

# **Level - Twin**

## **Fire Alarm Control Equipment**

*Installation, Commissioning  
and  
Operating Manual*

**MASTER  
MANUAL**

MLEVELTW-01 Issue 1.0 June 1998

# OPERATOR (USER) INSTRUCTIONS (INCLUDING FRONT PANEL INDICATIONS AND CONTROLS)

## Standby (Quiescent State)

In standby state, the only indication should be the "Supply Healthy" LED.

## Front Panel Indications

Are as follows:

Common Fire	(Red)	Supply Healthy	(Green)
Zoned Fire	(Red)	ARW Auto Reset Warning	(Yellow)
Detector Removed	(Yellow)	Aux. Outputs Isolated	(Yellow)
System Fault	(Yellow)	Zonal Fault	(Yellow)
Released/Imminent	(Red)		

## Front Panel Controls

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The following are only functional when the "Activate" keyswitch is turned 'ON'.

**‘SOUND ALARMS’:** When pressed this will activate all sounders. The panel internal sounder will operate with a two-tone alarm.

**‘SILENCE’:** This button will silence sounders:

- a) if a fire condition is detected.
- b) if the Sound Alarms button had been pressed.
- c) Or, used to silence the fault tone.

**‘RESET’:** This button will reset all fire zones (or cancel ‘Sound Alarms’) after ‘Silence’ has been depressed **and only** if the cause of the alarm has been cleared. During ‘Reset’ the panel performs a ‘Lamp Test’, except the ‘Aux. Isolate’ LED).

**‘AUX ISOLATE’:** When activated, shown by Aux. Isolated LED ON, any auxiliary circuits connected to the Aux. Relays will not respond in the event of a fire.

**‘ACTIVATE’:** This keyswitch is used to restrict access to the controls listed below by de-activating the switches when in the "OFF" position

## Fire Detected

When a smoke/heat detector or call point is operated on any zone the following functions occur.  
Assuming fire on Zone One:

Common fire (Red) LED's	... Flashing
Zone One (Red) Fire LED	... Flashing
Sounders	... Operate
Internal Sounder	... Two tone sound (unmutable)
Auxiliary Equipment	... Operates, i.e. fire doors shut etc.

After the source of the alarm has been investigated and any cause cleared, the alarm may be silenced and reset using the following procedure:

Turn '**Activate Controls**' keyswitch ON.

Press '**Silence**' This silences the sounders, changes the internal sounder from two tone to a continuous tone. Zone One and Common Fire LED become steady.

Press '**Reset**' This resets the control panel, silences the internal sounder, and tests the front panel LEDs (except the Aux. Isolated).

Should a fire signal be detected on a second zone after the sounders have been silenced and before the 'Reset' has been depressed, then the sounders will reactivate. The original zone fire LED will remain steady, whilst the new zone will pulse.

If the system re-alarms after a short period, then the original cause of the alarm could still remain. Investigate and repeat as above. If the alarm persists, please call your Service Engineer.

## Sound Alarms Evacuate

To sound the alarms, turn "Activate" key 'ON' and press 'Sound Alarms'.

All system sounders will operate, common red Fire LEDs and internal tone also operate.

Silence sounders as above.

## System Fault

Should any fault be detected on the system, the 'System Fault' LED's will illuminate and an internal fault tone will sound.

- a) "Supply Healthy" extinguished - check supply to the control panel has not been switched off due to other work in the premises or a supply fuse blown.  
Check internal LED's for Battery, Voltage Regulator or Earth faults.

## **System Fault (contd)**

- b) “Detector Removed” or “Zone Fault” LEDs can indicate the removal of an alarm device e.g. smoke detectors, heat detector or break glass call point. A visual check of the premises should reveal the cause.

If any other fault indications are present, or it is not possible to restore the panel to ‘Standby’ then please contact the Service Company immediately.

**See the Installation Manual for further fault analysis.**

### **A.R.W. (Automatic Reset Warning)**

If illuminated, this LED can be extinguished by ‘Activating Controls’ and pressing ‘Reset’. Should this re-occur on a regular basis, then contact the Service Company.

## **INTRODUCTION**

This range of control panels provides conventional fire detection from 1 to 4 zones and has self-contained detector removal monitoring, one-man engineer test facilities, many engineer's settings etc.

The control panels have been designed in accordance with the requirements of BS 5839 Pt.4 1988.

## **MECHANICAL CONSTRUCTION**

### **General Details**

The enclosure is constructed of 1.6mm (16 swg) zintec mild steel and powder coated in textured light grey. The enclosure is designed to give protection to IP45 level.

Each enclosure consists of back box and removable lid, together with a one-piece circuit board.

The back box is constructed from a single sheet of steel with tack welded corners for strength. Cable entry is via flush, 20mm, easily removed, knockouts, 11 on the top of the cabinet, 1 in the base and 9 at the rear for back entry. The back of the enclosure has a keyhole slot in the centre, to facilitate simple mounting and four indented 4mm holes near each corner to secure the box to the required surface.

The lid has a welded plate for extra strength and to provide location for the facia label. A bottom lip and two Allen screw fixings at the top secures the lid to the back box. Internal access is only required to the panel by qualified engineering staff. All controls are protected by a security key switch, which is an integral part of the PCB and protrudes through the lid when in position.

### **Flush Mounting**

A flush mounting bezel bracket is available for flush installations. This can be fixed to the wall prior to mounting the control panel and has cable-locating brackets (optional) to enable easy first fix of flush panel.

### **Panel Dimensions**

2 or 4 zones, 392mm wide, 305mm high, 92mm deep.

21 Knockouts. Up to 7Ah batteries may be fitted within the enclosure.

Weight excluding batteries: 5.2 Kg.

Matching battery chargers and plain boxes are available for ancillary equipment.

## **Functional Description**

The fascia label consists of a matt finished, scratch resistant, polycarbonate, anti static material which has embossed switch positions and clear LED windows with wide viewing angle, designated as follows:-

### **Panel Indications**

Twin common fire LEDs (red)  
Supply healthy LED (green)  
Twin system fault LEDs (amber)  
Twin engineer's test LEDs (amber)  
Twin auxiliary isolated LEDs (amber)  
ARW automatic reset warning LED (amber)  
Detector removed LED (amber) used in conjunction with zone fault LEDs.  
Zoned alarm LEDs (1 per zone) (red)  
Zoned fault LEDs (1 per zone) (amber)

### **Panel Control Switches**

'Activate controls' key switch  
Sound alarms  
Silence alarms  
System reset  
Isolate auxiliary relays

## **Internal Indications and Controls**

The internal circuit board has the following engineer's features:

### **Indications**

Alarm circuit fault LED (amber h.e.)  
Regulator fault LED (amber h.e.)  
Earth fault LED (amber h.e.)  
Battery fault LED (amber h.e.)

### **Controls**

Battery start-up switch (if no mains present)  
Engineer's test switch (scrolls various engineer tests)  
DIL Switches

DIL Switch 1:

Flt latch	Common fault latch selection
z-o bells	Selects zone of origin bell ringing mode
IO opts	Select option for steady lamps for repeater outputs

## Controls (contd)

DIL Switch 2:

Fr. Latch 1 }  
Fr. Latch 2 } Selection of latching/non latching fire zones  
Fr. Latch 3 }  
Fr. Latch 4 }

Fault sounder volume adjustment pot

Regulator voltage adjustment pot

**See Drawing No. S1578**

## Compatibility

The control panels are compatible with a wide range of detection devices. Please contact our Technical Department for advice if in doubt.

The following devices have been checked as compatible with the Level 2 & 4 Twin.

<b>Manufacturer</b>	<b>Part No.</b>	<b>Description</b>
Apollo	55000-200	Ionisation smoke series 60
Apollo	55000-300	Optical smoke series 60
Apollo	55000-101 to 104	Rate of rise series 60
Apollo	45681-202	Two wire base
Hochiki	SLR-E	Optical smoke
Hochiki	SIJ-E	Ionisation
Hochiki	DFJ-60E	Heat sensor
Hochiki	DCD-1EL	Rate of rise heat sensor
Hochiki	YBO-R-5PA	Two wire base
Nittan	NHD-G1 to G4	Heat sensors
Nittan	Sensortec STI	Ionisation smoke
Nittan	Sensortec STP	Optical smoke
Nittan	Sensortec STB-4	Mounting base
Nittan	STB-4SE-SW	Two wire base

## **Compatibility (contd)**

### **Manual Call Points**

KAC WR2013-SR Call point with 470Ω resistor & IN4001 diode

Ensure all call points have 470Ω resistor in series with N/O contacts for correct function unless operating in pre B.S. 5839:1988 mode, when a short circuit will give a fire condition.

### **Installation and Commissioning**

- The installation of fire detection and alarm systems should be carried out in accordance with Current IEE wiring regulations and in line with current British Standard Codes of Practice for fire alarm installations. The installation should be carried out by suitably qualified and experienced technicians.
- Care should be taken with regards to avoiding the close proximity of high voltage cables or areas likely to induce electrical interference. Earth links should be maintained on all system cables and grounded in the control panel.
- Any junction boxes used should be clearly labelled FIRE ALARM.
- Any ancillary devices, e.g. door retaining magnets, must be powered from a separate power source.
- Any coils or solenoids used in the system must be suppressed to avoid damage to the control equipment.
- Care must be taken when handling any circuit board or component outside its normal enclosure to avoid possible effects of electrostatic discharge. Use a wrist strap if possible.

### **Installation**

Remove outer cover by unscrewing the two fixing screws on the lid and lift the lid in an upwards direction. Disconnect transformer and earth connections from PCB at bottom r/h corner of PCB using small terminal driver. The terminals are marked txsec (white wires) and gnd (green and yellow wires). Remove circuit board from back box by unscrewing 6 in number m4 pozidrive screws from the nylon circuit board supports. Place circuit board, lid and fixings in safe position.

The keyhole mount provides a provisional means of fixing box to its desired location prior to final fixing using the four indented holes in the back box. Ensure that the box is mounted in a convenient location where it may be easily operated and serviced and where it is away from possible sources of vibration or shock, i.e., on partition wall next to a slamming door.



## **Installation (contd)**

External cables should be glanded via preformed knockouts at the top and rear of the box as provided. The enclosure should be cleaned of swarf etc., prior to refit of printed circuit board.

**Note:** To assist cabling into the top connector blocks, two additional mounting holes have been provided in the middle of the outer edges of the PCB. These can be used to temporarily fix the PCB to the lower nylon supports. When all connections have been made, the wires may be gently folded back and the circuit board refixed using the 6 number m4 pozi screws.

## **Commissioning**

Prior to termination of cables and end of line resistors, it is advisable to power up the control panel with both mains supply, batteries and all end of line resistors fitted. The panel should show a supply healthy LED (green) and, following activation of controls via key switch, ARW LED should clear when reset is pressed. The control panel should clear of faults before commencing cable connection. Disconnect the mains voltage supply, isolate and remove batteries before continuing.

Fit end of line resistors to last devices on detector and sounder circuits.

If a circuit is unused leave end of line in control panel terminals. Check that all external wiring is correctly identified and using a multimeter, check that all cables are free from fault conditions (earth, short and open circuit). When satisfied that all cables are good and showing correct readings, connect into their respective terminals, taking care not to over tighten the screws.

The panel may then be powered up as before and should give the same indications. If faults are present, refer to fault finding guide page 14

## **Power Supply Checks**

### **Sealed Lead Acid Batteries**

Check batteries for any signs of physical damage and for correct type and rating.  
Check battery terminal voltage open circuit (should be greater than 24v dc.)  
Record installation date.

To check charging rate of control panel, disconnect batteries from panel and place multimeter, set to read DC volts at 27.6v +/- 0.2v, across battery lead outputs. Adjustment can be made at the 28v adj. potentiometer located at bottom r/h side of PCB.

With batteries disconnected, the control panel should display a system fault and LED 15 [batt] fault should be illuminated. Unless fault latch has been selected, battery fault should automatically clear when the batteries are reconnected. This may take up to 30 seconds to cancel. Due to the method of battery fault monitoring used, the panel may register a battery fault on batteries with a low terminal voltage. Such batteries may regain useful voltage within several hours and may take up to 12 hours to regain full capacity.

The batteries should be allowed to charge for 24 hours before carrying out any load testing.

## **MAINS SUPPLY**

Disconnection of the mains supply will extinguish the Supply Healthy lamp and will pulse the System Fault lamps intermittently. This condition is not mutable, but is designed to afford the panel maximum standby time on batteries.

## **ZONAL CHECKS**

Removal of one leg of wiring to each zone circuit should give a constant fault LED on that zone, this indicates an open circuit condition. Likewise the application of a short circuit across the zone should pulse the zonal fault LED, indicating a short circuit fault (unless in short circuit as fire mode).

Connection of a 470R resistor across the zone terminals will simulate a fire condition, causing the Zonal fire lamps to pulse, common fire LED's to illuminate and sounder circuits to function. **The alarms must be silenced before a Reset can take place.**

All fire alarm devices fitted to the zone circuits should be checked for correct operation and fault signalling.

## **Functional Description**

### **Alarm Condition**

Dual common fire LEDs and the zone of origin LED will operate in a pulsed mode.

The internal buzzer will operate in a pulsed mode.

Sounders will operate in a pulsed or a continuous mode, as selected by the switch on the main PCB. Operation of the Silence Alarms button will also steady the zone of origin LED and the common fire LEDs.

Activation of a second zone will cause its zonal LED and the dual fire LEDs to operate in a pulsed mode, with the original alarm zone LED remaining steady. The internal buzzer will pulse and the sounder circuits will operate in a pulsed, or continuous mode, as selected. Operation of the silence alarms button will deactivate the sounder circuits and revert the internal buzzer to continuous mode. Status of the LEDs will remain unchanged - the original alarm LED will remain constant, the dual fire LEDs will revert to pulsing and the subsequent zonal alarm LEDs will remain in a continuous mode.

Operation of the Reset button will perform a lamp test on the control panel and revert all circuits back to normal operation. Failure to reset will indicate an alarm remaining present on one or more circuit.

## **Fault Condition**

### **Definitions:-**

Pulsed = 1 sec on, 1 sec off

Intermittent = 1 pulse every 15 seconds.

Slow pulse = 1 pulse every 5 seconds.

A Zoned fault will operate, the relevant zone fault LED, the System Fault LED and internal buzzer in a pulsed mode.

Operation of the Silence Alarms button will operate the internal buzzer in an intermittent mode, but the status of the LEDs will remain in a pulsed mode

A sounder circuit fault will operate the System Fault LED and the internal buzzer in a pulsed mode.

The operation of the Silence Alarms button will alter the internal buzzer to the intermittent mode but the system fault will remain in a pulsed mode.

A Supply Fault (mains, battery or fuse failure) will extinguish the Supply Healthy LED, illuminate the System Fault LED and the internal buzzer with operate in a pulsed mode.

Operation of the Silence Alarms button will alter the internal buzzer to the intermittent mode but the system fault LED will remain pulsing.

When the supply fault has been rectified, the panel will automatically revert back to its' normal condition of the Supply Healthy LED being illuminated.

### **Auxiliary Relay Isolate**

Operation of the Aux. Isolate button will disable all auxiliary contacts and operate the disablement LED in a constant mode, with the buzzer operating in an intermittent mode.

The relay isolate button will push 'ON' push 'OFF' to isolate and reinstate the auxiliary relays as required.

## **Routine Maintenance**

### **General**

Maintenance of equipment extraneous to the control panel will be detailed in the appropriate manufacturer's literature.

Standby batteries are of a maintenance free manufacture but attention should be made to the commissioning date as the batteries will require replacing every 4-5 years thereafter.

The components of the control panel are of a sufficient quality to withstand the life expectancy of the panel, which is 15 years. The printed circuit board is self-monitoring and therefore should only be replaced as required.

## **Routine Maintenance** (contd)

### **Routine Maintenance**

Routine maintenance should be carried out in accordance with BS 5839 Pt.1 Section 4 Clause 29.2

All performance checks undertaken should be recorded in the system log book.

As a minimum, the following performance checks must be undertaken on each maintenance visit. Static handling procedures must be adhered to and extreme caution must be exercised when working inside the control panel due to the presence of mains voltage 240v ac.

1. Carry out verification checks as detailed in the commissioning instructions.
2. Remove dust and dirt from the panel exterior using a soft brush or a lint cloth. A solvent which is harmless to the finishes of metal and plastic may be applied to more stubborn stains.
3. Examine the exterior of the enclosure for any signs of damage or loose cable glands and rectify any faults found.
4. Remove any dust or dirt from the interior of the control panel using a soft brush or a vacuum cleaner.
5. Examine the printed circuit boards for signs of overheating, dry joints and/or damaged tracks. Replace any defective items as required.
6. Examine the battery terminals for secure connection and for any signs of corrosion. Replace or repair as required.

## **Engineer's Settings / Engineer's Test Mode**

### **Description of Features**

- Ref.: P1 Volume adjustment potentiometer, adjusts volume of fault sounder only.
- Ref.: P2 / 28v adj. adjusts voltage output of battery charger/power supply. (27.6v  $\pm$  0.2v).
- Ref.: TEST 1, 18 pin dil socket for factory test use only.
- Ref.: S 17 Battery start button, press to override battery cut off relay if no mains supply present.

## Engineer's Settings / Engineer's Test Mode (contd)

### Description of Features (contd)

DIL Switch 1:

Ref: FLTLATCH Switch 'ON' to latch fault conditions until Reset is pressed. Switch 'OFF' to leave faults as self-resetting. Used in tracing intermittent faults.

DIL Switch 2:

Ref: Z-O BELLS Switch 'OFF' for normal common bell operation. Switch 'ON' for zone of origin constant, others pulsing.

DIL Switch 2: (V1.4 software only).

Ref: I/O OPTS Switch in "OFF" position for normal panel operation. In the "ON" position the zonal LEDs, common fire, and common fault LEDs and repeater outputs will not pulse when operated. This allows connection of relays for remote signalling.

**Note:** Route common supply for relays via auxiliary contacts to prevent operation during ('Test Lamps') reset. Also providing isolate.

Be aware that current consumption during mains failure will be increased by 25mA to 120mA plus the common fault relay (if used).

DIL Switch 2:

Ref: FRLATCH zones 2 & 4 enables Fire zone to be selected as self-resetting (non-latching). Switch 'OFF' for normal latching mode. Switch 'ON' for non-latching mode. This feature may be of use when interfacing with other systems.

### Engineers Test Mode

Pressing the engineers test button will scroll the various tests available on the panel. Only one test can be performed at a time. The first press will place zone one in one man test mode, engineer's test lamps and zone 1 fault LED will illuminate. If a fire condition is introduced to Zone 1 the following will occur:

Sounder circuits will activate for 1 second and fall silent. The panel will attempt to reset the zone automatically. If successful the sounders will pulse once to show that all is clear. The next device may then be tested on the zone.

Subsequent pressing of the test mode button will increment test mode to the next zone, up to zone four (Zone 2 on Level 2). The fifth press (3<sup>rd</sup> on Level 2) of the test mode button will activate a Bell Walk test mode. The Bell Fault LED will illuminate. This will activate the sounders for approximately 1 second in every ten to enable audibility testing of all sounders on a system.

## Engineers Test Mode (contd)

The sixth press (4<sup>th</sup> on Level 2) of the test mode button will invoke detector removal test mode. The Detector Removed LED will illuminate. In this mode, if a detector is removed from any zone, the sounders will operate for 1 second and then fall silent. The detector, when replaced, would cause a second short pulse of the sounders to indicate that 'detector removal' has cleared.

Pressing the reset button at any time will set panel back to normal operation, as will a fire condition occurring in any zone, other than the zone in test.

## Quick Fault Finding Guide

<b>Indication</b>	<b>Cause</b>	<b>Remedy</b>
Zone Fault LED continuous	open circuit fault	Place EOL in PCB terminals, if fault clears check operation of devices on zone to identify break in cabling. Check zone fuse.
Zone Fault LED pulsing	short circuit	Remove wiring from PCB fault should change to open circuit in panel. Use multi-meter to locate cabling fault.
Detector Removed fault	detector removed from circuit	Replace detectors or investigate faulty cabling. Placing EOL in panel Should clear fault.
Bell Fault LED continuous	open circuit bell circuit	Check all fuses. Place EOL in panel. Breakdown wiring to trace fault. Try sounder walk test.
Fault LED pulsing	short circuit bell fault	Remove wiring from panel. Check fault changes to open circuit. Breakdown wiring to isolate fault.
Reg Fault LED	power supply fault	Check output is 27.6 volts, check fuse F1.
Earth Fault LED on	earth fault	Disconnect cables and re-connect one at a time to identify source of cable fault.

## Quick Fault Finding Guide (contd)

<b>Indication</b>	<b>Cause</b>	<b>Remedy</b>
Batt Fault LED on	battery fault	Check fuse F2, check battery function and voltage. Check cut off relay and batt start switch.
ARW LED on	auto reset	Processor has halted and automatically restarted. Press Reset to clear. If LED persists interference may be present.
System Fault on, Supply Healthy LED off	mains failure	Check mains fuse and mains supply.
All Zone Faults illuminate simultaneously	zone fuse fail	Overload of zone circuit, replace fuse and check zone condition.
No Detector removal monitoring	incompatible device, or wiring error	Check devices and cabling.
No Controls	faulty keyswitch	Link out keyswitch terminals on PCB. Replace faulty keyswitch.

The above are intended as a guide only. Manufacturers advice may be sought if required.

## **Technical Data**

2 & 4 zone panels

### **Terminals**

All terminals suitable for 1.0 – 2.5mm conductors

Mains block: Live Neutral and earth 240v ac +10%/-15%, 50/60 Hz

Aux. relays: Single pole changeover rated at 30v 1amp

Auxiliary supply: 28v dc output rated at 1amp. (subject to overall loading)

Detection / Sndr ccts 1-4: Reverse polarity circuit rated at 500mA each. Max combined sounder load 1 Amp. Max 20 two wire bases per circuit recommended.

Repeater outputs: Common fault/fire and zones 1-4, rated at 100mA.

## **Technical Data** (contd)

### **Terminals** (contd)

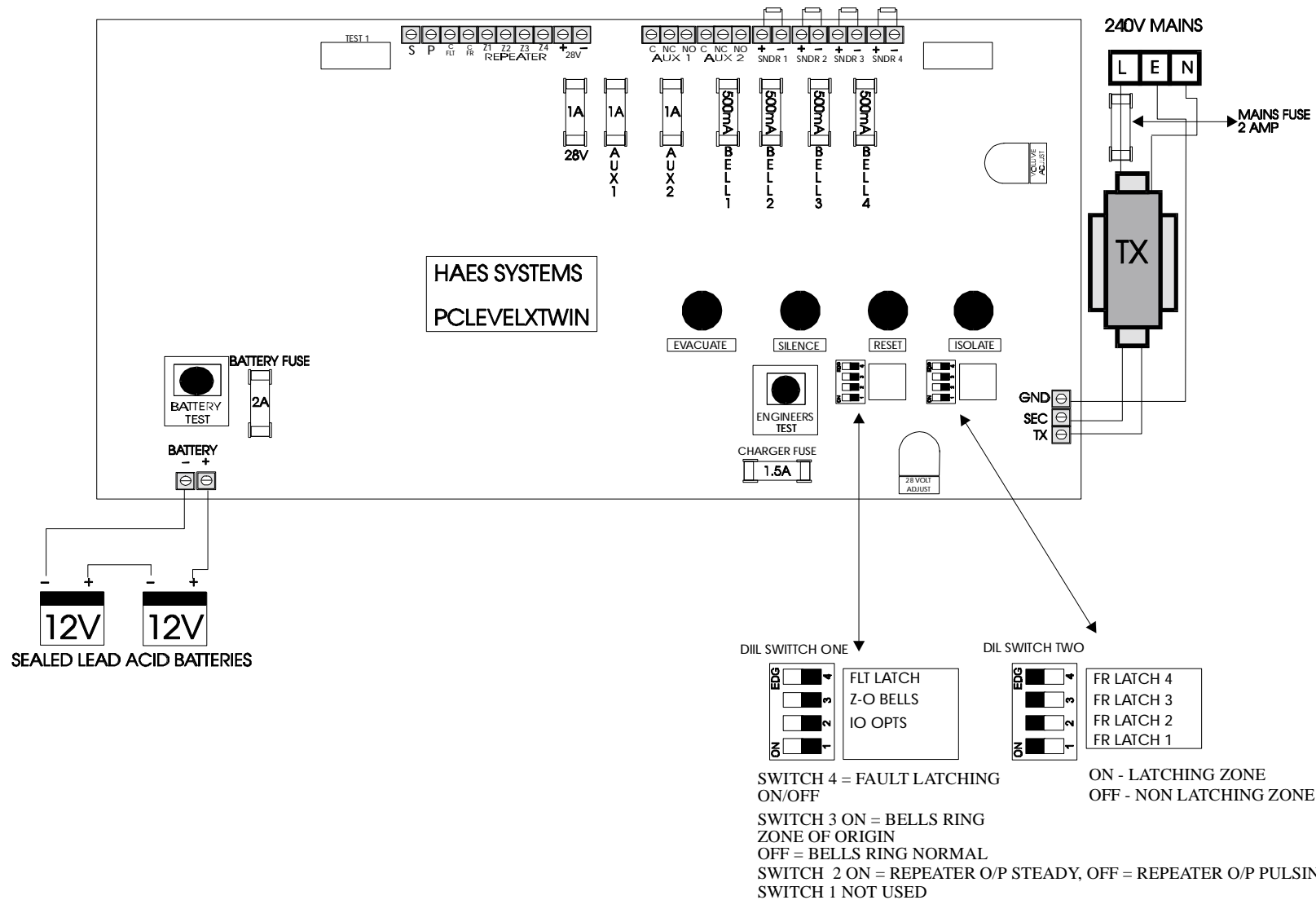
Remote inputs: Precinct (evacuate) and remote silence inputs require 0v to operate.

Battery: (+ -) output terminals designed to provide a maximum of 500mA from the charger. Suitable for SLA batteries only.

Quiescent Current: 60mA.

Recommended Batteries: 24 hrs standby use 2.8Ah, 72 hrs standby use 7Ah.





Columbia House, Packet Boat Lane, Cowley Peachey  
Uxbridge, Middlesex, UB8 2JP  
Telephone: West Drayton (01895) 422066  
Fax: (01895) 420603

Approved by

Date

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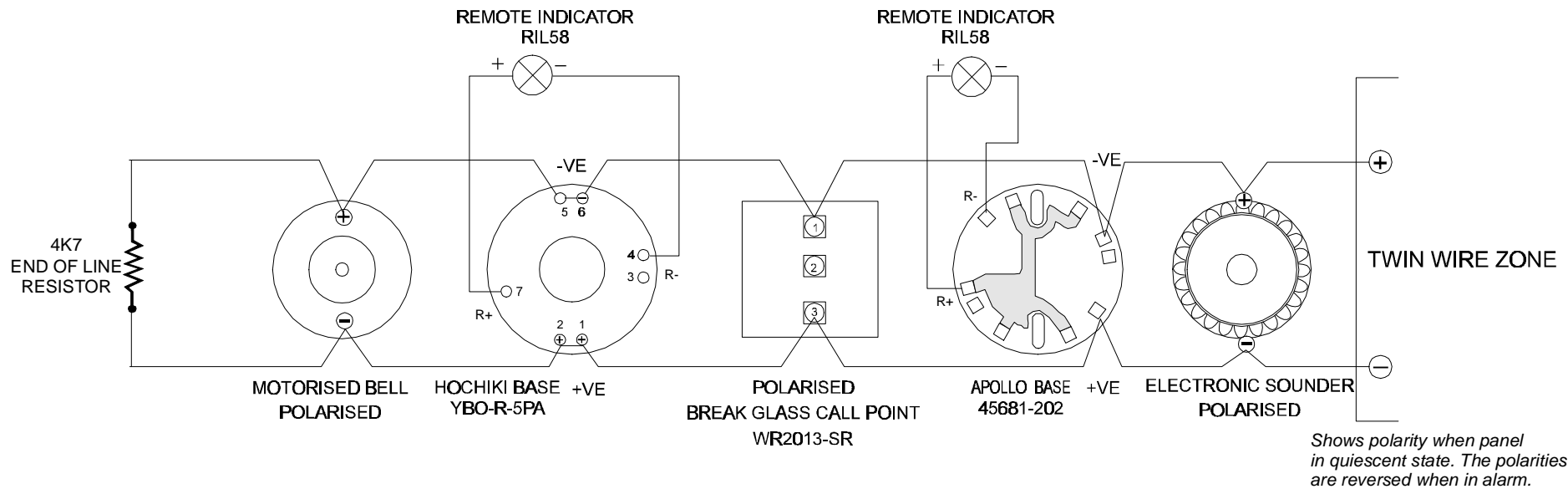
Title/Description

**DRAWING No S1578**

**LEVEL-TWIN SERIES CONTROL PANEL  
PCB DETAILS & DIL SWITCH OPERATION**

Drawn by:

**MRD/DC**



Columbia House, Packet Boat Lane, Cowley Peachey  
Uxbridge, Middlesex, UB8 2JP  
Telephone: West Drayton (01895) 422066  
Fax: (01895) 420603

Approved by	Date	Issue	Title/Description
	17-09-99	1	TWIN ZONE, CONNECTION DETAILS
<b>DRAWING No</b>		S1593LEV	
<b>Drawn by:</b>	DC		