Level 2 - 1CD

Fire Extinguishant Control Equipment

Installation, Commissioning and Operating Manual

MASTER MANUAL

MLEVEL2-1CD-01 Issue 1.0 February 1999

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

Standby (Quiescent State)

When in standby state, the indications should be, “Supply Healthy” led, “Automatic” and “Manual”, or “Manual Only” LED’s.

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)	Zoned Fault	(Yellow)
Released/Imminent	(Red)	Man Rel CCT FLT	(Yellow)
		Auto/Man CCT FLT	(Yellow)

Front Panel Controls

`ACTIVATE': This keyswitch is used to restrict access to the controls listed below by de-activating the switches when in the "OFF" position.

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

AUTOMATIC/MANUAL: When pressed this will change the system status from “Manual” operation to “Automatic” and “Manual “ operation.

`SILENCE': This button will silence sounders:

a) if a fire condition is detected.

b) used to silence the fault tone.

`RESET':** This button will reset all fire zones 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.

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 LED's (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 is in 'automatic' mode when both zones are in alarm, the 'Release Imminent' lamps will pulse and Release Imminent sounder will be activated. Once the pre-set time delay has expired and the extinguishing has been released, the 'release imminent' lamps will become steady and release imminent sounder will cease. A 'released' sounder will now be activated.

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.

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.

b) "Detector Removed" or "Zone Fault" LED's may 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.

System Fault (contd)

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.

OPTIONAL REMOTE CONTROLS

Extinguishant Release

Break Glass Call Point can be provided to enable manual activation of the extinguishant control. When activated, release imminent conditions will occur and countdown of the pre-discharge timer will take place, followed by the release of the extinguishant. Once the glass is broken the system cannot be re-set until the glass is replaced.

Hold Off

A 'hold off' button can be provided upon request. Pressing this button will stop the pre-discharge timer and silence the release imminent sounder, effectively putting the system on 'hold'. If the button is released, the timer will re-start and release imminent will re-start. It is possible to reset the system during 'hold off' in the case of a false alarm.

Remote 'Lock Off' Switch

A keyswitch can be provided, upon request, with indications to allow remote selection of "Automatic" and "Manual" modes and provide safety interlock for the system.

INSTALLATION INSTRUCTIONS

INTRODUCTION

The Level 2-ICD is designed as a self-contained low cost Fire Extinguishant Control System. It has two Coincidence Detection Circuits, one Manual Release Circuit and one Extinguishant Firing Circuit designed to operate a single actuator. The Control Panel has been designed to comply with the general requirements of B.S.7273 Pt.1 1990 AMD 8289.

MECHANICAL CONSTRUCTION

General Details

The enclosure is constructed of 1.6 mm (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 simplify mounting, and four indented 4mm holes near each corner.

The lid has a welded plate for extra strength and to provide location for the facia label. A flange at the bottom and two Allen screw fixings at the top, secure 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 keyswitch, which is an integral part of the PCB and protrudes through the lid when in position.

Recess Mounting

A recessed mounting bezel bracket is available. 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 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 facia 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 LED's (red ultra bright)
Supply healthy LED (green ultra bright)
Twin system fault LED's (amber ultra bright)
Extinguishant Release imminent LED's (red ultra bright)
Twin auxiliary isolated LED's (amber ultra bright)
ARW automatic reset warning LED (amber h.e.)
Detector removed LED (amber h.e.) used in conjunction with zone fault LED's.
Zoned alarm LED's (1 per zone) (red h.e.)
Zoned fault LED's (1 per zone) (amber h.e.)
Automatic and manual (amber ultra bright)
Manual only (green ultra bright)

Panel Control Switches

'Activate controls' keyswitch
Automatic / Manual selection
Silence alarms
System reset
Isolate auxiliary relays

Internal Indications and Controls

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

Indications

General and pre-discharge alarm circuit fault LED (amber h.e.)
Pressure switch and extinguishant fault LED (amber h.e.)
Earth fault LED (amber h.e.)
Power Supply fault LED (amber h.e.)

Controls

Battery start up switch (if no mains present)

DIL Switch 1: Select pre-discharge time delay.

Internal Indication and Controls (contd)

Controls (contd)

Switch Values

BIT 1 = 2 seconds
BIT 2 = 4 seconds
BIT 3 = 8 seconds
BIT 4 = 16 seconds

The switches select binary settings up 30 seconds, i.e. all "ON" = 30 seconds delay.
All "OFF" = no delay.

DIL Switch 2:

Pressure switch - Select pressure switch option
Single knock - Select single or double knock
Aux. Select - Aux.'s Stage 1 or Stage 2

DIL Switch 3: Not fitted.

Fault sounder volume adjustment pot
Regulator voltage adjustment pot
See Drawing No. 1674M

Compatibility of devices

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 range.

Manufacturer	Part No.	Description
Apollo	55000-200	Ionisation smoke series 60
Apollo	55000-300	Optical smoke series 60
Apollo	55000-101to104	Rate of rise series 60
Apollo	45681-201	Common mounting base
Hochiki	SLK-E & SLR-E	Optical smoke
Hochiki	SIH-E & SIJ-E	Ionisation
Hochiki	DFJ & DCD ranges	Heat sensor
Hochiki	YBK-RL-4H1	Mounting base
Nittan	2KH, ST-I	Ionisation
Nittan	2IC, ST-P	Optical
Nittan	NHD-G1 to G4 & GH1	Heat sensors
Nittan	RB3-SCH / RB4-SCH	Mounting bases
Nittan	Sensortec STB-4SD	Mounting base

Compatibility (contd)

Note: Some earlier models of smoke detector e.g. Apollo series 20 and series 30 will require a polarising diode to enable correct functioning of detector removal monitoring. Ensure all devices have a BYV10-60 schottky diode or equivalent in the base for detector removal monitoring, see connection drawings for details.

Manual Call Points

KAC WR2072 or WY2072 Call point with 470R resistor

Ensure all call points have 470Ω resistor in series with N/O contacts for correct function .

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 procedure

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 refitted 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 keyswitch, 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, **not** a megger, 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 pages 10 and 11.

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 27.6 v +/- 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 Zoned 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.

Sounder Circuit Checks

The sounder circuits should be checked for open circuit and short circuit monitoring in the same manner as the zone circuits. There is only one common sounder circuit fault LED for all 4 circuits. This will be steady if an open circuit is present, or pulse if a short circuit is present.

The audibility of all sounders on a system should be checked for compliance with BS5839 Pt.1 Section 2 9.4.

Functional Description

Alarm Condition

Dual common fire LED's 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 LED's.

Activation of a second zone will cause its zonal LED and the dual fire LED's 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 Alarm button will deactivate the sounder circuits and revert the internal buzzer to continuous mode. Status of the LED's will remain unchanged - the original alarm LED will remain constant, the dual fire LED's will revert to pulsing and the subsequent Zoned alarm LED's 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 LED's 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 and Routine Maintenance

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 installation 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. All printed circuit boards are self monitoring and therefore should only be replaced as required.

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 Engineer's options

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 ± 0.2v)

Ref.: TEST 1, 2, 18 pin dil sockets 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)

DIL Switch 1:

Ref.: Set Delay Bits / Select Pre-discharge Time Delay. These switches are used to select a binary value for a time delay function in 2 second steps.

Switch 1 = 2 seconds
Switch 2 = 4 seconds
Switch 3 = 8 seconds
Switch 4 = 16 seconds

Use combinations of switches to set desired time delay.

Note: All 'OFF' = no delay. All 'ON' = 30 seconds delay.

DIL Switch 2:

Ref.: **Pressure Switch:** Switch to 'ON'. A "Released" status, can be confirmed via pressure switch. Switch to 'OFF' if a pressure switch is not being used.

DIL Switch 2:

'Ref.: **Single Knock:** Switch to 'OFF' selects normal double knock operation i.e. both zones for stage 2. Switch `ON' for single knock operation, either zone = stage 2.

DIL Switch 2:

Ref.: **Aux. Select:** Switch in 'OFF' position, aux. contacts will activate on stage 2 only. In the 'ON' position aux. contacts will activate at stage 1 only.

DIL Switch 3: Not fitted.

Quick Fault Finding Guide

Indication	Cause	Remedy
Zone Fault LED continuous	open circuit fault	Place EOL in relevant zone terminals on PCB.
Zone Fault LED pulsing	short circuit	Remove wiring from relevant zone terminals, fault should change to open circuit in panel. Use multi-meter to locate cabling fault.
Detector Removed fault	detector removed from circuit	Replace detector or invest-igate faulty cabling. Placing EOL in panel should clear fault.

Quick Fault Finding Guide (contd)

Indication	Cause	Remedy
Fault LED continuous Gen/pre-alarm	open circuit bell circuit on general alarm or pre-discharge alarm	Check all fuses. Place EOL in panel. Breakdown wiring to trace fault. Try sounder walk test.
Fault LED pulsing Gen/pre-alarm	short circuit bell fault on general alarm or pre-discharge alarm	Remove wiring from panel. Check fault changes to open circuit. Breakdown wiring to isolate fault.
Press SW Fault LED Exting	pressure switch or extinguishant circuit Fault	check continuity of circuit wiring for open or short circuit faults. **Caution:** be careful when testing to prevent accidental discharge of extinguishant medium.
PSU 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.
PSU Fault LED on	battery fault	Check fuse F2, check battery function and voltage. Check cut off relay and battery 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 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.

Quick Fault Finding Guide (contd)

Indication	Cause	Remedy
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

LEVEL 2-1CD

Explanation of Circuits (terminal connections)

Zone 1 +– Coincidence Zone 1 }
} Detection Zones
Zone 2 +– Coincidence Zone 2 }

Man Rel +– Manual Release Circuit. Connections for manual release call points, open and short cct monitored 470R to activate

Auto/Man +– Connections for remote control keyswitch. Activation of keyswitch (470R) will put system into auto mode. De-activate keyswitch to return to manual.

H Hold off input. Normally closed loop to 'O' volts. Break to activate 'hold off' function, i.e. stop timer and hold off activation of extinguishant output.

P Precinct input. Short to O volts to activate general alarm output.

RI Switched negative output. Repeats Release Imminent lamps for remote status units.

CFR Common fire, switched negative output for remote status indicator or relay.

Z1/Z2 Switched negative repeater outputs for zone 1 and zone 2.

A Auto status lamp output, switched –ve.

M Manual status lamp output, switched –ve.

28 +– 28v dc. Supply output fused 1A.

AUX 1 / 2 Clean change over contacts, Stage 1 or Stage 2.
C NC NO.

GEN AL+– General alarm sounder output, on with any alarms.

PRE DIS +– Pre-discharge warning output and discharged warning output.

Technical Data (contd)

LEVEL 2-1CD

Explanation of Circuits (terminal connections) (contd)

DISCH.D +– Pressure switch input (470R).

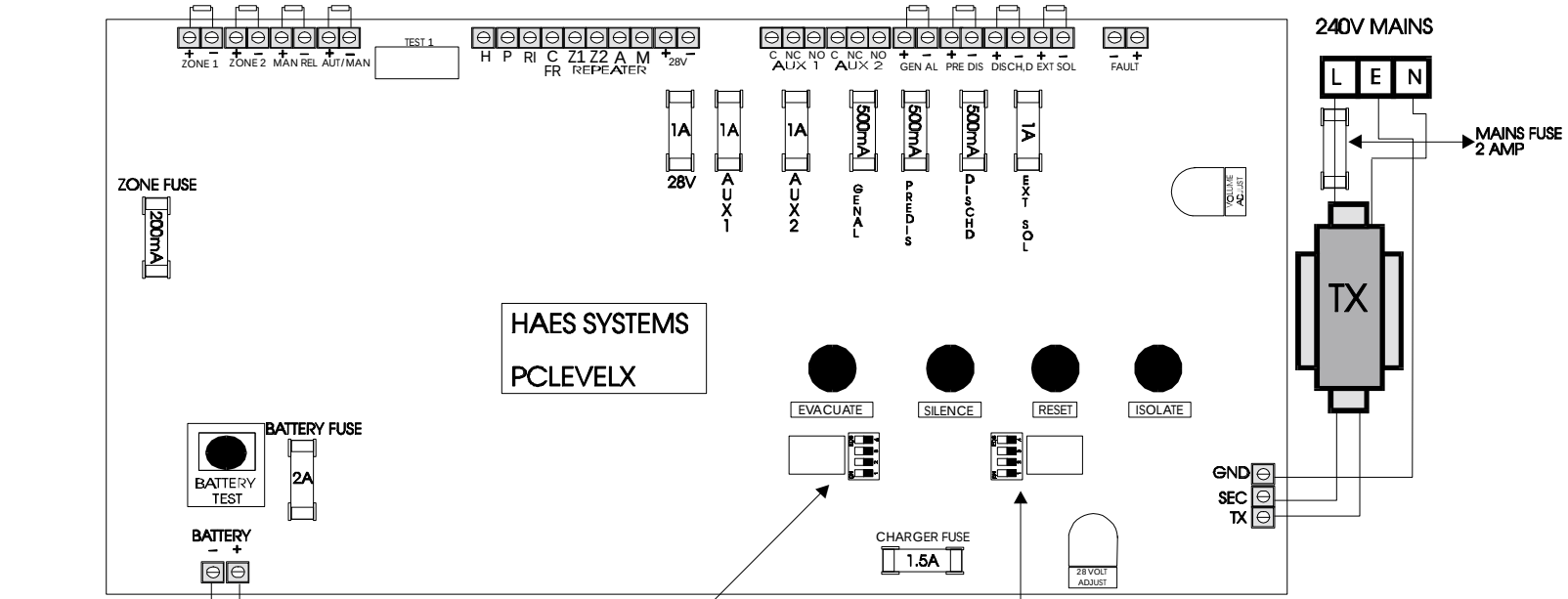
EXT SOL +– Extinguishant solenoid output.

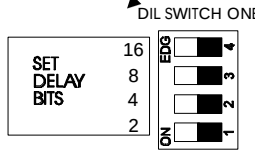
Fault +– Maintained fault output signal constant 28v. –ve clears when any fault present or at complete failure of system. Use to power accessory relay or signal input to other systems (switched –ve).

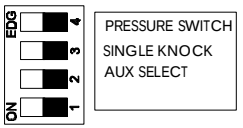
Other Terminals

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)
Sounder circuits 1-2	Reverse polarity circuit rated at 500mA each. Max combined sounder load 1 Amp.
DISCH.D circuit	Input from pressure switch.
Extinguishant circuit	28v dc reverse polarity circuit rated at 1A. Suitable for solenoid actuators or single 'Metron' actuator type DR2000. Ensure solenoids are polarised and suppressed.
Repeater outputs:	Common fault/fire and zones etc., rated at 100mA.
Remote inputs:	Precinct (evacuate) and Hold Off inputs require 0v to operate.
Zones 1-2:	+ - per zone, each rated at 5mA with a maximum 20 detectors per zone.
Battery:	+ - input terminals designed to receive a maximum of 500mA from the charger. Suitable for SLA batteries only.
Quiescent Current:	105mA.
Alarm Current:	250mA.
Recommended Batteries:	24 hrs standby use 2.8 Ah, 72 hrs standby use 7Ah.







SET TIME DELAY
1 = 2 SECONDS
2 = 4 SECONDS
3 = 8 SECONDS
4 = 16 SECONDS

ALL ON = 30 SECONDS

PRESSURE SWITCH ON = REQUIRED OFF = NONE.

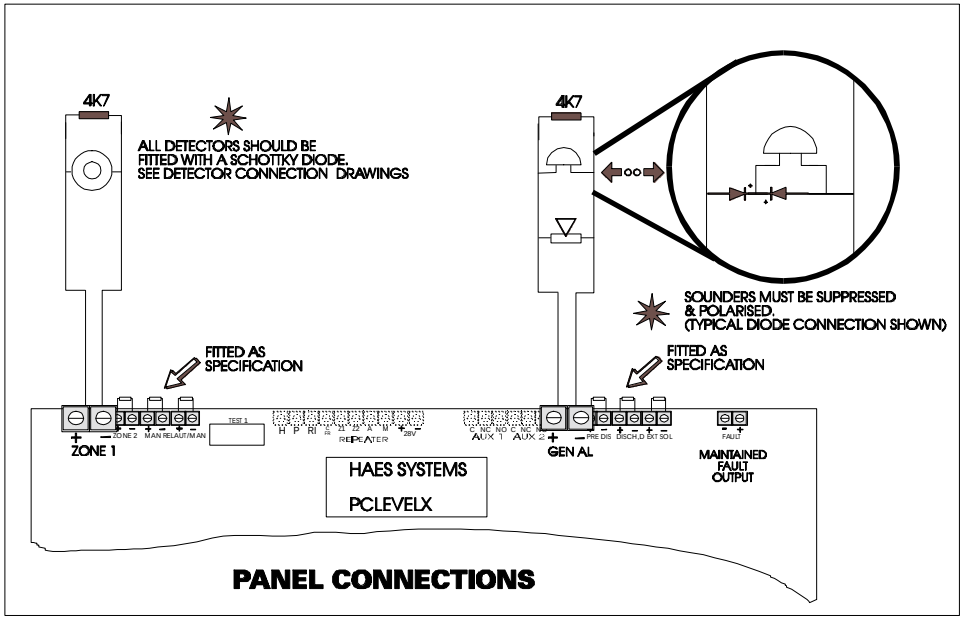
ON = SINGLE KNOCK OFF = DOUBLE KNOCK

AUX SELECT, SELECT AUXS ON = STAGE 1 OFF = STAGE 2 OPERATION

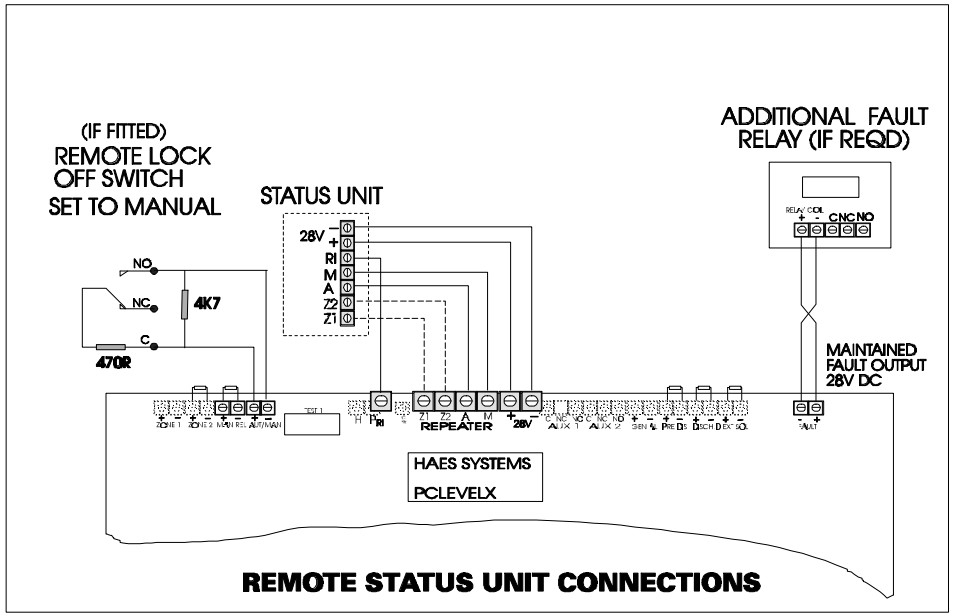
HAES SYSTEMS
Columbia House, Packet Boat Lane, Cowley Peachey
Uxbridge, Middlesex, UB8 2JP
Telephone: West Drayton (01895) 422066
Fax: (01895) 420603

Approved by	Date	Issue	Title/Description
	16-04-99	2	LEVEL EXTINGUISHANT PANEL CONNECTION DETAILS & DIL SWITCH OPERATION
DRAWING No	1674M		
Drawn by:	MRD		

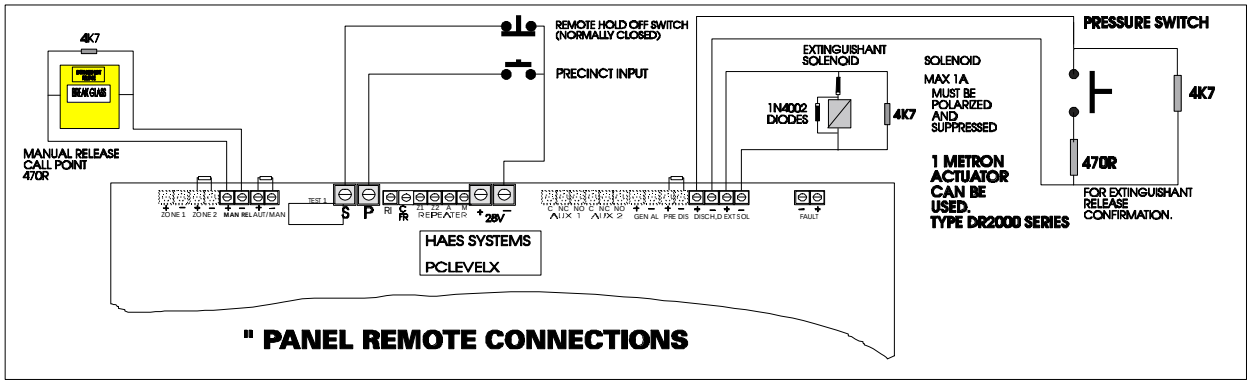
ONLY APPROVED EQUIPMENT SHOULD BE CONNECTED TO THIS CONTROL PANEL



PANEL CONNECTIONS



REMOTE STATUS UNIT CONNECTIONS



" PANEL REMOTE CONNECTIONS

HAES SYSTEMS

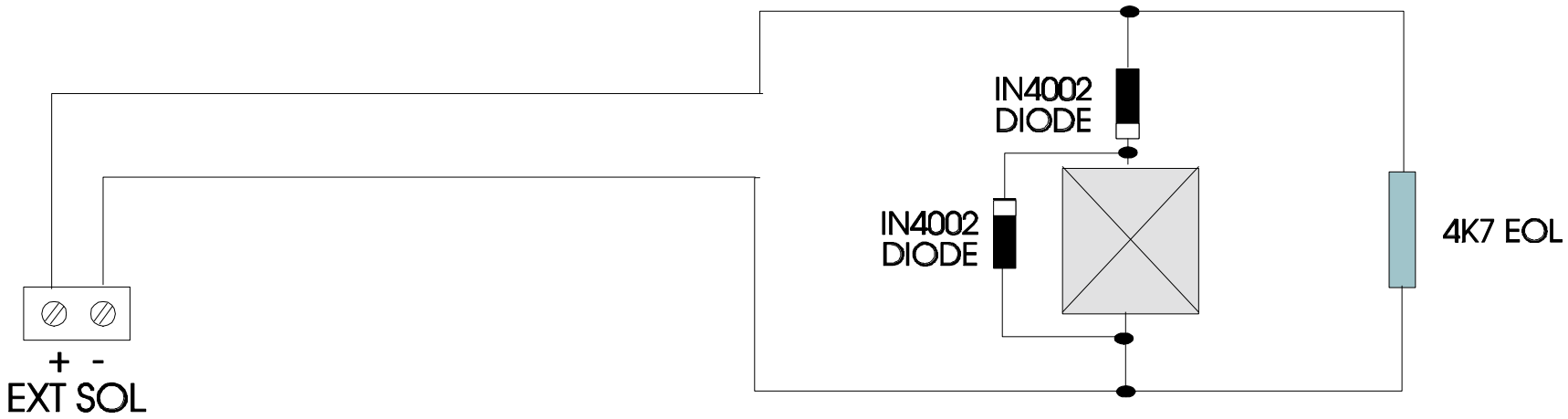
Columbia House, Packet Boat Lane, Cowley Peachey
Uxbridge, Middlesex, UB8 2JP
Telephone: West Drayton (01895) 422066
Fax: (01895) 420603

Approved by	Date	Issue	Title/Description
	22-02-2000	4	LEVEL EXTINGUISHANT PANEL CONNECTION DETAILS

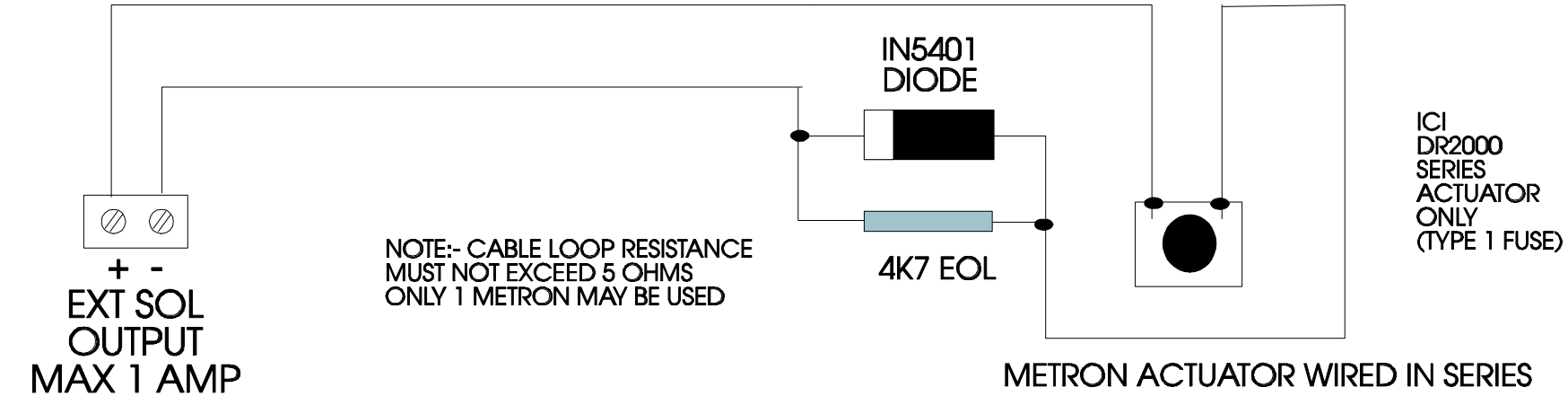
DRAWING No 1675M

Drawn by: MRD

SOLENOID ACTUATOR CONNECTIONS



METRON ACTUATOR CONNECTIONS



HAES SYSTEMS
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Approved by	Date	Issue	Title/Description
MRD	17-06-99	1	EXTINGUISHANT FIRING CIRCUIT CONNECTIONS
DRAWING No	1686M		
Drawn by:	M.DURBRIDGE		