

# **BVCOM**

## **Compact Routeing Mixer**

# **Operating Instructions**

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**BALDWIN BOXALL**  
**COMMUNICATIONS**

## **BVCOM, Compact Routing Mixer**

The BVCOM is a revolutionary four zone routing mixer designed to replace conventional equipment up to six times its size. The unit is designed to control the front-end of most voice alarm systems, however it can also be used for many public address applications.

The Compact is sold either as a BVCOM, which includes no options and a BVCOMC, which includes two message cards, four chime cards and four remote volume controls. The options are available separately and are listed below:

OPT402	64 Second EPROM based message card	up to 2 modules per BVCOM	see FIG 11
OPT33	1, 2 or 3 note chime card	up to 4 modules per BVCOM	see FIG 12
OPTEQ	Bose equaliser card for use with models 8, 25, 32 & 102F	up to 4 modules per BVCOM	see FIG 13

The MS2V is used for the remote volume control of the line level (music) input. Up to four MS2Vs can be used per BVCOM to adjust the level for each zone. This operates on a two wire system between the MS2V and BVCOM.

Each BVCOM has input facilities for two zonal emergency microphones, two zonal paging microphones and one line level music input. The standard priority configuration is :

1. EMERGENCY MICROPHONE 1
2. EMERGENCY MICROPHONE 2
3. EPROM MESSAGE 1
4. EPROM MESSAGE 2
5. PAGING MICROPHONE 1
6. PAGING MICROPHONE 2
7. LINE INPUT (MUSIC)

On the left of the front panel are the fault indicators for the fire microphones, messages, amplifier/line, data link, power supply and processor. Should a fault develop on the system the relevant LED indicator will illuminate and a fault will be announced. There are three controls for the line level (music) input which are common for all zones. The tone controls are at 100Hz and 12kHz for bass and treble with a gain of  $\pm 12$ dB. All other inputs have a tone control of +12dB at 2k5Hz.

Under normal - i.e. non-fault - conditions the green healthy indicator will illuminate, the fault relay will be energised and the sounder will be silent. A fault is indicated by the flashing yellow common fault indicator together with the sounder sounding 1 second on, 1 second off. By pressing the fault accept button the fault indicator will illuminate continuously and its sounder will be silent. Operation of the accept button does not affect the fault output produced by the relay contacts. The nature of the fault is indicated by a separate yellow indicator. All the fault indicators may be checked by pressing the lamp test button. If an indicator does not light it will not light if and when there is a fault.

On the right hand side of the unit is the aural monitor section. This is used to listen to each input individually. Either monitor through the internal loudspeaker or through headphones which are plugged into the headphone socket. Press the select button to select the input to monitor. The input LEDs will light in-turn as the button is pressed. The monitor volume is adjusted with the preset potentiometer which is accessed through the hole above the BGM LED.

The internal fault surveillance system will announce a fault if there is absence of a satisfactory audio output level or an abnormal DC offset present at the output of the digital to analogue converter (DAC). This could be due to a faulty EPROM, DAC or other digital processing device.

The internal fault surveillance system will also announce a fault if the audio surveillance signal is not present or any of the zone access lines develop a short or open circuit condition.

When Fire microphone 1 performs an All Call this bypasses the microprocessor.

COMPACT FRONT PANEL VIEW

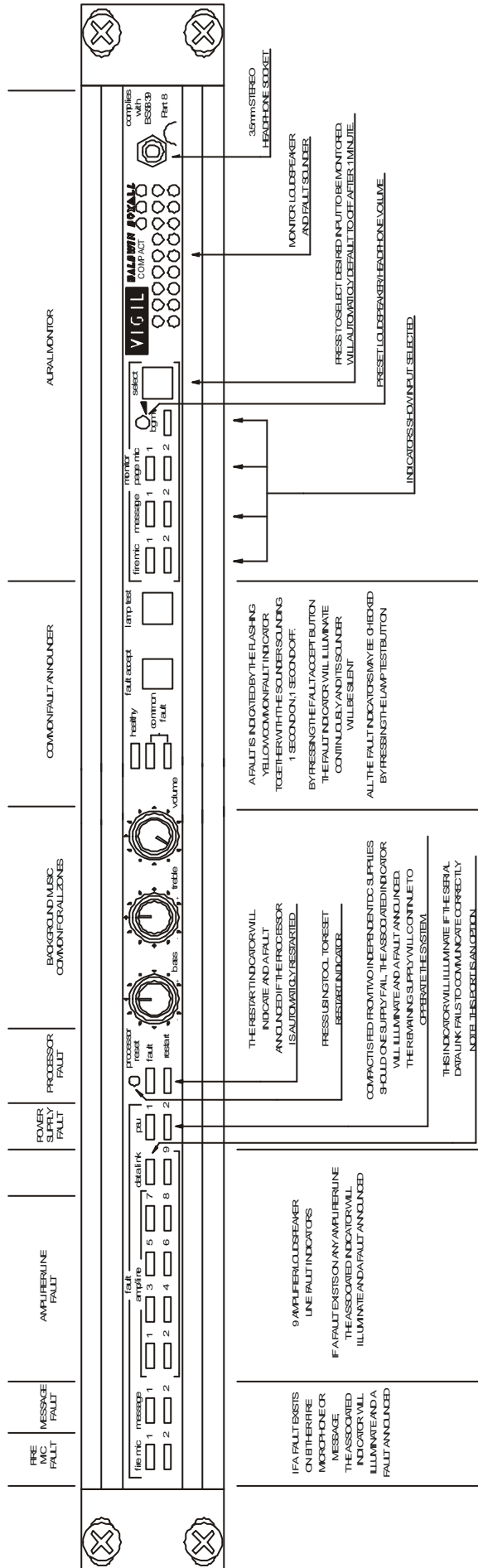
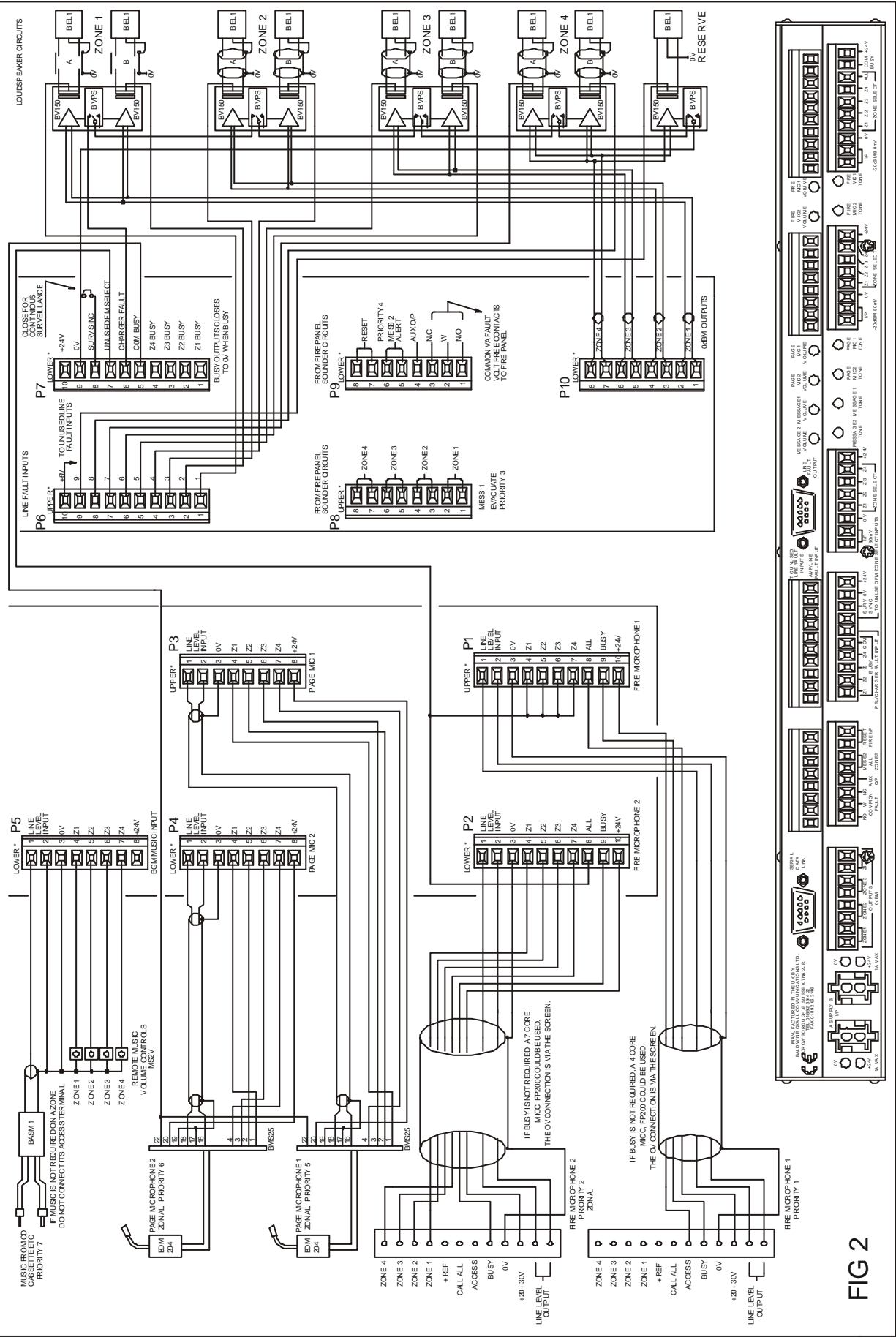


FIG 1

# WIRING DIAGRAM FOR TYPICAL 4 ZONE VA SYSTEM USING VIGIL COMPACT



**FIG 2**

# BLOCK DIAGRAM VIGIL COMPACT

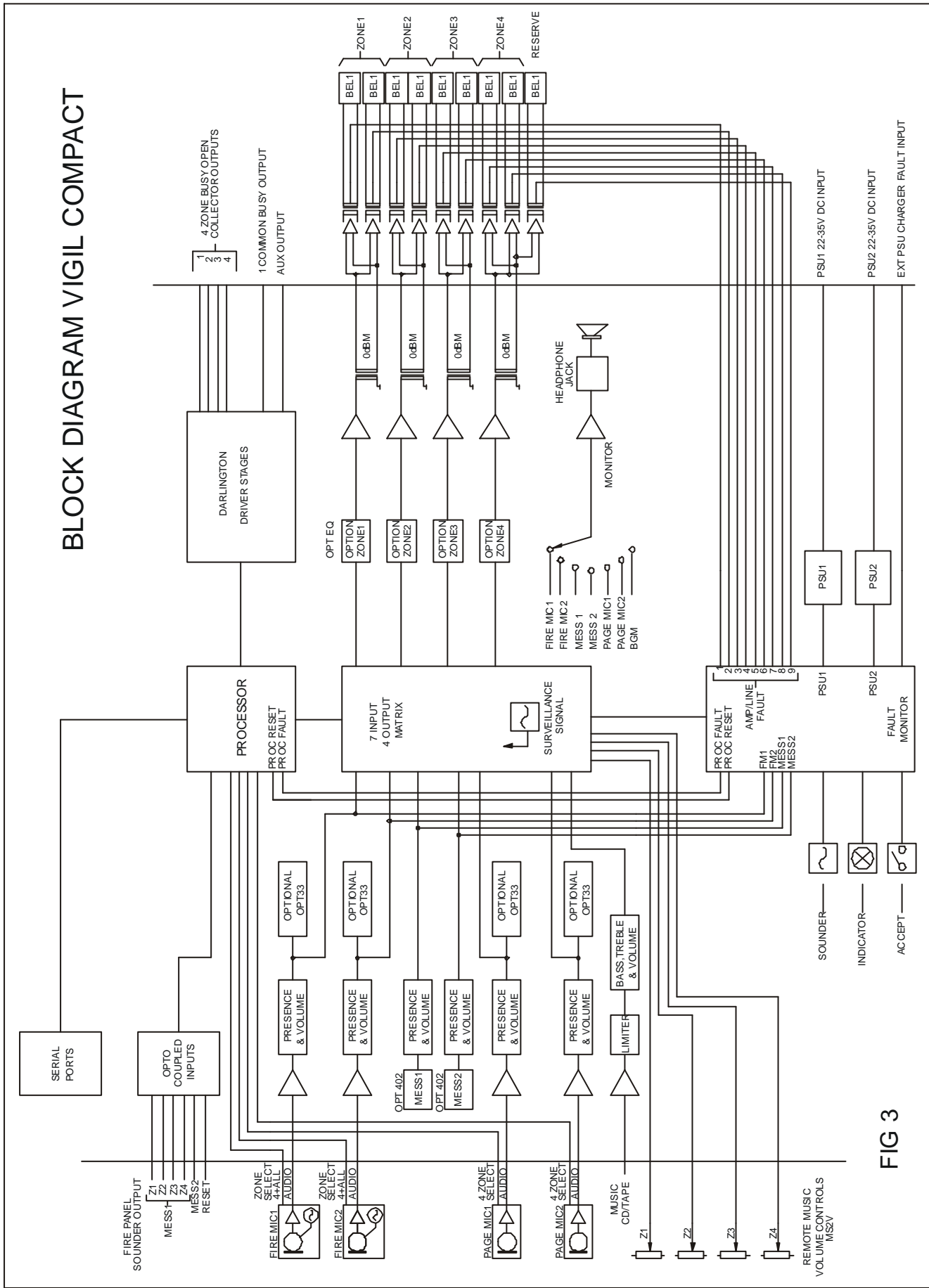
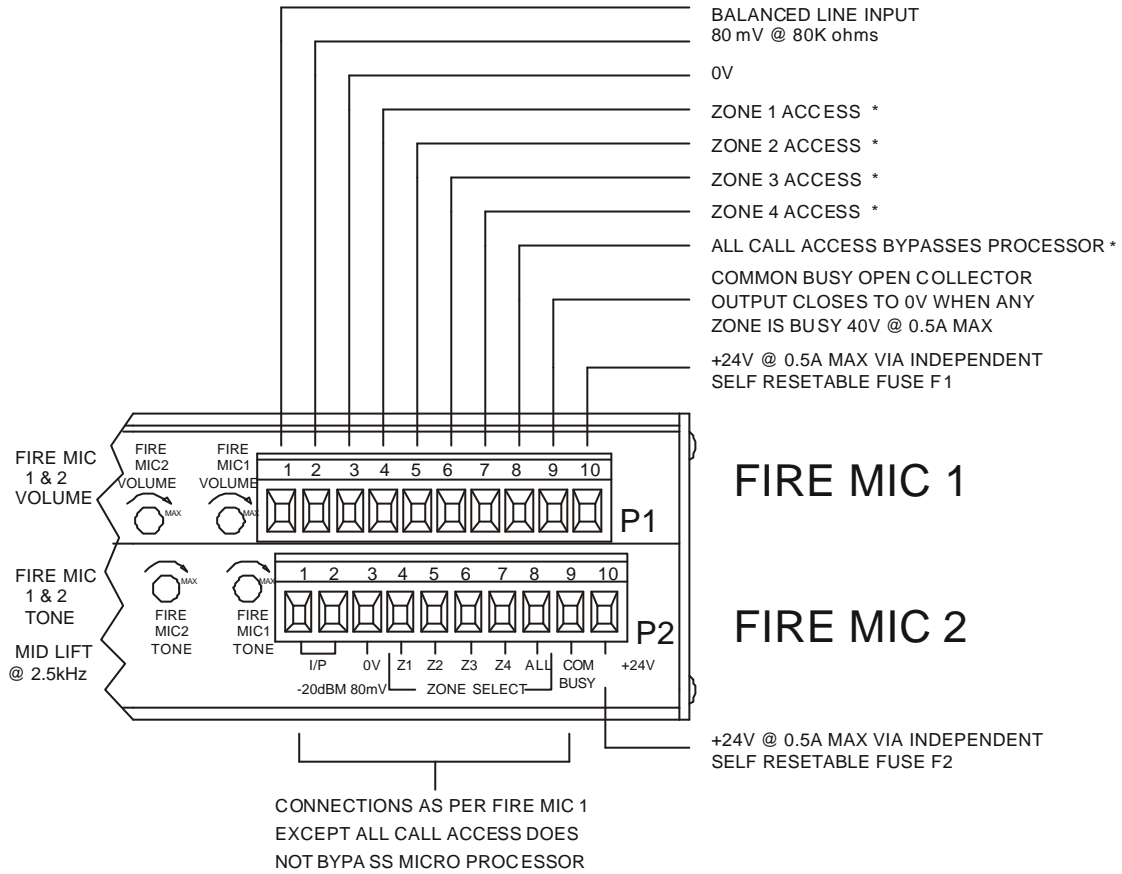
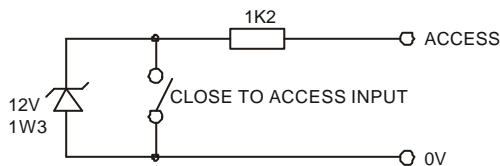


FIG 3

# FIRE MICROPHONE INPUTS - COMPACT



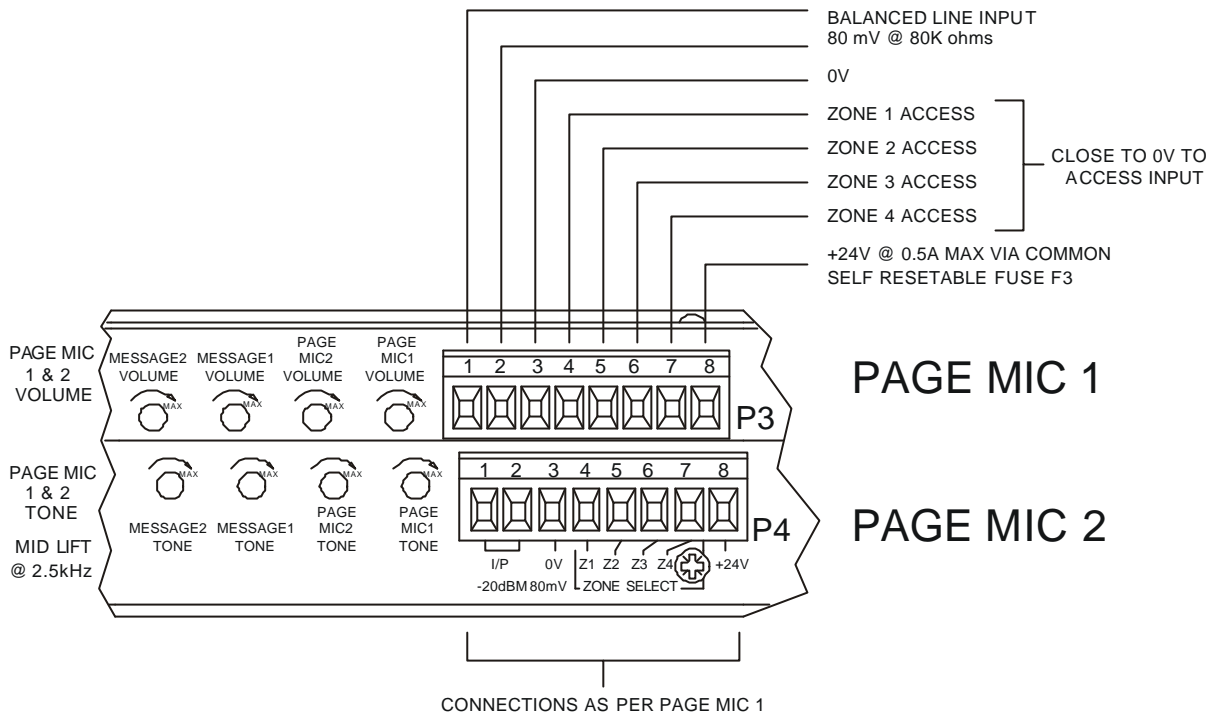
\* MONITORED ACCESS CONTROL CIRCUITS COMPATIBLE WITH OUR FIRE MICS & MUST BE TERMINATED WITH A 12V ZENER DIODE TO 0V. ACCESS CONDITION IS OBTAINED BY CLOSING TO 0V VIA A 1K2 RESISTOR. PLEASE SEE BELOW



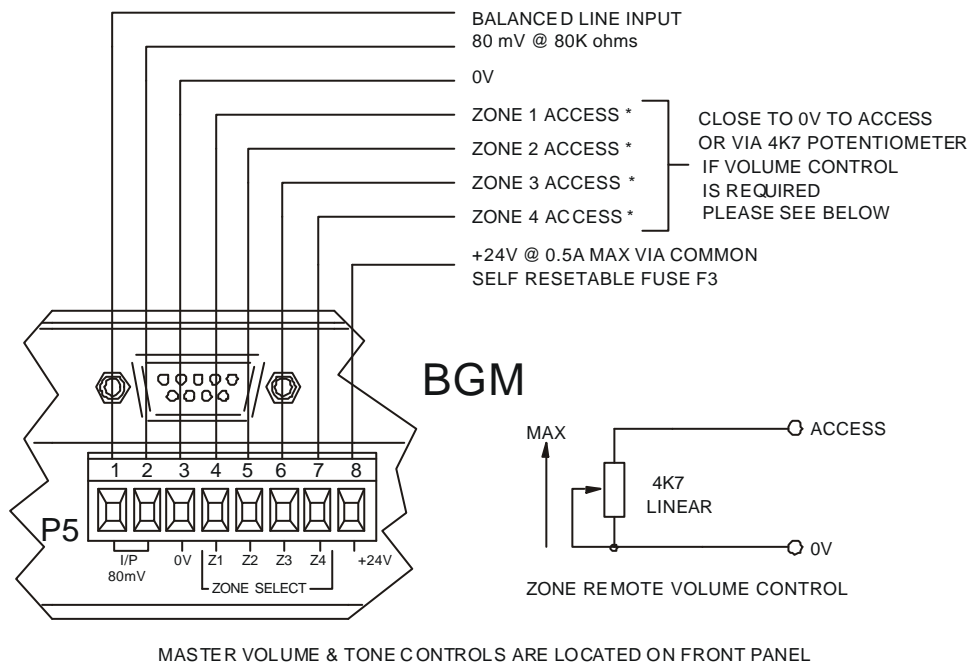
THE FAULT DETECTOR WILL ANNOUNCE A FAULT IF ANY OF THE FIVE ACCESS CONTROL LINES DEVELOPE EITHER AN OPEN OR SHORT CIRCUIT CONDITION, OR ABSENCE OF THE SURVEILLANCE SIGNAL TO THE BALANCED AUDIO LINE INPUT.  
ANY UNUSED FIRE MICROPHONE ACCESS INPUTS SHOULD BE CONNECTED TO PIN 7 OF P7. REFER TO FIG 6.  
IF EITHER FIRE MICROPHONE INPUTS ARE NOT REQUIRED, PLEASE REFER TO FIG 9

**FIG 4**

## PAGE MICROPHONE INPUTS - COMPACT



## BACKGROUND MUSIC INPUT - COMPACT



**FIG 5**

# AMP / LINE SURVEILLANCE - COMPACT

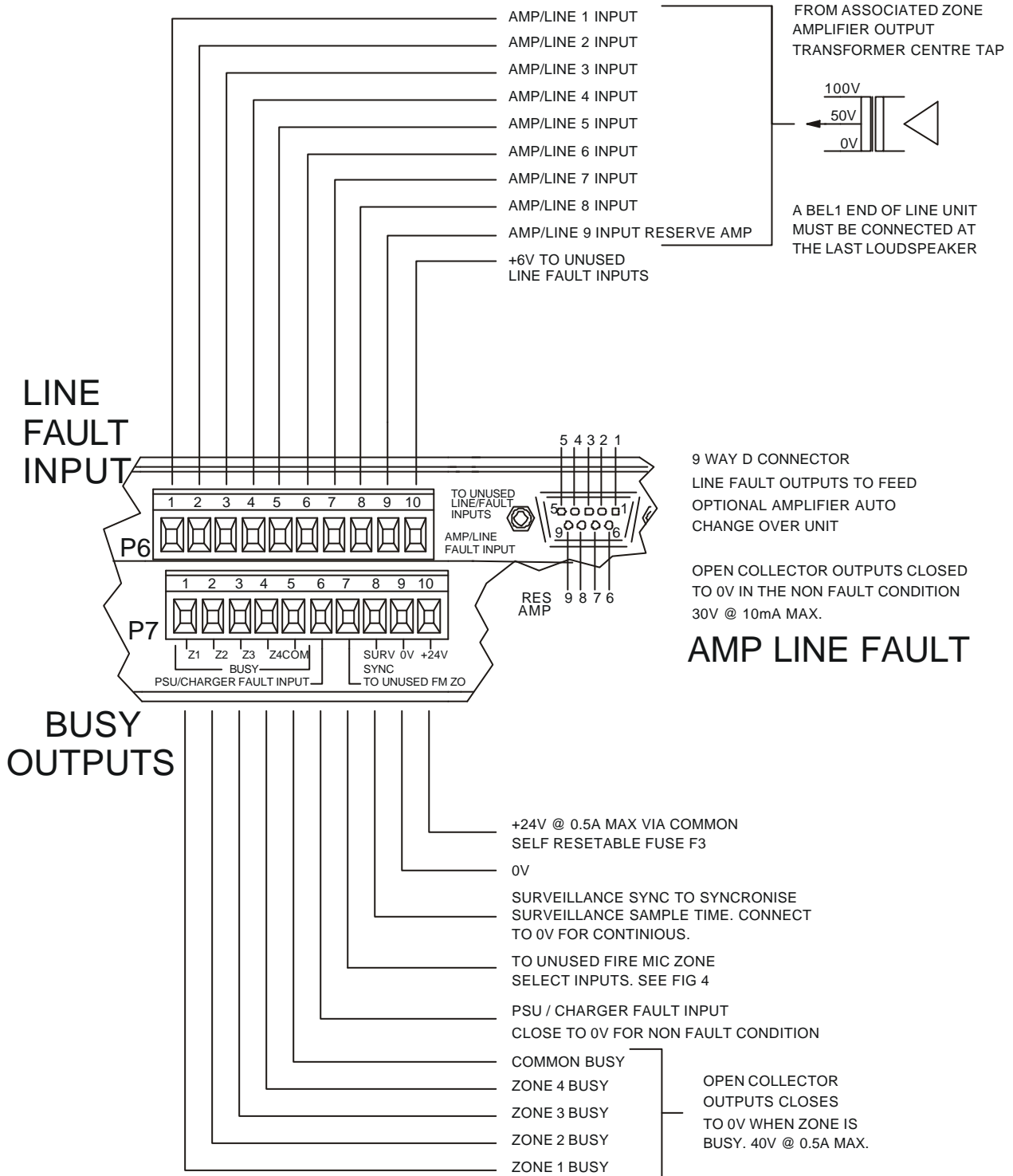
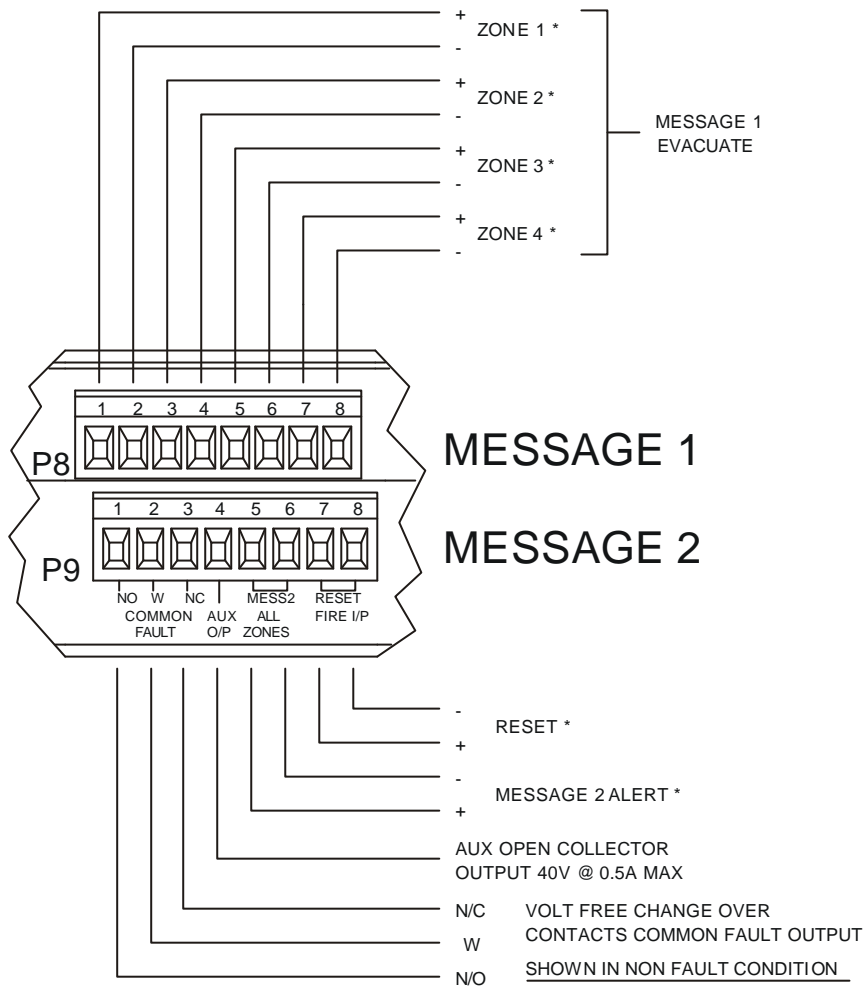


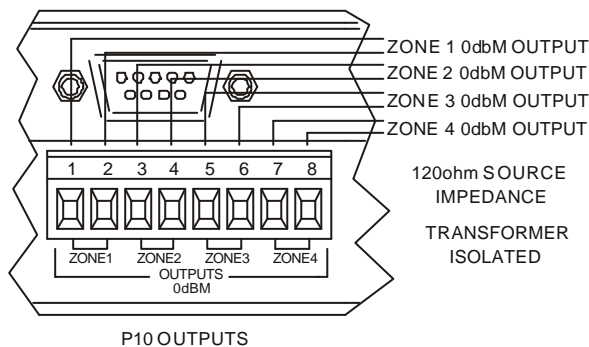
FIG 6

## FIRE PANEL CONNECTION - COMPACT



\* SOUNDER CIRCUIT INTERFACE WITH INTERNAL END OF LINE RESISTOR  
REVERSE POLARITY FOR A LARM CONDITION. + - SHOWN FOR  
THE ACTIVE / ALARM CONDITION.  
IF RESET IS NOT AVAILABLE FROM THE FIRE PANEL,  
APPLY 24V AND 0V TO THE RESET INPUT.  
IF EITHER MESSAGE IS NOT REQUIRED, PLEASE REFER TO FIG 9

## AUDIO OUTPUTS - COMPACT



**FIG 7**

# THE COMPACT AND BEL1 AMPLIFIER AND LOUDSPEAKER LINE SURVEILLANCE SYSTEM

## SINEWAVE SURVEILLANCE GENERATOR COMPACT

The Compact may be selected to either 30Hz or 20KHz when installed using the Jumper JP1, see Figure 8. 30Hz is suitable for systems employing horn loudspeakers or ceiling loudspeakers which have a poor low frequency response. Should speakers of good low frequency response be employed the 30Hz signal could be audible.

### Advantages of 30Hz

1. Less power absorbed by cable as compared to 20KHz.
2. More positive fault detection as breaks in the cable are easier to detect due to lower stray capacitive coupling compared to 20KHz.
3. Most digital meters selected to the AC range will accurately indicate a 30Hz signal.

### Disadvantages of using 30Hz

1. Speakers with a good low frequency response will produce the 30Hz signal.
2. Any harmonic distortion produced by the amplifier may be audible, even when using horn loudspeakers.
3. Interrupting the 30Hz surveillance signal will cause a click thus envelope shaping must be employed.

### Advantages of 20KHz

1. Generally inaudible, however some speakers may produce a sub-harmonic i.e. 10KHz.

### Disadvantages of 20KHz

1. High capacitive cable such as PYRO, FP200 etc absorb a lot of power at this frequency.
2. Breaks in cable may be difficult to indicate due to the capacitive coupling between adjacent conductors.
3. Possibility of lines resonating at this frequency and therefore consuming unnecessary power resulting in amplifiers overheating with reduced battery standby time.
4. Some digital multi-meters will not accurately read 20KHz AC.

## AMPLIFIER/LINE SURVEILLANCE SYSTEM OPERATION

The surveillance signal is generated by the Compact and via the power amplifiers it is transmitted to line. At the end of each line a BEL1 detects this signal and super imposes a DC current with reference to ground. The BEL1 consists of two 0.5mA constant current sources and together produce a total current of 1mA which is detected by the Compact. The constant current sources are cross coupled thus if one side of the line becomes disconnected the current source for the other side is disabled. This technique prevents the remaining circuit from operating in the half wave mode and therefore ensures that a fault condition is announced.

A voltage doubling circuit is incorporated which improves the overall system sensitivity, and care must be taken as high voltages may exist. The recommended surveillance signal level is 10 Volts but detection is not affected when higher speech or music signals are present. The DC line current produced by the BEL1 is extracted by the centre tap of the amplifier's output transformer, which is fed to the input of the Compact. This input is terminated with a 6.8K resistor and assuming a line current of 1mA produces 6.8 Volts across it. This DC signal is buffered and fed into a window detector via a sample and hold gate. The lower voltage threshold is 5 Volts and the upper is 10 Volts and providing the input signal is within this range the Compact will indicate a normal condition. The input circuit also includes an AC detector providing a fault condition should the loudspeaker line be unbalanced due to a fault condition.

Under normal - i.e. non-fault - conditions the green healthy indicator will illuminate, the fault relay will be energised and the sounder will be silent. A fault is indicated by the flashing yellow common fault indicator together with the sounder sounding one second on, one second off. By pressing the fault accept button the fault indicator will illuminate continuously and its sounder will be silent. Operation of the accept button does not affect the fault output produced by the relay contacts. The nature of the fault is indicated by a separate yellow indicator. All the fault indicators may be checked by pressing the lamp test button.

**SETTING UP THE SURVEILLANCE**

1. Select the required frequency (30 Hz or 20 kHz). See Figure 8.
2. Ensure that unused amplifier/line fault inputs are connected to terminal No.10 (+6V) of P6. See Figure 6.
3. Connect terminal No.8 (Surv Sync) and 9 (0V) of P7 together selecting the continuous surveillance mode. Figure 6.
4. Adjust each preset in turn for 10V loudspeaker line output to the associated zone. Figure 8.
5. If there are no line faults all 9 Amplifier/Line fault indicators should extinguish.
6. Remove the link between terminal No.8 & 9 of P7 to select the intermittent mode. Figure 6.

**Note** The system normally operates in the intermittent mode which increases battery standby time and reduces the heat generated by the power amplifiers.

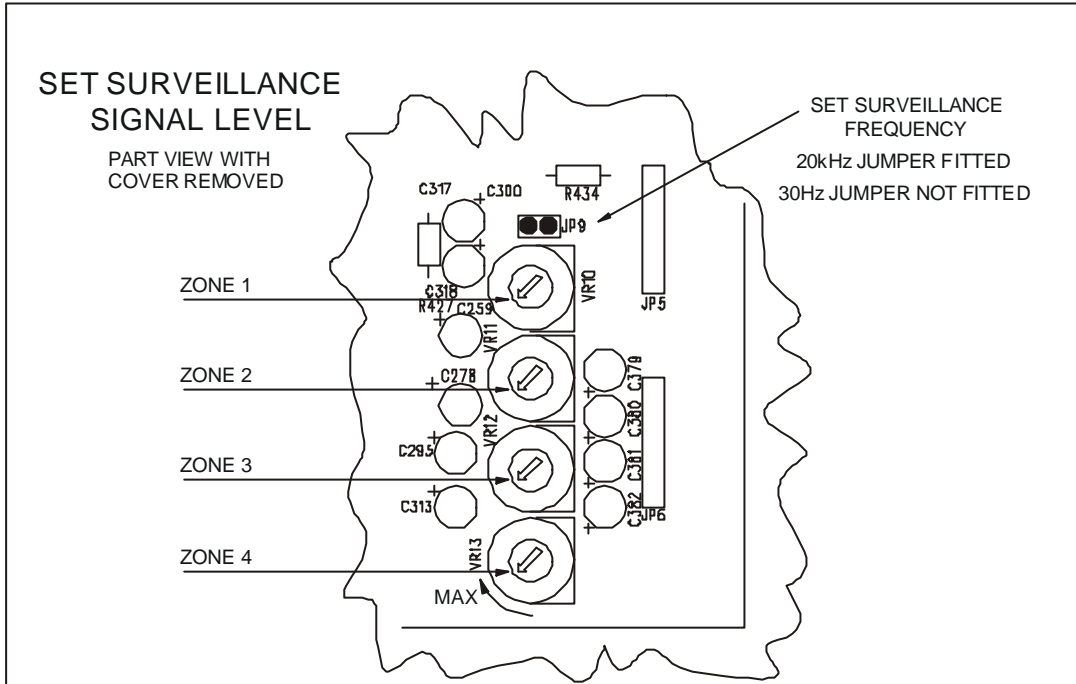


FIG 8

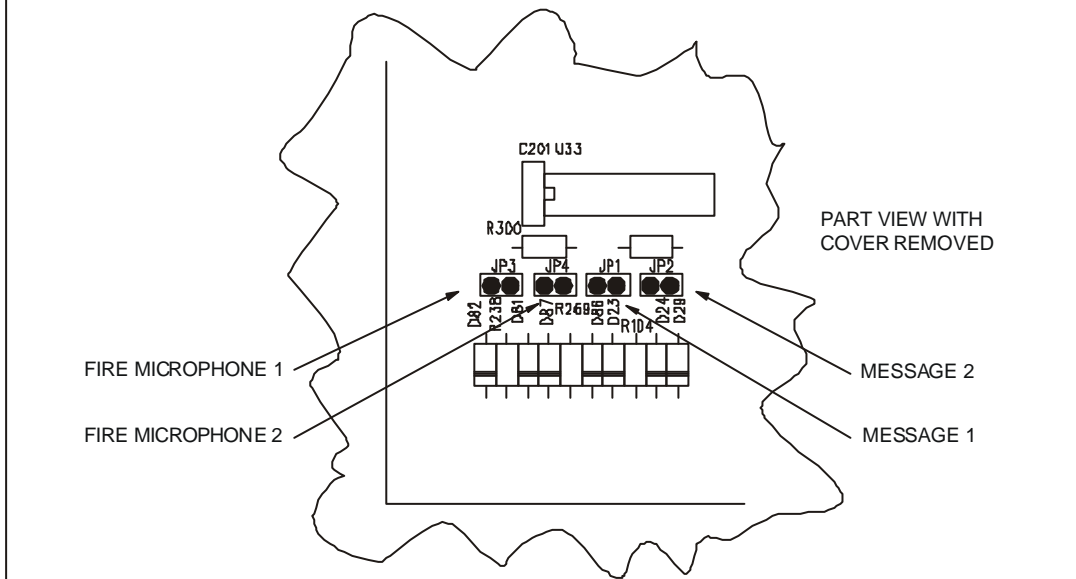


FIG 9

LOUDSPEAKER WIRING SHOWING END OF LINE DEVICE BEL1

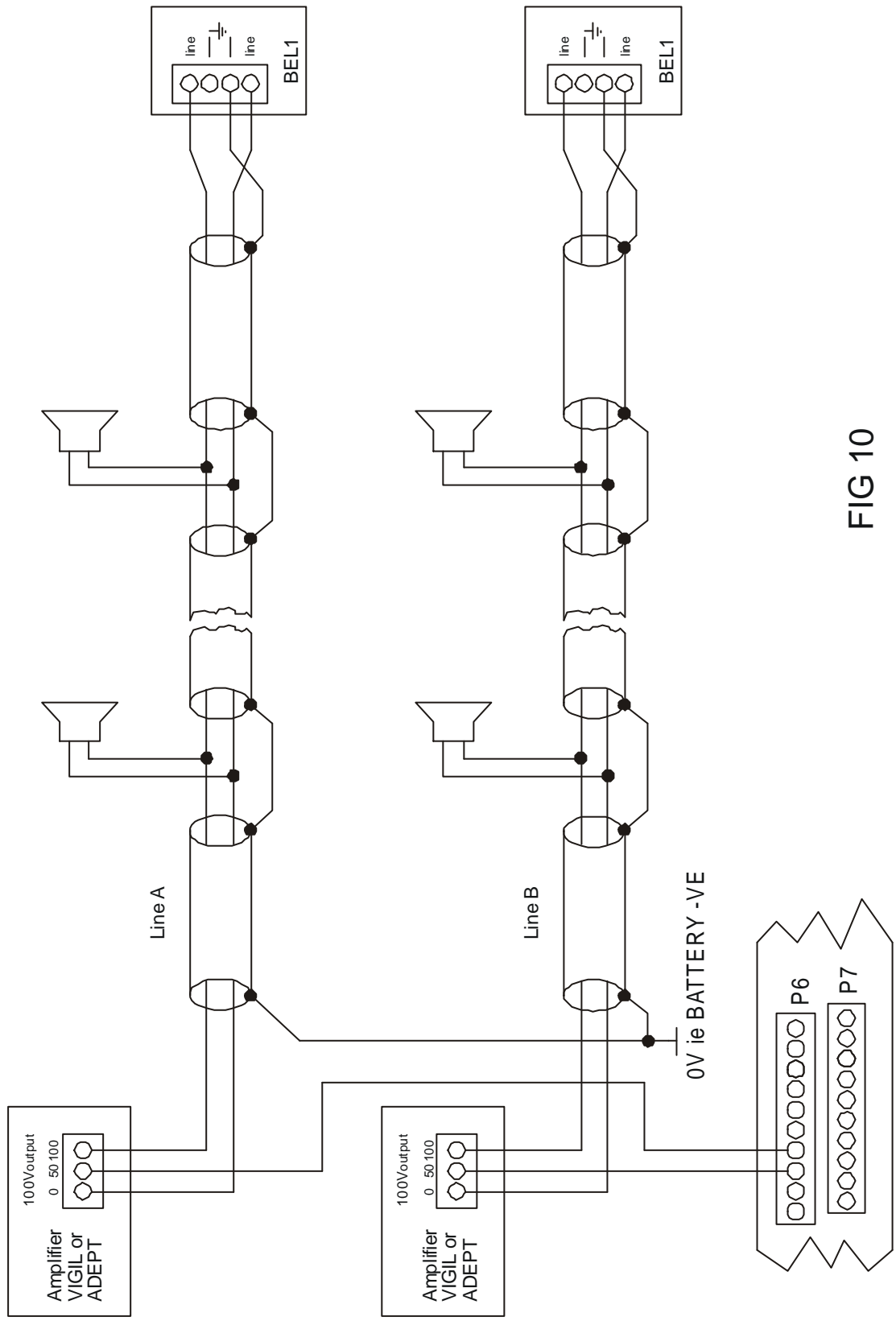


FIG 10

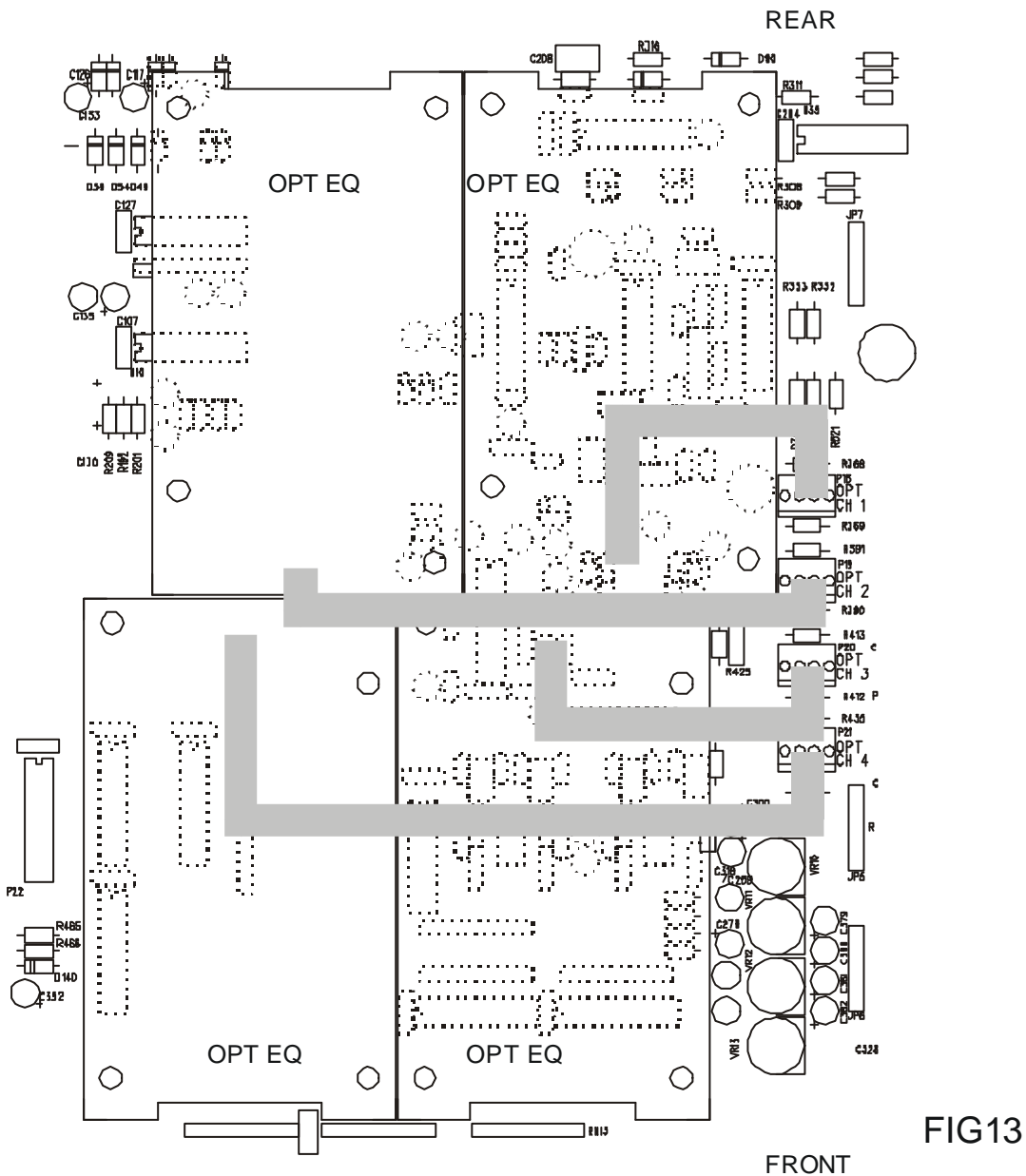
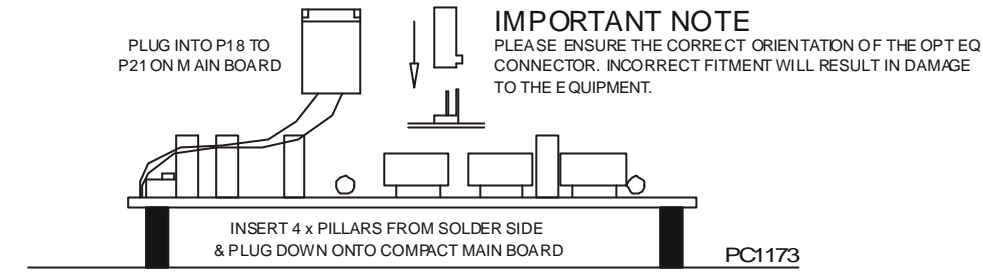
COMPACT  
SEE FIG 6 FOR MORE DETAIL





## COVER REMOVAL

REMOVE 3 X No4 SELF TAPPING SCREWS FROM BOTH SIDES  
& 3 X No4 SELF TAPPING SCREWS FROM THE TOP OF THE REAR PANEL  
LIFT THE COVER UP AT THE REAR AND PULL OUT OF THE FRONT  
EXTRUSION SLOT. TO REFIT COVER, REVERSE ABOVE OPERATION.



## DIL SWITCH SETTINGS FOR SERIAL PORT USING COMP8 SOFTWARE ONWARDS

RS485 half duplex, 9600 baud, 1 start, 8 data, even parity, 1 stop bit.

DIL switch settings

### SW1 on PC 1230 serial interface

### SW5 on PC 1173 compact main board

<u>SW1 on PC 1230 serial interface</u>		<u>SW5 on PC 1173 compact main board</u>			
DIL switch	Compact address	DIL switch	Zone start output 1	DIL switch	Zones used
1 2 3 4		1 2 3 4		5 6	
0 0 0 0	00	0 0 0 0	1 + address	0 0	1
1 0 0 0	01	1 0 0 0	2 + address	1 0	2
0 1 0 0	02	0 1 0 0	3 + address	0 1	3
1 1 0 0	03	1 1 0 0	4 + address	1 1	4
0 0 1 0	04	0 0 1 0	5 + address		
1 0 1 0	05	1 0 1 0	6 + address		
0 1 1 0	06	0 1 1 0	7 + address		
1 1 1 0	07	1 1 1 0	8 + address		
0 0 0 1	08	0 0 0 1	9 + address		
1 0 0 1	09	1 0 0 1	10 + address		
0 1 0 1	10	0 1 0 1	11 + address		
1 1 0 1	11	1 1 0 1	12 + address		
0 0 1 1	12	0 0 1 1	13 + address		
1 0 1 1	13	1 0 1 1	14 + address		
0 1 1 1	14	0 1 1 1	15 + address		
1 1 1 1	15	1 1 1 1	16 + address		

Priority	Input	BVRM display	RS485 audio channel code		Remote contact access features
			Select	Clear	
1	FM 1	'E'	01H	41H & 45H	All call processor bypass only
2	FM 2	'E'	02H	42H & 46H	Zonal & all call
3	Message 1	'1'	15H	55H	Zonal fire panel interface. All call FM 1
4	Message 2	'2'	16H	56H & 55H	All call fire panel interface & FM 1
5	FM 1 page mode	'P'	05H	45H & 41H	None
6	FM 2 page mode	'P'	06H	46H & 42H	None
7	PM 1	'P'	09H	49H	Zonal PM 1
8	PM 2	'P'	17H	57H & 55H	All call FM 1
10	Message 4	'4'	18H	58H & 55H	All call FM 1
11	AUX	'A'	11H	51H & 54H	Zonal DC remote volume controls

Note: When using the serial port all unused access inputs on FM 1 & FM 2 must be connected to the unused FM access terminal to prevent faults being announced.

## COMPACT SPECIFICATION

### Line Outputs x 4

Nominal output level (Transformer isolated)	0.775V 0dBm
Maximum output level	2.5V +10dBm
Output source impedance @ 1kHz	120 Ohms
Output noise	Better than 85dB

### Music Input x 1

Input sensitivity	120mV @ 80K Ohms balanced
Input level onset of limiter	200mV
Tone controls - Bass & Treble	±12dB @ 100Hz & 12kHz
Frequency response	-3dB @ 50Hz - 20kHz
Signal to noise ratio	Better than 70dB
Common mode rejection rate 50Hz-30kHz	Better than 40dB - Typically 60dB
Access/remote volume control x 4	0 Ohm maximum level
	3K Ohm -10dB
	5K Ohm -20dB

### Paging Microphone Inputs x 2

Input sensitivity	80mV -20dBm @ 80K Ohms balanced
Maximum input level	4.25V +15dBm
Mid lift tone control	+12dB @ 2k5Hz
Frequency response	-3dB @ 80Hz-16kHz
Signal to noise ratio	Better than 70dB
Common mode rejection ratio 50Hz-30kHz	Better than 40dB - Typically 60dB
Access type per zone x 4	Close to 0V

### Digital Messages x 2

Mid lift tone control	+12dB @ 2k5Hz
Frequency response	-3dB 100Hz-6kHz
Signal to noise ratio	Better than 60dB
Sampling frequency	16kHz
Maximum message duration	64 seconds
Memory type	Non-volatile read only - EPROM

### Fire Microphone Inputs x 2

Input sensitivity	80mV -20dBm @ 80K Ohms balanced
Maximum input level	4.25V +15dBm
Mid lift tone control	+12dB @ 2K5Hz
Frequency response	-3dB @ 80Hz-16kHz
Signal to noise ratio	Better than 70dB
Common mode rejection ratio 50Hz-30kHz	Better than 40dB - Typically 60dB
Fault detector threshold	1K5Hz 25mV -30dBm, 20kHz 17mV -33dBm

Access type Zone x 4 and All

Monitored by a 12V zener diode end of line.  
To access close to 0V via a 1K2 resistor.  
Compatible with our range of emergency microphones.

### Amplifier/Line Surveillance Signal

Frequency (jumper selectable)	30Hz or 20kHz
Maximum output level (adjustable per zone)	250mV -10dBm
Mode	Continuous or 1 sec every 30 sec

### Amplifier/Line Surveillance Detectors x 9

Input impedance	6K8 Ohms
DC input voltage for no fault condition	5V to 10V

For use with the Bell end of line unit.

The internal fault surveillance system will announce a fault if this input voltage is not within 5V to 10V.

Charger/PSU Fault Input x 1

Input type Normally closed to 0V in the non-fault condition. Open to announce fault.

Fire Panel Sounder Interface Inputs x 6

Input type Opto coupled  
Nominal input voltage 20V to 30V DC  
End of line resistor 10K Ohms replaceable  
Active input current @ 24V 9mA  
Number of inputs 4x Zone Evacuate  
1x All Alert  
1x Reset, to reset the above

Busy outputs x 5

Open collector closes to 0V when zone is busy 40V @ 0.5A maximum

Aural Monitor x 1

Output power to internal loudspeaker 300mW  
Headphone output 3.5mm stereo jack  
Channel selector Push button steps round all 7 inputs

Fault Announcer

Sounder type Piezo electric  
Common fault output Volt free change-over contacts 50V @ 500mA maximum

Processor type PIC17C43  
Clock frequency 4.915200 MHz  
Processor surveillance Watchdog timer which restarts in the event of a malfunction and announces a fault condition.  
Power requirements 22-35V DC @ 0.5A maximum - ignoring external equipment

Fuse protection +24V fire microphone 1 Self-resettable  
+24V fire microphone 2 Self-resettable  
+24V all other outputs Self-resettable

Terminations

1	Audio output	8-pin screw terminated connector
2	Page microphone inputs	8-pin screw terminated connector
1	BG music input	8-pin screw terminated connector
2	Fire panel inputs	8-pin screw terminated connector
2	Fire microphone inputs	10-pin screw terminated connector
1	Amplifier/line surveillance input	10-pin screw terminated connector
2	DC supply input	2-pin crimp terminated connector



Low Voltage Directive  
73/23/EEC as amended  
by 93/68/EEC

EMC Directive  
89/336/EEC as amended  
by 92/31/EEC and 93/68/EEC

Applies only when the items are correctly fitted and operated in or with products of our manufacture and are installed in a recommended enclosure.