Model 4802

Zero Two Series Control Module
for Combustible Gas
Applications

Instruction Manual **08/95**

PRELIMINARY

Part No. MAN4802A
Revision C/08-95

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Illustrations

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This chapter provides a brief description of the Model 4802, its features & benefits and a list of some of its applications. More detailed information on the features and benefits listed in section 1.2 will be presented in later chapters.

- SAFETY WARNING: Installation and Maintenance must be carried out by suitably skilled and competent personnel only.

1.1 General Description

The General Monitors Model 4802 (see figure 1) is a single channel Combustible Gas detection Control Module designed for use in Zero Two Series Gas and Flame Detection Systems. This Module connects to the wires from a field mounted General Monitors Catalytic Bead Sensor and monitors the presence of combustible gases and vapors. The Model 4802 is electrically and physically compatible with the other gas detection, flame detection and system modules in the Zero Two Series. It is distinguished from the other modules by its blue border and "4802" in the upper right corner of the front panel. The Model 4802 is designed for use in non-hazardous environments.

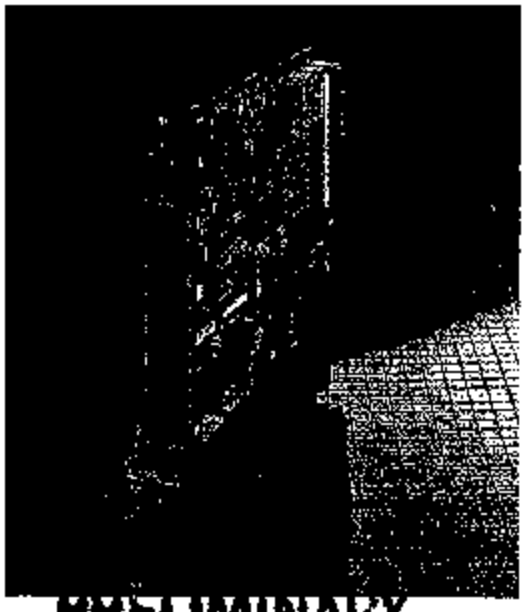

Figure 1

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1.2 Features & Benefits

Automatic Calibration: the unit's display indicates simple automated calibration prompts to the operator with no calibration adjustments.

Calibration Check Mode: verifies the integrity of the sensor by allowing the operator to apply a test gas and view the response on the display.

Calibration Level: the user specifies the gas concentration to be used for calibration.

Microprocessor Based Electronics: monitors fault conditions, sensor inputs and provides outputs in the form of display codes, analog signal, relay contact and open collector activations.

Setup Mode: allows the user to set parameters such as alarm output options, test options, etc. These parameters are viewed on the display during the Setup Mode.

Password Option: prevents unauthorized alteration of the setup parameters (can be disabled).

Setup Check Mode: allows the user to view the parameters that have been set by the factory and/or an operator.

LED Test: tests the integrity of each LED and each segment of the digital display on the front panel.

Card Test: tests the functionality of the card through the microprocessor ramps the signal from 0 to full scale.

Live Insertion/Removal: allows the user to insert or remove a module while power is applied to the system without damage to any of the components in the system.

1.3 Applications

The General Monitors Model 4802 is a Combustible Gas Control Module designed for Zero Two Series Applications. Below is a partial list of applications:

- Refineries
- Drilling platforms and rigs
- Gas and oil production platforms
- Gas collection facilities
- Oil well logging operations
- LPG/LNG processing and staorage
- Gas Turbines
- Solvent Vapors
- Hydrogen Storage
- Wastewater treatment plants
- Chemical plants

This chapter provides detailed specifications for the Model 4802 Zero Two Series Control Module. System, mechanical, electrical and environmental specifications present the Model 4802 in technical terms. The engineering specification provides a written specification that can be inserted into another written specification by architects and engineers.

2.1 System Specifications

Application: Combustible & Flammable Gas and Vapor Detection.

Sensor Type: General Monitors Low Temperature, Catalytic Bead, Limited Diffusion Sensor.

Typical Sensor Life: 4 to 5 years in normal service.

Measuring Range: 0 to 99% LEL/LFL.

Accuracy: ±3% LEL/LFL from 0 to 50% of full scale, ±5% LEL/LFL greater than 50% up to 100% of full scale, at reference ambient conditions and when the unit has been calibrated using 50% LEL/LFL.

Zero Drift: Less than 5% of span per year.

Stability: Adheres to FMRC Class 6310 & Class 6320 and CSA 22.2 No. 152-M1984.

Response Time: T50 ≤ 10 seconds with 50% LEL/LFL concentration of Methane (CH_4) applied. T90 ≤ 30 seconds with 50% LEL/LFL concentration of Methane (CH_4) applied.

Approvals: CSA certified to CSA 22.2 No. 152-M1984 performance standard for combustible gas detection instrumentation. FM approval is pending.

Warranty: 2 Years

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2.2 Mechanical Specifications

Weight:	11.2 oz.	(318 grams)
Length:	9.9 inches	(251 mm)
Height:	6.825 inches	(173 mm)
Width:	1 inch	(25 mm)

2.3 Electrical Specifications

Input Power Requirement: 20 to 35Vdc, (24Vdc @ 200mA, 4.8W nominal).

Electrical Classification: The Sensor is rated for used in Class I, Division 1, Groups B, C & D. The Model 4802 is designed for use in non-hazardous environments.

Relay Contact Rating: 4A @ 250Vac, 3A @ 30Vdc resistive. DPDT for A1 & A2, SPDT for Fault.

Open Collector Rating: 100mA @ 35 Vdc for A1, A2, Fault, UA, FUA, CAL-OC, LA1 & LA2.

Cable Parameters: Recommended 3 wire shielded, maximum cable lengths allowable between module and sensor with one way resistance of 10 Ohms per sensor lead (20 Ohms loop) @ 24Vdc nominal:

AWG	Feet	Meters
14	7600	2320
16	4800	1460
18	3000	910
20	1900	580

Cable Parameters (*continued*)

The maximum allowable cable lengths between the analog output connections on the control module with a remote device in series (maximum loop resistance of 500 Ohms between AO+ & AO-):

AWG	Feet	Meters
14	9000	2740
16	5200	1585
18	3800	1160
20	2400	730

2.4 Environmental Specifications

Operating Temperature Range:

Sensor -67°F to +200°F
-55°C to +93°C

4802 0°F to +150°F
-18°C to +66°C

Storage Temperature Range:

Sensor -67°F to +185°F
-55°C to +85°C

4802 -40°F to +150°F
-40°C to +66°C

Operating Humidity Range:

5% to 100% Relative Humidity, non-condensing

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2.5 Engineering Specifications

Zero Two System - Each system shall utilize modules capable of monitoring gas sensing elements or a 0 to 21.7mA analog signal from gas or flame detection transmitters. The system chassis shall be available in 4, 8 and 16 channels. Each chassis shall contain a bus for the following independent signals: A1 Alarm, A2 Alarm, Fault, Master Reset, Master Accept, Unaccept, CAL, +24Vdc and System Common. Module signals shall be capable of being bussed from one chassis to another, so that up to 100 modules can comprise a single system. The gas and flame detection modules shall be electrically and physically compatible and capable of being used in the same chassis to form combined fire and gas detection systems. The system shall consist of Zero Two Series component modules as manufactured by General Monitors, Lake Forest California, U.S.A. or General Monitors, Galway, Ireland.

4802 Control Module - The control module, with sensor, shall meet the performance requirements of CSA 22.2 No. 152-M1984 & FMRC Classes 6310 & 6320 and be capable of monitoring 0 to 100% LEL/LFL concentration of combustible gases/vapors. The control module shall have an interface panel, providing a mode/select switch and the following indications: 2 discrete alarm threshold level indicators, a fault or malfunction indicator, a ready indicator, a calibration mode indicator, a setup mode indicator and a 2 digit digital display. All alarm parameters and user options shall be software selectable. A functional card test and a front panel LED test shall be switch capable without interrupting normal on-line services.

Engineering Specification for the 4802 Control Module (*continued*)

The control module shall be capable of insertion and removal during power on conditions without damage to any component module in the system. The control module shall meet level 3 for severity and comply with BS 6667 Part 3 / IEC 801-3 for Radio Frequency Interference (RFI) susceptibility. The control module will generate display codes associated with fault conditions whenever a fault of malfunction occurs. A mode/select switch shall provide the operator front panel access to a calibration check mode, a calibration mode, a setup check mode, a setup mode and an inhibit mode. The control module shall a 100% backwards compatible optional available at the time of order. The control module, with sensor shall be capable of calibration with the following display prompts during the calibration routine:

AC = Calibration routine activated,

CP – Calibration in progress and

CC = Calibration complete.

The control module shall have a password protected setup routine capable of having the password disabled.

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This chapter discusses what to do when a Model 4802 is received, the terminal connections & designations, sensor location considerations and what to be aware of when applying power.

3.1 Upon Receipt of Equipment

All equipment shipped by General Monitors is packaged in shock absorbing containers which provides considerable protection against physical damage. The contents should be carefully removed and checked against the packing slip. If any damage has occurred or if there is any discrepancy in the order, notify General Monitors as soon as possible. All subsequent correspondence with General Monitors must specify the equipment part and serial numbers.

Each Model 4802 is completely checked at the factory, however, a complete check-out is necessary upon initial installation and start up to ensure system integrity.

3.2 Control Module Installation

A rack or panel mounted chassis will be required when installing any Zero Two Series Module. These chassis should be mounted in non-hazardous, weather protected locations and should be subjected to minimal shock and vibrations. The rack and panel mounted chassis are available in 4, 8, and 16 channel sizes. Multiple 16 channel chassis may be connected to each other to form larger systems.

In installations where two or more module type are to be mixed in the same chassis, ensure that the individual coding strips match the channel application. The coding strips are pre-configured at the factory and the male portion is already on each module.

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The female portion, if unmounted, must be fastened into position on the mounting strip of the desired chassis channel so as to mate with its counterpart on the module (see figure 2 below).

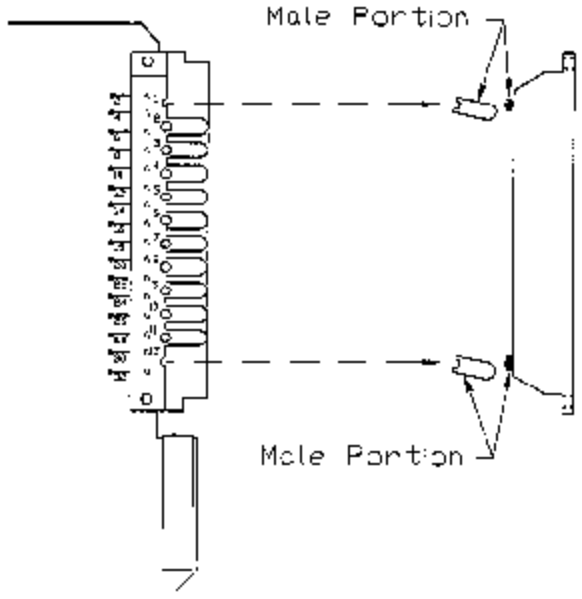


Figure 2

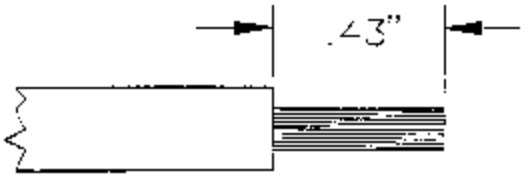
Zero Two series modules require air circulation to avoid excessive heat build-up. If chassis are stacked vertically within an enclosure, forced air circulation may be required. The Control Modules are, to a great extent, immune to electromagnetic interference (EMI). However, they should not be mounted in close proximity to radio transmitters or similar equipment.

3.3 Rear Terminal Connections

All wire connections to the Model 4802 are made to the terminal block located at the rear of the chassis. The terminal block accepts 16 AWG to 20 AWG, stranded or solid core wire.

Rear Terminal Connections (*continued*)

14 AWG wire may be used if it is properly stripped according to figure 3.



Strip Length

Figure 3

Contact with PC Board components should be avoided in order to prevent damage by ***static electricity***.

To connect wires to the terminal block on the Model 4802, loosen the desired screw, insert the stripped end of the wire and tighten.

For the rear terminal designations refer to figure 4 below:

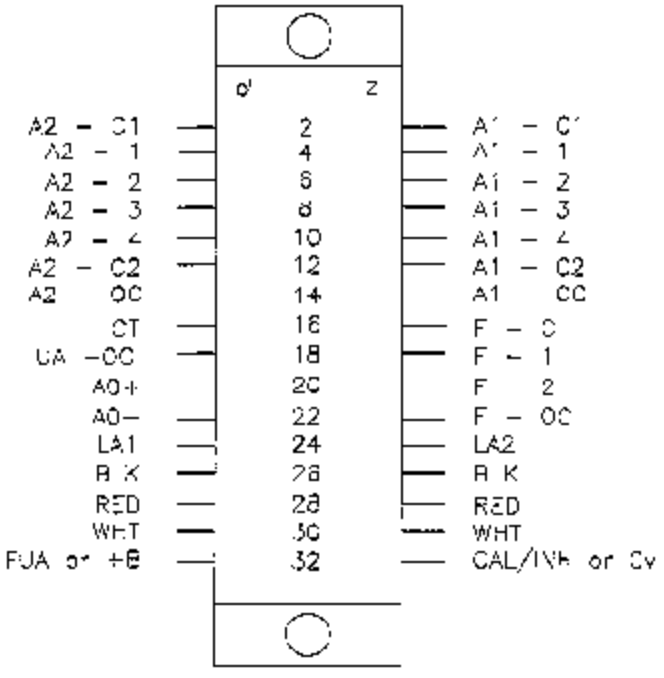


Figure 4

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A2 Alarm

The terminal designations for the A2 alarm outputs are:

Label	Term	Description
A2-C1	2d	Relay Common (1 & 2)
A2-1	4d	Relay Contact
A2-2	6d	Relay Contact
A2-3	8d	Relay Contact
A2-4	10d	Relay Contact
A2-C2	12d	Relay Common (3 & 4)
A2-OC	14d	Open Collector (OC)
LA2	24z	OC Logic for **A2** LED

The A2 alarm outputs are DPDT relays, 1 open collector output (A2-OC) that follows the logic of the relays and 1 open collector output (LA2) that follows the blinking pattern of the front panel LED. The A2-C1 designation is common for A2-1 & A2-2. The A2-C2 designation is common for A2-3 & A2-4. The normally open (NO) and normally closed (NC) contacts depend on a user selectable option (see chapter 5).

The table below refers to the proper open and closed A2 alarm relay contacts while the unit is on power:

User Selected Relay State	Normally Open	Normally Closed
Normally Energized	A2-C1 & A2-1, A2-C2 & A2-4	A2-C1 & A2-2, A2-C2 & A2-3
Normally De-Energized	A2-C1 & A2-2, A2-C2 & A2-3	A2-C1 & A2-1, A2-C2 & A2-4

Rear Terminal Connections (*continued*)

A1 Alarm

The terminal designations for the A1 Alarm outputs are:

Label	Term	Description
A1-C1	2z	Relay Common (1 & 2)
A1-1	4z	Relay Contact
A1-2	6z	Relay Contact
A1-3	8z	Relay Contact
A1-4	10z	Relay Contact
A1-C2	12z	Relay Common (3 & 4)
A1-OC	14z	Open Collector (OC)
LA1	24d	OC Logic for **A1** LED

The A1 Alarm outputs are DPDT relays, 1 open collector output (A1-OC) that follows the logic of the relays and 1 open collector output (LA1) that follows the blinking pattern of the front panel LED. The A1-C1 designation is common for A1-1 & A1-2. The A1-C2 designation is common for A1-3 & A1-4. The normally open (NO) and normally closed (NC) contacts depend on a user selectable option (see chapter 5).

The table below refers to the proper open and closed A1 alarm relay contacts while the unit is on power:

User Selected Relay State	Normally Open	Normally Closed
Normally Energized	A1-C1 & A1-1, A1 C2 & A1 4	A1-C1 & A1-2, A1 C2 & A1-3
Normally De-Energized	A1-C1 & A1-2, A1-C2 & A1-3	A1-C1 & A1-1, A1-C2 & A1-4

Fault Alarm

The terminal designations for the Fault outputs are:

Label	Term	Description
F-C	16z	Relay Common
F-1	18z	Relay Contact (NO)
F-2	20z	Relay Contact (NC)
F-OC	22z	Open Collector (OC)
FUA	32d	Open Collector (OC)

The Fault outputs are SPDT relays, 1 open collector output (F-OC) that follows the logic of the relays and 1 open collector output (FUA) dedicated to new fault indications. If the Backwards Compatible configuration is ordered, the FUA will not be present (pin 32d will be for +B). The Fault outputs are always normally energized when power is applied to the module.

The contact ratings for the A2 & A1 alarm and Fault relays are 4A @ 250 Vac, 3A @ 30 Vdc, *Resistive, maximum.*

Inductive loads (bells, buzzers, relays, etc.) on dry relay contacts must be clamped down. Unclamped inductive loads can generate voltage spikes in excess of 1000 volts. Spikes of this magnitude may cause false alarms and contact damage. Figures 5 & 6 show recommended relay protection circuits for AC and DC loads, respectively.

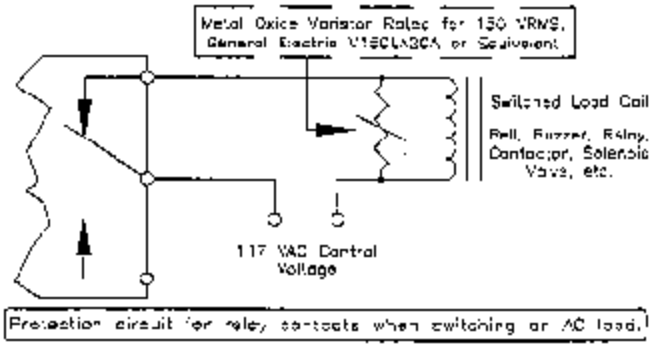

Figure 5

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Rear Terminal Connections (*continued*)

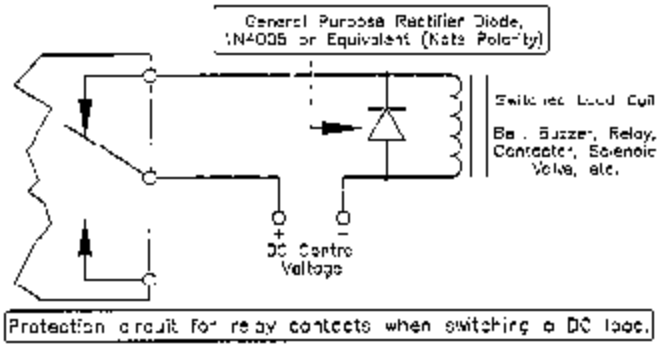

Figure 6

Other Open Collector Outputs

The terminal designation for the Unaccept and the Discrete Calibration / Inhibit Mode outputs are:

Label	Term	Description
UA-OC	18d	Unaccept Output
CAL/INH	32z	CAL-Inhibit Mode Output

If the Backwards Compatible configuration is ordered, the CAL/INH will not be present (pin 32z will be for 0v).

The electrical rating for all open collector outputs is 100mA @ 35 Vdc.

Figure 7 illustrates some typical open collector external circuits.

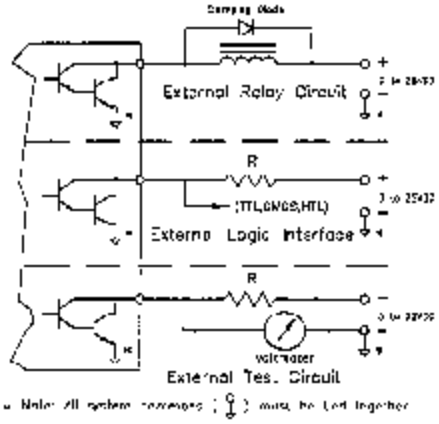

Figure 7

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Sensor Connections

The terminal designations for the Sensor wires are:

Label	Term	Description
BLK	26d,z	Black Sensor Wire
RED	28d,z	Red Sensor Wire
WHT	30d,z	White Sensor Wire

Only 1 sensor may be connected to a Model 4602.

Figure 8 illustrates the Sensor/Controller connections.

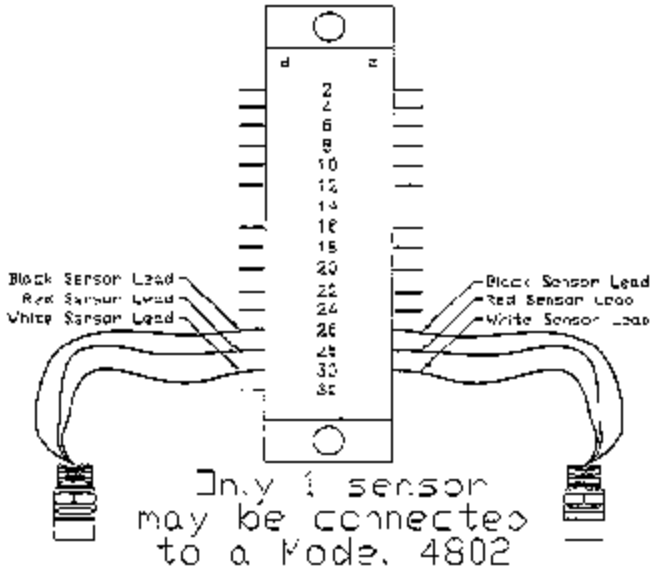


Figure 8

Card Test Switch

The terminal designation for the Card Test Input is:

Label	Term	Description
CT	16d	Switch Connection

Figure 9 is a block diagram that shows the switch connections for the Card Test feature.

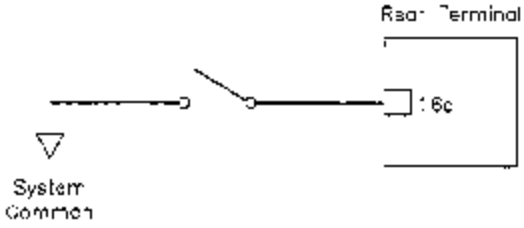


Figure 9

Rear Terminal Connections (*continued*)

The Card Test Input is provided so that the user can access the Card Test feature remotely. One end of a normally open SPST switch is connected to this termination and the other end is connected to system common. To activate the feature, simply press and hold the switch for as long as the test time is to be run.

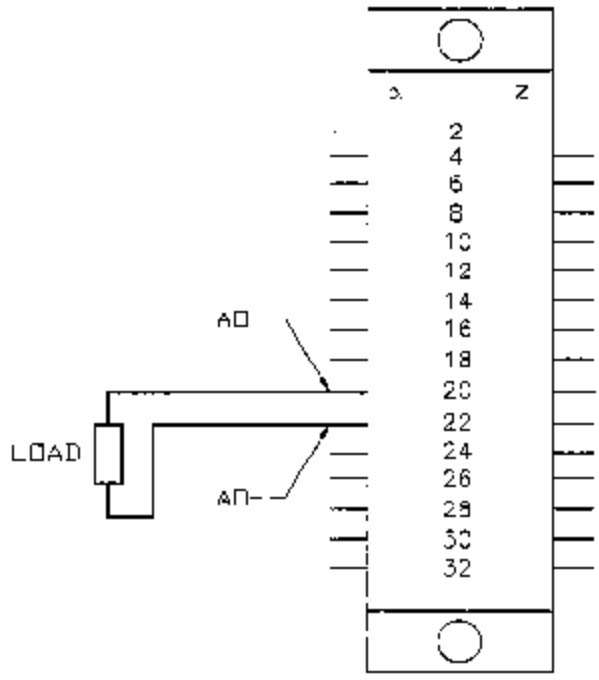
Analog Output Signal

The terminal designations for the Analog Output Signal are:

Label	Term	Description
AO+	20d	Analog Signal (plus)
AO-	22d	Analog Signal (minus)

If the Analog Signal is not used a jumper must be placed between 20d & 22d.

Figure 10 is a diagram of the Analog Signal connections.



The maximum load resistance between AO+ & AO- cannot exceed 500 ohms.

Figure 10

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Figure 11 indicates where the power connections for the chassis are made.

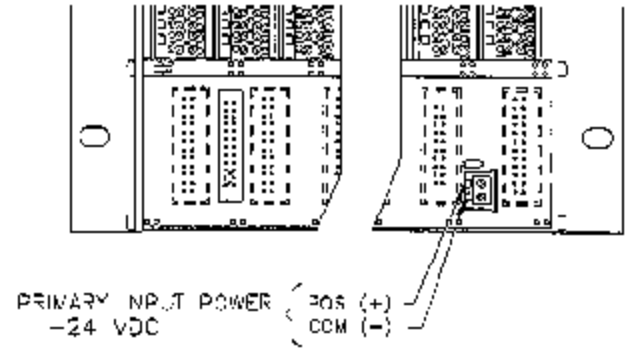


Figure 11

3.4 Sensor Location Considerations

There are no standard rules for sensor placement since the optimum sensor location is different for each application. The customer must evaluate conditions at the sensor site in order to make this determination.

Generally:

- The sensor should be easily accessible for calibration checks. Ensure that sufficient clearance exists to allow the use of field calibration devices such as the Remote Calibrator (Model RC-3) or a Portable Purge Calibrator for combustible gas applications.
- The sensor head should always be pointing down to prevent water build up on the sensing element. Remember that some combustible gases are heavier than air, however, do not rely too heavily on this fact when selecting a sensor position.
- The sensor should be located in areas where leaks are suspected (i.e.. near valves & pipe connections, etc.).
- The sensor should not be placed where it may be coated by contaminating substances.

3.5 Sensor Poisons

Sensors may be adversely affected by prolonged exposure to certain atmospheres.

The more important poisons are:

- Prolonged exposure to Hydrogen Sulfide (H_2S) Gas
- Halides . . . compounds containing Flourine, Chlorine, Bromine and Iodine
- Heavy Metals (e.g. Tetraethyl lead)

Silicones contained in greases or aerosols are the most common "coating" agents, which are not true sensor poisons, but reduce sensor reponse. Other damaging materials which attack the sensor physically include mineral acids and caustic vapors.

The presence of such poisons and vapors does not exclude the use of General Monitors Catalytic Bead Sensors, however, a careful analysis of ambient conditions should be undertaken and the customer should be aware that sensor calibration may need to occur at more frequent intervals.

3.6 Applying Power

Zero Two Series Modules do not have an ON/OFF power switch. Each module in the Zero Two Series operates from 24 Vdc. Current requirements will vary according to the number and type of modules in the system, as well as the number and type of field devices.

NOTE: *if the application of power does not turn ON the unit check fuse F1 on the control board.*

This chapter discusses what general maintenance to perform, describes the electrical inputs, outputs, accepting & resetting alarm & fault conditions and fault diagnostics.

4.1 General Maintenance

Once the Model 4802 has been installed, very little maintenance is required other than periodic checks to verify the integrity of the system.

- The user should evaluate conditions at the sensor site to determine how frequent calibration checks should be performed.
- A functional test of the system should be performed at least once each year. This test should include full operation of stand-by systems or back up power for the prescribed period.
- The power, sensor and output wiring should be checked for tightness, verifying that all of the components and devices are connected correctly.
- If the "Password" is disabled, periodic checks of the setup parameters should be performed.

4.2 Electrical Inputs

There are two electrical inputs to the Model 4802. They are the General Monitors Catalytic Bead Sensor (field device) and the Card Test input. Both of these input connections (sensor and card test) are made to the rear terminal block (see chapter 3 for more detailed installation information).

- The Catalytic Bead Sensor input consist of the standard three lead connections used with General Monitors Catalytic Bead Sensors. See figure 8 on page 10 of this manual.
- The Card Test input consists of a single termination for remote testing of the Model 4802's functions. For detailed information on the Card Test, refer to figure 9 on page 10 of this manual.

4.3 Electrical Outputs

The electrical outputs on the Model 4802 consist of relay contacts, open collectors and an analog current signal.

- The following outputs have rear terminal relay contacts:

  A1 Alarm - DPDT relay contacts

  A2 Alarm - DPDT relay contacts

  Fault - SPDT relay contacts

All of the relay contacts on the Model 4802 have a maximum rating of:

4A @ 250Vac, 3A @ 30Vdc resistive

- The following outputs have rear terminal open collectors:

  A1 Alarm & LED Mimic

  A2 Alarm & LED Mimic

  Fault

  UA - Unaccepted Alarm

  FUA - Unaccepted Fault

  CAL/INH - Inhibit, Calibration & Calibration Check Modes

All of the open collector outputs on the Model 4802 have a maximum rating of:

100mA @ 35Vdc

Electrical Outputs (*continued*)

- The Analog Output Signal is used for sending gas concentrations and status information to remote devices. The maximum analog load may not exceed 500 ohms including the wire/cable that the signal is sent on.

  The Analog Output is a 0 to 20mA current signal with 4 to 20mA being proportional to 0 to 100% of full scale.

  When the Model 4802 is placed in the calibration, calibration check or inhibit mode a 1.5mA signal is generated by this output. During the calibration mode the digital display will indicate prompts associated with the calibration procedure. During the calibration check mode the digital display will indicate the gas concentration with a flashing digit or pair of digits..

  When the Model 4802 enters into a fault condition a 0mA signal is generated by this output. During a fault the display will indicate a fault code ("**F**" followed by a digit).

  If the sensor attached to the Model 4802 is seeing gas in excess of 100% of full scale, this output will generate a signal between 20 and 21.7mA (not proportional). An over range condition is indicated by a flashing digital display reading full scale (**99**).

4.4 Accepting Alarm Conditions

Whenever a new alarm condition occurs the front panel LED and open collector associated with that alarm (LA1 or LA2) will begin to flash. In addition, the associated alarm outputs and the unaccept outputs (4802, UA open collector & FM002, UA relay) will activate, unless they are already activated.

The flashing front panel alarm LED and rear terminal open collector indicate that a new alarm has been activated. New alarms should be acknowledged or accepted. This is accomplished with the Master Accept Button located on the Facilities Module.

Pressing the Master Accept Button de-activates the UA outputs and causes the associated front panel alarm LED and rear terminal open collector to stop flashing and energize.

NOTE: Alarms that latch must be Accepted before they can be Reset (see 4.5 of this chapter).

There is a unique situation that may occur with some frequency in certain applications. An alarm may occur and the operator will accept this alarm by pressing the Master Accept Button. If the alarm output is latching and the condition at the sensor returns to normal (safe) the alarm output will need to be reset, as previously stated in section 4.4. If, however, the alarm output is not reset and that alarm set point is exceeded again, the front panel LED, the associated mimic open collector and the unaccept outputs will reflash or re-activate. This gives the operator an indication of a new alarm condition that must be re-accepted.

A type of alarm, other than the A1 & A2 alarms, is the fault alarm. The fault alarm can be accepted similarly with the A1 & A2 alarms. The front panel fault LED will flash and the fault unaccept (FUA) open collector will energize when a fault is detected. If the operator presses the accept button the front panel, the FUA output will de-energize and the Fault LED will stop flashing, but stay illuminated until the fault condition is corrected.

4.5 Resetting Latched Alarms

The user may select a "latching" or "non-latching" alarm output for A1 and/or A2. If an alarm output activates and the condition that caused that activation is no longer present, a non-latching alarm output will reset automatically, whereas a latched alarm output will need to be reset manually.

Resetting latched alarm outputs is accomplished with the Master Reset Button located on the Facilities Module (FM002). Pressing the Master Reset Button will reset any latched conditions that are no longer valid.

NOTE: Latched alarm conditions cannot be Reset until they have been Accepted (see section 4.4 of this chapter).

EXAMPLE: The sensor detects a gas concentration in excess of an alarm set point (trip level). The associated alarm outputs will activate. After a few moments, the gas concentration drops below the alarm set point. If the alarm outputs are latched, the operator can press the Master Reset Button and the latched alarm outputs will return to their normal (safe) state.

LED Test

The Master Reset Button performs another function. If the operator presses and holds the Master Reset Button for two or more seconds, all of the LEDs and LED segments in the digital display will illuminate for as long as the operator presses the button. This is called the LED Test. The LED test cannot be performed while the unit is in alarm or fault or during a Card Test.

4.6 CAL/INH Open Collector

There is an open collector that will energize anytime the unit is put in the Calibration Mode, the Calibration Check Mode or the Inhibit Mode. This open collector output is referenced to the system's ground/common. Energizing this output merely provides a path to ground as is the case with all energized open collector outputs. De-energized, this output will be in a high impedance state.

4.7 Card Test Feature

The Card Test Input is provided so that the user can access the Card Test feature remotely. One end of a normally open SPST switch is connected to this termination and the other end is connected to system common (see figure 9 on page 10).

To activate the Card Test feature, simply press and hold the switch for at least three seconds. The front panel LEDs and digital display will begin ramping up at the start of the card test and will continue to ramp up for the software selectable ramp time specified by the operator (3 or 10 seconds) during the Setup Mode (see section 5.4). Each alarm level (A1 & A2) will trip when the alarm set point is exceeded. The analog output signal will ramp from 4 to 20mA during the test. At the conclusion of the Card Test, the A1 & A2 outputs will automatically reset (overriding any latching option). A Card Test cannot be initiated if the unit is in alarm or fault or during an LED Test.

NOTE: There is an options that allows active outputs during a Card Test. If this option has been selected the relays (A1 & A2) and open collector outputs are active and will trip during the Card Test. This should be treated as a functional test of a Zero Two System.

4.8 Fault Diagnostics

In addition to the Fault LED on the front panel, the Model 4802 provides a fault code on the digital display whenever a fault condition occurs. The Fault Codes that can appear on the digital display are summarized on this page.

- **F1** - Open analog output signal. Check connections on rear terminal pins 20d & 22d. Check fuse F2 on the control board.
- **F2** - Failed to complete calibration. If this fault occurs, remove the gas and allow the sensor to see clean air for at least five minutes. Then attempt another calibration. If the second attempt fails, replace the sensor. If this fault continues to occur after the sensor has been replaced, consult the factory or your GMI Representative.
- **F3** - Software checksum error. This fault occurs during initial power-up of the unit. If this fault occurs, remove and reapply power to the unit. If the fault continues to occur, replace the unit and consult the factory or your GMI Representative.
- **F4** - Sensor connections are open or short circuited or there is excessive zero drift. Make sure the sensor wires are connected properly (in the field and at the rear of the unit) and re-calibrate if necessary. If this fault continues to occur, replace the sensor.
- **F5** - Not used at this time. This code has been reserved for future use.
- **F6** - Low supply voltage. Make sure the supply voltage level at the chassis is 24Vdc.
- **F7** - EEPROM verification failure. This fault will occur if the microprocessor can not store calibration or setup information in the EEPROM. If this fault occurs consult the factory or your GMI Representative.
- **F8** - Failed to complete setup. This fault may occur during or immediately after the Setup Mode. If this fault occurs consult the factory or your GMI Representative.
- **F9** - Calibration check period exceeded. If the calibration check gas is left on the sensor for more than 6 minutes, this fault will occur. Remove the gas and allow the sensor to see clean air.

In each of the fault cases listed on this page, when the fault occurs the FUA output is activated. Pressing the **ACCEPT** button on the Facilities Module (FM002) will acknowledge the fault, de-activate the FUA output and the fault LED will stop flashing and remain **ON** until the fault is corrected.

PRELIMINARY

This chapter discusses the user interfaces along with the Calibration Check Mode, the Calibration Mode, the Setup Check Mode and the Setup Mode.

5.1 Types of User Interfaces

User interfaces are provided so that the operator may interpret and direct the Model 4802 in the performance of its various functions. User interfaces (figure 12) consist of a digital display, status indicators and a Mode/Select switch.

- The digital display provides the user with the gas concentration at the sensor site, fault diagnostic codes, calibration prompts and setup parameters.
- The status indicators provide the user with an indication of the current mode of operation (alarm, fault, ready, calibration and setup).
- The Mode/Select switch provides the user access to the Calibration, Setup/Inhibit, Calibration Check and Setup Check modes.

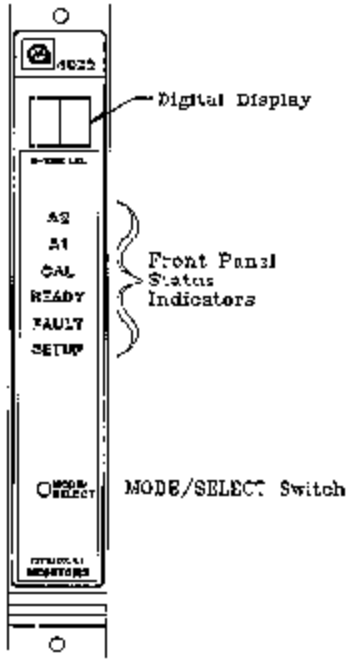


Figure 12

PRELIMINARY

5.2 Calibration Check Mode

To perform a calibration check, follow the procedure listed below.

- Place the cup from the portable purge calibrator over the sensor (figure 13).

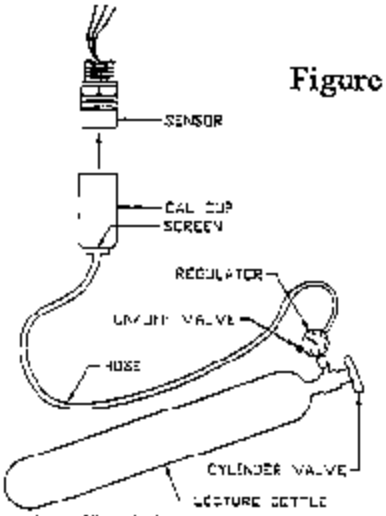


Figure 13

*** The Calibration Check Mode cannot be entered if the 4802 is in alarm.**

- Enter the Calibration Check mode by pressing and holding the Mode/Select switch until the **CAL** LED begins to flash (about ten seconds). When the **CAL** LED begins to flash, release the Mode/Select switch. The unit is now in the Calibration Check Mode (figure 14).

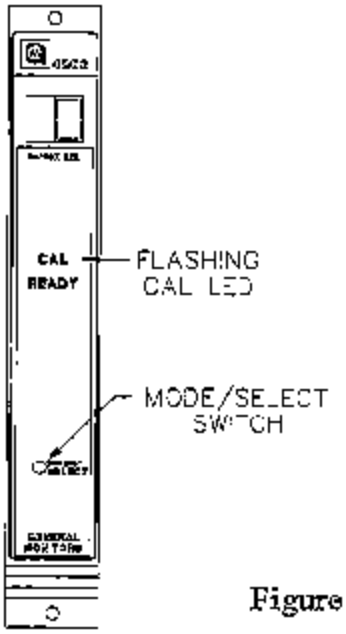


Figure 14

Calibration Check Mode (*continued*)

- When the Mode/Select switch is released, the display will indicate a flashing pair of bars (- -) for about ten seconds.
- When the display indicates a flashing **0** apply the test gas to the sensor (open the valve on the cylinder and the ON/OFF valve) and wait for a few seconds. The display will begin to go up scale as the sensor sees the gas. If the display does not change after 6 minutes the unit will return to the normal operating mode.
- If the sensor does see the gas the read-out on the display will be flashing for as long as the unit remains in the Calibration Check mode.
- The reading will stabilize 30 to 60 seconds of exposure to the test gas. This response time may increase due to the presence of the TGA-1, RC-3, Dust Guard, Splash Guard or other sensor accessories.
- The operator should compare the reading with the gas concentration applied and determine if it is necessary to calibrate the sensor.
- The A1 & A2 alarms are disable during the Calibration Check Mode. Use the Inhibit Mode to verify the alarm set points for A1 and A2.
- If the reading is acceptable remove the gas and allow the sensor to see clean air.
- If the operator determines that a calibration is necessary, do one of the following:
  A) If the applied gas concentration is equivalent to the user specified calibration level, place the unit in the calibration mode by pressing the Mode/Select switch or

  B) If the applied gas concentration is not equivalent to the user specified calibration level, remove the gas, allowing the sensor to see clean air, then follow the calibration procedure listed in section 5.3 of this chapter.

NOTE: If the 3 Liter Calibration Chamber is used with vapors or fumes from a volatile liquid/solvent, use the procedures listed on pages 30 and 31 in section 6.6 of this instruction manual.

5.3 Calibration Mode

To calibration the Model 4802, follow the procedure listed below.

- Make sure the calibration gas is the same concentration as the user specified calibration level.
- Make sure the sensor is seeing clean air.
- Place the cup from the portable purge calibrator over the sensor (figure 15).

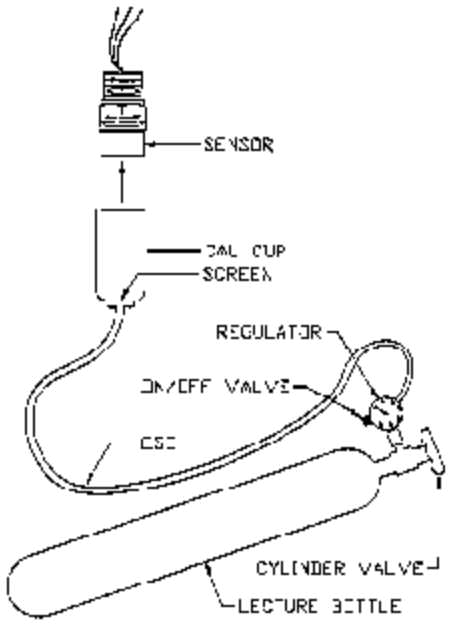


Figure 15

Calibration Mode (*continued*)

- Enter the Calibration mode by following the procedure for entering the Calibration Check mode, continuing to press and hold the Mode/Select switch until the **CAL** LED turns on steady (about fifteen seconds, figure 16).

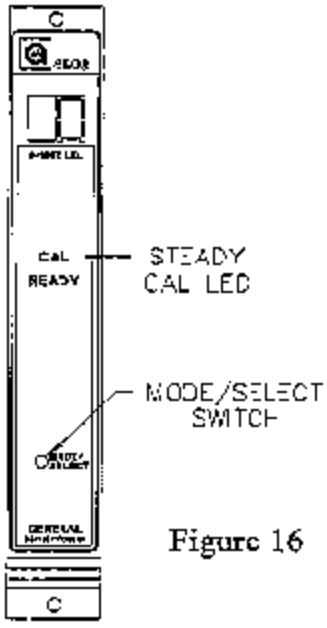


Figure 16

- When the **CAL** LED is on steady, release the Mode/Select switch. The display will show flashing bars (- -) for abaout ten seconds, then an **AC** indication on the display. The unit is now in the Calibration Mode (figure 17).

Figure 17

- Apply the gas by opening the valve on the cylinder and the ON/OFF valve and watch the display change from **AC** to **CP** as the sensor sees gas (figure 18).

Figure 18

If the display does not change from **AC** to **CP** after six minutes, the Model 4802 will return to normal operation.

- Wait for the display to change from **CP** to **CC** when the calibration routine is complete (about 1 minute, figure 19). If the display indicates **F2** remove the gas and recalibrate after 5 minutes.

Figure 19

- Remove the gas and watch the display return to normal operation, **0**, when the new calibration values have been stored in the EEPROM.

Calibration Mode (*continued*)

If the unit cannot store the new calibration values in the EEPROM, the Model 4802 will display an "**F7**" fault code (EEPROM verification failure, figure 20). If an **F7** calibration fault occurs, it will be necessary to replace the Model 4802.

If the Model 4802 fails to calibrate, the unit will use the previously stored calibration values.

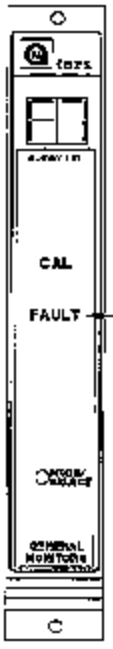


Figure 20

5.4 Setup & Setup Check Modes

The Setup Check Mode allows the operator to view the selected options for the module without allowing any changes to be made. Once this mode has been entered, the module will automatically display each of the selected options for a short period of time. The Setup Mode allows the operator to change the operating parameters by making choices for selected options.

The Setup Check & Setup Modes display identical information with the following exceptions:

- The Setup Check Mode allows the user to view the operating parameters of the Model 4802, whereas the Setup Mode allows the user to change the operating parameters of the Model 4802.
- Entering the optional Password is only available in the Setup Mode.
- The Inhibit Mode may only be entered from the Setup Mode. If the Inhibit Mode is entered, the A1 & A2 outputs will be inhibited until the Mode/Select switch is pressed.

NOTE: The Setup and Setup Check Modes cannot be entered if the unit is in alarm or fault.

During the Setup Mode the operator will be allowed to select options. The selection procedure is the same for most of the options. Pressing the Mode/Select Switch toggles the available choices. When the display has indicated a choice for five consecutive seconds, without the operator pressing the Mode Select Switch, the Setup routine will accept that selection and move on to the next option available.

NOTE: Before entering the Setup Mode to make changes, the user should fill out the form and become familiar with the block diagram on page 26 of this manual. This will aid the user during the selection process in the Setup Mode.

The Password, the A1 & A2 Alarm set points and the calibration level options offer the operator more than two choices. While these options are being selected, pressing

Setup Check & Setup Modes (*continued*)

the Mode/Select Switch repeatedly will sequence the display to the next available choice for that option.

To Enter the Setup Check Mode or the Setup Mode, follow the procedure for entering the Calibration mode press and hold the Mode/Select switch until the **SETUP** LED begins flashing (about twenty seconds). When the **SETUP** LED is flashing, release the Mode/Select switch to enter the Setup Check Mode (figure 21). Continuing to press and hold the Mode/Select switch until the **SETUP** LED stops flashing (about five seconds more) will allow the operator to enter the Setup Mode. When the **SETUP** LED stops flashing and stays on, release the Mode/Select switch and the unit will enter the Setup Mode (figure 21).

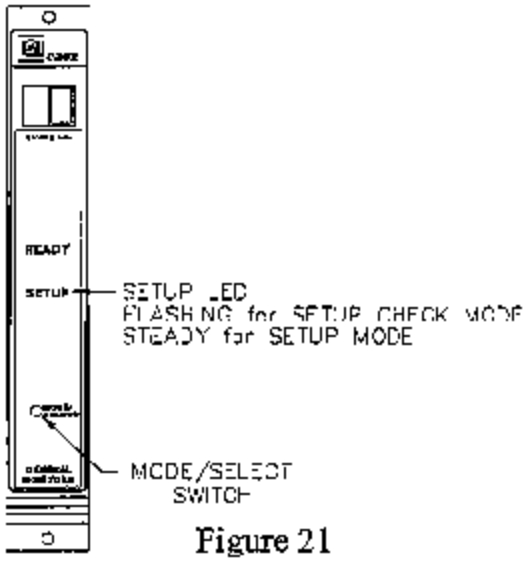


Figure 21

ENTERING THE PASSWORD

- **This option applies to the Setup Mode only:** If the password option is enabled, the right digit of the display will be blank and a **0** will appear in the left digit on the display (figure 22). If the number is incorrect, press the Mode/Select switch until the correct number is displayed, then wait about five seconds.

The left digit of the display will be blank and a **0** will appear in the right digit on the display (figure 22). If the number is incorrect, press the Mode/Select switch until the correct number is displayed, then wait about five seconds. If the password is correct the user will proceed with the inhibit option. If the password is incorrect the user will not be able to proceed and unit will return to the normal operating mode. Once in the operating mode the user may attempt to re-enter the Setup Mode. The factory default password is **00**.

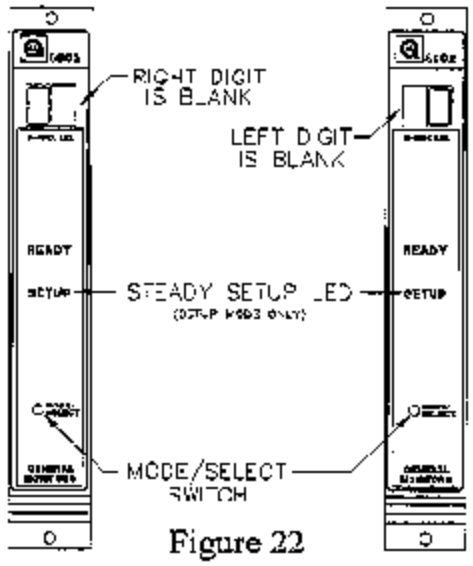


Figure 22

INHIBIT MODE

- **This option applies to the Setup Mode only:** If the password option is disabled, or after the correct password has been entered, the display will indicate **In** for five seconds (figure 23). Pressing the Mode/Select switch while **In** is displayed, will cause the unit to enter the Inhibit mode by inhibiting the alarm outputs. After the unit has entered the Inhibit mode, the Model 4802 will return to normal operation. If it is desired to enter the Setup Mode, do not press the Mode/Select switch for the five seconds that **In** is displayed.

PRELIMINARY

Setup Check & Setup Modes (*continued*)

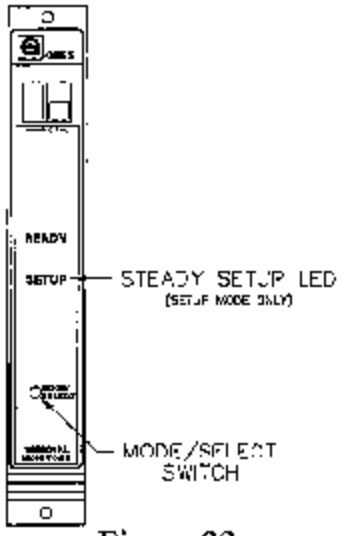


Figure 23

A2 ALARM OPTIONS

- Next, the **A2** LED will be flashing while the Energized/De-Energized option is displayed (figure 24). The display will indicate the current selection, (**En** or **dE**). De-Energized is the factory default for this selection.

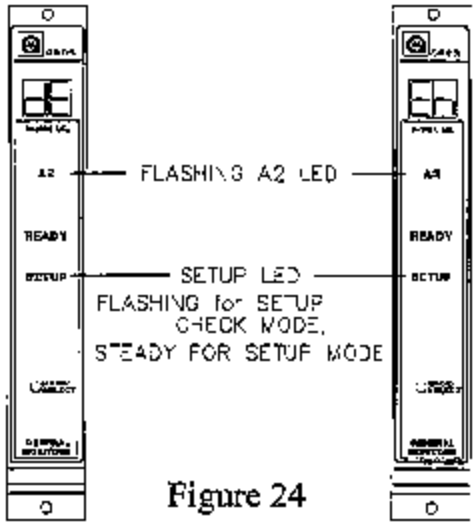


Figure 24

- The **A2** LED on the front panel will be flashing while the latching/non-latching option is displayed (figure 25). The display will indicate the current selection, (**nL** or **LA**). Latching is the factory default for this selection.

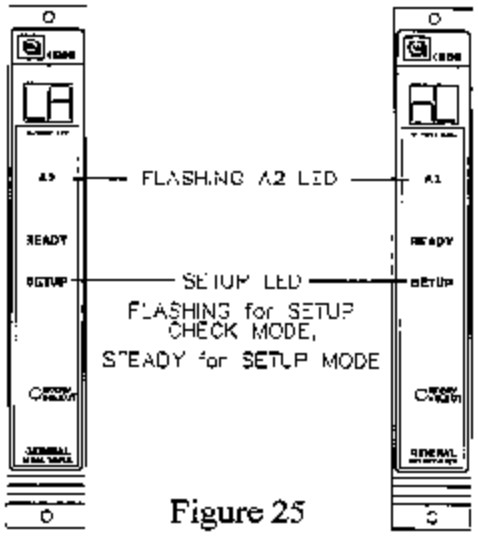


Figure 25

- The last A2 alarm option to appear on the display will be the alarm set point (trip level). If this level is reached or exceeded the A2 alarm outputs will activate. The display (figure 26) will indicate the current A2 alarm set point (10 to 60 in increments of 5). Press the Mode/Select switch repeatedly, until the desired A2 alarm set point appears on the display. **60** is the factory default for this selection.

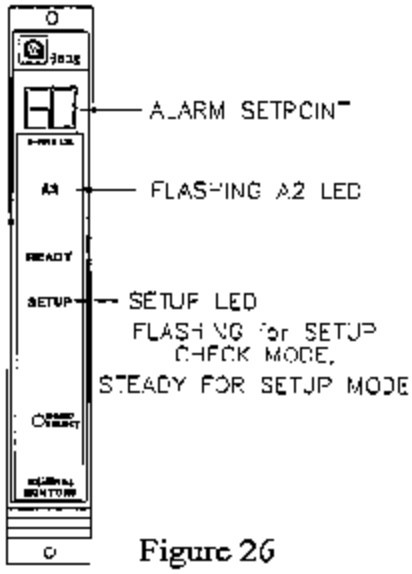


Figure 26

NOTE: The A2 set point cannot be set lower than the current A1 set point. To accomplish this, the A1 set point should be set lower than the desired A2 set point, then re-enter the Setup Mode and set the A2 set point.

Setup Check & Setup Modes *(continued)*

A1 ALARM OPTIONS

- Next, the **A1** LED will be flashing while the Energized/De-energized option is displayed (figure 27). The display will indicate the current selection, (**En** or **dE**). De-Energized is the factory default for this selection.

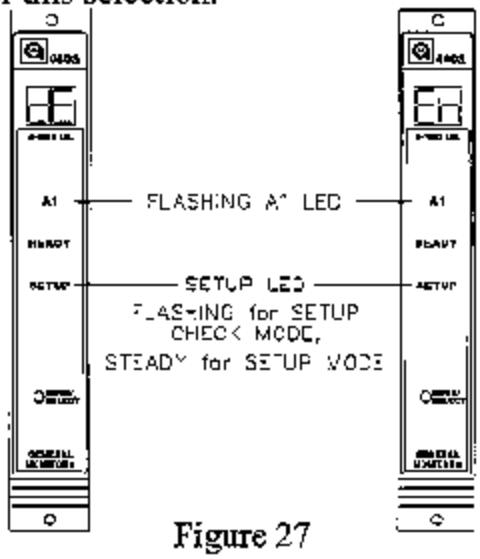


Figure 27

- The **A1** LED on the front panel will be flashing while the latching/non-latching option is displayed (figure 28). The display will indicate the current selection, (**nL** or **LA**). Non-Latching is the factory default for this selection.

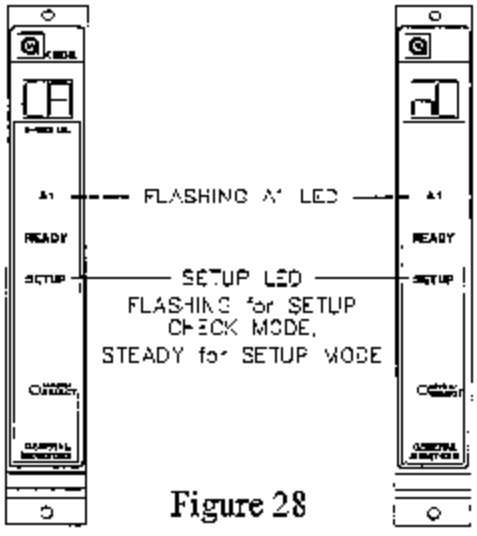


Figure 28

PRELIMINARY

- The last A1 alarm option to appear on the display will be the alarm set point (trip level). If this level is reached or exceeded the A1 alarm outputs will activate. The display will indicate the current A1 alarm set point (figure 29). Press the Mode/Select switch repeatedly, until the desired A1 alarm set point appears on the display (10 to the A2 set point in increments of 5). The A1 set point cannot be set higher than the A2 set point. **30** is the factory default for this selection.

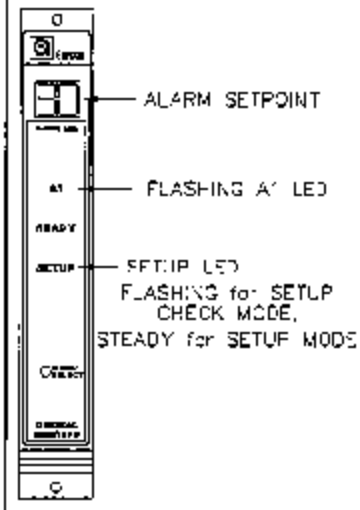


Figure 29

CALIBRATION LEVEL OPTION

- After the A1 alarm options have been selected, the user will choose the calibaration level (figure 30). The display will indicate **CL** for 5 seconds, then the current calibration level. The acceptable range of calibration level, in % LEL (lower explosive limit), is between **25** and **90**, inclusive.

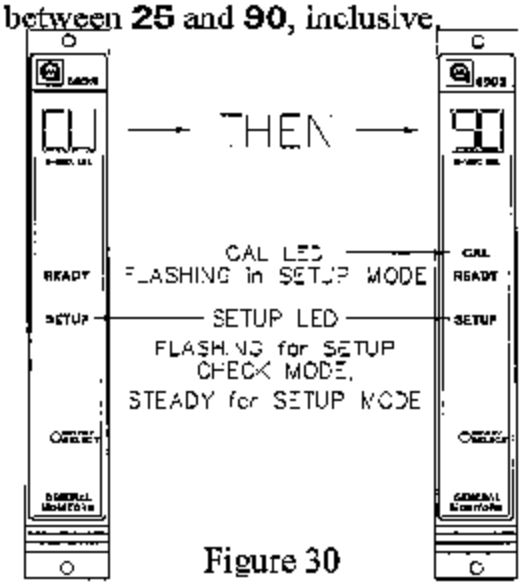


Figure 30

Setup Check & Setup Modes (*continued*)

FAULT/INHIBIT OPTION

- Next, the user will select the Fault/Inhibit option. The **FAULT** LED on the front panel will be flashing while the display indicates **Ac** or **nA** (figure 31). An **Ac** selection specifies that the Model 4802 will activate the Fault circuit while the unit is in the Inhibit Mode. An **nA** selection specifies that the Model 4802 will not activate its Fault circuit when the unit is placed in the Inhibit Mode. An **nA** selection will not disable the Fault circuit, therefore, if a Fault occurs during the Inhibit Mode, the unit will activate the Fault circuit. Not Active is the factory default for this selection.

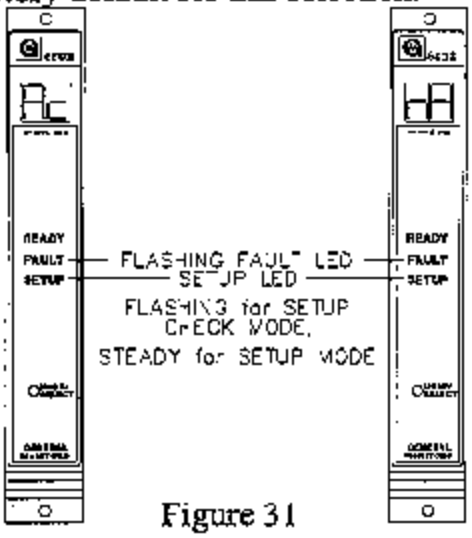


Figure 31

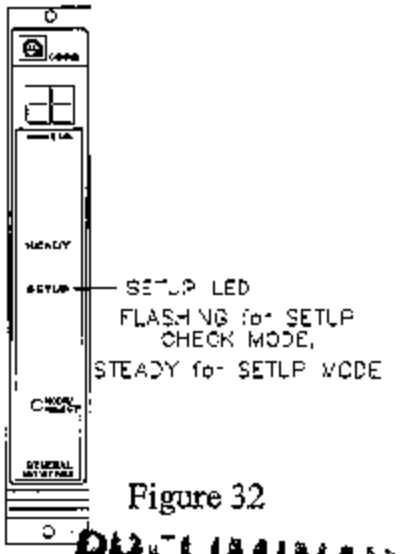


Figure 32

PRELIMINARY

CARD TEST OPTIONS

- After the Fault/Inhibit option has been selected, the user will select the ramp time (3 or 10 seconds) and whether or not the alarm outputs will activate during a Card Test. The display will indicate **ct** for about five seconds (figure 32) followed by the ramp up time (**3** or **10**) during the card test (figure 33). **3** is the factory default for this selection.
- Next, the display will indicate the alarm output option during a Card Test as either **Ac**, active or **nA**, not active. (figure 34). Not Active is the factory default for this selection.

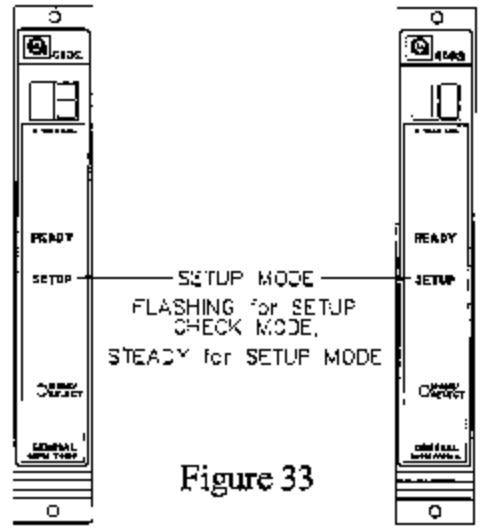


Figure 33

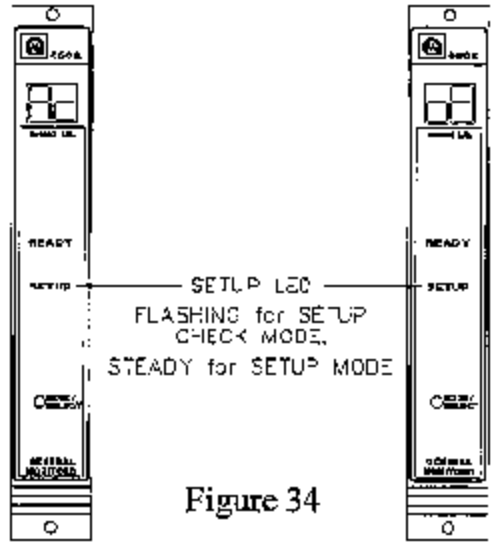


Figure 34

Setup Check & Setup Modes (*continued*)

NOTE: *Selecting* **nA** *option for the Card Test will not inhibit the Fault or A1/A2 alarm circuits in the event of a malfunction or gas condition.*

PASSWORD OPTIONS

- Once the Card Test options have been selected, the user will either enable or disable the password option (figure 35). The display will indicate either **PE**, for enabled or **Pd**, for disabled. Password Disabled is the factory default for this selection.

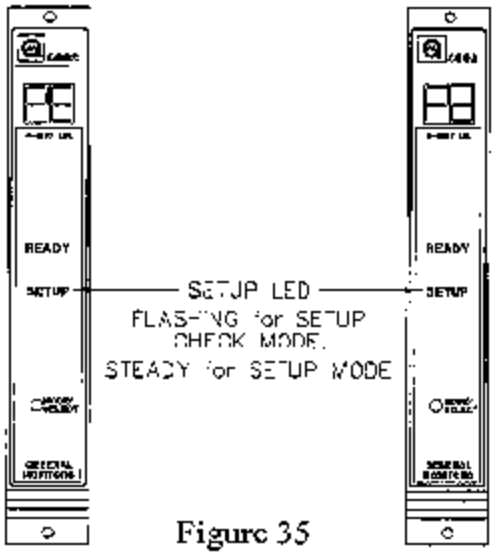


Figure 35

- **This option applies to the Setup Mode only:** If the Password is disabled, the unit will return to normal operation. If the Password is enabled, the user will be able to enter a new password. The unit will display the left digit of the Password, flashing on the display. The right digit will be blank until the left digit has been selected. Press the Mode/Select switch repeatedly until the correct value is displayed. Once the left digit is correct, wait for five seconds and the right digit of the display will begin flashing and the left digit will be blank. Press the Mode/Select switch repeatedly until the correct value is displayed. Wait about five seconds and the unit will return to normal operation, completing the Setup Mode (figure 36).

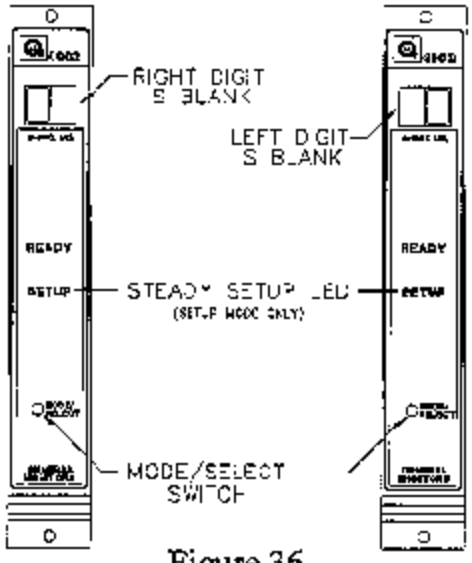


Figure 36

Setup Check & Setup Modes (*continued*)

This section is provided to aid the operator in making selections during the Setup Mode. It is recommended that the operator fill in the selections in the proper blanks and then use this page as a reference while programming the Model 4802. The blocks shown below indicate the order of options in the Setup Mode. To the right of each block is a description of the choices that are available for that option. More information about making each selection is provided in section 5.4 of this manual.

		ENTER SELECTION
Password	Enter the Password, if the Password is enabled.	
Inhibit Mode ?	Enter the Inhibit Mode, if desired.	
A2 Alarm Options	Set the Energized (En) / De-Energized (dE) Option	_____
	Set the Latching (LA) / Non-Latching (nL) Option	_____
	Set the A2 alarm set point (from 10 to 60, in increments of 5)	_____
A1 Alarm Options	Set the Energized (En) / De-Energized (dE) Option	_____
	Set the Latching (LA) / Non-Latching (nL) Option	_____
	Set the A1 alarm set point (from 10 to the A2 set point)	_____
Calibration Level	Set the calibration level, LEL (from 25 to 90, in increments of 5)	_____
Fault/Inhibit Option	Set the Fault Activate (Ac) or not (nA) during Inhibit Mode	_____
Card Test Options	Display will indicate "ct" for 5 seconds	
	Set the ramp time for the Card Test Mode (3 or 10 seconds)	_____
	Set the Alarm outputs for Active (Ac) or not Active (nA)	_____
Password Options	Set the Password to be Disabled (Pd) or Enabled (PE)	_____
	If the Password is Enabled:	
	Set the password digits . . . . . Left . . . . . Right _____	
Setup Check Mode	After all of the options have been selected, the 4802 will enter the Setup Check Mode.	

PRELIMINARY

This chapter provides a description of the types of field devices (sensors), and the accessories, that can be used with the Model 4802.

6.1 Sensing Elements

General Monitors uses a low temperature catalytic bead to detect the presence of combustible gases and vapors. These gases and vapors are found in many applications. The catalytic bead converts the combustible gases and vapors to heat. This change in heat results in a change in the electrical resistance of the bead.

By taking a matched pair of catalytic beads and coating one, so that it does not respond to the presence of combustible gases and vapors, we can compare the change in resistance between the two beads. The bead that is coated is called the reference bead and the other bead is the active bead (figure 37). Environmental factors can also influence the temperature of the catalytic beads. Because the beads are a matched pair, they will respond to changes in ambient temperature, humidity and pressure equally.

By connecting one end of each catalytic bead together, a series circuit is formed. This circuit is supplied with a constant current. The voltage drop across each bead will be identical in the absence of combustible gases and vapors. As combustible material is converted to heat, the resistance across the active bead increases, causing the voltage drop across ech bead to be different. This difference is proportional to the amount of combustible gas or vapor that is present at the sensing elements (catalytic beads).

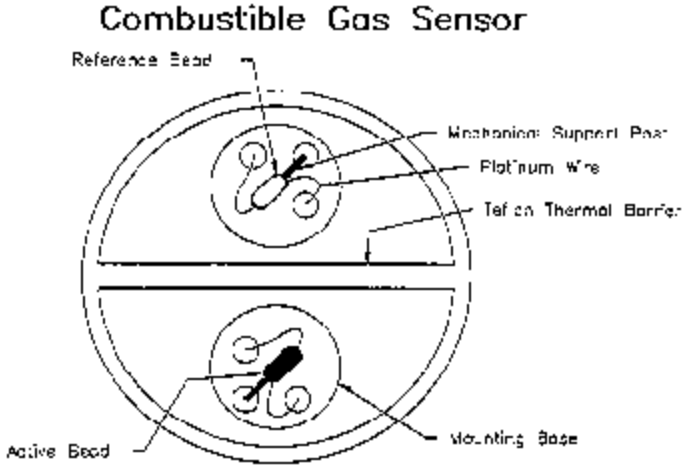


Figure 37

General Monitors offers a variety of Catalytic Bead Sensors with different detection ranges, sensor bodies and flame arrestors:

10001-1* General Purpose, Aluminum Body, Wire Screen Arrestor

10014-1* High Temperature, Aluminum Body, Wire Screen Arrestor

10022-1 Industrial PTB, Aluminum Body, Wire Screen Arrestor

10058-1* General Purpose, Stainless Steel Body, Wire Screen Arrestor

10059-1 Industrial PTB, Stainless Steel Body, Wire Screen Arrestor

10164-1 Hydrogen Specific, Aluminum Body, Wire Screen Arrestor

10387-1 Super Poison Resistant, Alum., Body, Wire Screen Arrestor

10391-1 High Temp., Stainless Steel Body, Wire Screen Arrestor

* = Poison resistant sensors are available

6.2 Sensor Housing

General Monitors offers an explosion proof housing that is rated for use in Class I, Division 1, Group B, C & D hazardous locations (see figure 38).

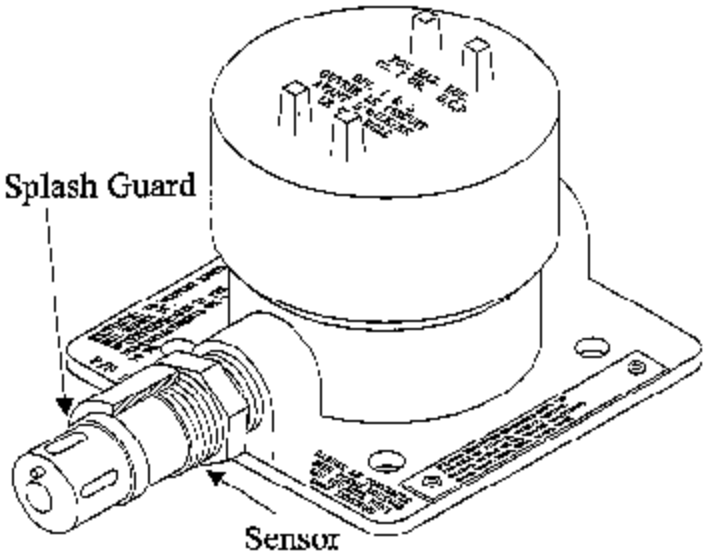


Figure 38

Both housing entries are tapped for 3/4 NPT threads. The sensor connects to one of these entries, while the other entry is for conduit runs. The lid of the housing is also threaded to allow the user to gain entry to the sensor connection in the field. Once the sensor is installed/operating in the field, no attempt should be made to disconnect the sensor, the conduit or the housing lid without removing power from the Model 4802, as such an act would compromise the explosion proof integrity of the field device.

6.3 Splash Guard

General Monitors produces a universal Splash Guard, P/N 10395-1, that has been designed for use on all General Monitors combustible gas and hydrogen sulfide gas sensors (figure 39).

The Splash Guard prevents water from rain or equipment washdowns from being forced into the sensor cavity and affecting the response of the sensing element. Constructed of rugged Valox plastic, it has a series of internal baffles to deflect water down and away from the sensor. This guard is also threaded for simple screw on installation. The splash guard is recommended for outside applications where rain or frequent hosedowns occur, such as offshore platforms. Sensor response is essentially not affected by this splash guard.

Figure 39

6.4 Dust Guard Assembly

The Dust Guard Assembly (figure 40) is a simple, threaded stainless steel cylinder with a wire screen at one end. It is easily removed for cleaning and/or replacement of the disposable screen. This General Monitors accessory is specifically designed to prevent dust and particulate matter from reaching the sensor flame arrestor. Such debris can plug the screen and limit the amount of gas reaching the active surface of the sensor. When the dust guard is installed, this problem is eliminated and sensor response is unchanged.

Figure 40

PRELIMINARY

Dust Guard Assembly (*continued*)

The Dust Guard is also available in a kit with twelve replaceable screens (figure 41). It can also be used as an effective wind screen, and is recommended for corrosive, windy or high temperature environments.

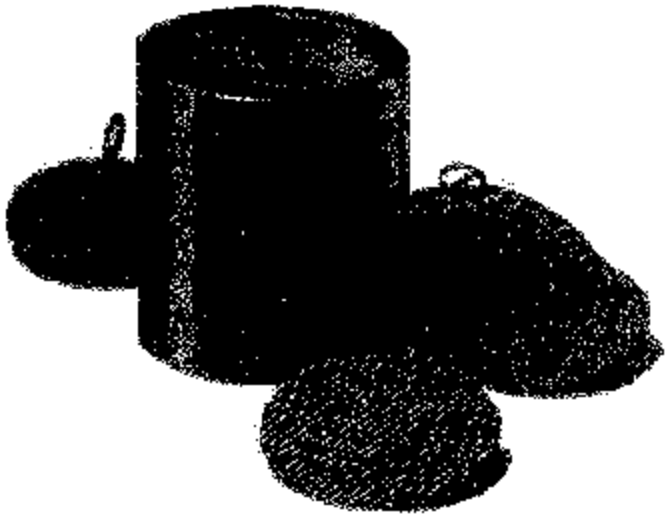


Figure 41

6.5 Duct Mounting Plate

General Monitors produces a Duct Mounting Plate (P/N 10041) for application that require the sensor to be mounted in an air-conditioning or heating duct. The Duct Mounting Plate is easy to install (figure 42).

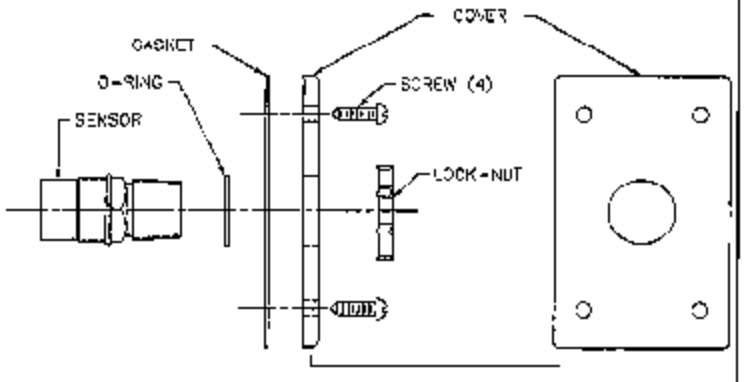


Figure 42

PRELIMINARY

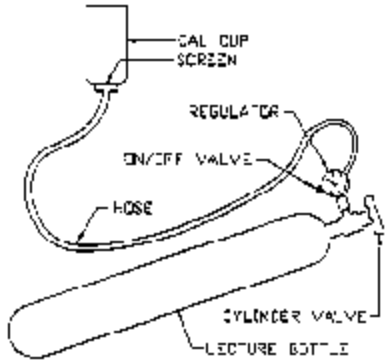
Read and understand the bulleted list below before mounting the Sensor into a duct.

- Select a location on the duct and cut out a hole large enough for the Sensor to be inserted into the duct.
- Place the O-Ring over the Sensor threads, against the 1 & 1/4 inch hex on the wiring side of the sensor.
- Insert the wiring side of the Sensor through the Gasket and Cover.
- Screw the Lock-Nut onto the wiring side of Sensor.
- Use the four Screw to attach the mounted Sensor to the duct. The Sensor should be oriented so that when the plate is attached to the duct the sensing element is inside the duct.

6.6 Calibration Equipment

The Model 4802 uses a Portable Purge Calibrator (figure 43) or a 3 Liter Chamber (figure 44) to accomoplish calibration. The calibration and calibration check procedures and use of the Portable Purge Calibrator is explained in sections 5.2 and 5.3, on pages 17 through 20 of this instruction manual.

Figure 43



Calibration Equipment (*continued*)

The procedure using the 3 Liter Chamber (figure 44) is explained below:

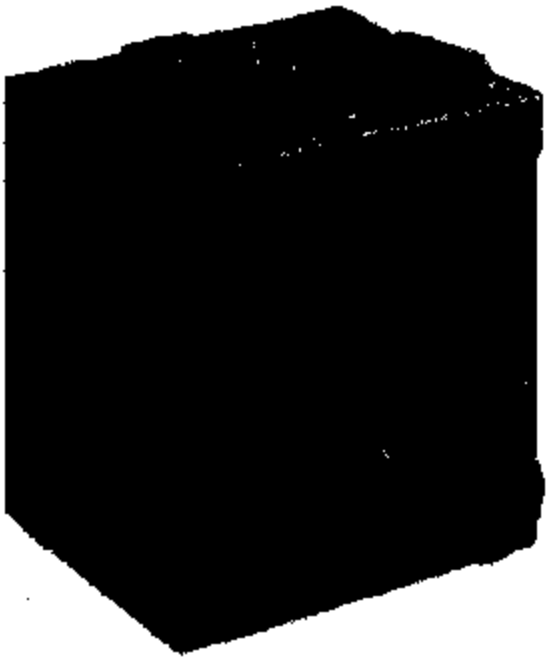


Figure 44

The 3 Liter Chamber is used when the 4802 is calibrated with liquid or solvent vapors.

Before the Model 4802 is calibrated with any solvent or volatile liquid, consult the listing in Appendix B of this instruction manual to determine the volume of solvent/liquid required to produce a 50% LEL concentration in the 3 Liter Chamber. However, if the user specified calibration level is not 50%, consult the factory for correct volume. Let the factory know the calibration level (25 to 95, steps of 5) and the solvent/liquid being used to calibrate the sensor.

Before using the 3 Liter Chamber, make sure the following is present: 3 Liter Chamber, Dish, 250 microliter syringe, the correct volume of solvent/liquid for calibrations and calibration checks.

- Orient the cahmber so that the lid and sensor hole are on top.
- It will be necessary to wind up the fan using the turnkey on the outside of the chamber. If the fan begins to turn, locate the switch underneath and behind the fan blades on the inside of the chamber and turn the fan off.
- Insert the sensor into the sensor hole, open the lid and place the dish at the bottom of the chamber.
- Draw the correct amount of solvent/liquid into the syringe, according to the listing in Appendix B or from consulting the factory.
- Place the Model 4802 in the Calibration Check or Calibration Mode, folowing the instructions listed in section 5.2 or 5.3 of this instruction manual.

Calibration Check Mode:

1. When **0** is flashing on the display (Calibration Check Mode) inject the solvent/liquid into the dish, reach underneath and behind the fan blades on the inside of the chamber, locate the fan switch, turning it on and close the lid on the 3 Liter Calibration Chamber.
2. As the sensor begins to respond to the combustible vapor in the chamber, the concentration will begin flashing on the display of the 4802.
3. The reading will stablize after one or two minutes.
4. Remove the sensor from the chamber and allow it to see clean air. When the display has stopped flashing and indicates a few % LEL and then zero (**0**), the Model 4802 has returned to normal operation.

Calibration Equipment (*continued*)

Calibration Mode:

① When **AC** appears on the display (Calibration Mode) inject the solvent/liquid into the dish, reach underneath and behind the fan blades on the inside of the chamber, locate the fan switch, turning it on and close the lid on the 3 Liter Calibration Chamber.

② As the sensor begins to respond to the combustible vapor in the chamber, the display on the 4802 will indicate **CP** (Calibration in Progress).

③ After one or two minutes the display will indicate **CC** (Calibration Complete).

④ Remove the sensor from the chamber and allow it to see clean air. When the display indicates a few % LEL and then zero (**0**), the Model 4802 has returned to normal operation.

Calibration Check & Calibration Modes:

■ Remove the Dish from the 3 Liter Chamber and clean thoroughly before using it again.

The following items are a list of calibration equipment and part numbers:

Description	Part Number
3 Liter Chamber with one 250 microliter syringe	1400200
Dish for 3 Liter Chamber	928-700
250 microliter syringe	928-718
Motor for 3 Liter Chamber	1400204
Fan for 3 Liter Chamber	1400207
Portable Purge Calibrator Methane Gas 50% LEL	1400150-M
Portable Purge Calibrator Hydrogen Gas 50% LEL	1400150-H
Portable Purge Calibrator Butadiene Gas 50% LEL	1400150-BD
Portable Purge Calibrator Butane Gas 50% LEL	1400150-B
Portable Purge Calibrator Ethane Gas 50% LEL	1400150-E
Portable Purge Calibrator Propane Gas 50% LEL	1400150-PR
Small Calibration Cup	1400152-1
Large Calibration Cup	1400154
Regulator, Pressure Gauge	922-009
Replacement Cylinder Methane Gas 50% LEL	140155-M
Replacement Cylinder Hydrogen Gas 50% LEL	140155-H
Replacement Cylinder Butadiene Gas 50% LEL	140155-BD
Replacement Cylinder Butane Gas 50% LEL	140155-B
Replacement Cylinder Ethane Gas 50% LEL	140155-E
Replacement Cylinder Propane Gas 50% LEL	140155-PR
Cylinder Refill Methane Gas 50% LEL	140015-M
Cylinder Refill Hydrogen Gas 50% LEL	140015-H

Glossary of Terms

AC - Alternating Current.

Analog - Continuous, without steps.

Ambient Temperature - Surrounding or background Temperature.

AWG - American Wire Gauge.

BASEEFA - British Approvals Service for Electrical Equipment in Flammable Atmospheres.

Calibration - Applying a known level of gas to a sensor and making adjustments so that the output signal matches the level of applied gas.

Canadian Standards Association - CSA is an approval agency. Testing laboratories will test Gas Detection Instruments to the standards set by approval agencies such as CSA. CSA certification is required for selling such equipment in Canada. CSA standards are recognized by many organizations outside of Canada.

Catalyst (Catalytic) - A substance that speeds up or slows down the rate of a chemical reaction. Any substance acting as the stimulus in bringing about or hastening a result.

Class I, Division 1 - This is a National Electric Code (NEC) classification dealing with hazardous locations and the degree with which the hazard is present. Class I, Division 1 is defined as any location where ignitable concentrations of flammable gases or vapors may be present under normal operating conditions. For more information on hazardous locations, refer to the NEC Handbook, Article 500.

COM - Common.

Conduit - Tubing, piping or a protected trough for electrical wires.

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DC - Direct Current.

DCS - Distributed Controls System.

Digital - Stepped in specific increments.

Diffusion - A process by which molecules or other particles intermingle as a result of random thermal motion.

Drain Loop - The purpose of a drian loop is to collect condensation so as to prevent moisture from entering the housing.

EEPROM - Electrically Erasable Programmable Read Only Memory.

EMI - Electro-Magnetic Interference.

FMRC - Factory Mutual Research Corporation.

Group B - Atmospheres containing more than 30% Hydrogen or gases/vapors of equivalent hazard.

Group C - Atmospheres such as cyclopropane, ethyl ether, ethylene, or gases/vapors of equivalent hazard.

Group D - Atmospheres such as acetone, ammonia, benzene, butane, ethanol, gasoline, hexane, methanol, methane, natural gas, naphtha, propane, or gases/vapors of equivalent hazard.

Halogen Free Solvent - Solvent that does not contain any of the following: astatine, bromine, chlorine, flourine, or iodine.

mA - Milliampere, one thousandth (.001) of an amp.

Microprocessor Base Electronics - All of the input signal processing, fault monitoring, calibrating routines, setup routines, and the outputs are under the control of a microprocessor unit (MPU).

mV - Millivolt, one thousandth of a volt.

Glossary of Terms (*continued*)

PCB - Printed Circuit Board.

PLC - Progammable Logic Controller.

Potentiometer - An adjustable resistor.

RFI - Radio Frequency Interference.

T50 - This is the amount of time it takes the sensor to reach the 50% level of the applied gas.

TB - Terminal Block.

Volatile Liquids and Solvents

Volatile liquids and solvents are not supplied by General Monitors. This page provides a listing of volatile liquids and solvents and the respective volumes required (in microliters) to produce a 50% LEL vapor concentration in the 3 Liter Chamber (see section 6.6).

If a concentration other than 50% LEL is desired for one of the volatile liquids or solvents listed on this page, consult the General Monitors factory.

Acetaldehyde	136
Acetic Acid	140
Acetone	112
Acetonitrile	96
Acrylonitrile	120
Amyl Acetate	100
Amylamine	156
Benzene	66
Butyl Acetate	137
Butyl Acrylate	148
Butyl Alcohol	78
sec-Butyl Alcohol	95
tert-Butyl Alcohol	138
Butyl Cellosolve	88
Butyraldhyde	102
Cyclohexane	86
Decane	95
Diethyl Ketone	103
Diisobutyl Ketone	82
Dimethylformamide	104
p-Dioxane	104
Dodecane	83
Ethyl Alcohol (Ethanol)	118
Ethyl Acetate	119
Ethyl Amine	140
Ethyl Benzene	60
Ethyl Ether	120
Ethylene Oxide	89
Gasoline 100 Octane	107
Heptane, Normal	94
Hexane, Normal	86
Isopentane	99
Isoprene	89
Isopropyl Alcohol	93
Isopropyl Ether	120
JP-4, Jet Fuel	183
Laktane	76
Methanol	148
Methyl Ethyl Ketone (MEK)	76
Methyl Metacrylate	111
Naptha (Petroleum Ether)	96
Octane	99
Pentane, Normal	105
Propanol	114
2-Propanol	93
Propyl Acetate	106
Propylamine	103
Propylbenzene	68
Propylene Oxide	98
Styrene	63
Tetradecane	79
Tetrahydrofuran	99
Tetrahydrofurfuryl Alcohol	89
Toluene	78
1,1,1-Trichlorethane	456
Trichloroehtylene	438
Triethylamine	102
Vinyl Acetate	152
Vinyl Ethyl Ether	99
o-Xylene	67
p-Xylene	83
Xylenes	83

PRELIMINARY

Engineering & Technical Drawings

Reference Drawing # 11145-1 Schematic Diagram - Control Electronics

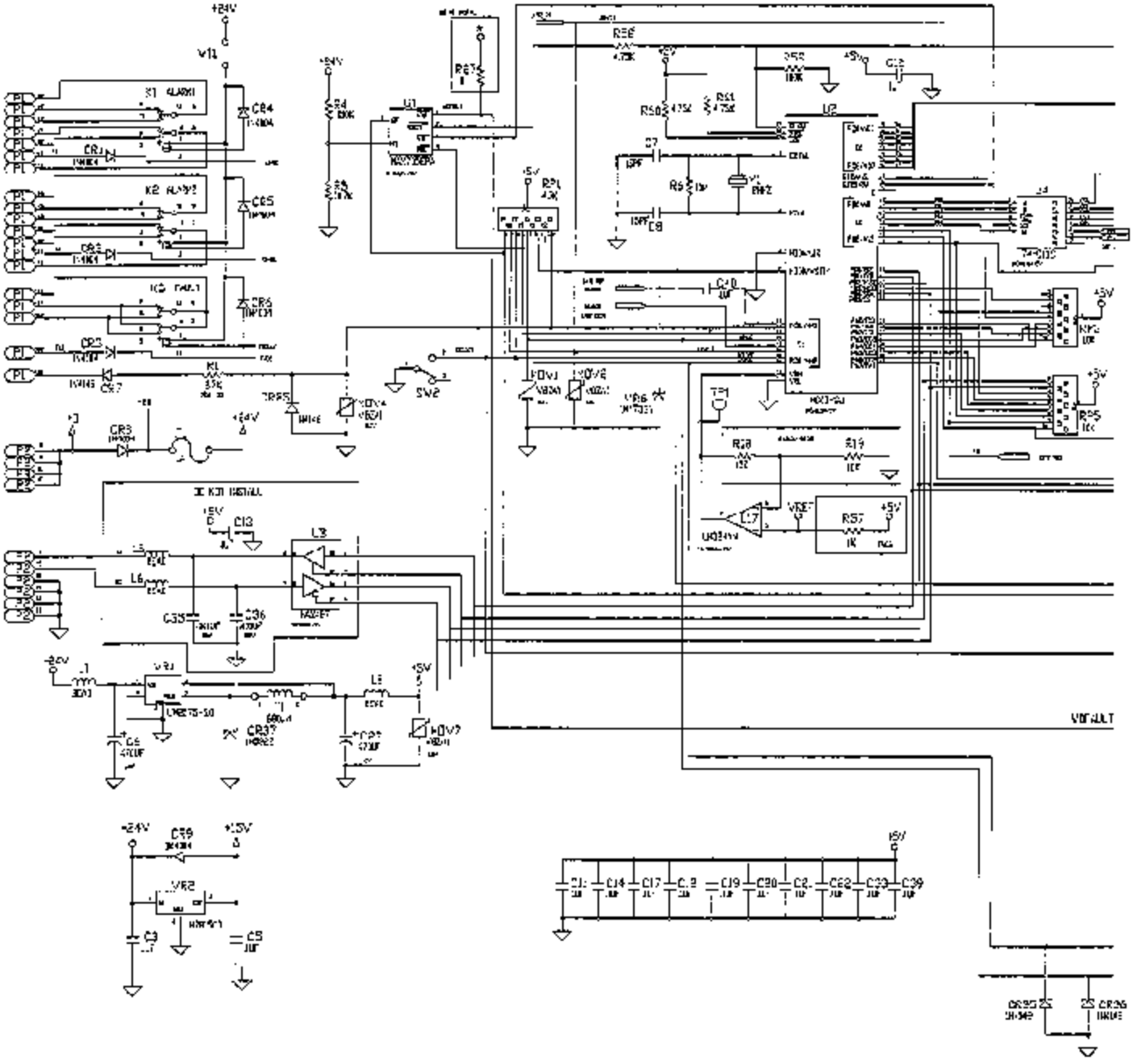

Figure 45

Left Side

PRELIMINARY

Engineering & Technical Drawings

Reference Drawing # 11145-1

Schematic Diagram - Control Electronics

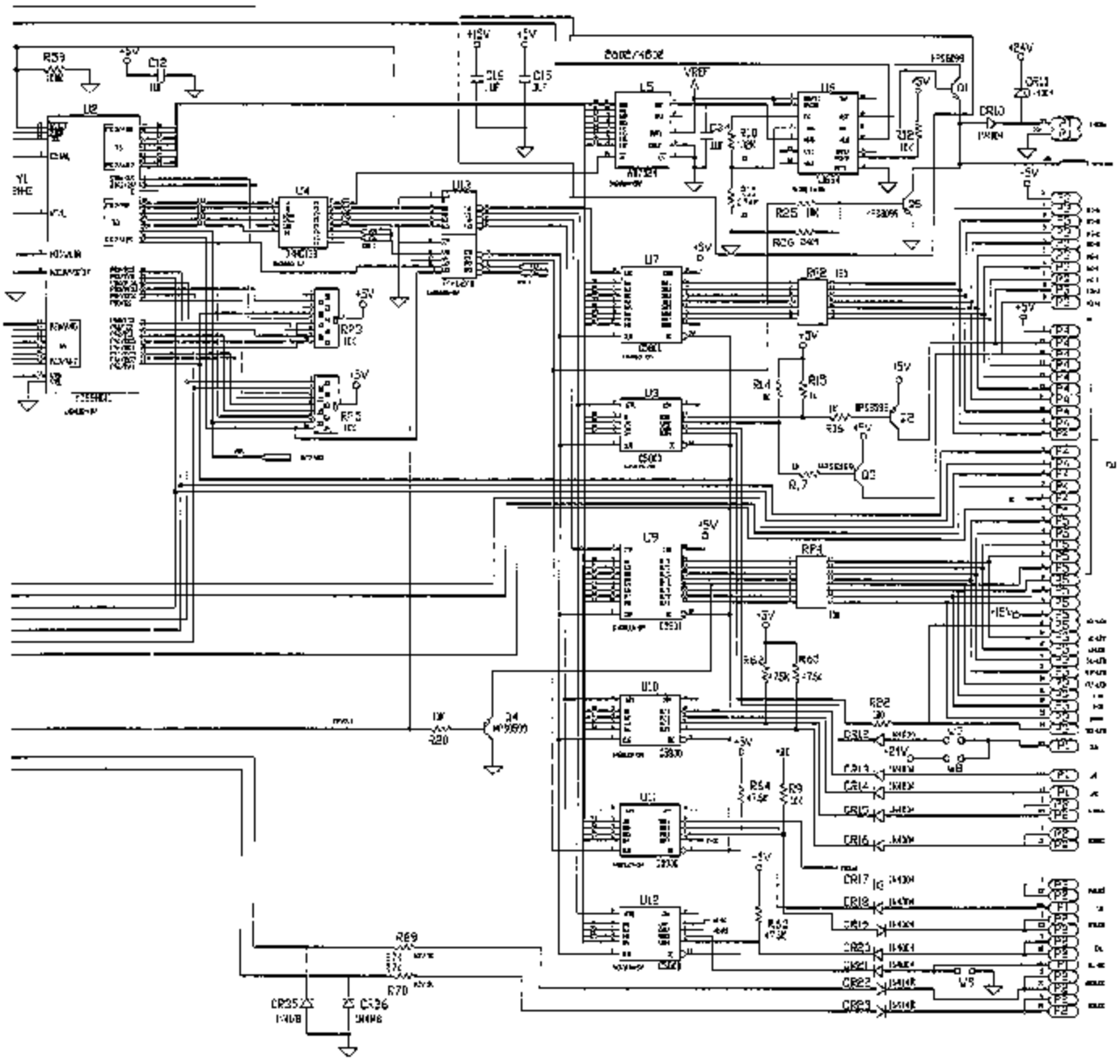

Figure 45

Right Side

PRELIMINARY

Engineering & Technical Drawings

Reference Drawing # 11145-2

Schematic Diagram - Sensor Input Circuit

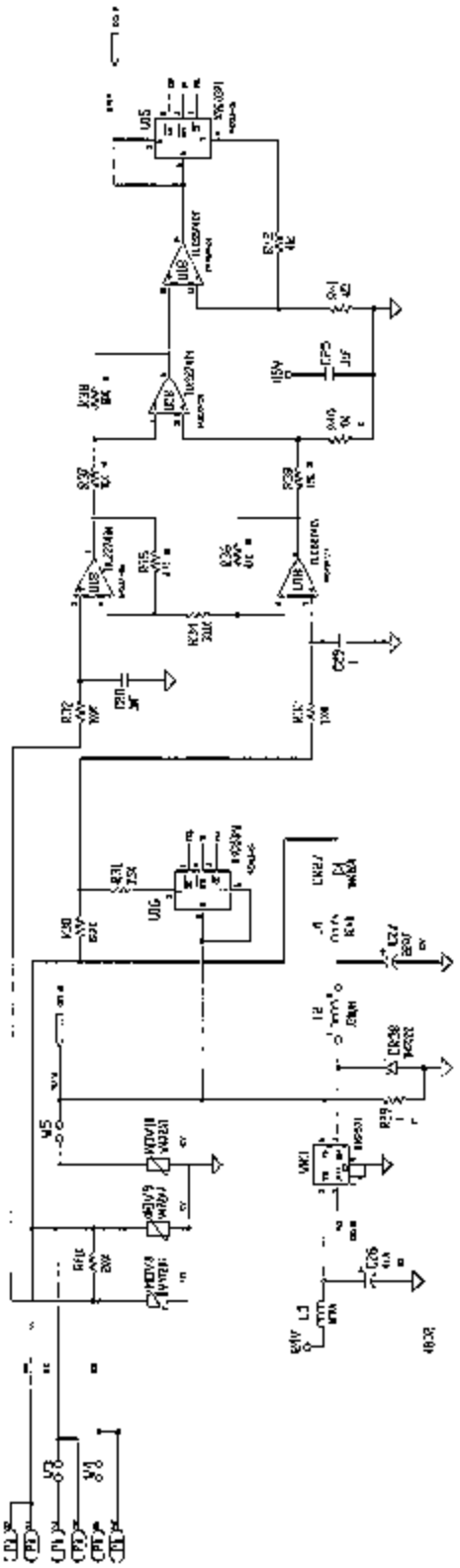

Figure 46

PRELIMINARY

Engineering & Technical Drawings

Reference Drawing # 11150-2

Schematic Diagram - Display Board

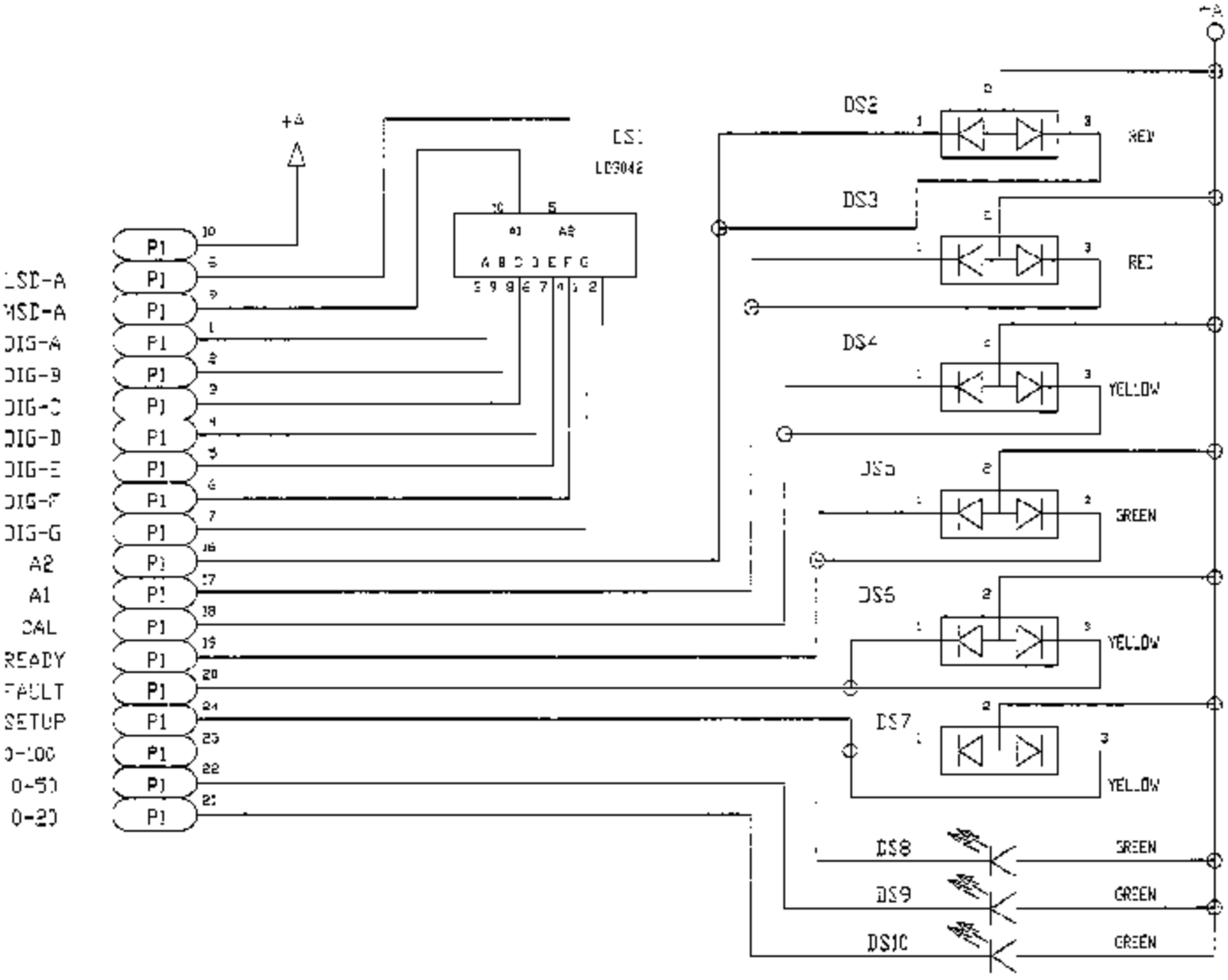

Figure 47

PRELIMINARY

Engineering & Technical Drawings

Reference Drawing # 11146-3

Circuit Card Assembly - Control Board

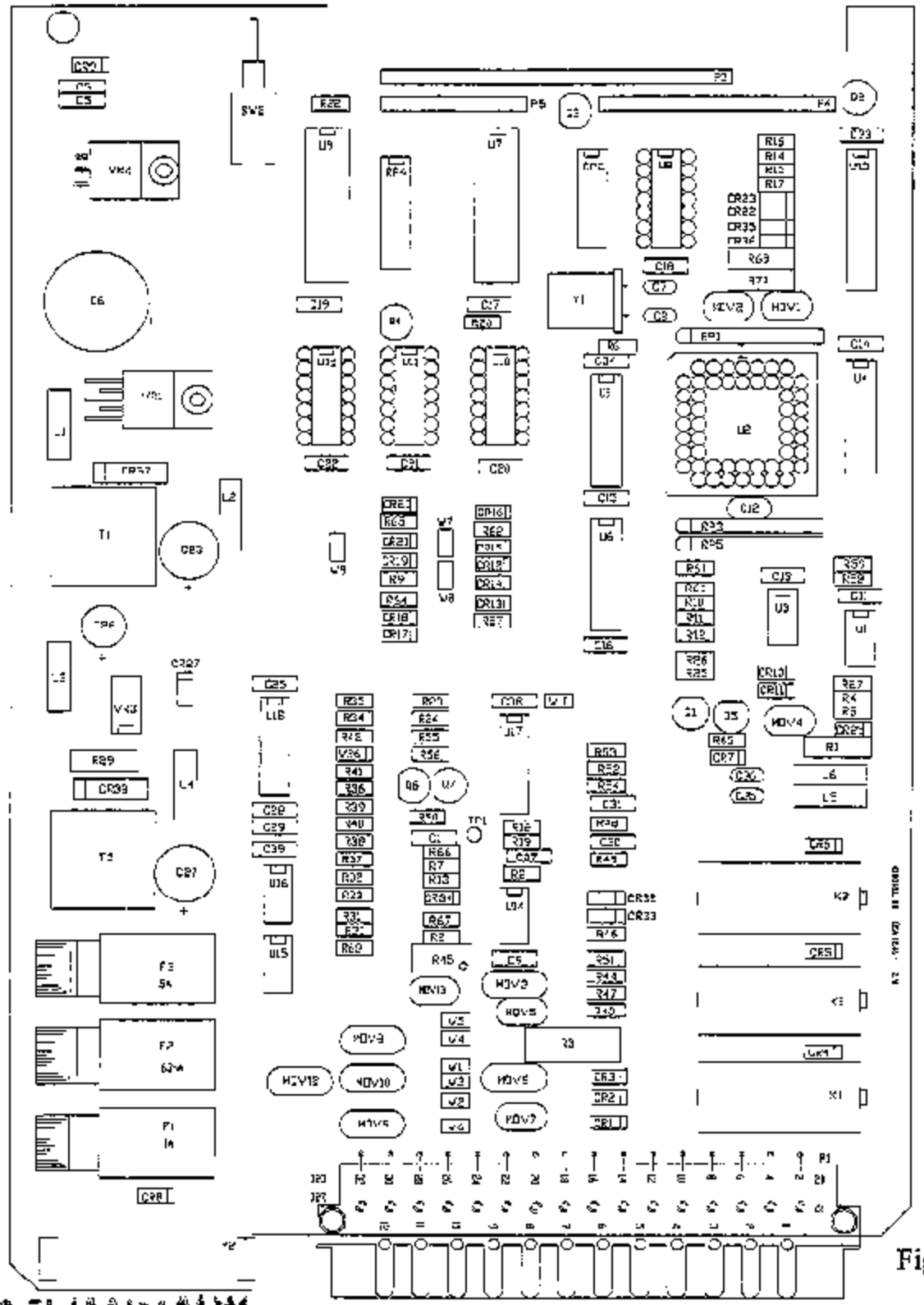

Figure 48

PRELIMINARY

Engineering & Technical Drawings

Reference Drawing # 11151-3

Circuit Card Assembly - Display Board

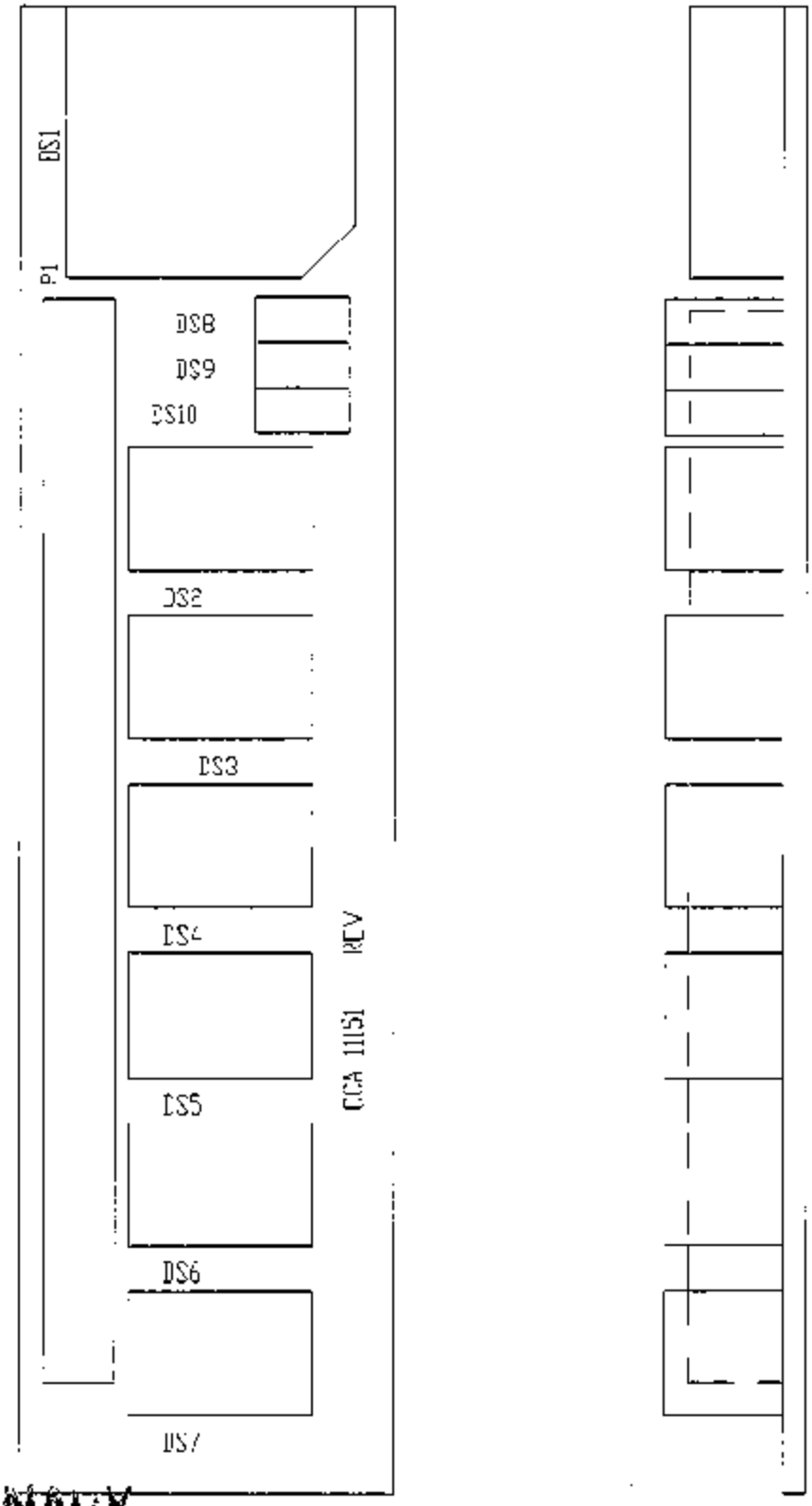

Figure 49

PRELIMINARY

Engineering & Technical Drawings

Reference Drawing # 11221 Outline & Terminal Connections

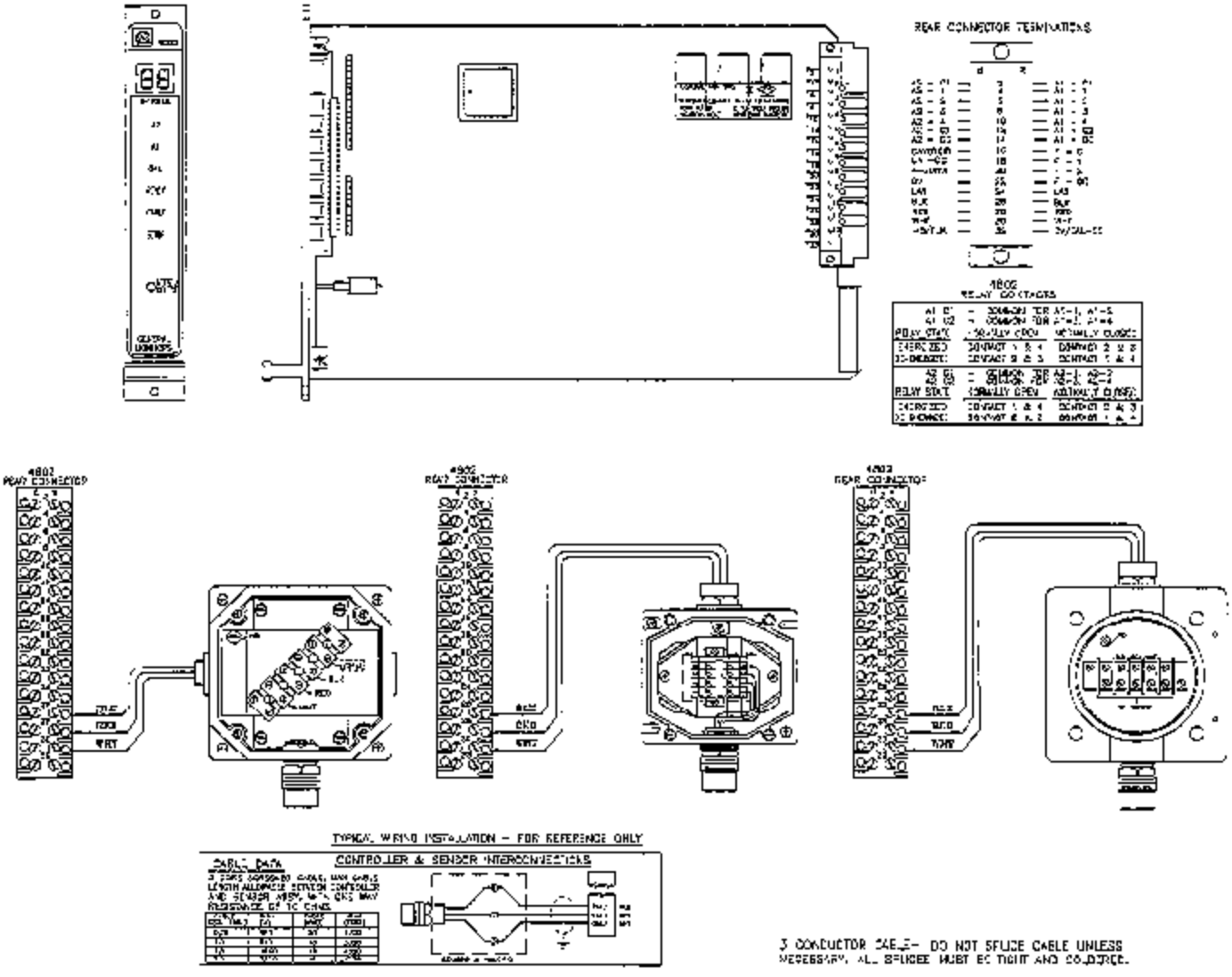

Figure 50

PRELIMINARY

Engineering & Technical Drawings

Reference Drawing # 11220-1 Final Assembly

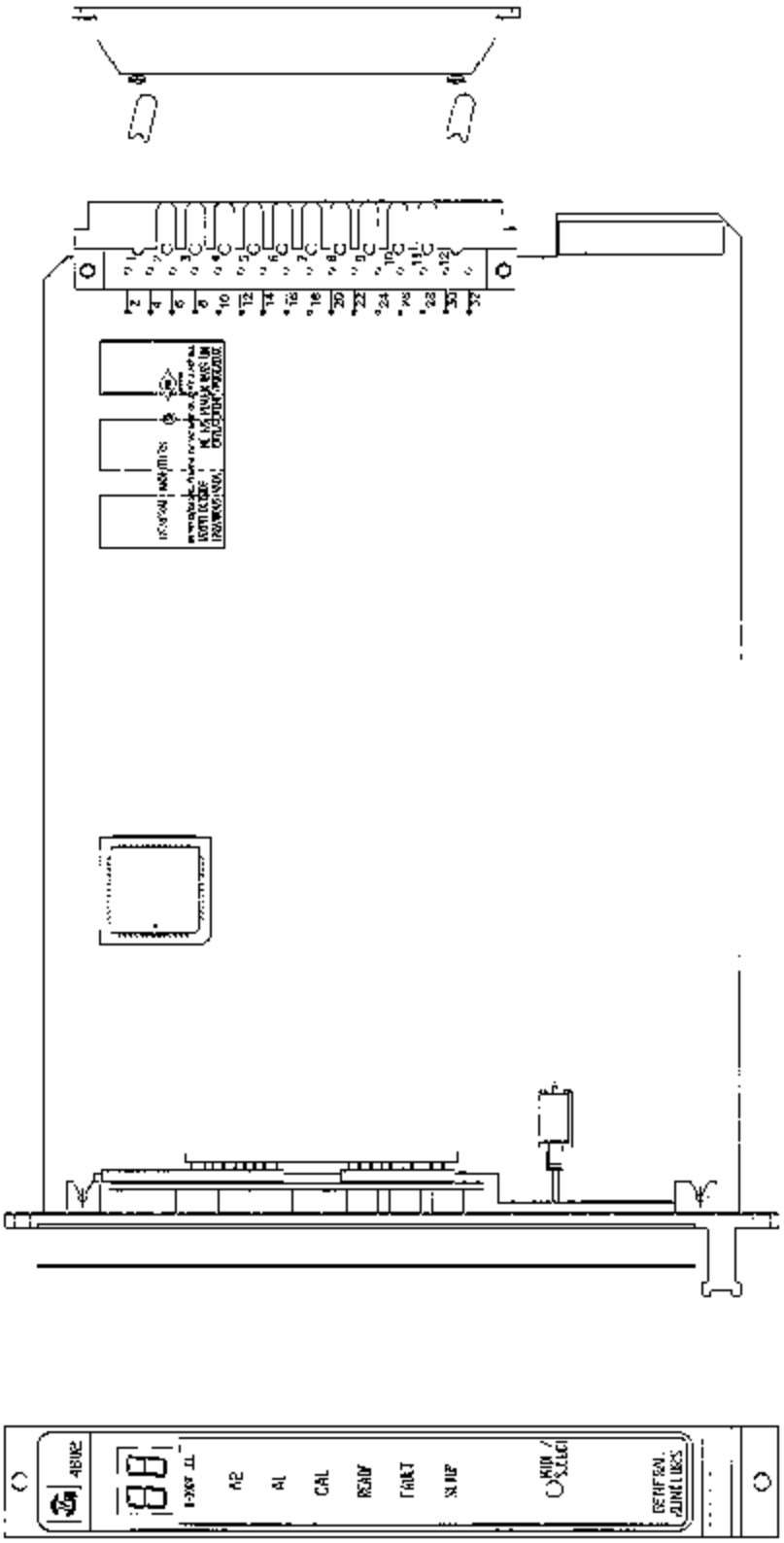

Figure 51

PRELIMINARY

Ordering Information

The standard configuration for the Model 4802 is:

4802A - 3 2 1 - 0 00 - 0 3 3

4802A - 3 2 □ - □ □□ - 0□□

- **Inhibit Mode / Compatibility**
  - 3 = Fault Not Active / CAL, FUA (standard)
  - 4 = Fault Not Active / Backwards Compatible
  - 5 = Fault Active / CAL, FUA
  - 6 = Fault Active / Backwards Compatible
- **Card Test / Ramp Time**
  - 3 = Relays Inhibited / 3 Second Ramp (standard)
  - 4 = Relays Inhibited / 10 Second Ramp
  - 5 = Relays Active / 3 Second Ramp
  - 6 = Relays Active / 10 Second Ramp
- **Sensor**
  - 00 = No Sensor (standard)
  - 01 = 10001-1, Industrial, Alum
  - 02 = 10001-1R Poison Resistant, Alum
  - 03 = 10014-1 High Temperature, Alum
  - 04 = 10014-1R High Temperature, Poison Resistant
  - 05 = 10022-1 PTB, Industrial, Alum
  - 06 = 10058-1 Industrial, SST
  - 07 = 10058-1R Poison Resistant, SST
  - 08 = 10059-1 Industrial, Alum, Export
  - 09 = 10164-1 Hydrogen Specific, Alum
  - 10 = 10387-4 Super Poison Resistant, Alum
  - 11 = 10391-1 High Temperature, SST
  - 12 = Consult the factory for other options
- **Active Channels**
  - 0 = Controller only (standard)
  - 1 = One Active Channel
- **Relay State**
  - 1 = A2 Latch/A1 Non-Latch, De-Energized (standard)
  - 2 = A2 Latch/A1 Non-Latch, Energized
  - 3 = A2 Latch/A1 Latch, De-Energized
  - 4 = A2 Latch/A1 Latch, Energized
  - 5 = A2 Non-Latch/A1 Non-Latch, De-Energized
  - 6 = A2 Non-Latch/A1 Non-Latch, Energized
  - 7 = A2 Non-Latch/A1 Latch, De-Energized
  - 8 = A2 Non-Latch/A1 Latch, Energized
  - 9 = Consult the factory for other options

PRELIMINARY

Zero Two Series Modules

Model 2602
Zero Two Series Control Module
for Hydrogen Sulfide Gas
Applications

Model 4802
Zero Two Series Control Module
for Combustible Gas
Applications

Model TA102
Zero Two Series Trip Amplifier Module
for Combustible Gas
Applications

Model TA202
Zero Two Series Trip Amplifier Module
for Hydrogen Sulfide Gas
Applications

Model TA402
Zero Two Series Trip Amplifier Module
for Flame Detection
Applications

Model FM002
Zero Two Series Facilities Module
Performs Common Functions
for Zero Two Systems

Model RL002
Zero Two Series Relay Module
Provides Extra Output Capacity
for Zero Two Systems

Model ZN002
Zero Two Series Zone Control Module
Performs Zoning and Voting Functions
for Zero Two Systems

Model MS002
Zero Two Series Solenoid Card
for Monitoring / Driving High Current
Output Devices

Model IN042
Zero Two Series Four Zone Input Card
For Callpoints, Smoke & Thermal Detectors

Model PS002
Zero Two Series Power Supply Module
for Zero Two Systems

PRELIMINARY

A

B

C

C

D

E

F

PRELIMINARY

G

H

I

M

M

N

O

P

R

PRELIMINARY

R

S

PRELIMINARY

T

U

W

Z