GENERAL MONITORS

Model IN042

Zero Two Series
Four Zone Input Module

Instruction Manual **04/04**

Part No.: MANIN042
Revision: G/04.04

Warranty Statement

General Monitors warrants the model IN042 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 the 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.

Warnings

- All Zero Two Series Modules 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.

- General Monitors has approved certain field devices for use with the Model IN042 (see Appendix E). Any attempt to use a device that has not been approved by General Monitors will void the warranty.

- The General Monitors Model IN42 was designed as an enhancement to the Model IN002; however the Model IN042 is not compatible with the Model IN002.

Safety Warning

Installation and maintenance must be carried out by suitably skilled and competent personnel only.

E C Declaration of Conformity in accordance with EC Directives

We at General Monitors Ireland Ltd., Ballybrit Business Park, Galway, Republic of Ireland, hereby declare that the equipment described below, both in its basic design and construction, and in the version or versions marketed by us, conforms to the relevant safety and health related requirements of the appropriate EC Directives, only as follows:

a) Conforms with the protection requirements of Council Directive 89/336/EEC, + Amd 92/31/68/EEC + Amd 93/68/EEC relating to Electromagnetic Compatibility, by the application of:

   A Technical Construction File No: GM 95005 and Competent Body Certificate No. 4473-95-106 and Report No. 4473/1K8

and

b) Conforms with protection requirements of IEC 1010-1 1990 + Amd 1: 1992 (+ Amd 2:1995 as applicable) relating to safety by the application of:

   A Technical Construction File No. GM 95005 and Competent Body Certificate No 4146/699L-6870, 4146/1119/9150 and 4146/1119/9507 issued by:

   ERA Technology Ltd. Cleeve Road, Leatherhead, Surrey KT22 7SB, England. Tel: +44 1372 367000

This declaration shall cease to be valid if modifications are made to the equipment without our approval.

PRODUCT: 02 series gas, flame and fire detection and monitoring cards
MODEL/S: 4802A, 2602A, TA102A, TA202A, TA402A, TA502A, IN042, ZN002A, MD002, FM002A and 02 series chassis.

It is ensured through internal measures and our ISO 9001: 1994 certifications, that series production units conform at all times to the requirements of these current EC Directives and relevant standards.

Responsible Person: _____ Date: 15-07-97

General Manager European Operations

The signatory acts on behalf of company management, and with full power of attorney.

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1.0 Introduction

This chapter provides a brief description of the Model IN042, its features and benefits and a partial list of applications. More detailed information on the features and benefits listed in Section 1.2 will be presented in later chapters.

1.1 General Description

The General Monitors Model IN042 (see figure 1) features four independent zone inputs; each monitoring two wire field devices. Field devices can be smoke detectors, manual call points, heat detectors, etc., which interface either directly with the IN042 or via a Safety Barrier. This module provides separate open collector outputs for Fault and Alarm conditions in each of the four zones. Additionally, the alarm output options are DIP switch selectable.

The Model IN042 is electrically and physically compatible with the other modules in the Zero Two Series.

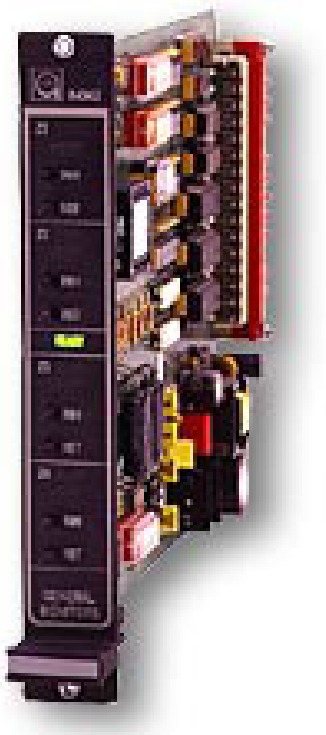


Figure 1 – Model IN042, Picture

1.2 Features and Benefits

- **Microprocessor Based Electronics** including Hardware and Software watchdogs
- **Detector** – Callpoint NO / Callpoint NC mode individually selectable
- **Safety Barrier / No Barrier** individually selectable
- **On-Board EOL** resistors selectable
- **Supply Voltage Low** monitoring
- **Low Supply Power Indication**: all front panel Fault LED's will illuminate when the input voltage drops below 20VDC.
- **Field loop monitoring** for open – and short – circuit
- **Inputs and Field loop protected** against open, short-to-ground, short-to-rail and reverse polarity
- **Outputs and Power Supply Input protected** against reverse polarity
- **Alarm LEDs** and corresponding outputs
- **Alarm Buss** output routing selectable
- **Alarm Unaccept Buss** and Unaccept output
- **Alarm Detection** immediate / 2 sec delayed response individually selectable
- **Alarm Function** latching / non-latching-following-accept individually selectable
- **Executive Alarm** outputs normally-on / normally-off individually selectable
- **Executive Alarm** and Alarm Buss outputs active / inactive during Cardtest selectable
- **Fault LED's**
- **Fault Buss** output
- **Fault Unaccept** output
- **Fault Function** latching / non-latching selectable
- **Individual Executive Fault** outputs/Common Executive Fault output selectable
- **Inhibit LEDs** and corresponding output(s)
- **Common Inhibit** output / individual inhibit outputs selectable
- **Inhibit switch and reset switch** per Zone
- **Card Test** and **LED Test**
- **Accept, Master Reset** and **Cardtest** inputs
- **Live Insertion / Removal** without damage to any of the system components

1.3 Applications

The General Monitors Model IN042 is designed to complement flame and gas detection systems and to provide increased flexibility by accepting inputs from a variety of field devices. The list below is a partial representation of suitable applications:

- Refineries
- Drilling platform and rigs
- Gas and oil production platforms
- Gas collection facilities
- Oil well logging operation
- LPG/LNG processing and storage
- Gas compressor stations
- Sewage and wastewater treatment facilities
- Chemical and petrochemical plants
- Mud logging operations
- Sulphur recovery plants
- Desulphurisation facilities
- Aircraft hangers and military installations

2.0 Specification

This chapter provides detailed specifications for the Model IN042 Four Zone Input Module. The system, mechanical, electrical and environmental specifications engineering specifications present the Model IN042 in technical terms. The engineering specifications provide written specifications that can be inserted into another written specification by architects and engineers.

2.1 Systems Specifications

Applications
Smoke or Heat Detection, Pull Switches and Call Points.

Detector Type:
Ionized chamber smoke & heat detectors. Optical smoke and heat detectors,
Normally open pull switches and call points.
Normally closed pull switches and call points.

Barrier Type:
Galvanic isolation or dual channel passive

Detectors per Channel:
The maximum number of detectors per channel varies with the detector type and barrier type. Use the table over page to cross reference with the barrier.

Approvals:
CSA certified

Warranty:
Two years

2.2 Mechanical Specifications

Height: 173mm (6.825”)
Width: 25mm (1.00”)
Length: 251mm (9.900”)
Weight: 318 grams (11.200 oz)

2.3 Electrical Specifications:

Supply Voltage Specifications:
+20.0 to + 35.0 VDC min/max
+24.0 VDC nom
+10.0 VDC abs min
The customer supplied PSU must comply with IEC 1010-1, limiting current to 8A under Fault conditions, in order to comply with CE Marketing requirements.

Supply Current Range:
0.5A max @ 18.0 VDC
0.3A max @ 35.0 VDC

Supply Noise + Ripple Voltage:
1.0 Vpp max

	No Barrier	MTL3043	MTL4061	MTL787	MTL87S	MTL788
Cerberus F905	40	29	35	39	39	39
Cerberus F906	65	47	56	62	62	62
Cerberus F910	65	47	56	62	62	62
Cerberus F911	65	47	56	62	62	62
Cerberus F915	40	29	35	39	39	39
Cerberus F922	80	57	69	76	76	76
Cerberus F925	22	16	19	21	21	21
Cerberus F915 w/Z91	20	14	17	19	19	19
Cerberus F915 w/Z94	20	14	17	19	19	19
Apollo Series 60	55	38	46	51	51	51

Supply Fault Detection Threshold Voltage:
+17.6 to + 19.1 VDC min / max

Open Collector Output Rating:
+35.0 VDC max
100 mA max
+2.0 Vsat max @ 100 mA

Field Loop Cable Parameters:
10 ohms max end-to-end

Field Loop End-of-line Resistor
5600 ohm + 5± % (Detector Mode)

Field Loop Quiescent Current:
2.0 mA max (Without EOL Resistor)
3.0 1.5 mA max (Without EOL Resistor for MTL 3043 Barrier)

Field Loop Quiescent Voltage:
+16.0 to + 24.0 VDC min / max (With EOL Resistor)
+27.0 VDC abs max. (Open Circuit)

Field Loop Reset Voltage:
+2.0 VDC abs max

Field Loop Externally Applied Voltage:
+35.0 vdc ABS MAX (both Terminals)

Field Loop Current Rating:
58.0mA abs max (Module Terminal Shorted)
78.0 mA abs max (Positive Terminal Shorted to Supply RTN)

Call Point NO Series Resistor:
390 to 820 ohm ± 5% (Detector Mode)

Call point NO series Zener Diode:

5.6 to 10.0 V ± 5%, 0.5 W (Detector Mode)

Call Point NC End-of-line Resistor:

390 to 5600 ohm ± 5% (Call point Mode)

Card Test, Mrbuss, ACCbuss Input Voltage

Rating:

1.0 VDC max (Activate)

2.0 3.5 VDC min (De-activate)

± 35.0 VDC abs max

Electrical Classifications:

The Model IN042 is designed for use in non-hazardous (safe) environments.

2.4 Environmental Specifications

Operating Temperature Range:

-18°C to +66°C (0°F to + 150°F)

Storage Temperature Range:

-40°C to +66°C (-40°F to + 150°F)

Operating Humidity Range:

5 to 100% maximum relative humidity (non-condensing)

EMC Susceptibility: (EN50082-2 : 1995)

10 V/m max.

2.5 Engineering Specifications

Zero Two System

Each system utilises modules capable of monitoring gas sensing elements or analogue signal from gas or flame detection transmitters. The system chassis is available in 4, 8 and 16 channels. Each chassis contains a buss for the following independent signals:

- A1 Alarm
- A2 Alarm
- Fault
- Master Accept
- Master Reset
- Unaccept
- Cal
- +24 VDC
- System Common

Module signals are capable of being bussed from one chassis to another so that up to 100 modules comprise a single system. The gas and flame detection modules are

electrically and physically compatible and capable of being used in the same chassis to form combined fire and gas detection systems. The system must be configured with Zero Two Series component modules manufactured by General Monitors (Lake Forest, California, USA and Galway, Republic of Ireland).

Four Zone Input Module

The Module IN042 Four Zone Input Module features four independent zone inputs, each monitoring two-wire field devices such as smoke or heat detectors, pull switches and call points.

Smoke detectors can be chamber ionization or optical types.

Each zone can be selected to interface with the field devices directly or via a Safety Barrier which must be of the dual-channel or Galvanic isolation type. On-board end-of-line resistors can be selected to terminate unused zones.

All zones have Alarm, Fault and Zone-inhibit LED indicators.

The module has individual open-collector outputs, which will mimic the status of the corresponding alarm LED indicators.

Further, the module has four open-collector outputs which can be selected to signal individual Fault conditions in each of the four input zones OR to signal the individual inhibit conditions in each of the four input zones and follow the status of the corresponding Inhibit LED indicators. In conjunction with these outputs, a fifth open-collector output is selected to act as a Common Inhibit OR Common Fault output.

Additionally the module has four programmable Alarm open-collector outputs corresponding to the four input zones, which can be selected individually to be of the normally on / off type.

Response to Alarm conditions can be programmed per individual zone as latching / non-latching-after-accept and/or immediate / 2 second-delayed; response to Fault conditions can be programmed as latching/non-latching for all four zones simultaneously.

Each zone has a momentary type Inhibit and Reset switch on the front panel. Activation of the Reset switch for a particular zone will also reset the Field Loop. A Master reset buss signal will reset all four zones and Field Loops simultaneously in a similar fashion.

The module features Live insertion / removal without damage to any of the Zero Two System components.

Other features include:

- LED test
- Module test input with programmable Alarm open-collector outputs
- Unaccept (buss) and Alarmbuss active / inactive selectable
- Power-fail indication, Unaccept and Fault-Unaccept open collector outputs
- Alarm Buss routing to A1 Buss or A2 Buss.

3.0 Installation

This chapter discusses what to do when the Model IN042 is received, how to install the module, what the terminal connections and their functions are and making the initial application of power.

Safety Warning
Installation and Maintenance must be carried out by suitably skilled and competent personnel only.

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 IN042 is completely checked by the factory. However, a complete check-out is necessary upon initial installation and start-up to ensure system integrity.

3.2 Module Installation

A rack or panel mounted chassis will be required when installing any Zero Two Series Module. These chassis should be mounted in a non-hazardous, weather protected location and should be subjected to minimal shock and vibration. The chassis must be connected to Safety Earth. 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 types 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. 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).

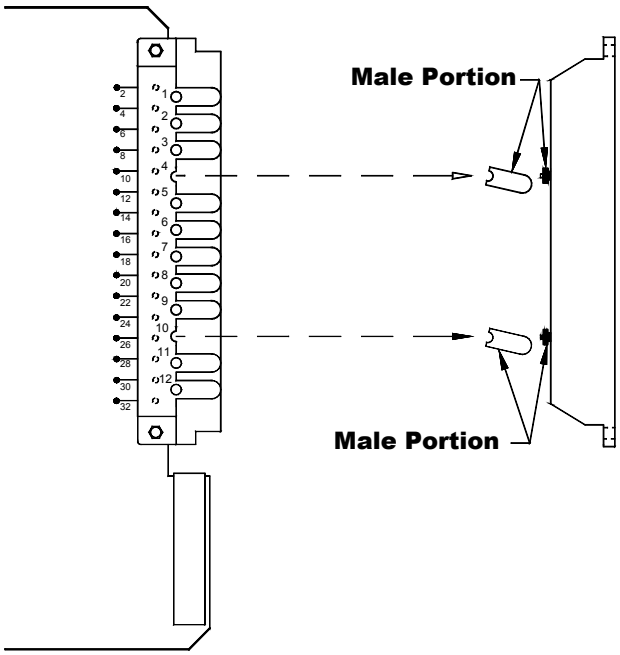


Figure 2 – Male Coding Strip

(not compatible with Model IN002)

Equipment is to be installed in Rack system or Cabinet meeting the fore enclosure requirements of IEC 1010-1.

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.

3.3 Rear Terminal Connections

All wire connections to the Model IN042 are made to the terminal block located at the rear of the chassis. The terminal block accepts 1.5mm^2 to 0.75mm^2 (16 to 22 AWG) stranded or solid core wire. 2.5mm^2 (14 AWG) wire may be used if it is stripped according to figure 3.

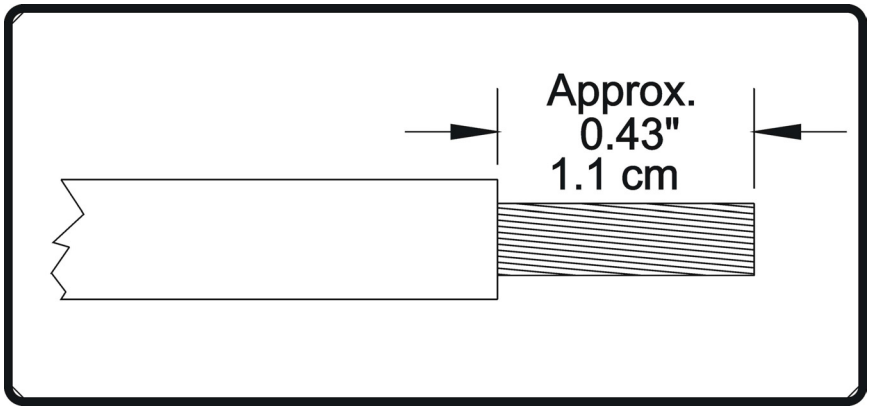


Figure 3 – Wire Strip Length

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 IN042, loosen the desired screw, insert the stripped end of the wire and tighten. Non screw-type connectors are available. (Alternative connector styles are available – consult the factory.)

For the rear terminal designations refer to figure 4 below:

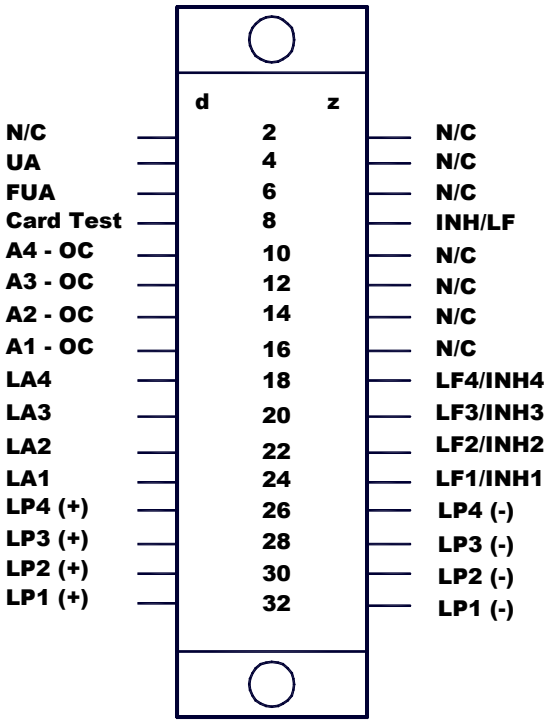


Figure 4 – Rear Terminal Connections

Signal Connections (field device)
Each zone accepts two wire inputs from the field device.
The terminal designations for these inputs are:

Designation	Term	Description
LP1 (+)	32d	Signal Input Zone 1
LP1 (-)	32z	Signal Return Zone 1
LP2 (+)	30d	Signal Input Zone 2
LP2 (-)	30z	Signal Return Zone 2
LP3 (+)	28d	Signal Input Zone 3
LP3 (-)	28z	Signal Return Zone 3
LP4 (+)	26d	Signal input Zone 4
LP4 (-)	26z	Signal Return Zone 4

Figure 5 is in block diagram of field device connections to Zone 1 of the IN042 Module.

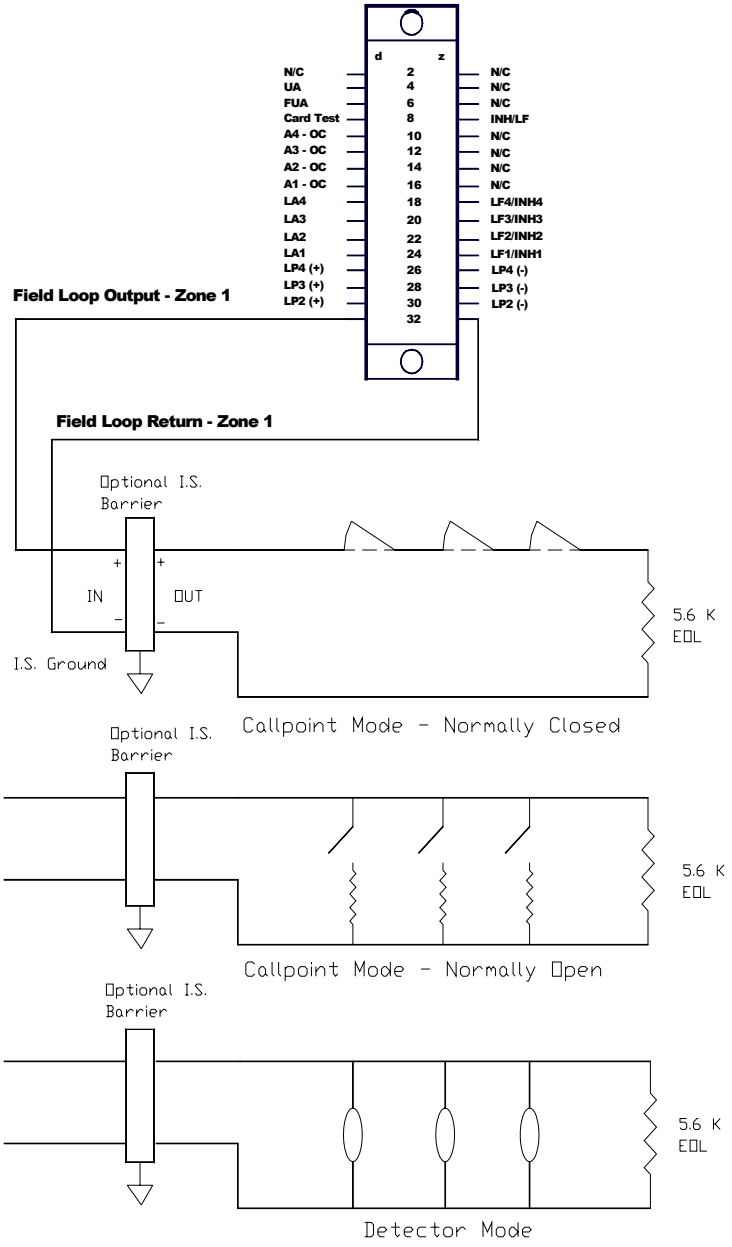


Figure 5- Field Device Connections

Alarm Outputs

Each zone provides an alarm open collector output and an additional open collector output that mimics the logic of the front panel LED. The terminal designations for these outputs are:

Designation	Term	Description
A1-OC	16d	Zone 1 Alarm OC
LA1	24d	Alarm LED Zone 1 OC Mimic
A2-OC	14d	Zone 2 Alarm OC
LA2	22d	Alarm LED Zone 2 OC Mimic
A3-OC	12d	Zone 3 Alarm OC
LA3	20d	Alarm LED Zone 3 OC Mimic
A4-OC	10d	Zone 4 Alarm OC
LA4	18d	Alarm LED Zone 4 OC Mimic

Fault Outputs (see Inhibit Outputs)
Each zone provides a fault open collector output. If these discrete outputs are not used, a common Fault open Collector output is available on Pin 8z. The terminal designations for the Fault outputs are:

Designation	Term	Description
LF	8z	Common Fault OC
LF1	24z	Fault Led Zone 1 OC
LF2	22z	Fault LED Zone 2 OC
LF3	20z	Fault LED Zone 3 OC
LF4	18z	Fault LED Zone 4 OC

Inhibit Outputs (see Fault Outputs)
Each zone provides an optional inhibit open collector output. If these discrete outputs are not used, a common inhibit open collector is available on pin 8z.

The terminal designations for the Inhibit outputs are:

Designation	Term	Description
INH	8z	Common inhibit OC
INH1	24z	Discrete Inh. Zone 1 OC
INH2	22z	Discrete Inh. Zone 2 OC
INH3	20z	Discrete Inh. Zone 3 OC
INH4	18z	Discrete Inh. Zone 4 OC

The Fault Inhibit outputs are DIP switch selectable.
The two configurations that are available are:

- Discrete Fault and Common Inhibit
- Common Fault and Discrete Inhibit

Unaccept Outputs
There are two unaccept open collector outputs. The first (UA) is dedicated to new alarm conditions and the second (FUA) is dedicated to new Fault conditions. The terminal designations for these outputs are:

Designation	Term	Description
UA	4d	Alarm Unaccept OC
FUA	6d	Fault Unaccepted OC

All of the open collector outputs on the Model IN042 have an electrical rating of 100mA @ 35VDC. Figure 6 illustrates some typical open collector external circuits.

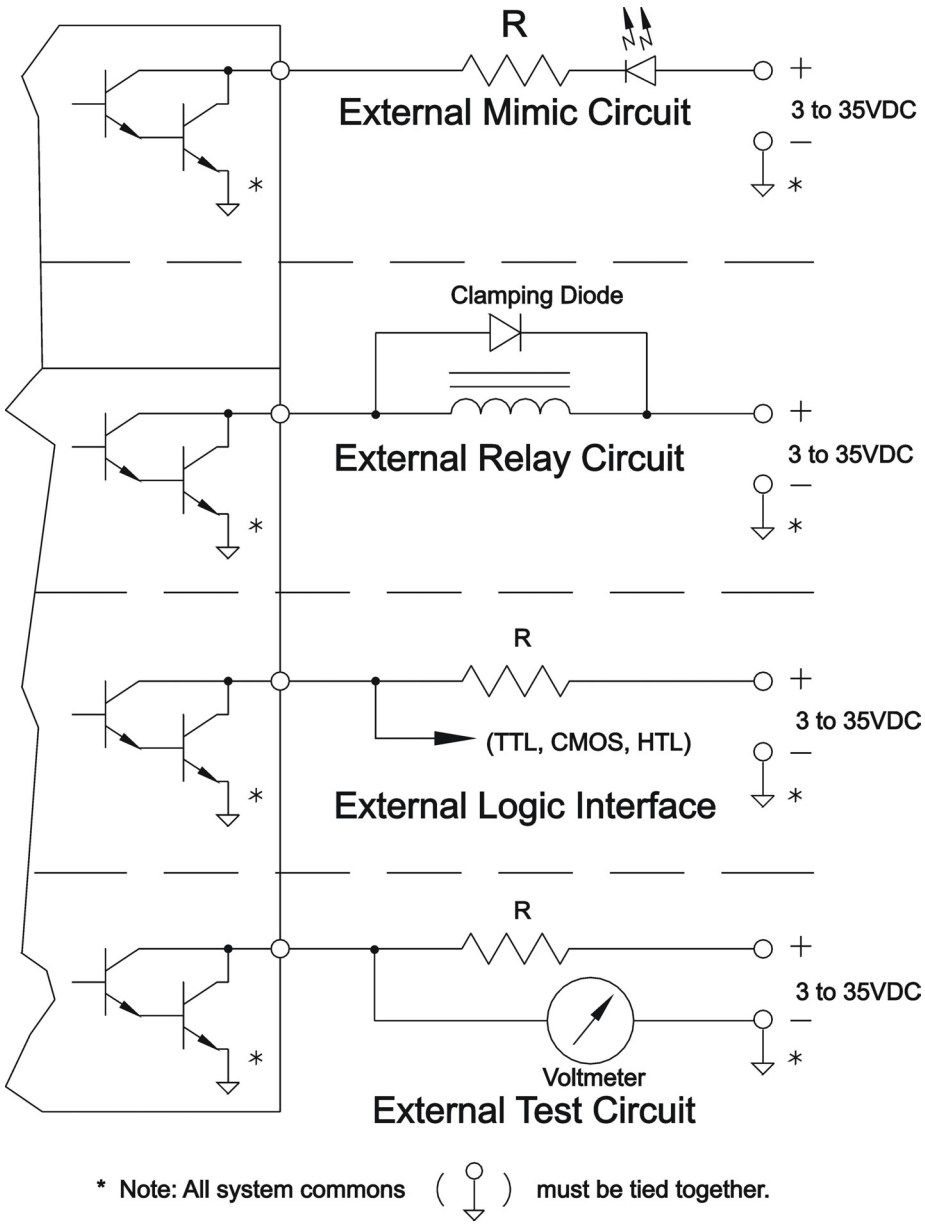


Figure 6 – Typical External Circuits for Open Collector

Card Test Input
There is an input that is dedicated to the Card Test. The terminal designation for this input is:

Designation	Term	Description
Cardtest	8d	Card test connection

Figure 7 is a block diagram of the Card Test connection.

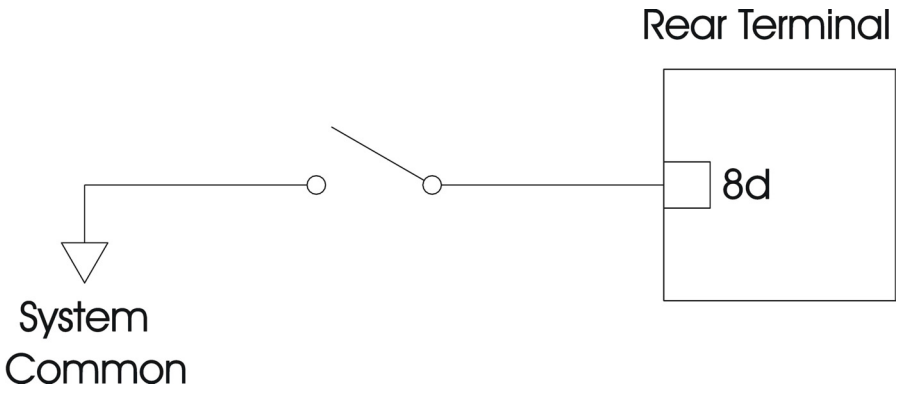


Figure 7 – CardTest External Wiring

Other Designation
These designations are designed for future use:

Designation	Term	Description
NC	2d	No Connection
NC	2z	No Connection
NC	4z	No Connection
NC	6z	No Connection
NC	10z	No Connection
NC	12z	No Connection
NC	14z	No Connection
NC	16z	No Connection

3.4 Switch Selectable Options

DIP Switches have been provided to allow the operator to select or change options that affect certain functions on the module. There are four DIP switches on the Model IN042; 3 eight position and 1 four position.

The DIP switches may have either a number corresponding to the position printed on the opposite edge of the switch that is labeled OPEN or where applicable, has its numbers printed on the switch positions of the DIP switch. When a switch position is down on the OPEN side, the state of that position is open, and where applicable, the numbered side of the switch positions is the open side.

Switch SW9 is an eight-position DIP switch that allows the operator to select the time delay and latching or non-latching alarm options (see table below)

Switch SW9 Options

#	State	Function
1	Open	Zone 1 – No time delay
	Closed	Zone 1 – 2 second time delay
2	Open	Zone 2 – No time delay
	Closed	Zone 2 – 2 second time delay
3	Open	Zone 3 – No time delay
	Closed	Zone 3 – 2 second time delay
4	Open	Zone 4 – No time delay
	Closed	Zone 4 – 2 second time delay
5	Open	Zone 1 – Alarm non-latching following accept
	Closed	Zone 1 – Alarm latching
6	Open	Zone 2 – Alarm non-latching following accept
	Closed	Zone 2 – Alarm latching
7	Open	Zone 3 – Alarm non-latching following accept
	Closed	Zone 3 – Alarm latching
8	Open	Zone 4 – Alarm non-latching following accept
	Closed	Zone 4 – Alarm latching

Switch SW10 is an eight position DIP switch that allows the operator to select the normally energized (ON) or de-energised (OFF) option for the alarm outputs and the zone input type, detector or call point, normally open or closed (see table below).

Switch SW10 Options

#	State	Function
1	Open	A1 – OC, Normally de-energised
	Closed	A1 – OC, Normally energised
2	Open	A2 – OC, Normally de-energised
	Closed	A2 – OC, Normally energised
3	Open	A3 – OC, Normally de-energised
	Closed	A3 – OC, Normally energised
4	Open	A4 – OC, Normally de-energised
	Closed	A4 – OC, Normally energised
5	Open	Zone 1 – Detector Callpoint NO
	Closed	Zone 1 - Callpoint NC
6	Open	Zone 2 – Detector Callpoint NO
	Closed	Zone 2 - Callpoint NC
7	Open	Zone 3 – Detector Callpoint NO
	Closed	Zone 3 - Callpoint NC
8	Open	Zone 4 – Detector Callpoint NO
	Closed	Zone 4 - Callpoint NC

Switch SW11 is a four-position DIP switch that allows the operator to specify the following options (see table below):

- Fault latching/Non-latching (all zones)
- Alarm Routing to the A1 Buss or A2 Buss
- Discrete/Common Fault & Inhibit Outputs
- Alarm outputs UA (BUSS), A1/A2 BUSS, A(1-4)- OC, Enabled/Disabled for Card Test

Switch SW11 Options

#	State	Function
1	Open	Latching Fault Outputs
	Closed	Non-latching Fault Outputs
2	Open	Alarms on A1Buss
	Closed	Alarms on A2Buss
3	Open	Discrete Fault/Common Inhibit
	Closed	Common Fault/ Discrete Inhibit
4	Open	Card Test – Alarms Disabled
	Closed	Card Test – Alarms Enabled

Switch SW12 is an eight position DIP switch that allows the operator to select the safety barrier option and the on-board end of line resistor (see table below).

Switch SW12 Options

#	State	Function
1	Open	Zone 1 – No Safety Barrier
	Closed	Zone 1 – Safety Barrier
2	Open	Zone 2 – No Safety Barrier
	Closed	Zone 2 – Safety Barrier
3	Open	Zone 3 – No Safety Barrier
	Closed	Zone 3 – Safety Barrier
4	Open	Zone 4 – No Safety Barrier
	Closed	Zone 4 – Safety Barrier
5	Open	Zone 1 – EOL Resistor Disabled
	Closed	Zone 1 – EOL Resistor Enabled
6	Open	Zone 2 – EOL Resistor Disabled
	Closed	Zone 2 – EOL Resistor Enabled
7	Open	Zone 3 – EOL Resistor Disabled
	Closed	Zone 3 – EOL Resistor Enabled
8	Open	Zone 4 – EOL Resistor Disabled
	Closed	Zone 4 – EOL Resistor Enabled

3.5 Applying Power

Zero Two Series Modules do not have an ON/OFF switch. Each module in the Zero Two Series operates from 24VDC. The 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. Figure 8 indicates where the power connections for the chassis are made.

Note: If the application of power does not turn the unit **ON**, check fuse F1 on the IN042.

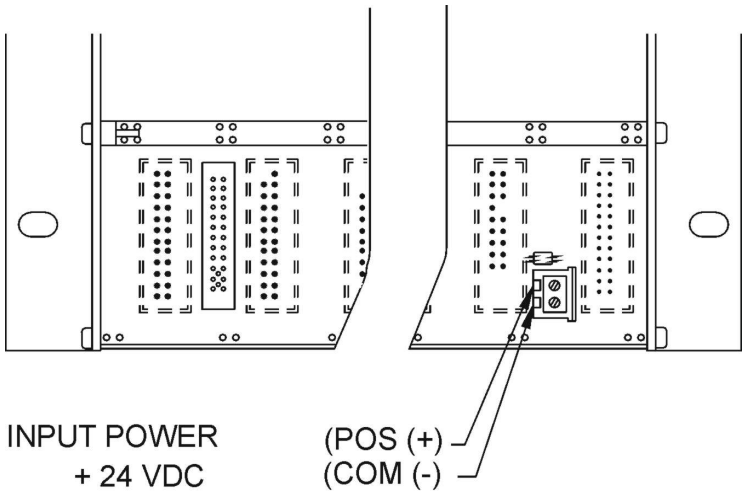


Figure 8 – Power Connections – Rear Chassis

3.6 Cable Parameters

General Monitors recommend screened and armoured cable to BS5308 or equivalent. Maximum cable lengths are as follows:

mm2	metres	AWG	Feet
2.5	1388	14	3533
1.5	833	16	2240
1.0	555	18	1748
0.75	416	20	1129
0.25	138	24	437

Field loop cable resistance of 10 ohms maximum, end to end. Field loop end of line (EOL) resistor (Detector mode) 5600 ohms ± 5%.

3.7 Interconnecting cable Guidelines

The interconnecting cable should have an overall screen or screen and armour. Cables to BS5308 or equivalent are suitable. Note that the terms “screen” and “shield” are equivalent for the purposes of this manual.

Interconnecting cables should be segregated from power and other “noisy cables”. Avoid proximity to cables associated with radio transmitters, welders, switch mode power supplies, inverters, battery chargers, ignition systems, generators, switchgear, arc lights and other high frequency or high power switching process equipment. In general, maintain a separation of at least 1m between instrument and other cables. Greater separations are required where long parallel cable runs are unavoidable. Avoid running instrument cable trenches close to lightning conductor earthing pits.

General Monitors do not recommend the use of cable shoes or crimps on any junction box or housing wiring terminals. Poor crimping can cause bad connection when unit experiences temperature variations. We therefore recommend good practice is to just terminate cable or sensor wires as is, especially in remote sensor applications.

Complete all cable insulation testing **before** connecting the cable at either end.

4.0 Operation

This chapter discusses general maintenance, refers to the electrical inputs, describes the electrical outputs, accepting and resetting alarms and fault diagnostics.

Safety Warning
Installation and Maintenance must be carried out by suitably skilled and competent personnel only.

4.1 General Maintenance

- Once the Model IN042 has been installed, no maintenance, other than periodic checks to verify the integrity of the system, is required.
- The user should evaluate conditions in the field and determine how often 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 on stand-by systems or back up power for the prescribed period.
- The power, field device and output wiring should be checked for tightness, verifying that all of the components and devices are connected correctly.
- Periodic checks of the DIP switch setting should be performed to ensure that the module has not been tampered with.

4.2 General

Each of the four zones ensures the Field Loop voltage does not exceed Minimum and Maximum quiescent Detector Operating Voltage.

Under open-circuit Field Loop conditions the loop voltage is clamped to guarantee the Maximum rated Detector Voltage is not exceeded.

The Field Loop current is limited under all Alarm and Fault conditions.

All open-collector outputs are protected against negative voltages. Outboard relays driven by these outputs must have clamp diodes fitted.

All inputs are protected against over-voltage.

The card is protected from reversed power supply connections by a series diode.

4.3 Alarm LEDs and Outputs

Each zone has a red Alarm LED indicator on the front panel and a corresponding open-collector Alarm output (LA), showing the Alarm status of the zone. Each open collector output follows the LED status, e.g. LED on-output on, LED off-output off.
Further, each zone has a programmable open-collector Alarm output (A-OC) which can be set individually as normally-on / normally-off.
A programming features selects the response to Alarm for each zone individually as latching / non-latching-after-accept and/or immediate / sec delayed.

4.4 Fault LEDs and Outputs

Each zone has a yellow LED Fault indicator on the front panel. Four open-collector outputs can be selected to act as individual Fault outputs (LF/INH), each showing the Fault status of the corresponding zone. The open collector outputs are normally-on.
Alternatively, a single open-collector output can be selected to act as a common Fault output (INH/LF), showing the Fault status of all four zones, e.g. any number of zones in Fault – output active. The open-collector output is normally-on.
This selection is combined with the individual / common Inhibit output selection, e.g. individual Fault + common Inhibit or individual Inhibit + common Fault.
The response to Fault is programmable via a single DIP switch to be latching or non-latching for all four zones simultaneously independent of individual or common Fault output selection.
The following Faults can be detected per zone:
Detector and Callpoint NO mode:
Open circuit in the detector loop
Short across the end-of-Line resistor
Positive or Negative line Short-to-ground
Negative line Short-to-power supply

Callpoint NC Mode:

Short across the end-of-Line resistor
Negative line Short-to-power supply

4.5 Accept and Master Reset Inputs, Unaccept, Alarm & TFAULT Outputs

The module features two-open-collector Alarm Unaccept outputs (UA and UABUSS), two open-collector Alarm outputs (A1BUSS and A2BUSS), one open-collector Fault Unaccept output (FUA) and a Tfault output (TFBUSS) output.

UABUSS, A1BUSS, A2BUSS & TFBUSS outputs connect to the Facilities Module via the zero Two Series Buss; the remaining UA and FUA outputs are general purpose open-collector outputs.

The Alarm function can be selected via a DIP switch to connect to A1BUSS or A2BUSS; for the purpose of the following discussion and functional sequence diagrams, this signal has been denoted as A-BUSS.

The Fault function can be selected via a DIP switch to be routed to four individual open-collector outputs (LF/INH) or a common open-collector output (INH/LF). In case the common output (NH/LF) is used, “new Faults” (Fault Unaccepted output activated) have priority over already accepted “old Faults” (Faults Unaccepted output deactivated). For the purpose pf the following discussion and functional sequence diagrams the selection is assumed to be for individual Fault outputs (LF/INH).

The module also features an Accept input (ACCBUSS) and a master Reset input (MRBUS), which connect to the facilities Module via the Zero Two Series Buss.

4.6 Alarm Detection

With a zone programmed as non-latching-after-accept and immediate, detection of an Alarm condition in that zone sets the UA, UABUSS and A-BUSS outputs. The Alarm LED and corresponding LA output activate / deactivate at a 2 Hz rate (LED flashing) and the A-OC output activates steady-state.
Depressing the “Accept” push-button on the facilities Module resets the UA and UABUSS outputs. As long as the Alarm condition remains in existence the Alarm LED, corresponding LA output and A-OC output activate steady-state (LED on), the A-BUSS output remains set, but no further action is taken by the module until the Alarm condition ceases to exist, causing the Alarm LED, corresponding LA output and A-OC output to return to their de-activated state and the A-Buss output to reset. Subsequent Alarm conditions are treated as a “New” Alarm.
Depressing the “Master Reset” push-button on the Facilities Module or the “reset” push-button on the corresponding LA output and A-OC output to their deactivated state and reset the A-BUSS output, regardless of the Alarm condition. Following “Reset” the module treats a remaining Alarm condition in that zone as a “new” Alarm. “Resetting” the module before “Accepting” has no effect.

Figure 9 shows the functional sequences.
Programming a zone as non-latching-after-accept and 2 sec delayed results in an identical response from the LEDs and outputs but now the module will not detect an Alarm until an Alarm conditions has been present for a minimum 2 seconds. The delay ensures that spurious Alarm conditions are ignored.

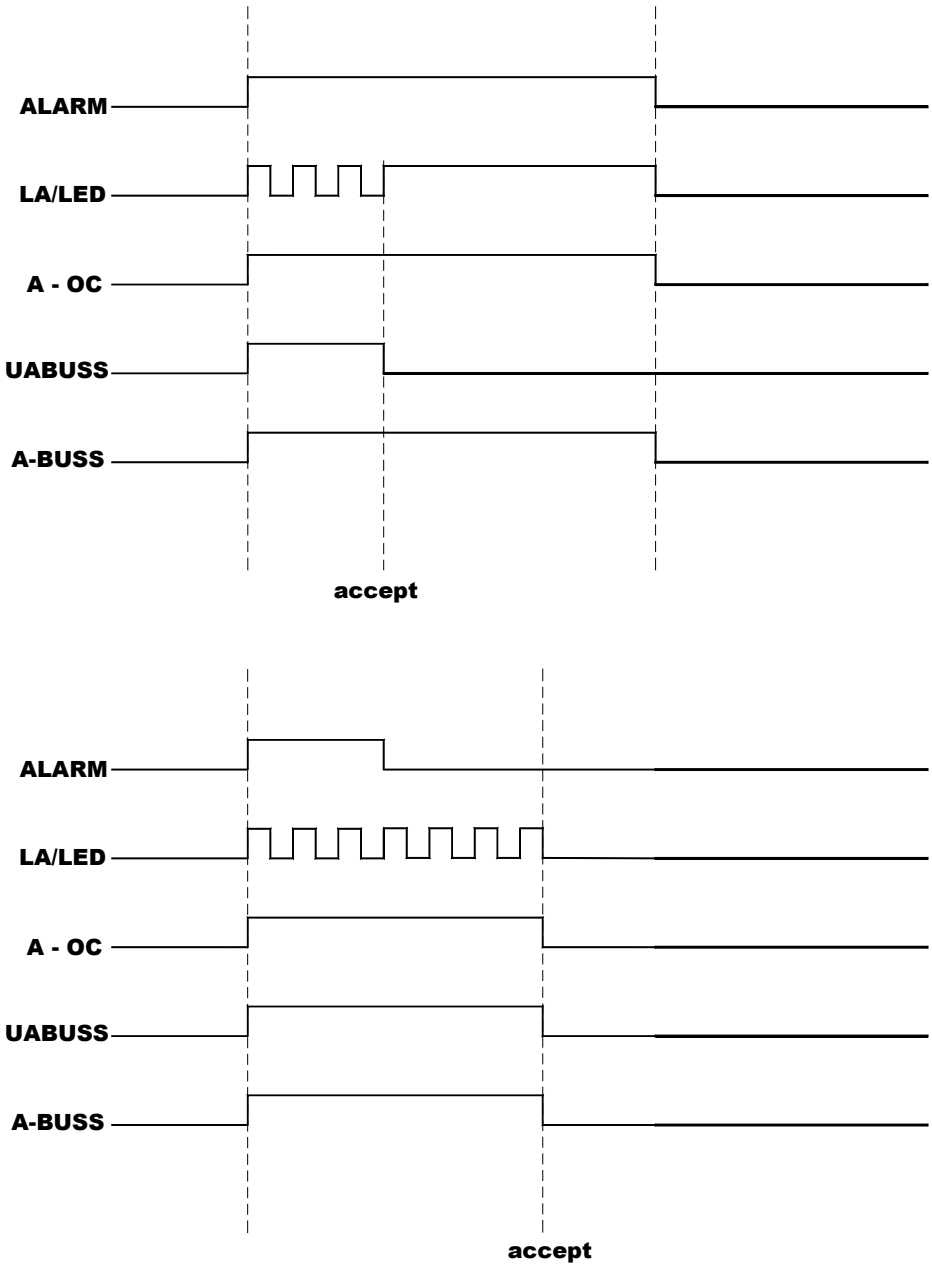


Figure 9 – Alarm non-latching-after-accept sequence

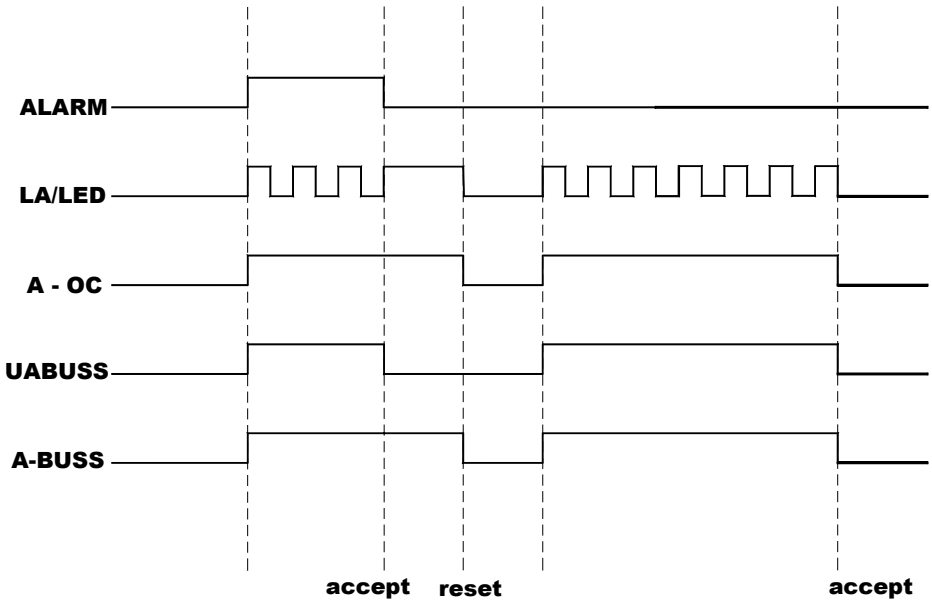


Figure 9 – Alarm non-latching-after-accept sequence

With a zone programmed as latching and immediate, detection of an Alarm condition in that zone sets the UA, UABUSS and A-BUSS outputs. The alarm LED and corresponding LA output activate / de-activate at a 2 Hz rate (LED flashing) and the A-OC output activates steady-state.
Depressing the “Accept” push-button on the Facilities Module resets the UA and UABUSS outputs, the A-BUSS outputs remains set, and causes the Alarm LED and corresponding LA output to activate steady-state (LED on) and the A-OC output to remain activated steady-state.
Depressing the “Master Reset” push-button on the Facilities Module or the “Reset” push-button on the module front panel resets the A-BUSS output and returns the Alarm LED, corresponding LA output and A-OC output to their de-activated state. Following “Reset” the module treats a remaining Alarm condition in that zone as a “new” Alarm. Resetting the module before “Accepting” has no effect. Removal of the Alarm condition after detection has no effect on the functionality of the LED and outputs or the “Accept” and “Reset” sequence, i.e. the Alarm condition has been latched until accepted and reset.

Figure 10 shows the functional sequences.
Programming a zone as latching and 2 sec delayed results in an identical response from the LEDs and outputs but now the module will not detect an Alarm until an Alarm condition has been present for a minimum of 2 seconds. The delays ensure that spurious Alarm conditions are ignored.

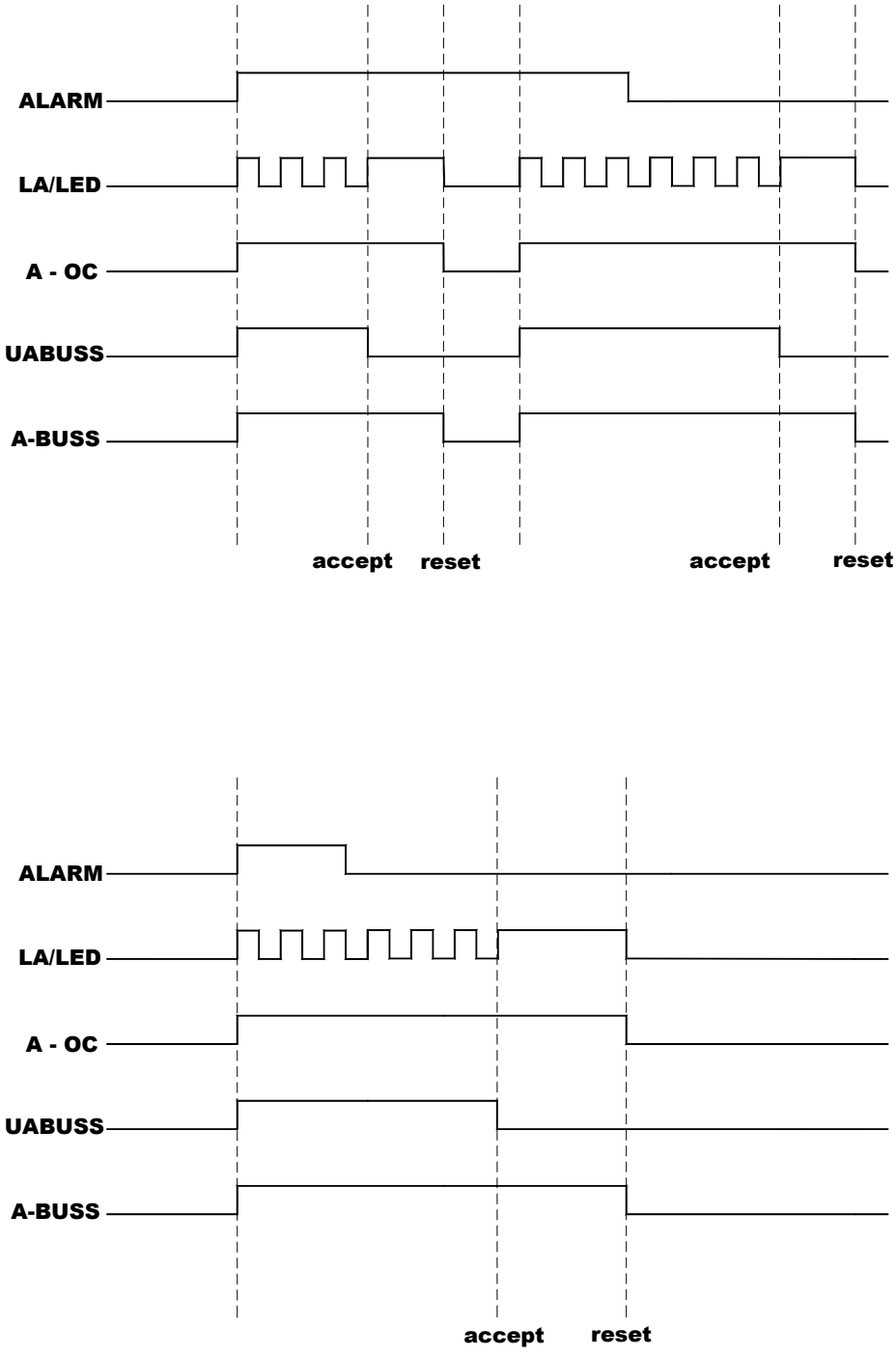


Figure 11 – Alarm latching sequence

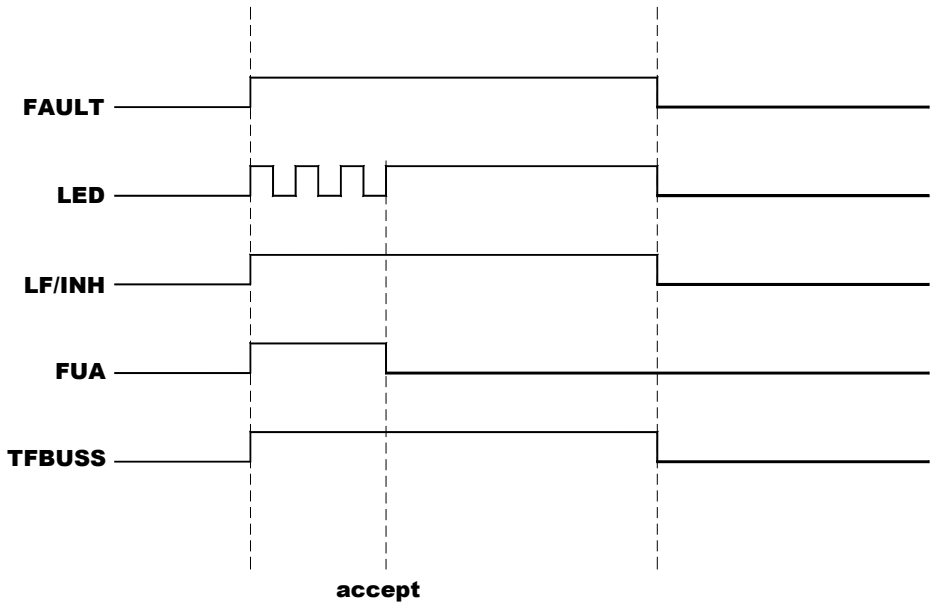
4.7 Fault Detection

Fault latching / non-latching functionally is selectable by a DIP switch, controlling all four zones simultaneously.

With Fault functionally programmed as non-latching, upon detection of a Fault condition a zone activates the LF/INH output (LF/LNH off) and sets the FUA and TFBUSS outputs. The Fault LED activates / de-activates at a Hz rate (LED flashing). No further action is taken by the module until the Fault condition ceases to exist, causing the Fault LED and LF/INH output to return to their de-activated state (LED off-LF/IHN on) and the FUA and TFBUSS outputs to reset. Subsequent Fault conditions are treated as a “new” Fault.

Depressing the “Master Reset” push-button on the Facilities Module or the “Reset” push-button on the Facilities Module or the “Reset” push-button on the module front panel returns the Fault LED and LF/INH output to their de-activated state and resets the TFBUSS output, regardless of the Fault condition. Following “Reset” the module treats a remaining Fault condition in that zone as a “new” Fault. “Resetting” the module before “Accepting” has no effect.

Figure 11 shows the functional sequences



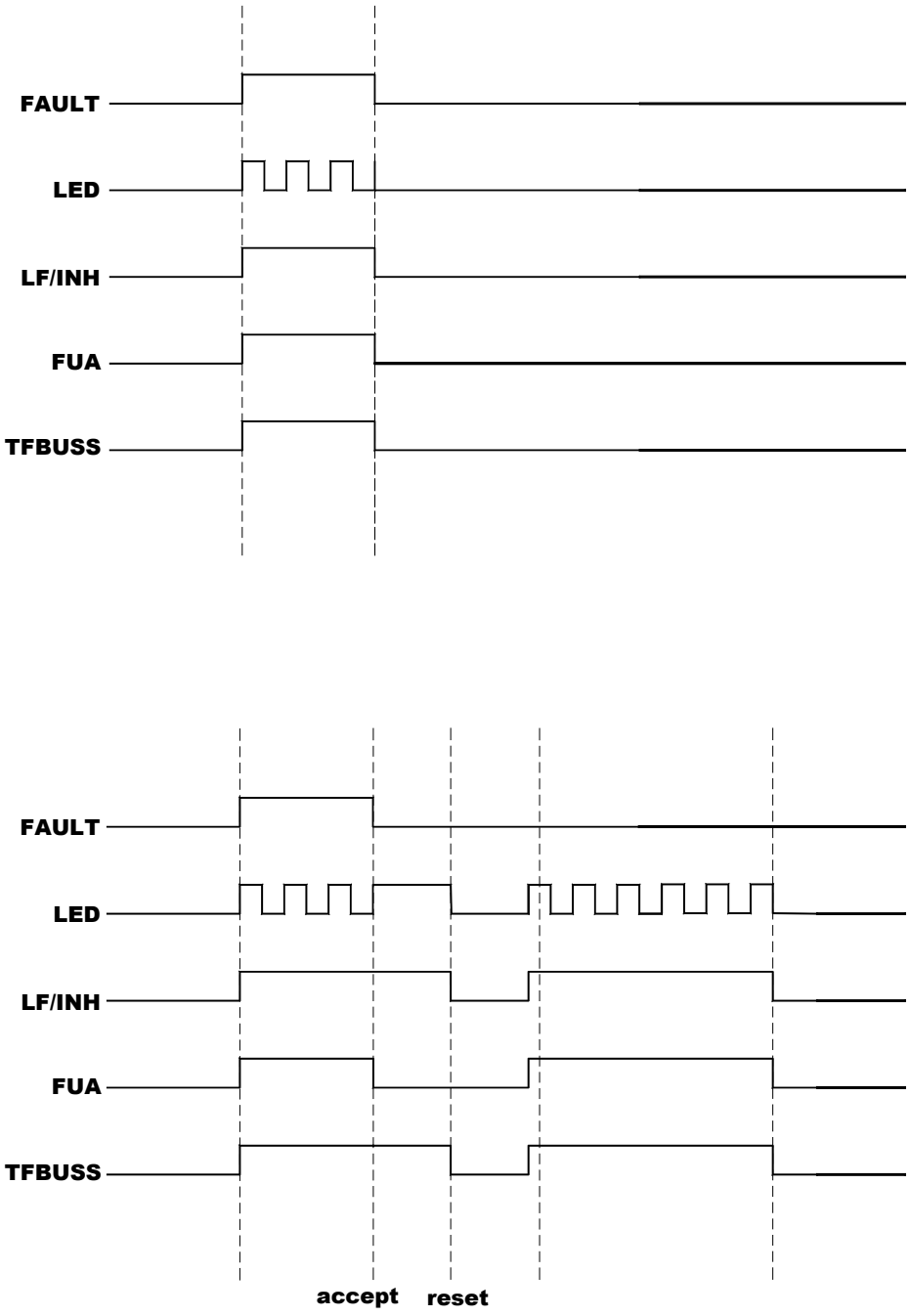


Figure 10 - Fault non-latching sequence

With Fault functionally programmed as latching, detection of a Fault condition in a zone activates the LF/INH output (LF/INH off) and sets the FUA and TFBUSS outputs. The Fault LED actives / de-activates at a 2 Hz rate (LED flashing).

Depressing the “Accept” push-button on the Facilities Module resets the FUA output. The Fault LED activates steady-state (LED on), the LF/IHN output remains activated (LF/IHN off) and the TFBUSS output remains set.

Depressing the “Master Reset” push-button on the Facilities Module or the “Reset” push-button on the module front panel returns the Fault LED and LF/INH output to their de-activated state and resets the TFBUSS output, regardless of the Fault condition. Following “Reset” the module treats a remaining Fault condition in that zone as a “new” Fault. “Resetting” the module before “Accepting” has no effect. Removal of the Fault condition after detection has no effect on the functionality of the LED and outputs or the “Accept” and “Reset” sequence, i.e. The Fault condition has been latched until accepted and reset.

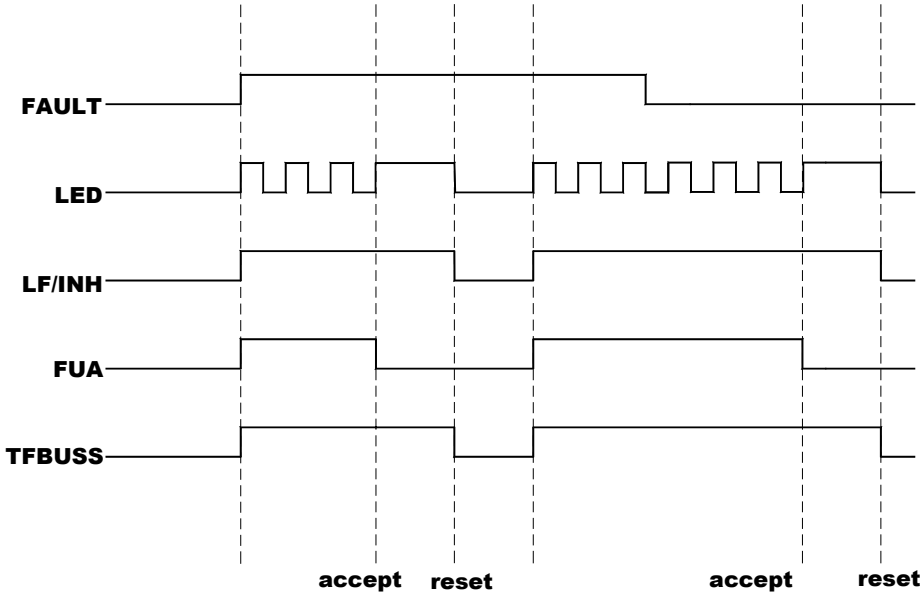


Figure 12 - Fault Latching sequence

4.8 Front Panel Inhibit Switches and Inhibit Output

Each zone has a momentary type Inhibit push-button with a corresponding Inhibit LED indicator on the front panel.

A single open-collector output can be selected to act as a common Inhibit (INH/LF). The Inhibit output follows the status of the inhibit LEDs, e.g. any LED on INH/LF output on, all LEDs off-INH/LF output off.

Alternatively, four open-collector outputs can be selected to act as individual Inhibit (INH/LF) outputs each showing the Inhibit status of the corresponding zone. The Inhibit outputs follow the status of the Inhibit LEDs, i.e. LED on - INH/LF output off.

This selection is combined with the individual/common Fault selection, e.g. Individual Fault + common Inhibit OR individual Inhibit + common Fault.

Depressing the Inhibit push-button for a minimum of 1 second causes the zone to enter Inhibit mode. The inhibit LED will be on and Inhibit output activated. The Field Loop is not affected.

The Inhibit function affects the UA, UABUSS, A-BUSS, FUA, TFBUSS, A-OC and LF outputs only. The corresponding signals are suppressed and as a result the outputs kept in a reset or de-activated state for the duration of the Inhibit mode. Alarm and Fault LEDs, LA outputs, “Accept” and “Reset” are functionally unaffected in Inhibit mode i.e. Alarms and Faults can be detected, accepted and reset as normal.

Depressing the Inhibit push-button a second time for a minimum of 1 second causes the zone to exit the Inhibit mode. The Inhibit LED will extinguish and INH/LF output de-activate. The common Inhibit output will de-activate only if no other zones in Inhibit mode. UA, UABUSS, A-BUSS, FUA, TFBUSS, A-OC and LF outputs are regenerated corresponding to the state of the zone displayed by the Alarm and Fault LED indicators at the time of exit and the latching / non-latching for that zone.

4.9 Front Panel Reset Switches

Each zone has a momentary type Reset push-button on the front panel.

Depressing the Reset push-button causes the Field Loop to reset and the voltage to the field devices connected to that zone to drop below a maximum of 2.0 VDC for a minimum of 2 seconds, allowing the devices to reset. The Alarm and Fault LEDs and open-collector (BUSS) outputs respond as outlined in the relevant section. Subsequent Alarm and Fault occurrences are ignored for a maximum of 1 second following re-application of the voltage to the field devices, allowing a setting time for the detectors and barriers.

4.10 Master Reset Input and LED Test

The Module features a Master reset input (MRBUSS), which connects to the Facilities Module via the Zero Two Series System BUSS.

Depressing the Reset push-button on the Facilities Module for a maximum of 1.5 seconds causes the Field Loops in all four zones to reset simultaneously and the voltage to the field devices to drop below a maximum of 2.0 VDC for a minimum of 2 seconds, allowing the devices to reset. The Alarm and Fault LEDs and open-collector (BUSS) outputs respond as outlined in the relevant section. Subsequent Alarm and Fault occurrences are ignored for a maximum of 1 second following re-application of the voltage to the field devices, allowing a settling time for the detectors and barriers.

Depressing the Facilities Module Reset push-button for a minimum of 2 second causes the module to enter LED test, all front panel LEDs to illuminate simultaneously and the LA outputs to activate for as long as the Reset push-button is held depressed. All other outputs are unaffected. LED test is unavailable during an Alarm condition in any of the four zones, during a power-fault and during Card Test. An Alarm detected during LED test will terminate the test.

4.11 Card Test Input

The module features a Card Test input, which when activated, causes all Alarm LEDs and the corresponding LA outputs to activate / de-activate at a 2Hz rate. A-OC outputs, maintaining their normally-on / normally-off polarity, UA (BUSS) and A-BUSS may be selected via a DIP switch to remain inactive or active steady. All other outputs remain in their previous state.

The Card Test continues for as long as the input is activated. Upon re-activation the Alarm, LEDs and outputs will return to their previous state. Card Test is unavailable while any number of zones is in Inhibit, during an Alarm condition in any of the four zones and during power-fault. An Alarm detected during Card Test will terminate the test.

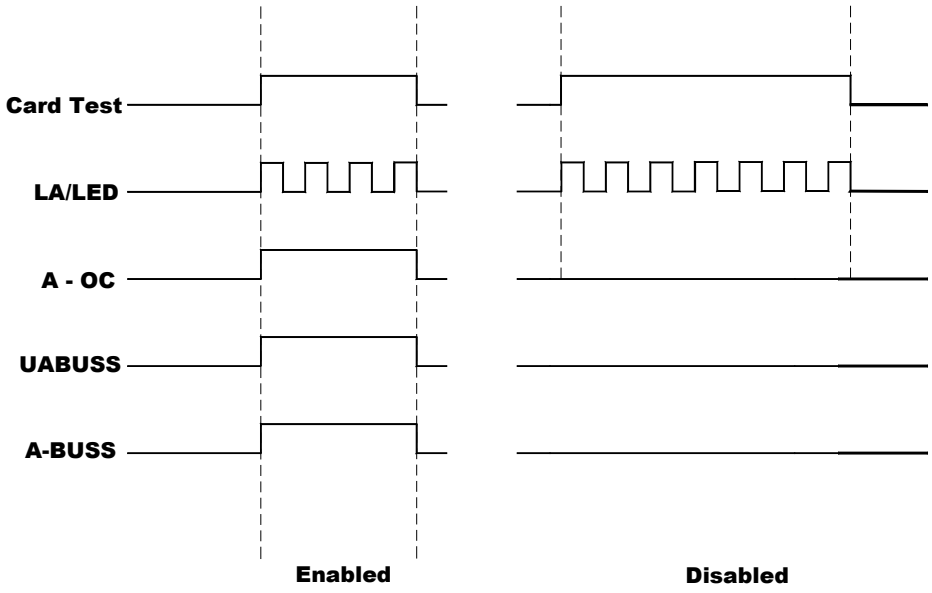


Figure 13 - Card Test sequence

4.12 Power Input, Power Fault, Hardware Watch-dog and Ready LED

A green Ready LED on the front panel indicates the Module is powered-up.

The Module monitors the supply voltage and indicates a non-latching-and-auto-accept Power Fault when the supply voltage goes below threshold, by activating all four Fault LEDs and the LF outputs simultaneously and sets TFBUSS. The ready LED extinguishes. All other outputs remain in their previous state. The Inhibit function does not affect the LF and TFBUSS outputs when activated by a Power Fault.

Following supply voltage recovery, the module restores the LEDs, LF outputs and resets TFBUSS after a 2 second delay, to prevent output jitter resulting from the 100/120 Hz ripple voltage super-imposed on the DC outputs of unregulated supplies.

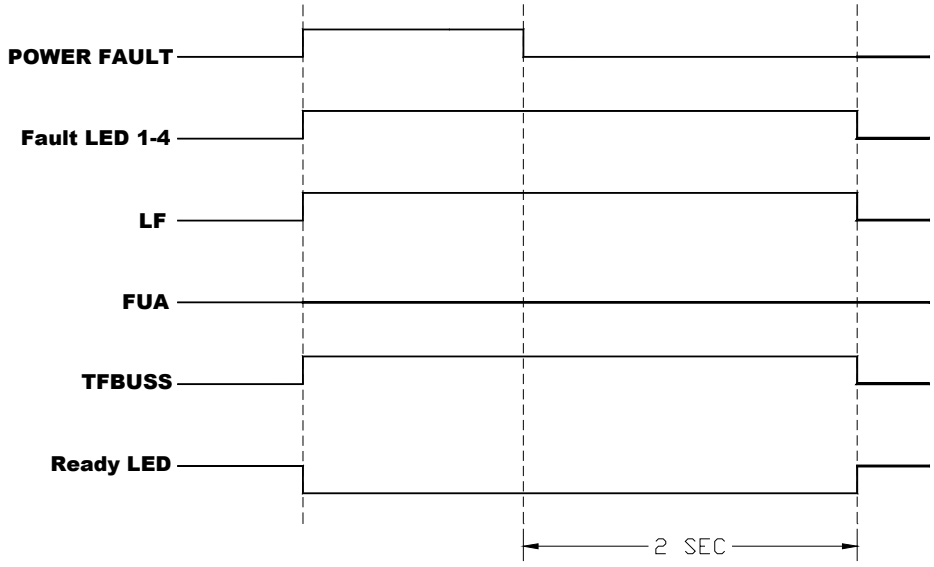


Figure 14 - Fault non-latching-auto-accept sequence

If the microprocessor fails to reset the hardware watch-dog timer within 1.6 seconds at any time during normal operation, a HW override activates all four Fault LEDs, the LF outputs and TFBUSS. The Ready LED will extinguish, while the INH and A2BUSS outputs de-activate. The state of the other outputs is NOT guaranteed following a hardware watch-dog-time-out.

5.0 Field Devices

This chapter lists the field devices and safety barriers recommended for use with the Module IN042.

5.1 Detectors

The following Detectors are recommended for use with Model IN042. The use of alternative Detectors is not excluded, but if a detector is used that is not listed below, consult General Monitors or your General Monitors representative for advice.

Manufacturer	**Model**
	Cerberus F905, F906, F910, F911 F915, F922, R925, D915 all with Z91 or Z94 base
Apollo	Series 60

5.2 Safety Barriers

The following Safety Barriers are recommended for use with the Model IN042. The use of alternative Safety Barriers is not excluded, but if a Safety Barrier is used that is not listed below, consult General Monitors or your General Monitors Representative for advice.

Manufacturer	**Model**
MTL	MTL3043, MTL4061, MTL787, MTL787S, MTL788

Appendix A

Glossary of Terms

A#-OC – Alarm# - open collector, the # is the channel number or zone number.

Accept – This term is synonymous with acknowledge. Accepting an alarm provides an indication that someone is aware of an impending alarm condition.

Activated – Made active, engaged in activity. An activated LED or output indicates that a state other than 'normal' is present.

Callpoint – A device which can be activated manually, like a 'Glass-Break' Fire Alarm.

CSA –Canadian Standards Association

De-activated – The opposite of activated. A de-activated LED or output is the normal state, usually safe (see Activated).

De-energised – The opposite of energised. A state where electrical voltage/current is not applied (see Energised)

DIP Switch – Dual-inline-Package Switch. Usually a multiple switch package used to configure inputs and outputs.

Energised – The opposite of de-engerised. A state where electrical voltage/current is applied (see De-energised).

EOL – End of Line.

Fault – An error or malfunction.

FUA – Fault unaccept.

INH – Inhibit

Inhibit – To prevent from occurring.

Ionised – Under the influence of radiation or an electrical charge.

Kohm – Kilo-Ohm, 1000 Ohms

LA# - Alarm LED Open Collector Designation. (# channel or zone number).

Latching – To hold on to (see non-latching).

LED – Light Emitting Diode

LF# - Fault LED Open Collector Designation (# channel or zone number),

mA – Milliampere, 1/1000 of an Ampere.

N/C – No Connection

Non-latching – Opposite of Latching (see Latching).

Open Collector – The output element of a transistor.

Reset – To return to previous state.

SPST – Single Pole, Single Throw.

SW – Switch

UA – Unaccept

Zone – Any area or region considered as separate or distinct from others.

Appendix B - Engineering Documentation

Circuit Card Assembly – Display Board

Reference Drawing # 11346-2

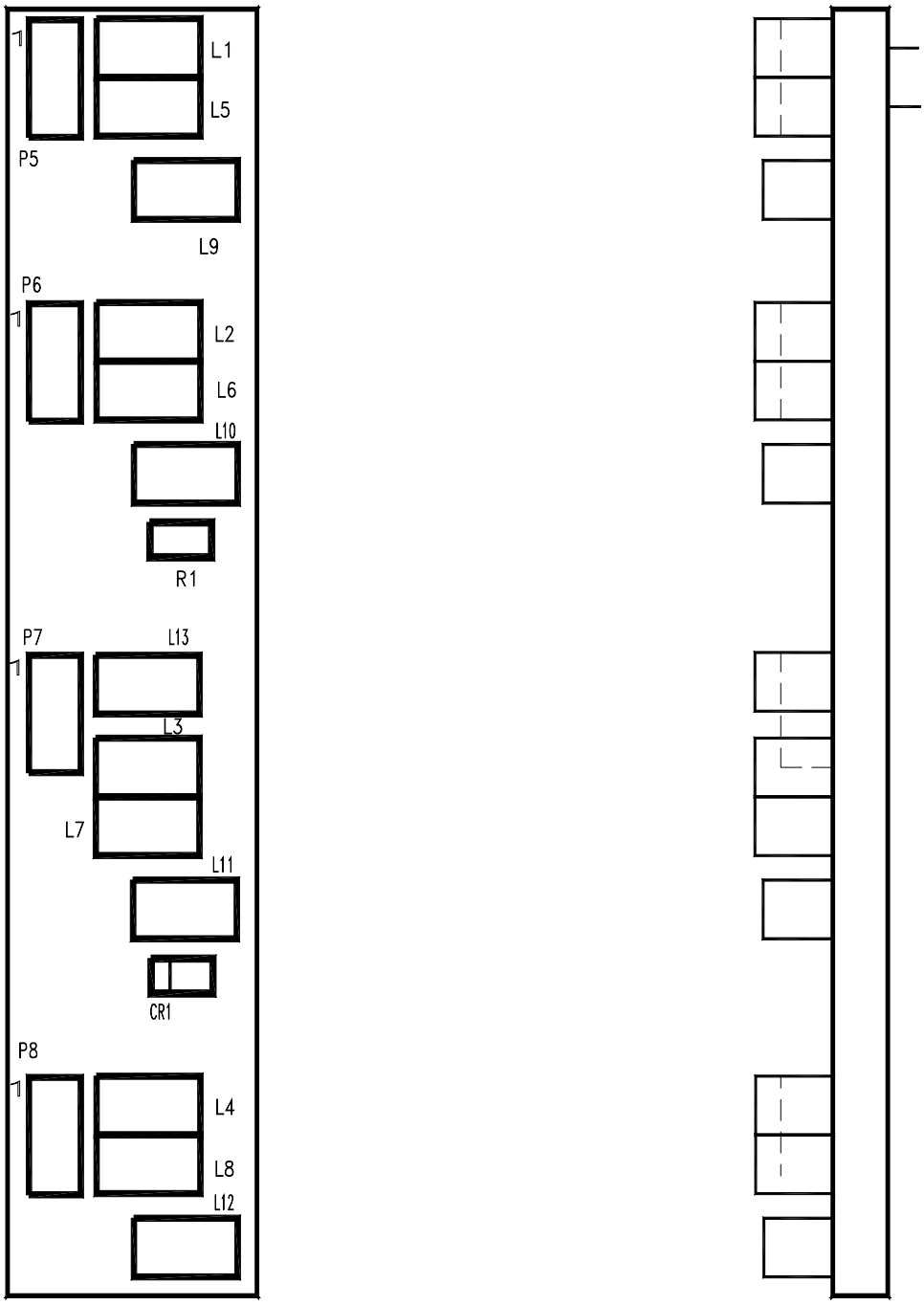
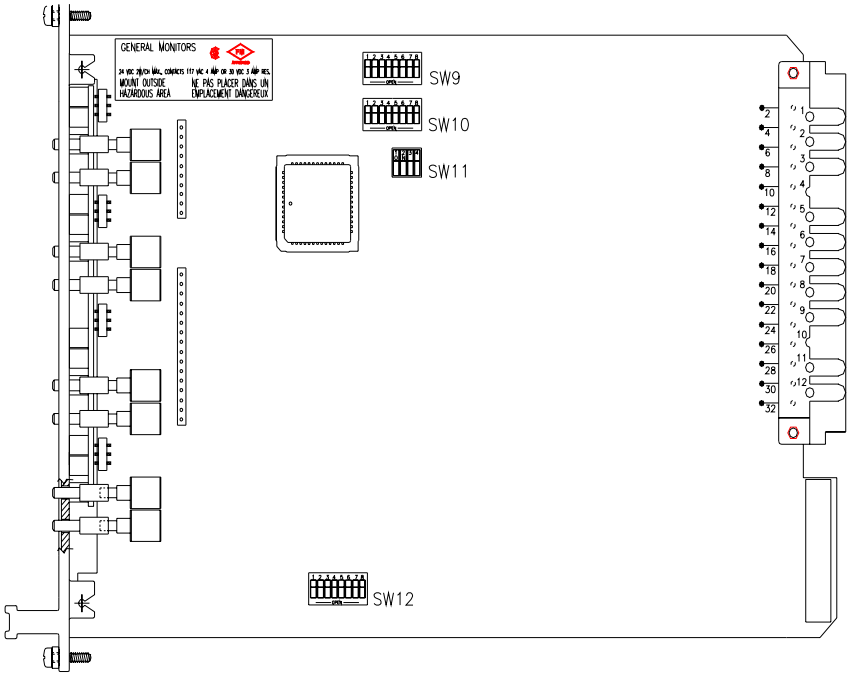


Figure 15 Circuit Card Assembly – Display Board

Outline & Terminal Connection Drawing

Reference Drawing # 11331



REAR CONNECTOR TERMINATIONS

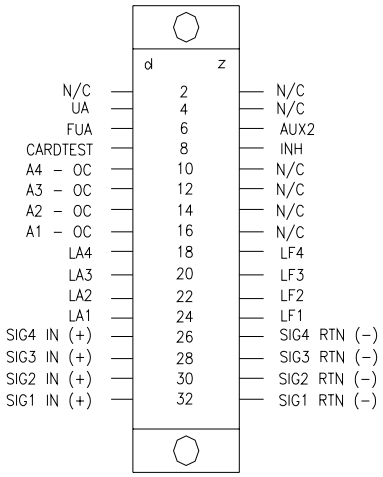


Figure 16 - Outline & Terminal Connection Diagram IN042

Final Assembly Drawing

Reference Drawing # 11330-1

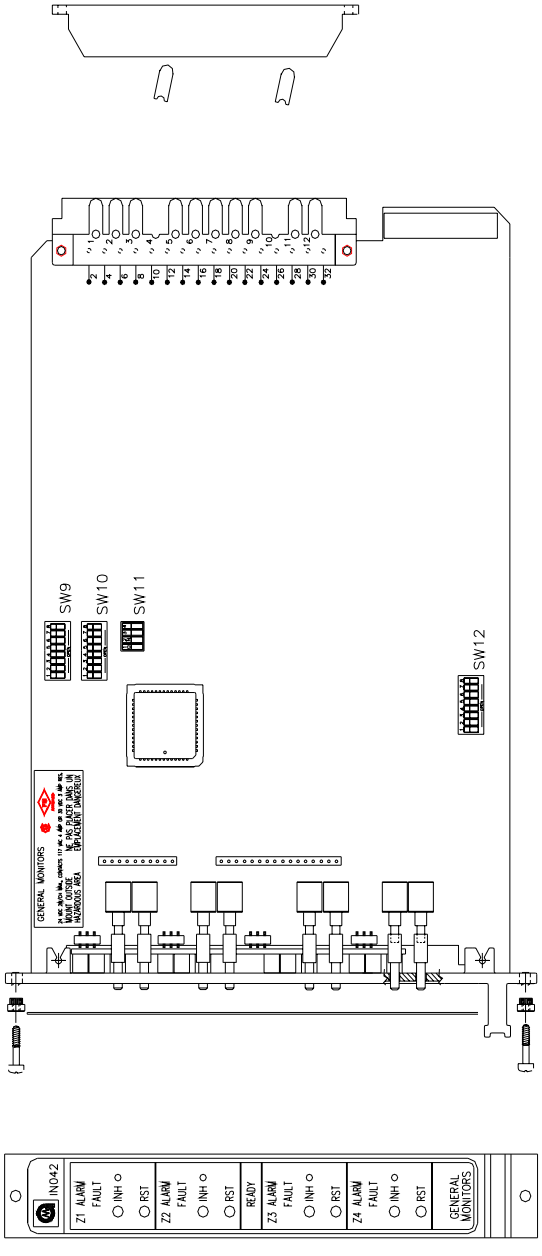


Figure 17 Final Assembly Drawing

Block Diagram IN042

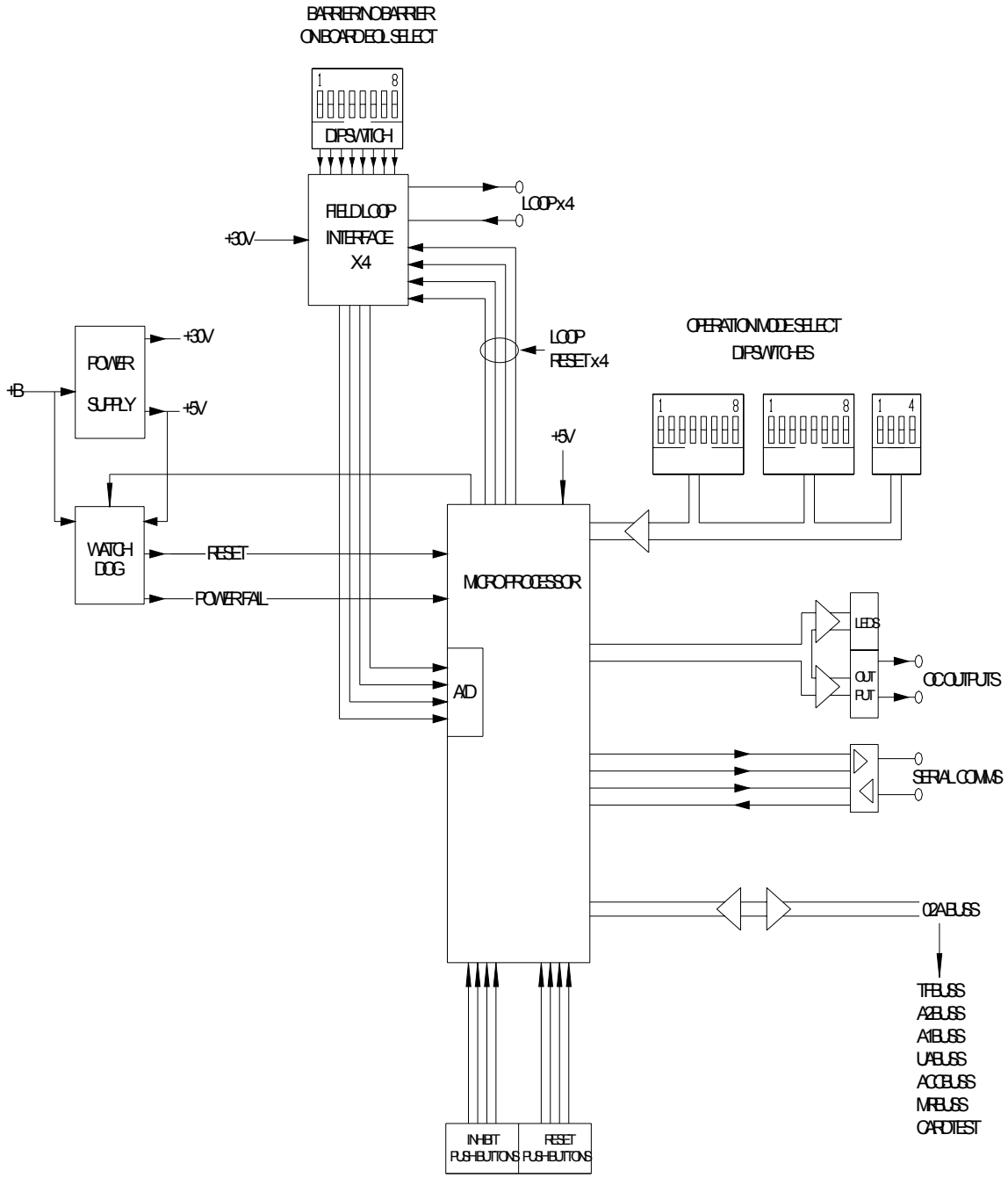


Figure 18 Block Diagram IN042

Appendix C

Zero Two Series Modules

Model 2602A
Zero Two Series Control Module for Hydrogen Sulphide Gas Applications

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Model 4802A
Zero Two Series Control Module for Combustible Gas Applications

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Model TA102A
Zero Two Series Trip Amplifier Module for Combustible Gas Applications

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Model TA202A
Zero Two Series Trip Amplifier Module for Hydrogen Sulphide Gas Applications

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Model TA402A
Zero Two Series Trip Amplifier Module for Flame Detection Applications

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Model TA502A
Zero Two Series Trip Amplifier Module
A flexible multipurpose module for a variety of GM Products.

Model FM002A
Zero Two Series Facilities Module
Performs Common Functions for Zero Two Series Systems

Model ZN002A
Zero Two Series Zone Control Module
Performs Zoning and Voting Functions for Zero Two Series Systems

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Model MD002
Zero Two Series Monitored Solenoid Module
For Monitoring/Driving High Current Output Devices

Model IN042
Zero Two Series Four Zone Input Module for Call points & Smoke & Heat Detectors

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Customer Satisfaction Questionnaire

Attention Field Operations:

We would appreciate your help in assessing and thus improving the quality of our Equipment and Service and would therefore be grateful if you would complete the Questionnaire below and return it to:

General Monitors Ireland Ltd,
Ballybrit Business Park,
Galway,
Republic of Ireland.

Thank you for your assistance

Client _____

Client Order No. _____

General Monitors Sales Order No. _____

(Please tick appropriate box)	Yes	No
1. Was the equipment the correct option?	☐	☐
2. Are sensors correct type and range?	☐	☐
3. Is mechanical assembly good? (everything proper fit and tight)	☐	☐
4. Did you receive the necessary accessories to commission the equipment?	☐	☐
5. Has the equipment been commissioned?	☐	☐
6. Any problems encountered during commissioning?	☐	☐
7. Is the equipment functioning correctly at present?	☐	☐

If you have answered **NO** to any of the above, please provide further details overleaf. **Thank you.**

Completed by: _____ Date: _____