TYCO T1200-C

Marine Fire Detection/Alarm Control Panel and Repeater

Application Guide

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3. Introduction

This document contains technical information necessary for application design using the T1200-C Marine Conventional Fire Detection control panel.

The following supporting documentation is also available:

- T1200-C Sales Literature
- T1200-C User Manual
- T1200-C Installation and Commissioning Manual
- T1200-C Log Book
- Display Insert Templates

Note: References are made throughout this document to "Fire Protection Output" and "Fire Output". These refer to particular outputs from the T1200-C panels and are provided for specific purposes:

- Fire Protection Output: An output used to activate ancillary fire protection equipment or systems. For example, fire doors or plant shutdown.
- Fire Output: An output used to send a common fire warning signal to a remote fire monitoring station.

References are also made to "Manual Fire Alarm" and "Muster". These relate to fire alarm sounder operating modes which are activated manually from the fire panel display. The panel is configurable to one or other of the two modes.

Detailed descriptions of both outputs are provided within the following text.

4. General Description

The T1200-C Panel range is fully compliant with the mandatory requirements and selected optional requirements of EN54 parts 2 and 4 as well as the relevant requirements of SOLAS 74.

The T1200-C equipment range consists of the following:

- Panels: 4, 16 and 32 zone versions.
- Repeater: 16 and 32 zone versions.

Each panel in the range is housed in a metal enclosure incorporating a door-mounted display board fitted with a polyester overlay providing user controls and indications. All display text is printed on polyester inserts that slide into pockets in the overlay. User controls are locked & unlocked via a Keyswitch. All indications are implemented using LEDs. The power supply is housed within the panel enclosure and the standby batteries are housed in a separate battery box.

Cable entry can be top or bottom. The T1204 has gland plates at the top & the bottom. The T1216-C & T1232-C have only one gland plate but the enclosure can be inverted to allow cable entry top or bottom. Factory default is bottom cable entry for the T1216-C & T1232-C.

4.1   Cabinet Specifications

Enclosure construction:
- High quality, robust welded mild steel enclosure with fully welded seams.
- Lockable door with trapped screws top & bottom.
- Gland plate with 20mm knock-outs.
- Reversible door to allow enclosure to be inverted to allow cable entry from top or bottom (not T1204).
- Door, gland plate and display plate fitted with neoprene seals.
- Display-mounted access control key switch fitted with weatherproof cover.
- Motherboard and power supply mounted to a removable chassis for easy installation.
- Optional door stay available.

Enclosure material gauge:
- Enclosure – 1.6mm thick.
- Gland plate – 2mm thick.

Paint finish:
- High quality, durable 2 stage system.
- Pre treatment – Electro-zinc plated and full passivation.
- Polyester powder coat, semi gloss leatherette at 70-80 microns.

Figure 1 – 4-Zone Panel Enclosure external view
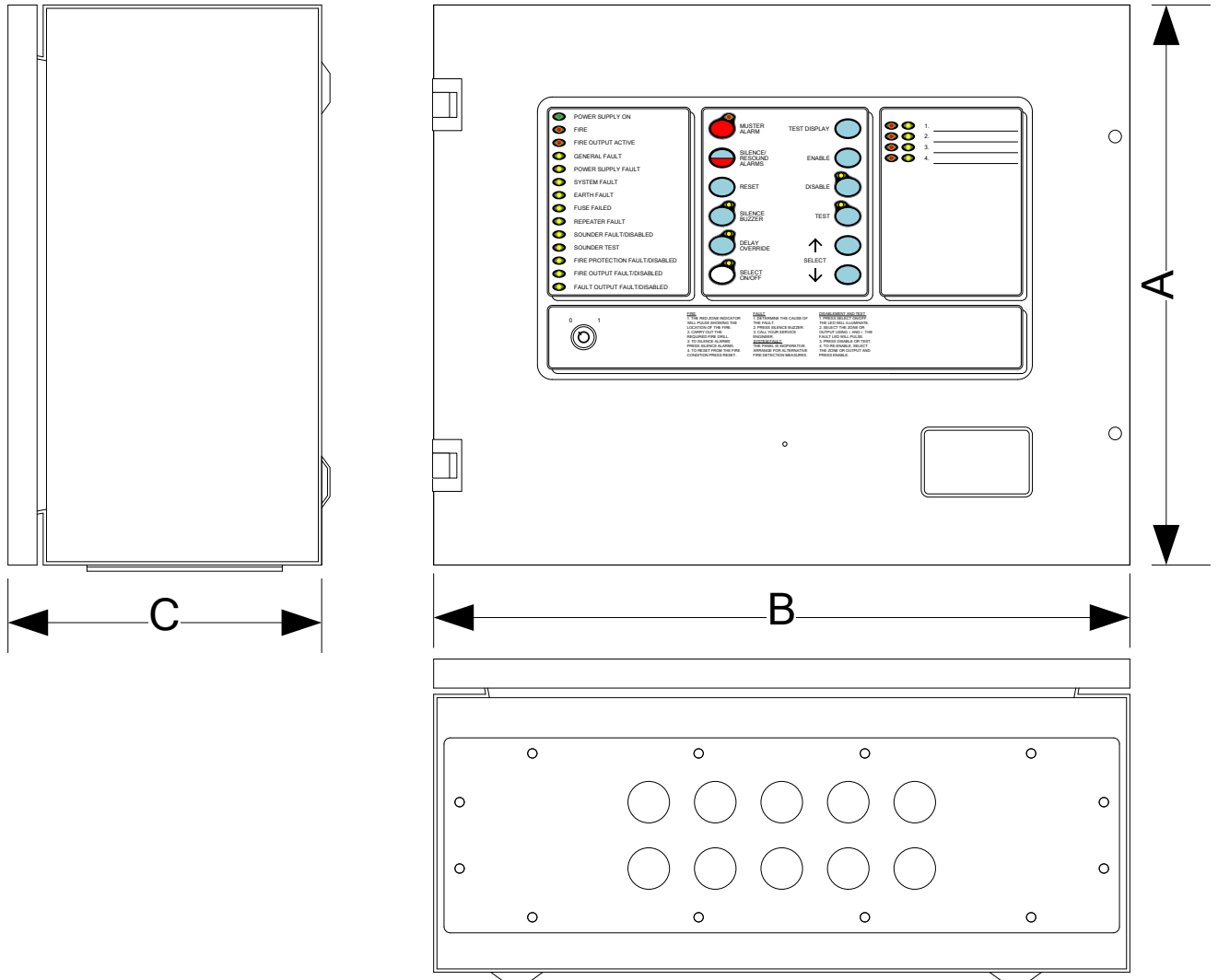
	T1204
20mm knock-outs (Top entry gland plate)	10
Bottom entry gland plate [without knock-outs]	✓
Dim A [mm]	270
Dim B [mm]	335
Dim C [mm]	148

Figure 2 – Console Mount Panel Enclosures external view
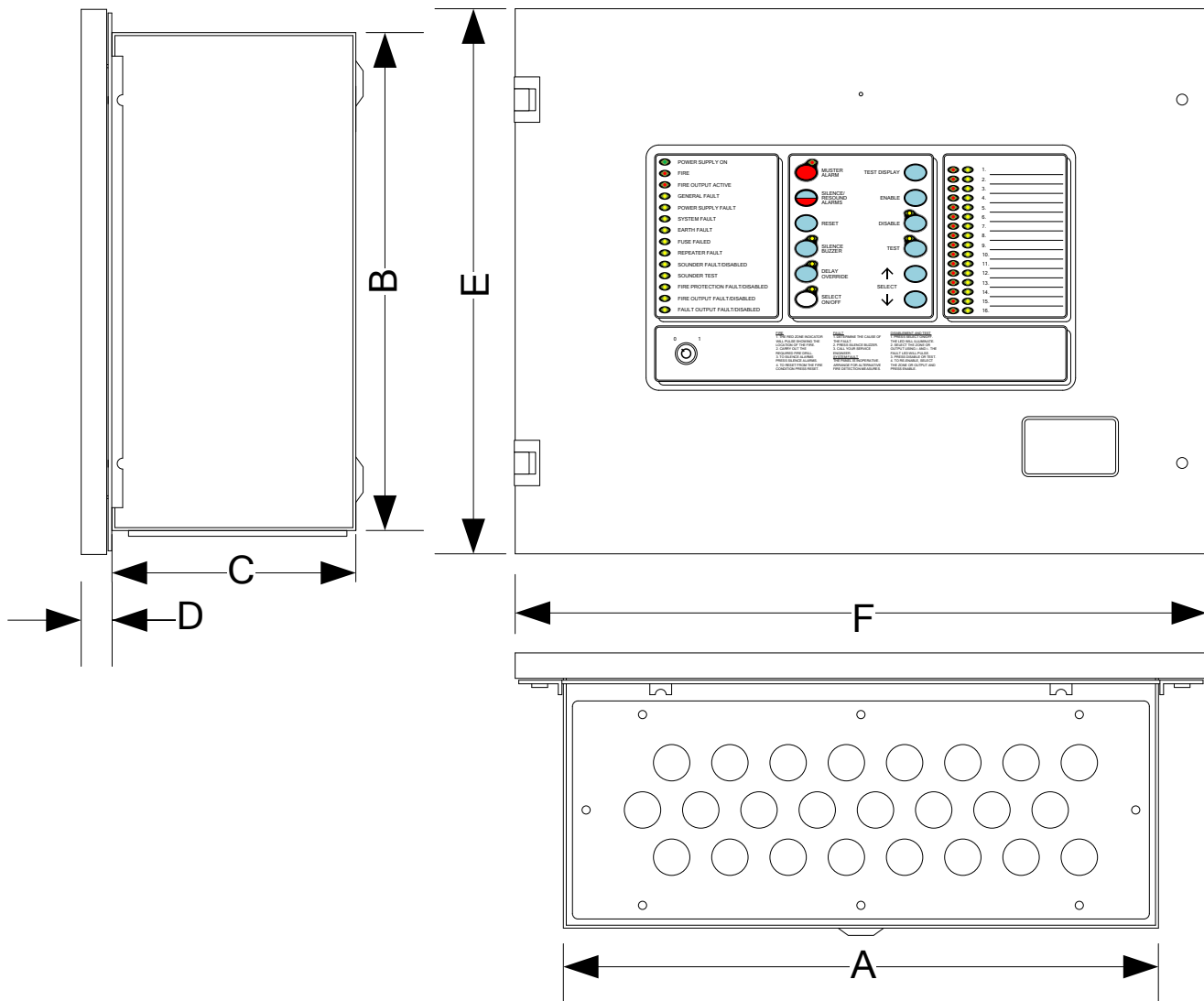
	T1216-C	**T1232-C**	**T1216R-C**	**T1232R-C**
20mm knock-outs in removable gland plate	24	36	24	36
Dim A [mm]	327	351	327	351
Dim B [mm]	274	280	274	280
Dim C [mm]	134	160	134	160
Dim D [mm]	18	18	18	18
Dim E [mm]	300	300	300	300
Dim F [mm]	380	400	380	400

Figure 3 – Battery Box
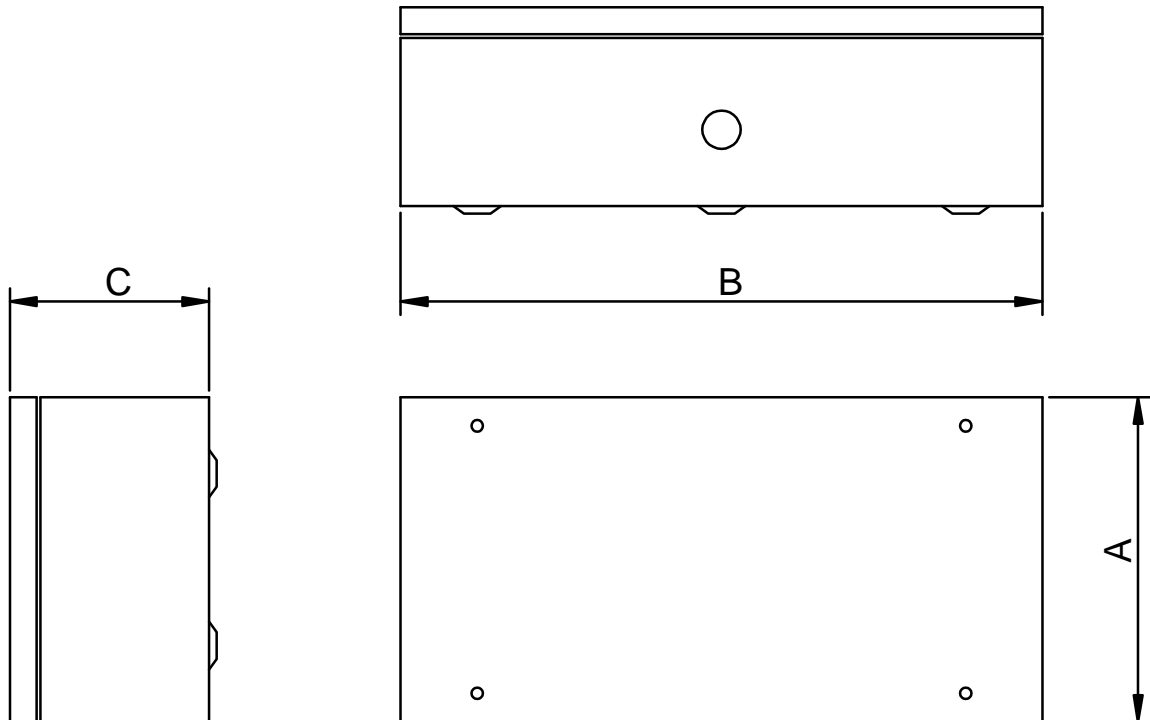
	T1200B-C Battery Box
20mm knock-outs	1 at top 1 at bottom
Dim A [mm]	235
Dim B [mm]	395
Dim C [mm]	106

4.1.1 Order Codes & Descriptions

Tyco Part No.	Description	Standby SLA Battery
508.023.001	T1204DC – 4-Zone Panel c/w 1.5A 24Vdc PSU.	24V, 7Ah in T1200B enclosure
508.023.002	T1204A1 – 4-Zone Panel c/w 1.5A 110Vac PSU.	24V, 7Ah in T1200B enclosure
508.023.003	T1204A2 – 4-Zone Panel c/w 1.5A 230Vac PSU.	24V, 7Ah in T1200B enclosure
508.023.023	T1200B B1 Battery box for T1204 – 4 zone panel.	24V, 3/7Ah
508.023.104	T1216-C – 16-Zone Panel c/w voyage data recorder output module and 4A 110/230Vac PSU.	24V, 17Ah in T1200B-C enclosure
508.023.105	T1216W-C – 16-Zone Watermist Panel with 2x C1634 Relay output boards and 4A 110/230Vac PSU.	24V, 17Ah in T1200B-C enclosure
508.023.106	T1232-C – 32-Zone Panel c/w voyage data recorder output module and 5Amp 110/230Vac PSU.	24V, 17Ah in T1200B-C enclosure
508.023.111	T1216R-C – 16 Zone Repeater - 24Vdc powered [including 2x C1631 repeater interfaces – one fitted, one spare for site fitting to panel].	N/A
508.023.114	T1232R-C – 32 Zone Repeater - 24Vdc powered [including 2x C1631 repeater interfaces – one fitted, one spare for site fitting to panel].	N/A
508.023.122	T1200E-C Expansion box for 4 output boards, without power supply	N/A
508.023.123	T1200B-C Battery enclosure for 2x 17Ah batteries.	24V, 17Ah
508.023.036	A1466 Relay Board [2x volt-free changeover contacts rated 2A, 30V Max].	N/A

4.1.2 Replacement Part Order Codes and Descriptions

Tyco Part No.	Description	Used in
509.023.006	C1626 – 4-zone panel motherboard. With AC PSU	T1204A1 T1204A2
509.023.007	C1626 – 4-zone panel motherboard. With no PSU	T1204DC
509.023.008	C1627 – T1216-C panel motherboard	T1216-C
509.023.009	C1627 – T1232-C panel motherboard	T1232-C
509.023.012	C1626 – Repeater motherboard	T1216R-C T1232R-C
509.023.021	C1628 – 4-zone panel display 2605041 fitted with 4 zone overlay [No inserts]	T1204A1 T1204A2 T1204DC
509.023.022	C1628 – 16-zone panel display 2605043 fitted with 16 zone overlay [No inserts]	T1216-C
509.023.023	C1629 – 32-zone panel display 2605044 fitted with 32 zone overlay [No inserts]	T1232-C
509.023.031	C1628 – 16-zone repeater display 2605054 fitted with 16 zone overlay [No inserts]	T1216R-C
509.023.032	C1629 – 32-zone repeater display 2605055 fitted with 32 zone overlay [No inserts]	T1232R-C
2605061	C1631 – Repeater interface Board	T1216-C [with repeater] T1232-C [with repeater] T1216R-C T1232R-C
2605060	C1630 – Output Expansion Interface Board	T1216-C T1232-C
509.023.042	C1632 – 16-zone expansion board (provides zones 17 to 32)	T1232-C
2605064	C1634 Relay Output Board	T1216-C T1232-C
508.023.035	C1665 – Muster interface (Optional add-on)	T1216-C T1232-C T1216R-C T1232R-C
509.023.071	C1714 VDR Interface Board	T1216-C T1232-C
509.023.052	24 VDC PSU [PS40-1-09]	T1204DC
509.023.051	110/230V AC PSU [PS136-1-09]	T1216-C T1232-C
509.023.061	T1200/T1200-C Spare key set - 2 off access controls keys	All panels and repeaters

4.1.3 Optional Language Display Inserts

Tyco Part No	Description	Insert set comprises
508.023.051	T1216/T1216-C insert set	LED Insert – Standard Version Side 1 – Chinese. Side 2 – Japanese
		Switch Insert 1 – Standard Version (Fire Alarm Switch). Side 1 – Chinese. Side 2 – Japanese
		Switch Insert 2 – Standard Version (Muster Alarm Switch). Side 1 – Chinese. Side 2 – Japanese
		Switch Insert 3 – Std Version (No Fire/Muster Alarm Switch). Side 1 – Chinese. Side 2 – Japanese
		Zone Location Insert Side 1 – Chinese. Side 2 – Japanese
		Instruction Insert – 16 Zone Standard Panel Side 1 – Chinese. Side 2 – Japanese
508.023.052	T1232/T1232-C insert set	LED Insert – Standard Version Side 1 – Chinese. Side 2 – Japanese
		Switch Insert 1 – Standard Version (Fire Alarm Switch) Side 1 – Chinese. Side 2 – Japanese
		Switch Insert 2 – Standard Version (Muster Alarm Switch) Side 1 – Chinese. Side 2 – Japanese
		Switch Insert 3 – Std Version (No Fire/Muster Alarm Switch). Side 1 – Chinese. Side 2 – Japanese
		Zone Location Insert x 2 Side 1 – Chinese. Side 2 – Japanese
		Instruction Insert – 32 Zone Standard Panel Side 1 – Chinese. Side 2 – Japanese
508.023.053	T1216R/T1216R-C insert set	LED Insert – Repeater Version Side 1 – Chinese. Side 2 – Japanese
		Switch Insert 1 – Repeater Version (Fire Alarm Switch) Side 1 – Chinese. Side 2 – Japanese
		Switch Insert 2 – Repeater Version (Muster Alarm Switch) Side 1 – Chinese. Side 2 – Japanese
		Switch Insert 3 – Repeater (No Fire/Muster Alarm Switch). Side 1 – Chinese. Side 2 – Japanese
		Zone Location Insert Side 1 – Chinese. Side 2 – Japanese
		Instruction Insert – 16 Zone Repeater Panel Side 1 – Chinese. Side 2 – Japanese
508.023.054	T1232R/T1232R-C insert set	LED Insert – Repeater Version Side 1 – Chinese. Side 2 – Japanese
		Switch Insert 1 – Repeater Version (Fire Alarm Switch) Side 1 – Chinese. Side 2 – Japanese
		Switch Insert 2 – Repeater Version (Muster Alarm Switch) Side 1 – Chinese. Side 2 – Japanese
		Switch Insert 3 – Repeater (No Fire/Muster Alarm Switch) Side 1 – Chinese. Side 2 – Japanese
		Zone Location Insert x 2 Side 1 – Chinese. Side 2 – Japanese
		Instruction Insert – 32 Zone Repeater Panel Side 1 – Chinese. Side 2 – Japanese

4.1.4 Optional Door Stay Assembly

Tyco Part No	Description	Used On
508.023.025	T1200 Door Stay Assembly	T1216-C, T1216W-C, T1232-C, T1216R-C, T1232R-C, T1200E-C

4.2   Fire Detection and Alarm Panel Description

See exploded general assembly drawings below.
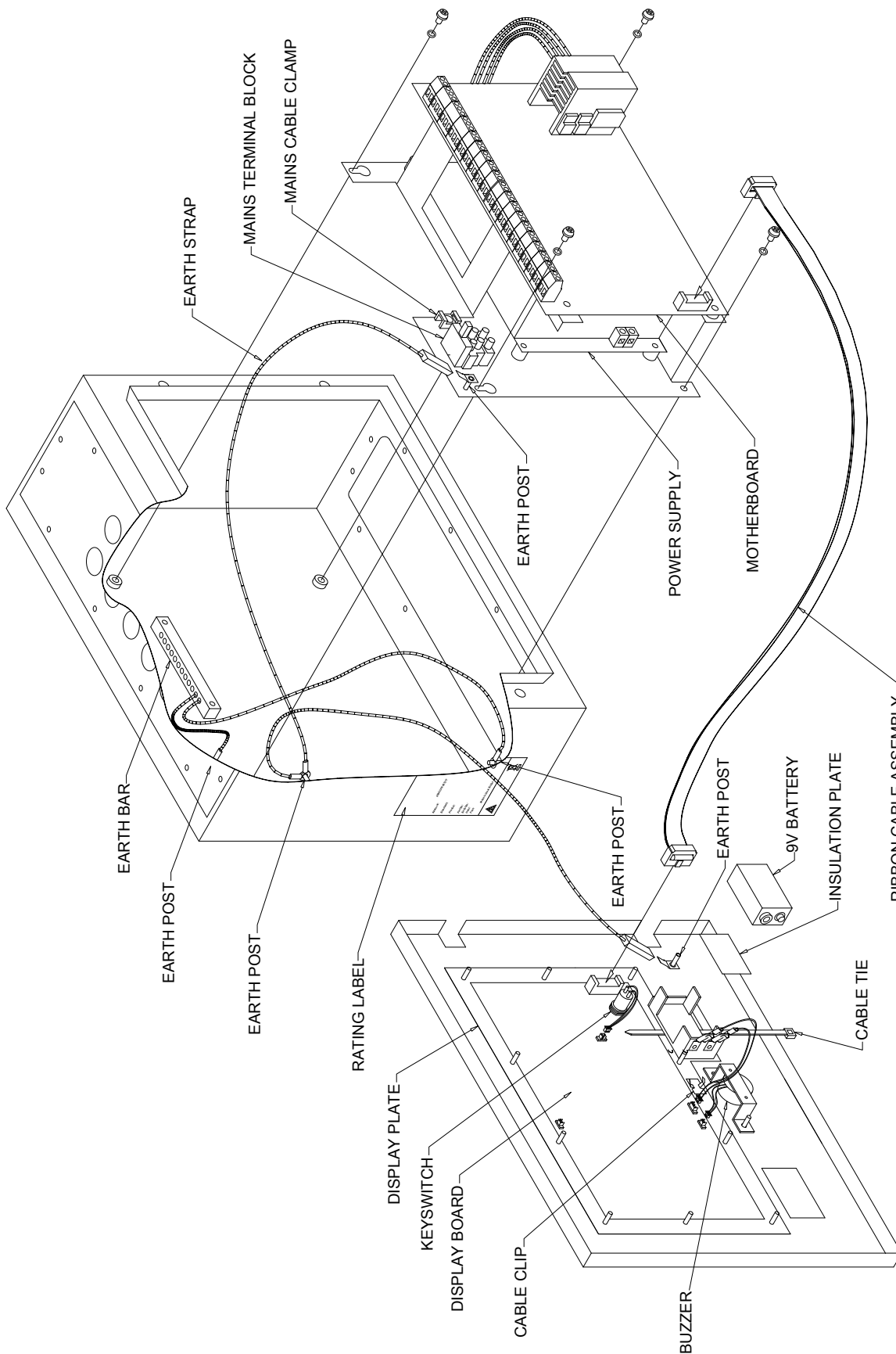
Figure 4 – T1204 Panel – General Assembly

Figure 5 – T1216-C Panel – General Assembly

Registered Company: Thorn Security Ltd. Registered Office: Dunhams Lane Letchworth Garden City Hertfordshire SG6 1BE
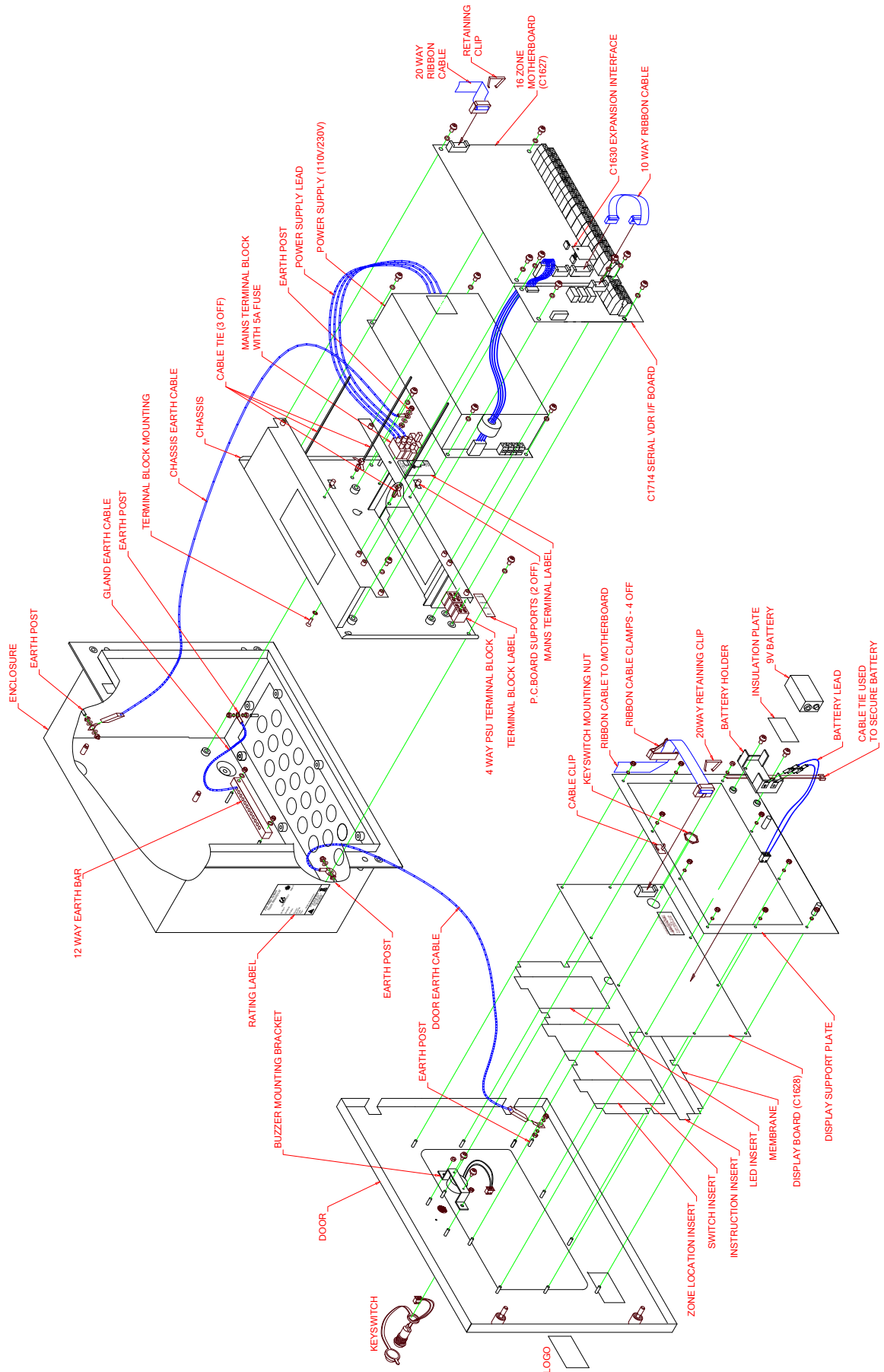
Figure 6 – T1232-C Panel – General Assembly

20 WAY RIBBON CABLE TO DISPLAY

RETAINING CLIP

C1630 EXPANSION INTERFACE BOARD

14 WAY CABLE ASSEMBLY

PANEL MOTHERBOARD (C1627)

10 WAY RIBBON CABLE ASSEMBLY

POWER SUPPLY (110V/230V)

C1714 SERIAL VDR I/F BOARD

POWER SUPPLY LEAD

C1632 + C1714 MTG DETAILS M3x22 HEX SPACER (4 OFF)

SERIAL VDR I/F BOARD MOUNTING BRACKET

POWER SUPPLY LEAD

EARTH POST

C1632 EXPANSION BOARD

CABLE TIE (3 OFF)

EARTH POST

CHASSIS EARTH CABLE

GLAND EARTH CABLE

EARTH POST

P.C.BOARD SUPPORTS (2OFF)

MAINS TERMINAL LABEL

MAINS TERMINAL BLOCK 5A0 FUSE

EARTH POST

ENCLOSURE

4 WAY PSU TERMINAL BLOCK

TERMINAL BLOCK LABEL

RIBBON CABLE TO MOTHERBOARD

KEYSWITCH MOUNTING NUT

RIBBON CABLE CLAMPS - 4 OFF

20W RETAINING CLIP

BATTERY CLAMP

INSULATION PLATE

9V BATTERY

CABLE CLIP

BATTERY LEAD

CABLE TIE USED TO SECURE BATTERY

12 WAY EARTH BAR (2 OFF)

RATING LABEL

EARTH POST

DOOR EARTH CABLE

EARTH POST

BUZZER MOUNTING BRACKET

ZONE LOCATION INSERT - 2 OFF

INSTRUCTION INSERT

SWITCH INSERT

LED INSERT

MEMBRANE

DISPLAY BOARD (C1629)

DISPLAY SUPPORT PLATE

KEYSWITCH

LOGO

4.2.1 C1626 4 Zone Motherboard

This board is used on the T1204 panel. It provides terminals for all the field wiring, connectors for the repeater interface and connections to the display board. It accommodates the microcontroller (including Firmware and RAM) and all of the vessel-specific configuration features (DIL switch & EEPROM).

It is also used, in a depopulated form, as the motherboard for the T1216R-C and T1232R-C repeater panels.

Power supply components for the mains powered 4-zone panels are located on this PCB. The components are depopulated for the DC powered panel and repeaters.

4.2.2 C1627 16 Zone Motherboard

This board is common to the T1216-C and T1232-C panels.

It provides terminals for all the field wiring, interface connectors for the repeater, zonal expansion connectors and connections to the display board. It accommodates the microcontroller (including Firmware and RAM) and all of the vessel-specific configuration features (DIL switch & EEPROM).

4.2.3 C1632 32 Zone Expansion Board

This board provides an additional 16 detection zones, labelled as zones 17 to 32. It is connected to the C1627 motherboard via a ribbon cable to provide a total of 32 zones for the T1232-C panel.

4.2.4 C1628 16-Zone Display Board and C1629 32-Zone Display Board

These boards provide visible [LED] user indications and user control buttons. The display board connects to the motherboard via a ribbon cable. The C1628 is common to the T1204, T1216-C and T1216R-C panels. The C1629 is common to the T1232-C and T1232R-C. The Enable, Disable, Test Select On/Off & Select Up/Down buttons are not fitted on the repeater versions. A jumper link is provided on the internal face of the display boards [on the control panels only] to allow the Manual Fire Alarm button, located on the display, to operate in one of the following modes:

- Manual fire alarm Sounder response.
- Muster Sounder response.
- No response [button disabled].

4.2.5 Display Overlay and Inserts

The display overlay is bonded to the display PCB and is used with a series of text label inserts to identify the various user controls and indications. The inserts slip into pockets in the overlay and

facilitate foreign language variants without affecting the overlay. The panel is provided with one set of Standard English text inserts fitted. These inserts are reversible and the rear is blank to allow small volume language variants to be typed. Since one of the panel's configurable options allows manual activation of the fire alarms in either the Manual Fire Alarm or Muster mode, an additional English text insert is provided for the user controls section; one side identifies the top left hand button and LED as "Manual Fire Alarm" the other side identifies the button as "Muster".

4.2.6 C1631 Repeater Interface Board

This optional plug-in board provides an RS485 serial interface for communication with up to 5 repeaters connected to a T1216-C or T1232-C panel. It is fitted to the panel & repeater motherboards via two connectors. The panel does not have the C1631 board fitted as standard. Each repeater is supplied with a C1631 fitted and a C1631 in the spares bag for fitting to the panel if required.

Three DIL switches on the C1631 configure the panel with the number of repeaters connected. At each repeater these DIL switches configure the address of the repeater.

4.2.7 C1665 Muster Interface Board

This optional plug-in board provides an additional fault monitored link between the fire alarm panel and the repeaters. It allows the muster alarm to be initiated on the panel by operating the Muster button on a repeater. It is capable of operating the Muster even if the microcontrollers have failed on the fire panel and repeaters. One C1665 needs to be fitted to the fire alarm panel and one to each repeater. If the muster alarm is to be initiated by the Manual Fire Alarm/Muster push button on the repeaters then the Muster Interface has to be fitted. There are no configuration requirements for this board. This board is not required for Manual Fire Alarm [general alarm] operation.

4.2.8 Output Expansion System

The output expansion system is an expandable modular output system, for use local to the T1216-C and T1232-C panels. It comprises of an Output Interface Board and four types of Output board that provide various output expansion options.

General features:

- 8 outputs per output board (except VDR output board).
- 4 application types:
  - ○ Type 1 – Indication output module (C1633).
  - ○ Type 2 – Fire protection output module

(C1635 – Monitored, C1634 – Non-monitored).

- o Type 3 – Sounder output module (C1635).
- o Type 4 – Voyage data recorder output module (C1714).

- Pre defined zone group allocation for types 1, 2 and 3 which allocates a group of 8 sequential zones to each board as follows. Zone groups are:

    Zones 1-8, 9-16, 17-24 and 25-32

- All terminals for field cabling are suitable for 2.5mm conductors.

- Ribbon Cable connection to panel providing 2-wire RS485 Serial Communications to all boards and DC power for C1634 (and other signals).

- DC Power supply input from panel or an external PSU depending upon application.

- A maximum of thirteen output boards can be connected to a single panel [4 off type 1, 4 off type 2, 4 off type 3, 1 off type 4].

Overviews for the C1630 interface and the C1714 Voyage Data Recorder are provided below, further details of the Output Expansion Modules can be found in the Output Expansion Module Manual.

4.2.9 C1630 Output Interface

This PCB is fitted as standard to the T1216-C and T1232-C motherboard and is required when output expansion modules are used. It provides the communication path between panel and output modules. A 7-way DIL switch is used to set up the total quantity of each type of O/P board connected to the panel.

4.2.10 C1714 – VDR Output Module

The VDR output module provides outputs to signal critical Fire Alarm Panel conditions to the vessel's Voyage Data Recorder unit. It is fitted as standard to the T1216-C and T1232-C. The VDR is not supported on the T1204.

Five volt-free changeover contacts provide the following signals:

- Common Fire.
- Machinery space fire detected. [Any zone or number of zones can be configured to operate this output].
- Common Fault – Fail-Safe.
- Mains Failed – Fail-Safe.
- Back-up Supply Failed – Fail Safe.

A 2-wire serial data output (RS422) is also provided, which conforms to IEC 61162-1. This provides zonal status information as well as the above signals (see section 10. on page 24).

4.3   T1200-C Repeater Description

The repeaters use the same display (de-populated & different overlay) and enclosures as for the T1216-C & T1232-C fire alarm panels. The motherboard is a de-populated C1626 board. The repeater and fire panel mechanical arrangements are similar. The C1631 Repeater interface board is fitted to the repeater motherboard and must also be fitted to the fire panel motherboard. Repeaters are powered directly from the 24Vdc output from the T1216-C & T1232-C panels. An optional Muster Interface board (C1665) is available and must be fitted to all repeater panels and the fire alarm panel if a muster fire condition is required to be initiated from repeater panels.

Repeaters are not provided for the T1204.

Figure 7 – T1216R-C Repeater – General Assembly
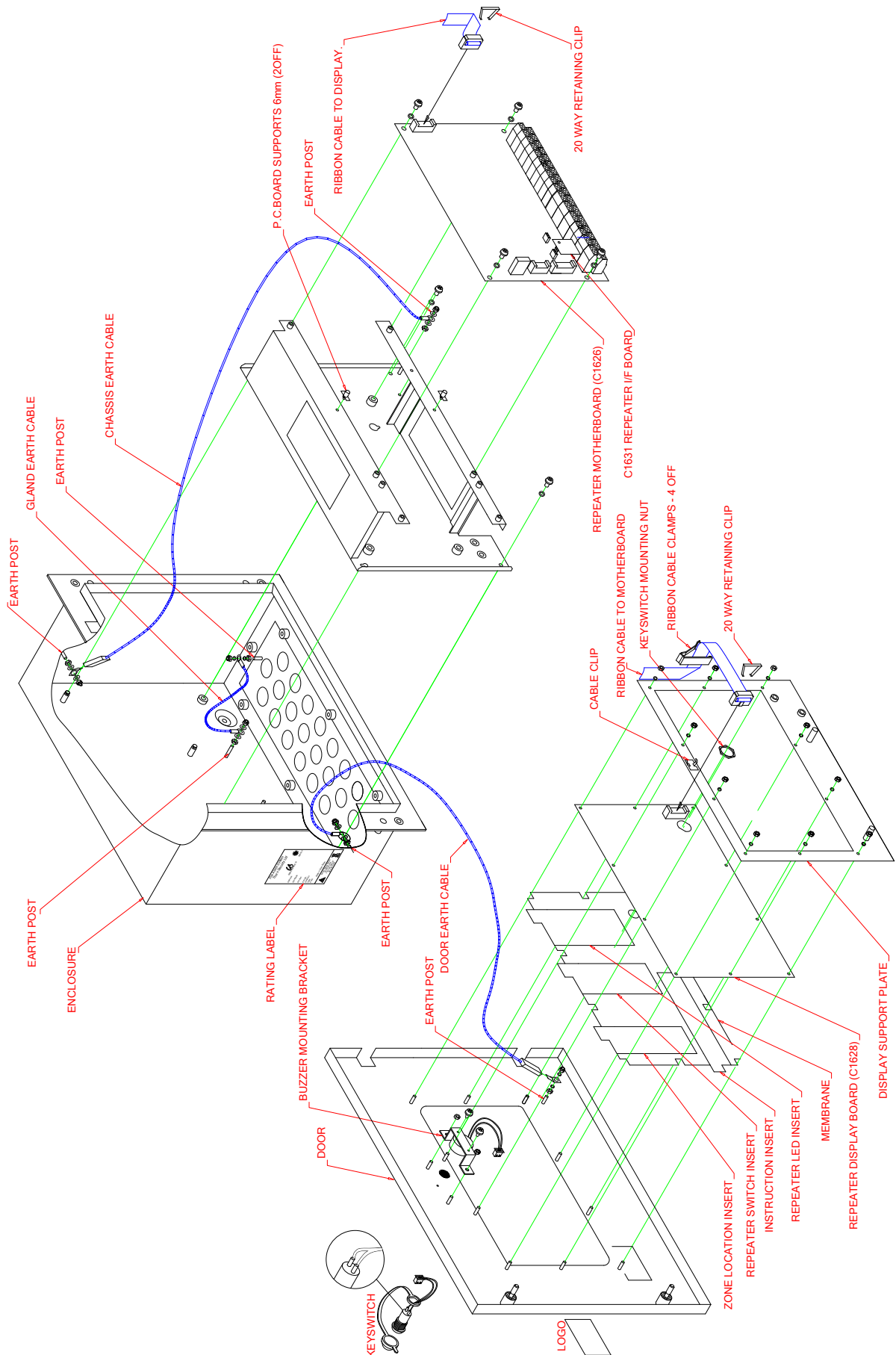
5. Functional Specification

5.1   T1200 Panel Input/Output List

Input/Output	T1204	T1216-C	T1232-C
Detection zones	4	16	32
Remote silence alarm I/P [non monitored]	1	1	1
Remote reset I/P [non –monitored]	1	1	1
Remote Manual Fire Alarm/Muster I/P [non –monitored]	1	1	1
Class change I/P [non –monitored]	1	1	1
Sounder circuits	4 @ 0.5A	4 @ 1A	4 @ 1A
Zonal O/Ps [open collector]	4	4 on Motherboard, additional outputs via O/P expansion system	
Disablement active [open collector]	1	1	1
Manual Fire Alarm/Muster active [open collector] – not activated when panel microprocessor fails.	1	1	1
Buzzer active [open collector]	1	1	1
Monitored Fire Output	1	1	1
Monitored Fire Protection O/P	1	1	1
Monitored Fault Output	1	1	1
Volt-free Reset Relay	1	1	1
Aux DC Supply [fused]	1 @ 0.5A	1 @ 1A	1 @ 1A
Repeater facility	N/A	Optional	Optional
Remote Muster I/P [from repeater] via optional muster interface	N/A	Optional	Optional
T1216-C & T1232-C only: Voyage data recorder O/P module providing 1 x volt-free changeover relay contact for each of the following alarms: Common Fire. Machinery Space Fire. Common Fault. Mains Failed. Battery Failed. (All contacts rated 1A @ 30Vdc) 1xRS422 output also provided, conforming to IEC 61162-1.	N/A	1	1
Additional Outputs via O/P expansion system	N/A	Optional	Optional

5.2 Features List

Enclosures	Tough welded mild steel enclosures with high quality paint finish.
	Removable gland-plate for termination and looming.
	Optional door stay available for all panels except T1204A1, T1204A2, T1204DC.
Temperature-compensated battery charging	Battery charging voltage is automatically adjusted between 28.25 and 26.72V DC over an ambient temperature range of -10°C to +55°C.
Battery disconnect	Protects the battery from permanent damage due to deep discharge by automatically disconnecting it when the battery voltage falls below 21V.
Mains Failed Indication Delay	The indication of main power failure is delayed by 90 seconds to allow the power to be switched from ship to shore and vice versa without generating a false fault indication.
Total power failure warning on the fire panels	A separate, non-rechargeable 9V battery provides the power for an audible warning should the primary [ship's] supply and the panel's standby battery fail (or be disconnected).
Class change input	Operates all sounders for up to 5 seconds without giving any panel indications (this is a land-based feature).
Configurable detection zones	Simple and flexible configuration process utilising the LED display, allowing detection zones to be configured for any or all of the following:

- Latching or non-latching Fire indication.
- Normal or Intrinsically-Safe zone monitoring.
- Machinery Space Zones.

Factory configuration: Latching, standard [non-I.S.], no zones programmed as Machinery Space Zones.

Selectable Zonal or General Alarm Sounder operation with sounders in alert or silent in non-alarm zones	Selectable via DIL switches on the motherboard.
	The standard sounders on the T1204 panel can be used in General or Zonal modes. [On T1216-C and T1232-C panels these sounders always operate in General mode regardless of DIL switch setting].
	The output expansion system provides additional sounder circuits for General or Zonal use on the T1216-C and T1232-C panels.
General sounder operation continuous or pulsed	DIL switch selectable on the motherboard. All sounders operate continuously or pulsed as selected.
Restart sounders or restart sounder delay	DIL switch selectable on the motherboard. With the panel in the silence alarms condition, a 2nd zone fire condition restarts the sounder delay or immediately operates all sounders. **[This is available only when panel is configured to the Crew Alarm Mode.]**

Configurable Fire Output, Fire Protection and Fault Output Relays	Configuration Links on the motherboard allow each Output Relay to be individually selected to the EN54 powered/fault-monitored mode or non-EN54-compliant volt-free changeover contacts. Factory configuration - Fully Monitored (EN54 Mode).
Reset Relay	A volt-free changeover contact operating for 10 seconds on panel fire alarm reset.
Auxiliary 24Vdc power supply output	Protected by an electronic fuse. Operation of the fuse is indicated on the display. Operation of the Reset button on the panel display resets the electronic fuse.
Open collector outputs	• Manual Fire Alarm/Muster active. • Buzzer Active. • Disablement Active. • Zonal fire for each zone up to zone 4. [additional zonal output expansion on T1216-C and T1232-C panel via open collector output expansion boards].
Remote Inputs	• Remote Manual Fire Alarm or Muster as configured. • Remote Silence Alarms. • Remote Reset. • Fully monitored Muster activation from repeater panel [via optional plug in board at panel and repeater].
Earth Fault monitoring	Can be disabled via link on the motherboard.
Zone/Output disablement feature	The following circuits can be independently disabled/enabled: • Each Zone • Fire Output • Fire Protection • Fault Output • All Sounders
One Man Zone Test	Each zone can be independently set to the One Man test condition. Sounders can be configured to operate briefly to confirm the panel has detected the test fire or not to operate during the test fire.
One Man Sounder Test	Operates the sounders intermittently.

Delay Mode Facility

(NOTE: This facility does not fully comply with the requirements of EN54-2 because the delay length is fixed)

Flexible system allowing:

- Activation of the delay by operation of an automatic fire detector on any zone.

- Single-stage, 2-minute fixed delay.

- Selection of the outputs to be delayed [Fire O/P and/or Fire Protection and/or Sounders] – can be any combination (Crew Alert mode automatically sets sounder delay on all circuits except 1 & 2; circuit 1 is delayed for all fires except for machinery space zones; circuit 2 is never delayed).

- Delay can be overridden by operating a manual call point on any zone or pressing the Delay Override button on the panel or repeater.

- In Crew Alert Mode the delay can also be overridden by pressing Resound Alarms after alarms have been silenced.

- In Crew Alert Mode the delay can be extended by pressing the Silence alarms button.

Crew Alert Mode

- Operation of an automatic fire detector or alert manual call point on any zone operates sounder circuit 2 only [Bridge/Crew areas].

- Operation of an automatic fire detector or alert manual call point on any machinery space zone operates sounder circuits 1 & 2 only (circuit 1 is for machinery spaces only).

- After 2 minute delay, all delayed sounder circuits (including any expansion sounder outputs) operate.

- Operation of an Evacuate manual call point overrides the delay and operates all sounders.

- Manual Fire Alarm/Muster activation overrides delay and operates all sounders.

- Fire O/P and/or Fire Protection O/P can be optionally configured to be delayed along with the sounder circuits.

- DIL switch option to allow delay to restart on a new fire condition if Alarms are silenced before the end of the delay.

Selectable Manual Fire Alarm or Muster sounder response

Manual Fire Alarm response: All sounders operate until silenced.

Muster response: International Marine Muster signal, capable of operation even if the panel processor fails.

Optional manual muster activation from repeater panel

Allows the muster condition to be manually initiated from the repeater panel even if the repeater panel processor fails.

Dimmable LED indicators on fire panels and repeater panels

All display-mounted LEDs can be manually dimmed for night time operation where bright indications may be too obtrusive.

Panel has 8 selectable brightness levels.

Repeater has two selectable brightness levels.

Automatic fire detector and manual call point fire event discrimination

Each zone is capable of recognising whether a fire condition has been caused by an automatic fire detector or a manual call point. This is used in conjunction with the output delay features.

Output expansion system for the T1216-C and T1232-C panels	Three different modules each providing eight switched outputs: • Open collector, suitable for LED mimics. • Volt-free relays for external signalling or equipment control. • Fault-monitored, powered outputs for EN54-2 type Fire Protection control or additional sounder circuits.
Voyage Data Recorder Output Board	Provides output signals for the Voyage Data Recorder: • Common Fire. • Common Fault. • Mains Failed. • Back-up Supply Failed. • Machinery space fire. [Zonally configurable] • IEC 61162-1 compliant RS422 output.
Other configuration features	• Prevent the Fire Protection output operating for a fire condition on a "Non-Latch" zone. • Inhibit the silencing and resetting of the panel for 3 minutes following the occurrence of a fire alarm. [Does not apply to Muster Alarm]. • Set the sounders to operate only when the panel is in the Manual Fire Alarm/Muster condition. • Inhibit the resetting of the fire alarm condition until the alarm sounders have been silenced. • Disable the internal panel buzzer. • Select latching fault mode where all fault conditions latch until the panel is manually reset. • Restore factory default configuration.
Repeater panels	Support for up to 5 repeater panels via two-wire RS485 serial communication. [Repeaters are not available for the T1204 panels].

6. T1204 Motherboard (C1626) Features

Figure 8 illustrates the C1626 motherboard features referred to elsewhere in the documentation.
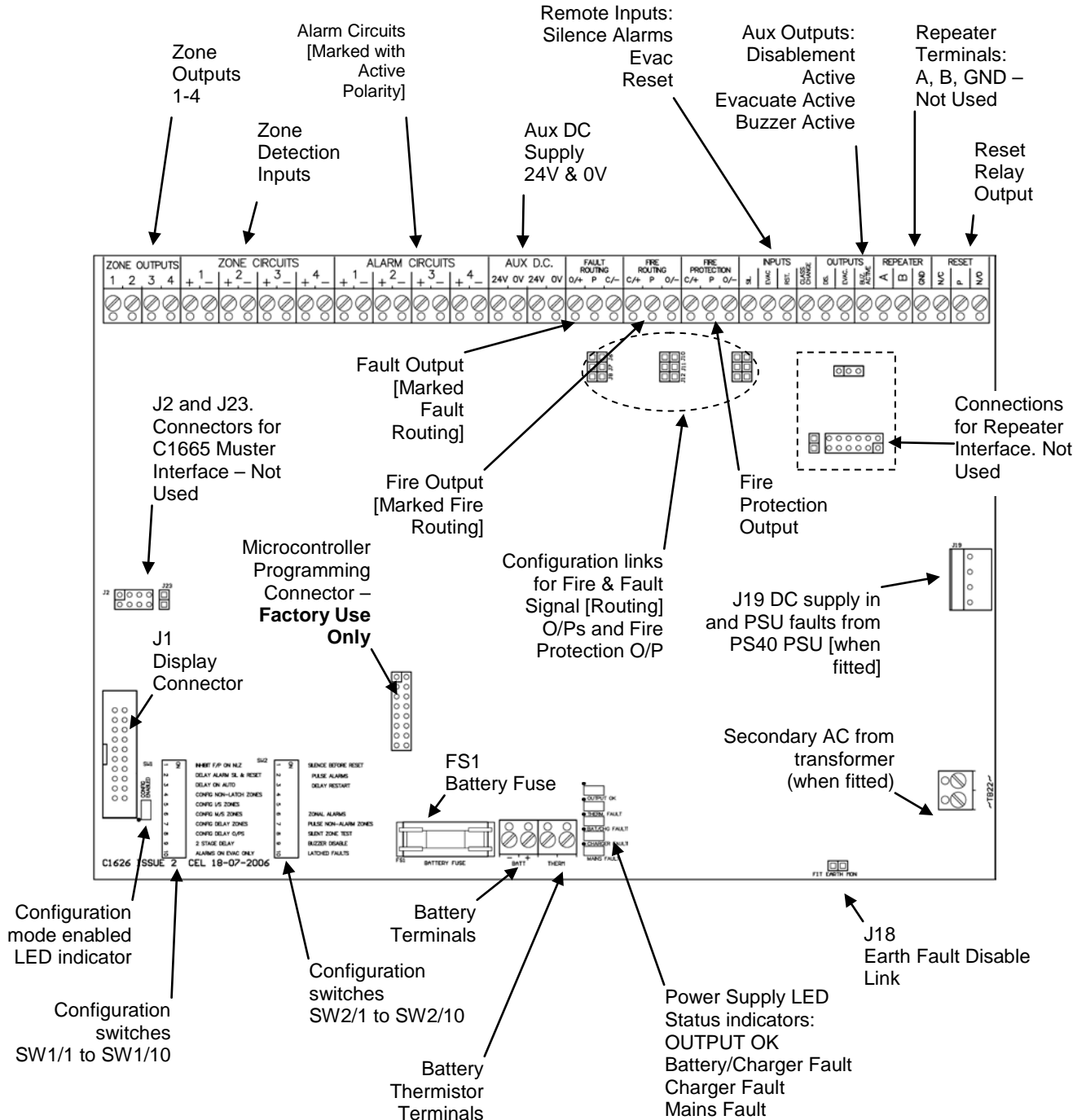
Figure 8 – C1626 motherboard layout

Notes:

I.   "Evacuate" or "Evac" = Manual Fire Alarm/Muster.

II. The 16-pin Microcontroller programming header is for use during manufacturing only and should not have any links fitted across any of the pins. Improper use of the connector may result in permanent damage to the motherboard.

7. T1216-C/T1232-C Motherboard (C1627) Features

Figure 9 illustrates the C1627 motherboard features.
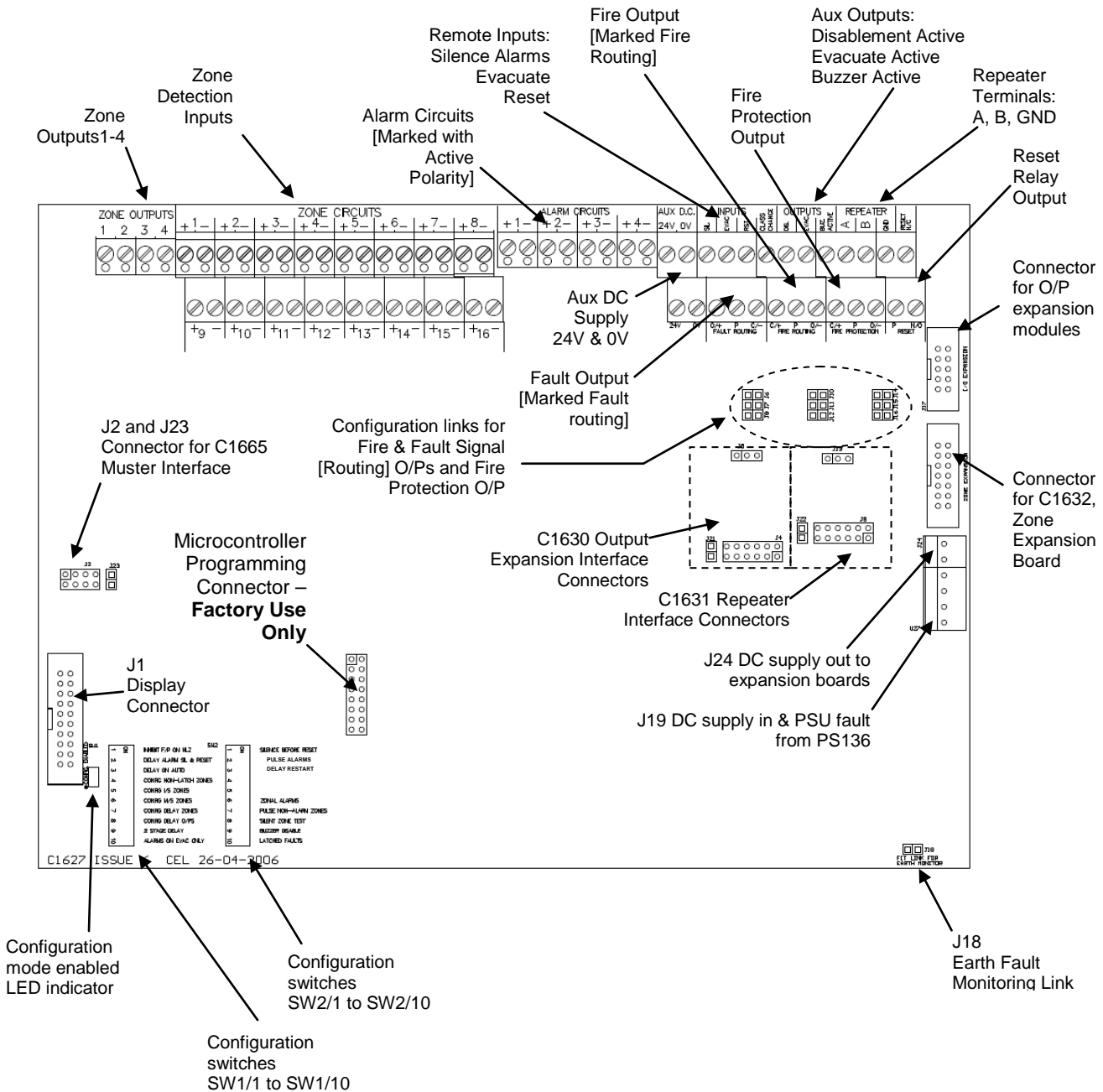
Figure 9 – C1627 motherboard layout

Notes:

I.   "Evacuate" or "Evac" = Manual Fire Alarm/Muster.

II. The 16-pin Microcontroller programming header is for use during manufacturing only and should not have any links fitted across any of the pins. Improper use of the connector may result in permanent damage to the motherboard.

III. J24 provides a 24Vdc output to the Output Expansion Boards and is not monitored for failure. DO NOT USE THIS OUTPUT FOR ANY OTHER PURPOSE.

8. T1200-C1632 16-zone expansion board Features

Figure 10 illustrates the C1632 16 zone expansion board features referred to elsewhere in the documentation.
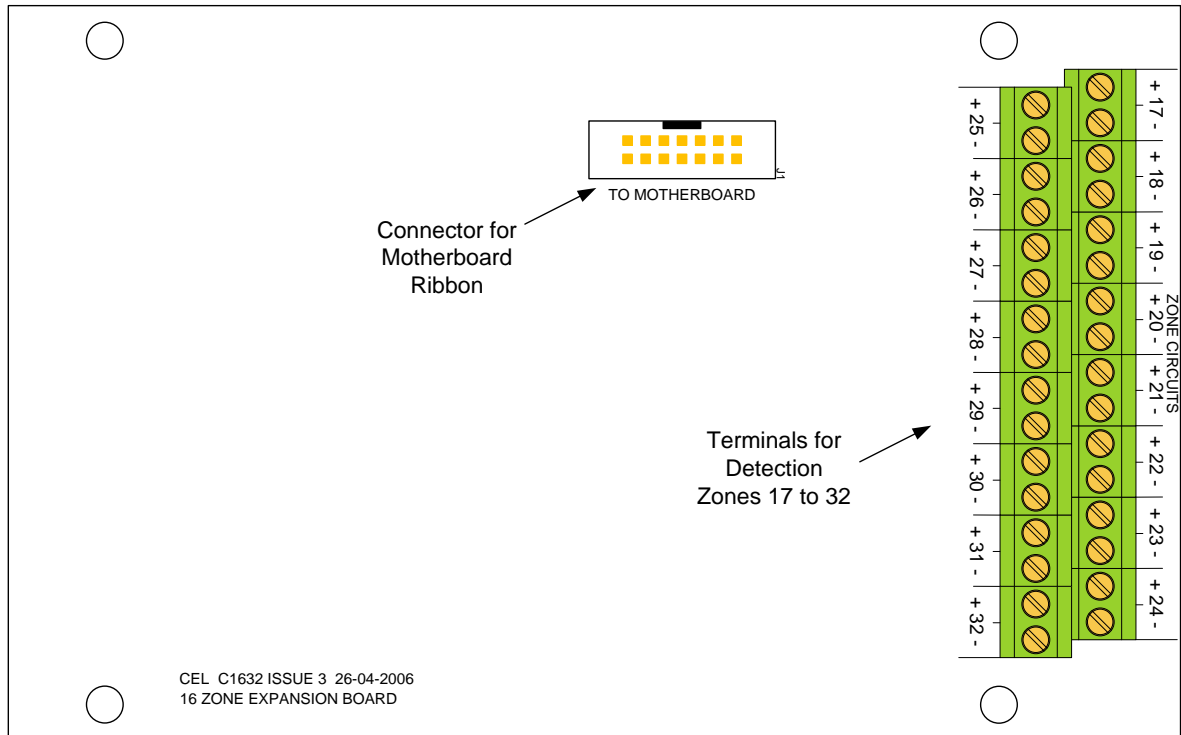
Figure 10 – C1632 16-zone expansion board

9. T1200-C Display Board Features
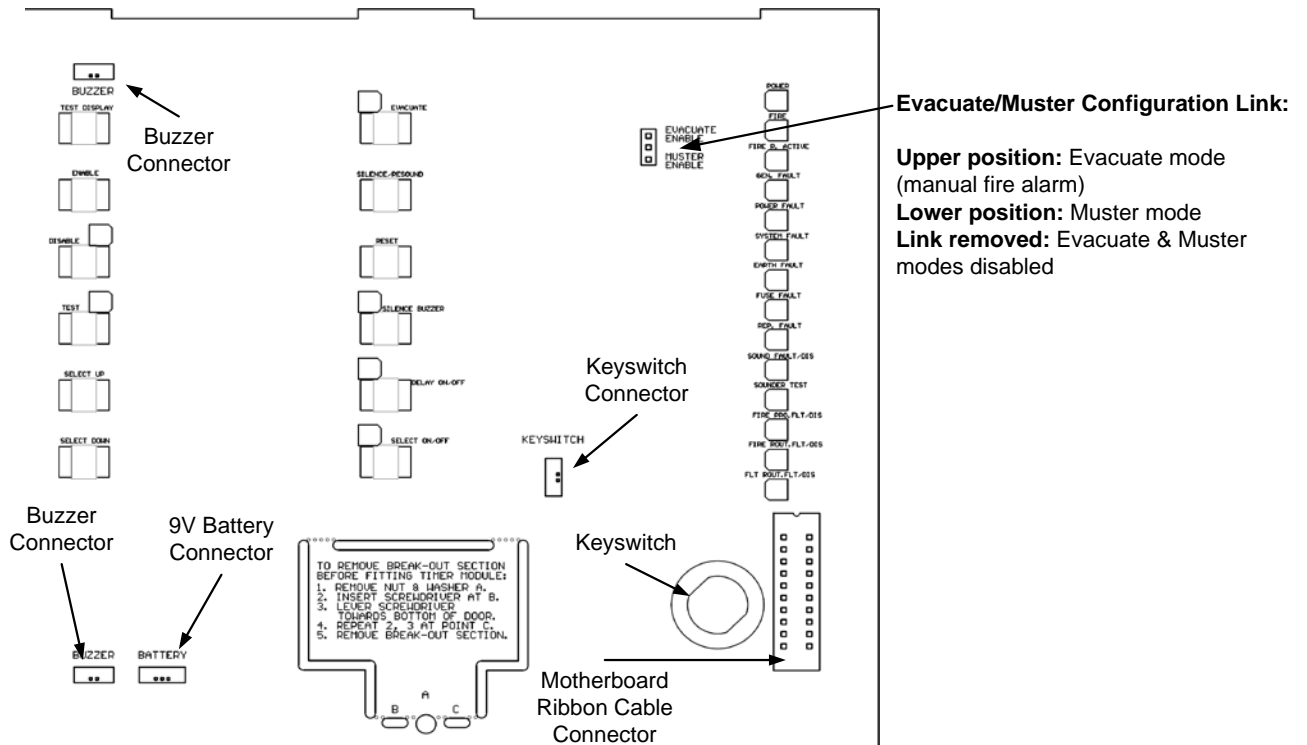
Note: "Evacuate" = Manual Fire Alarm/Muster

Figure 11 – Rear right hand side of display PCB

10. C1714 Voyage Data Recorder Interface Module

Figure 12 illustrates the C1714 VDR Interface Module fitted in the T1216-C and T1232-C.

Figure 12 – C1714 VDR Interface Module
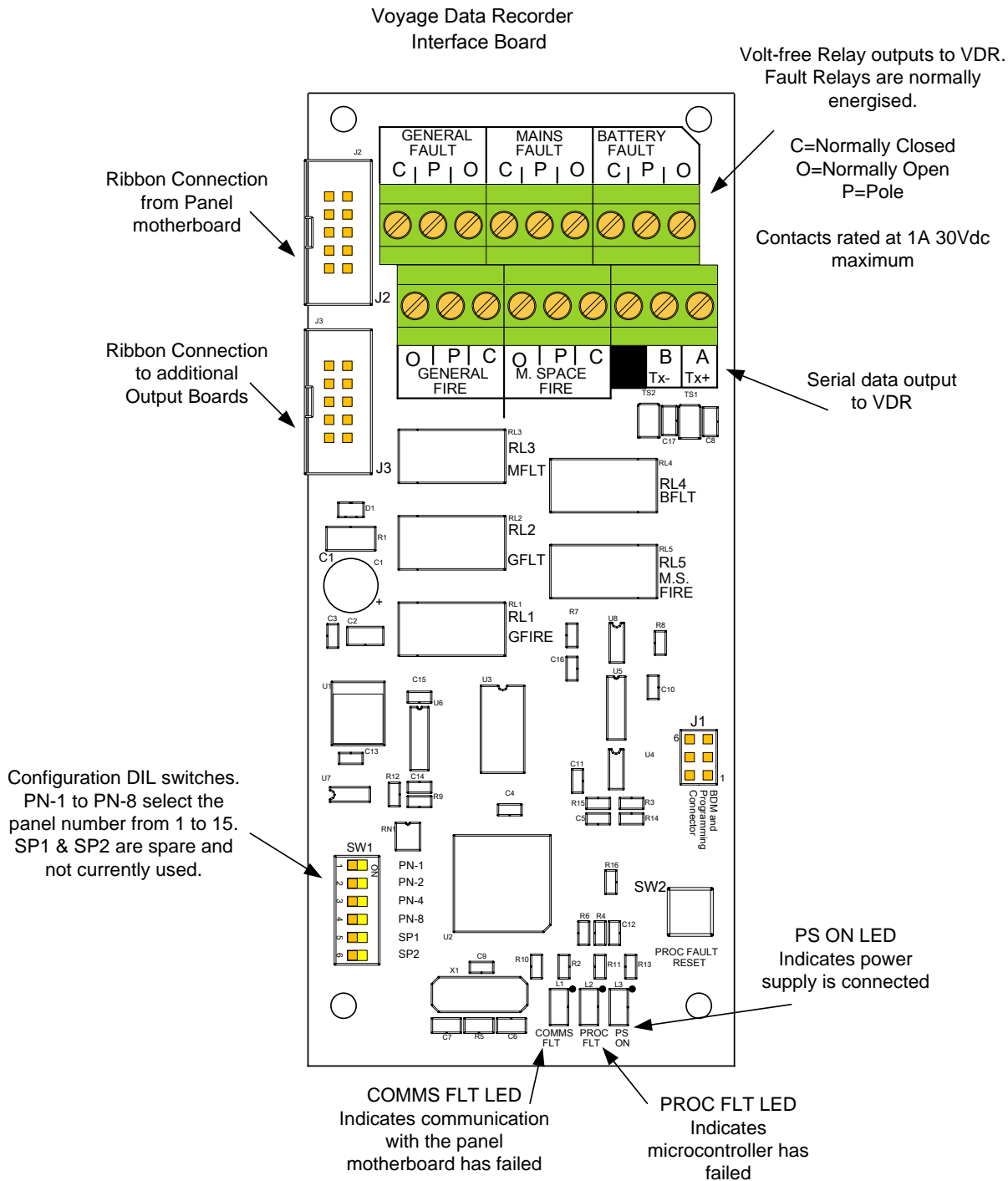
10.1   C1714 VDR Interface Module Description

The C1714 VDR Interface Module provides outputs for connection to a ship's Voyage Data Recorder to allow recording of various panel events. Volt-free relay contacts are provided along with a RS422 serial port which conforms to IEC 61162-1. The serial data output conforms to IEC PAS 61162-102 – Extra Requirements for the Voyage Data Recorder.

Connection to the panel motherboard is via a 10-way ribbon cable. This carries the power supply connections and the RS485 serial data comms. The panel must have a C1630 Output Expansion Interface Board fitted and set for VDR comms (fitted as standard to T1216-C & T1232-C).

DIL switches PN-1 to PN-8 allow the panel number to be set from 1 to 15. The panel number is included in the messages sent to the ship's Voyage Data Recorder and therefore aids in identifying the panel. If the panel number is set to zero then the serial output to the VDR is disabled. DIL switches SP1 & SP2 are for future requirements and are not used.

Panel Number	PN-1	PN-2	PN-4	PN-8
0 (No serial data)	OFF	OFF	OFF	OFF
1	**ON**	OFF	OFF	OFF
2	OFF	**ON**	OFF	OFF
3	**ON**	**ON**	OFF	OFF
4	OFF	OFF	**ON**	OFF
5	**ON**	OFF	**ON**	OFF
6	OFF	**ON**	**ON**	OFF
7	**ON**	**ON**	**ON**	OFF
8	OFF	OFF	OFF	**ON**
9	**ON**	OFF	OFF	**ON**
10	OFF	**ON**	OFF	**ON**
11	**ON**	**ON**	OFF	**ON**
12	OFF	OFF	**ON**	**ON**
13	**ON**	OFF	**ON**	**ON**
14	OFF	**ON**	**ON**	**ON**
15	**ON**	**ON**	**ON**	**ON**

Five volt-free relay outputs are provided; two operate on zone fire conditions, the other three are fault relays and are normally energised (fail-safe operation). The terminals are marked for the normal state of each relay output.

Serial communication with the VDR is provided by the terminals marked **Tx+** & **Tx-** (transmit positive & negative lines, often also referred to as A & B respectively). This is a RS422 port conforming to IEC 61162-1 (see details below). Isolation is required only at the listener (VDR). The **Tx+** & **Tx-** terminals should be connected to the **Rx+** & **Rx-** terminals at the VDR. Use standard RS422/RS485 2-core twisted-pair data cable. Maximum cable length should not exceed 1200m. (NOTE: the implementation of **Tx+/Tx-** & **Rx+/Rx-** can vary between manufacturers and therefore it may be necessary to reverse the connection i.e. **Tx+** to **Rx-** & **Tx-** to **Rx+**).

Data is transmitted in serial asynchronous form. The First Bit is a start bit and is followed by 8 data bits, least-significant-bit first (D0 to D7). The following parameters are used:

Baud rate – 4800

Data bits – 8 (D7=0)

Parity – none

Stop bits – 1

Start Bit	D0	D1	D2	D3	D4	D5	D6	D7	Stop Bit
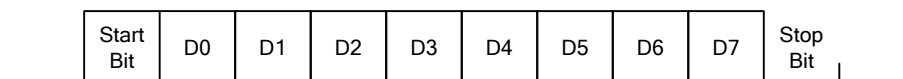
Data Format Protocol:

All transmitted data shall be interpreted as ASCII characters (D7=0).

The valid character set consists of all printable characters (HEX 20 to HEX 7E) except those defined as reserved characters. Carriage return (0D HEX) & Line Feed (0A HEX) are sent at the end of each sentence.

10.2   VDR RS422 Output Sentence Structure

The C1714 VDR interface module sends various sentences to the VDR regarding the status of the panel. These sentences are detailed in the following subsections.

A 'fire status' sentence is transmitted every 10 seconds, which shows the current number of zones in alarm (number of zones can be 0 to 32). This is used primarily to indicate to the VDR that the Interface module is connected & transmitting data.

When a fire, fault or isolation event occurs on a zone, the appropriate sentence is transmitted. The clearing of the fire, fault or isolation is also transmitted unless the panel is reset, in which case zonal fire clear & zone fault clear messages are not sent; only the RESET message is sent.

Each sentence consists of a number of data fields separated by a comma. A checksum of the transmitted data is attached to the end of the sentence.

10.2.1 ZONAL FIRE Sentence Structure

This sentence takes the following form:

> `$ttfff,a,hhmmss.ss,bb,dd,eee,fff,g,h,c—c*hh<CR><LF>`

`$` – start of sentence

`tt` – Talker Identifier = FR (Fire detection system)

`fff` – Sentence Formatter = FIR (Fire Detection)

`,` – Field Separator

`a – Message Type = E (Event)`

`hhmmss.ss` – Time of event = VDROB has no clock so currently set to 000000

`bb` – System indicator of fire detection = FD (Fire Detector)

`dd` – Division indicator of fire sensor allocation (1) = Zone Number – Leave Blank

`eee` – Division indicator of fire sensor allocation (2) = Loop Number – Leave Blank

`fff` – Fire Detector Number = Leave Blank

`g` – Condition = A (Activation) or V (Non-activation)

`h` – Alarm's acknowledge state = Leave Blank

`c—c` – Alarm's description text = Alarm description e.g. `PANEL 01 ZONE 01 FIRE`

`*` – Indicates next two characters are the checksum

`hh` – Checksum (XOR of all bytes including commas but excluding `$` and `*`)

`<CR>` – Carriage Return character = HEX 0D

`<LF>` – Line Feed character = HEX 0A

A fire on zone 1 of panel 1 would generate the following sentence:

> `$FRFIR,E,000000,FD,,,,A,,PANEL 01 ZONE 01 FIRE*33<CR><LF>`

The HEX data is:

> 24 46 52 46 49 52 2C 45 2C 30 30 30 30 30 30 2C 46 44 2C 2C 2C 2C 41 2C 2C 50
> 41 4E 45 4C 20 30 31 20 5A 4F 4E 45 20 30 31 20 46 49 52 45 2A 33 33 0D 0A

A fire cleared on zone 1 of panel 1 would generate the following sentence:

> `$FRFIR,E,000000,FD,,,,V,,PANEL 01 ZONE 01 FIRE CLEAR*5D<CR><LF>`

The HEX data is:

> 24 46 52 46 49 52 2C 45 2C 30 30 30 30 30 30 2C 46 44 2C 2C 2C 2C 56 2C 2C 50
> 41 4E 45 4C 20 30 31 20 5A 4F 4E 45 20 30 31 20 46 49 52 45 20 43 4C 45 41 52
> 2A 35 44 0D 0A

NOTE: For a Machine Space zone, the description text includes 'MS' after the zone number e.g.

> `PANEL 01 ZONE 01 MS FIRE`

10.2.2 ZONAL FAULT Sentence Structure

This sentence takes the following form:

    `$ttfff,hhmmss.ss,aa,bb,dd,eee,f,g,c—c*hh<CR><LF>`

$ – start of sentence

tt – Talker Identifier = FR (Fire detection system)

fff – Sentence Formatter = ALA (Set Detail Alarm Condition)

, – Field Separator

hhmmss.ss – Time of event = Leave Blank (VDROB has no clock)

aa – System indicator of alarm source = FR (Fire Detection System)

bb – Sub-system indicator of fire detection = OT (Others)

dd – Number of equipment = 01 (this is a quantity value)

eee – Number of Alarm Source = 901 (User Defined – General)

f – Alarm Condition = N (Normal) or H (Fault)

g – Alarm's Acknowledge State = B (Broadcast, no acknowledgement required)

c—c – Alarm's description text = Alarm description e.g. `Zone 1 Fault`

* – Indicates next two characters are the checksum

hh – Checksum (XOR of all bytes including commas but excluding **$** and *****)

<CR> – Carriage Return character = HEX 0D

<LF> – Line Feed character = HEX 0A

A fault on zone 8 of panel 1 would generate the following sentence:

    `$FRALA,,FR,OT,01,901,H,B,PANEL 01 ZONE 08 FAULT*6F<CR><LF>`

The HEX data is:

```
24 46 52 41 4C 41 2C 2C 46 52 2C 4F 54 2C 30 31 2C 39 30 31 2C 48 2C 42 2C 50
41 4E 45 4C 20 30 31 20 5A 4F 4E 45 20 30 38 20 46 41 55 4C 54 2A 36 46 0D 0A
```

A fault cleared on zone 8 of panel 1 would generate the following sentence:

    `$FRALA,,FR,OT,01,901,N,B,PANEL 01 ZONE 08 FAULT CLEAR*10<CR><LF>`

The HEX data is:

```
24 46 52 41 4C 41 2C 2C 46 52 2C 4F 54 2C 30 31 2C 39 30 31 2C 4E 2C 42 2C 50
41 4E 45 4C 20 30 31 20 5A 4F 4E 45 20 30 38 20 46 41 55 4C 54 20 43 4C 45 41
52 2A 31 30 0D 0A
```

10.2.3 GENERAL FAULT Sentence Structure

This sentence is identical to the ZONAL FAULT message except for the description field:

Any fault on panel 1 would generate the following sentence:

    $FRALA,,FR,OT,01,901,H,B,PANEL 01 GENERAL FAULT*0F<CR><LF>

The HEX data is:

    24 46 52 41 4C 41 2C 2C 46 52 2C 4F 54 2C 30 31 2C 39 30 31 2C 48 2C 42 2C 50
    41 4E 45 4C 20 30 31 20 47 45 4E 45 52 41 4C 20 46 41 55 4C 54 2A 30 46 0D 0A

All faults cleared on panel 1 would generate the following sentence:

    $FRALA,,FR,OT,01,901,N,B,PANEL 01 NO FAULTS*0D<CR><LF>

The HEX data is:

    24 46 52 41 4C 41 2C 2C 46 52 2C 4F 54 2C 30 31 2C 39 30 31 2C 4E 2C 42 2C 50
    41 4E 45 4C 20 30 31 20 4E 4F 20 46 41 55 4C 54 53 2A 30 44 0D 0A

10.2.4 MAINS FAULT Sentence Structure

This sentence is identical to the ZONAL FAULT message except for the description field:

A mains fault on panel 1 would generate the following sentence:

    $FRALA,,FR,OT,01,901,H,B,PANEL 01 MAINS FAULT*01<CR><LF>

The HEX data is:

    24 46 52 41 4C 41 2C 2C 46 52 2C 4F 54 2C 30 31 2C 39 30 31 2C 48 2C 42 2C 50
    41 4E 45 4C 20 30 31 20 4D 41 49 4E 53 20 46 41 55 4C 54 2A 30 31 0D 0A

Mains fault cleared on panel 1 would generate the following sentence:

    $FRALA,,FR,OT,01,901,N,B,PANEL 01 MAINS FAULT CLEAR*7E<CR><LF>

The HEX data is:

    24 46 52 41 4C 41 2C 2C 46 52 2C 4F 54 2C 30 31 2C 39 30 31 2C 4E 2C 42 2C 50
    41 4E 45 4C 20 30 31 20 4D 41 49 4E 53 20 46 41 55 4C 54 20 43 4C 45 41 52 2A
    37 45 0D 0A

10.2.5 BATTERY FAULT Sentence Structure

This sentence is identical to the ZONAL FAULT message except for the description field:

A battery fault on panel 1 would generate the following sentence:

    $FRALA,,FR,OT,01,901,H,B,PANEL 01 BATTERY FAULT*14<CR><LF>

The HEX data is:

    24 46 52 41 4C 41 2C 2C 46 52 2C 4F 54 2C 30 31 2C 39 30 31 2C 48 2C 42 2C 50
    41 4E 45 4C 20 30 31 20 42 41 54 54 45 52 59 20 46 41 55 4C 54 2A 31 34 0D 0A

Battery fault cleared on panel 1 would generate the following sentence:

    $FRALA,,FR,OT,01,901,N,B,PANEL 01 BATTERY FAULT CLEAR*6B<CR><LF>

The HEX data is:

    24 46 52 41 4C 41 2C 2C 46 52 2C 4F 54 2C 30 31 2C 39 30 31 2C 4E 2C 42 2C 50
    41 4E 45 4C 20 30 31 20 42 41 54 54 45 52 59 20 46 41 55 4C 54 20 43 4C 45 41
    52 2A 36 42 0D 0A

10.2.6 ZONAL DISABLEMENT Sentence Structure

This sentence is similar to that for fire and takes the following form:

    $ttfff,a,hhmmss.ss,bb,dd,eee,fff,g,h,c—c*hh<CR><LF>

$ – start of sentence

tt – Talker Identifier = FR (Fire detection system)

fff – Sentence Formatter = FIR (Fire Detection)

, – Field Separator

a – Message Type = D (Disabled)

hhmmss.ss – Time of event = VDROB has no clock so set to 000000

bb – System indicator of fire detection = FD (Fire Detector)

dd – Division indicator of fire sensor allocation (1) = Zone Number – Leave Blank

eee – Division indicator of fire sensor allocation (2) = Loop Number – Leave Blank

fff – Fire Detector Number = Leave Blank

g – Condition = A (Activation) or V (Non-activation)

h – Alarm's acknowledge state = Leave Blank

c—c – Alarm's description text = Alarm description e.g. **Zone 1 Disabled**

* – Indicates next two characters are the checksum

hh – Checksum (XOR of all bytes including commas but excluding **$** and *****)

<CR> – Carriage Return character = HEX 0D

<LF> – Line Feed character = HEX 0A

Disablement of zone 3 on panel 1 would generate the following sentence:

    $FRFIR,D,000000,FD,,,,A,,PANEL 01 ZONE 03 DISABLED*38<CR><LF>

The HEX data is:

    24 46 52 46 49 52 2C 44 2C 30 30 30 30 30 30 2C 46 44 2C 2C 2C 2C 41 2C 2C 50
    41 4E 45 4C 20 30 31 20 5A 4F 4E 45 20 30 33 20 44 49 53 41 42 4C 45 44 2A 33
    38 0D 0A

Enablement of zone 3 on panel 1 would generate the following sentence:

    $FRFIR,D,000000,FD,,,,V,,PANEL 01 ZONE 03 ENABLED*7A<CR><LF>

The HEX data is:

    24 46 52 46 49 52 2C 44 2C 30 30 30 30 30 30 2C 46 44 2C 2C 2C 2C 56 2C 2C 50
    41 4E 45 4C 20 30 31 20 5A 4F 4E 45 20 30 33 20 45 4E 41 42 4C 45 44 2A 37 41
    0D 0A

10.2.7 STATUS MESSAGE Sentence Structure

This message is transmitted every 10 seconds and is primarily used to tell the VDR that the VDROB is able to communicate with it. The sentence is similar to that for fire and takes the following form:

$ttfff,a,hhmmss.ss,bb,dd,eee,fff,g,h,c—c*hh<CR><LF>

$ – start of sentence

tt – Talker Identifier = FR (Fire detection system)

fff – Sentence Formatter = FIR (Fire Detection)

, – Field Separator

a – Message Type = S (Status)

hhmmss.ss – Time of event = VDROB has no clock so set to 000000

bb – System indicator of fire detection = OT (Other)

dd – Division indicator of fire sensor allocation (1) = Panel Number – Tyco Alpha Encoding format:- AA = 01, AB = 02, up to AJ = 10, then BA = 11 up to BE = 15

(Max value JI=99)

eee – Division indicator of fire sensor allocation (2) = Leave Blank

fff – Fire Detector Number = Number of zones in Alarm, e.g. 032

g – Condition = Leave Blank

h – Alarm's acknowledge state = Leave Blank

c—c – Alarm's description text = Description e.g. Panel 01 ZONES IN ALARM = 32

* – Indicates next two characters are the checksum

hh – Checksum (XOR of all bytes including commas but excluding **$** and *****)

<CR> – Carriage Return character = HEX 0D

<LF> – Line Feed character = HEX 0A

For example, 8 zones in alarm on panel 1 would generate the following sentence:

$FRFIR,S,000000,OT,AA,,008,,,PANEL 01 ZONES IN ALARM = 28*6E<CR><LF>

The HEX data is:

```
46 52 46 49 52 2C 53 2C 30 30 30 30 30 30 2C 4F 54 2C 41 41 2C 2C 30 30 38 2C
2C 2C 50 41 4E 45 4C 20 30 31 20 5A 4F 4E 45 53 20 49 4E 20 41 4C 41 52 4D 20
3D 20 30 38 2A 32 38 0D 0A
```

10.2.8 HOURLY STATUS MESSAGES

Every hour, the current status of all zones in fault or disabled is transmitted, along with any general & power supply fault status messages. This allows for VDRs with limited recording capacity to capture the status of the panel in any two hour period. The hourly status will be inhibited if the VDROB loses communication with the panel (A 'communication fault' message is sent instead).

A STATUS START message is sent at the beginning of the hourly status messages, and a STATUS END message is sent at the end of the hourly status messages to indicate that this is a record of current status rather than the actual time of the event since the VDROB has no ability to record the time of events.

STATUS START & END messages:

The Status Start message is transmitted at the beginning of the hourly status messages. Since this is not a fire or fault alarm condition, it uses the EVENT formatter EVE (general event messages are used to output detailed information about events in a safety related system in a format that can be stored but not necessarily understood by the VDR).

The Status End message is transmitted at the end of the hourly status messages.

The messages take the following form:

  $ttfff,hhmmss.ss,a—a,c—c*hh<CR><LF>

$ – start of sentence

tt – Talker Identifier = FR (Fire detection system)

fff – Sentence Formatter = EVE (EVENT)

, – Field Separator

hhmmss.ss – Time of event = VDROB has no clock so set to 000000

a—a – Tag code used for identification of source of event if applicable.

c—c – Event description text = ##### STATUS REPORT START #####

* – Indicates next two characters are the checksum

hh – Checksum (XOR of all bytes including commas but excluding **$** and *****)

<CR> – Carriage Return character = HEX 0D

<LF> – Line Feed character = HEX 0A

The **Start** sentence is:

  $FREVE,000000,Panel01,##### STATUS REPORT START #####*63<CR><LF>

The HEX data is:

```
24 46 52 45 56 45 2C 30 30 30 30 30 30 2C 50 61 6E 65 6C 30 31 2C 23 23 23 23
23 20 53 54 41 54 55 53 20 52 45 50 4F 52 54 20 53 54 41 52 54 20 23 23 23 23
23 2A 36 33 0D 0A
```

The **End** sentence is:

  $FREVE,000000,Panel01,##### STATUS REPORT END #####*6C<CR><LF>

The HEX data is:

```
24 46 52 45 56 45 2C 30 30 30 30 30 30 2C 50 61 6E 65 6C 30 31 2C 23 23 23 23
23 20 53 54 41 54 55 53 20 52 45 50 4F 52 54 20 45 4E 44 20 23 23 23 23 23 2A
36 43 0D 0A
```

10.2.9 COMMS FAULT Sentence Structure

This sentence indicates to the VDR that the VDROB has lost communication with the panel.

The comms fault sentence is sent out instead of the standard status message every 10 seconds, until comms is restored. The hourly status messages are **not** sent while the comms fault is present.

This sentence takes the following form:

`$ttfff,hhmmss.ss,aa,bb,dd,eee,f,g,c—c*hh<CR><LF>`

`$` – start of sentence

`tt` – Talker Identifier = FR (Fire detection system)

`fff` – Sentence Formatter = ALA (Set Detail Alarm Condition)

`,` – Field Separator

`hhmmss.ss` – Time of event = Leave Blank (VDROB has no clock)

aa – System indicator of alarm source = FR (Fire Detection System)

`bb` – Sub-system indicator of fire detection = OT (Others)

`dd` – Number of equipment = 01 (this is a quantity value)

`eee` – Number of Alarm Source = 901 (User Defined – General)

`f` – Alarm Condition = N (Normal) or H (Fault)

`g` – Alarm's Acknowledge State = B (Broadcast, no acknowledgement required)

`c—c` – Alarm's description text = Alarm description e.g. `Communication Failed`

`*` – Indicates next two characters are the checksum

`hh` – Checksum (XOR of all bytes including commas but excluding `$` and `*`)

`<CR>` – Carriage Return character = HEX 0D

`<LF>` – Line Feed character = HEX 0A

A loss of comms with panel 1 would generate the following sentence (every 10 seconds):

`$FRALA,,FR,OT,01,901,H,B,PANEL 01 Communication Failed*70<CR><LF>`

The HEX data is:

```
24 46 52 41 4C 41 2C 2C 46 52 2C 4F 54 2C 30 31 2C 39 30 31 2C 48 2C 42 2C 50
41 4E 45 4C 20 30 31 20 43 6F 6D 6D 75 6E 69 63 61 74 69 6F 6E 20 46 61 69 6C
65 64 2A 37 30 0D 0A
```

Restored comms from panel 1 would generate the following sentence:

`$FRALA,,FR,OT,01,901,N,B,PANEL 01 Communication Restored*79<CR><LF>`

The HEX data is:

```
24 46 52 41 4C 41 2C 2C 46 52 2C 4F 54 2C 30 31 2C 39 30 31 2C 4E 2C 42 2C 50
41 4E 45 4C 20 30 31 20 43 6F 6D 6D 75 6E 69 63 61 74 69 6F 6E 20 52 65 73 74
6F 72 65 64 2A 37 39 0D 0A
```

10.2.10 PANEL RESET Sentence Structure

This message is sent when the panel is reset from the fire alarm or fault condition.

Since this is not a fire or fault alarm condition, it uses the EVENT formatter EVE (general event messages are used to output detailed information about events in a safety related system in a format that can be stored but not necessarily understood by the VDR).

The message takes the following form:

> `$ttfff,hhmmss.ss,a—a,c—c*hh<CR><LF>`

`$` – start of sentence

`tt` – Talker Identifier = FR (Fire detection system)

`fff` – Sentence Formatter = EVE (EVENT)

`,` – Field Separator

`hhmmss.ss` – Time of event = VDROB has no clock so set to 000000

`a—a` – Tag code used for identification of source of event if applicable.

`c—c` – Event description text = PANEL 01 RESET OPERATED

`*` – Indicates next two characters are the checksum

`hh` – Checksum (XOR of all bytes including commas but excluding `$` and `*`)

`<CR>` – Carriage Return character = HEX 0D

`<LF>` – Line Feed character = HEX 0A

The RESET sentence is:

> `$FREVE,000000,Panel01,PANEL 01 RESET OPERATED*07<CR><LF>`

The HEX data is:

> ```
> 24 46 52 45 56 45 2C 30 30 30 30 30 30 2C 50 61 6E 65 6C 30 31 2C 50 41 4E 45
> 4C 20 30 31 20 52 45 53 45 54 20 4F 50 45 52 41 54 45 44 2A 30 37 0D 0A
> ```

11. C1630 Output Expansion Interface Features

Figure 13 – C1630 Output Expansion Interface
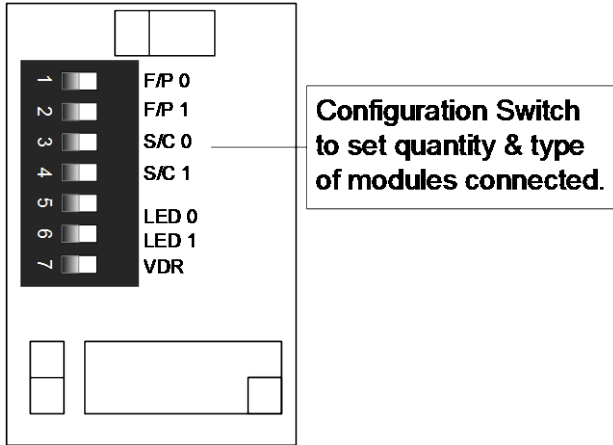
DIL Switch settings:

Number of Fire Protection Output Boards	F/P 0	F/P 1
0	OFF	OFF
1	ON	OFF
2	OFF	ON
4	ON	ON

Number of Sounder Controller Output Boards	S/C 0	S/C 1
0	OFF	OFF
1	ON	OFF
2	OFF	ON
4	ON	ON

Number of LED (open collector) Output Boards	LED 0	LED 1
0	OFF	OFF
1	ON	OFF
2	OFF	ON
4	ON	ON

Voyage Data Recorder Interface Board Enable	VDR
Disabled	OFF
Enabled	ON

12. C1631 Repeater Interface Board Features

Figure 14 – C1631 Repeater Interface Board
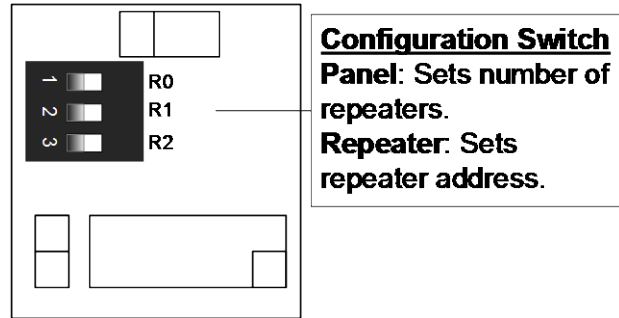
Repeater number or Repeater Address	R0	R1	R2
0	OFF	OFF	OFF
1	ON	OFF	OFF
2	OFF	ON	OFF
3	ON	ON	OFF
4	OFF	OFF	ON
5	ON	OFF	ON

13. C1665 Muster Interface Board Features

Figure 15 – C1665 Muster Interface Board
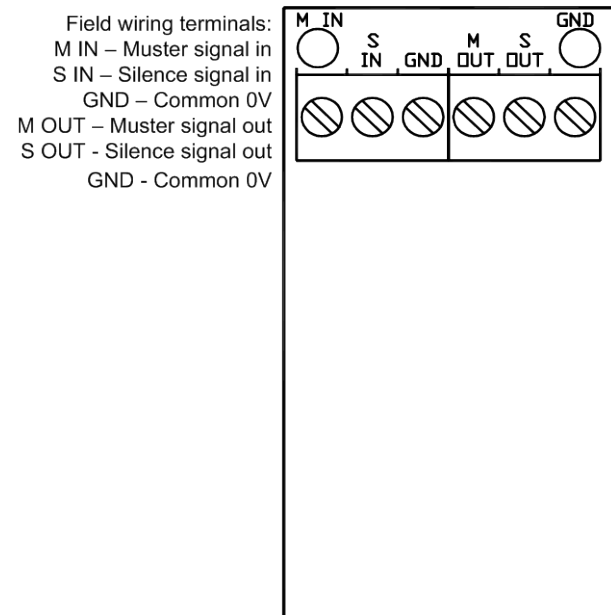
Field Wiring Terminals (left to right):

M IN	Muster Signal In (from repeater)
S IN	Silence Alarms Signal In (from repeater)
GND	Common 0V
M OUT	Muster Signal Out (to repeater or panel)
S OUT	Silence Alarms signal Out (to repeater or panel)
GND	Common 0V

14. Power Supplies

14.1   General

The T1200 range includes 4 types of power supply. Refer to the table in section 4.1.1 for a list of the various panel/PSU combinations.

All PSUs include:

- Temperature compensated battery charging and fault monitoring facilities for 2x 12V Sealed Lead-Acid standby batteries.

- Automatic "battery connected" check. If a battery disconnection is detected, the Battery/Charge Fault is indicated, illuminating the Batt/Charge fault LED and activating the "common fault" signal to the panel microcontroller.

- Automatic periodic battery load test. If the battery and interconnection resistance is greater than allowed, the Battery/Charge Fault is indicated, illuminating the Batt/Charge fault LED and activating the "common fault" signal to the panel microcontroller.

- Automatic "battery disconnect" facility. This electronically disconnects the battery when the battery terminal voltage falls below approximately 21V, thus preventing deep discharge of the batteries if the panel is powered for longer than the specified standby period. Also operates to protect the PSU if a short circuit occurs across the battery terminals.

- All PSUs are approved to EN54-4.

- All panels, except repeaters, have total power supply failure indication. An internally mounted [non-rechargeable] 9V battery (PP3 cell) provides the power to operate the panel buzzer for at least 1 hour following the loss of both the mains and stand-by supplies.

14.2   T1204A1 110V AC and T1204A2 230V AC mains powered PSUs.

The control and monitoring circuitry for the 1.5 Amp 110Vac and 230Vac mains powered PSUs is built onto the C1626 motherboard. The transformer is located on the chassis under the motherboard. See Figure 4 – T1204 Panel – General Assembly.

14.2.1 Supply Input

The Mains input is 230Vac @ 50/60Hz for the T1204A2 or 110Vac @ 50/60Hz for the T1204A1.

14.2.2 Supply Output

The DC output is 27.3Vdc at 25°C with load up to 1.5A.

The output current is shared between the panel load and battery charging. The battery charging current is therefore dependent on output current and will fall to zero as the panel load approaches 1.7A.

14.2.3 Fusing

The mains supply is protected by a replaceable 3.15A 20mm mains fuse in the mains terminal block.

The battery circuit is protected by a replaceable 2A 20mm fuse on the C1626 motherboard.

The DC load output is protected by electronic current limiting circuitry.

14.2.4 Battery Charger

The power supply provides a temperature compensated charging voltage to the batteries over a temperature range of -10°C to 55°C. The temperature profile of the charging voltage is compatible with 2x 12V series-connected sealed lead-acid Power-Sonic batteries (Up to a maximum capacity of 7Ah).

A Thermistor fitted inside the battery box senses the battery temperature. The Thermistor circuit is monitored for both open and short circuit fault conditions.

The charging voltage may also be adjusted via the trimmer potentiometer VR1 on the C1626 motherboard. However, the charging voltage is factory set and adjustment should not be necessary.

NOTE: The battery charging voltage should be set in the range 27.2V to 27.4V at a battery temperature of 20°C (use a 4k7 resistor in place of the Thermistor when setting the voltage).

14.2.5 Battery Monitoring

The health of the batteries, the battery connections and fuse are checked by a battery monitor circuit and automatic battery test facility once every 30 seconds. The Batt/Charge fault LED is illuminated and the 'Fault Output' is operated if the Battery is disconnected, the Battery voltage falls below 15.7V or the Battery and inter-connection resistance is greater than or equal to 1Ω. The circuitry also protects against reversed connection of the batteries.

14.2.6 Visual Indications

The following visual indications are provided:

i) A green **'Output – OK'** LED. This simply indicates that power is being supplied to the load.

ii) A yellow **'Thermistor Fault'** LED. This indicates an open circuit or short circuit fault of the Thermistor circuit.

iii) A yellow **'Batt Charge Fault'** LED indicating any one of the following conditions:

- o Battery or associated wiring has become disconnected.
- o Battery or associated wiring has become short circuited.
- o Battery fuse blown.

o Low Battery voltage (<15.7V ±0.4V).

o Battery and inter-connection resistance is greater than or equal to 1Ω.

iv) A yellow '**Charger Fault**' LED. This could be due to any of the following conditions:

o A mains fault exists (described below).

o Switching regulator or charger circuitry is malfunctioning.

o Battery fuse blown.

o Open or short circuit fault of Thermistor.

o The power supply output voltage has been incorrectly set to a value less than the terminal voltage of the batteries.

v) A yellow '**Mains Fault**' LED. This indicates that the mains voltage has failed or is less than the required minimum for correct operation of the power supply [80% of the rated voltage].

14.2.7 Fault Conditions

The control and monitoring circuitry for the 1.5A 110Vac and 230Vac mains powered PSUs communicates all faults to the microcontroller on the C1626 motherboard. The microcontroller then operates the necessary indications on the display and activates the fault outputs.

14.2.8 Battery Disconnect

The PSUs provide a battery disconnect facility which disconnects the batteries when the battery terminal voltage falls below 21.2V ±0.53V. This will occur under the following conditions:

- A short-circuit across the battery terminals.

- Prevention of deep discharge of the batteries if supplying the panel for an abnormally long period of time.

The batteries are reconnected when the mains voltage is present and the battery voltage is greater than 18.5V +/-0.46V.

14.3   PS40-1-09 and PS136-1-09 Power Supplies

14.3.1 PS40-1-09, T1204 24 Vdc PSU

The PS40-1-09 is intended for use on vessels using 24Vdc power supply installations. This self-contained PSU is located within the T1204 panel enclosure on the chassis under the C1626 motherboard. See Figure 4 – T1204 Panel – General Assembly.

NOTE: This PSU contains a fan which runs continuously to maintain a constant air flow inside the enclosure. This fan creates a low continuous humming noise which will change pitch depending on the current being drawn from the PSU. The fan has an operational life of at least 5 years and failure of the fan will not cause the PSU to fail immediately.

14.3.2 PS136-1-09, T1216-C and T1232-C 4A 110/230Vac PSU

The PS136-1-09 4Amp 110/230Vac switch-mode PSU is a self-contained unit and is located within the panel enclosure on the chassis under the motherboard. The stand-by batteries are accommodated in a separate enclosure. See Figure 5 – T1216-C Panel – General Assembly.

NOTE: This PSU contains a fan which runs continuously to maintain a constant air flow inside the enclosure. This fan creates a low continuous humming noise which will change pitch depending on the current being drawn from the PSU. The fan has an operational life of at least 5 years and failure of the fan will not cause the PSU to fail immediately.

14.3.3 Input Supplies

PS136-1-09 AC mains supply version:

This PSU requires a supply input of 110-230Vac rms. The PSU is auto-ranging. The AC supply is monitored for failure or brownout. A supply fault condition is indicated if the AC supply is below the brownout limit of approximately 80V and the unit is unable to maintain normal output.

PS40-1-09 DC primary supply version:

This PSU works with a DC supply input in the range 18Vdc to 31.2Vdc [nominal 24Vdc].

14.3.4 Fusing

On both AC and DC versions, the battery is connected through a 20mm T8AH230V replaceable fuse located on the PSU PCB.

PS136-1-09 AC mains supply version:

The PSU is protected by a fuse link fitted to the live (L1) incoming feed. This fuse is not replaceable by the user.

PS40-1-09 DC primary supply version:

The PSU is protected by a fuse link fitted to the positive (DC+) incoming feed. This fuse is not replaceable by the user.

14.3.5 DC Output

PS136-1-09 AC mains supply version:

The PSU can provide 27.3Vdc @ 4A continuously. The output provides power for the battery charger and the 27.3V load outputs.

The current limited constant voltage charger output is compatible with Power-Sonic sealed lead acid batteries.

PS40-1-09 DC primary supply version:

The PSU can provide 27.3Vdc @ 1.5A continuously. This output provides power for the battery charger and the 27.3V load outputs.

The current-limited constant voltage charger output is compatible with Power-sonic sealed lead acid batteries.

14.3.6 Battery Charger

PS136-1-09 AC mains supply version:

The PS136 PSU is designed to charge lead acid cells of 24V nominal voltage. It is capable of recharging 12Ah to 17Ah SLA batteries to 80% fully charged capacity in 24 hours.

PS40-1-09 DC primary supply version:

The PS40 PSU is designed to charge lead acid cells of 24V nominal voltage. It is capable of recharging 3.4Ah to 7Ah SLA batteries to 80% fully charged capacity in 24 hours.

On both AC and DC versions, the charging voltage is set at the factory and should not require field adjustment.

The output current is shared between the panel load and battery charging. The battery charging current is therefore dependent on output current and will fall to zero as the panel load approaches the specified maximum output current.

14.3.7 PS40-1-09 and PS136-1-09 Temperature Compensation

The chargers provide a temperature-compensated charging voltage over a battery temperature range of -10°C to $+55^{o}$C. A Thermistor sensor, located at the battery, is used to sense the ambient temperature. The Thermistor circuit is monitored for open and short circuit faults.

14.3.8 PS40-1-09 and PS136-1-09 Charger Monitor

The output from the charger is monitored to ensure that the battery is being charged. A fault is reported within 90 seconds of a fault occurring.

14.3.9 PS40-1-09 and PS136-1-09 Battery Health Functions

Battery connections reversed or short circuited:

The battery and circuit are protected from reverse or short circuit wiring.

14.3.10 PS40-1-09 and PS136-1-09 Battery Test

A battery test to determine the Battery plus inter-connection resistance is automatically carried out approximately every 20 minutes. Similarly, a test to see if the Battery is present is carried out every 30 seconds.

14.3.11 PS40-1-09 and PS136-1-09 Battery Disconnect

If the primary supply fails and the panel is running from the battery standby supply only, the battery will be automatically disconnected (electronically isolated) when the voltage drops below 21V. The battery is automatically re-connected when the primary supply returns.

If a short circuit occurs in the battery wiring or inside the batteries, then the disconnect circuit isolates the battery from the charger.

14.3.12 PS40-1-09 and PS136-1-09 Indications on the PSU

Charger Fault (LED 2 – yellow)

This LED is on when the fault condition is active (battery not being charged), i.e.:

- Charger output below battery voltage.
- Failure of AC or DC primary supply.
- Battery Thermistor is either open circuit or short circuit.

Battery Fault (LED 3 – yellow)

This LED is on when the fault condition is active, i.e.:

- Battery is open circuit or short circuit.
- Battery fuse has blown or battery wiring has become disconnected.
- Battery plus inter-connection resistance is greater than 0.6 ohms.

Primary Supply (LED 1 – green)

This LED is normally illuminated and extinguishes in the event of failure of the primary supply.

14.4 PS40-1-09 and PS136-1-09 Fault Outputs

Two open collector type outputs are provided, both active low in the healthy condition, high impedance in the fault condition. Both are used internally to signal to the fire panel.

Common Fault:

Operating for primary supply failed, battery fault or charger fault.

Primary Supply Failed:

Operating for primary supply failed.

14.4.1 Safety Earth

Warning. A safety earth wire is connected to the Power Supply Equipment chassis and terminated with a ferrule. To ensure safe operation, this lead must be connected to the enclosure earth point at all times.

14.5 PS40-1-09 & PS136-1-09 Mechanical Protection

Warning:

These power supplies use hazardous voltages. The units are fitted with a protective cage to protect service access users from electrical shock. Disconnect from mains before opening.

To prevent overheating, the ventilation holes in the cage must not be obscured.

14.5.1 T1200 Power Supply Features and Connections

Figure 16 shows the layout of the PS40-1-09 24Vdc Power Supply used in the T1204 panel.

See Figure 17 for the layout of the PS136-1-09 4 Amp 110/230Vac power supply used in the T1216-C and T1232-C panels.

Figure 16 – PS40-1-09 1.5 Amp 24Volt DC Power Supply Layout
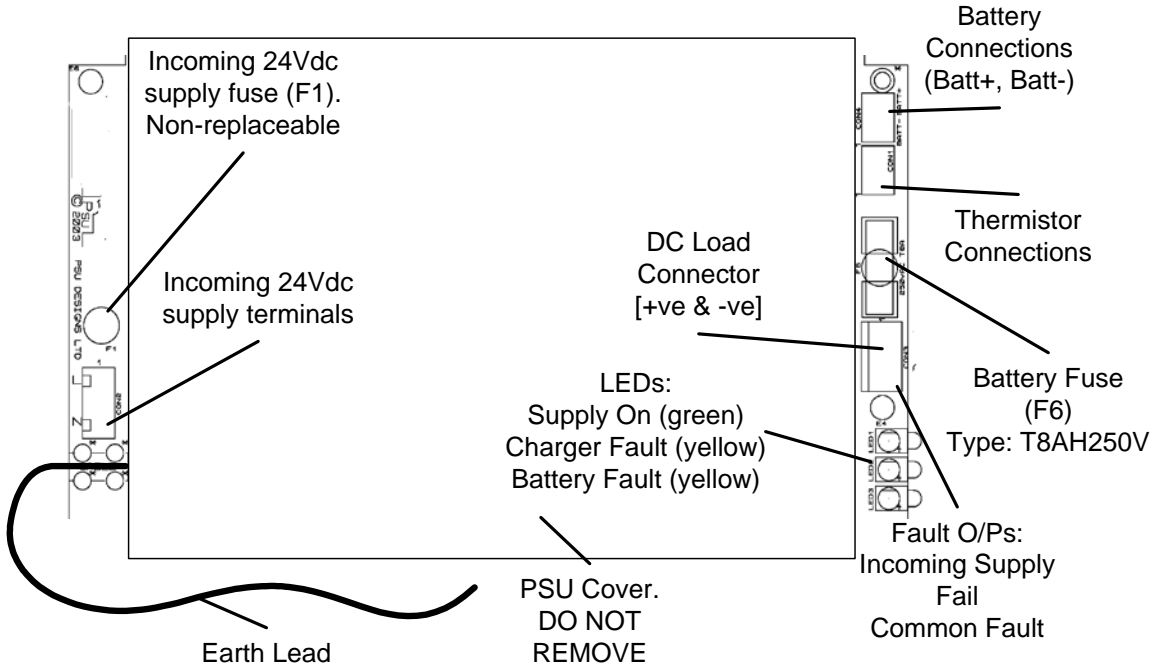
Figure 17 – PS136-1-09 4 Amp 110/230Vac Power Supply Layout
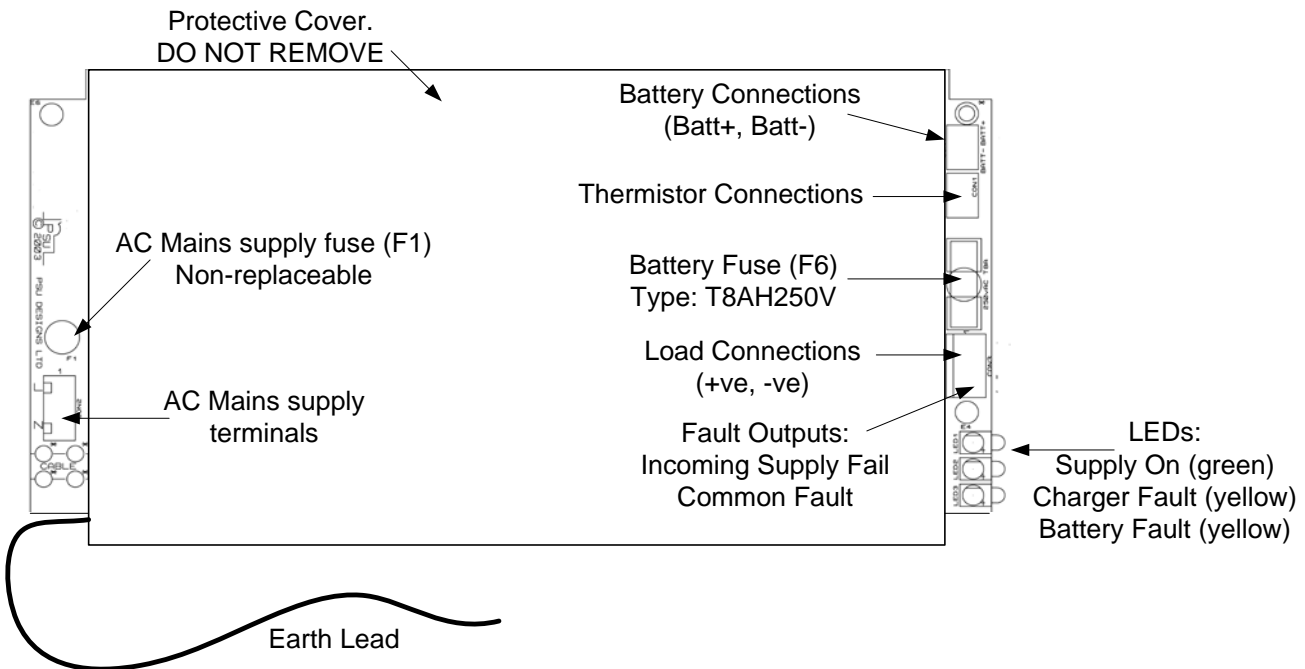
15. Compatible Field Devices

The T1200 panels are compatible with the devices listed in section 15.1.

15.1   Field Device Part Numbers

Manufacturer	Part no.	Description	Standby Current (mA)	Max. Devices per zone
Thorn/Tyco	MF601M	Smoke Detector Ionisation [marine]	0.050	24
Thorn/Tyco	MR601M	Smoke Detector Optical [marine]	0.050	24
Thorn/Tyco	M600	Series 600 Universal Base [marine]	N/A	N/A
Thorn/Tyco	MR601T	High Performance Smoke Detector Optical	0.050	24
Thorn/Tyco	MD601	Heat Detector Rate Of Rise	0.050	24
Thorn/Tyco	CP230	Manual call point	0.000	32
Thorn/Tyco	CP200	Manual call point	0.000	32
Tyco	H600	Heat Detector Fixed Temperature	0.000	32
Tyco	H601	Heat Detector Fixed Temperature	0.000	32
Tyco	H602	Heat Detector Fixed Temperature	0.000	32
Tyco	H604	Heat Detector Fixed Temperature	0.000	32
Tyco	H900	Heat Detector Fixed Temperature	0.000	32
Tyco	H902	Heat Detector Fixed Temperature	0.000	32
Tyco	H904	Heat Detector Fixed Temperature	0.000	32
Thorn/Tyco	S231F+	Triple I/R flame detector	0.333	3
Thorn	MS302EX	Flame detector (IS)	0.100	12
Tyco	M300EX	Detector base (IS)	N/A	N/A
Tyco	MU601EX	CO detector (IS)	0.050	24
Tyco	MD611EX	Heat detector (IS)	0.050	24
Tyco	MD601EX	Heat detector (IS)	0.050	24
Tyco	MR601TEX	High performance Smoke detector Optical (IS)	0.060	20
Tyco	MDU601EX	Combined CO and Heat detector (IS)	0.050	24
Tyco	MF601EX	Smoke detector Ionisation (IS)	0.050	24
Thorn/Tyco	MUBEX	Detector base (IS)	N/A	N/A
Thorn/Tyco	S111	I/R flame detector (IS)	0.100	12
Thorn/Tyco	S112	I/R flame detector (IS)	0.100	12
Thorn/Tyco	S121	I/R flame detector (IS)	0.100	12
Thorn/Tyco	S131	I/R flame detector (IS)	0.100	12
Thorn/Tyco	S161	I/R flame detector (IS)	0.100	12
Thorn	S231I+	Triple I/R flame detector (IS)	0.333	3
Thorn	CP220Ex	Manual Call Point (IS)	0.000	32
Non Branded	MC600	Series 600 Relay Base	N/A	N/A
Thorn/Tyco	CP210	Manual Call Point	0.000	32
Thorn	CP250M	Manual Call Point [Marine]	0.000	32
Thorn/Tyco	S232F+	Triple I/R Flame Detector	0.333	3
Thorn/Tyco	MF301	Smoke Detector Ionisation	0.050	24
Thorn/Tyco	MF301EX	Smoke Detector Ionisation (IS)	0.050	24
Thorn/Tyco	MR301	Smoke Detector Optical	0.050	24
Thorn/Tyco	MR301EX	Smoke Detector Optical (IS)	0.050	24
Thorn/Tyco	MD301	ROR Heat Detector Grade 1	0.050	24
Thorn/Tyco	MD301EX	ROR Heat Detector Grade 1 (IS)	0.050	24
Thorn/Tyco	MD303EX	ROR Heat Detector Grade 3 (IS)	0.050	24
Thorn/Tyco	MD305EX	Heat Detector Range 2 (IS)	0.050	24
Thorn/Tyco	M300	Conventional Base	N/A	N/A
Non Branded	601F-M	Conventional Solar Blind Flame Detector [marine]	0.233	5
Non Branded	601FEX-M	Conventional Solar Blind Flame Detector (IS) [marine]	0.233	5
Thorn/Tyco	MD631EX	Conventional Heat Detector Fixed Temperature (IS)	0.050	24

Manufacturer	Part no.	Description	Standby Current (mA)	Max. Devices per zone
Tyco	601CH-M	Conventional Enhanced CO Detector [marine]	0.067	17
Tyco	601H-R-M	Conventional Heat Detector (Rate of Rise) [marine]	0.067	17
Tyco	601H-F-M	Conventional Heat Detector Fixed Temperature {60 Deg C) [marine]	0.067	17
Tyco	601P-M	Conventional Optical Smoke Detector [marine]	0.067	17
Tyco	601PH-M	Conventional High Performance Optical Smoke Detector [marine]	0.067	17
Non Branded	611H-F	Conventional Heat Detector Fixed Temperature (60 Deg C)	0.067	17
Non Branded	631H-F	Conventional Heat Detector Fixed Temperature (90 Deg C)	0.067	17
Tyco	MCP250M	Manual Call Point [Marine]	0.000	32
Tyco	MCP260M	Manual Call Point [Marine]	0.000	32
Thorn/Tyco	MCP200	Manual Call Point	0.000	32
Thorn/Tyco	MCP210	Manual Call Point	0.000	32
Thorn/Tyco	MCP230	Manual Call Point	0.000	32
Non Branded	4B	4" Conventional Base	N/A	N/A
Non Branded	5B	5" Conventional Base	N/A	N/A

Notes:

1. These panels are designed with resistors as end of line devices. In order for detector head removal monitoring to function correctly any line continuity diodes in the detector bases that are in circuit when the detector head is removed must be disconnected. Removal of a detector will result in an open-circuit fault and any devices further along the zone wiring will no longer function.

2. The total current drawn by detectors on a zone must not exceed 1.2mA, otherwise the panel may not detect an open circuit fault on the zone wiring. The above table shows the AVERAGE standby current drawn by each device. To calculate the total number of devices that may be connected to a zone, add up the individual standby current values for each device and make sure that the total current does not exceed 1.2mA.

3. If a galvanic isolator (MTL5061/MTL5561) is used on the zone then this device will also draw current. Allow at least 0.1mA for the barrier (this could rise to 0.4mA depending on how much current is drawn by the detectors).

4. The maximum number of devices per zone including manual call points must not exceed 32 even if the current consumption is less than 1.2mA. This is a requirement of BSEN54 which requires that a single fault on a zone should not prevent the operation of more than 32 devices.

The values in the above table are for guidance only and will vary for individual detectors. Each zone should be fully checked for correct fault monitoring during installation & commissioning.

16. Overview Of User Functions

This section gives an overview of the functions available to the end user.

16.1   User Indications

General Indicator Section		
Indicator	**Indication Colour**	**Operating Condition**
Power Supply On	Green	Illuminates Steady for Mains or Standby power On.
Fire	Red	Flashes on any new fire alarm condition, changing to a steady indication on operation of Silence Alarms.
Fire Output Active	Red	Illuminates Steady when the Fire Output is active.
General Fault	Yellow	Flashes for any fault condition.
Power Supply Fault	Yellow	Flashes for mains or standby power supply/charge fault.
System Fault	Yellow	Illuminates Steady to indicate Microcontroller or Memory Failure. Flashes to indicate Engineer's Configuration Mode active.
Earth Fault	Yellow	Flashes for any positive or negative power supply earth fault.
Fuse Failed	Yellow	Flashes for any auxiliary supply fuse failure.
Repeater Fault	Yellow	Flashes for any Repeater fault or repeater communication fault.
Sounder Fault/Disabled	Yellow	Flashes for any sounder fault. Steady for sounders disabled.
Sounder Test	Yellow	Illuminates Steady while sounder walk test is active.
Fire Protection Fault/Disabled	Yellow	Flashes for a fault on the Fire Protection Output. Steady when Fire Protection Output is disabled.
Fire Output Fault/Disabled	Yellow	Flashes for a fault on the Fire Output. Steady when Fire Output is disabled.
Fault Output Fault/Disabled	Yellow	Flashes for a fault on the Fault Output. Steady when Fault Output is disabled.
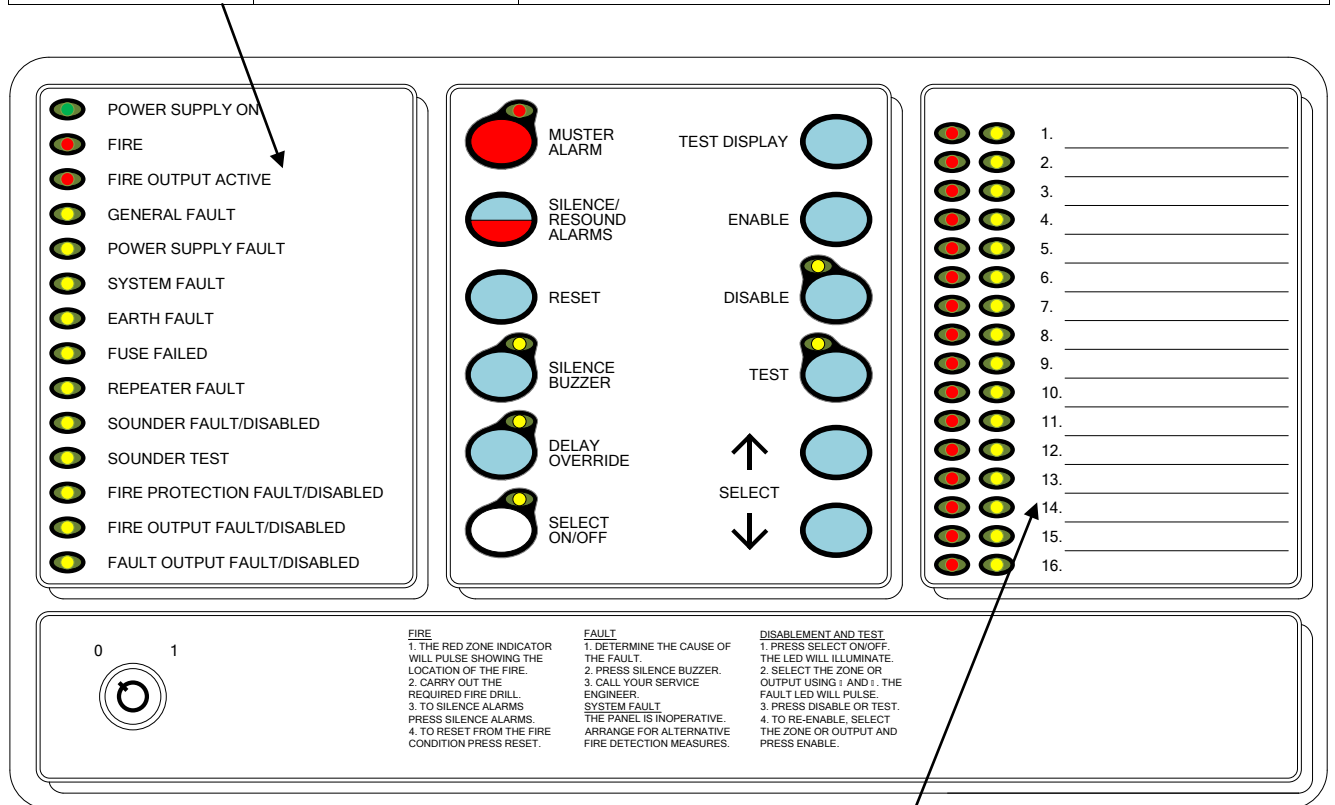
Zone Location Indications		
Indicator	**Indication Colour**	**Operating Condition**
User Generated Zone Location Text	Red	Flashes when zone is in a fire condition, turning to steady on operation of Silence Alarms.
User Generated Zone Location Text	Yellow	Flashes when zone is in a fault condition. Illuminates steady when zone is disabled or in test.

16.2   User Controls

POWER SUPPLY ON
FIRE
FIRE OUTPUT ACTIVE
GENERAL FAULT
POWER SUPPLY FAULT
SYSTEM FAULT
EARTH FAULT
FUSE FAILED
REPEATER FAULT
SOUNDER FAULT/DISABLED
SOUNDER TEST
FIRE PROTECTION FAULT/DISABLED
FIRE OUTPUT FAULT/DISABLED
FAULT OUTPUT FAULT/DISABLED

MUSTER ALARM   TEST DISPLAY
SILENCE/RESOUND ALARMS   ENABLE
RESET   DISABLE
SILENCE BUZZER   TEST
DELAY OVERRIDE   ↑
SELECT ON/OFF   SELECT   ↓

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

0   1

FIRE
1. THE RED ZONE INDICATOR WILL PULSE SHOWING THE LOCATION OF THE FIRE.
2. CARRY OUT THE REQUIRED FIRE DRILL.
3. TO SILENCE ALARMS PRESS SILENCE ALARMS.
4. TO RESET FROM THE FIRE CONDITION PRESS RESET.

FAULT
1. DETERMINE THE CAUSE OF THE FAULT.
2. PRESS SILENCE BUZZER.
3. CALL YOUR SERVICE ENGINEER.
SYSTEM FAULT
THE PANEL IS INOPERATIVE. ARRANGE FOR ALTERNATIVE FIRE DETECTION MEASURES.

DISABLEMENT AND TEST
1. PRESS SELECT ON/OFF. THE LED WILL ILLUMINATE.
2. SELECT THE ZONE OR OUTPUT USING ↑ AND ↓. THE FAULT LED WILL PULSE.
3. PRESS DISABLE OR TEST.
4. TO RE-ENABLE, SELECT THE ZONE OR OUTPUT AND PRESS ENABLE.

Access Controls Keyswitch:
0 – Controls Locked
1 – Controls Unlocked

Button	Functionality	Button Availability
Manual Fire Alarm or Muster [Configurable option]	Manual Fire Alarm: Operates all sounders continuously and lights the Manual Fire Alarm LED adjacent to the button until the silence button is operated . Muster: Operate all sounders in the Muster mode.	When controls are unlocked. [May be disabled if external muster system is used]
Silence/Resound Alarms	Following a fire alarm condition, 1st operation stops sounders. The General Fire LED and the Zonal Fire LED will change from flashing to steady. 2nd operation restarts the silenced sounders.	When controls are unlocked.
Reset	Resets any standing fire and/or fault conditions.	When controls are unlocked and panel has fire and/or fault conditions.
Silence Buzzer	Press to stop the buzzer sounding in fire or fault conditions.	When controls are locked or unlocked.
Delay Override	Overrides the delay when delay is running, turning the delay off. All delayed outputs will operate immediately.	When the panel is in the fire condition and the delay is running.
Select On/Off	Enables the User select feature for selection of zones or outputs via Select ↑ Select ↓ for disablement/re-enablement.	When controls are unlocked
Test Display	Press to illuminate all LEDs on the display and operate the buzzer. All indications remain active for approx 5 seconds after button press.	When controls are locked or unlocked.
Enable	Press to clear the disablement or test condition on a zone or output selected via the User Select feature.	When the flashing cursor is on a zone or output fault LED.
Disable	Press to disable a zone or output selected via the User Select feature. LED is lit whilst any disablement is active.	When the flashing cursor is on a zone or output fault LED.
	Press to view delay configuration of sounders, Fire and Fire Protection outputs.	When controls are unlocked.
Test	Press to enable One Man Test on sounders or zones as selected via the flashing cursor. LED will illuminate.	When the flashing cursor is on a zone or sounder fault LED.
Select ↑ Select ↓	Scrolls the flashing cursor through the zone and output fault LEDs on the display to select a circuit for disablement, or test. [LED illuminated when Select Mode is active]	When controls are unlocked and the Select button has been operated.
	Used to adjust the brightness of the display LEDs. [Press Test Display and ↑ to increase, Test Display and ↓ to decrease]	When controls are unlocked.

16.3 Selection of Zones or Outputs for Disablement, Enablement or Test

The panel provides a simple and straightforward means for selecting the sounder outputs and/or zones which are to be disabled, re-enabled or set to the test mode. The Fire Output, Fire Protection output and Fault Output can also be individually disabled and enabled.

The zone or output is selected using the Cursor Select feature. This allows the user to move a flashing cursor indication up or down through the yellow fault LEDs associated with the available zones and outputs until the required zone or output is highlighted. The yellow LED for the selected zone/output flashes in "Cursor" mode, which is easily distinguishable from all other indications. With the cursor flashing on the required zone/output, pressing the Disable button disables the zone/output. Pressing the Enable button re-enables the zone/output. Pressing the Test button initiates the test condition. [Note: Fire Output, Fire Protection Output and Fault Output cannot be placed in a test condition].

16.4 Disablement/Re-enablement of Detection Zones and Outputs

Any or all of the zones can be disabled.

A disabled zone will not report fire or fault conditions. The fire panel will respond normally to fire device operations and wiring faults on all enabled zones.

The following outputs can also be individually disabled/enabled:

- All Sounder circuits.
- The Fire Output.
- The Fire Protection Output.
- The Fault Output.

A disabled output will not report fault conditions and will not operate during a fault/fire alarm condition. The only exception to this is the Muster Alarm function which always operates the sounder circuits even if they are disabled.

16.5 Detector Zone One Man Test

When selected to the One Man Test condition, devices connected to the zone can be operated for test purposes without operating the Fire output or the Fire Protection outputs.

The zones to be set to the One Man Test condition are selected using the Cursor Select feature described in 16.3. With the cursor flashing on the required zone, pressing the Test button initiates the zone test. Pressing the Enable button or pressing the Test button again clears the test condition and restores normal operation to the zone.

The features of the One Man Zone Test condition are:

- A fire condition on a zone in Test Mode will not operate any of the fire outputs.
- Sounders can be configured not to respond to a detector test or to operate for 5 seconds and then automatically silence. When selected to respond to the detector zone test, sounders operate in general or zonal mode in accordance with the panel configuration.
- The panel will respond normally to a fire condition on any zone not selected to the Test Mode.
- After each test the panel and the device being tested is automatically reset allowing the next device to be tested without needing to return to the panel to silence and reset.
- If a fire condition occurs on any zone other than a zone in test mode, the panel responds fully to the fire condition as per its normal fire response and configuration. In this case the zone(s) in test will not be reset automatically.

16.6 Alarm Sounder One Man Test

The One Man Sounder Test operates all sounders on an intermittent basis until the Test mode is manually cleared. This allows an engineer to walk the vessel and confirm the operation of all the sounders. The sounder on/off cycle is 2 seconds on and 15 seconds off to allow operation to be confirmed without being too intrusive.

A genuine fire alarm condition overrides the test mode and operates the sounders normally.

16.7 Turning the Delay Mode on/off
STANDARD (NON-CREW) MODE:

The delay is automatically turned on when any of the outputs are configured to be delayed and automatically turned off when all of the outputs are configured not to be delayed. The DELAY LED illuminates to indicate that the delay is on. Pressing the DISABLE button will illuminate the relevant fault LEDs to show which circuits have been set to the delay mode.

CREW MODE:

CREW mode is enabled by setting DIL switch 2/6 OFF & 2/7 ON.

The delay is automatically turned on in Crew mode and applies to all sounder circuits except circuits 1 & 2 on the panel motherboard.

Sounder circuit 2 is intended for Bridge/crew areas and is never delayed.

Sounder circuit 1 is intended for machinery space areas and is not delayed for a detector alarm in a machinery space zone but is delayed for a detector alarm in any other zone.

The DELAY LED will not be illuminated unless the Fire O/P and/or the Fire Protection O/Ps are optionally configured for the delay mode.

16.8   Overriding the Delay Mode

The panel display includes a Delay Override button allowing the User to override the delay and operate the delayed outputs immediately during a fire alarm condition.

Operation of a Manual Call Point on a zone will also override the delay.

16.9   Adjustable Display LED Brightness

On the panel the brightness of the LEDs on the display can be adjusted to one of 8 levels from full brightness to dim.

On the repeater the brightness of the LEDs on the display can be set as either bright or dim.

To change the brightness, set the Access Keyswitch to the ON position, press the Test Display button, then within 5 seconds:

- On the panel: press the UP arrow button to increase the brightness or the DOWN arrow button to decrease the brightness.

- On the repeater: press the Test Display button to toggle the brightness (full/dim).

Power-up level is full brightness.

17. Overview of Engineers Functions

This section provides an overview of the functions available to the engineer.

17.1   Engineer's configuration process

Most of the Engineer's configuration facilities are controlled by DIL switches located on the motherboard, accessed by opening the panel door. Each configuration feature has its own dedicated DIL switch.

Some functions simply require the appropriate DIL switch to be either ON or OFF.

Where the function is to be applied to selected zones or outputs, operating the appropriate DIL switch initiates a programming mode in which the engineer is able to select the required zone or output and program the panel to enable or disable the required function. These programmed operating modes are stored in EEPROM and are not lost if the panel is powered down. The relevant DIL switches are shown below:

4		CONFIG NON-LATCH ZONES
5		CONFIG I/S ZONES
6		CONFIG M/S ZONES
7		CONFIG DELAY ZONES
8		CONFIG DELAY O/PS

17.2   Zone/Output selection

When one of the zone or output configuration DIL switches is switched to the ON position, the panel sounds the internal buzzer and illuminates the SYSTEM FAULT LED to indicate that the programming mode has been initiated. Any circuits which already have that mode set will have their fault LED illuminated.

The engineer can then use the Cursor Select feature to select the required zone or output by moving a flashing cursor indication up or down through the yellow fault LEDs associated with the available zones and outputs until the required zone or output is highlighted.

Note that in the Engineer's programming mode, any faults, or disablements are masked and are not shown on the display. The panel will not respond to faults or fires.

With the cursor flashing on the required zone/output, pressing the Disable button disables the required function for that zone/output (corresponding fault LED is OFF). Pressing the Enable button enables the required function for that zone/output (corresponding fault LED is ON).

Once all required zones/outputs have been programmed and the configuration DIL switch is returned to the OFF position, the panel will return to normal operation.

***NOTE: DIL switch 7 – CONFIG DELAY ZONES** is not applicable to the T1200-C range of panels.*

The factory default configuration for the zones and delayed outputs can be restored by selecting all five configuration DIL switches for the zones and outputs to ON then pressing the Disable switch on the display and finally setting the configuration switches back to the OFF position.

Factory default:

All zones are latching fire, not intrinsically safe, not machinery space.

All outputs operate immediately (not delayed).

The following sections describe the available configuration options.

17.3   Configure Delayed Outputs

Having operated the DIL switch for configuring delayed outputs the required output can be selected via the Cursor Select feature and can be set as either a Delayed output or a Non-Delayed output. If the output is set to the delayed mode, the appropriate output fault LED will be illuminated.

The following outputs can be independently programmed as delayed or non-delayed:

i) All Sounder Circuits (panel & output boards) unless in CREW mode

ii) Fire Output

iii) All Fire Protection Outputs (panel & output

boards)

Any output programmed as Delayed will not operate while the 2-minute delay timer is running.

17.4 Configure Machinery Space Zones

Having selected the DIL switch for configuring machinery space zones the required zone can be selected via the Cursor Select feature and can be set as either a Machinery Space Zone or a Standard Zone. If the zone is a Machinery Space Zone, then the appropriate zone fault LED will be illuminated.

A fire condition on a Machinery Space zone will operate the Machinery Space Fire Detected output relay on the C1714 Voyage Data Recorder Output Module.

The sounder operation in CREW mode is also affected by machinery space zones (see section 16.7).

17.5 Configure Non-Latching Zones

Having selected the DIL switch for configuring non-latching zones the required zone can be selected via the Cursor Select feature and can be set as either a Non-latching Fire Zone or a Latching Fire zone. If the zone is a Non-latching Fire Zone, then the appropriate zone fault LED will be illuminated.

The Non-latching Fire zone facility is primarily provided to allow multiple panels to be linked together via the Fire Protection relay and non-latching zone without causing a system lock-up condition, where the connected panels cannot be reset from the alarm condition.

A fire condition on a zone configured to the non-latch fire mode initiates the fire alarm condition on the panel and operates the fire alarm sounders, the Fire output and zone outputs as normal. The Fire protection output can be configured to operate or not to operate via DIL switch 1/1. On clearing the fire condition on a non-latch zone, the panel will clear the alarm indication if no other fire alarms are present.

17.6 Configure Intrinsically Safe Zones

Warning: Intrinsically safe zone arrangement.

- **Ensure that the installation has been carried out in full accordance with the installation documentation provided with the I.S. devices and I.S. barrier. Failure to carry out the installation correctly is likely to render the system unsafe and risks causing an explosion.**

- **End-of-line resistors must be used which comply with the requirements laid down in the installation data sheets provided with the I.S. barrier and the I.S. fire detection devices.**

10k resistors are required for the zone circuits and 3k9 for the sounder circuits.

- **Zones containing I.S. devices must be configured as Intrinsically Safe zones to ensure correct short circuit fault monitoring.**

Having selected the DIL switch for configuring the Intrinsically Safe zones (I.S.) the required zone can be selected via the Cursor Select feature and can be programmed as either an I.S. Zone or a standard zone. If the zone is set as an I.S. Zone, then the appropriate zone fault LED will be illuminated.

When configured to the **Standard Mode** the fire and fault trip thresholds for the zone are set by the panel to the optimum normal values and are compatible with a large range of TYCO detection devices. This is the factory set condition.

When configured to the **Intrinsically Safe Mode** the fire and fault trip thresholds for the zone are set by the panel to allow fire detection through I.S barriers (MTL5061/MTL5561 galvanic isolator).

Intrinsically Safe alarm devices [sounders] may be connected via an MTL5021/MTL5521 galvanic isolator. There are no requirements for configuring the panel's sounder outputs.

Note: Galvanic isolators prevent full fault monitoring of the sounder circuit due to the low monitoring voltage (open circuit fault occurs). Any cable fault between the isolator and I.S. sounders will not be detected. The 3k9 EOL resistor must be fitted to the terminals on the safe side of the barrier.

17.6.1 Mixed I.S. and Non-I.S. Zones

Where the Safety System Documentation allows, zones can contain I.S. and Non I.S. devices. The requirements of the Safety Documentation must be applied and the number of I.S. devices must be limited to 3 in total.

The I.S. devices must be located at the end of the zone with the I.S. barrier located in an adjacent safe area. All of the non-I.S. devices must be installed in the zone between the barrier and the panel.

The zone must be configured to the **NON-I.S.** mode [This simply sets the operating detection thresholds and is not a safety issue].

The non-I.S. section [safe side – between the panel and the I.S. barrier] will support full open and short circuit fault monitoring and detector/MCP fire event discrimination. The I.S. section [hazardous side – between the IS barrier and the end of line resistor] will support open circuit fault monitoring only - short circuit fault will initiate a detector fire condition. It will not support detector/MCP discrimination; all I.S. devices will raise a detector fire condition.

17.7 The Delay Mode Feature

NOTE: This feature does not fully comply with the requirements of EN54-2.

Outputs can be configured to be delayed in response to an automatic fire detector operating on any zone:

i)   Overall delay length – fixed at 2 minutes.

ii) Single-Stage (2-stage Delay DIL switch is disabled).

iii) Output Circuits to be delayed – configured as described in 17.3.

Operation of an automatic fire detector will raise the fire alarm indication audibly and visibly on the panel, operate any non-delayed outputs and start the time delay function for any delayed outputs.

The delay can be overridden, causing all outputs to operate immediately, by any of the following means:

- Operation of a manual call point on any zone.

- Operation of the Delay Override button on the panel or repeater.

- Pressing the Manual Fire Alarm/Muster button on the fire alarm panel or repeater. [Operates the sounders only - does not override other outputs].

17.7.1 Selection of Outputs to be Delayed

See section 17.3 for details.

The factory default is no outputs selected for delay (CREW mode is disabled).

The delay configuration status of the outputs can be checked on the display by unlocking the controls and pressing and holding the Disable button. Outputs selected to the delay mode will provide the disabled [steady] indication on the Fire Protection Fault/Disabled, Fire Output Fault/Disabled, Sounder Fault/Disabled LEDs (Sounder Delay not indicated in CREW mode). The indication clears when the Disable button is released.

17.8 Selectable Zonal or General Alarm Sounder operation

The Zonal Alarms DIL switch selects the sounders to either:

a) General Alarm Mode [all sounders operate for any fire condition] or

b) Zonal Alarm [in conjunction with the Pulse Non-Alarm Zones switch – see section 17.9]

The four standard sounder circuits on the 4-zone panel can be used in General or Zonal modes. On the 16 and 32-zone panels, these sounder outputs always operate in the General mode regardless of the setting on the general/zonal alarms configuration DIL switch. The optional output expansion system [see 4.2.8 above] provides additional sounder circuits for General or Zonal alarms on the T1216-C and T1232-C panels.

17.9 Pulse Non-Alarm Zones

This DIL switch selects the type of zonal sounder response to a fire when the Zonal Alarms feature described above is selected. The two selectable options are:

a) Zonal sounders for zone(s) in the fire condition operate continuously until silenced; all others are silent.

b) Zonal sounders for zone(s) in the fire condition operate continuously; all other sounders operate in pulsed mode until silenced.

17.10 Alarms in Crew Areas

If the ZONAL ALARMS switch is OFF and the PULSE NON-ALARM switch is ON, the Crew Area Alarm mode is enabled.

When configured to this mode, the activation of an automatic fire detector or alert manual call point on any zone (except Machinery Space) operates standard sounder output 2 (Bridge/Crew area sounder circuit) and starts a 2 minute delay. At the end of the delay sounder outputs 1, 3, 4 and any expansion sounder outputs also operate.

If an automatic fire detector is activated in a zone configured as Machinery Space, then sounder circuits 1 & 2 operate immediately (sounder circuit 1 is for machinery space zones).

Operating an Evacuate manual call point overrides the delay and operates all sounder outputs.

Pressing the Manual Fire Alarm/Muster button overrides the delay and operates all sounders in either Manual Fire Alarm or muster mode as configured.

If the Fire O/P and/or the Fire Protection O/Ps are also configured for delayed operation they will be delayed along with the sounder circuits.

17.11 Delay Restart DIL Switch

Applicable only when CREW mode is enabled, DIL switch SW2/3 (marked DELAY/MINUTES 2):

- DIL switch SW2/3 OFF: If the Sounders are silenced before the 2-minute delay has ended, a new fire condition will not restart the delay and all delayed outputs including all sounders will operate immediately.

- DIL switch SW2/3 ON: If the Sounders are silenced before the 2-minute delay has ended, a new fire condition will restart the 2-minute delay.

17.12 Selectable Muster/Manual Fire Alarm Sounder operation

All panels can be set up in either of the following Muster or Manual Fire Alarm Sounder response modes.

- In the standard **Manual Fire Alarm** mode,

operation of the Manual Fire Alarm/Muster button on the panel display causes all sounders to operate continuously until the silence alarms switch is operated. Manual Fire Alarm/Muster Alarm will also override the sounder delay and activate all sounder outputs.

- In **Muster**-mode, operation of the Manual Fire Alarm/Muster button on the panel display causes all sounders to operate in the internationally recognised **muster** mode [7 short pulses followed by one long pulse, repeated]. This will continue until the Silence Alarms button is pressed.

- If Muster and Manual Fire Alarm modes are **disabled**, the manual fire alarm/muster switch is not functional. This feature is provided to avoid duplication and operator confusion in instances where a totally separate manual muster system is provided.

All three modes (Muster, Manual Fire Alarm, and Disabled) are selected by a single link [J2] on the rear of the display PCB. **[Note: The link is clearly labelled – "Muster enabled/Evac enabled". Evac = Manual Fire Alarm]**. The link is removed for the **Disabled** condition.

The user control insert fitted to the display is double-sided to allow the installer to label the Manual Fire Alarm/Muster button according to the panel configuration. On the front side, the top left-hand button is labelled "Manual Fire Alarm" and on the reverse side it is labelled "Muster". A blank is provided for use when the Manual Fire Alarm/Muster feature is disabled.

17.13 Inhibit Fire Protection on Non-Latched Zone DIL Switch

DIL switch SW1/1 configures the Fire Protection output relay on the motherboard [and any expansion outputs selected to the fire protection type] to operate or not to operate for a fire condition on any zone configured to non-latched mode. This feature has been provided to allow two panels to be linked so that a fire condition on one panel triggers a fire on a zone on the other panel [and vice versa] without latching up. It can also be used to prevent a fire signal from a remote panel tripping any fire protection equipment connected to the local panel via the expansion outputs. The zones used to monitor the fire signals from remote panels should be configured to non-latching and the Fire Protection relay on the motherboard should be used to transmit a local fire signal to the remote panels.

17.14 Delay Alarm Silence and Reset Controls DIL Switch

DIL switch SW1/2 prevents the alarms being silenced and panel reset for a period of 3 minutes after a fire alarm condition occurs. (Not applicable to Muster Alarm).

17.15 Delay ON Auto DIL Switch

DIL switch SW1/3 has been re-assigned to enable zone coincidence for use with the Watermist extinguishing panel. This switch should be left in the OFF position for normal operation. When the switch is in the ON position, the Fire Protection outputs on the optional output expansion system will operate in pairs as required by the Watermist system.

17.16 Alarms on Evac Only DIL Switch

DIL switch SW1/10 configures the sounders to operate only when the panel is in Manual Fire Alarm or muster activated condition.

17.17 Silence before Reset DIL Switch

DIL switch SW2/1 determines when the panel can be reset from the fire condition:

OFF: Reset from Fire is available when panel is in the fire condition and sounders are active or silenced.

ON: Reset from Fire is available only after the sounders have been silenced.

17.18 Continuous or Pulsed Sounder Operation DIL Switch

DIL switch SW2/2 selects all sounders to operate in either continuous or pulsed mode.

17.19 Silent Zone Test DIL Switch

DIL switch SW2/8 selects the type of sounder response in One Man [Detector] Test Mode:

OFF: Normal sounder response [continuous or pulsed in line with panel configuration]

ON: Silent [no sounder operation]

17.20 Buzzer Disable DIL Switch

DIL switch SW2/9 enables/disables the panel fire/fault buzzer and gives a DISABLED indication on the display.

17.21 Latched Faults DIL Switch

DIL switch SW2/10 enables/disables the latched fault indication mode. When enabled, all fault indications latch until the Reset button is operated. Note: A latched zone fault will be cleared if a fire condition occurs on the same zone.

17.22 Repeater Configuration

Three DIL switches on the optional Repeater Interface board allow the engineer to configure the panel to communicate with up to 5 remote indication panels via the RS485 serial data link.

17.23 Output Relay Configuration

The Fire Signal Output, Fire Protection and Fault output relays are link-configurable on the panel motherboard to provide one of the following

options:

- Fault monitored 28Vdc powered outputs suitable for operating remote relays complying with the following requirements:
  Field relay requirements: Coil resistance - 2.6k to 4.5k. Coil Voltage 24Vdc nominal (min 18V, max 30V), fitted with suppression diode. (Compatible part: A1466 Relay Board. See Figure 29).
- Volt-free change over relay version suitable for switching a maximum of 1 Amp at 30Vdc. DO NOT USE WITH AC MAINS VOLTAGES.

17.24 Earth Fault monitoring

For installations where earth fault monitoring is unsuitable, it can be disabled by removal of the jumper link J18 in the bottom right hand corner of the C1627 motherboard. This is a non-EN54-2 feature provided for convenience.

18. Panel Repeaters

The T1200-C repeaters duplicate the panel indications and main user controls at a location remote from the main panel. The repeater uses the same motherboard [C1626] as the T1204 fire alarm panel although most of the components are depopulated. Up to 5 repeaters can be connected to a single panel using an RS485 serial connection. A C1631 repeater interface board needs to be fitted to connectors J13/J9 located towards the upper right hand edge of the C1626 motherboard in the panel and also on each repeater motherboard. If it is required to activate the Muster condition from a repeater panel, a C1655 Muster Interface board needs to be fitted to connector J2 on the motherboards of the fire panel and each repeater. [J2 is located middle left hand edge].

Note: The disable/enable/test facilities and the configuration functions are not available at the repeaters.
Repeaters are not supplied for use with the T1204.

Figure 18 – Repeater Display
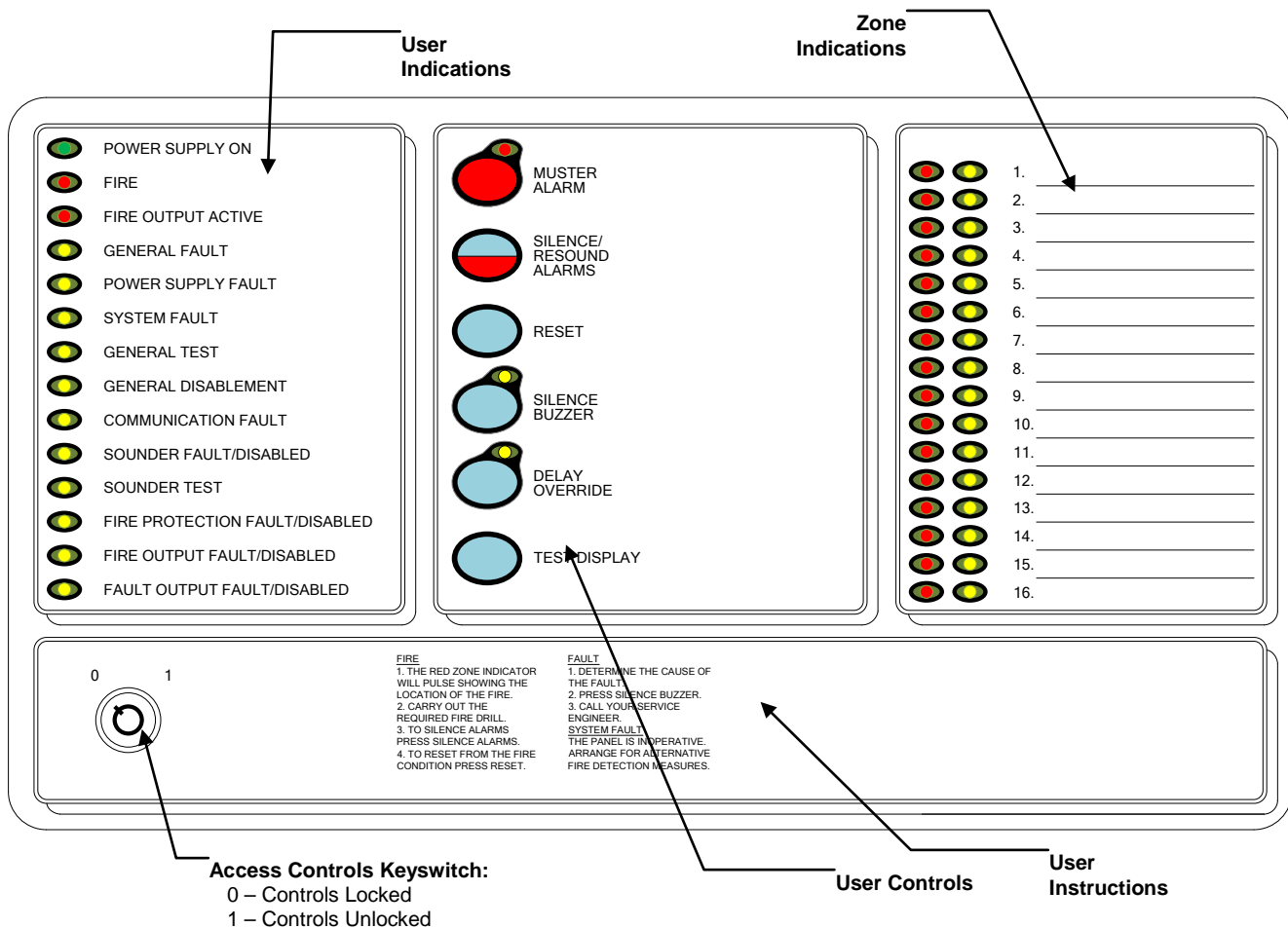
18.1   Repeater User Indications

Refer to Figure 18.

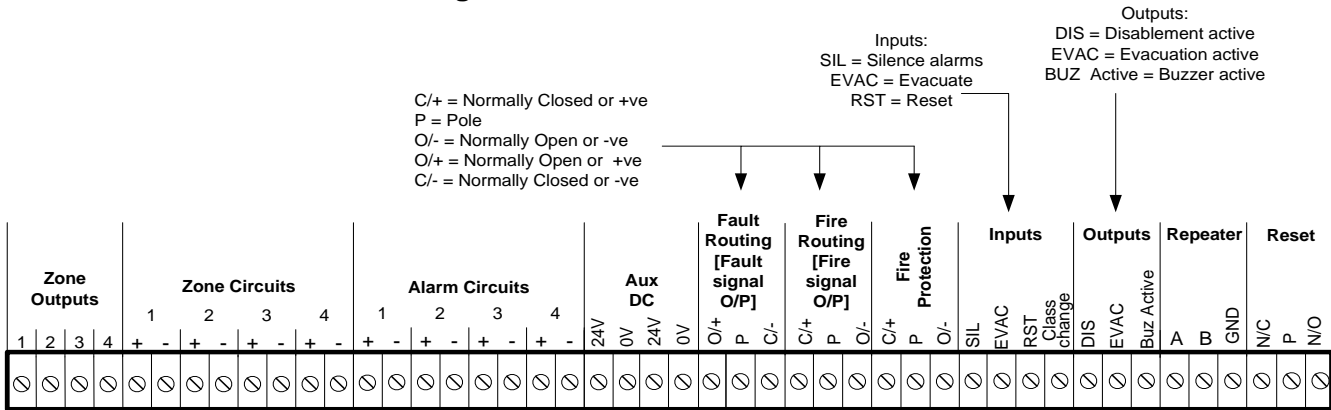| General Indicator Section		
Indicator Description	**Indication Colour**	**Operating Condition**
Power Supply On	Green	Illuminates Steady for Mains or Standby power On.
Fire	Red	Flashes on any new fire alarm condition, changing to a steady indication on operation of Silence Alarms.
Fire Output Active	Red	Illuminates Steady when the Fire Output is active.
General Fault	Yellow	Flashes for any fault condition.
Power Supply Fault	Yellow	Flashes for mains or standby power supply/charge fault on the panel.
System Fault	Yellow	Illuminates Steady to indicate microcontroller failure.
General Test	Yellow	Illuminated when Test Mode is active.
General Disablement	Yellow	Illuminated while any disablement is active.
Communication Fault	Yellow	Flashes for a repeater communication fault.
Sounder Fault/Disabled	Yellow	Flashes for any sounder fault. Steady for sounders disabled.
Sounder Test	Yellow	Illuminates Steady while sounder walk test is active.
Fire Protection Fault/Disabled	Yellow	Flashes for a fault on the Fire Protection Output. Steady when Fire Protection Output is disabled.
Fire Output Fault/Disabled	Yellow	Flashes for a fault on the Fire Output. Steady when Fire Output is disabled.
Fault Output Fault/Disabled	Yellow	Flashes for a fault on the Fault Routing Output. Steady when Fault Routing Output is disabled.

18.2   Repeater User Controls

Refer to Figure 18.

Switch Description	**Functionality**	**Button Availability**
Manual Fire Alarm or Muster [Configuration option at Panel]	1] Manual Fire Alarm: Operates all sounders continuously and lights the Manual Fire Alarm LED adjacent to the button until the silence button is operated. 2] Muster: Operates all sounders in the Muster mode until the silence button is operated.	When controls are unlocked. [May be disabled if external muster system is used].
Silence/Resound Alarms	Following a fire alarm condition, 1st operation stops the sounders. The General Fire LED and the Zonal Fire LED will change from flashing to steady. 2nd operation restarts the previously silenced sounders.	When controls are unlocked.
Reset	Clears the panel display, resets the zones, outputs and operates the reset relay.	When controls are unlocked and [if Silence Before Reset is configured] alarms silenced.
Silence Buzzer	Press to stop the buzzer sounding in fire or fault conditions.	When controls are locked or unlocked.
Delay Override	Overrides the delay when delay is running, turning the delay off. All delayed outputs will operate immediately.	When the panel is in the fire condition and the delay is running.
Test Display	Press to illuminate all LEDs on the display and operate the buzzer. All indications remain active for approx 5 seconds after button release. Press again while LEDs are illuminated to toggle the brightness setting between high & low.	When controls are locked or unlocked.

19. Circuit Connection Details

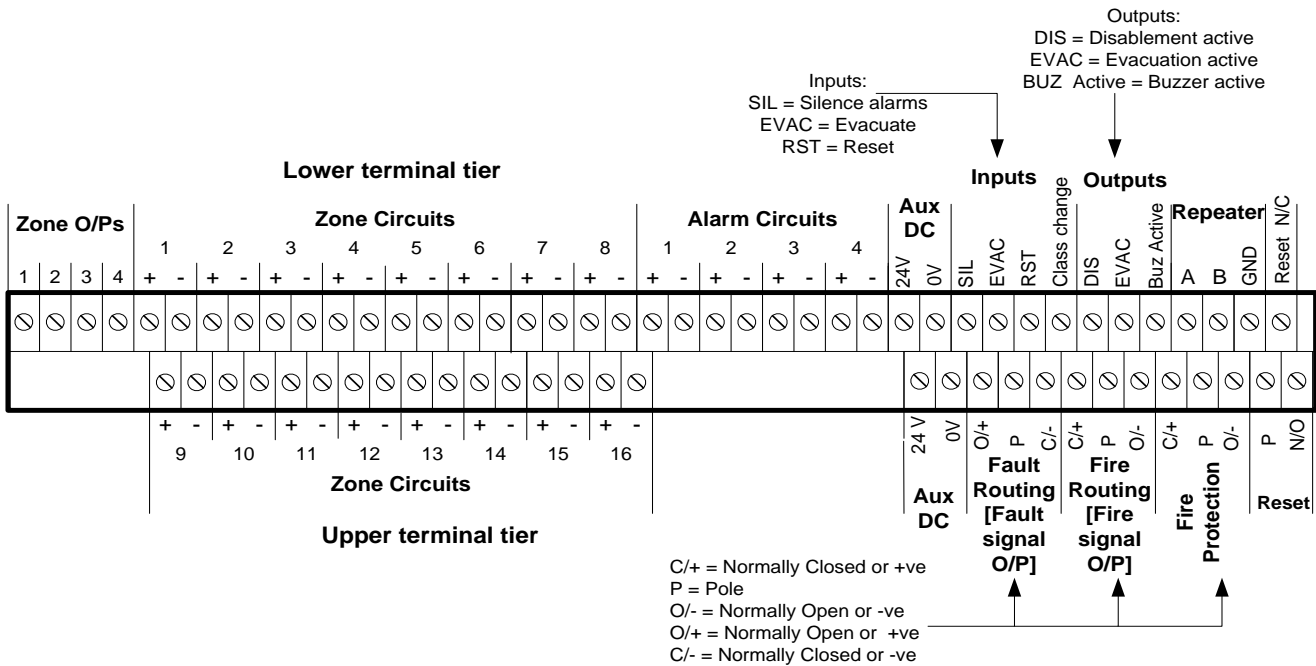### 19.1   T1204 (C1626) 4-Zone Panel Termination Details

Figure 19 – C1626 field terminations

Inputs:
SIL = Silence alarms
EVAC = Evacuate
RST = Reset

Outputs:
DIS = Disablement active
EVAC = Evacuation active
BUZ Active = Buzzer active

C/+ = Normally Closed or +ve
P = Pole
O/- = Normally Open or -ve
O/+ = Normally Open or +ve
C/- = Normally Closed or -ve

Zone Outputs				Zone Circuits								Alarm Circuits								Aux DC				Fault Routing [Fault signal O/P]			Fire Routing [Fire signal O/P]			Fire Protection			Inputs				Outputs			Repeater			Reset		
				1		2		3		4		1		2		3		4															SIL	EVAC	RST	Class change	DIS	EVAC	Buz Active	A	B	GND	N/C	P	N/O
1	2	3	4	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	24V	0V	24V	0V	O/+	P	C/-	C/+	P	O/-	C/+	P	O/-													

Note: "Evacuate" or "Evac" = Manual Fire Alarm/Muster

19.2   T1216-C and T1232-C (C1627) 16-Zone Motherboard Termination Details

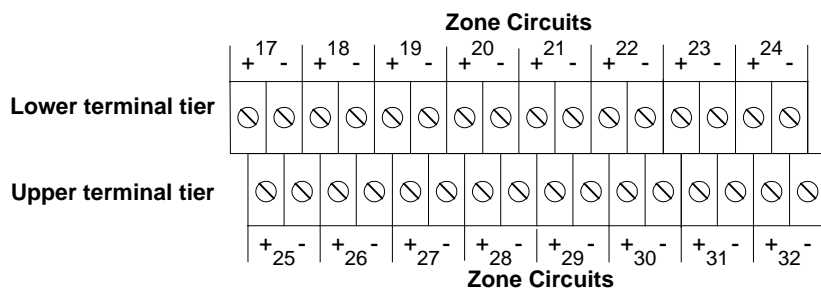**Figure 20 – C1627 field terminations**

Outputs:
DIS = Disablement active
EVAC = Evacuation active
BUZ Active = Buzzer active

Inputs:
SIL = Silence alarms
EVAC = Evacuate
RST = Reset

Lower terminal tier

Inputs / Outputs

Zone O/Ps				Zone Circuits																Alarm Circuits								Aux DC		SIL	EVAC	RST	Class change	DIS	EVAC	Buz Active	Repeater		GND	Reset N/C
				1		2		3		4		5		6		7		8		1		2		3		4		24V	0V								A	B		
1	2	3	4	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-													

(Upper tier)

24 V	0V	O/+	P	C/-	C/+	P	O/-	C/+	P	O/-	P	N/O
Aux DC		Fault Routing [Fault signal O/P]			Fire Routing [Fire signal O/P]			Fire Protection			Reset	

+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-
9		10		11		12		13		14		15		16	

Zone Circuits

Upper terminal tier

C/+ = Normally Closed or +ve
P = Pole
O/- = Normally Open or -ve
O/+ = Normally Open or +ve
C/- = Normally Closed or -ve

Note: "Evacuate" or "Evac" = Manual Fire Alarm/Muster

19.3   32-Zone Expansion Board Termination Details

Figure 21 – C1632 17-32 zone expansion board field terminations

Zone Circuits

	17		18		19		20		21		22		23		24	
	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-

Lower terminal tier

Upper terminal tier

+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-
25		26		27		28		29		30		31		32	

Zone Circuits

19.4　Auxiliary Supply

An auxiliary supply output is available to power external field equipment from the panel. This voltage is nominally 27.3Vdc but varies during mains-failed conditions. See section 21. below for details of maximum load.

The output is fused using an electronic device, and fuse activation will be indicated as Fuse Failed on the panel display. The fuse can be reset after removal of the fault by operating the Reset button on the display.

The auxiliary supply terminals are labelled Aux DC 0V and 24V. Although two sets of terminals are provided, they are both protected by the same fuse circuit and therefore the total load across both sets of terminals must not exceed the rated value.

Note: If equipment draws current from the auxiliary supply during the mains-failed condition this must be included in the battery capacity calculations.

19.5　Fire Protection, Fire Output and Fault Output Signal Outputs

These outputs are factory set to the fault-monitored, powered mode of operation but can be configured at site to volt-free relay outputs [See 17.23 above]. Connection details for both types of configuration are provided in Figure 24.

19.6　Use of Auxiliary Inputs

Auxiliary inputs are provided to allow remote operation of the following functions:

Auxiliary Input:	Type of activating switch:
Class Change.	Two-position latching
Remote Manual Fire Alarm/Muster.	Two-position latching
Remote Silence.	Biased off, momentary
Remote Reset.	Biased off, momentary

To activate an input, 0Vdc should be connected to the input circuit via a normally open contact arranged to close. [See Figure 22 – Auxiliary I/P connection detail]

Figure 22 – Auxiliary I/P connection detail
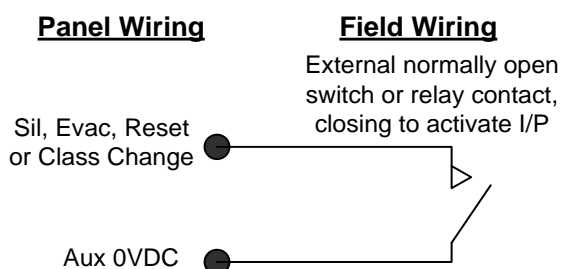
Note: "Evacuate" or "Evac" = Manual Fire Alarm/Muster

Note: To prevent unauthorised operation of the system, any manually operated auxiliary input must be operated by a key-switch. The key to the switch should be held with the panel's access control key.

19.7　Sounder Circuits

The T1204 panel has 4 sounder circuits, each rated at 0.5A. The T1216-C and T1232-C panels have 4 sounder circuits each rated at 1A. The circuits are reverse polarity monitored for open and short circuit faults. All connected field devices must be polarised to allow correct fault monitoring. To prevent damage to the control panel, any solenoid devices such as bells must also have a suppression diode fitted as shown in Figure 23 – Alarm circuit configuration.

The circuit must be terminated with a 3K9 end-of-line resistor.

Figure 23 – Alarm circuit configuration
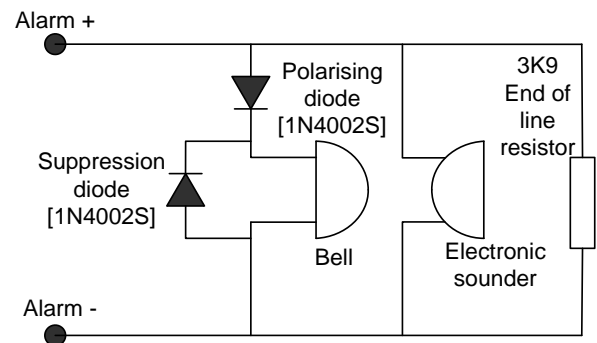
The voltage drop on each alarm circuit should be calculated to ensure that the minimum voltage at the end of each circuit exceeds the minimum required by each sounding device.

The voltage at the end of the circuit is given by:

$$V_{Amin} = V_{Omin} - (I_A \times 2 \times L \times R_C)$$

V_{Amin} = Minimum Alarm Voltage

V_{Omin} = Minimum Output Voltage**

I_A = Alarm Current in Amps

L = Alarm Circuit Length in metres

R_C = Cable resistance (Ohms per metre)

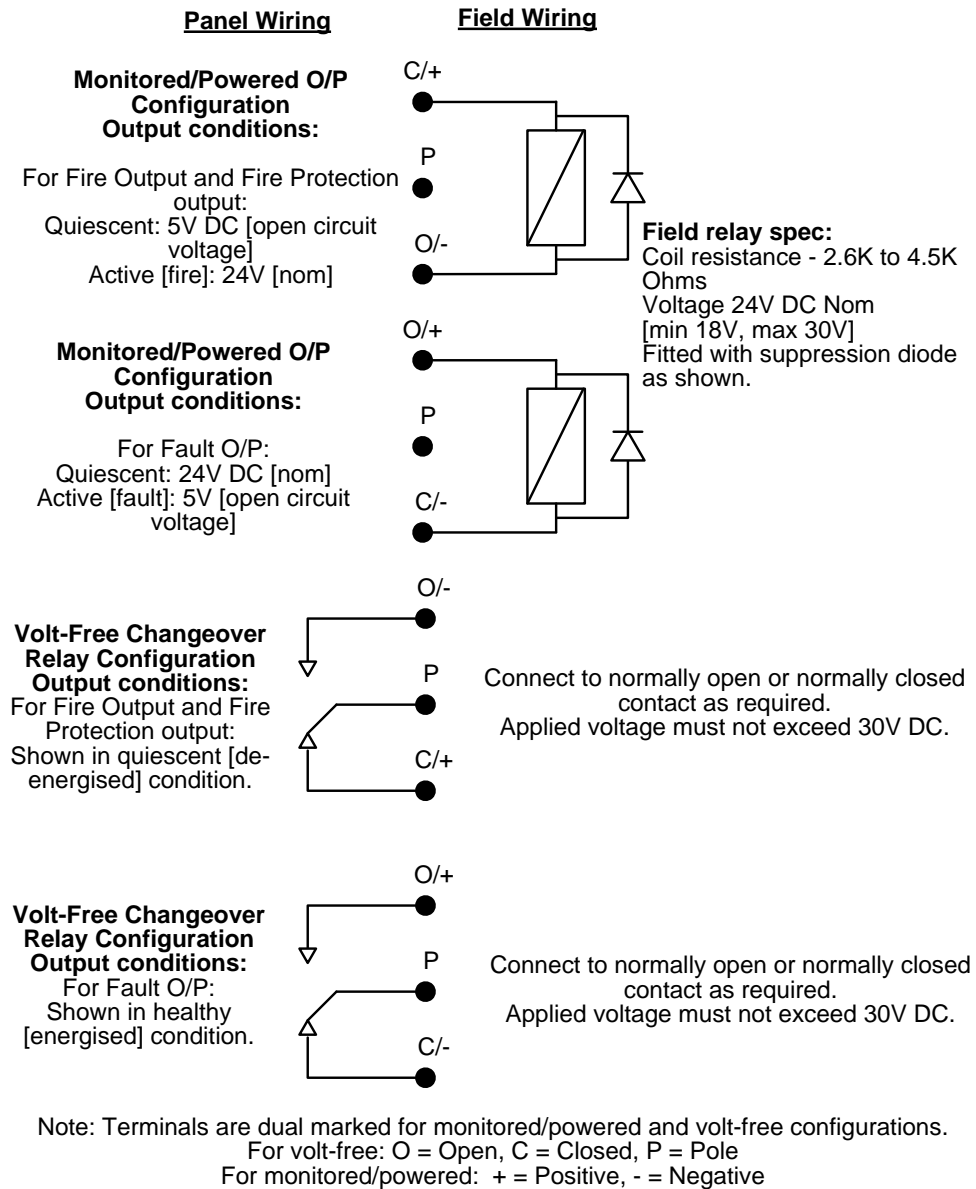** Min O/P voltages:

　T1204 = 19.2V

　T1216-C = 19.2V

　T1232-C = 18.4V

The resistance per metre is as follows:
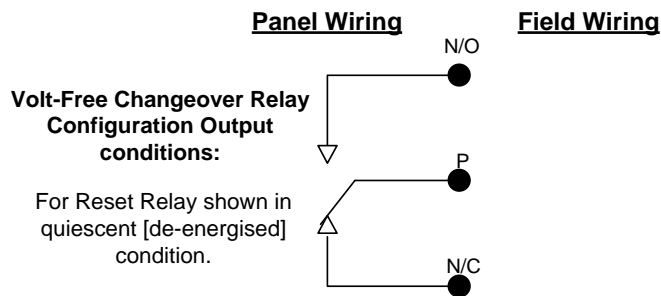
　$1.5mm^2$ - 0.015Ω per metre per core

　$2.5mm^2$ - 0.009Ω per metre per core

Figure 24 – Fire Protection, Fire and Fault Signal Output Connections

Panel Wiring   **Field Wiring**

Monitored/Powered O/P Configuration Output conditions:

For Fire Output and Fire Protection output:
Quiescent: 5V DC [open circuit voltage]
Active [fire]: 24V [nom]

C/+

P

O/-

Field relay spec:
Coil resistance - 2.6K to 4.5K Ohms
Voltage 24V DC Nom [min 18V, max 30V]
Fitted with suppression diode as shown.

Monitored/Powered O/P Configuration Output conditions:

For Fault O/P:
Quiescent: 24V DC [nom]
Active [fault]: 5V [open circuit voltage]

O/+

P

C/-

Volt-Free Changeover Relay Configuration Output conditions:
For Fire Output and Fire Protection output:
Shown in quiescent [de-energised] condition.

O/-

P

C/+

Connect to normally open or normally closed contact as required.
Applied voltage must not exceed 30V DC.

Volt-Free Changeover Relay Configuration Output conditions:
For Fault O/P:
Shown in healthy [energised] condition.

O/+

P

C/-

Connect to normally open or normally closed contact as required.
Applied voltage must not exceed 30V DC.

Note: Terminals are dual marked for monitored/powered and volt-free configurations.
For volt-free: O = Open, C = Closed, P = Pole
For monitored/powered: + = Positive, - = Negative

Warning: The volt-free auxiliary relay contacts must not be used to directly switch any voltage which exceeds 30Vdc.

Figure 25 – Reset Relay contact connection details

Panel Wiring   **Field Wiring**

N/O

Volt-Free Changeover Relay Configuration Output conditions:

For Reset Relay shown in quiescent [de-energised] condition.

P

N/C

Warning: The volt-free auxiliary relay contacts must not be used to directly switch any voltage which exceeds 30Vdc.

19.8 Electrical Design of Detection Zones

To allow the panel to correctly monitor for fault conditions, the wiring for each zone must be installed as a continuous pair with no spurs or tees and be terminated with a 10k 0.25W end-of-line resistor. Correct polarity must be strictly observed throughout.

19.8.1 Maximum Number of Devices on a Zone

The maximum number of devices supported by a zone depends on the quiescent current drawn by each device. The quiescent current will be listed on the device data sheet provided by the Manufacturer of the device.

The maximum quiescent current available to the devices on a zone is 1.2mA. Exceeding this value will prevent the panel from correctly monitoring for open circuit fault conditions.

Note: BSEN 54-2 recommends the maximum number of devices per zone is 32 (including MCPs) and requires that the maximum number of devices connected to a panel is limited to 512 (a single microcontroller failure should not result in more than 512 devices being lost).

19.8.2 Intrinsically Safe Zones

Warning: I.S. zone wiring and equipment installation must comply with the installation guidelines provided with the I.S. fire detection equipment and the I.S. barrier. [See section 17.6 above].

Figure 26 – Typical T1200-C Wiring Diagram
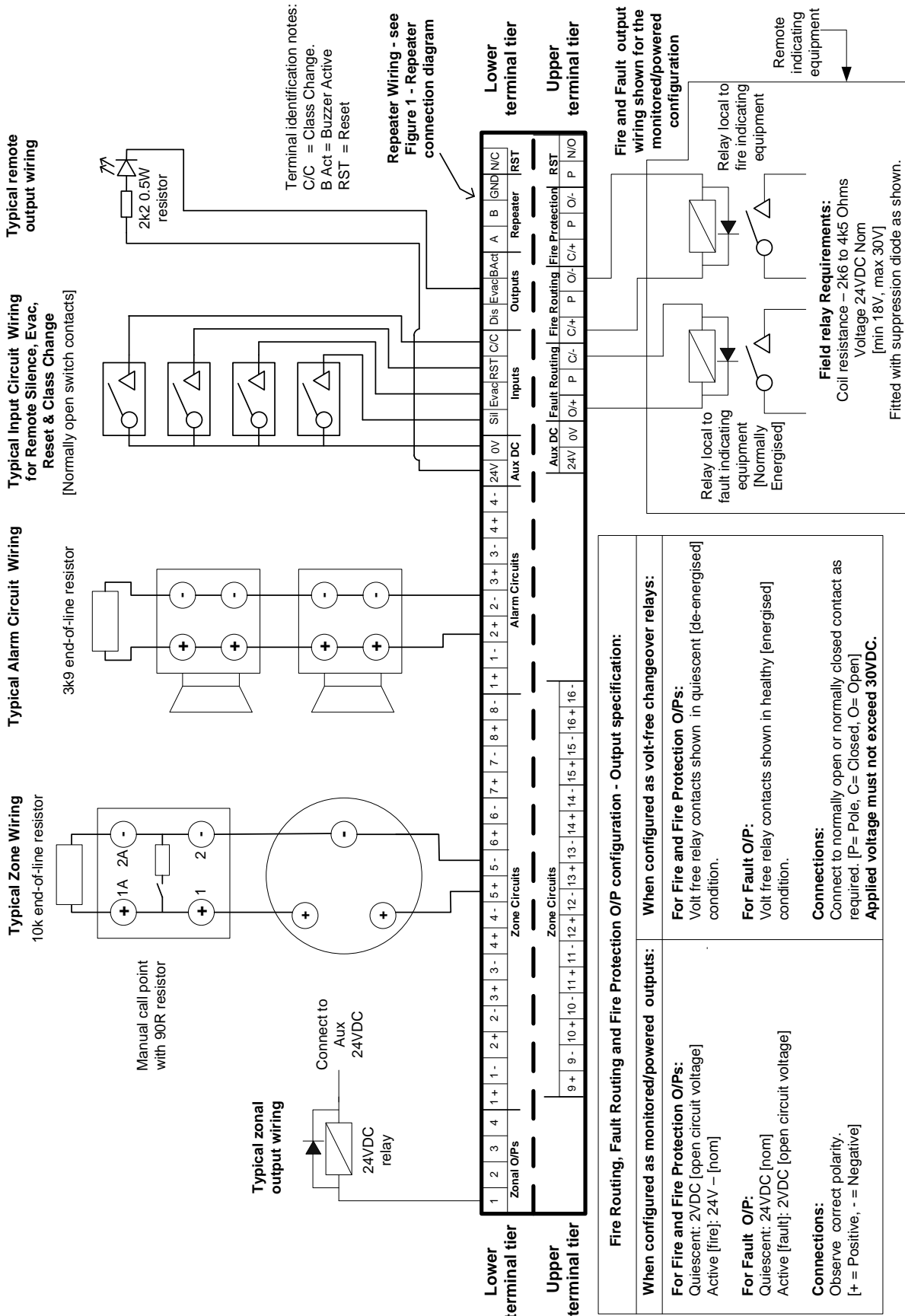
Note: "Evacuate" or "Evac" = Manual Fire Alarm/Muster

19.9   Repeater Panel and Repeater Muster Wiring

The Repeater RS485 communication and optional Muster Control connections should all be made via a single multi-core data cable. The 24Vdc supply from the panel can only be made through this cable if there is only one repeater connected and the cable is short enough to keep the voltage drop to 2Vdc or less (see notes below). The cable shield needs to be earthed at the panel & all repeaters.

Notes:

One repeater will draw up to 75mA which means that the total resistance of the cable should not exceed 24 Ohms (12 Ohms in each core). The T1200-C Application Guide lists cable types with their nominal DC resistance.

If more than one repeater is required or the cable resistance is too great, then data cable is unsuitable for supplying power and a separate suitable 2-core cable must be used.

Use only Plenum rated screened data cable with at least 3 pairs to accommodate repeater communication & Muster Interface options. 4 pairs will be required if power is also being provided (subject to the limitations described above).

Figure 27 – Repeater Wiring Diagram
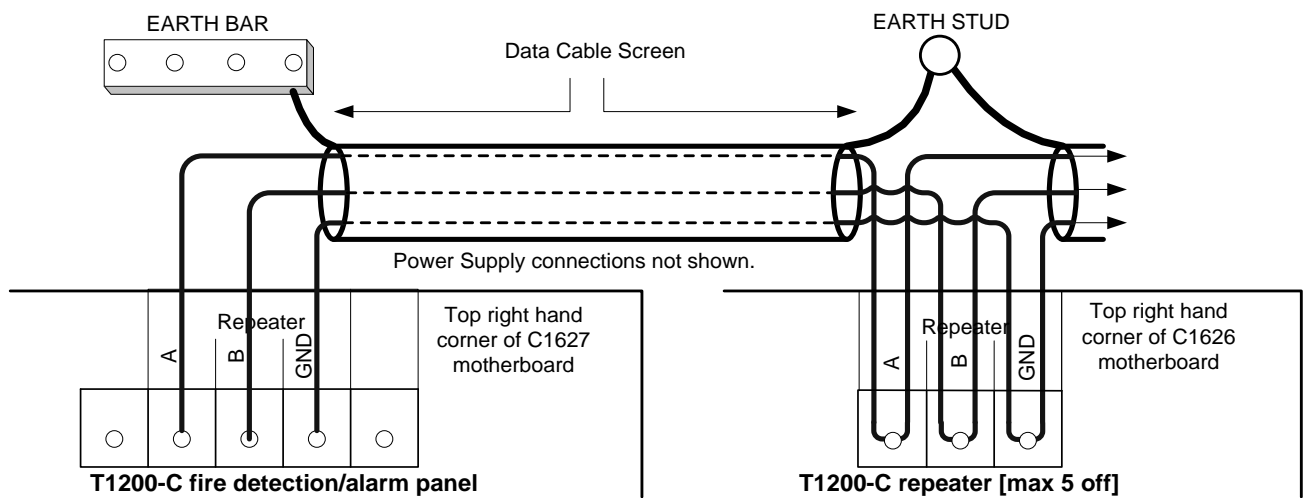
Figure 28 – Muster Interface Wiring Diagram

These three cores should be contained within the Repeater RS 485 communications cable, the cable screen being connected to the Earth Bar at panel & repeaters. If a separate cable is used then the cable screen should be connected to the Earth Bars.

Wiring Optional Repeater Muster Interfaces
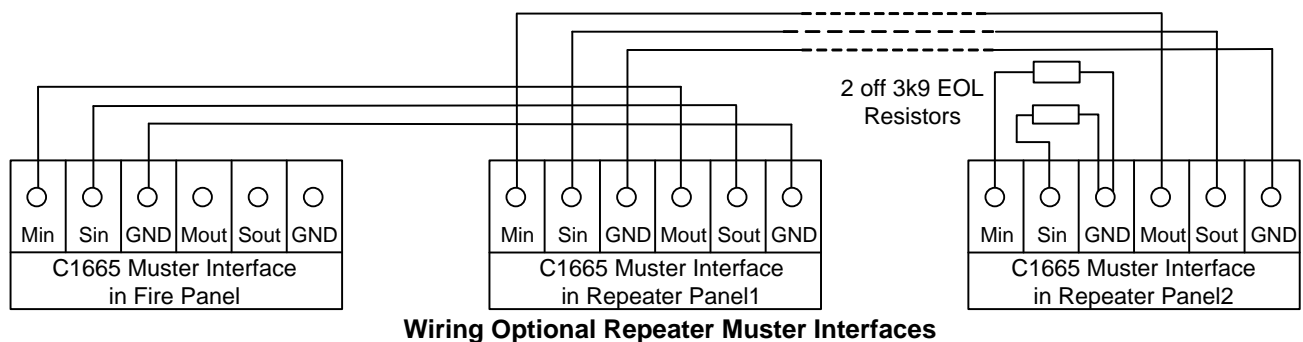
20. Mechanical, Electrical and Environmental Specification

Mechanical Specification	Panel						Repeater	
	T1204 DC	**T1204 A1**	**T1204 A2**	**T1216-C**	**T1232-C**	**T1200B-C**	**T1216R-C**	**T1232R-C**
Size (mm) **Height** **Width** **Depth**	270 335 148	270 335 148	270 335 148	See Figure 2	See Figure 2	235 395 106	See Figure 2	See Figure 2
Weight excluding batteries (kg)	7.1	8.3	8.4	8.1	9.3	4.4	6.7	7.7

	T1204A1	**T1204A2**	**T1204DC**	**T1216-C**	**T1232-C**
Mains Input Specification	110V AC PSU	230V AC PSU	24V DC PSU	110/230V AC PSU	110/230V AC PSU
Maximum Input Power (W)	110	115	70	200	200
Protection [Warning: Replace only with identical type & rating of BEAB or VDE approved fuse]	T3.15A H250V [3.15A anti-surge]	T3.15A H250V [3.15A anti-surge]	T3.15A H250V [3.15A anti-surge]	T5A H250V [5A anti-surge]	T5A H250V [5A anti-surge]
Voltage	93.5 – 121Vac	195.5 – 253Vac	18 – 31.2Vdc	93.5 – 253Vac	93.5 – 253Vac
Frequency (Hz)	47.5 – 63	47.5 – 63	N/A	47.5 – 63	47.5 – 63
Cable requirements	Minimum of 1mm^2 c.s.a. copper protected by a 5A fuse.				

Power Supply Output Specification	**T1204A1**	**T1204A2**	**T1204DC**	**T1216-C**	**T1232-C**
Maximum Short Term Current Output (I max b) (A)	1.5	1.5	1.5	4	4
Maximum Continuous Current (I max a) (A)	0.6	0.6	0.6	2	2
Minimum Output Current (I min) (mA)	N/A (PSU is integrated into the motherboard)		30	30	30
Voltage Output, Mains On (Vdc)	27.3 (Nominal, dependent on temperature)				
Maximum Current Output, Mains Failed (A)	1.5	1.5	1.5	4	4
Voltage Output (Vdc)	28.6 – 20.0	28.6 – 20.0	28.6 – 20.0	28.6 – 20.0	28.6 – 20.0
Max Ripple [full load/battery disconnected] (mV p-p)	200	200	200	300	300
Output voltage adjustment	Factory set				
Output protection	Electronic current limiting				
Common fault output	Outputs not available to user – internally connected to panel PSU monitor.				
Mains failed fault output	Outputs not available to user – internally connected to panel PSU monitor.				

Battery Specification	T1204A1	T1204A2	T1204DC	T1216-C	T1232-C
Battery charger output: Temperature compensated float charger 28.15V ±0.1V @ -10°C 26.6V ±0.1V @ +55 °C (A)	1.5	1.5	1.5	5	5
Maximum internal resistance of battery & charger circuit: (Ri max) (Ω)	1	1	0.6	0.6	0.6
Battery type: POWERSONIC Warning: Replace only with identical battery	2 off PS-1230 or PS1270 [12V 3.4Ah or 7Ah] In a T1200B battery box			2 off PS-12170 [12V 17Ah] In a T1200B-C battery box	
Battery capacity	24 hours stand-by + 0.5 hours alarm				
Battery size (mm): [For one 12V pack]					
Battery circuit protection: Warning: Replace only with identical type & rating of fuse	F2AL250V 20mm fast blow glass fuse	F2AL250V 20mm fast blow glass fuse	T8AH250V 20mm Ceramic Fuse	T8AH250V 20mm Ceramic Fuse	T8AH250V 20mm Ceramic Fuse
Mains failed fault battery current (mA)	55	55	70	125	170
Mains failed alarm battery current (mA)	90	90	105	170	210

Battery Dimensions ± 2mm

	PS-1230	PS-1270
L	133mm	151mm
W	67mm	65mm
H	60mm	94mm
HT	66mm	98mm

Environmental Specification	
IP Rating	Designed to IP56
Panel operating ambient temperature range	-10°C to + 55°C [Batteries –20°C to + 50°C charge, –20°C to + 60°C discharge]
Storage temperature range	All panels:-10°C to + 70°C
Operating and storage humidity	All panels: 95% Non condensing
Max operational vibration	GL2003 Section 9 Frequency range: 2Hz to 13.2Hz - amplitude: 1mm [peak] Frequency range: 13.2Hz to 100Hz – acceleration amplitude: 0.7g
EMC	**EMC Radiated Immunity:** GL2003 Section 16. BSEN 50130-4:2011 **ESD:** GL 2003 Section 15 BSEN 50130-4:2011 **Fast Transient Burst:** GL 2003 Section 17 BSEN 50130-4:2011 **Surge:** GL 2003 Section 19 BSEN 50130 -4:2011 **Conducted Interference [Low frequency]:** GL 2003 Section 20 **Conducted Interference [High frequency]:** GL 2003 Section 18 BSEN 50130-4:2011 **Conducted Emissions:** GL 2003 Section 21 [Bridge/Deck areas] BSEN61000-6-4:2007 + A1:2011 **Radiated Emissions:** GL 2003 Section 22 [Bridge/Deck areas] BSEN61000-6-4:2007 + A1:2011
Salt Mist	LR 1/2002 Section 16 IEC 68-2-11 Test Ka; IEC 68-2-52 Test Kb severity 1

21. T1200-C Input and Output Specification

Detection Zone Inputs	T1204 A1/A2/DC	T1216-C	T1232-C
Number of Zones	4	16	32
Specification	Conventional open and short circuit fault monitored. **Threshold current – Normal configuration:** Short circuit threshold: ≥ 65.0mA. Evacuate Manual Call Point alarm threshold: ≥ 37.92; <65.0mA. Detector/Alert Manual Call Point alarm threshold: ≥ 10.78; <37.92mA. Quiescent: ≥ 1.63; <10.78mA. Open circuit: < 1.63mA. **Threshold current – I.S. configuration [Using MTL5061/MTL5561 galvanic isolator]:** Short circuit threshold: ≥ 27.78mA. Evacuate Manual Call Point threshold: ≥ 20.92; <27.78mA. Detector/Alert Manual Call Point alarm threshold: ≥ 8.5; <20.92mA. Quiescent: ≥ 1.63; <8.5mA. Open circuit: <1.63mA.		
Cable requirements	Max resistance of circuit loop: 40 Ohms.		

Ancillary Inputs	T1204 A1/A2/DC	T1216-C	T1232-C
Zonal Fire Outputs for [Zones 1-4]	Open collector, 50mA 30V max input	Open collector, 50mA 30V max input [available for zones 1-4 only]	
Class Change Input	Non- fault monitored. 0 Volt I/P to activate. I/P sensitivity: 0-1k Ohm		
Remote Evacuate Input [Evac = Manual Fire Alarm or Muster Alarm]	Non- fault monitored. 0 Volt I/P to activate. I/P sensitivity: 0-1k Ohm		
Remote Silence Input	Non- fault monitored. 0 Volt I/P to activate. I/P sensitivity: 0-1k Ohm		
Remote Reset Input	Non- fault monitored. 0 Volt I/P to activate. I/P sensitivity: 0-1k Ohm		
Cable requirements	Cable loop resistance <= 1k Ohm		
Earth Fault I/P	Alarm threshold between 10k Ohm to 70k Ohm [dependant on circuit] between chassis and +ve or -ve line		

Outputs	All Panels
Evacuate [active] Output [Evacuate = Manual Fire Alarm/Muster]	Open collector. 50mA 30V max
Buzzer [active] Output	Open collector. 50mA 30V max
Disablement [active] Output	Open collector. 50mA 30V max
Reset Relay	1 x Volt-free change over rated 1 Amp at 30Vdc
Fire Output **Monitored configuration**	Quiescent: 2Vdc; Active [fire]: 24Vdc [nominal] Field relay spec: Coil resistance - 2.6k to 4.5k Ohms. Voltage 24Vdc Nominal [min 18V, max 30V]. Fitted with suppression diode
Volt –free configuration	1 x Volt-free change over rated 1 Amp at 30Vdc
Fire Protection Output **Monitored configuration**	Quiescent: 2Vdc; Active [fire]: 24Vdc [nominal]. Field relay spec: Coil resistance - 2.6k to 4.5k Ohms. Voltage 24Vdc Nominal [min 18V, max 30V]. Fitted with suppression diode
Volt –free configuration	1 x Volt-free change over rated 1 Amp at 30Vdc
Fault Routing Output **Monitored configuration**	Quiescent: 24Vdc [nominal]; Active [fault]: 2Vdc. Field relay spec: Coil resistance - 2.6k to 4.5k Ohms. Voltage 24Vdc Nominal [min 18V, max 30V]. Fitted with suppression diode
Volt –free configuration	1 x Volt-free change over rated 1 Amp at 30Vdc
Cable requirements	No special requirements

Alarm Circuits	T1204 A1/A2/DC	T1216-C	T1232-C
Quantity	4	4	4
Maximum Current per circuit (A)	0.5	1	1
Output Voltage (battery operation) (Vdc)	28.4 – 19.6	28.4 – 19	28.4 – 19
Output Voltage (mains operation) (Vdc)	28.4 – 25.8		
Fault Monitoring	Reverse polarity for open and short circuit faults		
Protection [Self resetting electronic] (A)	0.93	1.85	1.85
Cable requirements	No special requirements. Cable resistance and current load must allow a voltage at the end-of-line which is above the minimum operating voltage of the sounders.		

Auxiliary Supply	Panel			Repeater	
	T1204	**T1216-C**	**T1232-C**	**T1216R-C**	**T1232R-C**
Maximum Current (A)	0.5	1	1	N/A	N/A
Auxiliary supply (battery operation) (Vdc)	28.4 – 19.6	28.4 – 19	28.4 – 19	N/A	N/A
Auxiliary supply (mains operation) (Vdc)	28.4 – 25.8			N/A	N/A
Protection [Electronic] (A)	0.93	1.85	1.85	N/A	N/A
Cable requirements	No special requirements. Cable resistance and current load must allow a voltage at the end-of-line which is above the minimum operating voltage of the equipment connected.				

Repeater Output	**T1216-C/T1232-C Panels**
Number of repeaters	1 to 5
Maximum panel to repeater cable length	Up to 2000m, dependent on repeater load and cable resistance. Voltage drop between panel and repeater should not exceed 2Vdc.
Communication protocol	RS485 serial data 9600baud.
Protection	Electronic, current limited.
Cable Type	RS485 shielded cable: Two pairs for data + One pair muster control. Two core low impedance cable for power. See below for examples.

RS485 Cable Specification						
Generic Type	RS422/RS485 screened data cable.					
Plenum Rated Data Cable:						
Number of Conductors:	Two Pairs (Data Only)		Three Pairs (24Vdc Power & Data Only, or Data & Muster Control Only)		Four Pairs (24Vdc Power, Data & Muster Control)	
	Part Number	Core Resistance (300m)	Part Number	Core Resistance (300m)	Part Number	Core Resistance (300m)
Alpha Cable	57602	23.9Ω	57603	23.9Ω	57604	23.9Ω
	58412	15.3Ω	58413	15.3Ω	58414	15.3Ω
	57632	10.5Ω	-	-	57634	10.5Ω
Belden Cable	1325A	14.7Ω	1326A	14.7Ω	-	-
	6341PC	6.5Ω	6342PC	6.5Ω	6343PC	6.5Ω
	6341PT	6.6Ω	6342UE	6.5Ω	6343UE	6.5Ω

22. Appendix

22.1 EN54 Optional Functions with Requirements

The T1200-C panel has the following EN54 optional functions:

- Clause 7.8 Outputs to fire alarm devices.
- Clause 7.9 Outputs to fire alarm routing equipment.
- Clause 7.10 Outputs to Fire Protection Equipment.
- Clause 8.4 Total loss of the power supply.
- Clause 8.9 Output to fault warning routing equipment.
- Clause 10 Test condition.

22.2 Ancillary Functions Not Required By EN54

The T1200 panel offers several auxiliary functions that are not required/allowed by EN54. These are:

- Fire [Routing], Fire Protection and Fault [Routing] outputs can be configured to be volt-free change over contacts.
- Detection zones can be configured as non-latching.
- Detection zones can be configured for Intrinsically Safe applications.
- Class change input - operates sounders briefly to signal class changes in educational institutions. [Land-based feature].
- Reset relay to interrupt power supplies to external equipment that needs to be reset in tandem with the T1200-C panel (e.g. IR Beam Detectors).

- Engineer configurable features:
  - To require the silencing of the fire alarm condition prior to enabling the fire alarm condition reset.
  - To inhibit the operation of the Fire Protection Output for a fire condition on a zone configured as non-latching.
  - To inhibit the silencing of fire alarm devices and resetting of the fire alarm condition for a period of 3 minutes after a fire alarm condition occurs.
  - To prevent fire alarm devices operating for any fire alarm condition other than the Manual Fire Alarm/Muster condition.
  - To disable the panel buzzer.
- Open collector outputs for Manual Fire Alarm/Muster active, buzzer active, disablement active, zonal fire O/Ps for each zone up to zone 4.
- Remote inputs for remote Manual Fire Alarm/Muster, remote reset and remote silence alarms.
- One Man Sounder Test [see 16.6].
- Latching fault mode where all fault conditions latch until the panel is manually reset.
- Restore default configuration of zones and outputs.
- Selectable options for operation in the Manual Fire Alarm or Muster modes.
- Muster alarm capable of being initiated, locally or from a repeater panel, even if panel processors fail.
- Dimmable LEDs on the display.

22.3   Power Supply Load Calculation

The power supply load must not exceed the maximum identified below:

Panel	**Max Load**
T1204	1.5 Amps
T1216-C	4 Amps
T1232-C	4 Amps

To determine the maximum power supply load perform the following steps:

1. Look-up the mains failed panel load in alarm. Enter this value as I_{panel}.

2. Calculate the maximum load on the alarm circuits in mA in an alarm condition. Enter this value as I_{alarms}.

3. Calculate the load on the auxiliary supply in mA in an alarm condition. Enter this value as I_{aux}.

4. Calculate the maximum power supply load using the formula below:

$$I_{panel} = \text{………mA}$$

$$I_{alarms} = \text{………mA}$$

$$I_{aux} = \text{………mA}$$

$$I_{pse} = (I_{panel} + I_{aux} + I_{alarms})/1000 \quad \text{Amps}$$

$$= (..........+…………+…………)/1000 \quad \text{Amps}$$

$$= (…………)/1000 \quad \text{Amps}$$

$$= …………\text{ Amps}$$

Warning:
The value of I_{pse} must not exceed the maximum permissible load for the panel (see table above). Overloading the power supply will result in automatic shutdown of the power supply during a fire alarm condition.

22.4   Minimum Standby Battery Capacity Calculation

This section describes how to calculate the minimum required standby battery capacity for the control panel. To determine the battery capacity, perform the following steps:

1. Look-up the mains failed fault battery current. Enter this value as $I_{panelfault}$.

2. Look-up the mains failed alarm battery current. Enter this value as $I_{panelalarm}$.

3. Calculate the maximum load on the alarm circuits in mA in an alarm condition. Enter this value as I_{alarms} and enter this figure in the table.

4. Calculate the load on the auxiliary supply in mA in the quiescent condition. Enter this value as $I_{auxfault}$.

5. Calculate the load on the auxiliary supply in mA in an alarm condition. Enter this value as $I_{auxalarm}$.

6. Calculate the total battery load in fault, I_{fault}.

7. Calculate the total battery load in alarm, I_{alarm}.

8. Enter the required standby time in hours, T_{fault}.

9. Enter the required time in alarm in hours, T_{alarm}.

$$I_{panelfault} = \quad\quad\quad\quad\quad\quad\text{………mA}$$

$$I_{auxfault} = \quad\quad\quad\quad\quad\quad\text{………mA}$$

$$I_{fault} = \quad [I_{panelfault} + I_{auxfault}] \quad\quad\text{………mA}$$

$$T_{fault} = \quad\quad\quad\quad\quad\quad\text{………hrs}$$

$$I_{panelalarm} = \quad\quad\quad\quad\quad\quad\text{………mA}$$

$$I_{alarms} = \quad\quad\quad\quad\quad\quad\text{………mA}$$

$$I_{auxalarm} = \quad\quad\quad\quad\quad\quad\text{………mA}$$

$$I_{alarm} = \quad [I_{panelalarm} + I_{alarms} + I_{auxalarm}] \quad\quad\text{………mA}$$

$$T_{alarm} = \quad\quad\quad\quad\quad\quad\text{………hrs}$$

10.   Substitute the values in to the formula below.
       The MINIMUM battery capacity (C_{min}) required is given by:

$$C_{min} = \quad 1.25 \times ((T_{fault} \times I_{fault}) + (2 \times (T_{alarm} \times I_{alarm})))/1000 \text{ Ah}$$

$$= \quad 1.25 \times (\text{……. } \times \text{ ……. } + (2 \times (\text{……. } + \text{…….})))/1000 \text{ Ah}$$

$$= \quad 1.25 \times ((\text{……. } + (2 \times (\text{……..}))/1000 \text{ Ah}$$

$$= \quad 1.25 \times (\text{…………..})/1000 \text{ Ah}$$

$$= \quad 1.25 \times \text{……./1000 Ah}$$

$$= \quad \text{……./1000 Ah}$$

$$\mathbf{C_{min} = \quad \text{……. Ah}}$$

11.   Select the next highest available battery size.

Notes:
Battery Type: Powersonic Sealed Lead-Acid.

The maximum battery capacities that can be charged in line with EN54-4 recommendations are:

Panel	Max Battery Capacity
T1204	24Ah
T1216-C and T1232-C	70Ah

The T1204 is only approved for 3.4Ah & 7Ah batteries, The T1216-C & T1232-C are approved for 17Ah batteries.

The battery charger circuit is a constant voltage type designed for float charging Powersonic SLA batteries. Attempting to charge batteries smaller than specified (3.4Ah for T1204 & 17Ah for T1216-C/T1232-C) may result in permanent damage to the batteries.

The T1200B battery box can accommodate 3.4Ah or 7Ah batteries. The T1200B-C battery box is designed to house 17Ah batteries. Batteries larger than 17Ah must be housed in a suitable enclosure with the Thermistor mounted inside the enclosure. All fusing must be external to the battery enclosure. See the T1200-C Installation Manual for details.

22.5   A1466 Interface Relay

This relay is compatible with the following signalling outputs from the T1200-C fire detection and alarm panels when the outputs are configured as powered/monitored outputs:

- Fire Output.
- Fault Output.
- Fire Protection Output.

Figure 29 – A1466 Interface Relay Specification

PCB Layout

Circuit Diagram
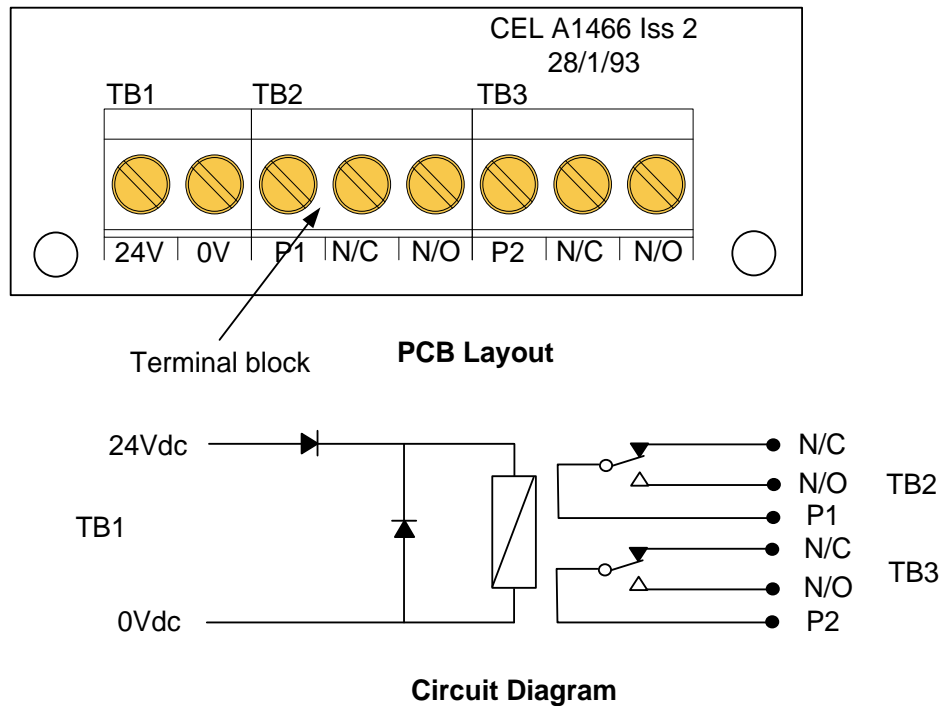
Specification

Terminals
Max conductor: 2.5mm.
24V, 0V: Relay coil connections – observe polarity.
P1: Relay contact 1 pole.
N/C: Relay contact 1 normally closed.
N/O: Relay contact 1 normally open.

P2: Relay contact 2 pole.
N/C: Relay contact 2 normally closed.
N/O: Relay contact 2 normally open.

Ratings
Coil: Operating voltage range: 17.5Vdc to 30Vdc.
    Operating current: 8mA at 24Vdc.
    Resistance: 2900Ω.
Relay contacts: 2A at 30Vdc.
Warning – Do not exceed the rated voltage or current.

Dimensions
Board size: 30mm x 45mm.
Height: 15mm.
Fixing centres: 24mm x 30mm.
Fixing hole sizes: M4 clearance.

Installation
Must be installed within enclosure of the equipment being controlled.
Environmental: Clean, dry location not subject to excessive vibration or shock.
Temperature: -10 to +70 deg C.

22.6   Panel Configuration Design Chart

Table 1 – Motherboard DIL Switch Configuration Design/Record

Switch	Function	Position	Actual Setting
1-1	Fire Protection relays operate for a fire condition on any zone.	Off	
	Fire Protection relays operate for a fire condition on any latching fire zone.	On	
1-2	Silence and reset available as normal.	Off	
	Prevents alarm silence & reset for a period of 3 minutes after a fire alarm condition occurs. [Does not apply to Muster Alarm]	On	
1-3	T1216W-C use only – leave in OFF position.		
1-4	Configuration mode disabled.	Off	**N/A**
	Zones can be configured to non-latch mode via the Engineer's Select feature.	On	Table 2
1-5	Configuration mode disabled.	Off	**N/A**
	Zones can be configured to Intrinsically Safe monitoring mode.	On	Table 2
1-6	Configuration mode disabled.	Off	**N/A**
	Configure zones as Machinery Space Zones see section 17.4.	On	Table 2
1-7	Not functional.		
1-8	Configuration mode disabled.	Off	**N/A**
	Configure delayed outputs via the Engineer's Select feature.	On	Table 3
1-9	Not functional.		
1-10	Sounders operate on any fire condition including Manual Fire Alarm/Muster.	Off	
	Sounders operate only when the panel is in the Manual Fire Alarm/Muster condition.	On	
2-1	Panel can be reset while sounders are active.	Off	
	Panel can be reset only after sounders are silenced.	On	
2-2	Continuous Alarm Sounder mode.	Off	
	Pulsed Alarm Sounder mode.	On	
2-3	**In Crew Mode, after Sounders have been silenced before delay ends:** A new detector fire condition operates all sounders & O/Ps without delay.	Off	
	In Crew Mode, after Sounders have been silenced before delay ends: A new detector fire condition restarts 2-minute delay.	On	
2-4	Not functional.		
2-5	Not functional.		
2-6	**DIL SW 2-7 OFF:** General Alarm Sounder Mode. **DIL SW 2-7 ON:** Crew Alert Mode – see section 17.10.	Off	
	Zonal Sounder Mode (see also 2-7)	On	
2-7	**DIL SW 2-6 OFF:** No Effect. **DIL SW 2-6 ON:** Zonal sounders for zones in fire operate as per switch 2-2 setting – all other zones are silent.	Off	
	DIL SW 2-6 OFF: Crew Alert Mode. **DIL SW 2-6 ON:** Zonal sounders operate as per switch 2-2 setting - all other sounders pulse.	On	
2-8	Sounders operate in response to zone test.	Off	
	Sounders do not respond to a zone test.	On	
2-9	Buzzer enabled.	Off	
	Buzzer disabled.	On	
2-10	Non-latched fault indication.	Off	
	Latched fault indication.	On	

Table 2 – Zone Configuration Design/Record

Zone Number	Zone Configuration		
	Non-Latch	**Intrinsically Safe**	**Machinery Space**
1			
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Table 3 – Output Delay Configuration Design/Record

Output	Output Configuration	
	Delayed	**Not Delayed**
Fire Output		
Fire Protection		
Alarm Devices		