K3000S

Multi Zone Fire Control Panels

Installation, Commissioning and Operating Manual

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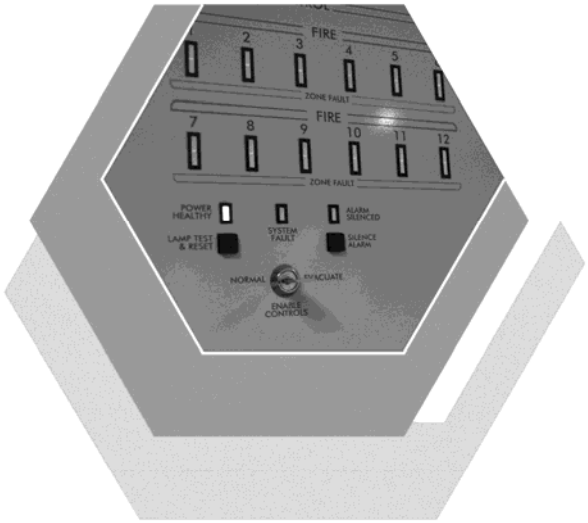

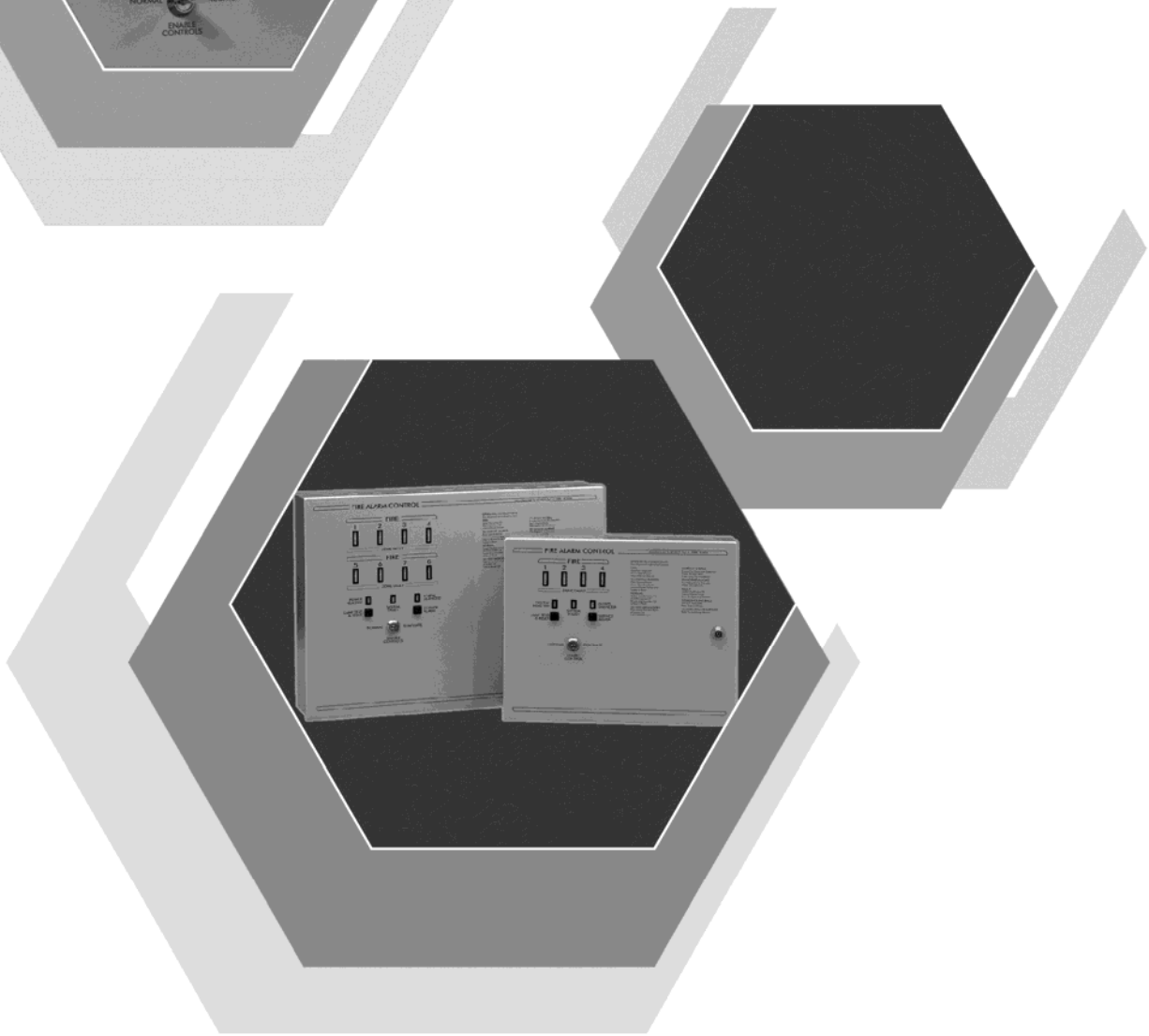

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1. General Description

The K3000S range of Fire Detection and Control Panels have been designed to offer high integrity protection in premises requiring from two zones upwards.

The extensive range of standard features and options allow most requirements to be satisfied by on site configuration of switches and links.

Standard features also include engineering functions for ease of maintenance, testing and repair.

All of the requirements of existing and previous codes of practice may be met with this range of equipment, making it ideal for service replacement in existing systems.

Controls and indications are kept to a minimum at the front panel to ensure clear and concise indication of the system's status at all times.

This system contains static sensitive high quality electronic control equipment. Care should be taken when connecting field wiring.

Do not make any connections with mains or battery power applied. The cabinet should be connected to a suitable earth point at all times.

2. Front Panel Indications

2.1 System Healthy

Under normal conditions only the green system healthy indicator is illuminated. The system healthy indicator will extinguish in the event of :

(i) Mains Failure
(ii) Battery Disconnection
(iii) System Fuse Failure
(iv) Total Power Failure

2.2 System Fault

The system fault indicator will illuminate under any abnormal condition. Certain conditions may be diagnosed without looking inside the enclosure as follows:

(i)	System fault on, Power Healthy off:-	Mains or battery failure.
(ii)	System fault on, zone fault on:-	Zone fault in indicated zone.

2.3 Alarm Silence

The alarm silenced indicator should only be accompanied by one or more steady fire indicators and indicates that the sounders have been silenced.
Operation of subsequent fire zones or the evacuate keyswitch will extinguish the alarm silenced indicator.

2.4 Zone Fault

Illumination of a zone fault indicator may mean that one or more trigger devices are inoperative and requires immediate attention.
Zone fault indicators will illuminate in the event of :-

(i) Disconnection or severance of zone wiring
(ii) Short circuit on zone wiring
(iii) Removal of a sensor from it's base
(iv) Disconnection of the end of line monitor resistor.
(v) Test mode activated.

The zone fault indicator will be accompanied by the system fault indicator.

2.5 Fire

Upon detection of a fire the red fire alarm indicator will flash to give warning of the area (zone) affected. A flashing fire indicator will be accompanied by a pulsing buzzer within the control panel and operation of the sounders.

3. Front Panel Controls

3.1 Alarm Silence

To silence an alarm activated by operation of a detection zone input, press the alarm silence button. The alarm silence button will only become operative with the keyswitch in the enable control position.

3.2 Reset & Lamp Test

All indicators may be illuminated, for testing purposes, by pressing the reset and lamp test switch, If any zones are in a fire condition these will be reset providing that the input signal e.g. break glass unit has been restored to normal. The reset and lamp test switch will only become operative with the keyswitch in the enable controls position.

3.3 Keyswitch

The keyswitch has three positions:

(i) Normal (ii) Enable Controls (iii) Evacuate

With the keyswitch in the enable position the internal buzzer will "beep" every few seconds and the alarm silence and reset/lamp test switches are enabled.

With the keyswitch in the evacuate position all alarm sounder circuits will activate and the Aux Alarm relay contact will operate.

4. Internal Indicators

4.1 S1 (Sounder Circuit 1 Fault)

This indicator will illuminate in the event of a short or open circuit fault detected on the wiring to sounder circuit 1 or failure of fuse F3.

The front panel system fault indicator will also illuminate.

4.2 S2 (Sounder Circuit 2 Fault)

As above for sounder circuit 2 or failure of fuse F4.

4.3 FS (Fuse Fault)

Failure of either fuse F1 or F2 will illuminate this indicator. Failure of fuse F2 will be indicated by the front panel system fault indicator.

Failure of fuse F1 will not illuminate the front panel system fault indicator.

4.4 R (Rem Sig Isolated)

This indicator will illuminate upon activation of the isol. rem (dil switch A) switch on the CON.05 pcb. The front panel system fault indicator will also illuminate.

4.5 C (Internal Connection Fault)

Disconnection of ribbon cables to extender boards will illuminate the ‘C’ indicator. The front panel system fault indicator will also illuminate.

4.6 T (Test Mode Active)

Operation of one or more zone test switches will illuminate this indicator.

5. Internal Controls

5.1 DIL Switch A

Selection of switch A to the off position will prevent the rem sig relay contacts from operating upon activation of a fire zone. The system can then be tested without activation of plant or signaling equipment connected to this contact. Indications are given as in 4.4 whilst the switch is operated.

5.2 DIL Switch B

Selection of switch B to the off position will cause the remote control 0V to pulse. This will result in pulsing sounders when the AL input is linked to the 0V.

5.3 Isol

A D.I.L switch is provided to isolate the detection zones individually. When operated the zone fault and system fault indicators will be illuminated. Triggering of isolated detection zones will not be detected by the control equipment.

5.4 Test

A D.I.L. switch is provided to enable testing of individual devices on any given zone without returning to the control panel to reset in between.

With the test switch operated, the system fault and zone fault indicator will be illuminated. Activation of a zone will illuminate the fire indicator and sound the alarms as normal, however the zone will self reset after a few seconds. Only 1 zone must be in test mode at any time.

6. Wiring Connections

6.1 Power Supply Input

Four terminals are provided for connection to the power supply these are:

(i) + to +24 volt load output at PSU
(ii) - to -VE load output at PSU
(iii) PF to power fault output at PSU (Not normally used)
(iv) PO to power on output at PSU

Under normal (no fault) circumstances a -VE appears at the PO terminal and illuminates the Power Healthy lamp on the front panel. If a power fault occurs (mains or batteries disconnected) the -VE is removed from the PO terminal.

A -VE at the PF terminal (or removal of –VE from the PO terminal) on the Con.05 pcb will illuminate the system fault lamp on the front panel and sound the internal buzzer.

6.2 System Fuse

A 5 amp 20 mm quick blow fuse is fitted and marked F1 on the pcb. This is the system fuse and is intended to protect the internal circuitry against the high current capacity of the battery.

The fuse is monitored and failure is indicated by extinguishing of the Power Healthy lamp on the front panel, an internal indicator marked "FS" and a continuous tone from the internal buzzer. Failure of this fuse renders the entire system inoperative.

6.3 Auxiliary Fuse

A 500 mA 20 mm quick blow fuse is fitted and is marked F2 on the pcb. This is the auxiliary 24 volt output protection fuse and is intended to protect the system from incorrect operation by faults or failure of any equipment connected to the system. Any externally connected equipment which uses the fire alarm power supply must take the power from the "aux 24V terminals to ensure reliable operation of the system as a whole.
The fuse is monitored and failure is indicated by the system fault lamp on the front panel, an internal indicator marked "FS" and a continuous tone from the internal buzzer.

The buzzer may be muted by operation of the alarm silence button. Failure of this fuse does not affect correct operation of 2 wire devices connected to the detection zones or the operation of sounder outputs and relay contacts.

6.4 Remote Control Input

Four terminals are provided for duplicating the controls found on the front panel. These are marked; OV, AL, S and R. A short circuit at OV and AL will activate the two common alarm outputs. Removal of the short will de-activate the alarm outputs.

0V appears at the AL terminal. when the evacuate key is turned, but not upon activation of the detection zones.

A short at 0V and S will silence any zones that are in alarm. **This input must be momentary, as a maintained short at this input will put any fresh alarms immediately into alarm silence mode**.

A short at 0V and R will reset the system and perform a lamp test. **This input must be momentary as a maintained short at this input will hold the system in lamp test and reset mod**e.

6.5 Rem. Sig. Contact

A volt free changeover contact is provided for signalling to an autodialler, house system or plant shutdown relay. This contact operates upon any fire condition and remains operated until the system is reset.

Operation of this contact may be inhibited for testing purposes by operating the dil switch A on the Con.05 pcb.
Operation of the isolate switch will be indicated by the system fault lamp on the front panel, a "Bleep" tone from the internal buzzer and an internal led marked "R".
The remote signal contact must only be used for switching up to 30 Volts DC at a maximum of 1 Amp.

Under no circumstances should voltages or currents outside of this maximum be connected.

6.6 Fault Contact

A volt free contact is provided for transmitting a fault signal to a remote location. This contact will operate upon any fault condition and will remain operated until the fault is cleared. The contact will also be operated upon total power failure.
The maximum rating of this contact is 1 Amp at 30 volts DC.

Under no circumstances should voltages or currents outside of this maximum be connected.

6.7 Alarm Contact

A volt free contact is provided for signaling a common alarm condition to a remote location. This contact is a pole of the alarm relay and will follow the action of the alarm sounder i.e. it will de-activate upon an alarm silence condition. The maximum rating of this contact is 1 Amp at 30 volt DC.

Under no circumstances should voltages or currents outside of this maximum be connected.

6.8 Repeat Contact

A normally open contact is provided for each zone. This contact will close upon activation of the zone and will remain operated until the zone is reset. The maximum rating of this contact is 1 Amp at 30 volts DC.

Under no circumstances should voltages or currents outside of this maximum be connected.

6.9 Sounder Outputs

Two sounder outputs are provided marked S1 (+ and -) and S2 (+ and -). These are monitored for both open and short circuit faults and are individually fused at 1 Amp each.

The short circuit threshold is set, so that if more than 3 mA is drawn from the monitoring circuit, a fault will be indicated, This prohibits the connection of unpolarised or reverse polarity connection of sounders of even very low current consumption types.

The open circuit threshold is set such that if less than 1.5 mA is drawn by the end of line monitoring circuit, an open circuit fault will be indicated. This feature has been put to use quite successfully on a number of occasions to monitor two sounder circuits wired in parallel and fitted with 22K or 27K end of line resistors.

This is particularly useful if extra sounder circuits have been wired in error or for replacement panels.

Additional 2 and 4 way sounder boards are available to plug directly onto the CON-05, K4ZMS and K8ZMS PCB's.

6.10 Detection Circuits

The detection circuit comprises of a common negative supply and a positive feed via a sense resistor.

The circuit is monitored for both open and short circuit faults and can also detect the removal of a sensor whilst maintaining line continuity, if the appropriate sensor bases are fitted.

The latter can be achieved by both of the currently used methods i.e. sensing of a voltage clamping device applied to the detection line when a sensor is removed, or blocking of the signal received from an end of line device.
The threshold levels at the normal supply voltage of 28 volts are:

(i)	0	to	30 OHMS	= SHORT CIRCUIT
(ii)	31	to	700 OHMS	= ALARM
(iii)	701	to	3500 OHMS	= DETECTOR REMOVED
(iv)	9000+		OHMS	= OPEN CIRCUIT

As can be seen from the above any trigger device which presents the circuits with a resistance of 31 to 700 OHMS at 28V DC will activate the detection circuit.

Up to 1.6mA may be drawn from the detection circuit without inhibiting open circuit line fault indication. Thus the total number of detection devices which may be connected to any zone can be calculated as, 1.6 mA divided by the quiescent current per device.

7. Battery Requirements

The current consumption of the control panels in the mains failure mode is as follows:

(i) 4 ZONE PANEL - 90 mA
(ii) 8 ZONE PANEL - 110 mA
(iii) 12 ZONE PANEL - 130 mA

(ie. Plus 5mA per zone)

The current consumption of the Control Panels in full alarm mode is as follows:

(i) 4 ZONE PANEL - 270 mA
(ii) 8 ZONE PANEL - 430 mA
(iii) 12 ZONE PANEL - 590 mA

(ie. Plus 40mA per zone)

Recommended battery sizes for 24 hours stand-by are as follows:

(i) 4 ZONE PANEL - 4.0 Ah
(ii) 8 ZONE PANEL - 7.0 Ah
(iii) 12 ZONE PANEL - 7.0 Ah

The above figures do not take into account any additional equipment (e.g. relays or additional sounder boards) which may be connected to the control equipment.

8. Use With I.S. Barriers

For applications requiring intrinsically safe detection circuits, a suitable barrier must be used. This may be a D.C. isolator or a zener barrier.

Zener barriers should be 28 volt 300 OHM types using a suitable earthing system as recommended by the manufacturers. D.C isolators should present the minimum possible load to the detection circuit (1mA Max.) to maintain open circuit monitoring. (Note with 1mA DC isolator only 0.6mA is available for detectors).
For correct operation the sensing thresholds on the detection circuits must be changed. This can be achieved on individual zones by cutting out resistors as follows:

I.S. Barriers fitted – Change end of line resistor to 10K.								
PCB Type	**Zone 1**	**Zone 2**	**Zone 3**	**Zone 4**	**Zone 5**	**Zone 6**	**Zone 7**	**Zone 8**
Con.05	A1 & A2	B1 & B2	C1 & C2	D1 & D2	-	-	-	-
K4.ZMS	A1 & A2	B1 & B2	C1 & C2	D1 & D2	-	-	-	-
K8.ZMS	A1 & A2	B1 & B2	C1 & C2	D1 & D2	E1 & E2	F1 & F2	G1 & G2	H1 & H2

The end of line monitoring resistor must be changed from 6K8 to 10K.

This applies to all boards CON.05 (four zones plus common control circuitry) K4ZMS (four detection zones) and K8ZMS (two groups of four detection zones).

These resistors should only be removed when using I.S. barriers and documentation should be left with the control panel to indicate to future service personal that zones have been modified.

Call points must be fitted with a 330R 2.5W wire wound resistor in series.

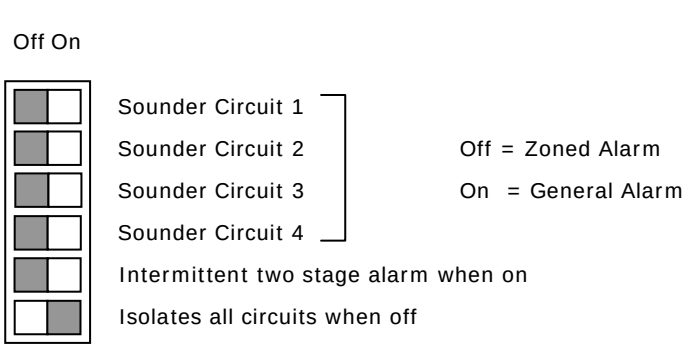
Connection of any other electrical equipment to the detection cables in a safe area should be avoided, unless the equipment is certified as safe (e.g.. remote indicator units or active end of line monitoring units). Cabling to safe areas should be clearly identified as such and where possible separated from other cabling.

ELECTRICAL CIRCUITS IN HAZARDOUS AREAS CAN BE EXTREMELY DANGEROUS UNLESS WIRED IN ACCORDANCE WITH THE BARRIER MANUFACTURERS RECOMMENDATIONS.

Only certified detectors should be used on intrinsically safe detection zones.

9. SB.04 - 4 Way Sounder Card

9.1 DIL Switch Settings



9.2 Installation

The SB.04 board is supplied with four mounting pillars and a connecting socket.
It may be mounted onto the CON.05, K4ZMS or K8ZMS pcb's by carefully aligning the connecting socket with the pin header on the host board and pushing the pillars firmly into the locating holes.

IMPORTANT

Boards should not be plugged in or unplugged unless both mains and battery power have been removed. Failure to do this is likely to result in damage to both boards.

The connecting socket and fixing pillar locations should be carefully checked before power is re-applied to the panel.

9.3 Power Requirements

Each sounder output has a 500mA fuse to protect the output. However, consideration must be given to the control panels' power supply when fitting extra sounder circuits.
Extra terminals are provided to connect additional 24 volt power to each SB.04 board if necessary. No more than two SB.04 boards should be fitted without wiring to these terminals. This can be from the control panels' supply, if the sounder load is within the capability of the supply, or to an additional power supply if the sounder load is beyond the capability of the panels' power supply.

The power supply inputs to the SB.04 board are diode protected thus preventing any "commoning" of power supplies.

10. Use With LCMU (Line Continuity Monitoring Unit)

To comply with amendment 6.6.2. of BS5839: Part 1: 1988 which requires that call points remain operational upon removal of detectors, the Line Continuity Monitoring Unit (LCMU) may be fitted in place of the end of line resistor.
To use this method of monitoring, the breaking connection of the detector base must be fitted with a diode. To ensure correct operation over a wide supply voltage range and with up to 20 detectors removed, a Schottky type BYV-1060 is recommended. These devices are, however, very sensitive to Electro-Static Discharge and extra care should be taken when handling or cable testing.

The LCMU itself is polarity conscious and the polarity is indicated in the normal manner i.e. Red or Pink wire is positive, Black wire is negative. A wrongly connected LCMU will produce a short circuit fault condition.
Due to the use of Surface Mount Technology components, the LCMU is probably the smallest device of its kind on the market. This enables the device to be fitted either within the last device on a zone or in the back box, eliminating the need for an additional wiring point.

Normal Current	-	4mA at 28 Volts
Fault Condition Current	-	750uA at 28 Volts
Operating Voltage	-	15 to 30 Volts
Size	-	25mm x 20mm x 8mm
Terminal Connections	-	Pin Crimp Connectors

11. Zone Configuration Options

Note: Once an option has been set it cannot be reset as the component has been removed.

Option 1 – Non latching zones. Remove the following diodes:

PCB Type	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6	Zone 7	Zone 8
Con.05	D17	D18	D19	D20	-	-	-	-
K4.ZMS	D17	D18	D19	D20	-	-	-	-
K8.ZMS	D17	D18	D19	D20	D61	D60	D59	D58

Option 2 – Silent operation i.e. No bells in fire condition. Remove the following diodes:

PCB Type	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6	Zone 7	Zone 8
Con.05	D37	D38	D39	D40	-	-	-	-
K4.ZMS	D37	D38	D39	D40	-	-	-	-
K8.ZMS	D37	D38	D39	D40	D87	D88	D89	D90

Option 3 – No remote signal i.e. auxiliary contacts. Remove the following diodes:

PCB Type	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6	Zone 7	Zone 8
Con.05	D97	D98	D99	D100	-	-	-	-
K4.ZMS	D21	D22	D23	D24	-	-	-	-
K8.ZMS	D21	D22	D23	D24	D57	D56	D55	D54

Option 4 – Short Circuit fire. Remove the following links:

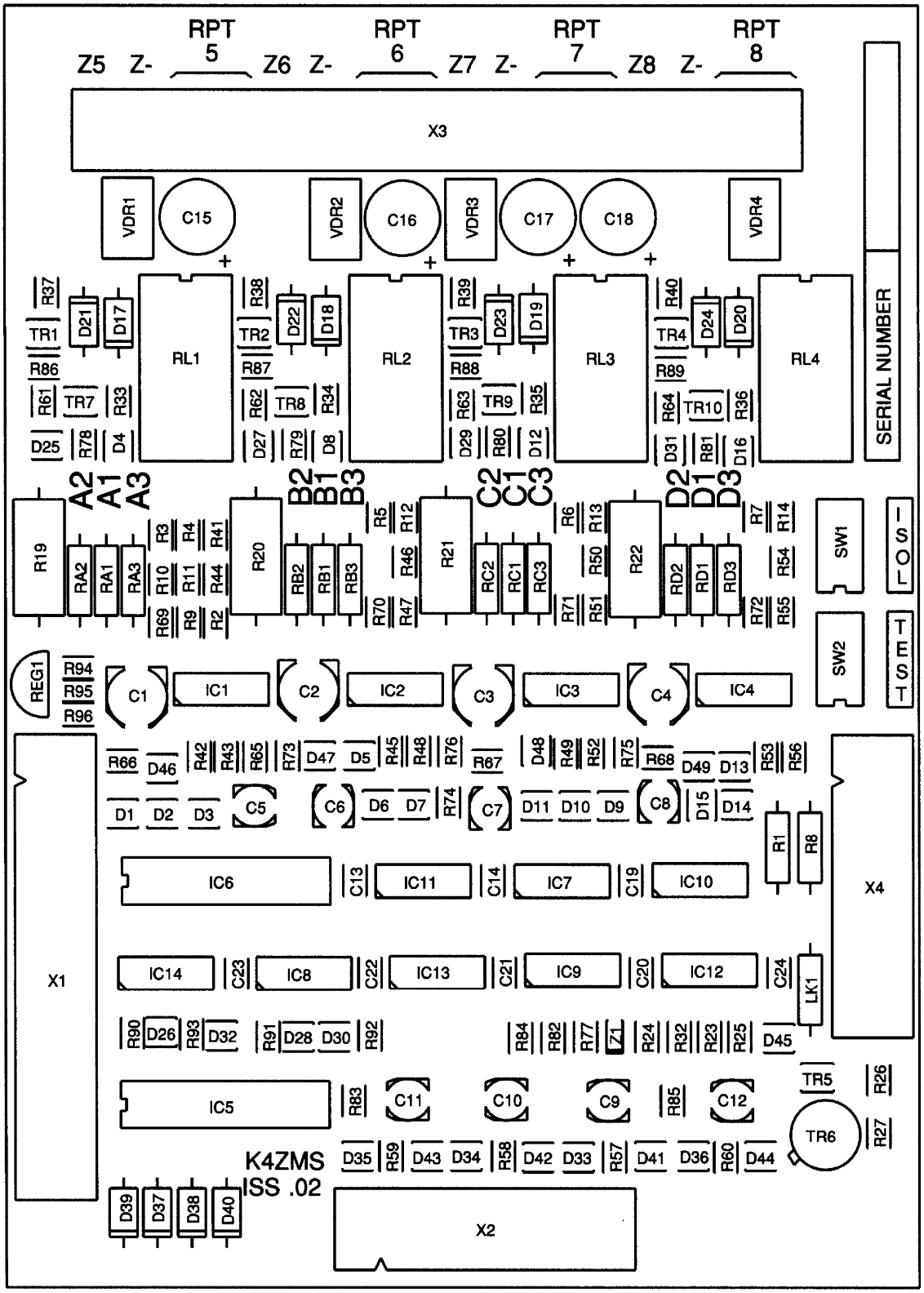
PCB Type	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6	Zone 7	Zone 8
Con.05	A3	B3	C3	D3	-	-	-	-
K4.ZMS	A3	B3	C3	D3	-	-	-	-
K8.ZMS	A3	B3	C3	D3	E3	F3	G3	H3

Note: Test facility cannot be used on zones with S/C fire.

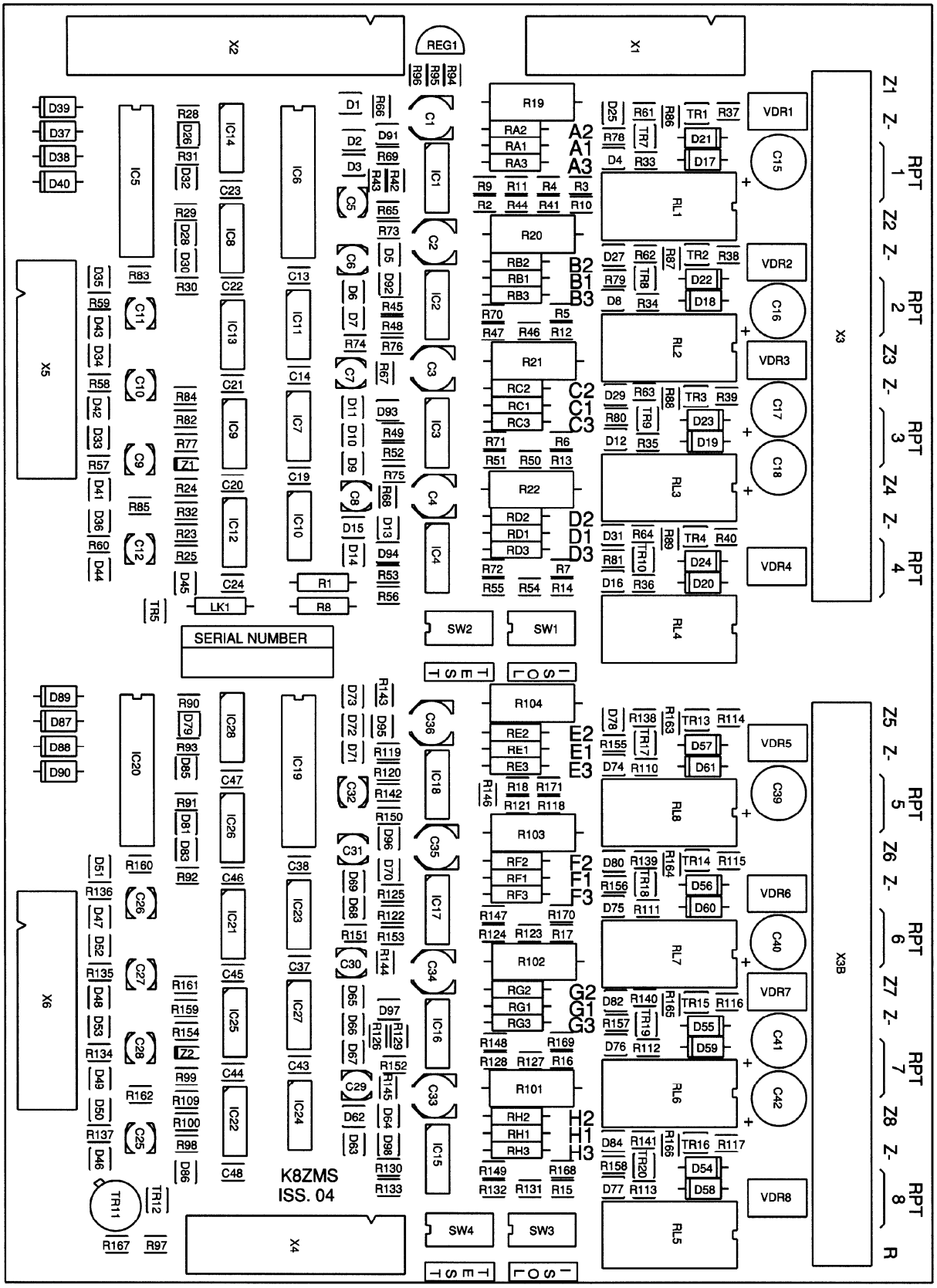
Option 5 – Trigger devices with a resistance greater than 680 ohms. Remove the following links:

PCB Type	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6	Zone 7	Zone 8
Con.05	A2	B2	C2	D2	-	-	-	-
K4.ZMS	A2	B2	C2	D2	-	-	-	-
K8.ZMS	A2	B2	C2	D2	E2	F2	G2	H2

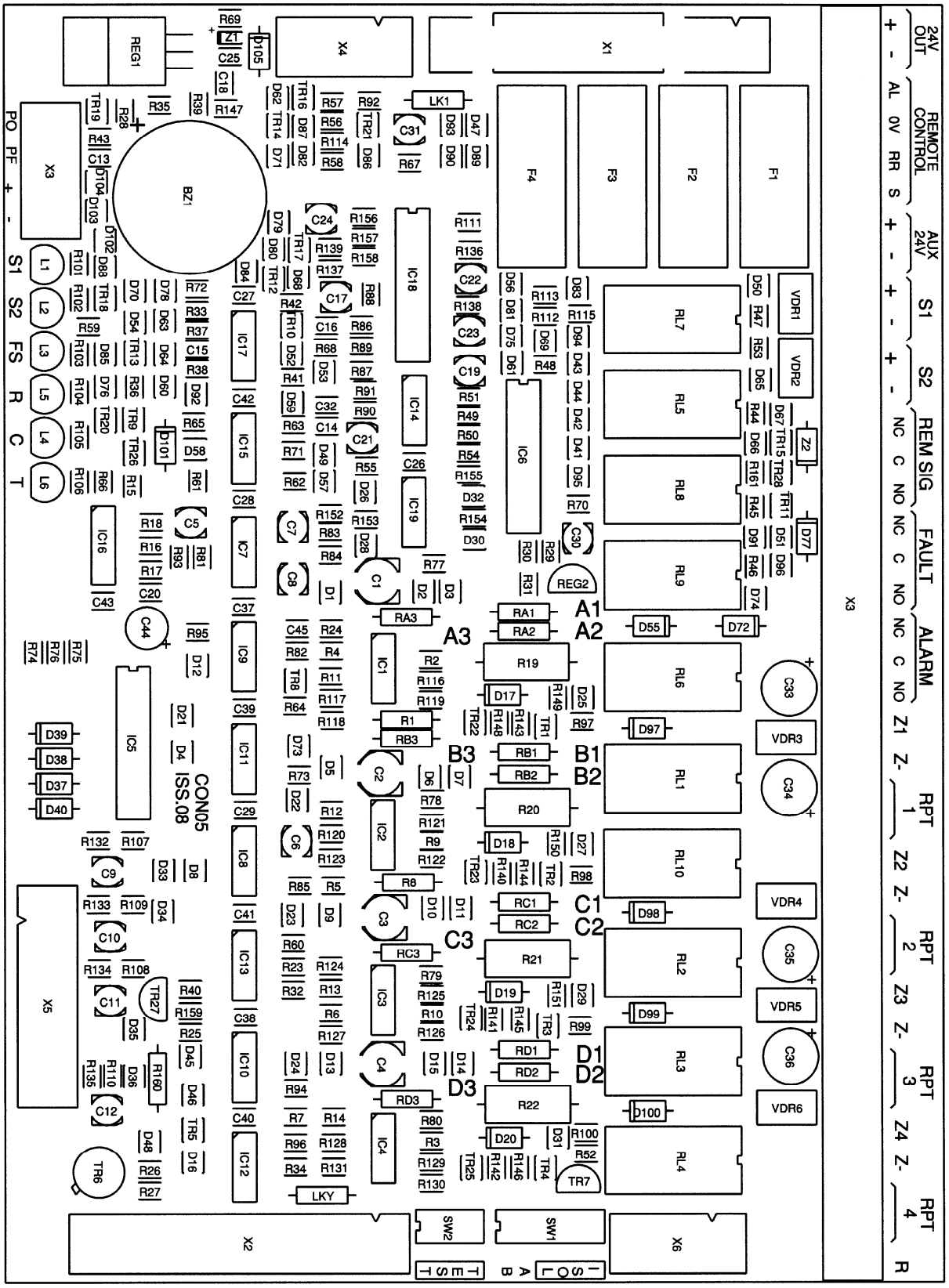
Annex 1 - K4.ZMS PCB



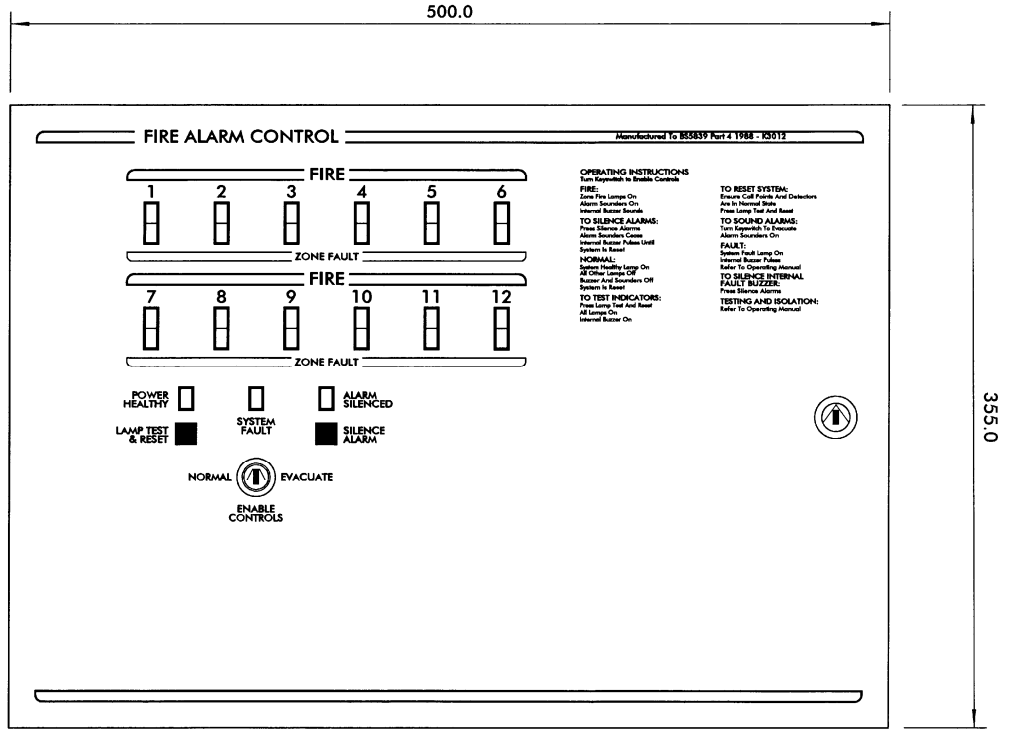
Annex 2 – K8.ZMS PCB

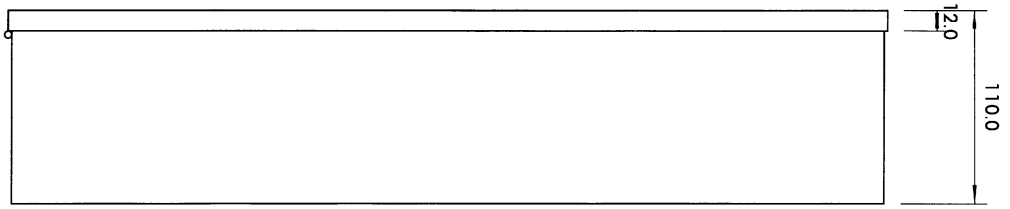


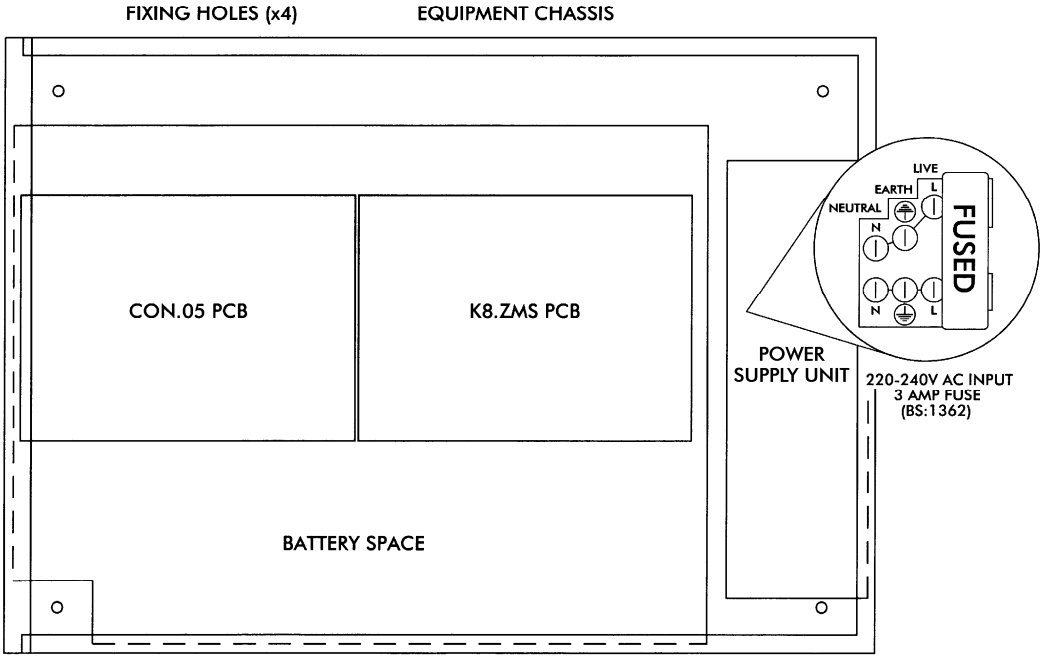
Annex 3 – CON.05 PCB



Annex 4 – Typical K3000 Installation & Mains Supply Connection





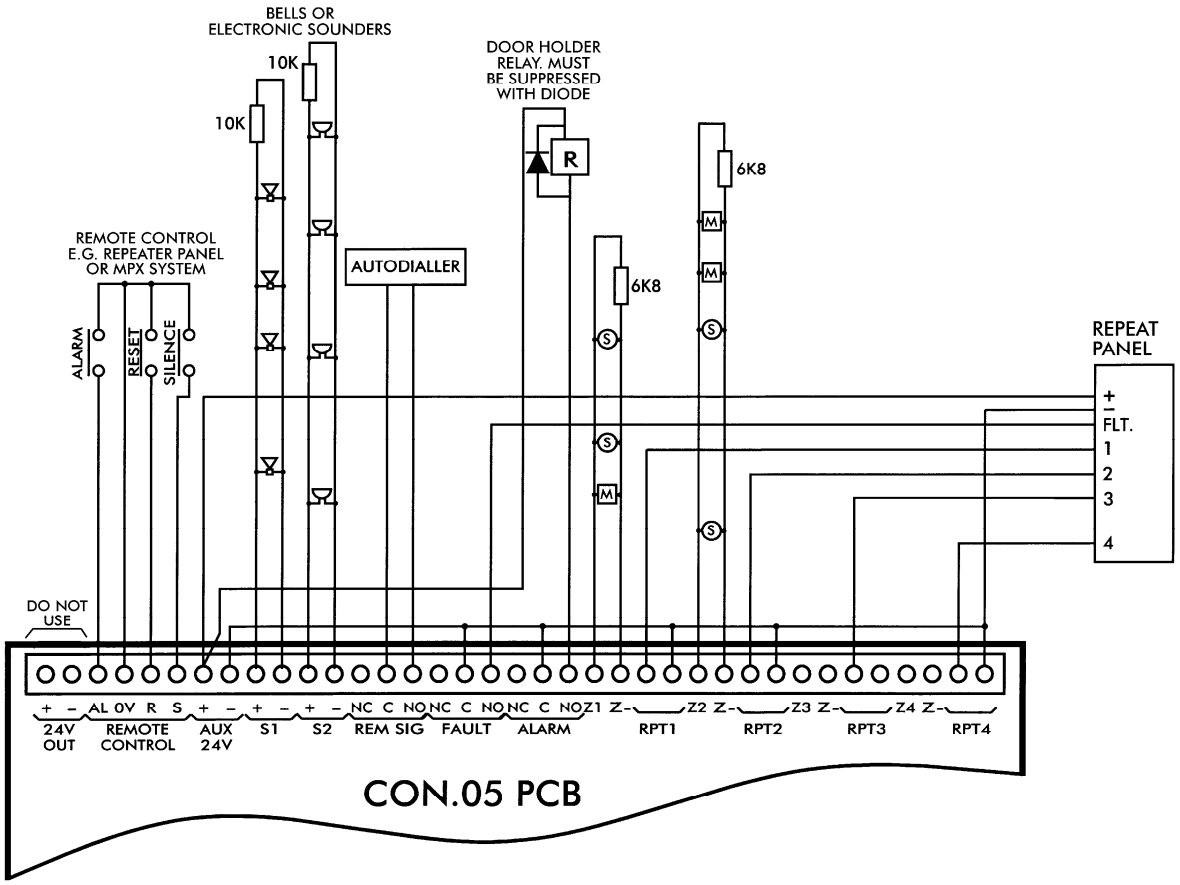


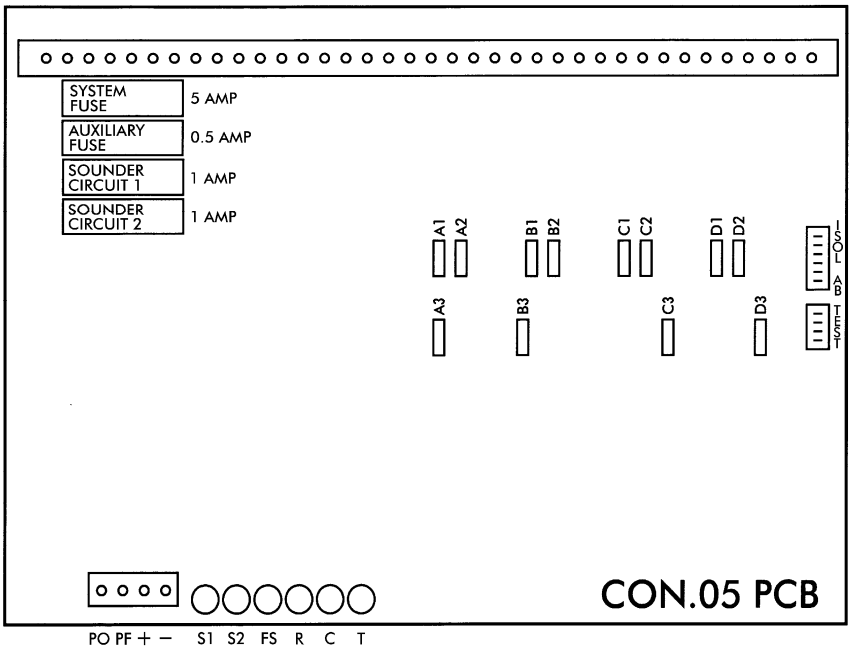
Annex 5 – Typical Field Wiring & Location of Optional Links / Resistors

Note: Where detectors are wired before call points on a zone, the 6K8 end of line resistor should be replaced by an active end of line unit and schottky diode detector bases used.

Or: Special detector bases that clamp the zone cables to 16V should be used.

Rev: Any external equipment that uses the fire alarm power supply must be taken from the Aux. 24V output. Any electromagnetic devices connected to the fire alarm power supply must be suppressed.





USE WITH I.S. BARRIER

RESISTORS

A1 AND A2 - Z1	REMOVE FOR
B1 AND B2 - Z2	USE WITH
C1 AND C2 - Z3	I.S. BARRIERS
D1 AND D2 - Z4	
A2, B2, C2, D2	REMOVE ONLY FOR USE WITH TRIGGER DEVICES WHICH PRESENT A RESISTANCE OF GREATER THAN 680 OHMS

SHORT CIRCUIT FIRE

TO REMOVE SHORT CIRCUIT MONITORING
REMOVE RESISTORS
A3 - Z1
B3 - Z2
C3 - Z3
D3 - Z4

NOTE

THE TEST FACILITY CAN NOT BE USED,
ON ZONES MODIFIED FOR SHORT CIRCUIT FIRE.

SWITCH B ON = CONTINUOUS OV (REMOTE CONTROL)
SWITCH B OFF = PULSING OV (REMOTE CONTROL)
SWITCH A ON = REMOTE SIGNAL CONTACT ACTIVE
SWITCH A OFF = REMOTE SIGNAL CONTACT ISOLATED