VIGILANT

Mini-Gen Mk 2

Multi Tone & Speech Generator

INSTALLATION & OPERATING INSTRUCTIONS
PA1026 Mini-Gen Mk2 – 24V

The VIGILANT Mini-Gen Mk2 is a self-contained tone and speech generator that produces a 100Vrms "Line" output for powering suitable 100V line loud speakers. It is designed to connect directly to VIGILANT fire alarm panels, but may be connected to other suitable panels. It utilises the fire alarm panel's output supervision (e.g. Bells and end-of-line resistors) to supervise the wiring from the panel to the unit, and from the unit to the speakers, for open and short circuit faults.

Mini-Gen Mk2 is available in 2 versions: PA1026 for 24V Operation: PA1025 for 12V Operation (refer to LT0363 for instructions).

Operation

Mini-Gen Mk2 has two control inputs (ALERT– , SYNCH–) suitable for internal panel connection only. It illuminates its green "ON" LED and generates the selected speech/tone combination whenever power is applied to the DC IN terminals. With power reversed it draws no current.
Signal/tone selection is by fitting 4 mini-jumpers in various combinations to pins C to G, allowing a variety of options. The tone selection jumpers may be changed while Mini-Gen Mk2 is running and the new selection will take effect at the end of the tone cycle in progress.
Up to five Mini-Gen Mk2s may be synchronised by linking their SYNCH– terminals.
If the 100V line is over-loaded (e.g. short circuit), Mini-Gen will stop generating the warning signal and illuminate its yellow LED until the overload is removed.

Connection and Fault Monitoring

The simplest method of connection is 2-wires in, 2-wires out. This is ideal for unsupervised alarm system outputs, e.g. retrofits, and those supervised by polarity reversal (FP4000, F3200 Bells, Bell Monitor Board, *MX1* Anc3). For these the 2-W jumper must be fitted. Refer to Fig 1.

Removing the 2-W jumper allows use of the dedicated Supervision terminal on Mini-Gen Mk2 for a 4-wires in, 2-wires out supervised connection to a panel with clean relay contacts and a separate supervision input (as with F08 Ancillary, F3200 Anc 1 & 2, 8RM, F4000 Ancil, ARR, *MX1* Anc3). Refer to Fig 2.

The fire alarm panel supervises the 100V speaker line while the output is not active. Capacitively coupled 100V line speakers must be used, and the appropriate end-of-line resistor (EOLR) must be installed at the end of the speaker run and sometimes at the input to the Mini-Gen itself. The speaker circuit end-of-line resistor must be capable of handling 100Vrms. For values below 27k this will need to be a higher power device. Note that the power dissipated by the end-of-line resistor must be included in the output power loading (e.g. a 10k EOL resistor dissipates 1 Watt).

The capacitors must be bipolar, rated at 10V minimum, and their value should be 1 - 5uF per Watt of their speaker's load (see Table 1). Higher values may be used, but this will increase the Fault delay after turnoff.

Table 1 – Recommended Capacitor Values for 100V Speaker Line

Speaker Load	0.33W – 0.5W	1W - 5W	10W - 20W
Recommended Capacitor	1uf Bipolar	10uF Bipolar	33uF Bipolar

Due to the charge time of the blocking capacitor at each speaker, a supervision defect/fault condition may occur on some panels each time Mini-Gen is de-activated (e.g. after a test). This will clear and can be reset after a few seconds. A label to this effect is included to stick in the panel as a reminder.

For FP4000, Bell Monitor Board, *MX1* Anc3 and F3200 Bells, which provide supervision of up to three branches, Table 2 shows the combinations possible. Fit the 2-W Supervision link on the Mini-Gen. Where an EOLR is fitted to the Mini-Gen it is fitted to the DC Looping terminals of the last unit (i.e. furthest from panel). Refer to Fig 1. For F3200 Bells the EOLR is 10k. For FP4000, *MX1* Anc3 and Bell Monitor Board the EOLR is 27k.

Table 2 - Branch Supervision

Number of Mini-Gen Mk2s	Number Spkr Line Branches per unit	DC Terminals		EOLR on each Branch	
		F3200	Bell Monitor/ *MX1*	F3200	Bell Monitor/ *MX1*
1	1	2 x 10k	2 x 27k	10k	27k
1	2	10k	27k	10k	27k
1	3	-	-	10k	27k
2	1	10k	27k	10k	27k
2	1 & 2 (3 total)	-	-	10k	27k
3	1	-	-	10k	27k

For more than 3 branches, multiple Bell Monitor Bds can be used, but check total loading of relays and fuses.

The Mini-Gen Mk2 has a high inrush current, so should be powered via a relay of at least 5A rating. Where a 2A relay is used, a 1Ω 2W series resistor must be placed in the +24V feed – see R1/R2 in Figures 1, 2 and 3.

Synchronised Operation

Up to 5 Mini-Gen Mk2s may be synchronised provided that the Mini-Gens and their controlling fire panel share a common 0V connection. Wire the SYNCH– terminals on each Mini-Gen together as shown in Fig 1. The signal/tone selection must be the same on all Mini-Gens and, if used, the ALERT– signal must be wired to all Mini-Gens.

Alert/Evac Switching

With some signal options the Mini-Gen Mk2 can optionally be switched from Evac mode to Alert mode by the fire panel switching the ALERT– input of the Mini-Gens to their –DC IN terminal by means of a co-located relay (refer to Fig 1). Refer to Table 4 to see which selections this applies to. On panels that permanently connect their Bells– to 0V (e.g. *MX1*) an open collector output can be used to drive ALERT– .

100V Speaker Line Wiring

The 100V line wiring is not SELV, and so must be segregated as per the appropriate wiring regulations. Note also the line capacitance limits - Mini-Gen Mk2 is not designed for driving very long lines. Full 20W output loading is only permitted on lines less than 1.5km of total cable length (TPS). Shorter distances will apply to highly capacitive cable (e.g. MIMS) - consult the cable manufacturer's specifications.

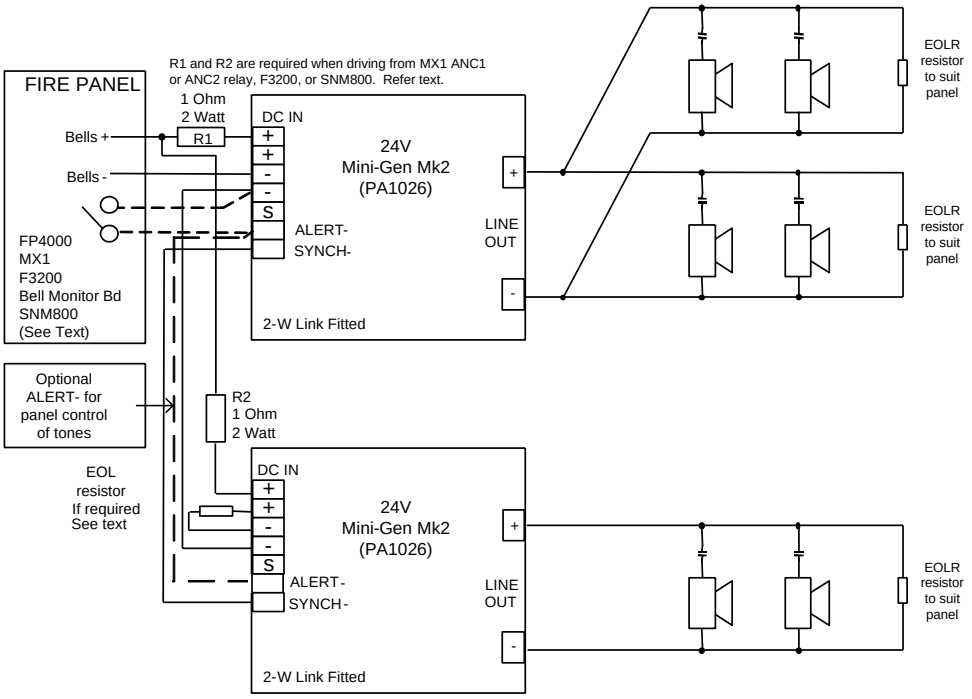

Fig 1
Example of Multiple Branches on Fire Panel with Bell 3 Branch Supervision

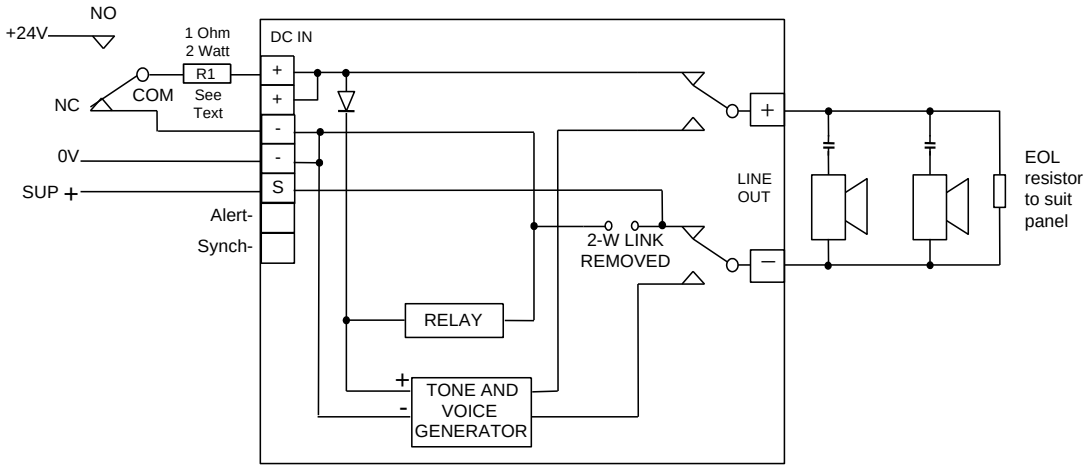

Fig 2
Mini-Gen Mk2 Connection With Separate Supervision (single pole / 4 wire)

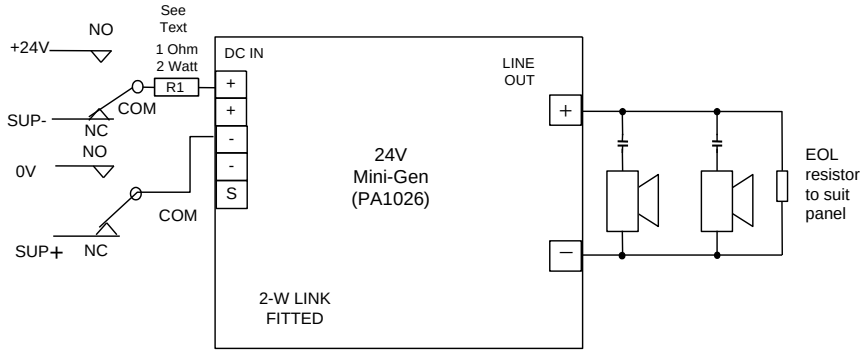

Fig 3
Mini-Gen Mk2 Connection for Two Pole Relay With Integral Supervision (2 Pole/2 Wire)

Fire Panel Connections

(Refer to Figures 1, 2 and 3)

MX1

Ancillary 3 Relay has integral supervision which supports 3 branches with 27k EOLRs. See Fig 1 and Table 2, noting that the 27k value applies. On *MX1*, Bells/Evac- is 0V, Bells/Evac+ is the COM terminal of ANC3, ANC3 NC is connected to SUP and NO is connected to +VBF.

The EOLR across the DC In terminals is in parallel with those across the speaker circuits, and any 27k EOLR connected to a 100V line must be rated at least 0.5 watts. If only one Mini-Gen is being used, fit 2 x 27k resistors in parallel across DC In. Since each EOLR on the speaker line dissipates 0.4W of power, this must be included when calculating the total load.

The 1 ohm resistors R1 (and R2) shown in the power feed in Figures 1, 2, and 3 are not required when using Ancillary Relay 3.

Ancillary Relay 1 or 2 can be used to drive a single Mini-Gen, with the Supervision connected as per Fig 2. The ALERT- input of the Mini-Gen can be driven using the GP1 OUT or GP2 OUT open-collector outputs of the *MX1*, if required.

Connect the relay NO to +24V supply, NC to Mini-Gen DC IN -ve, COM to Mini-Gen DC IN +ve, and 0V supply to the second DC IN -ve.
Connect Anc SUP to SUP+ on Mini-Gen.
Remove the 2-W Supervision link on the Mini-Gen.
Use a 15k, 2W EOLR at the end of the 100V line (dissipates 0.66W).

Only 1 Mini-Gen with one speaker line is allowed.

The 1 ohm resistor R1 shown in the power feed in Figure 2 **is required** when using Ancillary Relay 1 or 2.

SNM800 MX Addressable Module

An SNM800 can be used to drive a single Mini-Gen Mk2 (follow Fig 1 substituting SNM800 terminals S+ for Bells+ and S- for Bell-).
A single speaker branch is allowed using a 27K ohm (0.5W) EOLR. Supervision of the speaker line is performed by the SNM800.
An external 24V supply is required to power the Mini-Gen Mk2 (via the SNM800). The SNM800 supervises this for low voltage.
If control of the Mini-Gen Mk2 ALERT- input is required, an RIM800 module could be used.

The 1 ohm resistor R1 shown in the power feed in Figure 1 **is required**.

MX4428/F4000

Main Board

A single Mini-Gen can be driven by the single pole Ancil Relay. Connect the relay and Ancil supervision as per Fig 2.

- Cut the link on the MX4428/F4000 Main Board which connects Ancil Supervision to Ancil COM (i.e., disconnect).
- Remove the 2-Wire Supervision link on the Mini-Gen.
- Use a 15k 2W EOLR on the end of the 100V line (dissipates 0.66W).

Only 1 Mini-Gen with one speaker line is allowed.
The 1 ohm resistor R1 shown in the power feed in Figure 2 **is required**.

Alternatively, a 24V Bell Monitor Bd (PA0494) can be used to connect up to 3 branches of speaker lines as per Fig 1 and Table 2. Refer to LT0126, F4000 NZ Technical Manual Section 2.4.2, or LT0070 F4000 Installation Manual, Section 2.6.1.1. The 1 ohm resistor R1 shown in the power feed in Figure 2 is not required.

RRM

Use two relays of an RRM with both programmed to operate together. (Similar to Fig 3, but with the RRM having link selectable integral positive voltage supervision to the COM of each relay.) The amount of power drawn from the RRM +24V terminals is limited to 100mA max and by the loop restrictions. This is little more than Mini-Gen's active power with no load, and so is not a practical option.
Where more power is needed an external 24V PSU is required (with a back-up battery and supervision depending on the application). If using the Fire Panel +24V run both +ve and -ve and do not short out part of the responder loop.

- Connect the NO of one relay to 0V supply (PSU -ve), COM to Mini-Gen DC IN –ve, and program this relay for supervision but do **not** fit the link. Use the 3 way housing and crimp terminal supplied to connect the 'S' end pin of the 3 way header on the RRM to the S input terminal on the Mini-Gen.
- Connect the NO of the other relay to +24V supply, NC to RRM 0V, COM to Mini-Gen DC IN +ve, and select this relay as un-supervised.
- Do **not** fit the 2-W Supervision link on the Mini-Gen. Use a 15k 2W EOLR at the end of the 100V line (dissipates 0.66W).

Only one Mini-Gen with one speaker line is allowed. The 1 ohm resistors R1/R2 shown in Figures 1-3 **are required**.

IOR
Use of an IOR to control and supervise the Mini-Gen Mk2 is not recommended as the IOR's input supervision can cause low level clicking in the loud speakers.

MXP
An SNM800 can be used to control the Mini-Gen Mk2. Refer *MX1*/SNM800 above for details. The 1 ohm resistors R1/R2 shown in Figures 1-3 **are required**.

F3200
MAF/PSU Relays
The **Bells** relay has integral supervision which supports 3 branches with 10k EOLRs.
See Fig 1 and Table 2, noting that the 10k value applies, the EOLR across the DC In terminals is in parallel with those across the speaker circuits, and that any 10k EOLR connected to the 100V line must be rated at 2 Watts. If only one Mini-Gen is being used, fit 2 x 10k resistors in parallel across DC In. Note also that each EOLR on a speaker line dissipates 1 Watt of power, which must be included when calculating the total load. The 1 ohm resistors R1/R2 shown in Figures 1-3 **are required**.

Ancillary 1 or **2** relays can also be used, with the Supervision connected as per Fig 2.
- Connect the relay NO to +24V supply, NC to Mini-Gen DC IN -ve, COM to Mini-Gen DC IN +ve, and 0V supply to the second DC IN -ve.
- Connect Anc SUP to SUP+ on Mini-Gen.
- Remove the 2-W Supervision link on the Mini-Gen.
- Use a 15k, 2W EOLR at the end of the 100V line (dissipates 0.66W).

Only 1 Mini-Gen with one speaker line is allowed. The 1 ohm resistors R1/R2 shown in Figures 1-3 **are required**.

8 Relay Module (8RM)
Use two relays of an 8RM programmed to operate together. (Similar to Fig 3, but with the module having integral positive voltage supervision to the COM of each relay, link selectable). Alternatively you could fit a 3 way 5mm (or 0.2") pitch connector to the second pole of one relay. Parts CN0260 & CN0488 form a suitable, demountable pair. (Each relay has 2 poles, but only 1 set of connectors is fitted as standard). One Mini-Gen with one or two branches of speaker wiring, or two Mini-Gens with one branch each, are allowed.
- Connect the NO of one relay to 0V supply, COM to Mini-Gen DC IN -ve.
- Connect the NO of the other relay to +24V supply, NC to 0V, COM to Mini-Gen +ve.
- Select supervision on the relay connected to Mini-Gen DC IN -ve only (i.e., fit link in S position).
- Fit the 2-W Supervision link on the Mini-Gen.
- Use a 27k EOLR at the end of each 100V line, and one across the spare DC IN + and – terminals if there is only one Mini-Gen and one branch.
- The 1 ohm resistors R1/R2 shown in Figures 1-3 **are required**.

Alternatively, the single pole of one relay can be used and connection made directly to the supervision input on the 3 way Supervised / Un-supervised (S/U) link. Refer to Fig 2. Remove the supervision jumper altogether, plug a single connector onto the pin furthest from the screw terminals and wire this to the SUP+ terminal of the Mini-Gen. Do not bridge the two 'S' pins on the 3 way link. (A suitable 3-way housing is supplied with two crimp terminals, but requires an appropriate crimp tool and 0.1 - 0.35sqmm wire. Fit the spare terminal to the other end to help hold it on).
Remove the 2-W Supervision link on the Mini-Gen. Use 2 x 27k EOLs – one at the end of the 100V line and the other across the Line Out + and – terminals of the Mini-Gen. Only 1 Mini-Gen is allowed. The 1 ohm resistors R1/R2 shown in Figures 1-3 **are required**.

F08
Ancillary Relay
A single Mini-Gen can be driven by the single pole Ancil Relay. Connect the relay and Ancil supervision as per Fig 2.
- Remove the 2-W Supervision link on the Mini-Gen.
- Use a 15k 2W EOLR at the end of the 100V line (dissipates 0.66W).

Only 1 Mini-Gen with one speaker line is allowed. The 1 ohm resistors R1/R2 shown in Figures 1-3 **are required**.

A **24V Bell Monitor Bd** (PA0494) driven from the Bells relay can be used to connect up to 3 branches of speaker line as per Fig 1 and Table 2. Refer to LT0082, F08 Programming And Installation Manual Section 2.8.2.

BELL MONITOR BOARD
A 24V Bell Monitor Bd (PA0494) can be used to connect up to 3 branches of speaker line as per Fig 1 and Table 2. It is suitable for use with panels with a DEF- (Defect/Fault) input. (Refer to LT0190 Bell Monitor Data Sheet for details.) The 1 ohm resistors R1/R2 shown in Figures 1-3 are not required.

FP4000
Main Board
The **Evac** output can be used to connect up to 3 branches of speaker line as per Fig 1 and Table 2. The 1 ohm resistors R1/R2 shown in Figures 1-3 are not required.

ARR
Use two relays of an ARR to connect a single 24V Mini-Gen.
Refer to the FP4000 System Manual Section 4.3.4.2 for ARR configuration and programming.
Use a 15k 2W EOLR at the end of the 100V line (dissipates 0.66W). Fit the 2-Wire Supervision link on the Mini-Gen.
Only 1 Mini-Gen with one speaker line is allowed. The 1 ohm resistors R1/R2 shown in Figures 1-3 **are required**.

Signal Descriptions and Features

Table 3 - Signal Tone & Message Descriptions

Signal	Speech Message Included in Tone	
	NZ	Aust
AS 2220/NZS 4512 ALERT (MODIFIED)	16 seconds of alert tone, then "Warning, the fire alarm system has operated. Stand by for further instructions."	16 seconds of alert tone, then "Warning, the fire alarm system has operated. Stand by for further instructions."
AS 2220/NZS 4512 EVAC	16 seconds of evacuate tone, then "Evacuate the building using the nearest fire exit"	16 seconds of evacuate tone, then: "Evacuate as directed" (x2)
ISO 8201 ALERT	8 seconds of alert tone, then: "Warning, the fire alarm has operated. Stand by for further instructions."	8 seconds of alert tone, then: "Warning, the fire alarm system has operated. Stand by for further instructions."
ISO 8201 EVAC	8 seconds of T3 tone and keywords (as per Aust), then: "Evacuate the building using the nearest fire exit".	8 seconds of T3 temporal tone with "Emergency" and "Evacuate Now" keywords interspersed, then: "Evacuate as directed" (x2)
Bell	Continuous bell signal	Continuous bell signal
RH3	RH3 sound. No speech.	-----
1 min/3 min Changeover	Automatic changeover from Alert signal to Evac signal after the specified time.	

- In NZ mode the Alert tone does not have a soft start amplitude escalation. In Aust mode, soft start intervals are included, but are less than the full AS 2220 specification of 10dB.

Signal Tone Selection Jumper Settings

Table 4 – Tone Selection

N=link not fitted F=link fitted

Jumpers	CDE	CDE	CDE	CDE	CDE	CDE	CDE	CDE
FG	**NNN**	**NNF**	**NFN**	**NFF**	**FNN**	**FNF**	**FFN**	**FFF**
NN	NZ Speech AS 2220*	NZ Speech AS 2220 1 min changeover	Aust Speech AS 2220*	Aust Speech AS 2220 1 min changeover	Tone Only AS 2220*	Tone Only AS 2220 1 min changeover	Reserved for future use	Reserved for future use
NF	NZ Speech ISO 8201*	NZ Speech ISO 8201 1 min changeover	Aust Speech ISO 8201*	Aust Speech ISO 8201 1 min changeover	Tone Only ISO 8201*	Tone Only ISO 8201 1 min changeover	Reserved for future use	Reserved for future use
FN	Bell if ALERT– AS 2220 NZ Evac Speech otherwise	NZ Speech AS 2220 3 min changeover	Bell if ALERT– AS 2220 Aust Evac Speech otherwise	Aust Speech AS 2220 3 min changeover	Reserved for future use	Tone Only AS 2220 3 min changeover	Reserved for future use	Reserved for future use
FF	Bell if ALERT– RH3 otherwise	NZ Speech ISO 8201 3 min changeover	Bell if ALERT– Aust Speech ISO 8201 otherwise	Aust Speech ISO 8201 3 min changeover	Reserved for future use	Tone Only ISO 8201 3 min changeover	Reserved for future use	DO NOT USE (factory test mode)

* = Pulling ALERT– input low selects Alert signal.

Table 5 – General Function of Each Jumper

Link	General Function of Each Jumper (not fitted/fitted)
C	Speech/ No Speech
D	NZ/Aust Messages
E	No Changeover/ Changeover
F	1 min/3 min changeover or Standard/ Non-standard
G	AS 2220/ISO 8201 or Bell & AS 2220/Bell & RH3

Notes; the user must always refer to Table 4 for signal tone/speech message selection. The general functions of Table 5 are an indication of operation only, and do not apply in some combinations. If Link E (changeover) is not fitted, the "ALERT –" input state generally determines whether the tone is ALERT (input shorted to 0V) or EVAC (input left open).

Changing any of the jumper settings in change-over modes causes the change-over timer to reset completely and start from the beginning (even if it has reached the evacuate phase).

WARNINGS

Jumper links are unprotected inputs. Use only a local relay if switching, and use anti-static procedures when changing by hand.

Some components on Mini-Gen Mk2 will get hot when it has been running for a time into a heavy load, especially if a long line is used. This applies mainly to the transformer, which should therefore not be touched.

The loading must not exceed the fuse rating and the relay rating of the fire panel.

On power-up Mini-Gen Mk2 checks the contents of its speech message memory. If it finds the memory corrupt, it runs in tone-only modes and flashes the Overload LED (yellow) at 0.5Hz (i.e. 1 second on, 1 second off).

Inrush Current
The Mini-Gen has a capacitor connected across its power input terminals. When power is applied to the Mini-Gen a high inrush current flows to charge this capacitor. When the Mini-Gen is controlled by a 2A relay, be sure to include the resistors R1 / R2 as shown in Figures 1, 2, and 3, to prevent the relay from sticking due to welding of its contacts.

Earthing
Generally, earthing of the Mini-Gen should not be required. Provision has been made for earthing via two of the mounting holes, if required, for a specific application.

Mini-Gen Mk2 Specifications (PA1026)

Board Dimensions:	93mm x 67mm. Height 36mm from bottom of pcb.
Mounting Holes:	4 x Ø4.0 holes at 83mm x 57mm, 4 x 10mm high plastic standoffs supplied with Mini-Gen for fitting in Ø6.35 holes, drilled in 0.8-1.6mm thick sheet metal. Also 4 x 7mm high standoffs supplied with Mini-Gen for fitting in Ø4.8 holes.
Shipping Weight:	0.25kg.
Temperature:	Operating 0^0C – 45^0C Storage 0^0C – 70^0C.
Humidity:	0% to 95% RH (non-condensing).
Operating Voltage:	18-29Vdc.
Operating Current:	1.2A @ 27Vdc with 20W load.
Non-operating Current:	Nil.
Power Output:	20Wrms @ 100V line at 27Vdc, 150nF line capacitance (1.5km maximum of TPS). 15Wrms @ 100V line at 27Vdc, 200nF line capacitance (2km maximum of TPS). Power reduces with reduction of input voltage.
Overload:	Automatic shutdown at 180% nominal overload.
Indicators:	On (Green), Overload (Yellow). Overload also used for speech memory fault (flashing).
Supervision Links:	Select 2-wire or 4-wire input supervision (link 2-W).
Signal/Tone Selection:	Mini-jumper links (31 combinations using 5 links possible. See Tables 4 & 5).
Signal/Tone Specifications:	Refer to Table 4.
Recorded Messages:	Refer to Table 4.
Inputs:	ALERT– : Pull below 1.2V (@ 1.3mA) to select Alert signal in preference to Evac signals. SYNCH– : Synchronises signals between up to 5 Mini-Gens.

Mounting Provisions in Other Products

MX1: There are four Mini-Gen footprints in each *MX1* 15U gear plate. These footprints have Ø4.8 holes for fitting double clip plastic PCB standoffs, HW0052, that are supplied with the 24V Mini-Gen.

Accessories included with PA1026

PART NO	DESCRIPTION	QTY	WHERE USED
CN0313	0.1" Connector Housing, 3 Way	1	F3200 8RM Supervision, or F4000 RRM
CN0249	Crimp Terminal for above	2	F3200 8RM Supervision, or F4000 RRM
HW0130	PBR10 PCB Standoff	4	For mounting Mini-Gen in Ø6.35mm holes
LB0565	Warning Label	1	Fit to panel door if required
RR0234	15k 2W resistor	2	EOLR for MX4428/F4000 Main Board Ancil, IOR, FP4000 ARR
RR0762	27k0 1% resistor	3	EOLR for Bell Monitor Bd, FP4000 Evac, *MX1* ANC3
RR0839	10k 2W resistor	3	EOLR for F3200 Bells
RR0201	1 Ohm 2W resistor	1	When driving from relays rated at 2A
CN0123	PCB jumper links	3	Signal Tone selection
HW0052	Plastic Standoff	4	Mounting Mini-Gen on *MX1* Gear Plate. (4.8mm Φ holes)

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