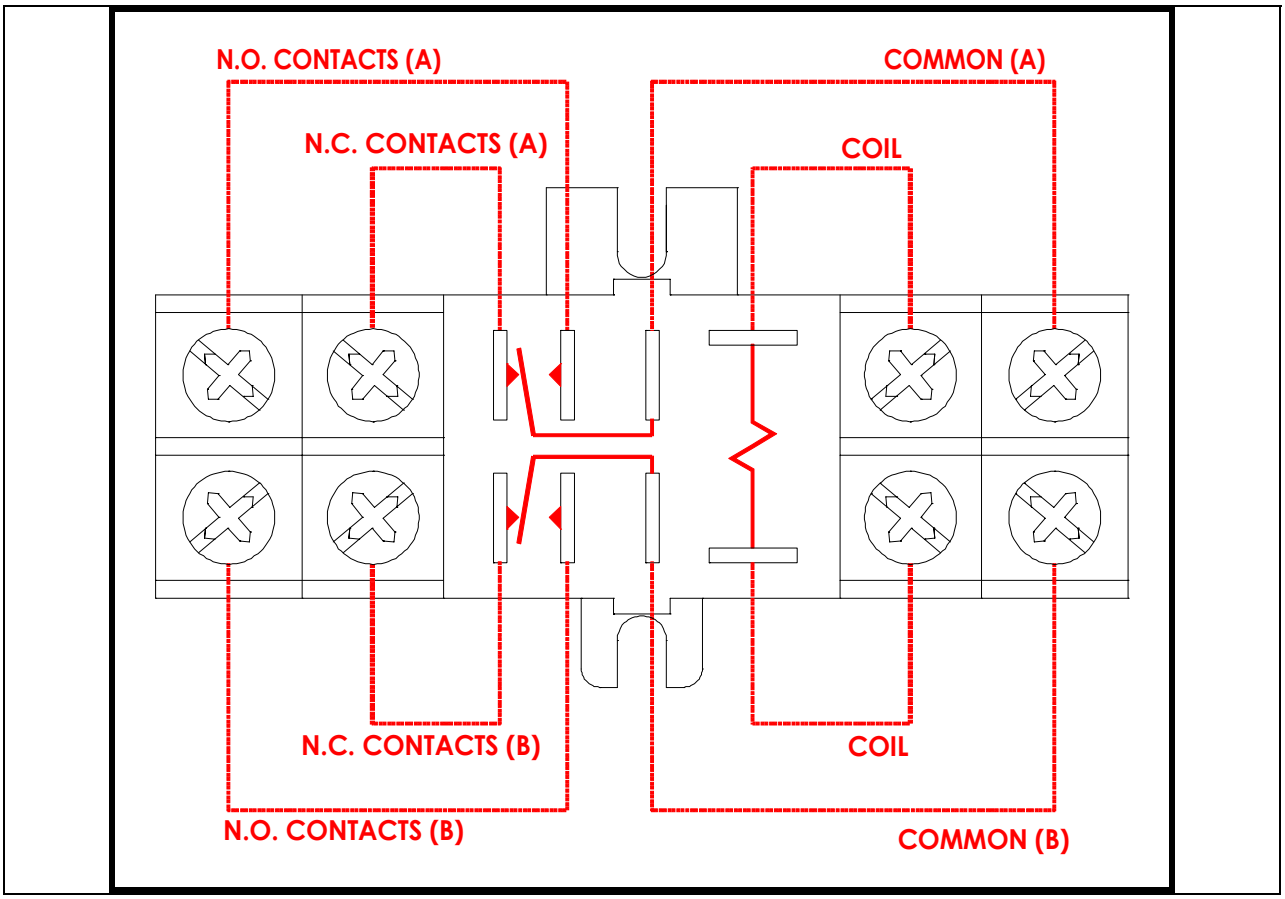


**Figure 3: Relay contact arrangement**

The AMC 1030 is shipped with the low and high alarm relays configured to be de-energised in the non-alarm state, as per the above diagram. If the user prefers to have relays in a normally energized (fail safe) state refer to Section Alarm Relay Programming for jumper configuration.

The optional fail relay is factory set in the energized (fail safe) mode and is not programmable by the end user.

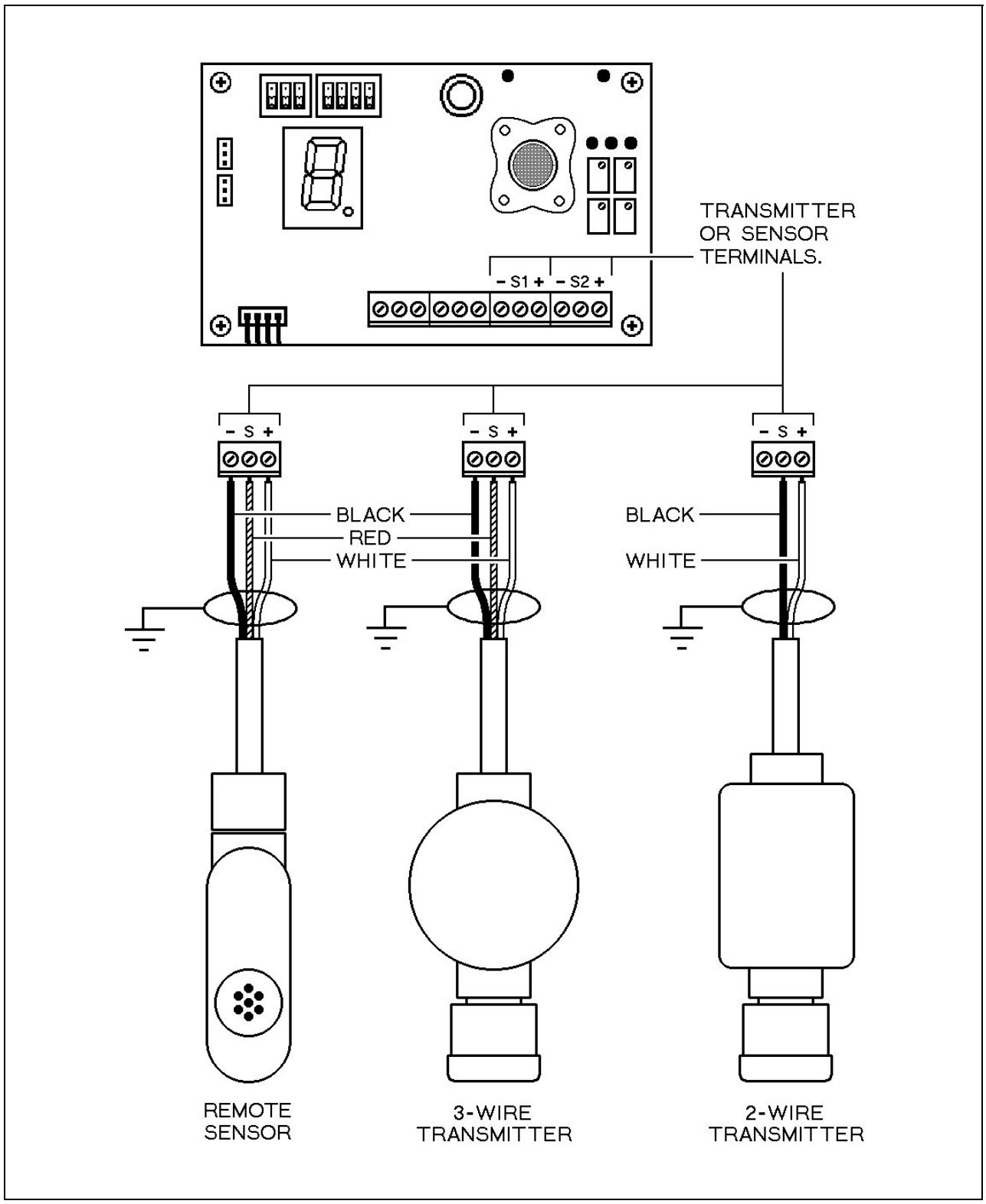


**Figure 4: Wiring of remote sensors and transmitters**

## 4.4 DIP SWITCH PROGRAMMING

The circuit card has two blocks of DIP switches for configuring the various functions. Each DIP switch can be set to OFF (down position) or ON (up position) depending on the function required.

**Table 1: DIP switch programming chart.**

| SWITCH | POSITION | FUCTION |
|---|---|---|
| **SW1-1** | OFF | No activation delay of LOW/S1 alarm conditions. |
| | ON | Five (5) minute activation delay of LOW (2-threshold) or Sensor #1 (1- threshold) alarm conditions. Sensor returning below alarm threshold resets delay timer. |
| **SW1-2** | OFF | No activation delay of HIGH/S2 alarm conditions. |
| | ON | Five (5) minute activation delay of HIGH (2-threshold) or Sensor #2 (1- threshold) alarm conditions. Sensor returning below alarm threshold resets delay. |
| **SW1-3** | OFF | Audio alarm indicator (buzzer) disabled. |
| | ON | Audio alarm indicator (buzzer) enabled. |
| **SW2-1** | OFF | Pressing the external ACKNOWLEDGE pushbutton switch silences the audio alarm indicator (buzzer) only. |
| | ON | Pressing the external ACKNOWLEDGE pushbutton switch silences the audio alarm indicator (buzzer), also resets the alarm the fail relays to normal (no-alarm state) subject to alarm timer (see SW2-2: ON). |
| **SW2-2** | OFF | Alarm relays return to normal state as soon as alarm condition is removed, or the ACKNOWLEDGE switch is pressed (If SW2-1 is ON). |
| | ON | Alarm relays are held in alarm state for a minimum of ten (10) minutes. A sensor level falling below the alarm threshold and recurring during this time resets the alarm timer. |
| **SW2-3** | OFF | Audio alarm is disabled for LOW alarm conditions (2- threshold sensor modes only). |
| | ON | Audio alarm is activated for LOW alarm conditions (2- threshold sensor modes only). |
| | OFF | Sensor fail threshold set at 100 mV (0.4 mA). Normal setting. |

| | | |
|---|---|---|
| **SW2-4** | ON | Sensor fail threshold set at 350 mV (1.4 mA). 3- wire transmitter only. |

## 4.5 ALARM RELAY PROGRAMMING

Two sets of jumpers are provided, at the left edge of the circuit card, to configure each alarm relay as normally Non-Energized or Energized when not in alarm. Use the chart below to configure the jumpers to the function required.

**Table 2: Jumper alarm relay programming.**

| JUMPER | POSITION | FUNCTION |
|---|---|---|
| JB3 | 1-2 | High/S2 alarm relay is de-energized during normal operation (energized on alarm). Use this configuration to reduce power consumption. |
| | 2-3 | High/S2 alarm relay is energized during normal operation (de-energized on alarm). Use this configuration to cause alarm in case of power failure. |
| JB4 | 1-2 | Low/S1 alarm relay is de-energized during normal operation (energized on alarm). Use this configuration to reduce power consumption. |
| | 2-3 | Low/S1 alarm relay is energized during normal operation (de-energized on alarm). Use this configuration to cause alarm in case of power failure. |

## 4.6 AUDIO ALARMS

An audio alarm output is provided, which produces various alarm sounds, as shown in the chart below. The audio alarm can be disabled by turning OFF DIP switch SW1-3.

**Table 3: Audio sounds for various alarms.**

| SENSOR STATUS | SOUND OUTPUT |
|---|---|
| Normal Operation (no alarms) | Off (no sound) |
| Low Alarm (SW2-3 OFF, two-threshold modes only) | Off (no sound) |
| Low Alarm (SW2-3 ON, two-threshold modes only) | Two (2) long beeps followed by a short pause |
| Any sensor alarm (one-threshold modes) or High Alarm (two-threshold modes) | Four (4) short, fast beeps followed by a short pause |
| Any sensor fail (with no unacknowledged alarms on the other sensor) | Two (2) short beeps followed by a long pause |

The controllers circuit operation ensures that Low alarm, High alarm and Fail conditions will not occur simultaneously on the same sensor. An alarm condition on a sensor will override a Fail condition on the other sensor.

# 5 OPERATION AND CALIBRATION

This section covers the operation and calibration procedures pertaining to the AMC 1030 monitor. Self-test and diagnostics instructions are following by a section on alarm activation delays. The use of the optional acknowledge function are also described in detail. The final topics covered in this section are the descriptions of the alarm and fail thresholds as well as alarm and signal adjustments instructions.

## 5.1 POWER-ON SELF-TEST AND DIAGNOSTICS

The controller features an on-card circuit that continuously monitors display activity. If the display stops for more than one second, indicating a controller failure, the controller is reset. This circuit also monitors the on-card 5 VDC power supply for instability, and will hold the controller in a reset condition until the 5 VDC power supply stabilizes.

On controller power up or reset, the internal memory is checked. If a fault is detected, the display will show "**E**" (error) with the Decimal Point OFF and the controller is reset.

Following this test, the software is calculated and compared with a stored checksum value. If the calculated checksum is incorrect, the display will show "**E**" (error) with the Decimal Point ON and the controller is reset.

During operation, if an error is detected in the analog-to-digital (ADC) converter circuit, the ADC is reset. If the fault remains, the display will show "**H**" (halt) with the Decimal Point ON and the controller is reset.

The fail relay stays de-energized (fault condition) until all self-tests have been successfully completed, and if the controller is reset.

### 5.1.1 POWER-ON DELAY

Following successful completion of all self-tests, the detection of sensor alarm and fail conditions is disabled for 30 seconds. This delay allows the sensors to stabilize. During this delay, the display shows the "sensor normal" condition (cycling dash), with a flashing Decimal Point. The audio alarm is silent, the alarm relays are held in the no-alarm condition, and the fail relay is energized (non-fail state). After this delay, the unit becomes operational and shows the "sensor normal" condition, a dash (-) cycling up and down the display.

### 5.1.2 TEST SWITCH FUNCTION

While the on-card test switch is pressed, it will cause continuous activation of all three relays and audio alarm indicator, and the display shows a "**t**" (test) and decimal point. Processing of

sensor signal(s) and internal functions continues. When the test switch is released, the controller returns to normal operation.

## 5.2 ALARM ACTIVATION DELAYS

If required, an activation delay of five (5) minutes may be independently enabled for LOW/HIGH or Sensor #1 or #2 alarm conditions (see DIP switch Programming chart). While enabled (ON), a sensor signal exceeding the alarm threshold momentarily then returns to normal before the delay expires will be ignored and the delay timer will reset. If a sensor signal exceeds the alarm threshold and maintains this level, the alarm will activates after the delay expires. When an active alarm condition returns to normal (no-alarm) the alarm activation delay timer will reset.

## 5.3 ACKNOWLEDGE FUNCTION

An option exists for an “Acknowledge” pushbutton switch. When this switch is pressed, all alarm and fail conditions will be silenced (audio alarm off) for 30 minutes. If any alarm or fail condition remains after 30 minutes, the audio alarm will reactive. Any new alarm, fail condition occurring or those returning to normal then reactivating, will cause an immediate audio alarm.

During an acknowledged alarm or fail condition, the display shows the Decimal Point ON. When the acknowledge timer ends or alarm and fail conditions have returned to normal the Decimal Point will be turned OFF.

If DIP switch SW2-1 is ON, the alarm and fail relays are returned to normal when alarms are acknowledged. If the alarm timer is active (DIP switch SW2-2 ON), the alarm relays will remain in their current state until the alarm timer ends.

## 5.4 ALARM AND FAIL THRESHOLDS

The alarm thresholds are individually adjustable using adjustment trimmers RV1 (for LOW of Sensor 1) and RV2 (for HIGH or Sensor 2). The adjustment voltages can be measured at the three test points labeled LO/1, GND and HI/2 located directly above the trimmers. The adjustment range is from 0 to 5 volts.

**When two transmitters are used, there can be either one alarm per channel or two alarm shared by both channels. In the case of shared alarms, each channel must be for the same gas and have the same alarm settings. If using two solid state sensors, there must be one alarm per channel. With a single transmitter or solid state sensor, there can be one or two alarms.**

When a 2-threshold mode is selected, the LOW threshold is internally adjusted to match the HIGH threshold if the HIGH is set to a value lower than the LOW threshold (or set higher than the LOW threshold for decreasing-level sensors). The alarm thresholds are also internally limited to prevent overlap with the fail threshold.

The fail threshold is set internally at either 100 mV or 350 mV, selectable using DIP switch SW2-4, below which level the sensor will indicate a fail condition. For 4-20 mA operation, these voltages correspond to threshold settings of 0.4 mA (100 mV) or 1.4 mA (350 mV).

## 5.5 ALARM AND SIGNAL ADJUSTMENTS

### 5.5.1 FOR TRANSMITTERS

Transmitters supply a linear 4 to 20 mA DC signal to the monitor. This translates to a 1 to 5 volt DC range. The alarms may be set to correspond to some fraction of the transmitters full scale calibration. This means that a 50% of full scale alarm would be set at 3.0 volts (Alarm threshold adjustments are made using trimmers RV1 and RV2 and the voltages are measured at the test points directly above these trimmers, as shown in Figure 5). Refer to the transmitter manual for transmitter calibration procedures.

### 5.5.2 FOR ON-BOARD OR REMOTE SENSORS

To observe immediate reaction during calibration, the Low/S1 and High/S2 alarm time delays should be disabled (DIP switches SW1-1 and 1-2). All adjustments are made using trimmers RV1, RV2, RV3 and RV4 that are directly below the test points (refer to Figure 5).

## NOTE:

**IF A SENSOR HAS BEEN REPLACED ALLOW 24 HOURS FOR SENSOR ELEMENT TO STABILIZE. AFTER THE STABILIZATION PERIOD, ADJUST THE SIGNAL FIRST AND THEN PROCEED WITH LOW/S1 ALARM AND HIGH/S2 ALARM ADJUST.**

ONE-THRESHOLD ALARM ADJUSTMENTS:

The LO/1 alarm adjust trimmer is used to establish the alarm trip point for Sensor #1. This is done by exposing the sensor being calibrated to the alarm gas concentration and adjusting the LO/1 trimmer clockwise until the display starts to show “A, 1, A, 1, blank”.

The HI/2 alarm adjust trimmer is used to establish the alarm trip point for Sensor #2. This is done by exposing the sensor being calibrated to the alarm gas concentration and adjusting the HI/2 trimmer clockwise until the display starts to show “A, 2, A, 2, blank”.

TWO-THRESHOLD ALARM ADJUSTMENTS, ONE SENSOR ONLY:

The LO/1 alarm adjust trimmer is used to establish the low alarm trip point. This is done by exposing the sensor being calibrated to the low alarm gas concentration and adjusting the LO/1 trimmer clockwise until the display starts to show “L, #, L, #, blank”.

The HI/2 alarm adjust trimmer is used to establish the high alarm trip point. This is done by exposing the sensor being calibrated to the high alarm gas concentration and adjusting the HI/2 trimmer clockwise until the display starts to show “H, #, H, #, blank”.

SIGNAL ADJUSTMENT PROCEDURE:

The signal adjust is used to set the sensitivity of a sensor. This is done by exposing the sensor to the Low alarm concentration of gas and adjusting the S1 (RV3) or S2 (RV4) trimmers. The voltage associated with signal can be measured at the two test points located at the top edge of the circuit card, on the right of the test switch (see Figure 5). The voltage(s) measured at the signal test points should match the values listed on the chart in Product Information, pg. Iii.

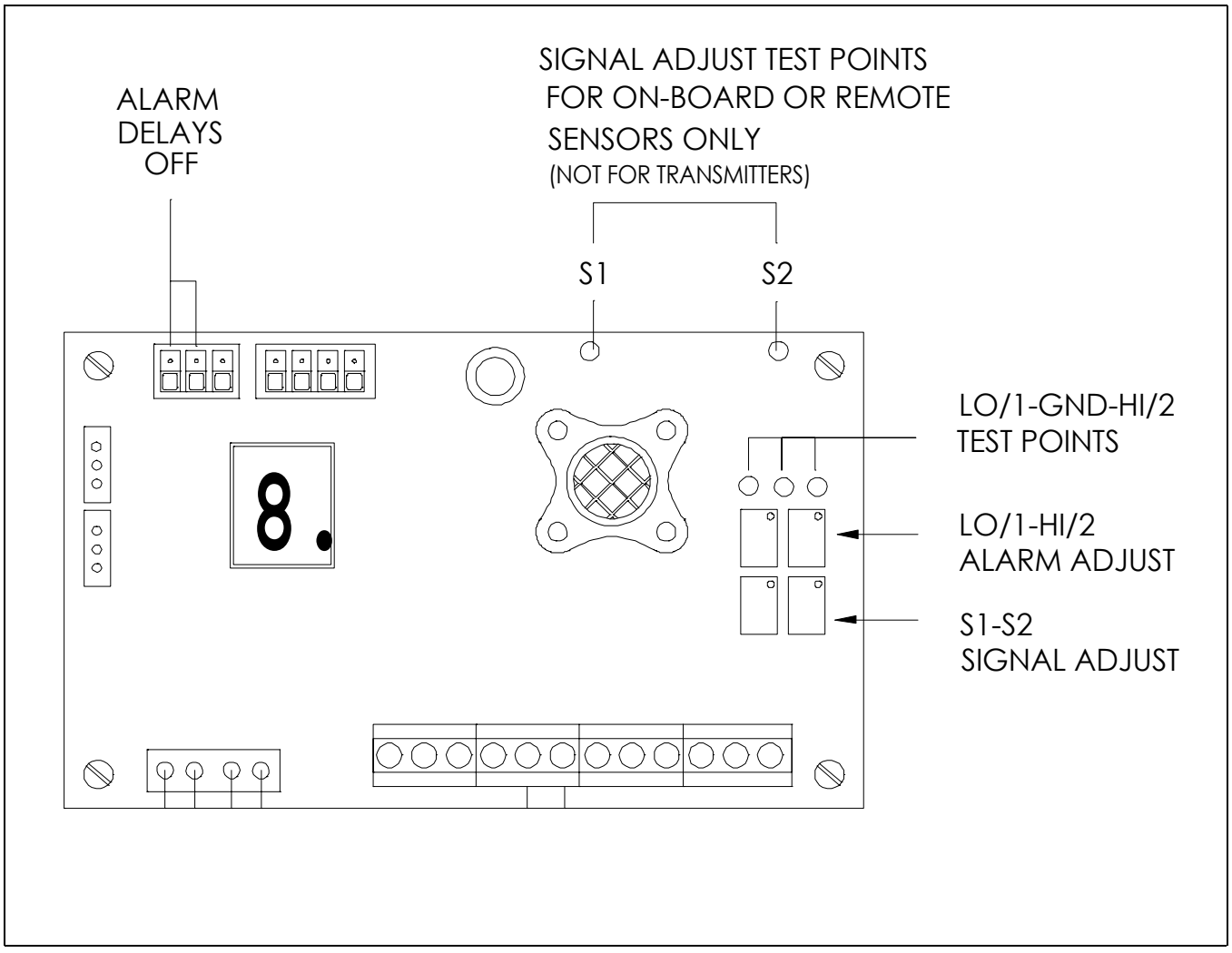


**Figure 5: Trimmer and test point locations and functions**

# 6 PREVENTIVE MAINTENANCE

## 6.1 GENERAL

The monitor unit 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 enclosure should be avoided.

## 6.2 VERIFICATION OF OPERATION

To verify the operation of the system make sure that each sensor and/or transmitter is still responding to gas and that the correct condition is shown on the display. 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.**

The sensor should be replaced when the display shows the letter "**F**" following by the number "**1**" or "**2**" (depending on which channel it is configured on).

ON-BOARD SENSOR:

Sensor life is typically in excess of 10 years. When the sensor needs replacing, reorder the part number listed in Product Information, pg. iii. Verify the sensor signal at the S1 or S2 test points ( See Figure 5) and replace the sensor element if required.

Remove the front panel by unscrewing the four (4) retaining screws. Unplug the used sensor element from its socket (on the circuit card) and discard, then plug in the replacement sensor element. Allow 24 hours for the new sensor element to stabilize (burn-in) then follow instructions in section 5.5. When finished, reinstall the front panel and retaining screws.

TRANSMITTER OR REMOTE SENSOR:

For a transmitter or remote sensor, follow the sensor replacement procedures described in the appropriate transmitter or remote sensor manual.