1A54 User Guide

4, 8 & 16 Point Alarm Panels

relay monitoring systems pty ltd

Advanced Protection Devices

User Guide

Test Manual

1A54 User Guide

About This Manual

This User Guide covers all 1A54 relays manufactured from August 2006. Earlier relays do not necessarily incorporate all the features described. Our policy of continuous may means that extra features & functionality may have been added.

The 1A54 User Guide is designed as a generic document to describe the common operating parameters for all relays built on this platform. Some relay applications are described but for specific model information the individual “K” number Product / Test manuals should be consulted.

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To download a PDF version of this guide:
http://www.rmspl.com.au/userguide/1a54_user_guide.pdf

To download the model specific Test Manual:
http://www.rmspl.com.au/search.asp

How this guide is organised

This guide is divided into six parts:

Part 1 Overview

About this Manual

Contents

Test Manual

Part 2 Mechanical Configuration

Part 3 Technical Bulletin

Part 4 Operating Logic Flow Chart

Part 5 Installation

Handling of Electronic Equipment

Safety

Unpacking

Accessories

Storage & Handling

Equipment Operating Conditions

Relay Dimensions & Other Mounting Accessories

Equipment Connections

Commissioning

Decommissioning & Disposal

Part 6 Maintenance

Mechanical Inspection

Test Intervals

Defect Report Form

Part

1

Test Manual

This User Guide covers all 1A54 relay versions & describes the generic features & attributes common across all versions.

Different relay versions are required to cater for varying customer requirements such as auxiliary voltage range, I/O configuration, case style, relay functionality etc.

The product ordering code described in the Technical Bulletin is used to generate a unique version of the relay specification & is called a type number. The type number takes the form 1A54Kxx where the Kxx is the "K" or version number.

Refer to: *www.rmspl.com.au/handbook/parta3.pdf*
for a complete description of the RMS "K" number system.

Each 1A54 version has a specific Test Manual which provides details on the unique attributes of the relay. Each Test Manual includes the following information:

- Test Certificate
- Specific technical variations from the standard model if applicable
- Test & calibration record
- Wiring diagram

A Test Manual is provided with each relay shipped.

If you require a copy of the Test Manual for an RMS product the following options are available:

- Check the RMS web site at: *www.rmspl.com.au/search.asp*
- RMS CD catalogue select: *List all Product/Test Manuals* under *Technical Library*
- Contact RMS or a representative & request a hard copy or PDF by email.

Part

2

Mechanical Configuration

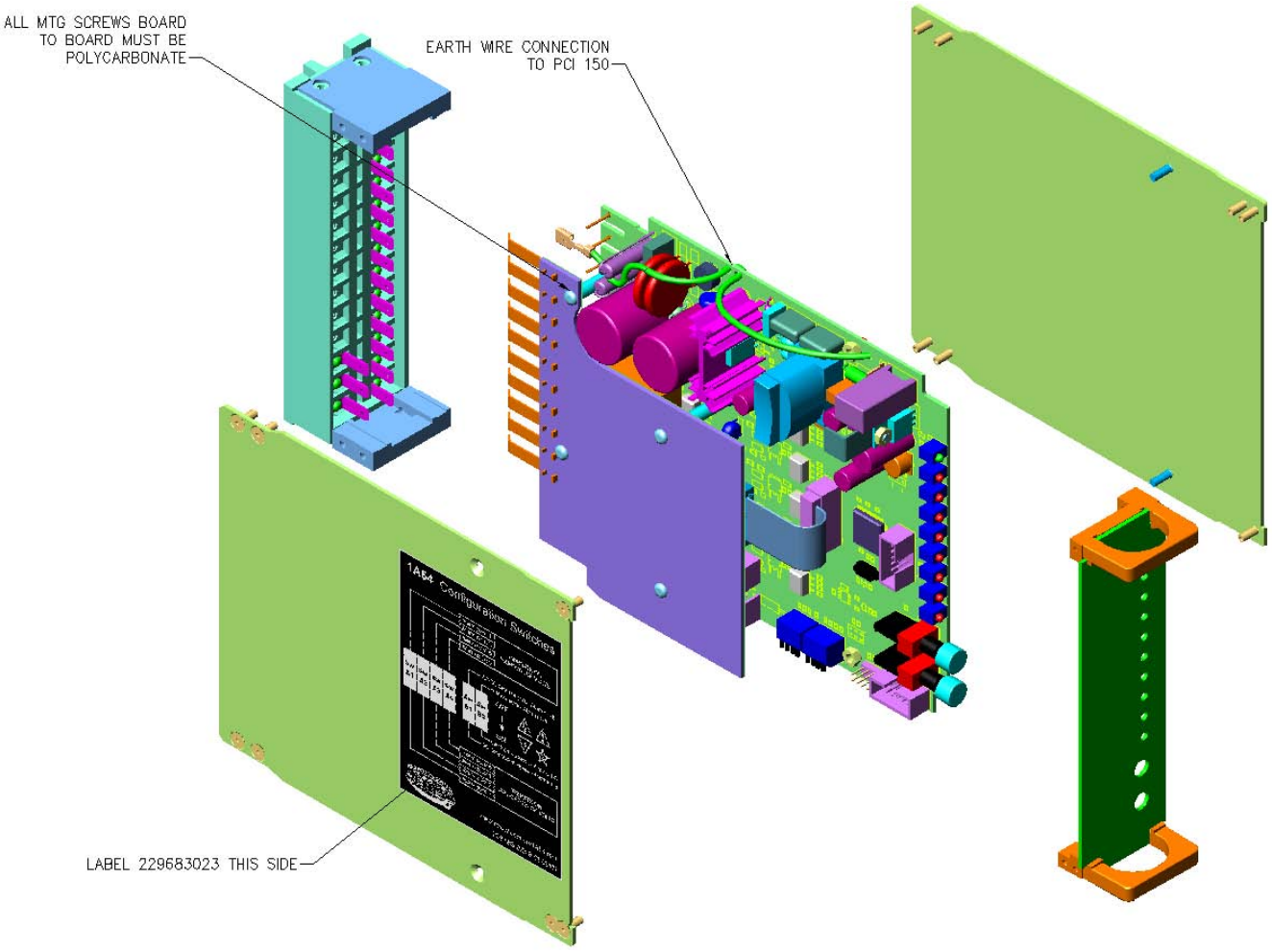
Great care has been taken to design a rugged, cost effective & flexible mechanical solution for the *MATRIX* range of RMS protection relays. The *MATRIX* range provides a compact draw out case solution with M4 screw terminals:

- 4 Point alarm panel 2M28 Size 2 case with 28 terminals
- 8 Point alarm panel 2M28 Size 2 case with 28 terminals
- 16 Point alarm panel 4M56 Size 4 case with 56 terminals

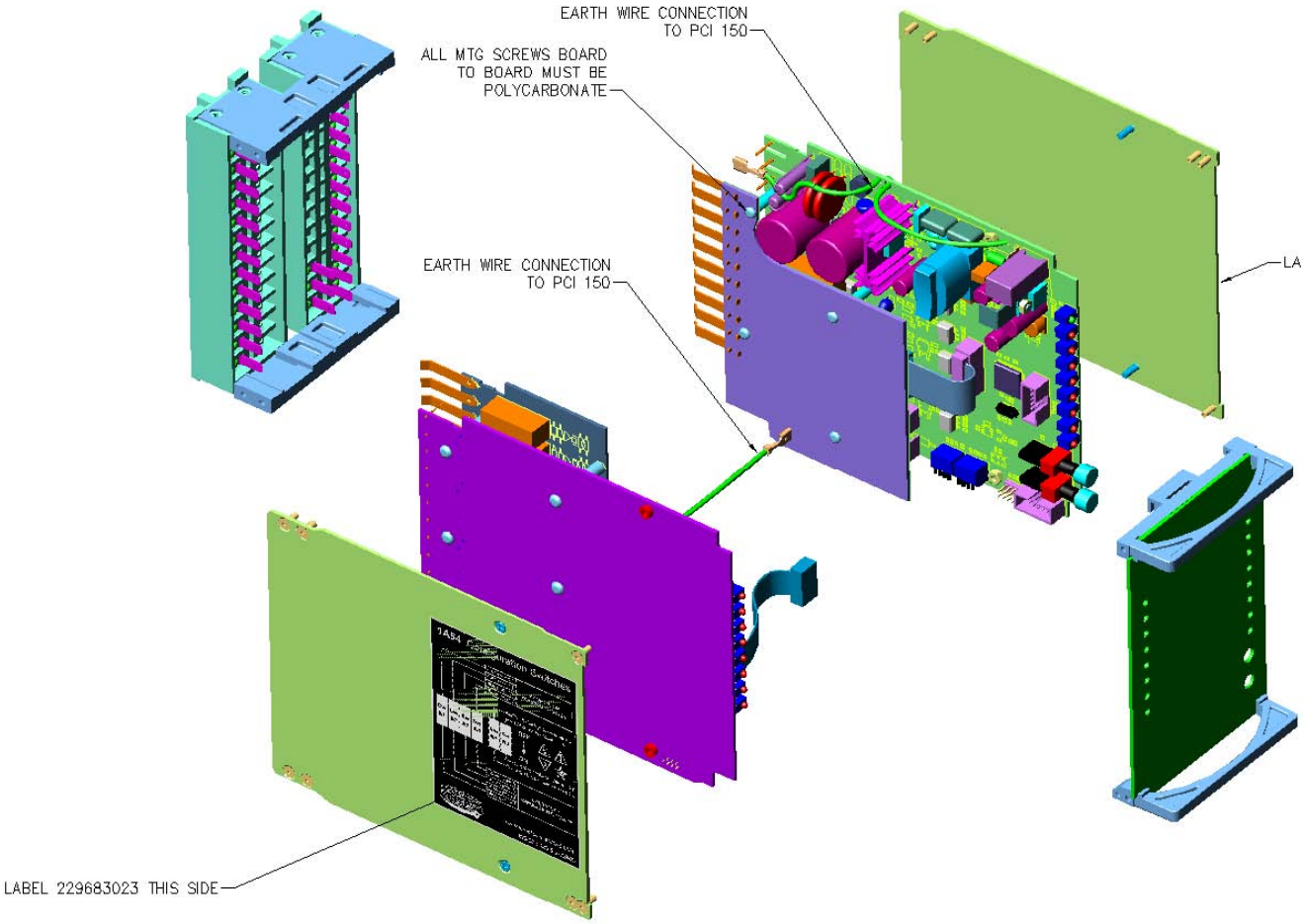
Complete details & attributes for the M (MATRIX) cases & accessories may be found at:

http://www.rmspl.com.au/mseries.htm

The 1A54 is configured in a 2M28 or 4M56 case & the following images depict the general mechanical configuration. It should be noted that re-usable screw rivets are used to bind the draw out relay module. A 1/16" hex key is required for disassembly.



1A54 8 Point Alarm Panel assembly depicted in a 2M28 case



1A54 16 Point Alarm Panel assembly depicted in a 4M56 case

Part

3

Technical Bulletin

The detailed technical attributes, functional description & performance specifications for the 1A54 are described in the attached Technical Bulletin. For the most up to date version go to:

www.rmspl.com.au/handbook/1a54.htm

For any specific attributes of a particular version refer to the Test Manual for that type (K) number.

The order of precedence for technical information is as follows:

- Test Manual
- Technical Bulletin
- User Guide

Technical Bulletin

1A54

4, 8 & 16 Point Alarm Panels

Features

- 4, 8 or 16 alarm points
- Rack or panel mount draw out case design
- LED indication for each alarm point with space for custom label text
- Non volatile memory ensures last recorded alarm states are restored on power up
- Wide range status input to initiate each alarm point with selectable instantaneous or time delayed operation
- Repeat output contact(s) for each alarm point (Latch or S/R)
- Common alarm output contact for use with external audible or visual device or SCADA input
- Front panel acknowledge button & status input
- Front panel reset button & status input
- Self supervision watchdog with healthy LED & alarm contact
- Built in test sequence
- Wide range auxiliary supply

Description

The 1A54 is a station alarm panel which can be supplied with either 4, 8 or 16 alarm points. Each alarm point comprises a status input, red LED alarm indicator & a minimum of one repeat output contact.

In addition to the 4, 8 or 16 alarm points, front mounted push buttons & status inputs are provided for alarm acknowledge & reset. A single common output contact is provided for operation of an external lamp or audible device.

Configuration of the 1A54 is completed by the factory in accordance with the customer ordering code & through a set of internal configuration switches accessible to the user by withdrawing the module from the outer case.

Continuous self testing is used to maintain the front panel healthy LED & self supervision alarm contact for increased system security.

A self test routine may be manually initiated at the front panel to check that all alarm LED's & output contacts are functioning correctly.

1A54 8 alarm point versions
with custom alarm text

Application

Made in Australia

The 1A54 is a flexible & cost effective choice for the annunciation of alarms & operating events. The 1A54 can be scaled for 4, 8 or 16 alarm points to indicate as few or as many points as needed for a specific application. Alarm groups can be configured for instantaneous or time delayed operation. Multiple alarm panels can be used for high density alarm applications.

The following examples represent examples of typical alarm panel installations. Use the 1A54 alarm panel for indication of a wide variety of conditions including:

- **Transformer alarm panel;**
- **Quantity high / low;**
- **Timing status;**
- **Intrusion / security status;**
- **Device operational status;**
- **Breaker / switch position;**
- **Protection relay status;**
- **Trip & alarm contact multiplication.**

A switchmode power supply provides a very wide auxiliary operating range which combined with the heavy duty output contacts & rugged draw out case construction makes the protection class 1A54 suitable for sub station applications.

A relay fail alarm is provided in the form of a N/C contact which is picked up when the auxiliary supply rail & CPU watchdog status is healthy.

ALARM STATUS INPUTS – APPLY VOLTS TO INITIATE

Each alarm point has an associated status input. An alarm is initiated with the application of a control voltage to the status input.

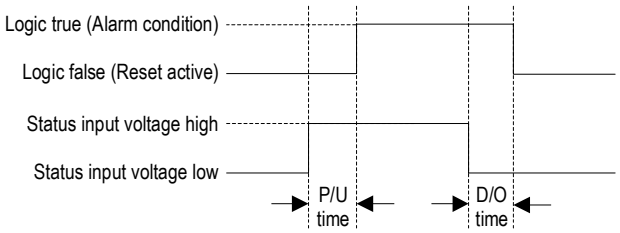


Figure 1: Status input timing definition

Status inputs are arranged in groups of four. Each group is isolated from all other groups, alarm contacts & auxiliary supply.

ALARM STATUS INPUTS – REMOVE VOLTS TO INITIATE

It is also possible for some of the status inputs to be configured to operate upon removal of a control voltage (Refer to section on configuration switches).

It should be noted that if the 1A54 auxiliary power is also used to energize the external Status Input circuits, loss of the external auxiliary supply will remove the initiate voltage from the Status Inputs before the 1A54 CPU shuts down. This will cause these Status Inputs to pick up & signal the CPU to record an alarm event in non volatile memory (EEPROM). When the auxiliary power is restored all alarm point LED's with Status Inputs configured to operate on removal of volts will re-activate.

This is not an issue if the Status Input initiate voltage remains applied when the external 1A54 auxiliary supply is removed or when the Apply Volts to initiate Status Inputs setting is employed.

ACKNOWLEDGE STATUS INPUT

A status input is provided for remote acknowledgement of an alarm condition. This input functions in the same way as pressing the front panel acknowledgement push button.

RESET STATUS INPUT

A status input is provided for remote reset of an alarm condition. This input functions in the same way as pressing the front panel reset push button.

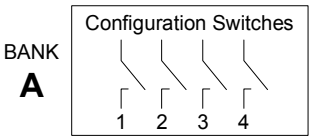
STATUS INPUT TIME DELAY

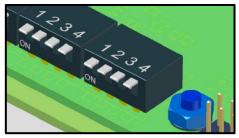
Status input groups 2, 3, 4 & 5 can be independently set for time delayed or 'instantaneous' operation by setting the appropriate configuration switch. This feature is useful where high speed is not necessary such that a fixed time delay can be employed to allow transient signals to clear & thus avoid nuisance alarms from being generated. When a delay is selected for a status input group the standard time delay setting is 10s. The status input must be continuously picked up for this period before the alarm is activated. Other definite time delays may be specified in the ordering information section.

CONFIGURATION SWITCHES

Configuration switches are accessible to the user by first drawing out the 1A54 module from the outer case. Two banks of 4 switches (A & B) are provided on the size 2 case versions.

The 16 point alarm version has a further two banks of 4 switches (C & D).





While the function of the configuration switches may vary for special custom models, the standard settings are described in the wiring diagrams 5-7 & in the Factory Configuration section on page 10.

ALARM OUTPUT CONTACTS

Each alarm point has one or more associated output contacts. These alarm contacts may be configured to pick up to a latched condition whenever its alarm LED is flashing (Slow)*, or on solid. Alternatively when configuration switch 2 is set to OFF, the output contacts will be self reset when the initiate input is removed.

Alarm output contacts are usually provided in N/O format although the 16 point version has provision for some C/O contacts. Refer to wiring diagrams in figures 5-7.

For C/O options on the 4 & 8 point versions consult the factory.

COMMON ALARM OUTPUT CONTACT

A single N/O alarm contact is provided which picks up whenever any LED is flashing. This contact is reset when all alarms are acknowledged or reset.

OPERATING SEQUENCE

When a signal is applied to an alarm status input the front panel LED will flash & the associated repeat output contact pick up. The common alarm output contact will also pick up.

Pressing the acknowledge push button or activating the acknowledge status input will change the front panel LED from flashing to solid on. The common alarm output will be reset.

Provided the abnormal condition has been cleared, pressing the reset push button or activating the reset status input will change the front panel LED from solid on to off. The repeat output alarm output will also be reset.

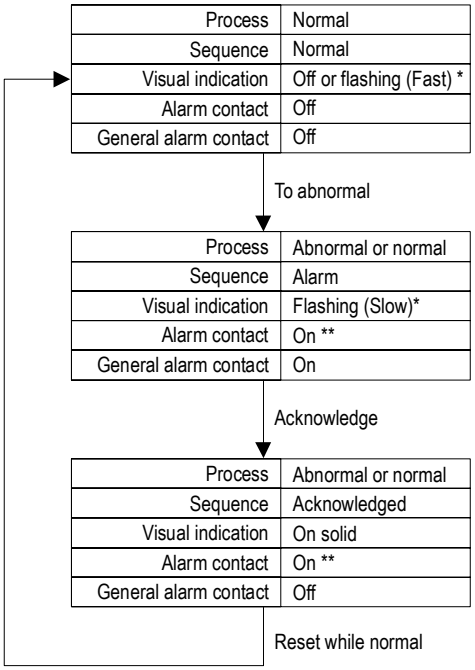


Figure 2: Reset state diagram

Notes:

* Where the status input time delay function has been invoked, the LED will flash 'fast' during timing & then flash 'slow' after time out (Abnormal condition).

** The operating sequence described above is valid when configuration switch B2 (Alarms 1-8) & D2 (Alarms 9-16), are set to ON for latching output contacts. When set to OFF the output contacts will self reset when the alarm initiate signal is removed.

NON VOLATILE MEMORY

The status of each alarm point LED & output contact is saved to EEPROM memory whenever a channel changes from Normal to Alarm, from Alarm to Acknowledged, or from Acknowledged to Normal.

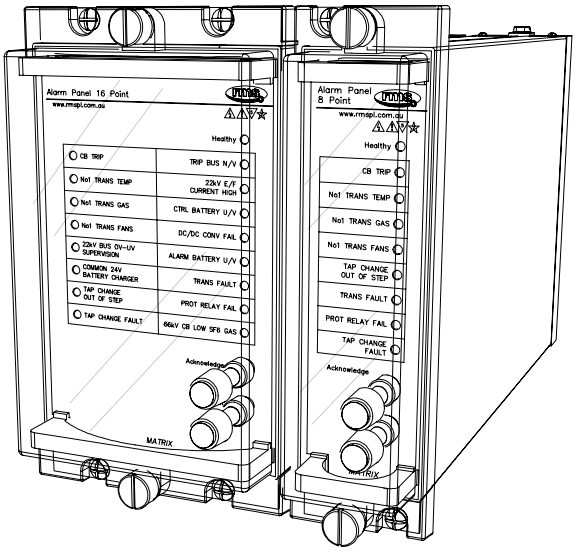
When the 1A54 is powered up after loss of the auxiliary supply the status of all LED's & output contacts are restored to the condition saved prior to power down. The preserved states are reset using the acknowledge button or status input.

RELAY FAIL ALARM

A N/C alarm contact is maintained in the energized state when all of the following conditions are met:

- The auxiliary supply is applied
- The internal 24V DC rail is within acceptable limits
- The CPU hardware watchdog maintains a pulsing output

A CPU software watchdog records “suspect” events to an assert register and if necessary performs a soft restart.



LED TEST SEQUENCE

The LED test sequence is initiated by pressing & holding the front panel reset button for ~8s. All LED’s will flash until the acknowledge button is pressed causing all LED’s to go on solid. The test sequence is terminated by pressing the reset button causing all LED’s to go off.

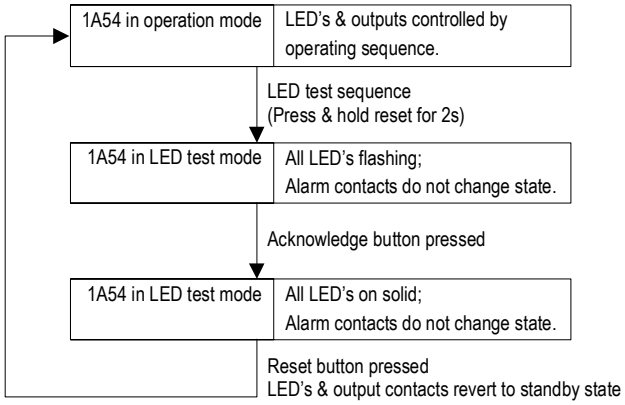


Figure 3: LED test logic diagram

OUTPUT CONTACT TEST SEQUENCE

Pressing & holding the front panel reset button & acknowledge button simultaneously for ~8s will cause the 1A54 to initiate an output contact test sequence. All alarm output contacts & LED’s will operate. Pressing the acknowledge button will operate the common alarm output & change the LED’s from solid to flashing. The test sequence is terminated by pressing the reset button causing all output contacts & LED’s to reset.

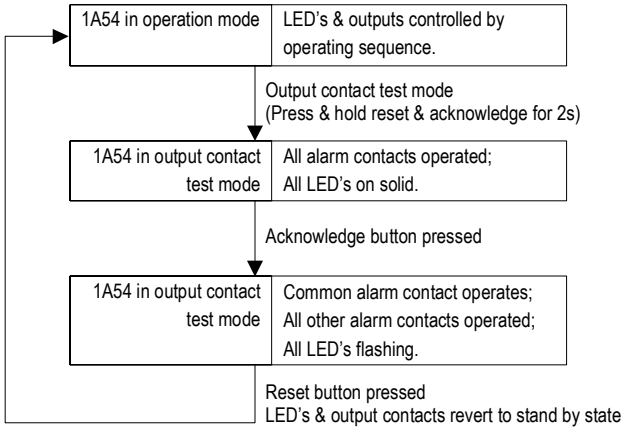


Figure 4: Output contact test logic diagram

Technical Data

AUXILIARY SUPPLY
A high efficiency switchmode power supply is incorporated which provides a low burden to the auxiliary supply.
Low range model: 20-70V DC
High range model: 40-300V DC & 40-275V AC

AUXILIARY SUPPLY BURDEN (At 110V DC)
Quiescent: Less than 3W
Maximum: Less than 10W

FRONT PANEL LED's
Green system healthy LED
One red LED per alarm point:
OFF Alarm point not active (Reset)
Flashing – fast: Status input timing
Flashing – low: Status input timer timed out
Solid: Alarm point acknowledged

STATUS INPUT OPERATING VOLTAGE (AC rejection filter)
The operating range of the status inputs are set using internal configuration switch 1. This setting may be pre defined when ordering.

18 - 300V DC Set Configuration Switch to **ON**
In this mode the universal status input will reject AC signals that may be induced on the control wiring. Suitable for high security applications where a DC battery supply is available.

18 - 300V DC & 18 – 275V AC Set Configuration Switch to **OFF**
In this mode the universal status input is designed to operate on both AC & DC input voltages. Suitable for applications where an AC auxiliary voltage is available such as transformer or generator control panels.

STATUS INPUT MINIMUM OPERATING CURRENT
10mA P/U for 1ms then reducing to1.5mA after 4ms.

While the function of the configuration switches may vary for special custom models, the standard functions & default settings are described in the Ordering Information section.

STATUS INPUT OPERATING TIME ('Instantaneous')

		AC Rejection Filter	
Initiate input	Minimum	ON	OFF
DC	P/U	<16ms	<4ms
	D/O	<4ms	<16ms
AC	P/U	N/A	<23ms
	D/O		<33ms

STATUS INPUT TIME DELAY SETTING
Fixed time delay accuracy: ±0.1s
Timer reset characteristic: Refer status input drop out time
Default fixed delay setting: 'Instantaneous' or 10s
Optional fixed delay: 0.1 to 25.0s in 0.1s steps

LED OPERATE TIME
As per status input operating time

OUTPUT CONTACT OPERATE TIME
As per status input operating time + 11ms

RESET
Press the front reset button or pulse the reset status input.

ACKNOWLEDGE
Press the front acknowledge button or pulse the acknowledge status input.

CUSTOM ALARM TEXT - Refer ordering information page.

4 point alarm panels
Maximum characters: 4 lines x 15 characters per alarm point.
Maximum font size: 2 lines x 10 characters per alarm point.

8 & 16 point alarm panels
Maximum characters: 2 lines x 15 characters per alarm point.
Maximum font size: 1 line x 10 characters per alarm point.

OUTPUT CONTACTS
Alarm repeat contacts: 1, 2, 3, 4 or 6 contacts per alarm point
Refer wiring diagrams 5-7
Common alarm contact: 1 N/O
Fail alarm: 1 N/C for the power supply / CPU fail
Normally picked up & drops out to signal an alarm condition.

OUTPUT CONTACT RATINGS **IEC60255-0-2**

Carry continuously	5A AC or DC	
Make & carry	0.5s 20A AC or DC	
L/R ≤ 40ms & V ≤ 300V	0.2s 30A AC or DC	
Break capacity I ≤ 5A & V ≤ 300V	AC resistive	1,250VA
	AC inductive	250VA @ PF ≤ 0.4
	DC resistive	75W
	DC inductive	30W @ L/R ≤ 40ms 50W @ L/R ≤ 10ms
Minimum number of operations		10^6 at maximum load
Minimum recommended load		0.5W limit 10mA / 5V

TRANSIENT OVERVOLTAGE **IEC60255-5**

Between all terminals & earth	5kV 1.2/50us 0.5J
Between independent circuits without damage or flashover	5kV 1.2/50us 0.5J

INSULATION COORDINATION **IEC60255-5**

Between all terminals & earth	2.0kV RMS for 1 minute
Between independent circuits	2.0kV RMS for 1 minute
Across normally open contacts	1.0kV RMS for 1 minute

AUXILIARY SUPPLY **IEC60255-11**

Allowable breaks / dips in supply Collapse to zero from nominal voltage	≤ 20ms

HIGH FREQUENCY DISTURBANCE **IEC60255-22-1 CLASS III**
2.5kV 1MHz common mode
1.0kV 1MHz differential mode
No mal operation

ELECTROSTATIC DISCHARGE **IEC60255-22-2 CLASS III**
6kV contact discharge
No mal operation

FAST TRANSIENT **IEC60255-22-4**
4kV, 5/50ns, 100KHz repetitive
No mal operation

TEMPERATURE RANGE **IEC68-2-1/2**
Operating: -5 to +55°C
Storage: -25 to +75°C

HUMIDITY **IEC68-2-78**
40 °C & 95% RH non condensing

4 Point Alarm Panel Wiring

TERMINATION SCREWS

M4 Screws

An M4 screw kit is supplied as standard with each 1A54. Additional M4 screw kits may be purchased separately.

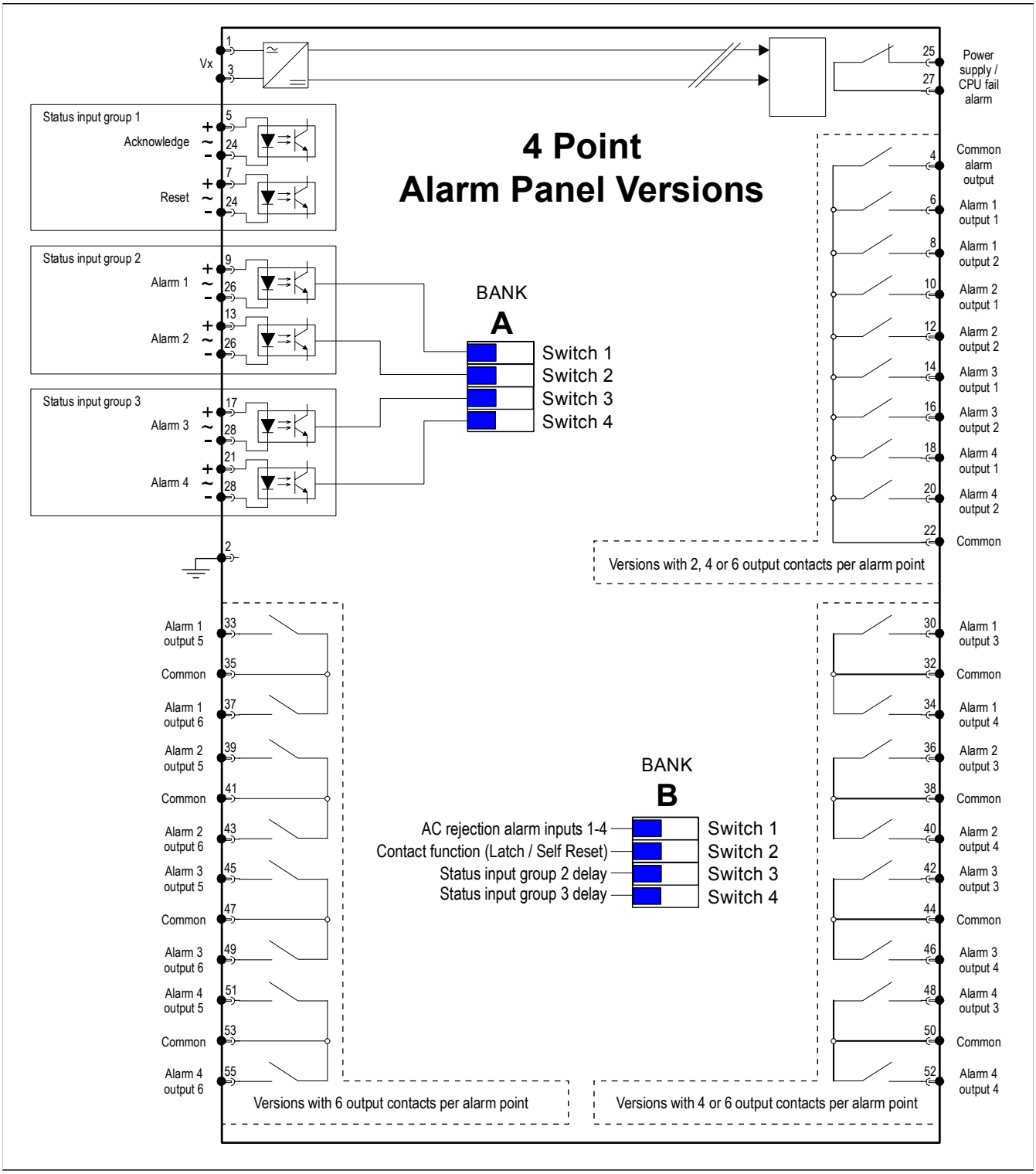


Figure 5: Wiring diagram for 1A54 four (4) point alarm panel with 2, 4 or 6 output contacts per point
Relays shown in de-energized condition

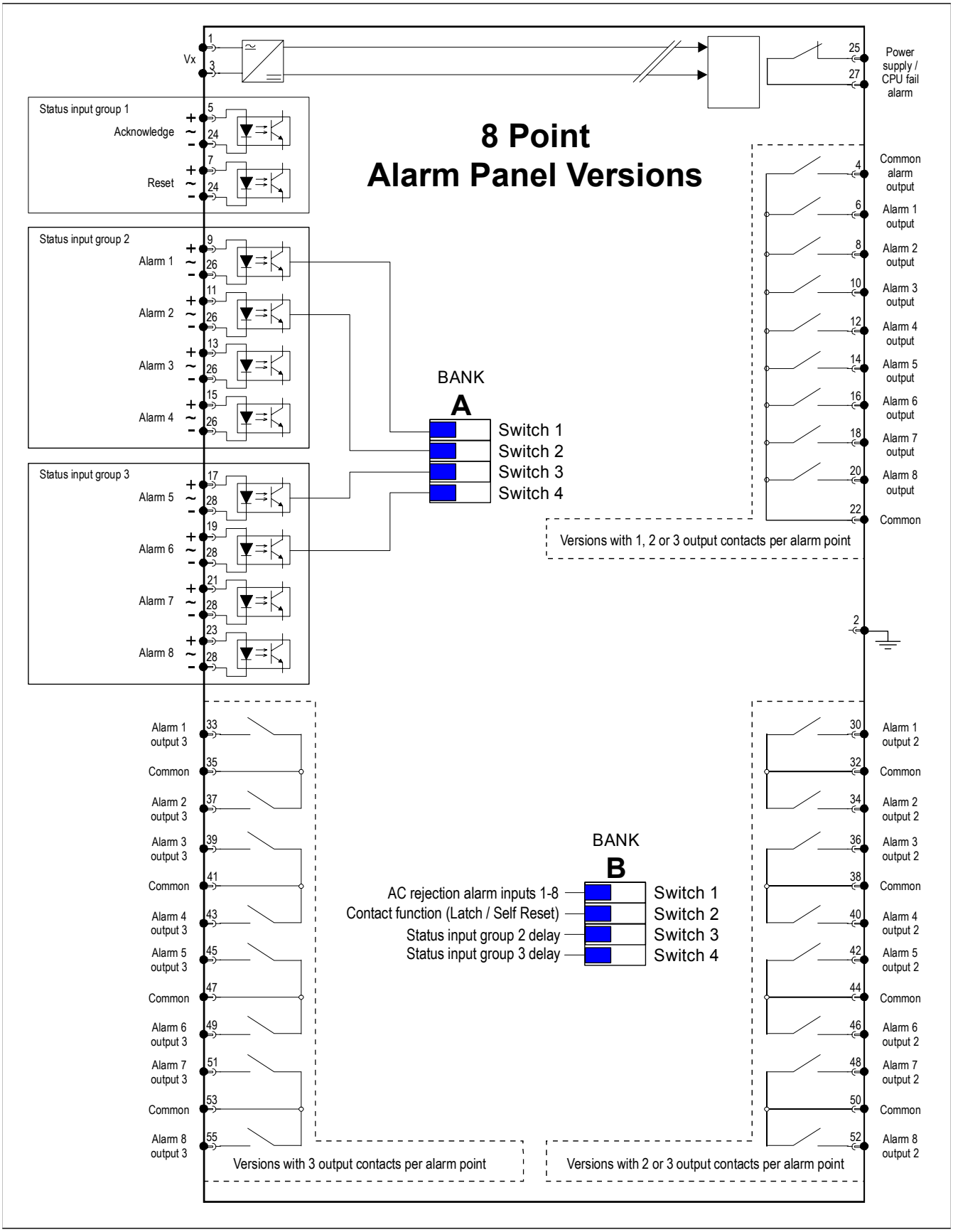


Figure 6: Wiring diagram for 1A54 eight (8) point alarm panel with 1, 2 or 3 output contacts per point
Relays shown in de-energized condition

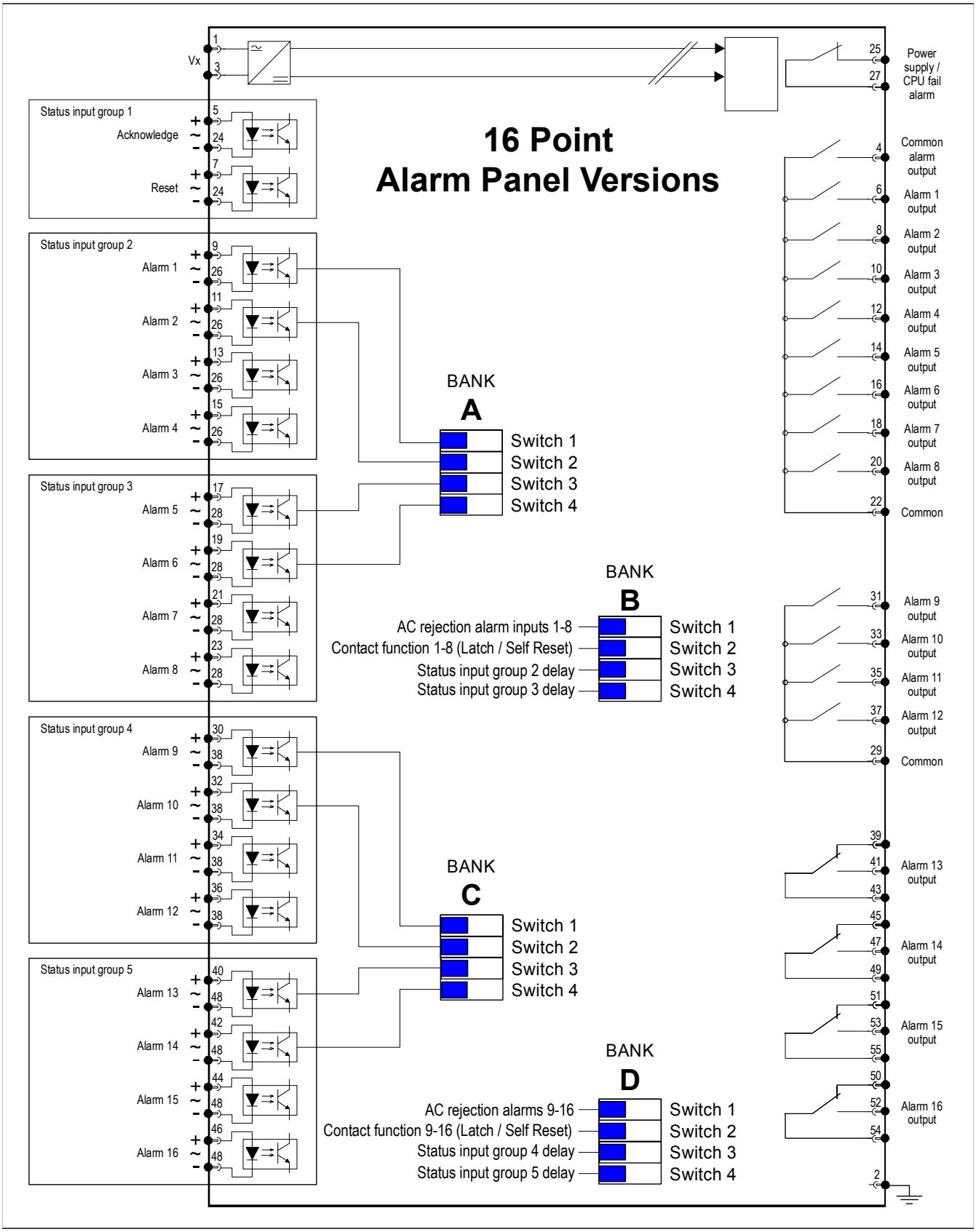


Figure 7: Wiring diagram for 1A54 sixteen (16) point alarm panel with one (1) output contact per point
Relays shown in de-energized condition

Case Mounting

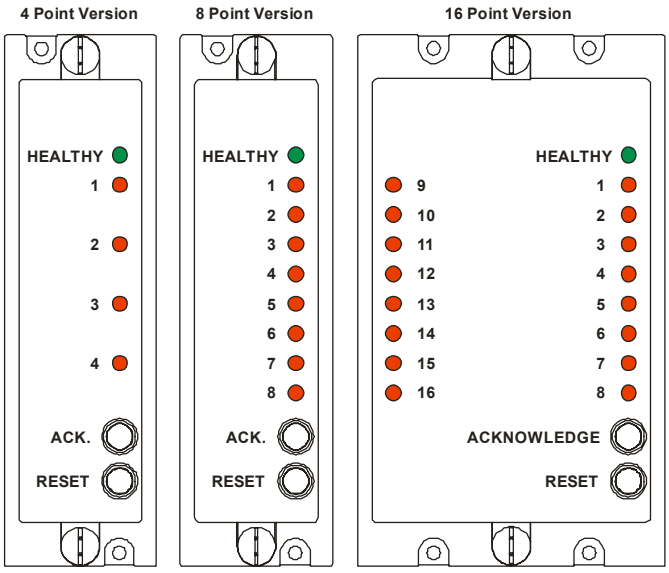


Figure 8: Alarm text position layout

CASE SIZE

2M28-S or 4M56-S draw out case depending on the number of alarm points & output contacts as follows:

Alarm Points	Output contacts per point	Case size
8	1	2M28-S
16	1	4M56-S
4	2	2M28-S
8	2	4M56-S
8	3	4M56-S
4	4	4M56-S
4	6	4M56-S

ACCESSORIES SUPPLIED WITH EACH RELAY

2M28 case versions

1x M4 self threading mounting screw kit P/N 290-406-151
1x M4 terminal screw kit (28 per kit) P/N 290-407-153

4M56 case versions

1x M4 self threading mounting screw kit P/N 290-406-151
2x M4 terminal screw kit (28 per kit) P/N 290-407-153

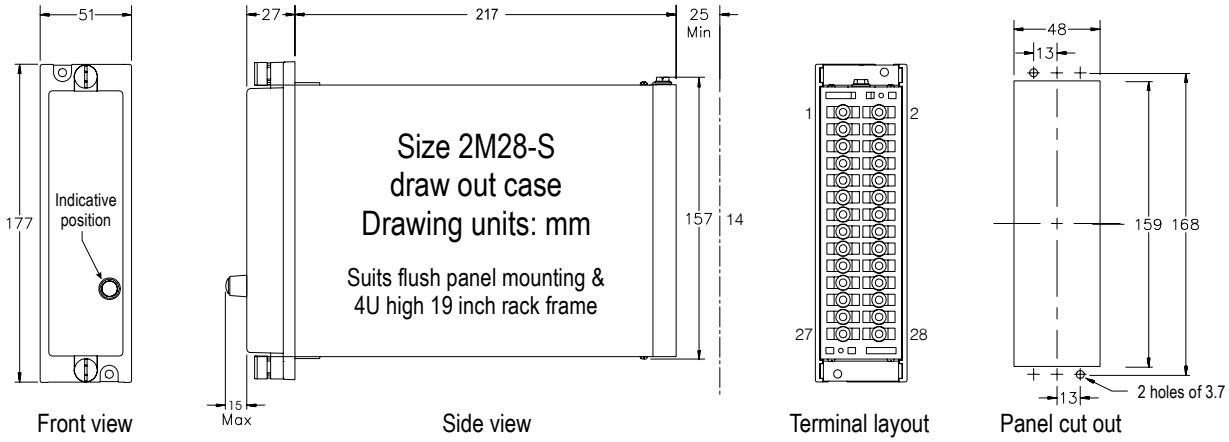


Figure 10: Case mounting details for 2M28-S case versions

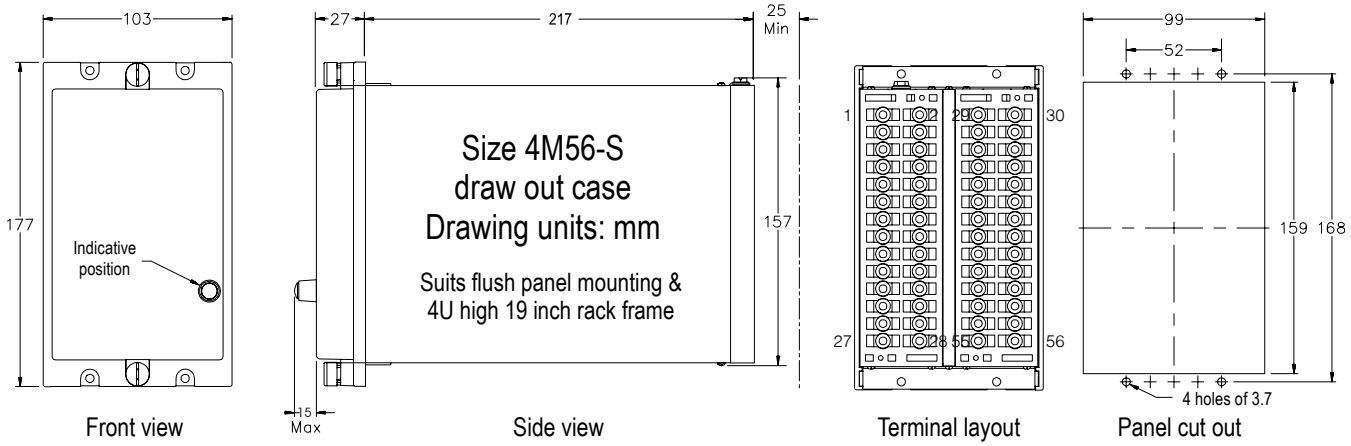


Figure 10: Case mounting details for 4M56-S case versions

Ordering Information

ALARM TEXT LABELS

The 1A54 front panel has provision for custom text to identify the function of each alarm LED. The required text may be engraved on the front panel by the factory if specified at time of order. Alternatively the front panel may be removed for engraving by the user or contractor. The RMS web site provides an ACAD file for this purpose.

The front panel is fabricated from flexible plastic sheet with a white surface & black substrate to provide high contrast black text when engraved.

Removal of the front label is achieved by drawing out the 1A54 module from the outer case & pulling the label from the edges at the mid point between the top & bottom draw out handles. This will cause the label to bend & disengage from the top & bottom handle retention points. Once free from the 1A54 module the front label can be placed on an engraving table. Additional factory engraved labels may be sourced from RMS for later field installation.

While an engraved label provides the most permanent record other methods such as laser printed stick on labels or indelible marker pen may be satisfactorily employed.

CUSTOM ENGRAVED TEXT DEFINITION

Complete the following tables with one character per box. Refer to the front panel alarm point layouts depicted in figure 6. Submit completed labeling information with the 1A54 product ordering code. For maximum font size limit text for each alarm point to 1 line x 10 characters.

Text for the left hand side alarm points will be left justified.
Text for the right hand side alarm points will be right justified.

1															
2															
3															
4															
5															
6															
7															
8															
9															
10															
11															
12															
13															
14															
15															
16															

ORDER CODE

The order code determines the hardware build in the factory & cannot be changed in the field.

Generate the required order code as follows: e.g. 1A54 ABAA

General Type		Order Code			
		1	2	3	4
1A54	-				

1 ALARM POINTS

A	8 with 1 output per point
B	16 with 1 output per point
D	4 with 2 outputs per point
E	8 with 2 outputs per point
J	8 with 3 outputs per point
L	4 with 4 outputs per point
P	4 with 6 outputs per point

2 AUXILIARY SUPPLY RANGE

A	20 - 70V DC
B	40 - 300V DC & 40 – 275V AC

3 CUSTOM ENGRAVED TEXT

A	Not required	No engraving - factory default
B	Required	Complete the custom text details at left

4 STATUS INPUT TIME DELAY SETTING

A	Instantaneous or 10s	(Default)
B	Instantaneous or _ _ . _s	(0.1 to 25.0s with 0.1s resolution)

Factory Configuration

CONFIGURATION CODE (Optional specification)
Refer to the wiring diagram for each 1A54 model for details on configuration switch setting.

The configuration code can be set in the field by withdrawing the relay module & following the instructions on the side plate label for setting the configuration switches.

The configuration code may be specified at time of order so that the relay will be shipped from the factory pre-set to meet customer pre-determined operating requirements.

e.g. CONFIG A - 0101

If a configuration code is not specified the factory default will be set as indicated below:

CONFIG A -	1111	All alarm panel versions
CONFIG B -	1111	All alarm panel versions
CONFIG C -	1111	16 point alarm panel versions
CONFIG D -	1111	16 point alarm panel versions

Specify Factory Configuration		Configuration Switches			
		A1	A2	A3	A4
CONFIG A	-				

A1-4 **ALARM INITIATE INPUT FUNCTION** (Refer wiring diag.)

1	ON	Apply volts to initiate	(Default)
0	OFF	Remove volts to initiate	

Specify Factory Configuration		Configuration Switches			
		B1	B2	B3	B4
CONFIG B	-				

B1 **ALARM INITIATE INPUT SENSITIVITY** (Groups 1-3)

1	ON	DC operation only - AC rejection ON	(Default)
0	OFF	AC / DC operation - AC rejection OFF	

B2 **ALARM OUTPUT CONTACTS 1-8 FUNCTION**

1	ON	Latching	(Default)
0	OFF	Self reset	

B3-4 **ALARM INITIATE TIME DELAY** (Groups 2-3)

1	ON	Instantaneous	(Default)
0	OFF	Time delayed	

Specify Factory Configuration		Configuration Switches			
		C1	C2	C3	C4
CONFIG C	-				

C1–4 **ALARM INITIATE INPUT FUNCTION** (Refer wiring diag.)

1	ON	Apply volts to initiate	(Default)
0	OFF	Remove volts to initiate	

Specify Factory Configuration		Configuration Switches			
		D1	D2	D3	D4
CONFIG D	-				

D1 **ALARM INITIATE INPUT SENSITIVITY** (Groups 4-5)

1	ON	DC operation only - AC rejection ON	(Default)
0	OFF	AC / DC operation - AC rejection OFF	

D2 **ALARM OUTPUT CONTACTS 9-16 FUNCTION**

1	ON	Latching	(Default)
0	OFF	Self reset	

D3-4 **ALARM INITIATE TIME DELAY** (Groups 4-5)

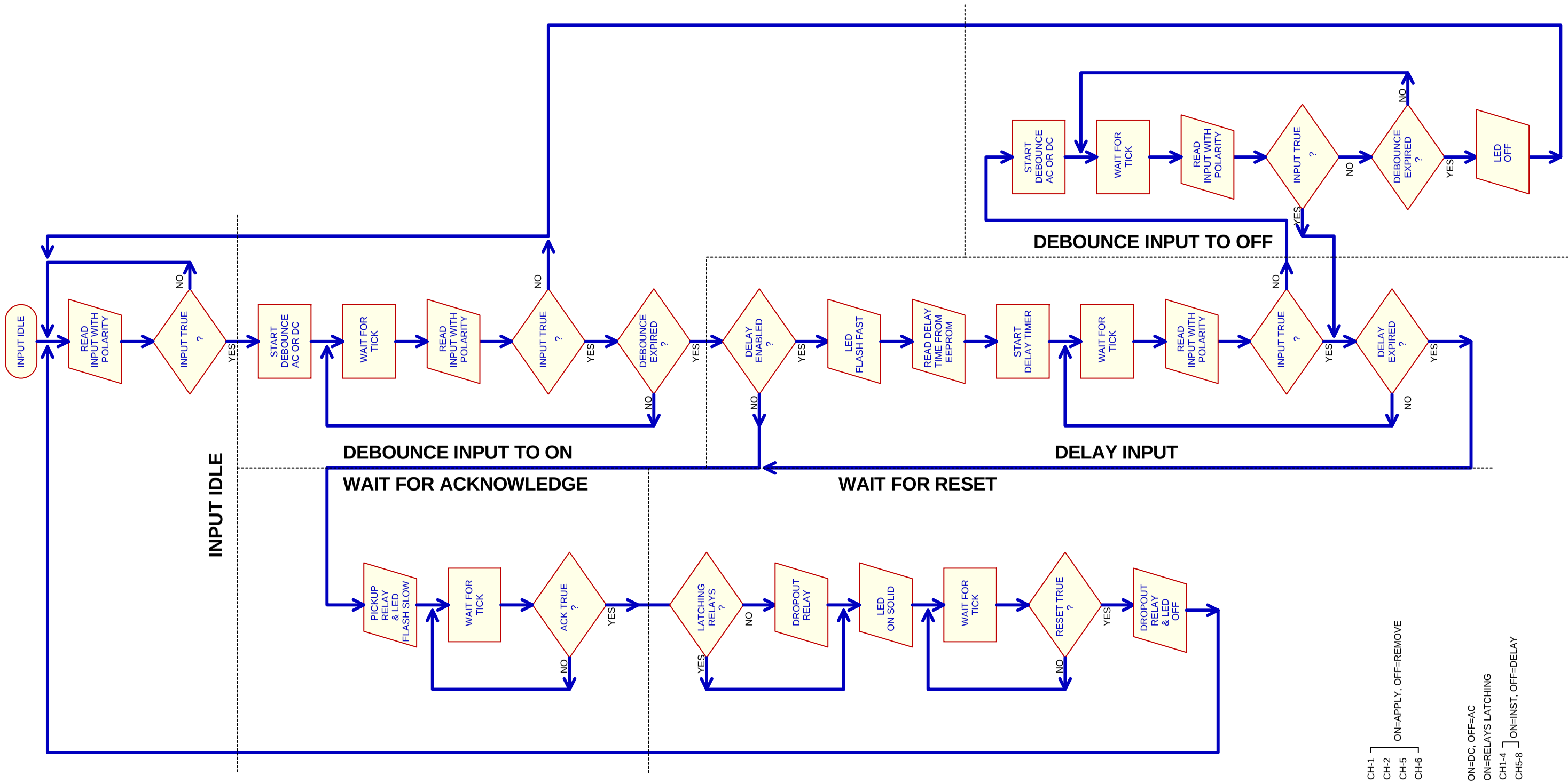
1	ON	Instantaneous	(Default)
0	OFF	Time delayed	

Part

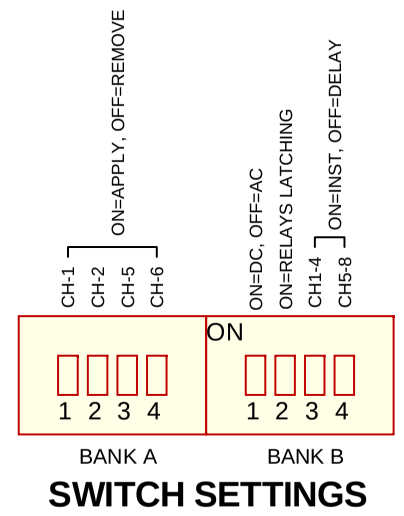
4

Operating Logic Flow Chart

The following flow chart describes the operating logic of all 1A54 Alarm Panels.



LED STATES	MEANING
OFF	IDLE OR NOT DEBOUNCED
FLASH FAST = NORMAL RATE	DELAY TIMING
FLASH SLOW = HALF NORMAL RATE	PICKED UP
ON	ACKNOWLEDGED



SWITCH SETTINGS

MATERIAL: See N.A. for Materials List FINISH: N.A.

Unless otherwise stated:

SMD Resistors are 1/8W 1% 0805 Metal Film
SMD Capacitors <100P are 50V 0805 NPO
SMD Capacitors >100P and < 1n0 are 100V 0805 NPO
SMD Capacitors >1n0 and < 1u0 are 50V 0805 X7R

Uncontrolled UDocument

USE ONLY FOR JOB No.
J/N:

PROTECTION & CONTROL rms
www.rmspl.com.au

TYPE No. ---- FLOWCHART

DRAWN	DATE
D.W.B	08/07/2006

1A054-INPUTS

V1.00

SHEET: A3 SCALE: D.N.S SHEET:1 OF: 1

D:\THE_CHIP\RMS\MATRIX-S\ALARM PANEL\DOCO\1A054-INPUTS-100.Sch

RMS-A3.SCHDOT Iss A

3rd Angle projection

Part

5

Installation

Handling of Electronic Equipment

A person's normal movements can easily generate electrostatic potentials of several thousand volts. Discharge of these voltages into semiconductor devices when handling electronic circuits can cause serious damage, which often may not be immediately apparent but the reliability of the circuit will have been reduced.

The electronic circuits of Relay Monitoring Systems Pty Ltd products are immune to the relevant levels of electrostatic discharge when housed in the case. Do not expose them to the risk of damage by withdrawing modules unnecessarily.

Each module incorporates the highest practicable protection for its semiconductor devices. However, if it becomes necessary to withdraw a module, the following precautions should be taken to preserve the high reliability and long life for which the equipment has been designed and manufactured.

1. Before removing a module, ensure that you are at the same electrostatic potential as the equipment by touching the case.
2. Handle the module by its front-plate, frame, or edges of the printed circuit board.
3. Avoid touching the electronic components, printed circuit track or connectors.
4. Do not pass the module to any person without first ensuring that you are both at the same electrostatic potential. Shaking hands achieves equipotential.
5. Place the module on an antistatic surface, or on a conducting surface which is at the same potential as yourself.
6. Store or transport the module in a conductive bag.

If you are making measurements on the internal electronic circuitry of an equipment in service, it is preferable that you are earthed to the case with a conductive wrist strap.

Wrist straps should have a resistance to ground between 500k – 10M ohms. If a wrist strap is not available, you should maintain regular contact with the case to prevent the build up of static.

Instrumentation which may be used for making measurements should be earthed to the case whenever possible.

Safety Section

This Safety Section should be read before commencing any work on the equipment.

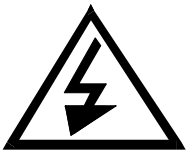
The information in the Safety Section of the product documentation is intended to ensure that products are properly installed and handled in order to maintain them in a safe condition. It is assumed that everyone who will be associated with the equipment will be familiar with the contents of the Safety Section.

Explanation of Symbols & Labels

The meaning of symbols and labels which may be used on the equipment or in the product documentation, is given below.

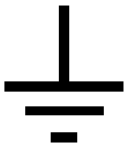
Caution: refer to product information

Caution: risk of electric shock



Functional earth terminal

Note: this symbol may also be used for a protective/safety earth terminal if that terminal is part of a terminal block or sub-assembly eg. power supply.



Unpacking

Upon receipt inspect the outer shipping carton or pallet for obvious damage.

Remove the individually packaged relays and inspect the cartons for obvious damage.

To prevent the possible ingress of dirt the carton should not be opened until the relay is to be used. Refer to the following images for unpacking the relay:

Outer packing carton showing shipping documentation pouch.
Address label on top of carton.

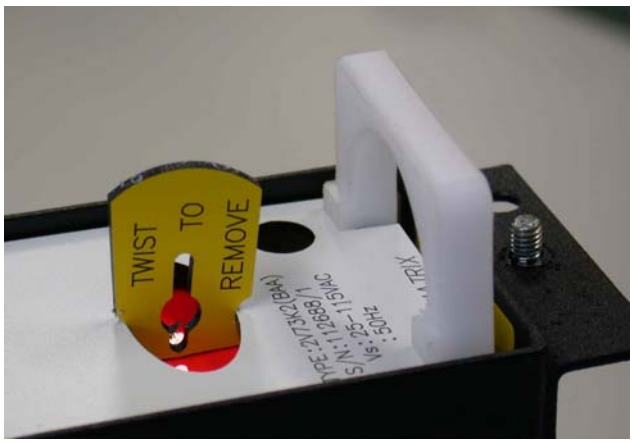
Inner packing carton showing front label detailing the customer name, order number, relay part number & description, the relay job number & packing date.
(Size 2 inner packing carton depicted)

Unpacking (Continued)

Inner packing carton with lid open showing protective foam insert.

CD depicted supplied with digital relay models or upon request at time of order.

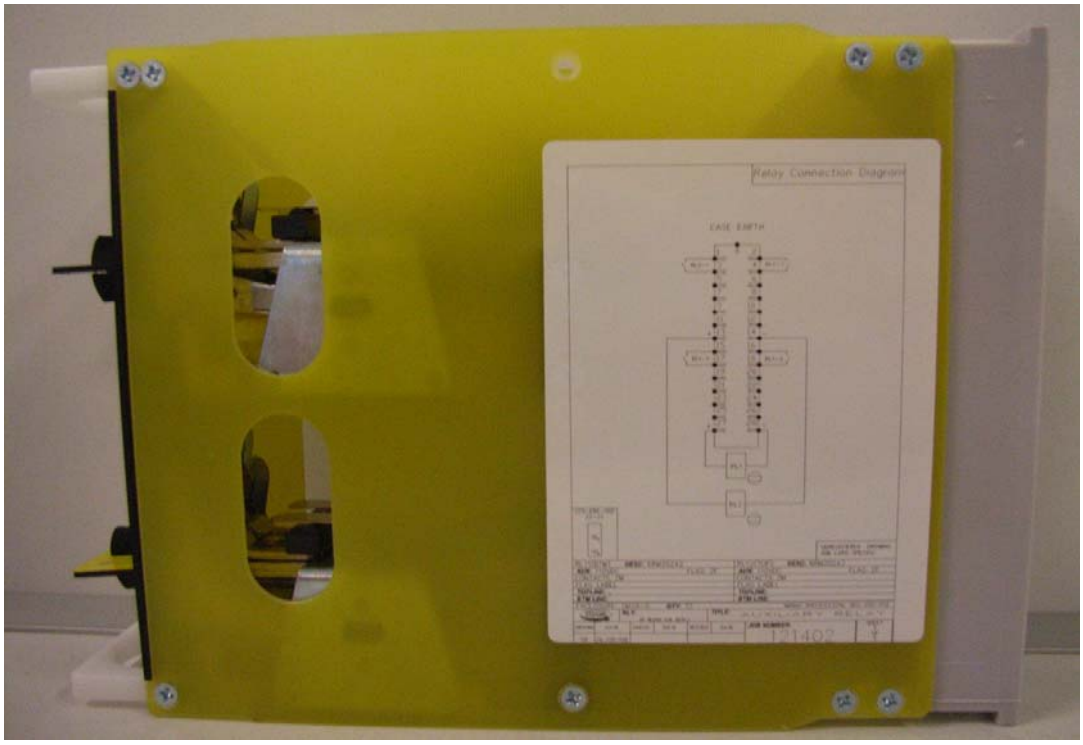
Inner packing carton with protective foam insert removed showing relay location.



Where mechanical flags are fitted the yellow transit wedge must be removed before operation using a gentle twisting action. The wedge should be stored with the original packaging material.

Relay Module Side Label Depicting Product Details

Relay Module Side Label Depicting Wiring Diagram (6R MATRIX relays only)



Accessories Supplied With Each Relay

Self threading M4 mounting screws

M4 terminal screws with captured lock washers

Storage & Handling

If damage has been sustained a claim should immediately be made against the carrier, also inform Relay Monitoring Systems Pty Ltd and the nearest RMS agent

When not required for immediate use, the relay should be returned to its original carton and stored in a clean, dry place.

Relays which have been removed from their cases should not be left in situations where they are exposed to dust or damp. This particularly applies to installations which are being carried out at the same time as constructional work.

If relays are not installed immediately upon receipt they should be stored in a place free from dust and moisture in their original cartons.

Dust which collects on a carton may, on subsequent unpacking, find its ay into the relay; in damp conditions the carton and packing may become impregnated with moisture and the de-humidifying agent will lose is efficiency.

Equipment Operating Conditions

The equipment should be operated within the specified electrical and environmental limits.

Protective relays, although generally of robust construction, require careful treatment prior to installation and a wise selection of site. By observing a few simple rules the possibility of premature failure is eliminated and a high degree of performance can be expected.

Care must be taken when unpacking and installing the relays so that none of the parts are damaged or their settings altered and must al all times be handled by skilled persons only.

Relays should be examined for any wedges, clamps, or rubber bands necessary to secure moving parts to prevent damage during transit and these should be removed after installation and before commissioning.

The relay should be mounted on the circuit breaker or panel to allow the operator the best access to the relay functions.

Relay Dimensions & Other Mounting Accessories

Refer drawing in Technical Bulletin. Relevant Auto Cad files & details on other accessories such as 19 inch sub rack frames, semi projection mount kits & stud terminal kits may be down loaded from:

http://www.rmspl.com.au/mseries.htm

Equipment Connections

Personnel undertaking installation, commissioning or servicing work on this equipment should be aware of the correct working procedures to ensure safety. The product documentation should be consulted before installing, commissioning or servicing the equipment.

Terminals exposed during installation, commissioning and maintenance may present hazardous voltage unless the equipment is electrically isolated.

If there is unlocked access to the rear of the equipment, care should be taken by all personnel to avoid electric shock or energy hazards.

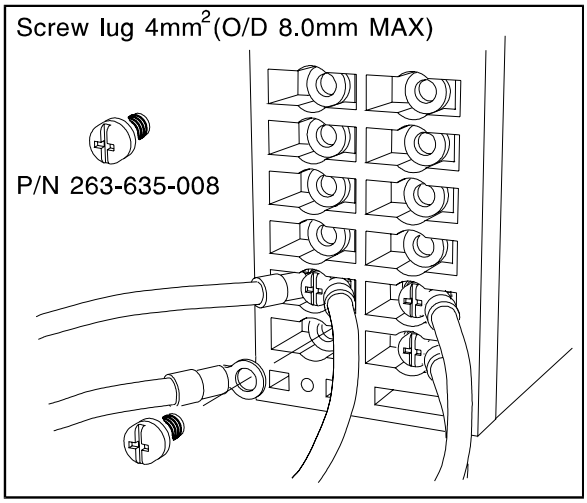
Voltage and current connections should be made using insulated crimp terminations to ensure that terminal block insulation requirements are maintained for safety. To ensure that wires are correctly terminated, the correct crimp terminal and tool for the wire size should be used.

Before energising the equipment it must be earthed using the protective earth terminal, or the appropriate termination of the supply plug in the case of plug connected equipment. Omitting or disconnecting the equipment earth may cause a safety hazard.

The recommended minimum earth wire size is 2.5mm^2, unless otherwise stated in the technical data section of the product documentation.

Before energising the equipment, the following should be checked:

1. Voltage rating and polarity;
2. CT circuit rating and integrity of connections;
3. Protective fuse rating;
4. Integrity of earth connection (where applicable)



Current Transformer Circuits

Do not open the secondary circuit of a live CT since the high voltage produced may be lethal to personnel and could damage insulation.

External Resistors

Where external resistors are fitted to relays, these may present a risk of electric shock or burns, if touched.

Insulation & Dielectric Strength Testing

Insulation testing may leave capacitors charged up to a hazardous voltage. At the end of each part of the test, the voltage should be gradually reduced to zero, to discharge capacitors, before the test leads are disconnected.

Insertion of Modules

These must not be inserted into or withdrawn from equipment whilst it is energised, since this may result in damage.

Electrical Adjustments

Pieces of equipment which require direct physical adjustments to their operating mechanism to change current or voltage settings, should have the electrical power removed before making the change, to avoid any risk of electric shock.

Mechanical Adjustments

The electrical power to the relay contacts should be removed before checking any mechanical settings, to avoid any risk of electric shock.

Draw Out Case Relays

Removal of the cover on equipment incorporating electromechanical operating elements, may expose hazardous live parts such as relay contacts.

Insertion & Withdrawal of Heavy Current Test Plugs

When using a heavy current test plug, CT shorting links must be in place before insertion or removal, to avoid potentially lethal voltages.

Commissioning Preliminaries

Carefully examine the module and case to ser that no damage has occurred during transit. Check that the relay serial number on the module, case and cover are identical, and that the model number and rating information are correct.

Carefully remove any elastic bands/packing fitting for transportation purposes.

Check that the external wiring is correct to the relevant relay diagram or scheme diagram. The relay diagram number appears inside the case.

Particular attention should be paid to the correct wiring and value of any external resistors indicated on the wiring diagram/relay rating information.

Note that shorting switches shown on the relay diagram are fitted internally across the relevant case terminals and close when the module is withdrawn. It is essential that such switches are fitted across all CT circuits.

If a test block system is to be employed, the connections should be checked to the scheme diagram, particularly that the supply connections are to the 'live' side of the test block.

Earthing

Ensure that the case earthing connection above the rear terminal block, is used to connect the relay to a local earth bar.

Insulation

The relay, and its associated wiring, may be insulation tested between:

- all electrically isolated circuits
- all circuits and earth

An electronic or brushless insulation tester should be used, having a dc voltage not exceeding 1000V. Accessible terminals of the same circuit should first be strapped together. Deliberate circuit earthing links, removed for the tests, subsequently must be replaced.

Commissioning Tests

If the relay is wired through a test block it is recommended that all secondary injection tests should be carried out using this block.

Ensure that the main system current transformers are shorted before isolating the relay from the current transformers in preparation for secondary injection tests.

DANGER

DO NOT OPEN CIRCUIT THE SECONDAY CIRCUIT OF A CURRENT TRANSFORMER SINCE THE HIGH VOLTAGE PRODUCED MAY BE LETHAL AND COULD DAMAGE INSULATION.

It is assumed that the initial preliminary checks have been carried out.

Relay CT shorting switches

With the relay removed from its case, check electrically that the CT shorting switch is closed.

Primary injection testings

It is essential that primary injection testing is carried out to prove the correct polarity of current transformers.

Before commencing any primary injection testing it is essential to ensure that the circuit is dead, isolated from the remainder of the system and that only those earth connections associated with the primary test equipment are in position.

Decommissioning & Disposal

Decommissioning: The auxiliary supply circuit in the relay may include capacitors across the supply or to earth. To avoid electric shock or energy hazards, after completely isolating the supplies to the relay (both poles of any dc supply), the capacitors should be safely discharged via the external terminals prior to decommissioning.

Disposal: It is recommended that incineration and disposal to water courses is avoided. The product should be disposed of in a safe manner.

Maintenance

Mechanical Inspection

Relay Assembly

Inspect the relay for obvious signs of damage or ingress of moisture or other contamination.

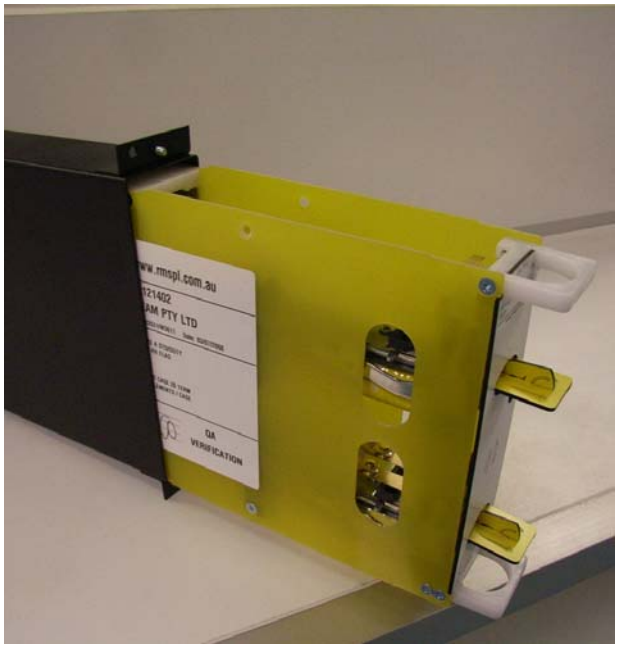
Relay Module

Isolate the relay, remove the front cover & carefully withdraw the relay module from the case.

Care must be taken to avoid subjecting the relay element to static discharge which may damage or degrade sensitive electronic components.

Inspect the relay module for signs of any overheating or burn marks which may have been caused by overvoltage surge or transient conditions on the power supply or digital status inputs.

Inspect the VT & CT stages for degradation of insulation on the terminal wiring & transformer windings.



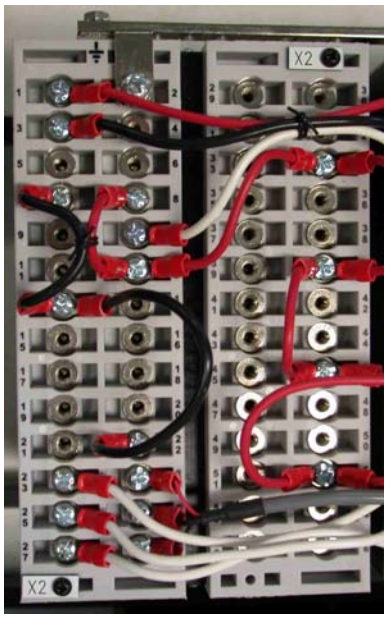
Remove cover by unscrewing black thumb screws & withdraw the relay module from the case.

Relay Case

Inspect the outer terminals checking insulation integrity & tightness.

Inspect inside the case and use a blower to remove dust.

Inspect the inner terminals for worn, distorted or tarnished contacts and if necessary clean the contacts using a brush dipped in a suitable substance.



Case outer terminals

Case inner terminals

Module plug in terminals

Test Intervals

The maintenance tests required will largely depend upon experience and site conditions, but as a general rule it is recommended that the following inspection and tests are performed every twelve months.

- Mechanical Inspection
- Check of Connections
- Insulation Resistance Test
- Fault Setting Tests by Secondary Injection
- Tests using Load Current
- Check the continuity of the neutral CT loop with a bell test set or an ohmmeter

Defect Report Form

Please copy this sheet and use it to report any defect which may occur.

Customers Name & Address:	Contact Name:
	Telephone No:
	Fax No:
Supplied by:	Date when installed:
Site:	Circuit:

When Defect Found

Date:	Commissioning?	Maintenance?	Systems Fault?	Other, Please State:
Product Part No:				Serial Number:
Copy any message displayed by the relay:				
Describe Defect:				
Describe any other action taken:				
Signature:		Please Print Name:		Date:

For RMS use only

Date Received:	Contact Name:	Reference No:	Date Acknowledged:	Date of Reply:	Date Cleared:

Australian Content

Unless otherwise stated the product(s) quoted are manufactured by RMS at our production facility in Melbourne Australia. Approximately 60% of our sales volume is derived from equipment manufactured in house with a local content close to 90%. Imported components such as semi-conductors are sourced from local suppliers & preference is given for reasonable stock holding to support our build requirements.

Quality Assurance

RMS holds NCSI (NATA Certification Services International), registration number 6869 for the certification of a quality assurance system to AS/NZS ISO9001-2008. Quality plans for all products involve 100% inspection and testing carried out before despatch. Further details on specific test plans, quality policy & procedures may be found in section A4 of the RMS product catalogue.

Product Packaging

Protection relays are supplied in secure individual packing cardboard boxes with moulded styrene inserts suitable for recycling. Each product & packing box is labeled with the product part number, customer name & order details.

Design References

The products & components produced by RMS are based on many years of field experience since Relays Pty Ltd was formed in 1955. A large population of equipment is in service throughout Australia, New Zealand, South Africa & South East Asia attesting to this fact. Specific product & customer reference sites may be provided on application.

Product Warranty

All utility grade protection & auxiliary relay products, unless otherwise stated, are warranted for a period of 24 months from shipment for materials & labour on a return to factory basis. Repair of products damaged through poor application or circumstances outside the product ratings will be carried out at the customer's expense.

Standard Conditions of Sale

Unless otherwise agreed RMS Standard Terms & Conditions (QF 907) shall apply to all sales. These are available on request or from our web site.

Relay Monitoring Systems Pty Ltd

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