Model TA102/TA202
Trip Amplifier
Display Modules

Instruction Manual **01/92**

Part No. MANTA102
Revision C/01-92

General Monitors
Models TA102/TA202

Warning

The Model TA102 Combustible Gas Trip Amplifier and the Model TA202 Hydrogen Sulfide Gas Trip Amplifier contain components which can be damaged by static electricity. Special care must be taken when wiring the system to ensure that only the connection points are touched.

CAUTION, MODEL TA202 USERS:

HYDROGEN SULFIDE IS AN EXTREMELY TOXIC GAS, AND EXPOSURE MAY RESULT IN A LOSS OF CONSCIOUSNESS OR DEATH.

General Monitors
Models TA102/TA202

CONTENTS

	Sub-Section	Page
Introduction		
General Description	1-1	1
Trip Amplifier Operation	1-2	2
Facilities Module Operation	1-3	4
TA102 Special Feature	1-4	5
System Components	1-5	6
Specifications		
System Specifications	2-1	7
Mechanical Specifications	2-2	7
Electrical Specifications	2-3	7
Environmental Specifications	2-4	8
Installation		
On Receipt of Your Equipment	3-1	9
Chassis Installation	3-2	9
Trip Amplifier Installation	3-3	9
Terminal Connections	3-4	9
Outline & Dimensional Drawings	3-5	13
Chart, DIP Switch SW3 - TA102/TA202	3-6	14
Maintenance		
General Maintenance	4-1	15
Calibration - Model TA102	4-2	15
Calibration - Model TA202	4-3	17
Storage	4-4	19
Troubleshooting		
Troubleshooting Chart	5-1	21
Schematics	5-2	23
Circuit Card Assemblies	5-3	27
Final Assembly Drawings	5-4	35
Spares & Accessories		
Ordering Information	6-1	46
Accessories	6-2	49
Spare Parts for One Year	6-3	49

Warranty

General Monitors warrants the *Model TA102* and the *Model TA202* to be free from defects in workmanship or material under normal use and service within two (2) years from the date of shipment. General Monitors will repair or replace without charge any such defective equipment to be found defective during the warranty period. Full determination of the nature of, and responsibility for, defective or damaged equipment will be made by General Monitors' personnel. Defective or damaged equipment must be shipped prepaid to General Monitors' plant or representative from which shipment was made. In all cases this warranty is limited to the cost of the equipment supplied by General Monitors. The customer will assume all liability for the misuse of this equipment by its employees or other personnel.

All warranties are contingent upon proper use in the application for which the product was intended and do not cover products which have been modified or repaired without General Monitors' approval or which have been subjected to neglect, accident, improper installation or application, or on which the original identification marks have been removed or altered. Except for the express warranty stated above, General Monitors disclaims all warranties with regard to the products sold, including all implied warranties of merchantability and fitness and the express warranties stated herein are in lieu of all obligations or liabilities on the part of General Monitors for damages including, but not limited to, consequential damages arising out of/or in connection with the use or performance of the product.

General Monitors
Models TA102/TA202

Introduction

1-1 General Description

The Models TA102 and TA202 are single channel **02 Series** trip amplifier control modules that have been designed for use with General Monitors Smart Sensors. The Model TA102 has a wide blue border around the display on the front panel and is used with the Model S104, S106, SC100, or SC110 Combustible Gas Smart Sensor. The Model TA202 has a wide yellow border around the display on the front panel and is used with the Model S204, S206, ST200, or ST210 Hydrogen Sulfide (H_2S) Gas Smart Sensor. Features of the **02 Series** trip amplifier control modules include:

Digital Display

DIP Switch Selectable Options

DPDT Relay for A1

DPDT Relay for A2

SPDT Relay for Fault

Open Collector Outputs for A1, A2, LA1, LA2, Fault, and UA

LED Test Feature

Auto Test Feature

Bussed Connections on Chassis for:

- **+24 VDC**
- **Common**
- **A1**
- **A2**
- **Fault**
- **Accept**
- **Unaccept**
- **Reset**
- **Cal**

Both of these modules have a 0 to 20mA input signal requirement. The digital display for the TA102 has a range of 0 to 99% LEL with a flashing **99** indicating a gas concentration equal to or greater than 100% LEL. The digital display for the TA202 has a range of 0 to 20 parts-per-million (ppm), 0 to 50 ppm, or 0 to 99 ppm, depending on the range of the Smart Sensor. On the 0 to 99 ppm version, a flashing **99** indicates a gas concentration equal to or greater than 100 ppm. On the 0 to 20 and 0 to 50 ppm modules, when the concentration of gas that is present exceeds full scale, the display will flash **20** and **50** respectively. Both of these modules are offered with the full range of alarm re-flash (oscillation), open collector and relay outputs. They also have latching/non-latching and energized/de-energized functions for the alarm circuits. Over-range latching is a standard provided for the TA102. These trip amplifiers are both visually and physically compatible with other **02 Series** modules, and may be inter-mixed in chassis assemblies. The chassis assemblies are available in four, eight, and sixteen channel versions for both rack and panel mounting. Every channel in a chassis is provided with a coding strip which dedicates that channel to a particular type of module. Therefore, inadvertent reversal of modules is eliminated. The chassis provides an additional position specifically dedicated to a Facilities Module (FM002). The Facilities Module provides for all of the common Alarm, Fault, Reset, and Accept functions. Each chassis provides a buss on which these signals travel, as well as the Power, Cal Door Position, and Unaccept signals. For a comp-

Introduction

lete explanation of the Facilities Module refer to sub-section 1-3.

1-2 Trip Amplifier Operation

On board power supply
The Models TA102/TA202 operate from a +24VDC (nominal) input. This unregulated +24 volt source is fed to an on board power supply. This power supply produces a regulated +24 volt signal, +5 volt signal, and a Reset voltage signal. These voltages are the source for operating all of the circuitry on the Trip Amplifier Card, as well as the Smart Sensor.

Smart Sensor signal processing
The analog input signal from the Smart Sensor is converted to a voltage level and sent to the non-inverting input of an operational amplifier (Op Amp). This Op Amp, configured as a differential amplifier, has its output multiplexed to an analog-to-digital (A/D) converter. This A/D converter places a digital signal on the data buss for the microprocessor to analyze. The analog input signal from the Smart Sensor has four operational ranges or levels. The first level is at 0 mA and indicates a fault at the Smart Sensor. The next level is at 1.5 mA (±0.5 mA). This is the signal that the Smart Sensor uses to indicate that it is in the calibration or the test gas mode. When the Smart Sensor is in one of these modes, the display will indicate **CA**. The next range is from 4 to 20 mA. This is the range that the Smart Sensor uses to indicate gas concentrations from 0 to 100% of full scale. A no gas condition is signaled by 4 mA and a full scale gas condition is signaled by 20 mA. Gas concentrations less than full scale are proportional to the 4 to 20 mA signal that is generated by the Smart Sensor. The fourth range is from 20 mA to 21.7 mA. This range represents gas concentrations equivalent to or in excess of 100% of full scale. A digital display is provided on the front panel for reading gas concentrations in the range of 0 to 99% of full scale.

Alarm levels
The Models TA102/TA202 are provided with two separate alarm levels. Both levels have discrete outputs and front panel LED indicators. When the analog input signal from the Smart Sensor exceeds an alarm setpoint, the outputs and LED indicator associated with that alarm level will be activated. The outputs include DPDT Alarm relays, if present, an open collector output that follows the logic dictated by DIP switch selections that have been made for that particular alarm level, and an open collector output that follows the logic of the front panel LED indicator for that alarm level. The setpoints for each alarm can be adjusted by opening the CAL door and depressing the appropriate switch and adjusting the associated potentiometer while viewing the display. When the alarm setpoints have been properly adjusted, closing the CAL door will return the unit to normal operation. The DIP switch selectable options that are available for the alarms are: latching/non-latching and energized/de-energized. The latching/non-latching option allows for the alarm circuits to be manually reset or automatically reset in the case of an alarm condition that has occurred but is no longer valid. A latching condition requires that the alarm circuits be manually reset. A non-latching condition automatically resets an alarm that is not valid

General Monitors
Models TA102/TA202

Introduction

any longer. The energized/de-energized option specifies the electrical state of the relay and the open collector output. The energized option specifies that the relays, if present, will have power applied to them, and the open collector output will be sinking current in a normal, no gas situation. When an alarm condition occurs, this energized relay will de-energize, the normally open contacts will close, the normally closed contacts will open, and the open collector ouput will not sink current. For the de-energized option, these conditions are the opposite. Under a normal no gas situation the relays will be at mechanical rest, and the open collector output will not be sinking current. When an alarm condition occurs, the relays will energize, the normally open contacts will still close, and the normally closed contacts will still open, but the open collector output will sink current. The recommended option configuration for the alarm relays is A1 & A2 to be de-energized with A2 latching and A1 non-latching. In this configuration it is recommended that the A1 setpoint be at a level that indicates an increased, but not harmful presence of gas, and the A2 setpoint should be at a level that indicates a gas concentration that is approaching hazardous or harmful levels.

Fault or malfunction indications

The Fault circuit is activated in the event of a low supply voltage, a Smart Sensor fault, or an open CAL door when the DIP switch setting is in the position that requires a fault to occur during an open CAL door. The Fault circuit is always active when the unit is on, and consists of a front panel LED indicator, a SPDT relay, if present, and an open collector output. There are no DIP switch selectable options that can be set for the Fault circuit. The standard configuration for the Fault outputs are energized and non-latching open collector and relay contacts. When a Fault occurs, the relay will de-energize, the normally open contact will close, the normally closed contact will open, and the open collector output will de-energize and stop sinking current. This output configuration provides specific benefits. When the unit loses power, the relay will de-energize indicating a Fault. When a Fault condition goes away and the unit returns to normal operation, the Fault outputs will reset automatically. During a Smart Sensor Fault or a Low Voltage Fault the display will indicate **Er**.

CAL door

The CAL door has been provided for accessing the alarm setpoint potentiometers and the switches that check the alarm setpoints. The door protects these switches and potentiometers from accidental use or misuse. Any time the CAL door opens the Fault LED illuminates. There is a DIP switch setting available for activation of the Fault outputs while the CAL door is open. If the Fault outputs are to activate, when the CAL door opens, the Ready LED will turn off. If the Fault outputs are not supposed to activate, when the CAL door opens, the Ready LED will stay on. In both cases, the Fault LED will illuminate. An open CAL door, in any case, will inhibit the alarm relays.

Accept and Unaccept

An accept buss line has been provided to allow the user to accept an alarm indication. Accepting an alarm indication requires the user to depress a button on the Facilities

Introduction

Module titled **ACCEPT**. When an alarm occurs and the ACCEPT button is depressed, the associated alarm LEDs, and open collector outputs associated with these LEDs, will go from an oscillating indication to a steady one (they will stop flashing). When an alarm occurs, in addition to the normal outputs, the **UNACCEPT** outputs are activated. There are two outputs associated with Unaccept. The first is a discrete open collector output that energizes. This output is on the individual card or channel that goes into alarm. The second is a common SPDT relay on the Facilities Module that activates. When the ACCEPT button is depressed, both of these outputs are de-activated.

Autotest feature
The Autotest feature has been provided so that a remote functional test of the unit can be performed without having to expose the Smart Sensor to a potentially hazardous level of gas. One end of a normally open switch can be connected to the rear panel termination that is dedicated to the Autotest feature, and the other end to the system ground. The switch will activate this feature for as long as it is depressed or engaged. Engaging the switch will cause the display to steadily increase the value of its output. As the A1 and A2 setpoints are exceeded, the associated front panel LEDs will begin to oscillate. The display will continue to increase until the full scale value is reached. A DIP switch selection has been provided so that the gas alarm outputs (relays and open collector outputs for A1 & A2) can be activated or inhibited during this test. **NOTE**: if this test is performed with the CAL door open, the gas alarm outputs will be inhibited in any case. Any latched alarm conditions will need to be reset manually (master reset) upon conclusion of this test.

RESET and LED test feature
A Master RESET button appears on the Facilities Module. A rear panel terminal on the Facilities Module has been provided for remotely resetting any latched alarms that are no longer valid. A remote reset can be wired the same way as the remote autotest feature. One end of a normally open switch is connected to the rear panel terminal that is dedicated to a remote reset, and the other end of the switch is connected to the system common. For the Model TA102, a latched overrange condition that is no longer valid can be reset by depressing this switch. The Reset also allows a user to perform an LED test. When the switch is depressed for two or more seconds, all of the segments on the display and each LED on the front panel will illuminate for as long as the switch is depressed.

1-3 Facilities Module Operation

The Facilities Module (FM002) is an optional assembly which plugs into the far right position in a 4, 8, or 16 channel chassis. This module can be ordered with and without relays. The Facilities Module provides the following:

Common alarm outputs for A1, A2, Fault, and the UA (unaccepted alarm)

A master reset switch for latched alarm conditions that are no longer valid

An accept switch for acknowledging alarms and de-activating the UA outputs

General Monitors
Models TA102/TA202

Introduction

For the following discussion we will assume that a Facilities Module with relays is present in a chassis. If on any channel in the chassis an **A1** alarm occurs, signals will be sent on the buss to the Facilities Module. These signal will activate the **A1** alarm outputs and the **UA** relay on the Facilities Module. In addition, the **UA** open collector output on the card that went into alarm will activate. When the **ACCEPT** button is pressed, both of the **UA** outputs (*the open collector on the channel that went into alarm and the relay on the FM002 card*) will de-activate. If an **A2** alarm occurs, more signals will be sent on the buss to the Facilities Module. These signals will activate the **A2** alarm outputs and the **UA** relay on the Facilities Module. Again, the **UA** open collector output on the card will activate. When the **ACCEPT** button is pressed, both of the **UA** outputs (*the open collector on the channel that went into alarm and the relay on the FM002 card*) will de-activate. Any new alarm condition that occurs on the chassis will activate both of the **UA** outputs, if they have not been activated already. The **Master Reset** switch, when pressed, will reset any latched alarms (**A1** and/or **A2**) that are no longer valid. If the **Master Reset** switch is depressed for three or more seconds, all of the segments of the displays and LEDs on the front panel of each channel that is on power in the same chassis will illuminate. The relays on the Facilities Module are DPDT for **A1** and **A2**, and SPDT for **Fault**, and **UA**. The **A1**, **A2**, and **UA** alarm outputs have DIP switch selectable energized/de-energized options.

The settings for these options are:

SW3-1	**Open**	**A1 is Eneregized**
SW3-1	**Closed**	**A1 is De-Energized**
SW3-2	**Open**	**A2 is Energized**
SW3-2	**Closed**	**A2 is De-Energized**
SW3-3	**Open**	**UA is Energized**
SW3-3	**Closed**	**UA is De-Energized**
SW3-4	**Not Used**	

1-4 TA102 Special Feature

The Model TA102 is equipped with a standard over-range latching feature. Any time the Smart Sensor sends a signal to the Model TA102 causing the unit to indicate a flashing **99**, the Model TA102 will latch this condition. When this condition happens, the rear panel outputs and front panel indicators will also latch. If this condition occurs and is no longer valid, the Model TA102 will have to be reset manually by depressing the Master Reset switch on the Facilities Module.

General Monitors
Models TA102/TA202

Introduction

1-5 System Components

MODEL	DESCRIPTION	PART NUMBER
TA102	Combustible Gas Trip Amplifier Module with Relays	10570-1
	Combustible Gas Trip Amplifier Module without Relays	10570-2
	Combustible Gas Trip Amplifier Module (FM) with Relays	10570-3
	Combustible Gas Trip Amplifier Module (FM) without Relays	10570-4
TA202	H_2S Gas Trip Amplifier Module (0-100ppm) with Relays	10590-1
	H_2S Gas Trip Amplifier Module (0-50ppm) with Relays	10590-2
	H_2S Gas Trip Amplifier Module (0-20ppm) with Relays	10590-3
	H_2S Gas Trip Amplifier Module (0-100ppm) without Relays	10590-4
	H_2S Gas Trip Amplifier Module (0-50ppm) without Relays	10590-5
	H_2S Gas Trip Amplifier Module (0-20ppm) without Relays	10590-6
FM002	Facilities Module with Relays	10660-1
	Facilities Module without Relays	10660-2
RL002	Relay Module	10765 1
ZN002	Zone Control Module	10730-1
PS002	Power Supply Module	10820-1
Chassis	16 Channel Rack	10725-X
	8 Channel Rack	10726-X
	4 Channel Rack	10727-X
Term Block	32 PIN DIN Connector	921-377

X = *Number of active channels*

General Monitors
Models TA102/TA202

Specifications

2-1 System Specifications

Application:

TA102	Combustible Gas Detection
TA202	Hydrogen Sulfide Gas Detection

Measuring Range:

TA102	0 to 100% LEL
TA202	0 to 100 ppm 0 to 50 ppm 0 to 20 ppm

Number of Channels:

One per Trip Amplifier Module

User Protection:

The TA102 is designed to conform to the Instrumentation Society of America, Canadian Standards Association, and Factory Mutual Performance Standards for Combustible Gas Detection Instrumentation.

The TA202 is designed to conform to the Instrumentation Society of America Performance Standard for Hydrogen Sulfide Gas Detection Instrumentation.

Canadian Standards Association and Factory Mutual approvals are pending for the TA102 and the TA202.

2 Year Warranty for the TA102, TA202, and FM002.

2-2 Mechanical Specifications

Modules:

Weight	11.2 oz	(318 grams)
Length	9.9"	(251mm)
Height	6.825"	(173mm)
Width (Trip Amp)	1"	(25mm)
(FM002)	.75"	(20mm)

Chassis:

Depth (all)	9.625"	(244mm)
Height (all)	7.08"	(180mm)
Width (16 channel)	18.1"	(460mm)
Width (8 channel)	10.1"	(257mm)
Width (4 channel)	6.1"	(155mm)

2-3 Electrical Specifications

Input Power Requirement:

TA102 & TA202	20 to 35 VDC @ 125mA maximum, plus 6 watts for the Smart Sensor
FM002	20 to 35 VDC @ 100mA maximum

Input Signal:

TA102 & TA202	0 to 20mA analog signal from the Smart Sensor
FM002	Buss on the chassis contains all input signals

Input Impeadance:

TA102 & TA202	30 ohms
FM002	Not Applicable

General Monitors
Models TA102/TA202

Specifications

2-3 Electrical Specifications (continued)

Relay Contact Rating:

A1, A2	DPDT, 4A 250 VAC, 3A 30VDC, resistive max.
Fault	SPDT, 4A 250VAC, 3A 30VDC, resistive max.
UA (FM002)	SPDT, 4A 250VAC, 3A 30VDC, resistive max.

Open Collector Rating:

TA102/TA202

A1, A2, Fault with Relays; LA1, LA2
30VDC @ 50mA max.

A1, A2, Fault without Relays; UA
30VDC @ 100mA max.

FM002

A1, A2, Fault, and CAL
30VDC @ 50mA max.

Electrical Classification:

General purpose, non-hazardous areas

2-4 Environmental Specifications

Operating Temperature Range:

0°F to 150°F -18°C to 66°C

Storage Temperature Range:

-40°F to 150°F -40°C to 66°C

Operating Humidity Range:

5 to 100% RH, non-condensing

General Monitors
Models TA102/TA202

Installation

3-1 On Receipt of Your Equipment

All equipment shipped by General Monitors is pre-packed in shock absorbing containers which provide considerable protection against physical damage. The contents should be carefully removed and checked against the packing slip. If any damage has occurred or there is any discrepancy in the order, please notify General Monitors as soon as possible. All subsequent correspondence with General Monitors must specify the equipment part number and the serial number. Each Model TA102 and Model TA202 is completely checked by the factory, however, a complete checkout is necessary upon initial installation and start-up to ensure system integrity.

3-2 Chassis Installation

The chassis should be mounted in a non-hazardous, protected environment and should be subjected to a minimum of shock and vibration. In installations where two or more module types are to be mixed in one chassis, check that the individual channel coding strips match the channel application. The coding strips are pre-configured at the factory and the male portion is already mounted on each module. The female portion, if unmounted, must be fastened in position on the mounting strip so as to mate with its counterpart on the module. Connectors for system expansion should be fastened using the screws provided. *Do not over-tighten the connector or coding strip fasteners, as this may damage the plastic molded parts* .

If chassis are to be stacked vertically within an enclosure, forced air circulation will be required.

3-3 Trip Amplifier Installation

Although the modules are, to a great extent, immune to electromagnetic interference (EMI), they should not be mounted in close proximity to a radio transmitter or similar equipment. The modules require some air circulation to avoid excessive heat build-up inside of the enclosure. Never attempt to install a module into a chassis that has power applied to it.

3-4 Terminal Connections

Refer to figure 3-A for the terminal designations for the Model TA102 and TA202.

The terminations for **A1** are as follows:

Label	Term	Contact
A1-C1	2z	Relay Common
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
A1-OC	14z	Open Collector (OC)
LA1	24d	OC Logic for A1 LED

A1-1 and A1-2 use A1-C1 as Common. A1-3 and A1-4 use A1-C2 as Common. LA1 follows the logic of the front panel LED for A1.

General Monitors
Models TA102/TA202

Installation

REAR CONNECTOR TERMINATIONS

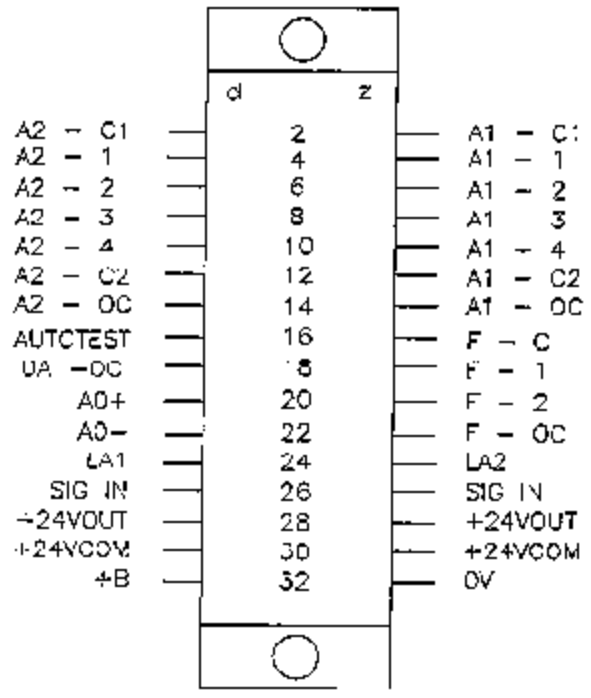


Figure 3-A, TA102/TA202

The terminations for **A2** are as follows:

Label	Term	Contact
A2-C1	2d	Relay Common
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
A2-OC	14d	Open Collector (OC)
LA2	24z	OC Logic for A2 LED

A2-1 and A2-2 use A2-C1 as Common. A2-3 and A2-4 use A2-C2 as Common. LA2 follows the logic of the front panel LED for A2.

The terminations for **Fault** are as follows:

Label	Term	Contact
F-C	16z	Relay Common
F-1	18z	Relay Contact
F-2	20z	Relay Contact
F-OC	22z	Open Collector

F-1 and F-2 use F-C as Common.

The **Unaccept** output terminations are:

Label	Term	Contact
UA	18d	Open collector output

The relay contact ratings for A1, A2, and Fault are 4A @ 250VAC, 3A @ 30VDC. The open collector rating for A1, A2, and Fault with relays is 50mA @ 30VDC, and without relays is 100mA @ 30VDC. The open collector rating for the outputs labeled LA1 and LA2 is always 50mA @ 30VDC. The open collector output rating for the ouput labeled UA is always 100mA @ 30VDC.

The termination for the **Autotest** feature is:

Label	Term	Description
AUTOTEST	16d	Autotest Feature

The terminations for the **Analog Output** contacts are: (Must be jumpered when not in use.)

Label	Term	Description
AO+	20d	Analog Output + contact
AO-	22d	Analog Output - contact

RELAY CONTACTS: (TA102, TA202, FM002)

Relay State	Normally Open	Normally Closed
Energized	Contact 1 & 4	Contact 2 & 3
De-Enrgzd	Contact 2 & 3	Contact 1 & 4

General Monitors
Models TA102/TA202

Installation

The terminations for the **Smart Sensor** connections are:

Label	Term	Description
SIG IN	26d,z	Analog Signal Input
+24VOUT	28d,z	+24VDC connection
+24VCOM	30d,z	DC Common

The terminations for the **Alternate Power Supply** input are:

Label	Term	Description
B+	32d	Alternate +24VDC input
0V	32z	Alternate common input

Refer to figure 3-B for the terminal designations for the Model FM002.

REAR CONNECTOR TERMINATIONS

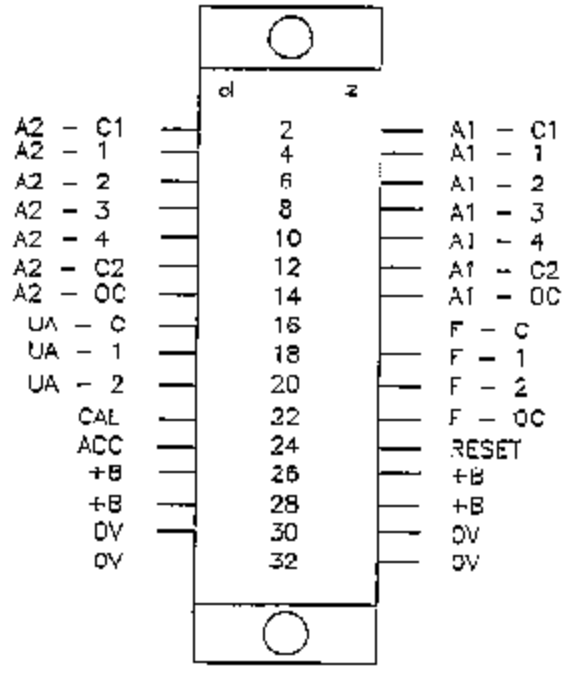


Figure 3-B, FM002

The terminations for **A1** are as follows:

Label	Term	Contact
A1-C1	2z	Relay Common
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
A1-OC	14z	Open Collector (OC)

A1-1 and A1-2 use A1-C1 as Common. A1-3 and A1-4 use A1-C2 as Common.

The terminations for **A1** are as follows:

Label	Term	Contact
A2-C1	2d	Relay Common
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
A2-OC	14d	Open Collector (OC)

A2-1 and A2-2 use A2-C1 as Common. A2-3 and A2-4 use A2-C2 as Common.

The terminations for **Fault** are as follows:

Label	Term	Contact
F-C	16z	Relay Common
F-1	18z	Relay Contact
F-2	20z	Relay Contact
F-OC	22z	Open Collector

F-1 and F-2 use F-C as Common.

The termination for the **CAL** door is:

Label	Term	Contact
CAL	22d	Open Collector

General Monitors
Models TA102/TA202

Installation

The terminations for **UA** are as follows:

Label	Term	Contact
UA-C	16d	Relay Common
UA-1	18d	Relay Contact
UA-2	20d	Relay Contact

UA 1 and UA 2 use UA-C as Common.

The termination for remote **RESET** is:

Label	Term	Description
RESET	24z	Remote Reset Termination

The termination for remote **ACCEPT** is:

Label	Term	Description
ACC	24d	Remote Accept Termination

The terminations for the **Alternate Power Supply** input are:

Label	Term	Description
B+	26d,z	Alternate +24VDC input
B+	28d,z	Alternate +24VDC input
0V	30d,z	Alternate common input
0V	32d,z	Alternate common input

NOTE:
When any Open Collector Output is connected to a device which is not powered by the same supply that is powering the Trip Amplifier, clip W1. W1 is located on the Control Board to the left of the fuses. See section 5-2 drawing 10573 and section 5-3 drawing 10574. For the Facilities Module, section 5-2 drawing 10662 and section 5-3 drawing 10663.

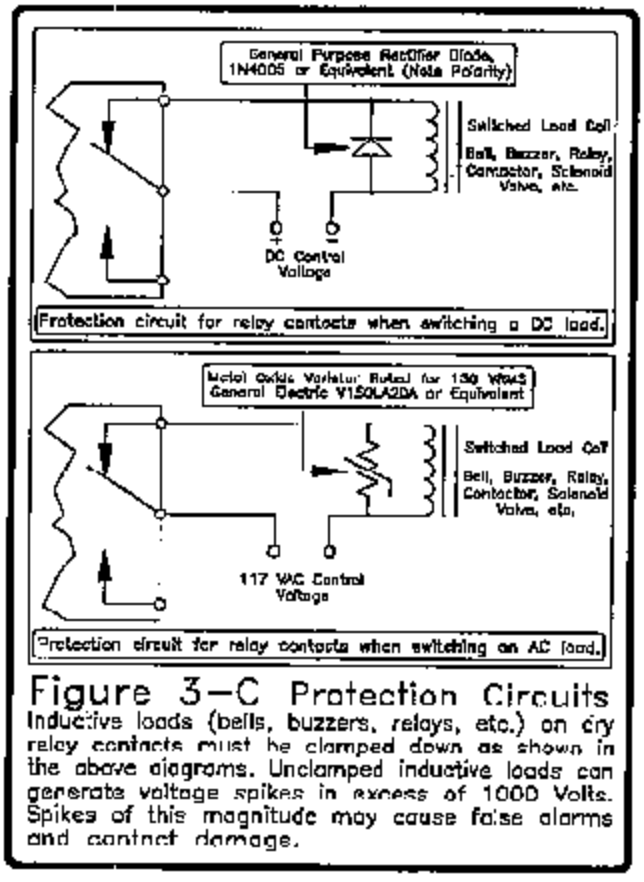


Figure 3–C Protection Circuits
Inductive loads (bells, buzzers, relays, etc.) on dry relay contacts must be clamped down as shown in the above diagrams. Unclamped inductive loads can generate voltage spikes in excess of 1000 Volts. Spikes of this magnitude may cause false alarms and contact damage.

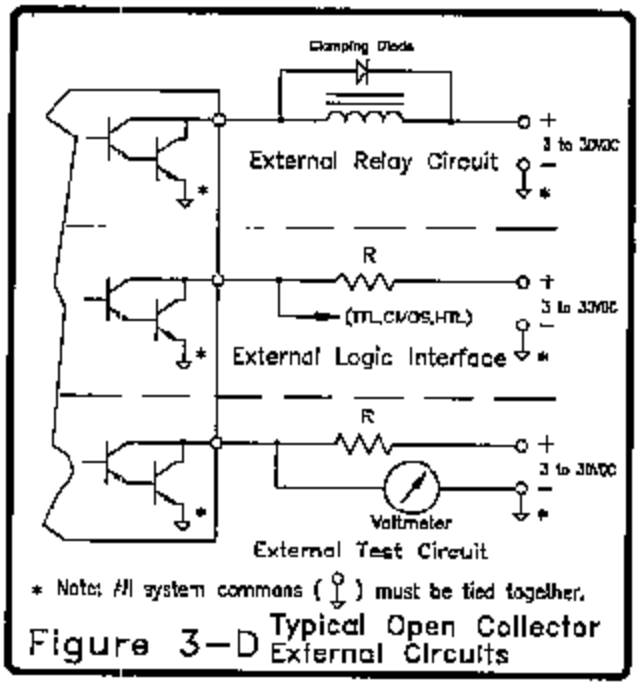
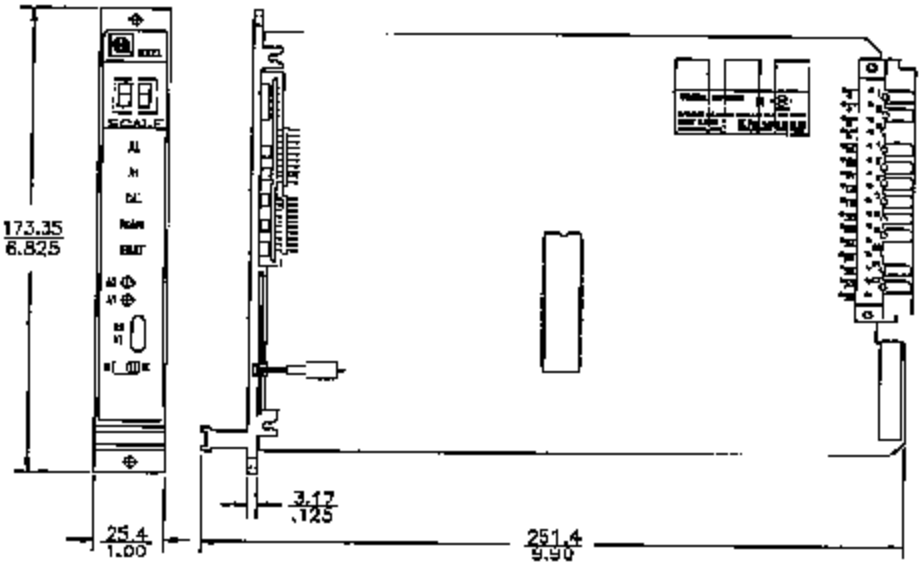


Figure 3–D Typical Open Collector External Circuits

General Monitors
Models TA102/TA202

Installation

3-5 Outline & Dimensional Drawings

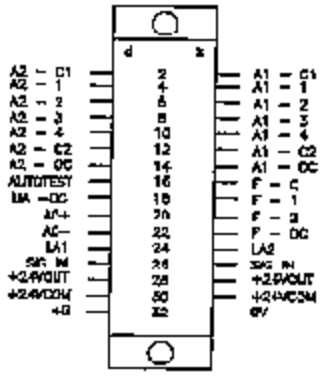


TA102 Trip Amplifier Module
Reference 10572 rev. A

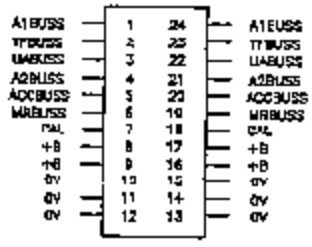
TA202 Trip Amplifier Module
Reference 10592 rev. A

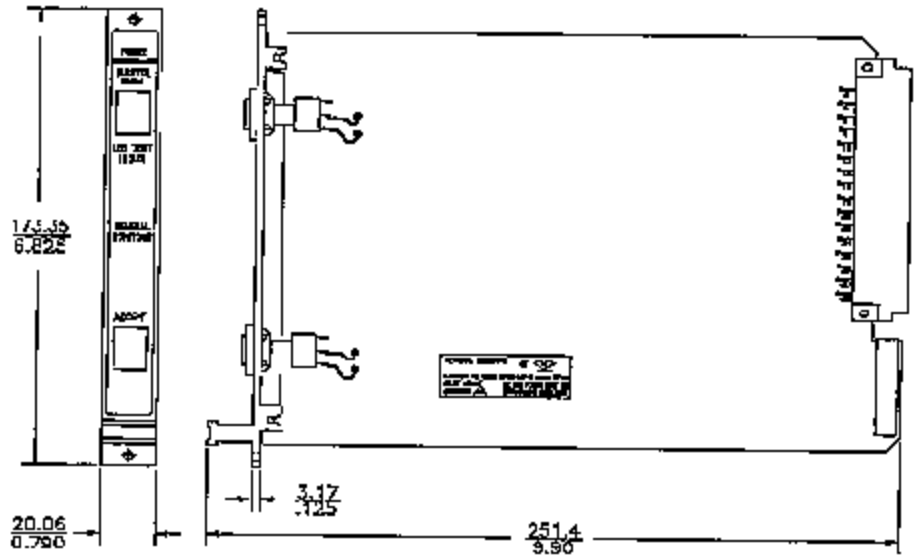
Outline & Dimensional Drawing

REAR CONNECTOR TERMINATIONS



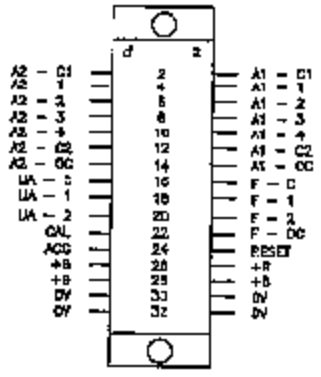
BUSS CONNECTIONS



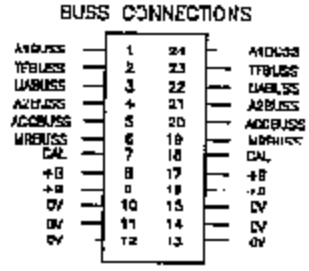


FM002 Facilities Module
Reference 10669 rev. A
Outline & Dimensional Drawing

REAR CONNECTOR TERMINATIONS



BUSS CONNECTIONS



Installation

3-6 Chart, DIP Switch SW3 - TA102/TA202

All settings for the Models TA102 and TA202 are done via DIP switch SW3. To access the DIP switch, remove the module from the chassis. On the DIP switch, **OPEN** means the switch is pushed in on the side labeled OPEN, and **CLOSED** means the switch is pushed in on the side with the number corresponding to the switch position.

Switch Position	POSITION	DESCRIPTION
1	Open	A2 alarm - normally de-energized
1	Closed	A2 alarm - normally energized
2	Open	A1 alarm - normally de-energized
2	Closed	A1 alarm - normally energized
3	Open	A2 alarm is non-latching
3	Closed	A2 alarm is latching
4	Open	A1 alarm is non-latching
4	Closed	A1 alarm is latching
5	Open	Fault outputs are not activated when the CAL door is opened
5	Closed	Fault outputs are activated when the CAL door is opened
6	Open	A1 and A2 alarm outputs are active during an Autotest
6	Closed	A1 and A2 alarm outputs are not active during an Autotest
7 & 8	N/A	Not used at this time

General Monitors
Models TA102/TA202

Maintenance

4-1 General Maintenance

Once correctly installed the system requires little maintenance other than routine calibration and periodic inspection. General Monitors (GMI) strongly recommends that the complete system, including all alarm circuitry, be tested at least annually and that the following checks be incorporated:

All sensor assemblies for effectiveness of mounting positions so that modifications to the plant layout have not affected this.

Security of mounting of sensor assemblies.

Sensor flame arrestors for clogging due to water, oil, dust, or paint.

Sensor accessories, where fitted.

Cable connections (tightness and damage).

Cooling air filters, where fitted. Be sure that replacement filters are clean and dry.

Operation of complete system on stand-by supplies, where fitted, for the full prescribed time.

Spare parts stock.

4-2 Calibration - TA102

Activating the calibrate switch on the Smart Sensor will automatically disable the alarm circuits by sending a 1.5mA (0mA optional) signal to Trip Amplifier Module. This will prevent activation of the relay contacts and open collector outputs and the sending of incorrect gas concentration information during the calibration process. General Monitors recommends that Combustible Gas Smart Sensors be calibrated one (1) hour after start-up.

Calibration should be checked at least every ninety (90) days to ensure system integrity. General Monitors is not implying that the customer should expect problems with sensor life or stability, but frequent calibration checks merely assures the integrity of life protecting equipment. The above statement is not intended to discourage the customer from checking calibration more frequently. Additional calibration checks are recommended for environments that have problems such as mud collecting on the sensor head, sensors accidentally being painted over, etc.

NOTE: A calibration check consists of applying a known concentration of gas to the sensor and observing the reading on the Smart Sensor, and/or Trip Amplifier Module. General Monitors recommends that a calibration schedule be established and followed. A log book should also be kept showing calibration dates and dates of sensor replacement.

SC100 & S104 without display

1. If it is suspected that hydrocarbons are present, it will be necessary to purge the sensor environment with *Zero Air*. If *Zero Air* is unavailable, cover the sensor for about thirty (30) seconds before applying the calibration gas.
2. Apply the magnet to the LED switch and wait for the LED in the switch to come on steady (about ten (10) seconds). Apply a 50% LEL gas concentration to the sensor assembly. If the GMI Portable Purge Calibrator (P/N:1400150-M) is not used, when calibrating the Smart Sensor with Methane (CH_4), the SPAN gas flow rate needs to be 350cc/min to 450cc/min.

Maintenance

3. After one (1) or two (2) minutes, the LED will commence a slow blink at a rate of once every two (2) seconds. Remove the calibration gas and wait for the unit to return to normal operation (LED off).
4. The unit is now calibrated and the new **ZERO** and **SPAN** values are stored in the unit's non-volatile memory.

If there is a problem and the Smart Sensor cannot complete the calibration sequence, the LED in the switch assembly will blink at a rapid rate (about four (4) times per second). Refer to the specific Smart Sensor Instruction Manual for possible reasons of an unsuccessful calibration.

SC110, S106, & S104 with display

1. If it is suspected that hydrocarbons are present, it will be necessary to purge the sensor environment with *Zero Air*. If *Zero Air* is unavailable, cover the sensor for about thirty (30) seconds before applying the calibration gas.
2. Apply the magnet near the GMI logo and wait (about ten (10) seconds) for the display to indicate **AC** (automatic calibration). Allow about five (5) seconds for the unit to acquire the zero reading before applying the calibration gas. If the GMI Portable Purge Calibrator (P/N1400150-M) is not used, when calibrating the Smart Sensor with Methane (CH_4), the SPAN gas flow rate needs to be 350cc/min to 450cc/min.
3. Apply a 50% LEL gas concentration to the sensor. The display will change from **AC** to **CP** (calibration in progress) indicating that the sensor is responding to the calibration gas being applied.
4. After one (1) or two (2) minutes the display will change from **CP** to **CC** (calibration complete) indicating a successful calibration. Remove the calibration gas and wait for the unit to return to normal operation. The display will indicate a few percent LEL, then drop to **0.**
5. The unit is now calibrated and the new **ZERO** and **SPAN** values are stored in the unit's non-volatile memory.

If there is a problem and the Smart Sensor (S104 or S106 only) cannot complete the calibration sequence, the unit will enter a fault mode and the output current will drop to zero (0). If the **ZERO** value could not be determined, the display will indicate **F1**. If the **SPAN** value could not be determined, the display will indicate **F3**. If the calibration time period is exceeded the display will indicate **F2**. If the Smart Sensor failed to properly store the **ZERO** and/or **SPAN** values, the display will indicate **F7**. Refer to the SC110 Smart Sensor Instruction Manual for possible reasons for an unsuccessful calibration.

Checking Calibration

When checking calibration for Models SC100 and S104 without display, it will be necessary to inhibit the gas alarm outputs by opening the CAL door on the Trip Amplifier Module before applying the test gas. When checking calibration for the Models SC110, S104, and S106, it will be necessary to place the Smart Sensor in the test gas mode. In the test gas mode, these units will send a 1.5mA signal to the Trip Amplifier. A calibration check consists of applying a known concentration of gas to the sensor and observing the reading on the Smart Sensor, and/or Trip Amplifier Module. When the test gas is removed the

General Monitors
Models TA102/TA202

Maintenance

Smart Sensor will return to normal operation. The Models S106, SC110, and S104 with display, will return to normal operation when the gas concentration drops below 5% LEL.

4-3 Calibration - TA202

Activating the calibrate switch on the Smart Sensor will automatically disable the alarm circuits by sending a 1.5mA (0mA optional) signal to the Trip Amplifier Module. This will prevent activation of the relay contacts and open collector outputs and the sending of incorrect gas concentration information during the calibration process. General Monitors recommends that Hydrogen Sulfide (H_2S) Gas Smart Sensors be calibrated twenty-four (24) hours after start-up. Calibration should be checked at least every ninety (90) days to ensure system integrity. General Monitors is not implying that the customer should expect problems with sensor life or stability, but frequent calibration checks merely assures the integrity of life protecting equipment. The above statement is not intended to discourage the customer from checking calibration more frequently. Additional calibration checks are recommended for environments that have problems such as mud collecting on the sensor head, sensors accidentally being painted over, etc.

NOTE: A calibration check consists of applying a known concentration of gas to the sensor and observing the reading on the Smart Sensor, and/or Trip Amplifier Module. General Monitors recommends that a calibration schedule be established and followed. A log book should also be kept showing calibration dates and dates of sensor replacement.

ST200 & S204 without display

1. Apply the magnet to the LED switch and wait for the LED in the switch to come on steady (about three (3) seconds). Apply a 20% of full scale H_2S gas concentration.

2. The LED in the switch will give a double blink indication when the 20% value has been accepted. Apply a 70% of full scale H_2S gas concentration.

3. After one (1) to three (3) minutes, the LED will commence a slow blink at a rate of once every two (2) seconds. Remove the calibration gas and wait for the unit to return to normal operation.

4. The unit is now calibrated and the new calibration values are stored in the unit's non-volatile memory.

If there is a problem and the Smart Sensor cannot complete the calibration sequence, the LED in the switch assembly will blink at a rapid rate (about four (4) times per second). Refer to the specific Smart Sensor Instruction Manual for possible reasons of an unsuccessful calibration.

S206 & S204 with display

1. Apply the magnet near the GMI logo and wait, about ten (10) seconds, for the display to indicate **AC** (automatic calibration). Apply a 20% of full scale H_2S gas concentration and wait for the display to indicate **LC** (lower complete), about three (3) to five (5) minutes. Before an indication of **LC** is given, the unit will display **CP** (calibration in progress).

Maintenance

2. After the display changes to **LC**, apply the 70% of full scale H_2S gas concentration. When the sensor responds to the gas, the display will indicate **CP.**
3. After one (1) to three (3) minutes the display will change from **CP** to **CC** (calibration complete) indicating a successful calibration. Remove the calibration gas and wait for the unit to return to normal operation. The display will indicate a few parts-per-million (ppm) and drop to **0.**
4. The unit is now calibrated and the new calibration values are stored in the unit' s non-volatile memory.

If there is a problem and the Smart Sensor cannot complete the calibration sequence, the unit will enter a fault mode and the output current will drop to zero (0). If the lower calibration value could not be determined, the display will indicate **F1.** If the upper calibration value could not be determined, the display will indicate **F3.** If the calibration time period is exceeded, the display will indicate **F2.** If the Smart Sensor failed to properly store the lower and/or upper calibration values, the display will indicate **F7.**

ST210

1. Apply the magnet near the GMI logo and wait, about ten (10) seconds, for the display to indicate **AC** (automatic calibration). Apply a 20% of full scale H_2S gas concentration and wait for the display to indicate **LC** (lower complete), about three (3) to five (5) minutes. Before an indication of **LC** is given, the unit will display **CP** (calibration in progress).
2. After the display changes to **LC**, apply the 100% of full scale H_2S gas concentration. When the sensor responds to the gas, the display will indicate **CP.**
3. After one (1) to three (3) minutes the display will change from **CP** to **CC** (calibration complete) indicating a successful calibration. Remove the calibration gas and wait for the unit to return to normal operation. The display will indicate a few parts-per-million (ppm) and drop to **0.**
4. The unit is now calibrated and the new calibration values are stored in the unit' s non-volatile memory.

If there is a problem and the Smart Sensor cannot complete the calibration sequence, the unit will enter a fault mode and the output current will drop to zero (0). Refer to the ST210 Smart Sensor Instruction Manual for possible reasons for an unsuccessful calibration.

Checking Calibration

When checking calibration for Models ST200 and S204 without display, it will be necessary to inhibit the gas alarm outputs by opening the CAL door on the Trip Amplifier Module before applying the test gas. When checking calibration for the Models ST210, S206, and S204 with display, it will be necessary to place the Smart Sensor in the test gas mode. In the test gas mode, these units will send a 1.5mA signal to the Trip Amplifier. A calibration check consists of applying a known concentration of gas to the sensor and observing the reading on the Smart Sensor, and/or Trip Amplifier Module. When the test gas is removed the Smart Sensor will return to normal operation. The Models S206, ST210, and S204 with display, will return to normal operation when the gas concentration drops below 5% of full scale.

Maintenance

4-4 Storage

Electronic modules should be stored in a clean, dry area and within the temperature range quoted under Environmental Specifications in Section 2. When prolonged storage is anticipated, modules should be sealed, together with a desiccant, into electrostatic plastic bags and double wrapped for protection. Both Hydrocarbon and Hydrogen Sulfide sensors should be stored as stated above, but note that in the latter case the RED CAP supplied with the sensor should remain on the sensor throughout the storage period.

General Monitors
Models TA102/TA202

Troubleshooting

5-1 Troubleshooting Chart

The information presented in this section is designed to remedy the more common faults which occur during system start-up and operation and which are repairable by a competent operator. Should the various actions suggested in the table fail to restore normal operation, the affected module may be replaced and sent for repair.

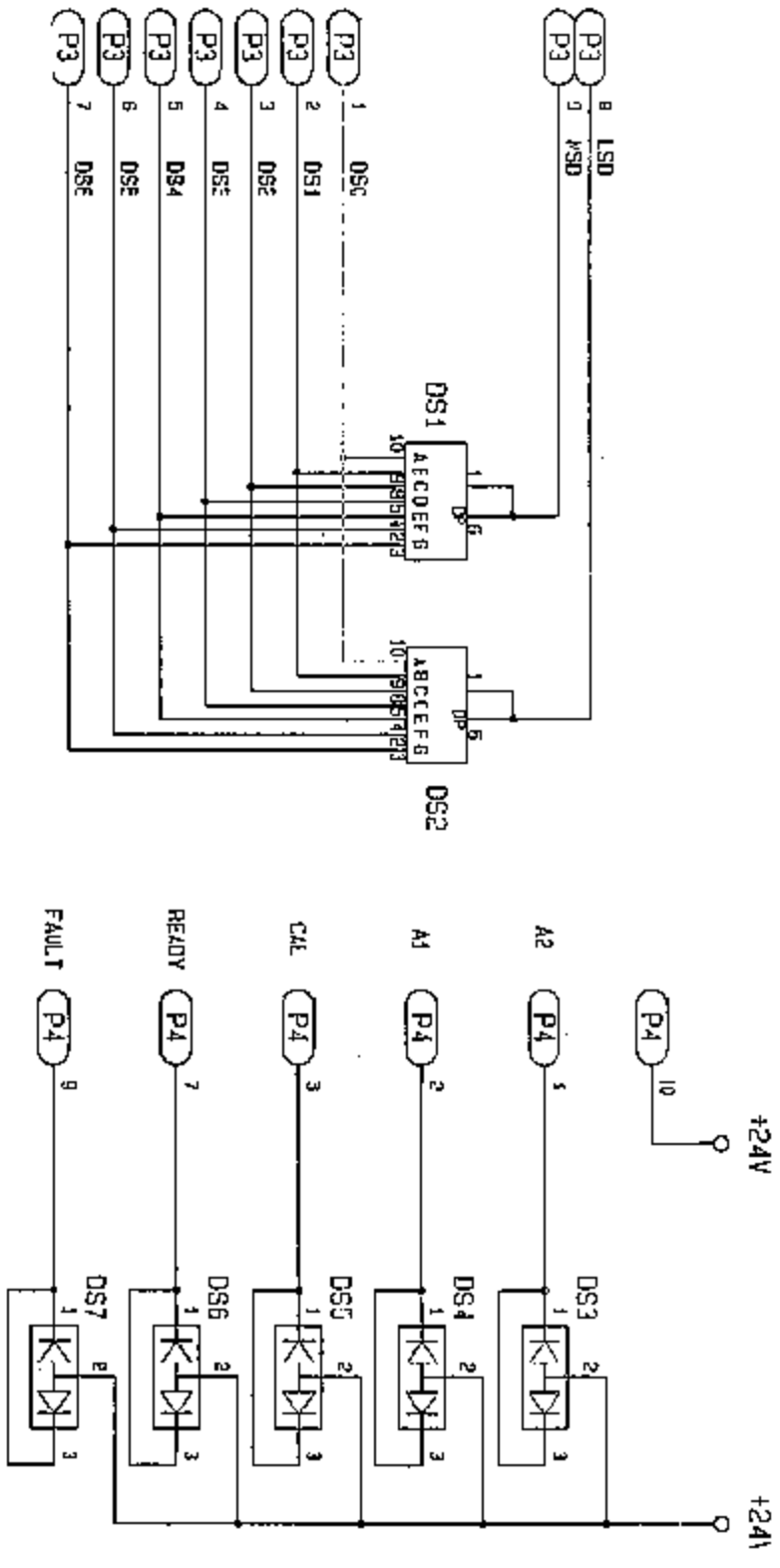
A replacement module for a particular channel will require calibration to gas (refer to section 4). Repair of an electrontic module should only be attempted by certified General Monitors personnel or an authorized representative. Failure to comply with this requirement will invalidate the Warranty.

SYMPTOMS	POSSIBLE CAUSE	ACTION
The display and the front panel indicators are not lit.	Loss of power to the chassis.	Check power supply to chassis.
	Module fuse blown	Replace fuse (1A Char T, F1)
Intermittent fault or continuous fault indication.	Loss of supply voltage.	Ensure supply conforms to specification (20-35VDC).
	Analog output load in excess of specification.	Check the analog output loads. The total impedance should not exceed 300 Ohms from the Smart Sensor, to the Trip Amplifier, out the AO+ and returned to the AO-.
	Analog input current less than 1mA.	Check SIGNAL IN circuitry.
	Analog input fuse is blown.	Replace analog input fuse F3.
Fault and Ready indicators both ON continuously.	Remote sensor in CAL mode.	Check remote sensor for correctness of indication.
	CAL door is open.	Close CAL door.

General Monitors
Models TA102/TA202

Troubleshooting

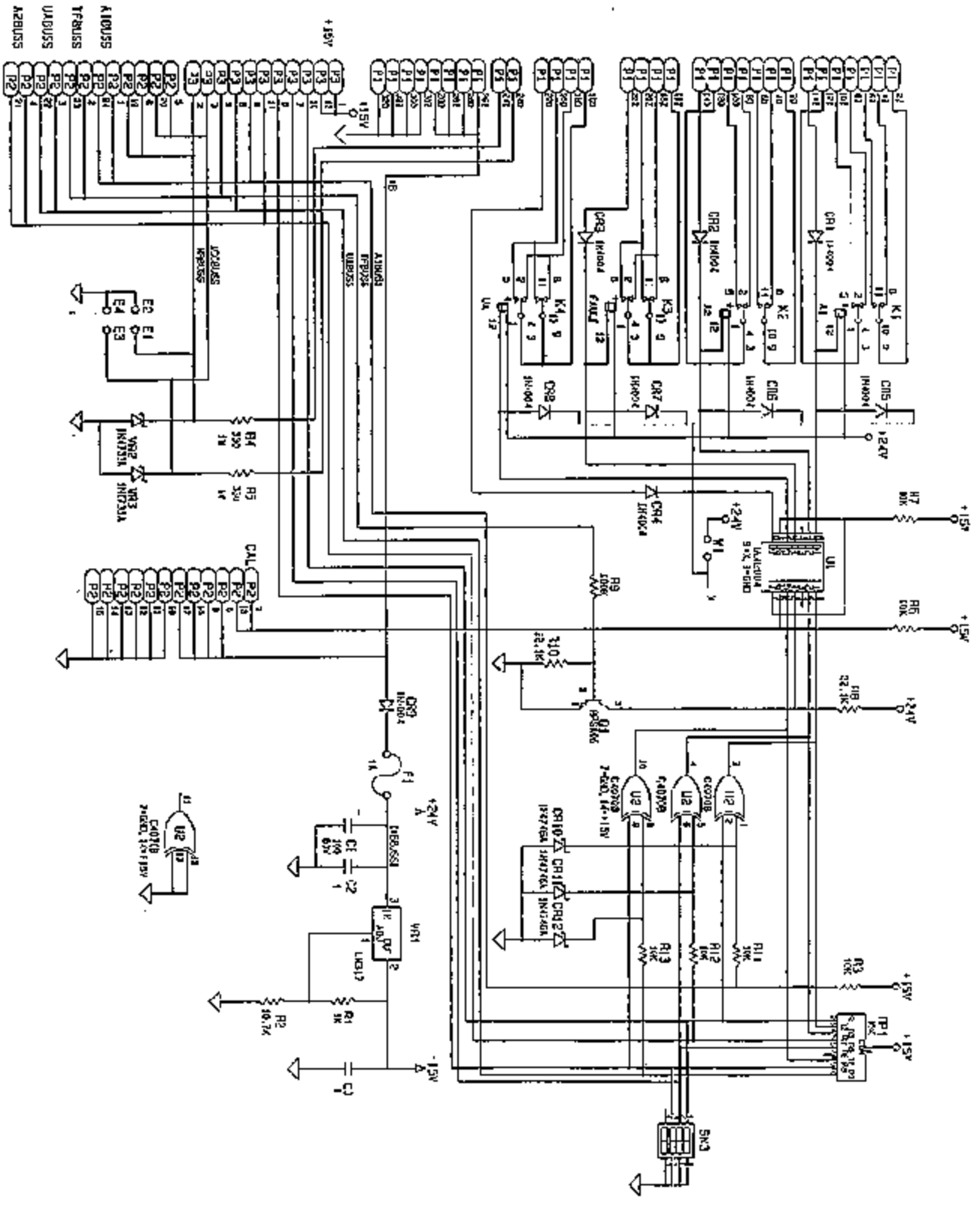
Schematic - TA102/TA202 Display Board
Reference 10577



General Monitors
Models TA102/TA202

Troubleshooting

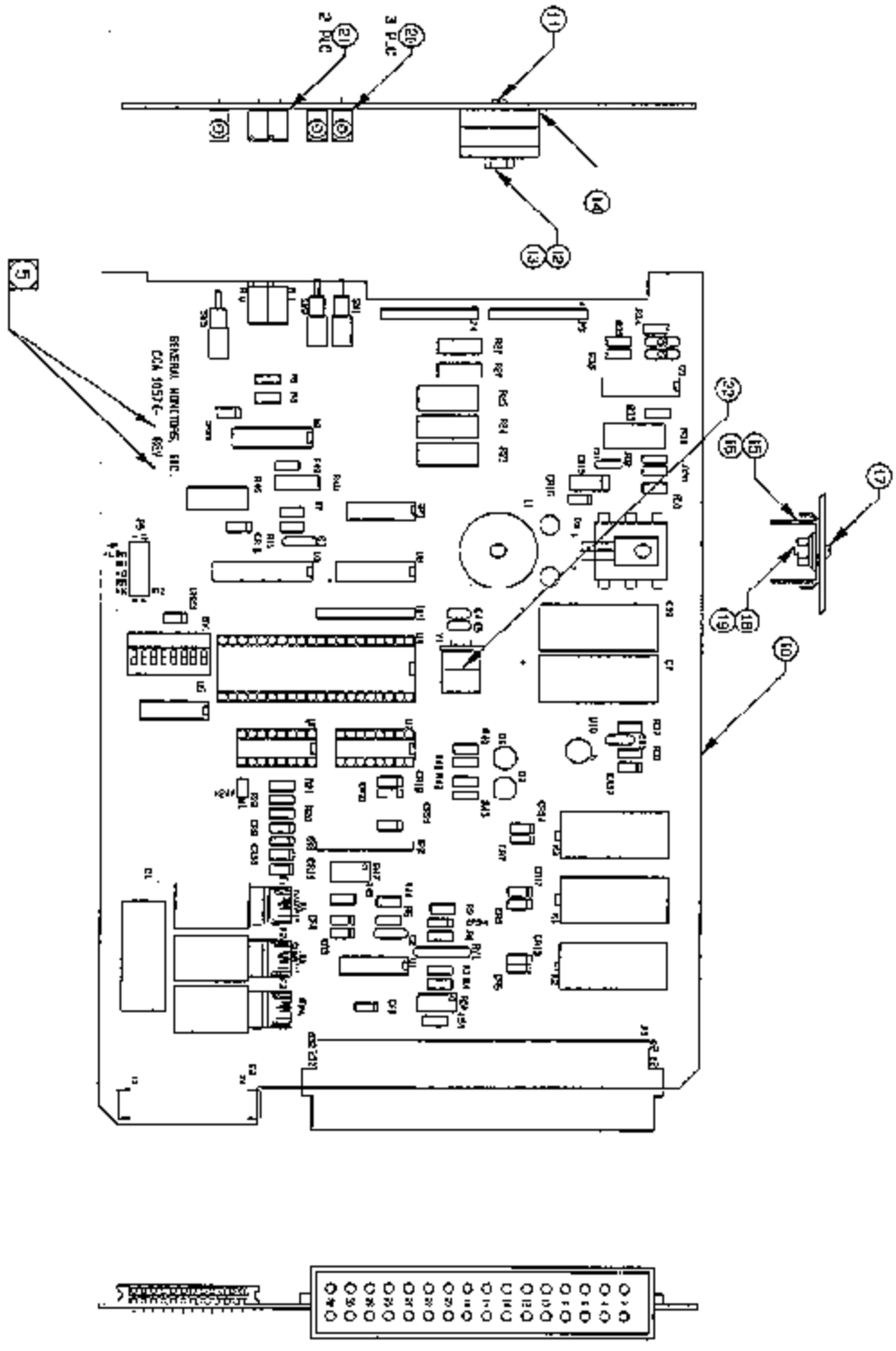
Schematic, Control Board - PM002
Reference 10662



General Monitors
Models TA102/TA202

Troubleshooting
5-3 Circuit Card Assemblies

CCA, Control Board - TA102/TA202
Reference 10574



Troubleshooting

Bill of Materials - 10574-1 & 10574-2

PART #	DESCRIPTION	ITEM	REFERENCE
10573	Schematic Control Board TA02 Series DWG	INFO	
10574	CCA Control Board TA 02 Series DWG	INFO	
10575	CCD Control Board TA 02 Series (-1 with relays, -2 without relays)		
932-002	Conformal Coating	10	
915-120	Capacitor 1000uf 25V Aluminum		C1
915-017	Capacitor .01uf 50V Ceramic		C2, 9
915-027	Capacitor 150pf 100V Dipped Mica		C3, 8
915-026	Capacitor 20pf 500V		C4, 5
915-033	Capacitor .1uf 50V Ceramic		C6
915-168	Capacitor 68uf 60V Aluminum		C7, 10
915-036	Capacitor 1uf 50V Ceramic		C11
948-123	Diode 1N4004 400V 1A Rectifier	CR1,5,6,7,8,9,10,11,12,13,19,20,21,22,23	
948-104	Diode 1N4148 Signal		CR3, 4, 17
948-124	Diode 1N4934 1A 100V Rectifier Frcvry		CR16
948-035	Diode Zener Transient Suppression 39V 5%		CR15
948-030	Diode 1N4733A 5.1V 1W 5%		CR18
948-036	Diode Zener 3.9V 1/2W 5%		CR24
951-013	Fuse Mini 5x20mm 1A 250V		F1
951-200	Fuse Mini 5x20mm 1/2A 250V		F2
951-216	Fuse Mini 5mmx20mm 63mA 250V		F3
921-607	Fuse Holder PC Mounted with Cap		F1, 2, 3
945-039	Relay 24V 4A DPDT 2850 Ohm (10574-1 Only)		K1, 2, 3
30011-1	Inductor 2mH		L1
931-063	Insulator Pad .812 OD x .145 ID	14	L1
12553	Screw M3x.5x20 Slot Pan Head Nylon	11	L1
12517	Nut M3x.5 Nylon Hex	12	L1
9115	Washer #6 Flat Fiber	13	L1
921-376	Terminal Block Header 32 Position Dual-In-Line		P1
921-662	Connector Plug PC Mount 24 Position		P2
921-696	Connector Rcpt 12 Position Double Row .100 Ctrs		P5
948-248	Transistor MPS8599		Q1, 2
948-238	Transistor 2N5194 PNP 4A 60V		Q3
12516	Nut M3x.5 Nylon Insert-S-C Lock	18	Q3
9419	Washer Cupped Aluminum W/TO126	19	Q3
948-410	Heatsink	15	Q3
931-036	Insulator Pad .75x.5 in	16	Q3
12571	Screw M3x.5x10 Phillips Pan Head Stainless Steel	17	Q3
947-325	Resistor 20K 1% Metal Film		R2, 4, 33, 34
949-105	Resistor 36.5 Ohm 1% Metal Film		R3
949-101	Resistor 82.5K 1% Metal Film		R5, 6
947-033	Resistor 5.6K 1/4W 5% Carbon		R7, 36
947-045	Resistor 1.8K 1/4W 5% Carbon		R8, 9
947-536	Potentiometer 2K 20 Turn		R10, 11
ECD-058	Pad Spacer	21	R10, 11
947-301	Resistor 10K 1% Metal Film		R15,20,21,22,40,42
947-225	Resistor 1K 1W 5% Carbon		R23, 25
947-204	Resistor 750 Ohm 1W 5% Carbon		R24
947-129	Resistor 2.7K 1/2W 5% Carbon		R26, 27
947-328	Resistor 1K 1% Metal Film		R29, 30, 45
947-203	Resistor 330 Ohm 1W 5% Carbon		R31, 46

General Monitors
Models TA102/TA202

Troubleshooting

Bill of Materials - 10574-1 & 10574-2
continued

PART #	DESCRIPTION	ITEM	REFERENCE
947-012	Resistor 100 Ohm 1/4W 5% Carbon		R32, 51
947-048	Resistor 100K 1/4W 5% Carbon		R35
949-104	Resistor 34K 1% Metal Film		R37
947-383	Resistor 11.5K 1% Metal Film		R38
947-327	Resistor 2K 1% Metal Film		R41, 43
947-366	Resistor 3.01K 1% Metal Film		R44
947-552	Potentiometer 1K 20 Turn		R47, 50
947-606	Resistor 6.65K 1% Metal Film		R48
947-394	Resistor 442 Ohm 1% Metal Film		R49
947-912	Resistor Network 4.7K 10 pin Single-In-Line Package		RP1
947-922	Resistor Network 10K 10 pin Single-In-Line Package		RP2
947-906	Resistor Network 220 Ohm 14 pin 7 resistors		RP3
931-360	IC Varistor Metal Oxide 47V 7 Joules		RV1
951-426	Switch PB SPDT Sealed		SW1, 2
ECD-057	Pad Spacer	20	SW1, 2, 5
951-600	Switch 8 Postion Dual-In-Line Package		SW3
951-328	Switch Toggle SPDT Sealed		SW5
921-518	Jumper Test Point .100 Spacing		TP1, 2
931-361	IC Quad Operational Amplifier LM324AN		U1
931-428	IC Analog Multiplexor/Demultiplexor Single 8 Channel		U2
931-427	IC Analog to Digital Converter 8 bit 20 pin		U3
921-711	IC Socket 40 pin Dual-In-Line		U4
931-444	IC Quad 2 Input Exclusive OR Gate		U5
931-425	IC Darlington Transistor Array Hi Volt		U6, 7, 8
921-793	IC Socket 16 pin Dual-In-Line Package		U6, 7
931-366	IC Switching Regulator TL494CN		U9
931-388	IC Programmable Voltage Regulator		U10
921-518	Jumper		W1
923-000	Crystal 6 Megahertz		Y1
9146	Buss Wire 22AWG Soft Draw	22	Y1

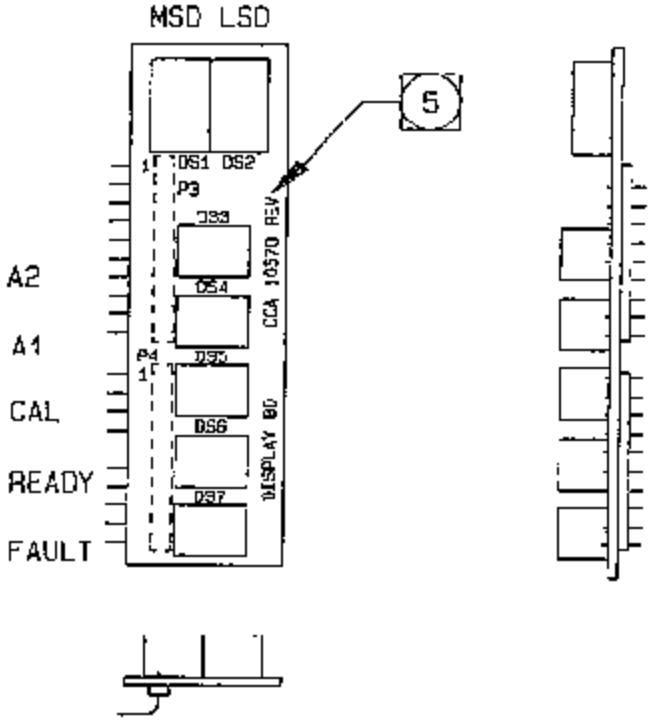
FOR **10574-2** DO NOT INCLUDE THE FOLLOWING:

945-039	Relay 24V 4A DPDT 2850 Ohm (10574-1 Only)		K1, 2, 3

General Monitors
Models TA102/TA202

Troubleshooting

CCA, Display Board - TA102/TA202
Reference 10578



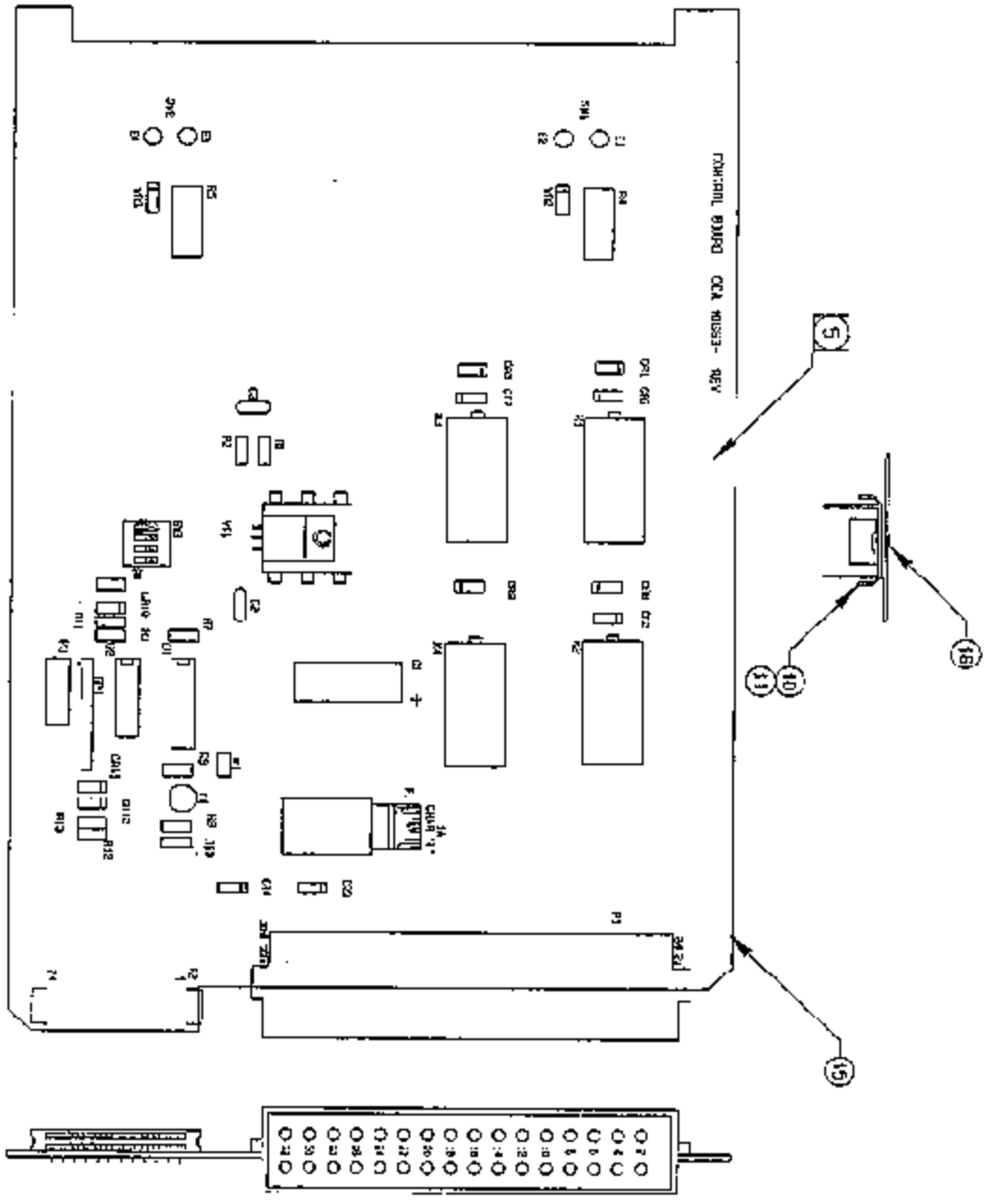
Bill of Materials - Display Board
Refence 10578-1

PART #	DESCRIPTION	ITEM	REFERENCE
10577	Schematic, Display Board Drawing	INFO	
10578	Circuit Card Assembly, Display Board Drawing	INFO	
10579-1	Circuit Card Detail, Display Board		
932-002	Conformal Coating	10	
948-369	LED, Red Digital Seven Segment (2)		DS1, DS2
948-364	LED, Red Light Bar Module (2)		DS3, DS4
948-848	LED, Yellow Light Bar Module (2)		DS5, DS7
948-870	LED, Green Light Bar Module		DS6
921-848	Connector Header 10 Position .100 Ctr RA		P3, P4

General Monitors
Models TA102/TA202

Troubleshooting

CCA, Control Board - FM002
Reference 10663



General Monitors
Models TA102/TA202

Troubleshooting

Bill of Materials - 10663-1 & 10663-2

Reference 10663-1

PART #	DESCRIPTION	ITEM	REFERENCE
10662	Schematic Control Board DWG	INFO	
10663	CCA Control Board DWG	INFO	
10664-1	CCD Control Board with relays		
932-002	Conformal Coating	15	
915-184	Capacitor 100µf 63V Aluminum		C1
915-036	Capacitor 1µf 50V Ceramic		C2, 3
948-123	Diode 1N4004 400V 1A Rectifier		CR1,2,3,4,5,6,7,8,9
948 011	Diode 18V 1W 5% Zener		CR10, 11, 12
951-013	Fuse Mini 5x20mm 1A 250V		F1
945-039	Relay 24V 4A DPDT 2850 Ohm		K1, 2, 3, 4
921-376	Terminal Block Header 32 Position DIN		P1
921-862	Connector Plug PC Mount 24 Position		P2
948-243	Transistor MPSA06 60V		Q1
947-328	Resistor 1K 1% Metal Film		R1
947-308	Resistor 10.7K 1% Metal Film		R2
947-301	Resistor 10K 1% Metal Film		R3, 6, 7, 11, 12, 13
947-203	Resistor 330 Ohm 1W 5% Carbon		R4, 5
947-601	Resistor 22.1K 1% Metal Film		R8, 10
947-316	Resistor 100K 1% Metal Film		R9
947-922	Resistor Network 10K 10pin Single-In-Line Package 9 resistors		RP1
951-601	Switch Mini-DIP SPST 4 Position 8 Pin		SW3
931-425	IC Darlington Transistor Array Hi Volt		U1
931-444	IC Quad 2 Input Exclusive OR Gate		U2
931-382	IC Voltage Regulator Position Adjustable 3 Terminal		VR1
948-410	Heatsink	10	VR1
931-086	Insulator Pad 3/4x1/2 in.	11	VR1
1401	Rivcrew M3x.5x6	16	VR1
948-030	Diode 1N4733A 5.1V 1W 5%		VR2, 3
921-607	Fuse Holder PC Mount with Cap		XF1

Reference 10663-2

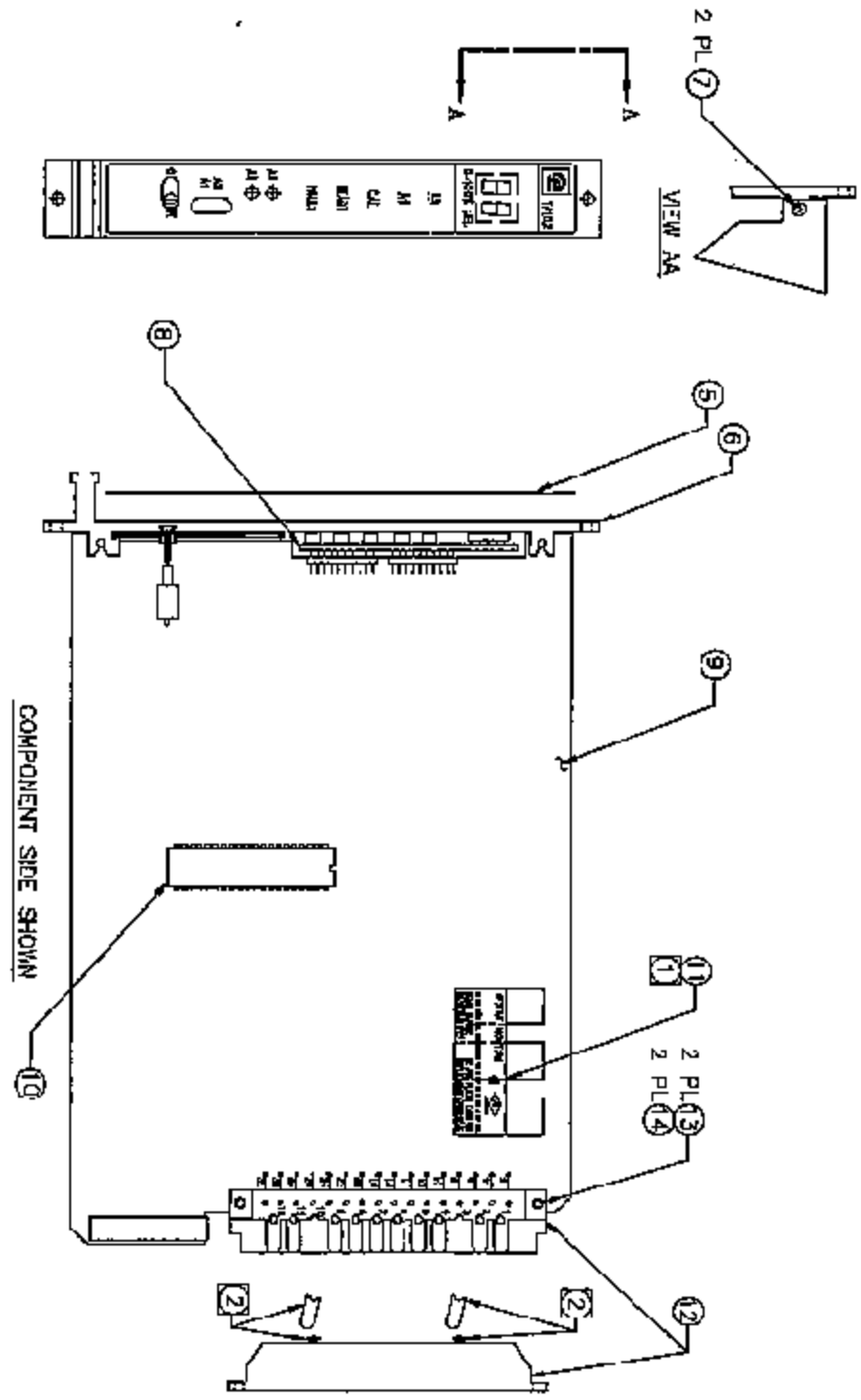
PART #	DESCRIPTION	ITEM	REFERENCE
10662	Schematic Control Board DWG	INFO	
10663	CCA Control Board DWG	INFO	
10664-2	CCD Control Board without relays		
921-376	Terminal Block Header 32 Position DIN		P1
921-862	Connector Plug PC Mount 24 Position		P2
947-203	Resistor 330 Ohm 1W 5% Carbon		R4, 5
948-030	Diode 1N4733A 5.1V 1W 5%		VR2, 3

General Monitors
Models TA102/TA202

Troubleshooting

5-4 Final Assembly Drawings

TA102



(1) 10568-1 IS USED ON U.S. MANUFACTURED INSTRUMENTS. 10568-2 IS USED ON IRELAND MANUFACTURED INSTRUMENTS. FOR -2 (WITHOUT RELAYS) ADHERE LABEL (ITEM 11) TO BOARD IN SAME POSITION.

(2) PRIOR TO SHIPPING REMOVE PINS 3 & 10 ON MALE CODING STRIP AND INSERT CODING PINS IN FEMALE CODING STRIP IN SLOTS 3 & 10.

Reference 10570 rev. A
FINAL ASSY, HC TRIP AMPLIFIER
0-100% LEL

General Monitors
Models TA102/TA202

Troubleshooting

Bill of Materials - TA102

Reference 10570-1

PART #	DESCRIPTION	ITEM	REFERENCE
10584-1	Front Panel Inlay 0-100% LEL	5	
10681-1	Front Panel Sub-Assembly	6	
9420	4 x 1/2 Pan Head Self Tapping Zinc Screw (2)	7	
10578-1	Circuit Card Assembly Display Board	8	
10574-1	Circuit Card Assembly Control Board With Relays	9	
10284-37	Programmed Micro-Computer TA102 0-100	10	
10568-1	CSA Approved Label	11	
921-794	Connector Coding Device	12	
1095	2-56 x 3/4 Pan Head Stainless Steel Screw (2)	13	
12516	M3 x 0.5 Nylon Nut Insert S-C Lock (2)	14	

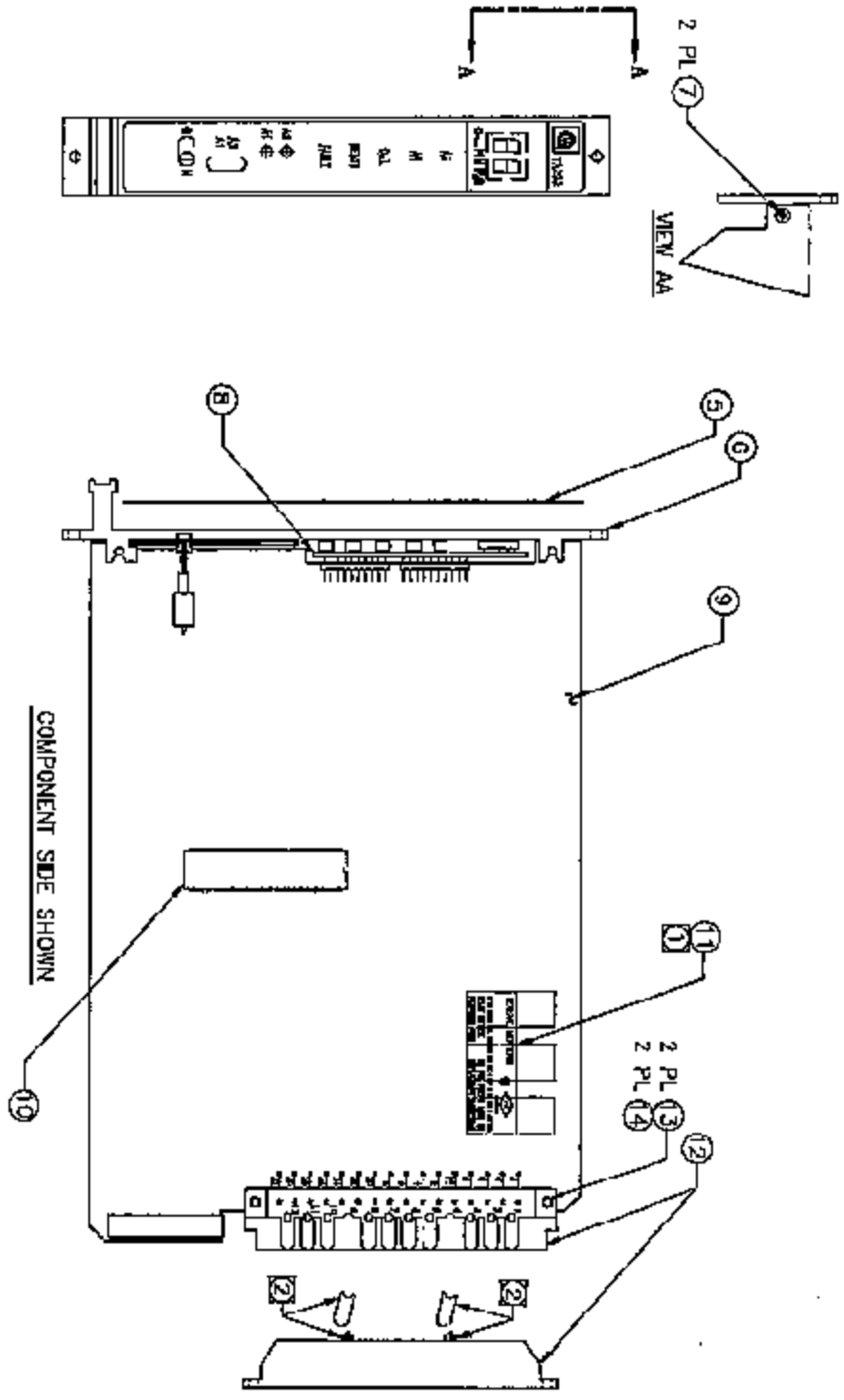
Reference 10570-2

PART #	DESCRIPTION	ITEM	REFERENCE
10584-1	Front Panel Inlay 0-100% LEL	5	
10681-1	Front Panel Sub-Assembly	6	
9420	4 x 1/2 Pan Head Self Tapping Zinc Screw (2)	7	
10578-1	Circuit Card Assembly Display Board	8	
10574-2	Circuit Card Assembly Control Board Without Relays	9	
10284-37	Programmed Micro-Computer TA102 0-100	10	
10569-1	CSA Approved Label	11	
921-794	Connector Coding Device	12	
1095	2-56 x 3/4 Pan Head Stainless Steel Screw (2)	13	
12516	M3 x 0.5 Nylon Nut Insert S-C Lock (2)	14	

General Monitors
Models TA102/TA202

Troubleshooting

TA202



1. 10538-1 IS USED ON U.S. MANUFACTURED INSTRUMENTS. 10568-2 IS USED ON RELAND MANUFACTURED INSTRUMENTS. FOR -2 (WITHOUT RELAYS) ADHERE LABEL (ITEM 11) TO BOARD IN SAME POSITION.

2. PRIOR TO SHIPPING REMOVE PINS 4 & 9 ON MALE CODING STRIP AND INSERT CODING PINS IN FEMALE CODING STRIP IN SLOTS 4 & 9.

Reference 10590 rev. A

FINAL ASSY, TRIP AMPLIFIER

Hydrogen Sulfide

General Monitors
Models TA102/TA202

Troubleshooting

Bill of Materials - TA202

Reference 10590-1

PART #	DESCRIPTION	ITEM	REFERENCE
10594-1	Front Panel Inlay 0-100 ppm H_2S	5	
10681-1	Front Panel Sub-Assembly	6	
9420	4 x 1/2 Pan Head Self Tapping Zinc Screw (2)	7	
10578-1	Circuit Card Assembly Display Board	8	
10574-1	Circuit Card Assembly Control Board With Relays	9	
10284-38	Programmed Micro-Computer TA202 0-100 ppm	10	
10560-1	CSA Approved Label	11	
921-794	Connector Coding Device	12	
1095	2-56 x 3/4 Pan Head Stainless Steel Screw (2)	13	
12516	M3 x 0.5 Nylon Nut Insert S-C Lock (2)	14	

Reference 10590-2

PART #	DESCRIPTION	ITEM	REFERENCE
10596-1	Front Panel Inlay 0-50 ppm H_2S	5	
10681-1	Front Panel Sub-Assembly	6	
9420	4 x 1/2 Pan Head Self Tapping Zinc Screw (2)	7	
10578-1	Circuit Card Assembly Display Board	8	
10574-1	Circuit Card Assembly Control Board With Relays	9	
10284-48	Programmed Micro-Computer TA202 0-50 ppm	10	
10568-1	CSA Approved Label	11	
921-794	Connector Coding Device	12	
1095	2-56 x 3/4 Pan Head Stainless Steel Screw (2)	13	
12516	M3 x 0.5 Nylon Nut Insert S-C Lock (2)	14	

General Monitors
Models TA102/TA202

Troubleshooting

Bill of Materials - TA202

Reference 10590-3

PART #	DESCRIPTION	ITEM	REFERENCE
10598-1	Front Panel Inlay 0-20 ppm H_2S	5	
10681-1	Front Panel Sub-Assembly	6	
9420	4 x 1/2 Pan Head Self Tapping Zinc Screw (2)	7	
10578-1	Circuit Card Assembly Display Board	8	
10574 1	Circuit Card Assembly Control Board With Relays	9	
10284-39	Programmed Micro-Computer TA202 0-20 ppm	10	
10568-1	CSA Approved Label	11	
921-794	Connector Coding Device	12	
1095	2-56 x 3/4 Pan Head Stainless Steel Screw (2)	13	
12516	M3 x 0.5 Nylon Nut Insert S C Look (2)	14	

Reference 10590-4

PART #	DESCRIPTION	ITEM	REFERENCE
10594-1	Front Panel Inlay 0-100 ppm H_2S	5	
10681-1	Front Panel Sub-Assembly	6	
9420	4 x 1/2 Pan Head Self Tapping Zinc Screw (2)	7	
10578-1	Circuit Card Assembly Display Board	8	
10574-2	Circuit Card Assembly Control Board Without Relays	9	
10284-38	Programmed Micro-Computer TA202 0-100 ppm	10	
10568-1	CSA Approved Label	11	
921-794	Connector Coding Device	12	
1095	2-56 x 3/4 Pan Head Stainless Steel Screw (2)	13	
12516	M3 x 0.5 Nylon Nut Insert S-C Lock (2)	14	

General Monitors
Models TA102/TA202

Troubleshooting

Bill of Materials - TA202

Reference 10590-5

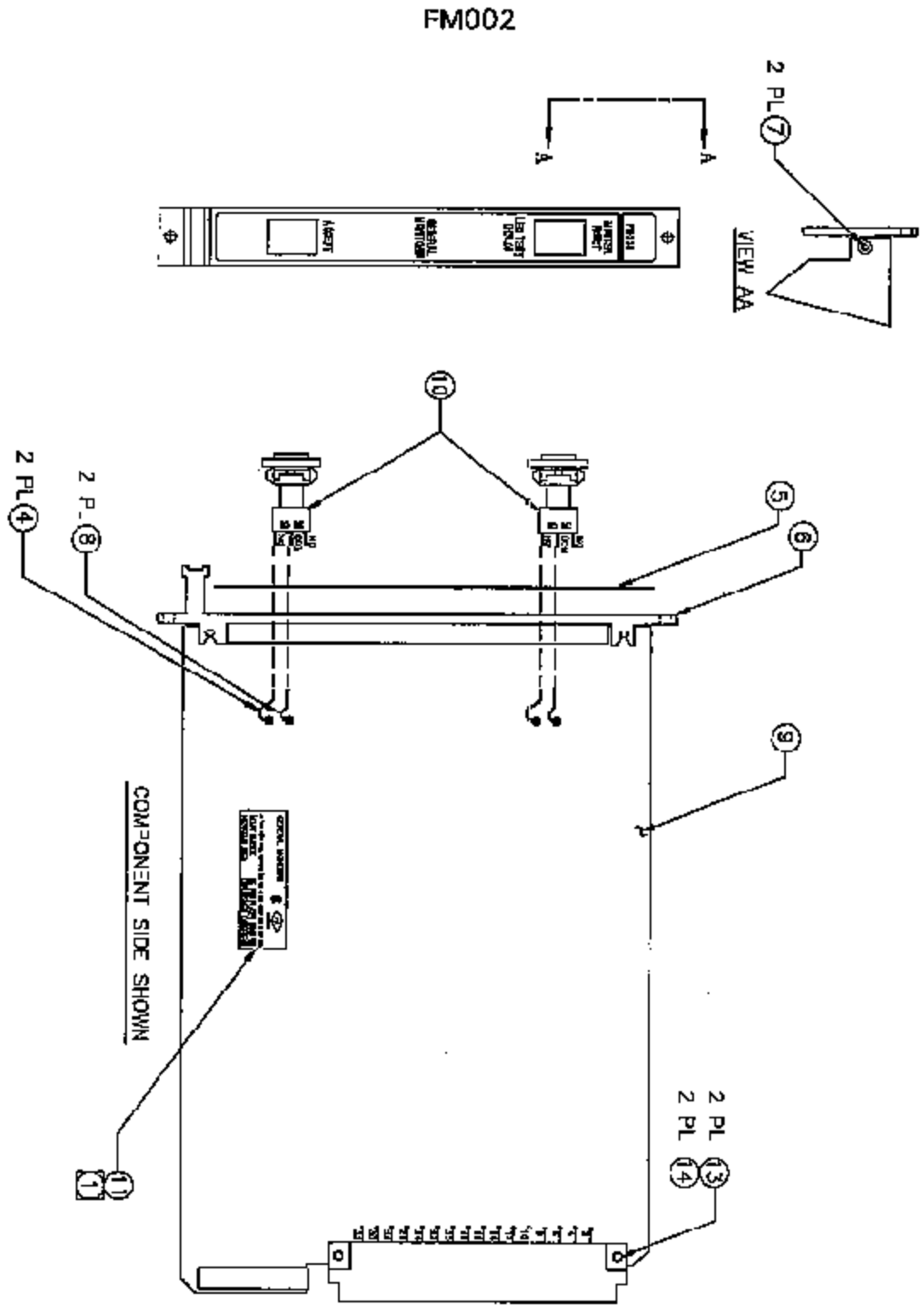
PART #	DESCRIPTION	ITEM	REFERENCE
10596-1	Front Panel Inlay 0-50 ppm H_2S	5	
10681-1	Front Panel Sub-Assembly	6	
9420	4 x 1/2 Pan Head Self Tapping Zinc Screw (2)	7	
10578-1	Circuit Card Assembly Display Board	8	
10574-2	Circuit Card Assembly Control Board Without Relays	9	
10284-48	Programmed Micro-Computer TA202 0-50 ppm	10	
10568-1	CSA Approved Label	11	
921-794	Connector Coding Device	12	
1095	2-56 x 3/4 Pan Head Stainless Steel Screw (2)	13	
12516	M3 x 0.5 Nylon Nut Insert S-C Lock (2)	14	

Reference 10590-6

PART #	DESCRIPTION	ITEM	REFERENCE
10598-1	Front Panel Inlay 0-20 ppm H_2S	5	
10681-1	Front Panel Sub-Assembly	6	
9420	4 x 1/2 Pan Head Self Tapping Zinc Screw (2)	7	
10578-1	Circuit Card Assembly Display Board	8	
10574-2	Circuit Card Assembly Control Board Without Relays	9	
10284-39	Programmed Micro-Computer TA202 0-20 ppm	10	
10568-1	CSA Approved Label	11	
921-794	Connector Coding Device	12	
1095	2-56 x 3/4 Pan Head Stainless Steel Screw (2)	13	
12516	M3 x 0.5 Nylon Nut Insert S-C Lock (2)	14	

General Monitors
Models TA102/TA202

Troubleshooting



General Monitors
Models TA102/TA202

Troubleshooting

Bill of Materials - FM002

Reference 10660-1

PART #	DESCRIPTION	ITEM	REFERENCE
9189	22 AWG Black Buss Wire	4	
10667-1	Front Panel Inlay Facilities Module	5	
10678-1	Facilities Module Panel Machined	6	
9420	4 x 1/2 Pan Head Self Tapping Zinc Screw (2)	7	
9191	22 AWG Red Buss Wire	8	
10663-1	Circuit Card Assembly Control Board With Relays	9	
951-431	Switch BP W/White Cap and Black Frame (2)	10	
10568-1	CSA Approved Label	11	
921-794	Connector Coding Device	12	
1095	2-56 x 3/4 Pan Head Stainless Steel Screw (2)	13	
12516	M3 x 0.5 Nylon Nut Insert S-C Lock (2)	14	

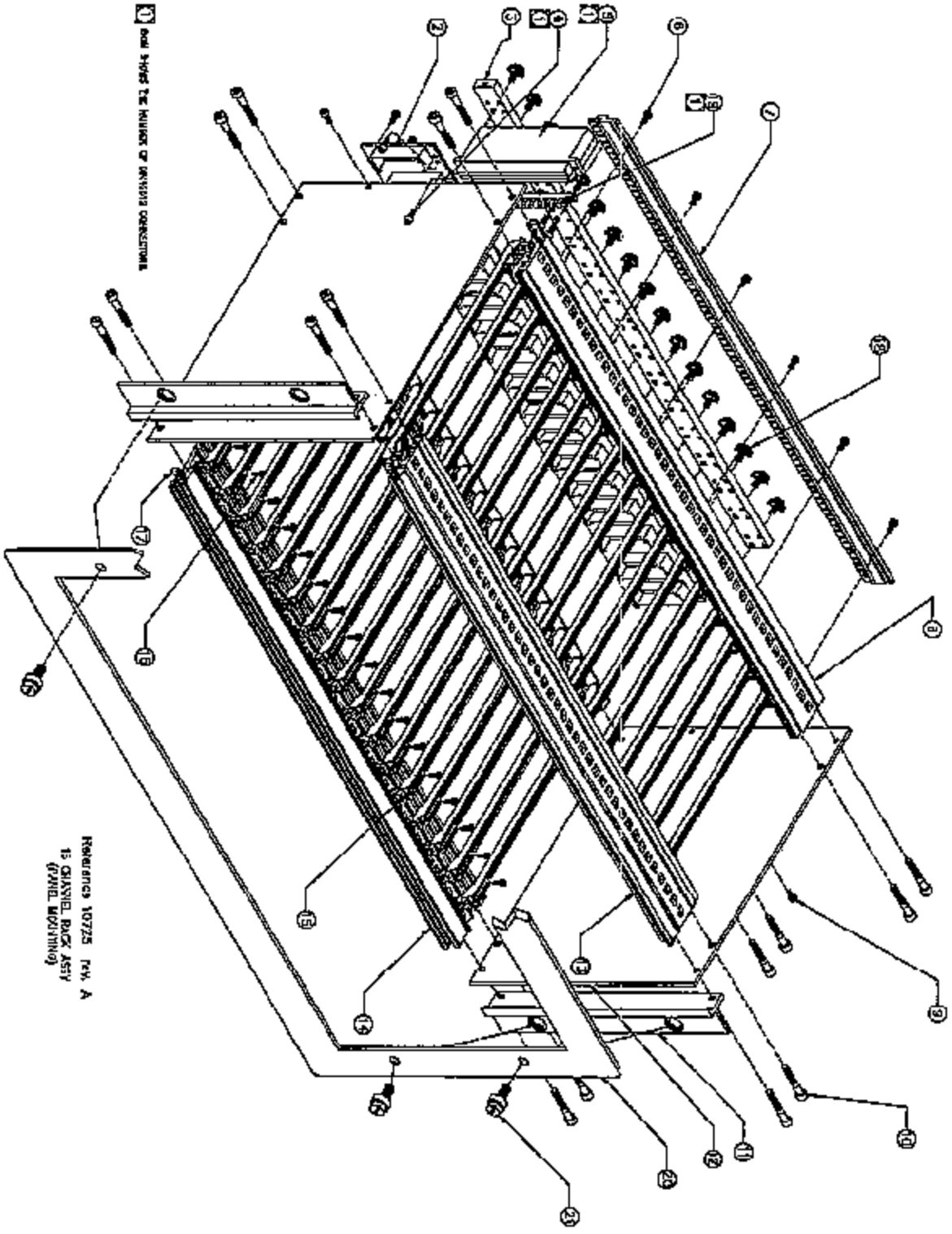
Reference 10660-2

PART #	DESCRIPTION	ITEM	REFERENCE
9189	22 AWG Black Buss Wire	4	
10667-1	Front Panel Inlay Facilities Module	5	
10678-1	Facilities Module Panel Machined	6	
9420	4 x 1/2 Pan Head Self Tapping Zinc Screw (2)	7	
9191	22 AWG Red Buss Wire	8	
10663-2	Circuit Card Assembly Control Board Without Relays	9	
951-431	Switch BP W/White Cap and Black Frame (2)	10	
10568-1	CSA Approved Label	11	
921-794	Connector Coding Device	12	
1095	2-56 x 3/4 Pan Head Stainless Steel Screw (2)	13	
12516	M3 x 0.5 Nylon Nut Insert S-C Lock (2)	14	

General Monitors
Models TA102/TA202

Troubleshooting

16 Channel Chassis



General Monitors
Models TA102/TA202

Troubleshooting

Bill of Materials - 16 Channel Chassis

Reference 10725-17

PART #	DESCRIPTION	ITEM	REFERENCE
10680	19 Inch Rack Assembly	INFO	
10671-1	Circuit Card Assembly - 02 Buss Board, 16 Channel	2	
10567-1	Bar Support, 16 Channel Rack	3	
921-377	Connector, 32 Position Female DIN Type F (17)	5	
1104	Screw, M2.5 x 8mm Phillips Pan Head Stainless Steel (125)	6	
928-925	Connector Rail, 16 Channel Rack	7	
921-226	Rear Tie Bar (2)	8	
1458	Screw, M3 x 8mm Phillips Pan Head Stainless Steel (2)	9	
928 826	Screw, M4 x 25, SKT CAP (16)	10	
10699-1	Side Angle (2)	11	
10679-1	End Plate (2)	12	
921-223	Front Tie Bar, 16 Channel Rack (2)	13, 14	
921-221	PCB Guide, Plug-In-Unit (34)	15	
1457	Screw, M2.5 x 6mm Phillips Pan Head Stainless Steel (34)	16	
921-222	Tapped Strips (4)	17	
928-315	Screw Terminal SEMS 6-32 x 3/8 GRN (17)	18	
921-798	Coding Strip, Female & Coding Pins (16)	19	
10810-1	Mounting Bezel, 16 Channel	20	
928-804	Screw and Cup Washer (4)	21	

General Monitors
Models TA102/TA202

Spares & Accessories

6-1 Ordering Information

A set of configuration codes has been provided to aid the customer in ordering the various modules.

TA102 - 3□□ - 1 0 0 - 0□□

Specifies if the unit is to be ordered with or without relays:

- 1 = Without Relays
- 2 = With Relays

Specifies if the Fault Relay will activate when the CAL Door is opened:

- 1 = Fault relay does not activate
- 2 = Fault relay activates

Specifies if the Alarm relays will activate during an Auto Test:

- 1 = Alarm relays inhibited
- 2 = Alarm relays activated

Specifies the relay options:

- 0 = None
- 1 = Latching A2/Non-Latching A1 De-Energized
- 2 = Latching A2/Non-Latching A1 Energized
- 3 = Latching A2/Latching A1 De-Energized
- 4 = Latching A2/Latching A1 Energized
- 5 = Non-Latching A2/Non-Latching A1 De-Energized
- 6 = Non-Latching A2/Non-Latching A1 Energized
- 7 = Non-Latching A2/Latching A1 De-Energized
- 8 = Non-Latching A2/Latching A1 Energized
- 9* – Other Options

*NOTE: The *Other Options* has been provided to allow the customer to specify different Energized/De-Energized states for the A1 and A2 relays.

General Monitors
Models TA102/TA202

Spares & Accessories

TA202 - 3□□ - 1 0 0 -□□□

Specifies if the Fault Relay will activate when the CAL Door is opened:
- 1 = Fault relay does not activate
- 2 = Fault relay activates

Specifies if the Alarm relays will activate during an Auto Test:
- 1 = Alarm relays inhibited
- 2 = Alarm relays activated

Specifies the range of the Display:
- 1 = 0 to 99 ppm Display
- 2 = 0 to 50 ppm Display
- 3 = 0 to 20 ppm Display

Specifies the relay options:
- 0 = None
- 1 = Latching A2/Non-Latching A1, De-Energized
- 2 = Latching A2/Non-Latching A1, Energized
- 3 = Latching A2/Latching A1, De-Energized
- 4 = Latching A2/Latching A1, Energized
- 5 = Non-Latching A2/Non-Latching A1, De-Energized
- 6 = Non-Latching A2/Non-Latching A1, Energized
- 7 = Non-Latching A2/Latching A1, De-Energized
- 8 = Non-Latching A2/Latching A1, Energized
- 9* = Other Options

Specifies if the unit is to be ordered with or without relays:
- 1 = Without Relays
- 2 = With Relays

*NOTE: The *Other Options* has been provided to allow the customer to specify different Energized/De-Energized states for the A1 and A2 relays.

General Monitors
Models TA102/TA202

Spares & Accessories

FM002 - 3□□ - 0 0 0 - 0 0 0

Specifies the Energized/De-Energized relay state:
- 0 = None
- 1 = De-Energized
- 2 = Energized

Specifies if the unit is to be equipped with or without relays:
- 1 = Without relays
- 2 = With relays

RK002 - 0 0 0 - □1 7 - □□0

Specifies if modules are to be installed or not:
- 1 = Installed
- 2 = Not installed

Specifies if a Bezel is to be equipped on the rack:
- 1 = No
- 2 = Yes

Specifies the rack size:
- 1 = 4 Channel
- 2 = 8 Channel
- 3 = 16 Channel

General Monitors
Models TA102/TA202

Spares & Accessories

6-2 Accessories

Portable Purge Calibrators :

Gas	Complete Unit	Spare Bottle
Butadiene	1400150-BD	1400155-BD
Butane	1400150-B	1400155-B
Ethane	1400150-E	1400155-E
Hydrogen	1400150-H	1400155-H
Methane	1400150-M	1400155-M
Propane	1400150-PR	1400155-PR

Portable 3 liter Calibration Chamber:

Description	Part Number
Complete Unit	1400200
Motor Assembly	1400204
Grommet	1400206
Fan Blade	1400207
Carrying Strap	914-035
Dish	928-700
250 Micro-liter Syringe	928-715

Hydrogen Sulfide Ampoules:

Description	Part Number
100 ppm, each	50004-5
50 ppm, each	50004-13
25 ppm, each	50004-21
20 ppm, each	50004-9
10 ppm, each	50004-3
5 ppm, each	50004-11
100 ppm, Box of 12	50008-14
50 ppm, Box of 12	50008-9
25 ppm, Box of 12	50008-16
20 ppm, Box of 12	50008-15
10 ppm, Box of 12	50008-10
5 ppm, Box of 12	50008-17

Hydrogen Sulfide Ampoules (continued):

Description	Part Number
Box of 6 each, 20 & 50 ppm	50008-11
Box of 6 each, 10 & 25 ppm	50008-12
Box of 6 each, 5 & 10 ppm	50008-13
Box of 4 ea, 20, 50 & 100 ppm	50008-6
Box of 4 ea, 10, 25 & 50 ppm	50008-7
Box of 4 ea, 5, 10 & 20 ppm	50008-8

Hydrogen Sulfide Calibration Kits (with double breaker calibration bottle):

Description	Part Number
Double Breaker Bottle only	50020-1
With 6 each, 20 & 50 ppm	50023-1
With 6 each, 10 & 25 ppm	50023-2
With 6 each, 5 & 10 ppm	50023-3

Portable H2S Calibrator:

Description	Part Number
Model BP200	50070-1
Cylinder of Dry Air (size 3)	914-045
0-100ppm Permeation Tube	914-121
0-50ppm Permeation Tube	914-123
0-20ppm Permeation Tube	914-122

6-3 Spare Parts for One Year

Part #	Qty	Description
951-013	2	Mini Fuse, 1A 250V
951-200	1	Mini Fuse, 0.5A 250V
951-216	1	Mini Fuse, 63mA 250V