PERTRONIC INDUSTRIES

INSTALLATION DATASHEET
Emergency Telephone System
ETS

Overview

The Pertronic Emergency Telephone System (ETS) is a self-contained, fully protected telephone system for the exclusive use of fire-fighters. The system provides party-call communication between fire-fighters. It is intended for facilities in which the emergency services radio communication system is likely to experience difficulties, or as otherwise specified by the local fire authority.

The ETS consists of an ETS Master Controller, up to 100 ETS Isolating Jack-Points located throughout the facility, and a set of up to ten portable ETS Handsets. A purpose-built lockable cabinet with shelf space for up to ten Pertronic ETS Handsets is also available.

The ETS Master Controller has a built-in backup battery. It will continue to function if all other telephones or electrical systems fail. The battery and system wiring are supervised for faults.

Short-circuit isolators are built in to every jack-point, and to the loop terminals on the master controller. A single wiring fault (open or short circuit) will not affect the operation of any handset in the system.

Pertronic Emergency Telephone System Master Controller

Advantages of the Pertronic system include excellent audio quality, battery condition monitoring, fault tolerance due to the presence of a short-circuit isolator in each jack-point, and automatic recovery from fault isolation.

System Features

- Excellent audio quality when wired with twisted-pair cable
- Fault tolerant: The system is fully operational with a single short-circuit or open-circuit cable fault
- Operates over a loop of twisted pair cable, with both ends connected to the Master unit
- Automatic recovery when the fault condition is resolved
- Up to 100 Jack-Points, 10 Handsets
- Separate terminals for Loop-Out and Loop-Return connections
- Daily automatic battery capacity check
- Automatic battery present test performed every ten seconds
- Historic fault indication
- External DC supply input, for external battery-backed power supply
- Complies with Melbourne MFB Guideline GL-01, v.6: *The Installation of MFB Emergency Telephone and Leaky Cable Communication Systems*.

Emergency Telephone System Components

Master Controller

- Metal wall-mount cabinet
- Internal backup battery
- Power supply supervision
- Battery supervision (missing battery and low voltage)
- Wiring supervision – open and short circuit faults
- Audible (buzzer) and visible (LED) fault indications
- External supervisory fault relay output (clean contact, form C)
- Detailed internal fault indication

Handset

- Mounted in metal carry box with carry strap
- Compact and lightweight (1.4kg)

Jack-Point

- Automatic short-circuit detection and isolation
- Fits Australian and New Zealand industry-standard fire-rated electrical single flush-boxes
- May be installed in third-party surface-mount boxes
- Loud internal ringer (70 dBA @ 1 metre)
- Call button to alert other users
- External indication of isolator activation
- Symmetrical loop interface with two interchangeable LOOP connections

Phone Storage Cabinet

- Powder-coated steel construction
- Five shelves with room for ten ETS Handsets
- Clear polycarbonate window
- Standard firefighter's key lock

Pertronic Emergency Telephone System Handset with Carry Box

Emergency Telephone System Isolating Jack-Point, featuring built-in fault detection and short-circuit isolation.

Pertronic Emergency Telephone System Phone Storage Cabinet

System Description

Master Controller

The master controller consists of a powder-coated steel cabinet containing the master controller board, mains power supply, internal mains switch, and 12-volt sealed lead-acid battery.

A front-panel PHONE jack socket allows a Pertronic ETS Handset to be plugged in to the master controller. A momentary press button (labelled “CALL”) on the front panel activates the ring tone at any remote jack-point that has a plugged-in handset.

The front panel also has three LED indicators.

The master controller board drives both ends of the ETS loop circuit via the LOOP OUT and LOOP RETURN connector (K6). The LOOP OUT and LOOP RETURN connections have self-resetting short-circuit isolators, ensuring that a short-circuit fault on one loop segment does not affect the operation of the other.

The Pertronic ETS operates over a two-wire loop circuit. Loop power is transmitted over the same pair of wires that carry audio and system control signals. Power for the loop circuit is provided by an isolated dc boost converter in the master controller.

Pertronic Emergency Telephone System Master Controller, including master controller board, mains power switch, and battery

Loop Architecture

The Pertronic ETS system is connected as a fault-tolerant bi-directional loop comprising one ETS Master Controller and up to 100 ETS Isolating Jack-Points. Each loop segment is wired with two-core twisted-pair copper cable.

Each jack-point forms a junction between two adjacent loop segments. The jack-point’s LOOP connectors provide a separate set of screw terminals for each loop segment. This configuration allows the ETS fault supervision system to report an open-circuit fault if any conductor on either segment becomes detached from the screw terminal.

Inside the jack-point, the two LOOP terminals are connected to each other via two multi-pole isolators. The jack-point’s wiring supervision system continuously monitors each loop segment for faults. If a short-circuit fault is detected in either segment, the supervision system opens the corresponding isolator, disconnecting the faulty segment.

In the case of a short-circuit fault on one loop segment only, the ETS continues to function. The jack-points at each end of the faulty segment automatically disconnect themselves from the faulty segment. These two jack-points are able to communicate with the master controller and all other jack-points via the unaffected loop segments. A handset plugged in to any jack-point is able to communicate with a handset plugged into any other jack-point, or the PHONE jack socket on the master controller.

Audible Signalling

Ring Tone

To initiate the ring tone

- Plug a handset into any jack-point, or the master controller
- Lift the receiver off-hook
- Press the CALL button

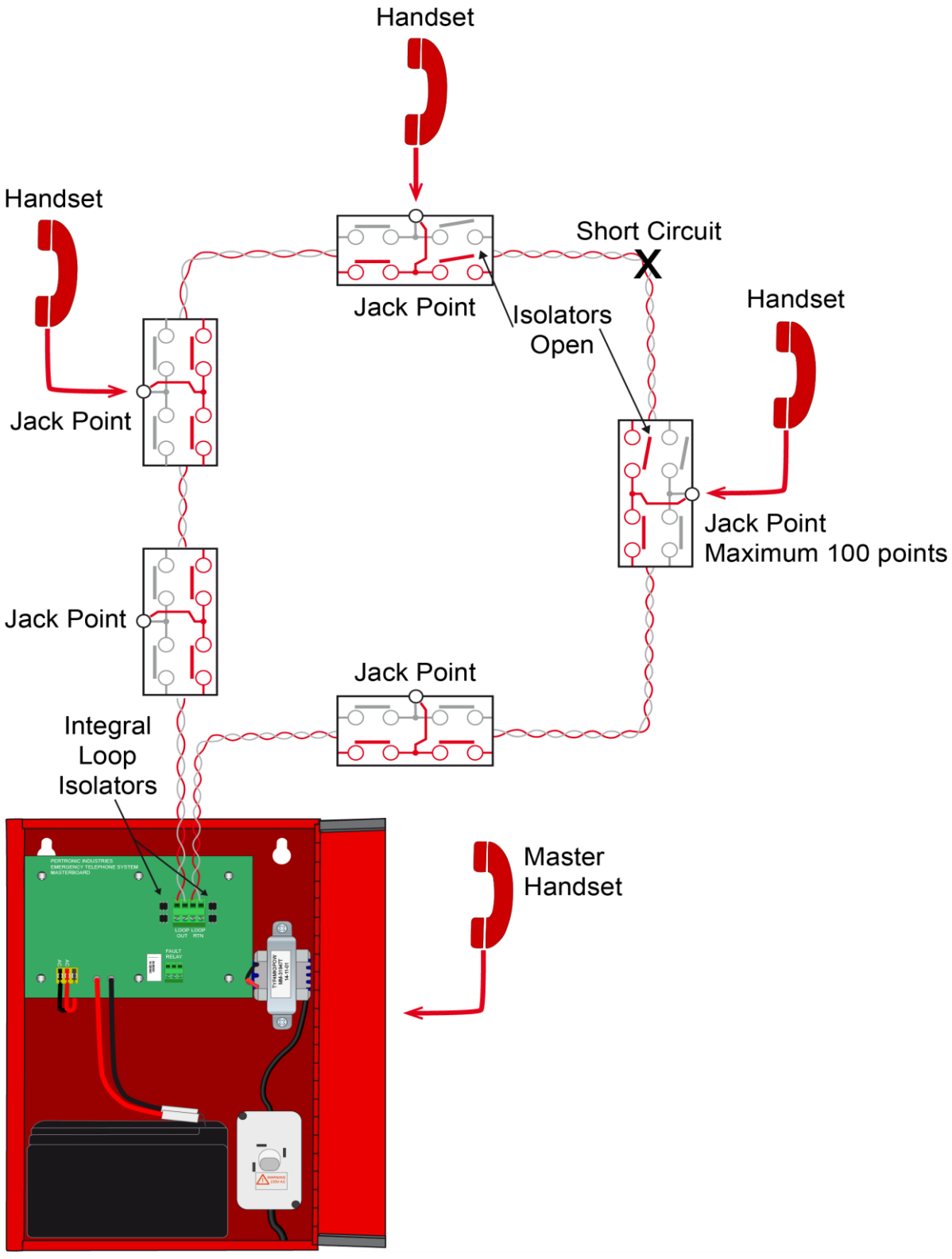
The audible ring tone will be broadcast from the master controller, and from every jack-point with a plugged-in handset (irrespective of whether the handset is on or off-hook).

Fault Tone

The audible fault tone is broadcast from the master controller whenever a fault condition is present. The fault tone can be muted by pressing the master controller CALL button. It will remain muted until a new fault condition occurs (this includes the muted fault condition being cleared and then re-occurring).

The fault tone is automatically muted if the master controller handset is lifted off-hook.

Wiring Diagram



NOTES

1. The ETS Jack-Point has two loop cable connectors (K2 and K3). Either loop segment may be connected to K2 or K3. However, only one segment may be connected to each connector, and the cable polarity must match the polarity marked on the jack-point PCB.

2. We strongly recommend Emergency Telephone System cabling should be adequately protected against mechanical or fire damage, as required by FRV Guideline GL-01, v.6.

Specification

Master Controller

Capacity	Up to 100 jack-points Up to ten handsets
Supply Voltage	230 V ac
External DC Supply	18 to 30 V dc, 2 A (battery back-up recommended)
Loop Voltage	30 ±3 V dc output. Generated by a boost converter on the master controller board
Audible Ring Tone	3500 Hz (approx.): On for 300 ms; Off for 300 ms. Minimum 5 cycles Continues while CALL button held down
Audible Fault Tone	450 Hz: On for 150 ms; Off for 150 ms. Minimum 1 cycle Continues until muted or fault cleared
Fault Relay	1 x clean contact form C (changeover), 2 A @ 30 V dc resistive load
Battery Capacity	The following battery sizes should be used when it is required to have 24 hours standby time, followed by 30 minutes of full operation with handsets: Up to 35 Jack Points 7 Ah Up to 60 Jack Points 9 Ah Up to 100 Jack Points 12.5 Ah* *will not fit in the cabinet For larger systems, an external, battery protected power supply can be used in place of an internal battery. In this case, the “DISABLE BATTERY CHECK” jumper on the Master board should be fitted.
Cabinet Dimensions:	350 mm (H) x 245 mm (W) x 80 mm (D)

Handset

Connecting Cable	1.5 m long with 6.35 mm (¼″) phone jack
Dimensions	280 mm (W) x 100 mm (D) x 80 mm (H)
Weight	1.4 kg

Jack-Point

Audible Ring Tone	3500 Hz (approx.): Same pattern as ETS Master Controller	
Terminal Blocks	Two (2 x LOOP, interchangeable)	
Isolating Action	A short-circuit fault located between any two jack-points will result in electrical disconnection of the affected wiring segment. The bi-directional loop architecture provides an alternative path between the jack-points, ensuring that a single fault does not affect system operation. The affected segment is automatically reconnected if the fault clears.	
Dimensions	118 mm (H) x 75 mm (W) x 15 mm (D)	(excluding flush-box)

Phone Storage Cabinet

Capacity		10 x Emergency Telephone System Portable Handsets
Dimensions		615 x mm (H) x 320 mm (W) x 330 mm (D) + 5mm forward protrusion (lock)
Weight		12.8 kg
Material	Cabinet	Power-Coated Steel
	Window	Polycarbonate
Colour		Flame Red (Pantone 484, RAL3000, Dulux 288 4155G)

Maximum System Capacity

The Pertronic ETS supports a maximum end-to-end loop length as per the following table, when wired with 1.5 mm², 2-core twisted cable (FireSense FR-1.50-2CW)

Loop Length (m)	Maximum Number of Jack Points
2000	20
1800	40
1500	70
1300	100

Functional Description

Normal Operation

The Pertronic Emergency Telephone System is used by fire-fighters responding to an alarm incident.

The ETS Master Controller, and the locked handset cabinet, are usually located near the facility's fire indicator panel. Fire-fighters are able to open the handset cabinet using the standard fire-fighter's key (code 003). A list of installed ETS Isolating Jack-Points and their locations is located near the ETS Master Controller.

To establish communication, a fire-fighter plugs an ETS Handset in to any ETS Isolating Jack-Point, or to the ETS Master Controller. The fire-fighter can then use the CALL button to call any of their colleagues who are within audible range of the ETS Master Controller, or a jack-point with a plugged-in handset.

Indicator LEDs

Master Controller Front Panel Indicators

Indicator	Colour	Action	Function
Normal	Green	Blinking	Indicates SYSTEM NORMAL. This indicator is extinguished when the FAULT indicator lights up.
Fault	Yellow	Blinking	Indicates that the supervisory system is detecting at least one FAULT.
Call	Red	Steady	A CALL signal is present on the loop (That is, someone is pressing an active CALL button.)

Note: The front panel FAULT indicator does not show historic fault conditions.

Master Controller Board Indicators

The ETS Master Controller Board has ten indicator LEDs. These are provided for maintenance and diagnostics, and are not visible when the front panel is closed.

Indicator	Colour	Action	Function
Normal	Green	Blinking	Same function as front panel NORMAL indicator
Power In	Green	Steady	Rectified mains power is present
12V	Green	Steady	Indicates the system has 12 Volt dc power, either from the charger output (from the mains supply) or from the battery.
Loop Power	Green	Steady	Power is available from the boost converter to power the loop.
Call	Red	Steady	Same function as front panel CALL indicator
S/C - Loop Out	Yellow	Steady	A short-circuit fault is present on the LOOP OUT segment. The associated isolator on the ETS Master Controller Board has isolated this loop segment.
S/C - Loop Rtn	Yellow	Steady	A short-circuit fault is present on the LOOP RETURN segment. The associated isolator on the ETS Master Controller Board has isolated this loop segment.
Supply Fault, Battery Fault, Wiring Fault	Yellow Yellow Yellow	Steady or Blinking	Continuous illumination ("Steady") indicates an existing (current) fault condition. Intermittent illumination ("Blinking") indicates that a fault condition occurred in the past (historic), and has now cleared. Historic fault indications can cleared by pressing the RESET button on the ETS Master Controller Board. The WIRING FAULT indicator lights up if either of the S/C indicators light up, or if a loop open circuit fault is detected.

Jack-Point Indicators

Four indicator LEDs are mounted on the jack-point board.

Indicator	Colour	Location	Function
Operating	Green	Visible only when the jack-point is removed from its mounting to access the PCB	Blinks every 5 seconds to indicate that the ETS Isolating Jack-Point has power and is functioning normally. The blink rate increases when an ETS Handset is plugged in.
S/C x 2	Yellow	Visible only when the jack-point is removed from its mounting to access the PCB.	The two S/C LEDs are located adjacent to the connectors and indicate that a short circuit has been detected between that connector and the next ETS Isolating Jack-Point. The associated isolator has disconnected that loop segment.
Jack	Yellow	Shines through the inside of the PHONE jack socket. Visible from outside the jack-point.	Whenever one or other S/C indicator lights up, the JACK LED also lights up. This LED shines through the inside of the phone jack socket. This is intended as a trouble-finding aid for service technicians. When a loop fault is present, the jack-points at each end of the affected segment are easily identified, because the inside of their phone jack sockets are lit up.

Master Controller Startup Sequence

When the ETS Master Controller is first powered up, or when it is reset, the indicators go through the following sequence:

The NORMAL and CALL LEDs, and the five fault LEDs, briefly illuminate. This allows service personnel to check that the indicators are operational.

The internal and external NORMAL LEDs, and the front panel FAULT LED, flash in sync (one second on, one second off) for a period of time, indicating that the system is stabilising. During this period, the jack-points will be powering up. The loop will appear to be an open circuit until all jack-points have powered up and connected their isolators.

The system will either:

- Illuminate the internal and external NORMAL indicators if the system has successfully started up, or
- Illuminate the appropriate FAULT indicators if a fault condition is detected.

Automatic Fault Recovery

The ETS detects and responds to any short-circuit fault within 250ms.

The supervisory system checks the loop every 30 seconds to determine if an open-circuit fault exists and updates the fault status accordingly.

Loop checking is suspended whenever a handset plugged in to the Master unit is picked up, and resumes 5 seconds after this “Master Handset” is replaced.

Technical Tip

When diagnosing a fault, you can trigger a wiring test by plugging an ETS handset into the Master unit, then lifting and replacing this handset.

Ordering Information

Product Code	Description
ETS-M	Emergency Telephone System Master
ETS-IJP	Emergency Telephone System Isolating Jack-Point
ETS-PH	Emergency Telephone System Portable Handset
ETS-PHCAB	ETS Phone Storage Cabinet, Red