NOTIFIER®
by Honeywell

Emergency Warning System
ECS-16
Installation Manual
Australia Edition

Document DOC-01-41 Rev: A
22/09/2023

C- 1- 1

ECS-16
EMERGENCY WARNING SYSTEM

INSTALLATION MANUAL

ECS-16
Emergency Warning System
Installation Manual

DOCUMENT: DOC-01-041
Issue 1.0 13 June 2023

END USER LIABILITY DISCLAIMER

Some of the operation of ECS-16 Emergency Warning System as described in this manual is dependent on site-specific configuration performed by the field engineer. If the configuration is not well-designed, then operation may differ from this manual and compliance to local installation standards may be invalidated.

NON-DISCLOSURE AGREEMENT

Notifier by Honeywell (the Company) and the User of this/these document(s) desire to share proprietary technical information concerning electronic systems.

For this reason the Company is disclosing to the User information in the form of this/these document(s). In as much as the Company considers this information to be proprietary and desires that it be maintained in confidence, it is hereby agreed by the User that such information shall be maintained in confidence by the User for a period of TEN YEARS after the issue date and only be used for the purpose for which it was supplied.

During this period, the User shall not divulge such information to any third party without the prior written consent of the Company and shall take reasonable efforts to prevent any unauthorised disclosure by its employees. However, the User shall not be required to keep such information in confidence if it was in their possession prior to its receipt from the Company; if it is or becomes public knowledge without the fault of the User; or the information becomes available on an unrestricted basis from a third party having a legal right to disclose such information.

The User's receipt and retention of this information constitutes acceptance of these terms.

AMENDMENT LOG

13 June 2023	1.0	First Release

- W A R N I N G -

This is a Class A product. In a domestic environment this product may cause radio interference, in which case the user may be required to take adequate measures.

TABLE OF CONTENTS

1. Introduction 1-1

1.1 Introduction and Scope 1-1

1.2 Description of ECS-16 1-1

1.3 Specifications – ECS-16 Panel 1-5

1.4 Other ECS-16 & Product Manuals 1-6

1.4.1 ECS-166 Manuals 1-6

1.4.2 Other Manuals 1-7

1.4.3 Third Party Manuals 1-7

2. Cabinet Installation & Wiring 2-1

2.1 ECS-16 Cabinets 2-1

2.2 Handling & Checking Cabinets 2-1

2.3 Cabinet Installation 2-2

2.3.1 Requirements of Cabinet Location 2-2

2.3.2 Fixing Cabinet to Wall 2-2

2.3.3 Removal and Refitting of Internal Mounting Frames 2-4

2.3.4 Changing Outer Door Hinge Side 2-4

2.4 Mains Wiring 2-4

2.4.1 Mains Feed 2-4

2.4.2 Turning PSE On and Off 2-5

2.5 PSE Interconnection Wiring 2-5

2.6 Battery Installation & Wiring 2-6

2.6.1 Battery Fitting and Wiring 2-6

2.6.2 Battery Connection and Disconnection 2-6

2.7 Internal 24V DC Distribution 2-7

2.8 Adjacent Cabinet Wiring 2-7

2.9 Field Wiring 2-8

2.10 Remote Cabinet Wiring 2-8

2.11 Interfacing to Other Systems 2-8

2.12 Zone, WIP and User Button Labels 2-9

3. Site Configuration 3-1

3.1 Site Configuration 3-1

3.2 Example Site Configuration 3-1

3.3 Circuit Usage Report 3-2

4. On-Site Programming 4-1

4.1 What's Available 4-1

5. Placing Into Operation 5-1

5.1 Initial Power Up 5-1

5.2 Check Field Wiring Before Connecting to ECS-16 5-1

5.3 Commissioning 5-2
5.4 Fault Finding 5-4

6. Spare Parts, Drawings 6-1
6.1 Spare Parts 6-1
6.2 Drawings 6-2

7. Module Installation 7-1
7.1 Installation Guide For Each ECS-16 Module 7-1

1. Introduction

1.1 Introduction and Scope

This manual describes the installation, field wiring, site-programming, placing into operation, and commissioning of a CS-16 Emergency Warning System.

The ECS-16 is supplied with the requested modules fitted and wired into the cabinet(s), and a site configuration prepared and programmed into the ECS-16 based on the information provided with the order. Depending on the completeness of the information provided the ECS-16 may be fully operational, or it could require further site configuration to match the installation.

ATTENTION
This equipment contains
STATIC SENSITIVE DEVICES
Use Antistatic Procedures when handling modules.

The ECS-16 is designed to be installed and commissioned in accordance with AS 1670.4:2018 or NZS 4512:2021.

1.2 Description of ECS-16

ECS-16 fulfils the functions of an emergency warning system as defined in AS 4428.16 and an emergency intercommunications system as defined in AS 4428.4. When it is activated, e.g., from a connected fire alarm system or manually via Manual Call Points (MCP) located at strategic positions in the premises, it will generate warning signals to the appropriate areas of the building via loudspeakers. These are supplemented with Visual Alarm Devices (VADs) – flashing beacons, where needed, to warn the occupants about the emergency and provide instructions on evacuating the building. Optional, red warden phones located in strategic positions allow voice communications between the floor wardens and the building warden, or for fire brigade personnel to use in an emergency.

ECS-16 can provide non-emergency functions such as background music, public address, paging, recorded message generation, and warden phone communications.

ECS-16 is a modular system, with the specific combination of modules selected to meet the site requirements – in terms of the number of zones, amplifiers and power rating, power supplies, field wiring modules, and optional networking. A block diagram is shown in Figure 1. ECS-16 is highly configurable and expandable up to 224 emergency zones on the user interface.

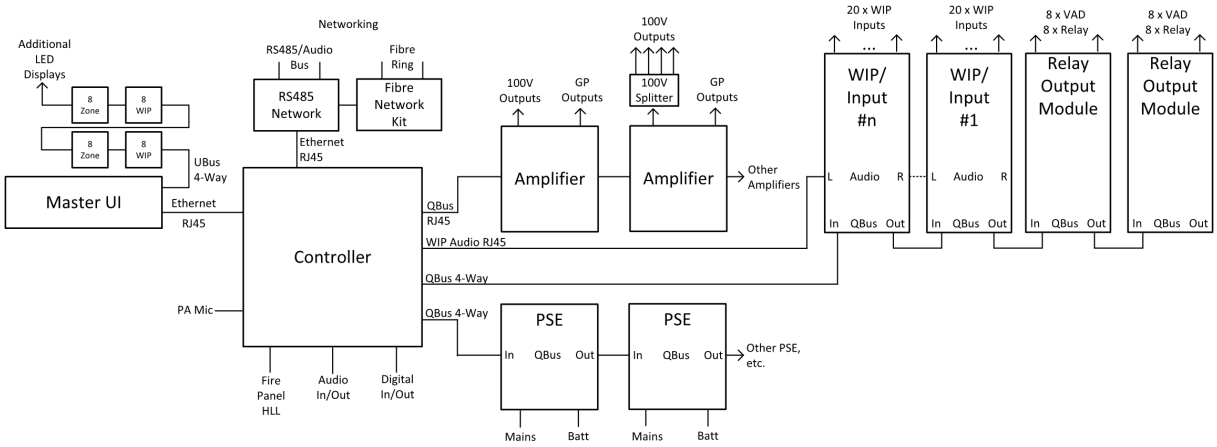


Figure 1 ECS-16 Block Diagram

The Controller is the brain. It contains the site configuration defining what other modules are present and how the inputs and outputs of those modules are organised. It controls the other modules and determines what needs to happen. Some common audio and digital inputs and outputs are provided by the Controller.

The PSE (Power Supply Equipment) provide a dc power supply for all modules from either mains power or backup batteries. They also provide battery charging.

The Master User Interface (MUI) and the 8 Zone and 8 WIP Expansion boards provide the user interface consisting of the LCD and touchscreen, System and All-Zone controls and indications, plus pushbutton and LED indications for the required number of zones and WIPs in the system.

The amplifiers provide 100V audio outputs to drive loudspeakers in the emergency zones. The number of 100V outputs and their power ratings vary with the different amplifier modules. Local audio inputs and switched 24V GP outputs are available on all amplifier modules, and some models support separate music or standby amplifier connections.

The 100V Splitter Module divides the 100V output of an amplifier into 4 separate 100V speaker feeds, each with isolation so that a short circuit fault does not affect the other outputs.

Each WIP/INPUT module provides 20 circuits that can be used for field wiring to warden phones (WIP), manual call points (MCP), to alarm sources like a fire panel, or for general purpose functions. One WIP circuit must be assigned to the master WIP on the user interface, if fitted.

Relay Output Modules provide 8 outputs for controlling Visual Alarm Devices (VAD) and 8 relay outputs for general use.

Connection to secondary emergency control panels (SECP), remote equipment racks or other networked panels is provided by the RS485 Network Module. Copper wired networking is available directly, or fibre-optic cable is supported with the addition of a Fibre Network kit.

Each ECS-16 will be supplied in one or more 19” rack mounting cabinets, with a Perspex window in the outer doors and the user interface mounted on hinged inner doors. Behind the inner door the required number of ECS-16 modules will be mounted on removable mounting frames screwed to the rear of the cabinet. If the required

combination of modules exceeds the capacity of a single cabinet, additional cabinets will be supplied, and these will need to be located adjacent to the main cabinet.

Figure 2 shows an example front panel view, and Figure 3 an internal view.

Figure 2 Example ECS-16 Front View

Figure 3 Example ECS-16 Internal

1.3 Specifications – ECS-16 Panel

Panel Size:	28U	40U	Double 28U	Double 40U
Height (mm)	1330	1863	1330	1863
Width (mm)	575	575	1150	1150
MECP Depth (mm)	388	388	-	388
SECP Depth (mm)	213	213	213	213
Maximum number of zones with:				
25W RMS Amps	28	40	-	80
60W RMS Amps	20	32	-	64
120W RMS Amps	10	16	-	32
240W RMS Amps	5	8	-	16
WIP Zones (max)	56	56	120	120
SECP Zones (max)	56	56	120	120

Number of Zones	224 on front panel – up to 600 internally
Number of Network Nodes	64
Operating Temperature	-5C – 45C 10% - 95% RH non-condensing
Cabinets	28U, 40U 19” Rack mounting, body 1.6mm m/s
Depth	388mm Deep, 213mm SECP cabinet
Colour, finish	Dulux Titania Ripple, 288 1235Z
Power Supply	Mains Supply; 230-240V AC 50Hz; 4.2A per PSE
DC Output per PSE	26V @ 27A peak, non-continuous.
Charging Current	2.5A nominal per PSE
Battery Capacity	Up to 150AHr per cabinet (4 x PSE)
Heat Generation (max quies)	28U: 150W; 40U: 250W
Audio Inputs	4 on Controller, 4 per Amplifier Module
Input Type	Balanced; transformer / capacitor isolated
Input Level	315mV rms; 1.4V rms max.; 10K input impedance
Common Mode Rejection	>33dB
Emergency Speech Mic	Noise-cancelling, front panel mounted
Automatic Level Control	30dB dynamic range
Amplifiers	25W, 60W, 120W, 240W (4, 4, 2, 1 per module)
Max Number	56 modules per panel
Output Voltage	100V rms @ 1kHz sine wave
Efficiency	>85%
100V Line Supervision	56K/100K EOL Single / Dual Spur
Max Capacitive Load	200nF
Frequency Response	215Hz – 8400Hz (+-3dB)

Signal To Noise (SNR)	>75dB(A)
Total Harmonic Distortion	<0.25%
Message Storage	200 messages with total of ~120 minutes
Play Capability	Any message to any zone output
GP Inputs	20 per WIP/Input; 4 x Controller; 2 x RS485 /Net 4 x MUI
Input Range; EOL	0-30Vdc; 10k, 4 state
GP Outputs	4 x Controller; 2 x RS485 Net; 4 x MUI
Output Current	100mA < 1V on; 30Vdc off; Supervised > 12V
Relay Outputs	2 x Controller, 8/16 x Relay Output Module
Rating	NO/NC relay contact; 2A @ 30V dc resistive
Amplifier GP Outputs	4 x Amplifier Module
Output Voltage	24Vdc @ 100mA; Optional load Supervision
Visual Alarm Outputs	8 x Relay Output Module
Rating	24V Dual Polarity 1A max; 2k7 EOL supervised
WIPs	320 WIPs (20 x WIP/Input Module; 16 Modules)
WIP Handset	FP0938 Compatible
Ring Volume	>80 dB(A)
Collocated Input	Parallel wired MCP or “Zone manned” pushbutton
Supervision	10k EOL
Wiring	1km of screened cable
FIP Inputs	Use WIP/Input Module inputs
High Level Links	RZDU, Panel-Link, Computer Port (4100ESi)
Max Inputs	320 WIP/Input; 528 RZDU, Unlimited – Panel-Link; 600 points 4100ESi

1.4 Other ECS-16 & Product Manuals

1.4.1 ECS-16 Manuals

DOC-01-040	ECS-16 Operator Manual
LT0709	ECS-16 Service Manual
DOC-01-041	ECS-16 Installation Manual
LT0726	ECS-16 Design Manual
LT0732	ECS-16 Fibre Networking User Manual
LT0704	ECS-16 Config User Manual
LT0694	FP2001 27A PSE Install Guide
LT0695	FP2015 Extender Blank Install Guide
LT0696	FP2000 Controller Install Guide
LT0697	FP2002 Relay Output Module Install Guide

LT0698	FP2003 WIP/INPUT Module Install Guide
LT0700	FP2005 RS485 Networking Module Install Guide
LT0701	FP2006/7/8/9 Amplifier Modules Install Guide
LT0702	FP1187/89 ECS-16 Hinge Kit Install Guide
LT0703	FP1186 ECS-16 Module Mounting Frame Install Guide
LT0705	FP2023 2 x 4-way 100V Splitter Module Install Guide
LT0706	FP2010 Master User Interface Install Guide
LT0707	FP2011/12/13 Extender User Interfaces Install Guide
LT0710	FP2014 WIP Tray Install Guide
LT0713	FP2019 Fan Cooling Module Install Guide
LT0714	FP2024/25 Fibre Networking Module Install Guide
LT0715	FP2021/22 8 Zone / 8 WIP Expansion Board Install Guide
LT0716	FP2020 Battery Shelf Install Guide
LT0727	FP2027 Power Distribution Fuse Board Install Guide
LT0728	FP2028 Air Filter Install Guide
LT0738	FP2029 GP Mounting Bracket Install Guide

1.4.2 Other Manuals

LT0114	FP0539 Paging Console Operating and Installation Instructions
LT0229	Panel-Link Intelligent HUB (I-HUB) User's Manual
LT0529	Panel-Link IP Bridge (PIB) User Manual
LT0346	PC Paging Console Wiring Diagram
LT0564	MX1 Networking Manual
LT0371	PA0688 Microphone Pre-amplifier Module Installation & Operating
FP0938inf	FP0938 WIP Install Sheet

1.4.3 Third Party Manuals

MOXA EDS-405A Ethernet Switch User Manual
Cisco ATA 191 and ATA 192 Analog Telephone Adapter User Guide
Cisco ATA 191 and ATA 192 Analog Telephone Adapter Administration

THIS PAGE INTENTIONALLY LEFT BLANK

2. Cabinet Installation & Wiring

2.1 ECS-16 Cabinets

The ECS-16 is supplied in one or more 19” rack mounting cabinets.

- 28U for systems up to 56 display zones and containing up to 12 modules
- 40U for all other systems.

Deep cabinets will be used for all systems except those that are SECPs.

Cabinet Type	Dimensions (H x W x D)
28U MECP (Deep – 310mm)	1330 x 575 x 388 mm
40U MECP (Deep – 310mm)	1863 x 575 x 388 mm
28U SECP (Shallow – 165mm)	1330 x 575 x 213 mm
40U SECP (Shallow – 165mm)	1863 x 575 x 213 mm

The ECS-16 could also be supplied as a “Combo” panel, where both a fire alarm system and the ECS-16 are installed in a single 40U deep cabinet.

2.2 Handling & Checking Cabinets

Precautions should be taken when handling the ECS-16 cabinets, as they can be of significant weight. Suitable lifting equipment may be needed.

On receipt of a ECS-16 system the following should be checked immediately.

- Any sign of damage to the outside of the packaging of the cabinet(s).
- Any sign of damage to the exterior of the cabinet(s).
- All modules inside the cabinet are firmly retained in their positions.
- The system contains the equipment options requested in the order.

Any sign of damage or loose modules may indicate mishandling during transit and will need to be raised immediately with the freight company.

Each ECS-16 will include a package (usually placed in the bottom of the first cabinet) containing:

- Copies of all the manuals needed.
- A printout of the factory-prepared site configuration. Depending on the amount and accuracy of the information provided prior to preparation of this configuration, it may be suitable for field use. Or it may require changes to be made on-site once the missing information is finalised. Once finished, the site configuration should become part of the Baseline Data as required by AS 1670.4 and backed up off-site.
- Battery loom sets.
- Cables for interconnecting adjacent cabinets, where provided.

It is recommended the ECS-16 be powered up on a temporary mains supply and checked for any unexpected faults before it is installed and field wiring is fitted. Any faults that cannot be explained should be resolved before installation.

2.3 Cabinet Installation

2.3.1 Requirements of Cabinet Location

The ECS-16 cabinets need to be installed in accordance with the applicable installation standards (e.g., AS 1670.4 or NZS 4512) and any local or site-specific requirements.

In particular, the chosen location needs to:

- Have an ambient noise level of not more than 70 dB(A),
- Not exceed the ambient operating conditions for the ECS-16,
- Allow all the controls and indications of the ECS-16 to be within 750 mm and 1850 mm of the floor,
- Have a clearance area of at least 1m in front of and 0.5m to the sides of the cabinets,
- Not block the air intake grill at the bottom of the cabinet outer door(s) or the exhaust grill at the top of the cabinet door(s).
- Allow suitable access for the field wiring.

2.3.2 Fixing Cabinet to Wall

Each ECS-16 cabinet is secured to the wall via mounting dimples containing 6.5mm holes in the back of the cabinet. 28U cabinets have 6 positions and 40U cabinets have 8 positions. This is shown in Figure 4 below.

To meet the control and indication mounting height requirements of AS 1670.1 and AS 1670.4 and maximise the number of zones that can be included in a cabinet, the top mounting hole of both the 28U and 40U cabinet should be 1751mm from the floor. Alternatively, a 40U cabinet could be mounted on a plinth 38mm in height. This will position the top row of buttons / indications just under the 1850mm allowable height from the floor.

Multiple 40U cabinets can be mounted beside each other without any gaps, and still allow the doors of the cabinets to be opened at any time.

Two 28U cabinets can be mounted beside each other without a gap, as long as the outer door on the left-hand cabinet is left hand hinged and the right-hand cabinet is hinged on the right. Any additional 28U cabinets will need to be spaced at least 26mm apart to allow back-to-back outer doors to be opened simultaneously to 90^{o}.

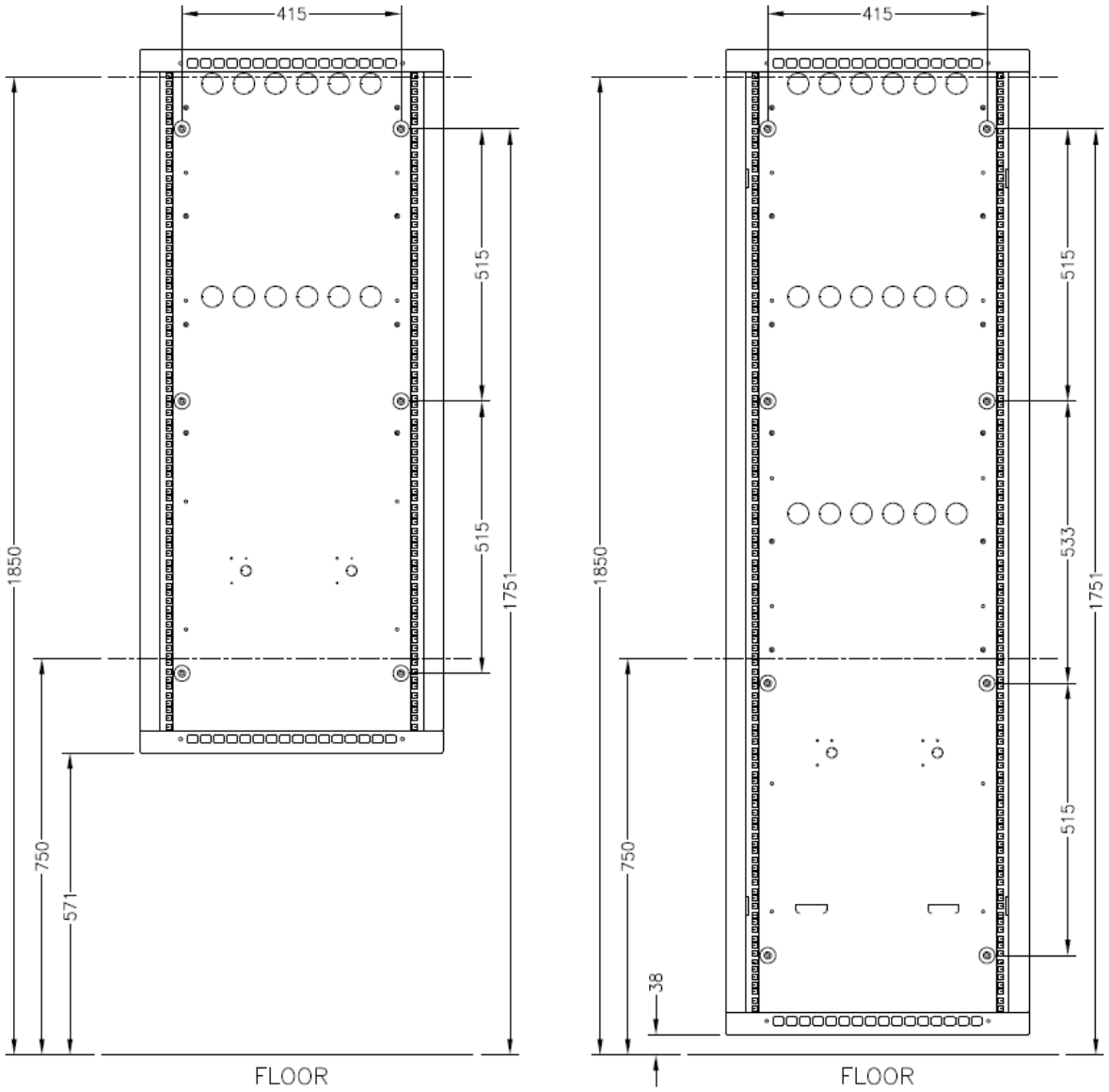


Figure 4 ECS-16 Cabinet Wall Fixing Details

2.3.3 Removal and Refitting of Internal Mounting Frames

To make mounting of the cabinet and fitting of the field wiring easier it is possible to remove the internal mounting frames and their modules from the cabinet.

Disconnect the cables that connect to the modules on the frame (first record which cable connects to which module connector). Undo and remove the two lower M6 fixing screws that secure the mounting frame to the rear wall of the cabinet. Loosen the top two screws and then lift the mounting frame and its modules off the screws. Note that a fully loaded frame with many amplifier or PSE modules will be quite heavy.

To refit the mounting frame, lift the frame into position and locate onto the two top screws using the keyholes in the frame. Fit and tighten all four screws. Reconnect the cabling to the modules.

If only 1 or 2 frames are fitted in a 40U cabinet, then there are alternative mounting positions in the rear wall for the frames. This may make fitting and terminating the field wiring easier, but will make later expansion more difficult as fitting 3 frames requires the frames to be in specific positions.

2.3.4 Changing Outer Door Hinge Side

The master cabinet (containing the Master User Interface) is generally supplied with the outer door hinged on the left-hand side, and any additional cabinet hinged on the right-hand side, to make a matching pair.

The side the outer door is hinged on may be changed once the cabinet is received, and also after it is installed.

Remove the screws that hold the top hinge block on to the cabinet body. Lift the door off the bottom hinge block(s) and place aside. Remove the plastic plugs from the hinge mounting holes on the opposite side of the cabinet. Remove the remaining hinge blocks from the cabinet body and refit only the bottom hinge block on to the holes on the other side of the cabinet. Have the hinge pin/hole pointing upwards and leave the top hinge block(s) off for now. Fit the plastic plugs into the holes on the original hinged side. Fit the rotated door onto the hinge block. Fit and secure the remaining hinge block(s) on to the cabinet body. Check the door hinges freely. Adjust the hinge blocks if needed.

The hinge side for the inner door is fixed on the left-hand side and cannot be easily changed.

2.4 Mains Wiring

2.4.1 Mains Feed

Each ECS-16 cabinet needs to be supplied with a dedicated mains feed direct from a main switchboard (refer AS/NZS 3000), terminated into the GPO outlet(s) in the back of the ECS-16 cabinet.

The cabinet may have up to 4 x 27A power supplies (PSE) fitted, with each PSE drawing up to 4.2A from the mains supply at full load. The mains supply must have a suitably rated cable size and circuit breaker at the switchboard. Consideration should be given to future expansion of the ECS-16 at the time of selecting and installing the mains supply. The following table shows the recommended circuit breaker rating and

cable size for the number of PSE fitted. A circuit breaker rated more than 20A should not be used.

IMPORTANT. The mains wiring into the GPO must be done by a suitably qualified electrician. It is recommended the mains lead enter the cabinet via the knockout behind the GPO.

No. of PSE Fitted	Circuit Breaker Rating	Conductor Size (min)
1	10A	1.5mm^2
2	16A	1.5mm^2
3	16A	2.5mm^2
4	20A	2.5mm^2

The mains wiring to the ECS-16 cabinet is terminated in the single dual-outlet GPO (1-2 PSE) or two dual-outlet GPOs (3-4 PSE). The GPO terminal capacity is a maximum of 3 x 2.5mm^2 conductors, so fitting the incoming mains wire and a wire across to the other GPO is possible. Connect the incoming earth wire to the earth terminal on the cabinet body. Do not remove the factory fitted earth wire that connects each GPO earth terminal to the cabinet.

Multiple cabinets will require individual mains feeds if each cabinet contains or could contain PSE.

During installation and commissioning the PSE may be plugged into a temporary mains feed, if the permanent mains wiring is not in place. The temporary feed must be sufficiently rated to the meet the load currents that may be present during use. It is suggested that testing be limited to activating no more than one heavily-loaded zone at a time to avoid overloading the temporary cable.

2.4.2 Turning PSE On and Off

The mains feed to each PSE can be turned on and off via the switch for the appropriate socket on the mains GPO, or can be totally isolated by removing the mains lead from the GPO. To totally remove power from a PSE it will also be necessary to disconnect the battery.

2.5 PSE Interconnection Wiring

During factory assembly the PSE in the same cabinet will have their battery terminals joined together using a 4-way loom LM0651 if there are 3 or 4 PSE, or a 2-way loom LM0650 if there are only 1 or 2 PSE fitted. These leads terminate in 2 or 1 “Anderson” type connectors respectively that allow the batteries to be connected and disconnected.

Each section of the loom connecting to a PSE contains a replaceable 30A fuse (Littelfuse CAT NO 0287030) to limit the battery current to each PSE and its loads.

The BT- terminal of each the PSE in the cabinet will be linked together so that synchronisation of battery testing is done.

Refer to drawing 2001-2 Sheet 800 for details.

2.6 Battery Installation & Wiring

2.6.1 Battery Fitting and Wiring

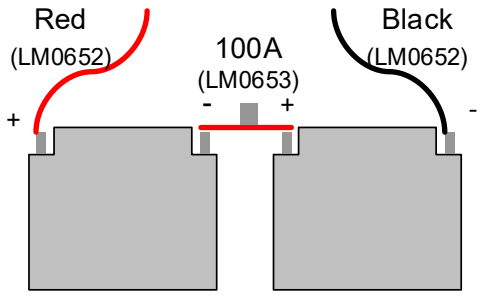
Each cabinet must have batteries of the required capacity fitted, as the batteries must be sufficient for the load current of each cabinet. Battery power should not extend to other cabinets (other than UBus wiring to 8 Zone and 8 WIP Extender modules).

An SECP (shallow) cabinet has room for two 12V 17AHr batteries.

Each 28U deep cabinet has space for up to 2 x 75AHr batteries.

Each 40U deep cabinet has space for up to four x 80AHr 12V batteries. Two are mounted in the bottom of the cabinet and, if required, the second two are mounted on the optional battery shelf (FP2020). Leave 10mm of gap around each battery. Alternatively, 2 x 100AHr batteries can be fitted, one in the bottom and one on the optional battery shelf. The battery shelf clips into the 40U cabinet (refer LT0716 for details). The shelf does not fit into a 28U cabinet.

The ECS-16 is supplied with pre-made battery leads – LM0652: containing an “Anderson” connector with red and black leads to M6 lugs and LM0653: a battery joining lead containing a replaceable 100A fuse (Littelfuse CAT NO 0498100). These leads can be used with batteries that require M6 or M5 screws. The kit supplied with each ECS-16 includes suitable M5 and M6 screws.



Connect the black lead of LM0652 to the negative terminal of one battery, and one end of the LM0653 battery joining lead to the positive terminal. Connect the other end of the battery joining lead to the negative of the second battery, and the red lead of LM0652 to the positive terminal.

Do not connect the Anderson connector until the ECS-16 has been initially powered up and tested.

Wiring to a remote battery is not permitted.

Cabinets installed to NZS 4512 will require the batteries to be suitably restrained to provide seismic protection. Batteries less than 75AHr in size should be restrained using Velcro strips on the bottom of the battery and on the floor of the cabinet. Batteries of 75 AHr or larger need to be restrained using straps and a bracket.

2.6.2 Battery Connection and Disconnection

The batteries may be disconnected by “breaking apart” the “Anderson” connectors that are at the ends of the PSE joining lead and the battery lead.

To connect the batteries, mate the matching halves of the “Anderson” connector together and push into place.

2.7 Internal 24V DC Distribution

The 27A PSE modules provide 24V DC power to the internal modules. Actually, the 24V DC is ~26V DC when the PSE is operating off mains power and varies from ~27.5V down to the minimum operating voltage of ~18V when operating off batteries.

Each PSE includes, by default, 2 LM0654 DC Output leads, but up to 2 more could be fitted to provide 4 x DC output leads. Each lead connects to one high-power Amplifier module or a VAD module using one (or two) 1m extension leads (LM0655), or to 3 low current modules (4 x 25W Amplifier and all other modules) using a 3-way splitter cable LM0656.

The wiring arrangement from PSE to the modules will have been designed to ensure the load currents of the connected modules do not exceed the output rating of each PSE. Therefore, the 24 DC connections should not be re-arranged, or additional loads connected, without doing a recheck of all loads connected to each PSE, and a battery capacity calculation.

2.8 Adjacent Cabinet Wiring

Where a ECS-16 system consists of multiple adjacent cabinets it will be necessary to reconnect the factory fitted wiring between the cabinets. Long connecting cables will be included in any additional cabinets, to allow connection to the previous cabinet.

Do not mix up the 4-way QBus and 4-way UBus cables, nor the RJ45 QBus and RJ45 WIP Audio cables, as they have the same cable types, but are incompatible.

Connect the QBus 4-wire cable to a spare 4-way QBus connector on a ROM, WIP/Input, PSE or the Controller in the previous cabinet. Refer to drawing 2001-1 Sheet 11. The first WIP/Input Module in each additional cabinet must have LK2 REMOVED so that 24V power from the previous cabinet is not connected to the additional cabinet.

Connect the Amplifier QBus RJ45 cable to a spare RJ45 QBus Out connector on an amplifier (or Controller) in the previous cabinet. Refer to drawing 2001-1 Sheet 9.

Connect the WIP Audio RJ45 cable to the open WIP Audio Right RJ45 connector on a WIP/Input, RS485 Network, or Controller in the previous cabinet. Refer to drawing 2001-1 Sheet 12. Note a WIP Audio RJ45 cable may also need to be wired back to the LEFT WIP AUDIO connection of WIP Module #1 if it is in a previous cabinet.

If there are any user interface modules in the additional cabinets, then connect the 4-wire UBus cable from the user interface to an open J3 or J4 connector of an 8 Zone or 8 WIP module in the previous cabinet. Refer to drawing 2001-1 Sheet 8. An additional power feed will be present if the number of zones is greater than 120. Connect this to the 24V POWER J5/J6 connector on the MUI Module.

Connect the single black wire to the clamp connector on a PSE in the previous cabinet. Refer to drawing 2001-1 Sheet 10.

If any standby amplifier is in a different cabinet to the amplifiers it serves, then the 100V Output will need to be run between cabinets. Double-insulated >100V cable needs to be used for this cabling.

Each cabinet will need to have its own dedicated mains feed and batteries if the cabinet contains any PSE. Refer to Mains Feed and Battery Wiring.

2.9 Field Wiring

The recommended cable types and sizes for field wiring are detailed in the installation guide for each ECS-16 module.

The field wiring should enter the cabinet via the cable gland in the top of the cabinet and run underneath the higher mounting frames and exit out where needed to connect to the appropriate ECS-16 module.

The cable entries should be sealed or protected against moisture, e.g., water running down the cables, and vermin.

2.10 Remote Cabinet Wiring

Any remote control panels (SECPs) and equipment cabinets will need to be connected using networking. Two types of networking are available:

- RS485 copper cables using 4 pairs of separately screened cables run in a ring for the data cables and in 2 buses for the two audio circuits. Refer to the RS485 / Network Module Installation Guide LT0700 for details.
- Fibre optic cable networking using a pair of multi-mode or single-mode fibre optic cables run in a ring. Refer to the Fibre Networking Module Install Guide LT0714 for details.

If other audio signals, such as background music, paging, local zone paging, etc, need to be sent from one panel to another, additional cables will be needed to link between the ECS-16s when copper cabling is used. If fibre cabling is used, then additional equipment will be fitted to the ECS-16 to transport the audio signals over the fibre network.

2.11 Interfacing to Other Systems

For connecting the ECS-16 to other systems refer to the appropriate ECS-16 Module install guide for these functions.

Other System	**Refer to ECS-16 Install Guide**
Fire Panel – Relay contacts to WIP/Input	WIP/Input Module LT0698
Fire Panel – RZDU HLI connection	Controller LT0696 – RZDU
Fire Panel – Simplex HLI connection	Controller LT0696 – 4100
Fire Panel – Panel-Link connection	RS485 /Network Module LT0700 and Fibre Networking Kit LT0714
Fault Output	Controller LT0696
Background music audio input	Controller LT0696
Paging Console(s) & Microphones	Controller LT0696
100V Loudspeakers	Amplifier LT0701
100V Splitter Modules	100V Splitter Module LT0705
Audio Attenuators	Amplifier LT0701
Local amplifier audio inputs	Amplifier LT0701

Music amplifiers	Amplifier LT0701
Standby amplifiers	Amplifier LT0701
VAD Outputs	Relay Output Module LT0697
WIP Phones, MCP & Zone Manned	WIP/Input Module LT0698
Relay Outputs – Relay Output Module	Relay Output Module LT0697
General purpose I/O - Controller	Controller LT0696
General purpose I/O – WIP/Input	WIP/Input Module LT0698
General purpose I/O – RS485 / Network	RS485 /Network Module LT0700
General Purpose I/O – User Interface	User Interface Module LT0706
RS485 networking	RS485 /Network Module LT0700
Fibre networking	RS485 /Network Module LT0700 Fibre Networking Kit LT0714

2.12 Zone, WIP and User Button Labels

The Zone, WIP and User buttons on the front of the user interface should be labelled to identify each button.

ECS-16 Config includes a command (Menu File | Print Labels) to print pre-formatted labels using the names entered into the:

- Emergency Zones table - Zone Name field
- WIP Button Mapping table – Label field
- Command Scripts table – Description for GUI / User Buttons field.

Alternatively, there is a preformatted label, LB0694, that is available from the Fireplace website (vigilant-fire.com.au) as an editable PDF file and an AutoCAD drawing. Enter the required button descriptions into these forms and print them off.

These labels can then be cut out and slide into the appropriate slots on the user interface.

Manual :

THIS PAGE INTENTIONALLY LEFT BLANK

3. Site Configuration

3.1 Site Configuration

Each ECS-16 is programmed with its site configuration to define:

- The number of zone and WIP controls, and where they map to on the front panel
- For each zone the amplifier outputs, VAD outputs, standby amplifiers
- For each zone the fire alarm & MCP inputs
- For each WIP button the WIP circuit used
- Other inputs and outputs and their functionality
- Networking with other panels
- Phased evacuation, messages, etc.

A printout of the site configuration is supplied with each ECS-16 and is the key document defining what function has been assigned to each input and output of the ECS-16 and thus what field wiring should be connected and where.

The site configuration will also show, to some extent, the layout of the modules on the inner door and the mounting frames inside the cabinet.

3.2 Example Site Configuration

The site configuration can be printed from ECS-16 Config either table by table, or as a complete PDF document. In general, each page is a replication of each table as shown in ECS-16 Config.

One of the most useful tables is the Emergency Zones table. This shows all the zones, their names / locations, and what equipment inputs / outputs are mapped to the zone. This essentially details which field wiring cables need to be connected to which I/O terminal points in the ECS-16.

Emergency Zones Printed On 2/09/2021 2:11:05 PM

Zone Number	Zone Name	Amps	S/B Amp	ROM Outputs	FIPs	MCPs	Not All Zones	Cannot be disabled
1	Ground Floor	1.1	3.1		H301	1.1	No	No
2	First Floor	1.2	3.1		H302	1.2	No	No
3	Second Floor	1.3	3.1		H303	1.3	No	No
4	Third Floor	1.4	3.1		H304	1.4	No	No
5	Plant Room	2.1	3.1	1.1	H305	1.5	No	No
6	Storage Room	2.2	3.1	1.2	H306	1.6	No	No

For example, for the “Storage Room” zone 6:

- The speaker cable needs to be terminated on Amplifier Module address 2, 100V Output number 2.
- The cable to the VADs needs to be terminated on ROM address 1, VAD 2.
- The cable to the MCP (and probably a WIP) needs to be terminated on WIP Module address 1, Input 6.
- The fire alarm panel needs to activate zone 306 to create an alarm condition via the RZDU high level link.
- The standby amplifier – S/B amplifier address 3 output 1 will need to have been wired to the Music/Standby input for Amplifier 2.2.

The WIP Module table details the WIP Input assignments and, in this case, confirms the same cable for the Zone 6 MCP (WIP Input 1.6) goes to a WIP in the Storage Room. This WIP is mapped to WIP button #1 on row 6.

Card Address	Input Number	Name	Circuit Type	Emergency Zone	WIP Button	Comments
1			Enabled			
1	1	Ground Floor East	WIP + MCP	1	1.1	
1	2	First Floor East	WIP + MCP	2	2.1	
1	3	Second Floor East	WIP + MCP	3	3.1	
1	4	Third Floor East	WIP + MCP	4	4.1	
1	5	Plant Room	WIP + MCP	5	5.1	
1	6	Storage Room	WIP + MCP	6	6.1	
1	7		None			

3.3 Circuit Usage Report

The Circuit Usage Report available in ECS-16 Config can be used to list the inputs and outputs assigned and their function. This can assist in terminating the field wiring to the correct terminals, if the wiring is labelled by zone number / location.

```
ECS-16 Install Manual Example

********Amplifiers***********
  1.1      60W     Zone    1
  1.2      60W     Zone    2
  1.3      60W     Zone    3
  1.4      60W     Zone    4
  2.1     120W     Zone    5
  2.2     120W     Zone    6
  3.1     240W     (unmapped)

********ROM Outputs***********
  1.1     Zone    5
  1.2     Zone    6

********WIP Module Inputs***********
  1.1      WIP & MCP      Zone    1       Button    1.1
  1.2      WIP & MCP      Zone    2       Button    2.1
  1.3      WIP & MCP      Zone    3       Button    3.1
  1.4      WIP & MCP      Zone    4       Button    4.1
  1.5      WIP & MCP      Zone    5       Button    5.1
  1.6      WIP & MCP      Zone    6       Button    6.1
```

4. On-Site Programming

4.1 What's Available

Most site settings are entered into ECS-16 Config to form the site configuration. This is downloaded to the ECS-16 and stored in non-volatile memory in the Controller, so it is available each time the ECS-16 is turned on.

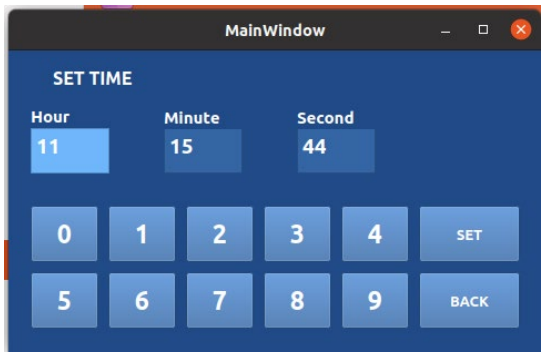
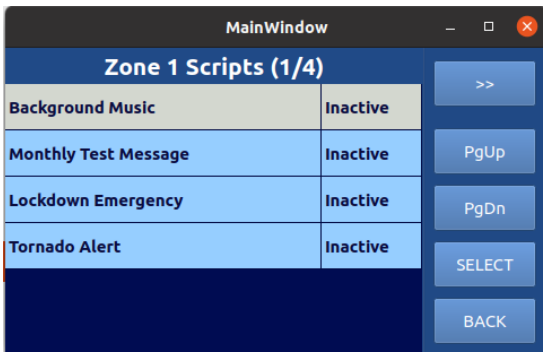
The following items can be configured on-site separately to the site configuration, so may be changed without requiring a computer with ECS-16 Config installed and access to change the configuration.

- Volume setting for each amplifier. If the volume (SPL) is too high for all loudspeakers connected to an amplifier 100V output, it is possible to reduce the overall volume for the amplifier in the ECS-16 rather than change all the tap settings on the loudspeakers.
- Time and date.

If changes are made to an amplifier volume it is recommended that the same changes be made to the site configuration, or the configuration be extracted from the ECS-16, so that the off-site backup includes the new volume settings.

The following table outlines the method to change each setting. Further details on using the ECS-16 touchscreen are contained in the ECS-16 Operator Manual DOC-01-040.

Setting	Instructions for Changing
Amplifier Volume	Touch the LCD touchscreen to display the main menu. Touch **MODULES** and scroll down to the required amplifier module that contains the 100V output that needs to have its volume changed. Touch the amplifier to highlight it. Press **SELECT.** If access to Level 3 has not been granted enter the passcode, then touch **SET** to gain Level 3 access. Touch **SELECT** again. This will display the details for the selected amplifier module. Scroll down until the required Amp Output is shown and highlight (touch) this. Press **SELECT**. The Set Amplifier Volume / Test Tone screen will be displayed for the selected amplifier output along with the current volume and a rotary volume control. 

	Rotate the knob to obtain the desired volume and touch **SET VOL.** The amplifier volume will be changed. Check the volume in the area is appropriate. Next time the site configuration is extracted or before it is changed, a prompt will be given to merge the on-site volume settings with the site configuration. Allow this.
Time & Date	Touch the LCD touchscreen to display the main menu. Touch **SETUP** and then **SET TIME** to change the time or **SET DATE** to change the date. Enter the required time / date by touching the relevant fields (Hour/Minute/Second or Day/Month/Year) and entering the required number. Each time a field is touched it will be cleared, allowing incorrect entries to be deleted and a new value to be entered.  When complete touch **SET** to save the new time / date. Hint – enter the time a few seconds ahead of the real time and at the required time press **SET** to set the time accurately.
Zone Background music on /off	If the installer has provided a zone command to turn background music on and off the following method can be used. Touch the LCD touchscreen to display the main menu. Touch **EVC ZONES,** scroll down to the required zone and highlight (touch) it. Press **>>** and then **Function.** If a zone command has been included for changing the background music this will be shown in the list of zone commands (scripts). 

	Highlight the required command script (touch it) and press **SELECT.** Press **EXEC** in the following confirmation screen to execute the command or **CANCEL** to abort. Note the background music setting is lost on power down / restart of the ECS-16 and will be initialised on power up to a state defined by the installer.

THIS PAGE INTENTIONALLY LEFT BLANK

5. Placing Into Operation

This chapter describes placing a ECS-16 system into operation.

5.1 Initial Power Up

The ECS-16 is generally supplied with its site configuration installed, all modules configured and end-of-lines fitted. Therefore, a new ECS-16 should have few, if any, fault conditions if powered up with no field wiring connected. The only faults present should be for batteries or external equipment that are required to be connected but are not (such as extension cabinets, paging consoles, networked panels).

It is recommended that a new ECS-16 be powered up (on temporary mains power) before any EOLs are removed from the panel or field wiring is connected. Any faults present should be checked that they represent external equipment that is not connected. Any other faults should be investigated and resolved. Then…

- Install the ECS-16 cabinets and complete the mains power wiring to the cabinets. If permanent mains wiring is not available, temporary wiring may be used as long as the ECS-16 has no VADs or 100V loads connected (so the power consumption is minimal).
- Switch on the PSE in the cabinet with the Controller. Allow the ECS-16 to initialise.
- Press and hold in the **Silence Buzzer** button to conduct an LED test. Check that all LEDs on all the user interface modules turn on. Release the button.
- Then use the LCD and touchscreen to view the faults present. Note that other cabinets may not be connected / powered up yet, so faults will be present due to missing modules. Check that no unexpected faults are present.
- Turn on the PSE in each additional cabinet, and check that the faults for the modules in the cabinet clear and that no new unexpected faults are generated (note batteries will be not connected).
- Once all cabinets are powered up check that any faults present are due to missing equipment. If any other faults are present ascertain why and resolve before proceeding.
- Power down the ECS-16.

5.2 Check Field Wiring Before Connecting to ECS-16

Each field wiring cable should be checked for the required load or EOL device and any earth fault before connecting to the ECS-16. Otherwise tracking down faults (such as an earth fault) could be quite time consuming. For each measurement allow time for the reading to stabilise, as loudspeaker coupling capacitors and cable capacitance need time to charge.

- For each 100V speaker circuit conduct an impedance measurement using a 100V impedance meter and check the value is higher than the minimum load impedance for the amplifier rating. Refer to the Amplifier Manual LT0701 for details. Conduct a DC resistance measurement across the circuit and check the resistance is nominally 56k. Conduct a DC resistance measurement between the circuit wires and earth and check the resistance is greater than 1M ohms.

- For each WIP Module circuit (to a WIP, MCP, or FIP) conduct a DC resistance measurement across the circuit and check the resistance is 9k5 to 10k5 ohms. If the system is a QE90 upgrade and the 10V Zener EOLs are still being used, then check the resistance is open circuit in both directions using the resistance (ohms) scale. If the meter has a diode function, check the reading is open when the black (negative) lead is connected to the 0V or -ve lead. Check the reading is ~0.7 when the red (positive) lead is connected to the 0V or -ve lead. Conduct a DC resistance measurement between the circuit wires and earth and check the resistance is greater than 1M ohms.
- For each VAD circuit conduct a DC resistance measurement across the circuit and check the resistance is 2k3 to 3k0 ohms. Conduct a DC resistance measurement between the circuit wires and earth and check the resistance is greater than 1M ohms.
- For each Amplifier GP Output circuit (e.g., to volume controllers) conduct a DC resistance measurement across the circuit and check the resistance is as expected. The resistance will depend on the load device (for example, the A2250 attenuator measures ~1800 ohms). Conduct a DC resistance measurement between the circuit wires and earth and check the resistance is greater than 1M ohms.
- For each GP Input that is wired to external equipment conduct a DC resistance measurement across the wiring and check the resistance matches the current state (open circuit, 10K, 680E, or short circuit). Conduct a DC resistance measurement between the circuit wires and earth and check the resistance is greater than 1M ohms.
- For each ROM Relay output that is wired to external equipment conduct a DC resistance measurement between the circuit wires and earth and check the resistance is greater than 1M ohms.
- For any external DC power cabling conduct a DC resistance measurement between the circuit wires and earth and check the resistance is greater than 1M ohms.

In stages, attach some of the field wiring and:

- Power up the ECS-16 and check no new faults have been introduced. Resolve any new faults before moving on to the next block of wiring.

Continue until all field wiring and peripheral devices are connected.

Finally:

- Connect the batteries and allow to charge for at least 24 hours.
- Check that any faults present are attributable to missing equipment.

5.3 Commissioning

Prepare labels to identify each zone and WIP button (they can be printed from ECS-16 Config or manually filled in from the configuration) and fit to the pockets in the user interface.

The general steps for commissioning a ECS-16 are as follows (also refer to each ECS-16 module installation guide for specific commissioning instructions).

- For each evacuation zone:

  - Press the Alert button and check the correct alert signal (tone and messages) sounds over the loudspeakers in the zone. Check any required VADs in the zone are operating (should flash white).
  - Press the Evac button and check the correct evacuate signal (tone and messages) sounds over the loudspeakers in the zone. Check any required VADs in the zone are operating (should flash red).
  - Press the Speech button, pick up the microphone and make a speech announcement. Check the speech is heard clearly from the loudspeakers in the zone and that it is intelligible.
  - Check the required SPL is generated in each emergency zone. Adjust the loudspeaker tapping to a lower power level if the sound level is too high, or a higher power if the sound level is too low. If any speaker tapping is changed to a higher power, then recheck the amplifier is not overloaded – redo the load impedance test.
  - If the zone has background music volume controllers, check the controllers adjust the music volume for those speakers that require it. Check that full volume is produced for paging (if used), Alert, Evac and Speech functions.
- For each WIP button assigned:
  - Press the WIP button and check the correct WIP phone rings in the zone. Pick up the WIP and check voice communications is possible. Hang up the WIP and check the WIP LED goes out.
  - If there is a co-located MCP, activate the MCP using the test key and check an alarm is indicated on the correct zone of the ECS-16. Restore the MCP and Reset the alarm.
  - If there is a co-located Zone Manned pushbutton, press the pushbutton and check Zone Manned is indicated on the correct zone of the ECS-16. Release the pushbutton and clear Zone Manned from the zone using the Zone Cleared button on the ECS-16.
- For each alarm trigger from the fire alarm panel:
  - Activate an appropriate zone alarm (or test the zone) on the fire panel and check the correct zone on the ECS-16 goes into alarm. Reset the alarm at the fire panel, then Reset the alarm on the ECS-16 and check all zones are normal.
  - For RZDU and Panel-Link connections Disable (isolate) the zone or output on the fire panel and check a fault is generated on the ECS-16. Re-enable the zone/output on the fire panel and check the fault clears from the ECS-16.
- For each other input or output function check that the required states are activated in the correct conditions.
- Phased evacuation can be tested using just the ECS-16. On the ECS-16 press **Auto** and then **Test** to activate test mode (if enabled). Make sure no other condition is present first.
  For each alarm zone: Press the **Alert** button to simulate an alarm condition on the zone. Check the phasing of Alert and Evacuate states through the zones of the ECS-16 is correct. Reset the alarm and all zone states (press **Manual**, **Silence Warning** then **Rese**t followed by **Silence Warning** and **Auto**, or press **Test** to exit test mode and reset all states).
- Check that an earth fault can be detected. Connect a field wiring 0V or -ve terminal to earth (cabinet earth tab) and check an earth fault is generated.

Check that the fault on the ECS-16 generates a fault on the fire panel if the fire panel monitors the ECS-16 for faults.

- With no batteries connected put all zones (or at least those in each cabinet) into evacuate at the same time. Leave running for at least 1 minute (preferably longer). Check that no faults are generated, and the evacuation tones and messages are heard in each zone. This is to test the PSUs can deliver the required load current and do not shut down due to overload.

5.4 Fault Finding

The ECS-16 Operator Manual (DOC-01-040) includes instructions for using the touchscreen and LCD to recall the current fault conditions, the historical log of events, and the current status of most inputs and outputs.

A PC connected to the Controller module USB port is able to use the “off” command to list all of the off-normal conditions. The “his” command can be used to list the events going back in time.

The installation guide for each module includes details on the fault indications shown on the LEDs of the module.

From these sources the location of any fault conditions on the ECS-16 should be able to be determined and thus what action is needed to rectify the fault.

Further details on fault finding are contained in the ECS-16 Service Manual LT0709.

6. Spare Parts, Drawings

6.1 Spare Parts

Note most ECS-16 products are labelled with the part number of their replacement part.

Part Number	ECS-16 Module Spare / Additional Item
FP2000	ECS-16 Controller Module
FP2001	ECS-16 27A Power Supply Equipment (PSE)
FP2002	ECS-16 Relay Output Module (ROM)
FP2003	ECS-16 WIP/Input Module
FP2005	ECS-16 RS485 / Network Module
FP2006	ECS-16 Quad 25W Amplifier Module
FP2007	ECS-16 Quad 60W Amplifier Module with Relays
FP2008	ECS-16 Dual 120W Amplifier Module
FP2009	ECS-16 Single 240W Amplifier Module
FP2010	ECS-16 Master User Interface Module (LCD & All-Zone Controls)
FP2011	ECS-16 8 WIP / 8 Zone Extender Module
FP2012	ECS-16 16 WIP Extender Module (8 WIPs fitted)
FP2013	ECS-16 16 Zone Extender Module (8 zones fitted)
FP2014	ECS-16 WIP Tray and Speech Microphone
FP2015	ECS-16 Extender Module Blank
FP2019	ECS-16 Rack Cab Cooling Module (Fan Module, 2 x baffles, filter)
FP2020	ECS-16 Battery Shelf
FP2021	ECS-16 8 Zone Expansion Board c/w Loom and Mtg
FP2022	ECS-16 8 WIP Expansion Board c/w Loom and Mtg
FP2023	ECS-16 2 x 4 Way 100V Splitter Module
FP2024	ECS-16 Fibre Networking Kit, Single mode fibre
FP2025	ECS-16 Fibre Networking Kit, Multi-mode fibre
FP2026	ECS-16 SECP Controller Module
FP2027	ECS-16 Power Distribution Fuse Board
FP2028	ECS-16 Cooling Fan Air Filter Kit
FP2029	ECS-16 GP Mounting Bracket, 1 Module Wide
FP1186	Kit, ECS-16 Module Mounting Frame C/w Mtg
FP1187	Kit, ECS-16 5 Module Support Kit 15U
FP1189	Kit, ECS-16 9 Module Support kit 27U

Part numbers for some of the peripherals commonly used with ECS-16 panels:

Part Number	Peripheral Parts
FP0539B	ECS-16 Paging Console
FP0902	PC Paging Console
SU0168	Goose Neck Microphone
SU0169	Desk Mount Microphone
PA0688	Microphone Preamp Board 1923-19
PA0646	ALIM9706 Audio Line Isolator
FP0938	ECS-16 WIP Phone Red, Master or Field WIP.
SU0608	White MCP (EVACUATE Lettering)
SU0615	Transparent Hinged Cover to suit Manual Call Points
A2260	10W audio attenuator
A2265	40W audio attenuator
A2339	100W audio attenuator
576.080.017	SOL-LX White Ceiling VAD, White Flash AS 7240 approved
576.080.023	SOL-LX White Ceiling VAD, Red Flash AS 7240 approved
576.080.018	SOL-LX White Wall VAD White Flash AS 7240 approved
576.080.022	SOL-LX White Wall VAD, Red Flash AS 7240 approved

6.2 Drawings

The following system wiring diagrams are included later in this manual to explain multi-cabinet wiring. Refer to the field wiring diagrams included with each module Installation Guide for detail on wiring of each module type.

2001-1 Sheet 8 Multi-cabinet Wiring – User Interfaces UBus
2001-1 Sheet 9 Multi-cabinet Wiring – Amplifiers
2001-1 Sheet 10 Multi-cabinet Wiring – Power
2001-1 Sheet 11 Multi-cabinet Wiring – QBus – WIP, ROM, PSE
2001-1 Sheet 12 Multi-cabinet Wiring – WIP Audio

7. Module Installation

7.1 Installation Guide For Each ECS-16 Module

LT0694	FP2001 27A PSE Install Guide
LT0695	FP2015 Extender Blank Install Guide
LT0696	FP2000 Controller Install Guide
LT0697	FP2002 Relay Output Module Install Guide
LT0698	FP2003 WIP/INPUT Module Install Guide
LT0700	FP2005 RS485 Networking Module Install Guide
LT0701	FP2006/7/8/9 Amplifier Modules Install Guide
LT0702	FP1187/89 ECS-16 Hinge Kit Install Guide
LT0703	FP1186 ECS-16 Module Mounting Frame Install Guide
LT0705	FP2023 2 x 4-way 100V Splitter Module Install Guide
LT0706	FP2010 Master User Interface Install Guide
LT0707	FP2011/12/13 Extender User Interfaces Install Guide
LT0710	FP2014 WIP Tray Install Guide
LT0713	FP2019 Fan Cooling Module Install Guide
LT0714	FP2024/25 Fibre Networking Module Install Guide
LT0715	FP2021/22 8 Zone / 8 WIP Expansion Board Install Guide
LT0716	FP2020 Battery Shelf Install Guide
LT0727	FP2027 Power Distribution Fuse Board Install Guide
LT0728	FP2028 Air Filter Install Guide
LT0738	FP2029 GP Mounting Bracket Install Guide

Replace with 2001-1 Sheet 8
Multi-cabinet Wiring – User Interfaces UBus

Replace with 2001-1 Sheet 9
Multi-cabinet Wiring – Amplifiers

Replace with 2001-1 Sheet 10
Multi-cabinet Wiring – Power

Replace with 2001-1 Sheet 11
Multi-cabinet Wiring – QBus – WIP, ROM, PSE

Replace with 2001-1 Sheet 12
Multi-cabinet Wiring – WIP Audio