VIGILANT

QE20
Emergency Warning System
Service Manual

QE20 is a product of

Johnson Controls

END USER LIABILITY DISCLAIMER

Some of the operation of QE20 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.

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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   Introduction and Scope

This manual describes the fault-finding, service and maintenance of a VIGILANT QE20 Emergency Warning System.

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ATTENTION
This equipment contains
STATIC SENSITIVE DEVICES
Use Antistatic Procedures when handling modules.
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The QE20 is designed to be maintained in accordance with AS 1851 or NZS 4512.

1.2   Description of QE20

QE20 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, supplemented with Visual Alarm Devices (VADs) – flashing beacons, where needed, to warn the occupants about the emergency and provide instructions on evacuating the building.

QE20 can provide non-emergency functions such as background music, public address, paging, recorded message generation, and warden phone communications.

QE20 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.

QE20 is highly configurable and expandable up to 224 emergency zones.
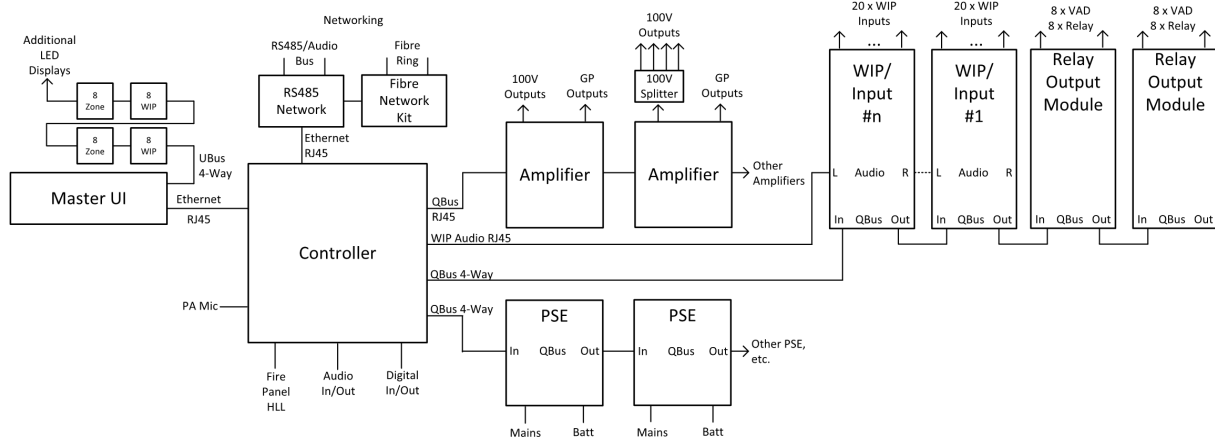
Figure 1 QE20 Block Diagram

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 optional 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.

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 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 QE20 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 QE20 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 QE20 Front View

Figure 3 Example QE20 Internal View

1.3   Specifications – QE20 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	Vigilant 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 Modules
High Level Links	RZDU, Panel-Link, Computer Port (4100ESi)
Max Inputs	320 WIP/Input; 528 RZDU, Unlimited; 600 CP

1.4   Other QE20 & Product Manuals

1.4.1   VIGILANT QE20 Manuals

LT0711	QE20 Operator Manual
LT0709	QE20 Service Manual
LT0712	QE20 Installation Manual
LT0726	QE20 Design Manual
LT0732	QE20 Fibre Networking User Manual
LT0704	QE20Config User Manual
LT0705	QE20COST 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 QE20 Hinge Kit Install Guide
LT0703	FP1186 QE20 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 VIGILANT 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

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2.   Maintenance

2.1   Regular Testing

In general, there is no regular service / maintenance that needs to be carried out on a QE20 system, other than that defined in AS 1851 or NZS 4512.

This work will usually be carried out by the contracted fire alarm / emergency warning system service company.

Table 6.4.3.1 of AS 1851 outlines the monthly testing that needs to be carried out on the EWS. The test of the EWS in Item 1.5 is usually conducted along with the test of the connected fire alarm system.

First, an announcement that a test is being conducted should be made to the building occupants using the All-Speech function and the microphone. Then create a test alarm on the fire alarm system, and check that this activates the QE20 into alarm and that the correct emergency signals are generated. The floor wardens, if present, can be involved in this process, by calling in to the QE20 using their WIP phone when the alarm signal is heard. At the completion of the test reset the alarm condition and activated signals, then advise the building occupants that the test is completed.

In AS 1851 Table 6.4.3.2 provides the yearly service schedule for the EWS portion of QE20 and Table 6.4.4.1 the yearly schedule for the warden phone portion.

Table 6.4.3.3 provides the five yearly service schedule for the EWS.

2.2   Battery Recharging

If the batteries become discharged, or a new set of batteries is connected to the QE20, then it is possible the QE20 will report faults while charging the batteries. This is because the battery voltage could be below an acceptable level until partially charged. The fault will automatically clear when the battery voltage rises sufficiently.

Note the PSE will not connect and charge batteries that are extremely discharged (e.g., discharged to a voltage of less than ~13V for 2 x 12V batteries). The QE20 will report disconnected batteries, even though they are connected. It will be necessary to remove the batteries and start their charging on a battery charger than can provide current to overly discharged batteries. It may be necessary to charge each 12V battery separately on a 12V battery charger, at least until the battery voltage is in a working range (> ~10V).

2.3   Battery Charging Voltage

The charging voltage of the batteries is set within the PSE and is not field adjustable.

To measure the charging voltage:

1) Operate the PSE from mains with a charged battery connected so that no battery / PSE fault is shown.
2) Disconnect the battery and quickly measure the open circuit charger voltage from the PSE within 30 seconds. If the voltage drops to ≈10V repeat the process until a valid reading (≈27.3V) is obtained. [Every 30 seconds the PSE turns off the charger to measure the battery voltage. With no battery connected, the charger will not turn on again.] Reconnect the battery.

2.4   Disabling Earth Fault

The QE20 will generate an earth fault if any (supervised) field wiring is connected to earth. This may also occur in service situations, for example when a laptop / computer that is earthed is connected to the USB port on the Controller.

During commissioning and service work the generation of the earth fault can be disabled by removing Lk2 on the Controller Module. This will disable all sources of earth fault.

Lk2 must be refitted at the end of commissioning / service so that earth fault detection is re-enabled. There is no warning that LK2 is not fitted.

Therefore, a check that an earth fault can be detected must be included at the end of commissioning and service work, and after the Controller Module is replaced.

3.   Fault Finding

3.1	Fault Finding

The QE20 includes supervision of most of its field cabling, so that an open circuit or a short circuit fault condition is detected. It also checks that there is not an earth fault on any critical field cabling.

The QE20 does not test any of its audio inputs, other than the front panel microphone, as these are used for non-emergency functions and are disabled when an emergency condition is present.

The QE20 also checks many internal functions for operation, so that if a required module is not connected or has failed, then a fault condition is generated.

The QE20 will indicate a fault by turning its buzzer on steady and de-energising the Fault relay on the Controller (unless it is programmed for another function).

The buzzer can be silenced by pressing the **SILENCE BUZZER** button. The buzzer will resound if another fault condition is detected.

If the fault condition goes away, then the fault indication on the QE20 is automatically cleared.

The QE20 LCD and touchscreen can be used to recall the current fault conditions, the historical log of fault events, and the current status of most inputs and outputs. Details are contained in the QE20 Operator Manual (LT0711).

If a fault is present, touch the LCD to show the main menu, then use the **STATUS | FAULTS** command to see the current faults.

If the fault has cleared, but you want to see what faults have occurred, then use the **STATUS | EVENTS** command to display the historical list of events. To show only fault events can be selected using the touch buttons on the right-hand side of the screen.

Most of the modules in the QE20 include LEDs to show the type of fault(s) that are present on the module. These are detailed in Section 3.2.

A PC connected to the USB port on the Controller module can be used to access the diagnostic terminal and use the "off" command to list all of the off-normal conditions. Refer to Section 4.2.

From these sources the location of any fault conditions on the QE20 should be able to be determined and thus what action is needed to rectify the fault.

The Installation Guide for each module includes details of the faults that can be detected by the module and the likely causes.

3.2   Module Fault LED Indications

Most QE20 modules include a yellow Fault LED that displays a sequence of flashes to indicate the faults that are present or, for the PSE a 7-segment display shows the faults present.

A long flash (~0.75s) is a fault that is present and a short flash (~0.25s) is not present.

The following sections detail the fault indications for each module type.

Refer to the QE20 Operator Manual LT0711 for details on the LEDs on the front of the User Interface and use of the LCD and touch screen for finding further information on the faults present.

3.2.1   Controller Module LED Indications

There are ten LED indicators on the QE20 Controller Module.

- **POWER** is on green when power is applied. Off means 24V power is not applied.
- **FAULT** will turn on yellow when there is a fault in the QE20 system – it matches the Fault Relay.
- **A** – Will turn on and off approximately every 1-2 seconds when the QE20 is running (assuming the default logic to flash the LED is included in the site configuration). This can be overridden by site programming.
- **B** – By default not used. Can be overridden by site programming.
- **C** – By default not used. Can be overridden by site programming.
- **RESET** is on yellow when the CPU on the Controller is being reset. It is normally off. If this flashes on it indicates the microprocessor is restarting.
- **LINK / ACT** indicators for each of the four Ethernet ports. These are green LEDs that are on if an Ethernet connection is present and blink with activity on the port.

3.2.2   MUI Module LED Indications

There are three LED indicators on the rear of the LCD (MUI) Board.

LD1 POWER/LINK is on green when power is applied and the MUI is operating. Off means 24V power is not supplied or the module is faulty.

LD2 RESET will turn on yellow while the Reset signal is being applied to the microprocessor on the LCD board. This will occur if the Reset pushbutton is pressed for at least 5s. If the operating system initiates a reset (watchdog timeout, update, etc) the LED will blink briefly. But if it occurs at any other time, it indicates a problem with operation of the microprocessor, which usually will mean the board is faulty.

LD3 ACTIVITY will flash yellow when there is activity on the Ethernet connection between the MUI and the Controller. If this is off there is no power to the MUI or Controller, the connection is unplugged or broken, or one of the modules is faulty or not operating correctly.

3.2.3   MKI Module LED Indications

There is one LED Indicator on the rear of the MKI Board.

- **LD3 POWER/LINK** is on green, blinking off every second or so as it communicates with the LCD Board, when power is applied. Off means 24V power is not supplied, the module is faulty or the short interconnecting FRC to the MUI PCB is disconnected. Steady on means the module is not communicating with the LCD Board. If the MKI Board appears to be off but the LCD Board has power applied, then check the FRC cable that joins the two boards.

If both the internal POWER/LINK and the front POWER LEDs are fast flashing (at ~8Hz) the Module is in Bootloader mode. Power the module down and up again (or push the Reset button on the MUI for > 5s) to exit bootloader mode.

3.2.4   8 Zone & 8 WIP Extender Module LED Indications

There are two LED indicators on the rear of each PCB of the Extender Module and a number on the front.

If both rear LEDs are fast flashing (at ~8Hz) the Module is in Bootloader mode. Change the address from 00 to the required address and power the module down and up again to exit bootloader mode.

8 Zone / 8 WIP Extender Module FAULT LED Flash Indications

LED Name	Colour	Description
POWER/ LINK	Green	OFF – no power applied. On, flashing off briefly every 1 - 15 seconds as the Master User Interface communicates with the PCB. Steady On – not communicating with the Master User Interface, or faulty.
SYSTEM FAULT	Yellow	OFF – no fault present. Flashing – fault present When a System Fault is present the SYSTEM FAULT LED shows a sequence of 8 flashes followed by a pause, with each flash short (250msec) if that fault is not present and long (750msec) if that fault is present. The system faults are indicated in this order: 1. PCB not communicating with the Master User Interface. This will occur when the QE20 is starting up, until the Master User Interface is operational. Otherwise check the 4-way Power/Comms connection to the previous Extender or Master User Interface, the QE20 site configuration, the Address Rotary switch setting on the PCB of the Extender User Interface, or for a faulty Extender. 2. Invalid Address (Not 01…99). Try rotating the address rotary switches and then put back to the desired address. If cannot be fixed, replace the PCB. 3. Firmware CRC Incorrect. Replace the PCB. 4. Software Fault. Will not occur. 5. Unexpected restart occurred. Something happened to cause the User Interface microprocessor to restart. Clears once status sent to the Master User Interface. If does not clear, even after power down/up, replace the PCB. 6. No Configuration Data. Will occur on start up until the QE20 Controller has sent the necessary configuration data to the Master User Interface. 7. Will not occur. 8. Hardware mismatch. Replace the PCB.

3.2.5   Amplifier Module LED Indications

There are between three and six LED indicators on each QE20 Amplifier Module.

- **1 – 4 ACTIVE** LEDs (one for each amplifier fitted) that flash blue with the audio signal on the 100V output. Generally, these are off, shimmering with any background music and possibly every 30s when the internal amplifier is tested with a 27kHz test tone; On brightly with the alert or evacuate signal; and flickering with live or recorded speech. These LEDs do not show the audio signals provided by the MUSIC / STANDBY inputs.
- **STATUS** is on green, blinking off every second or so as the module communicates with the Controller Module, when power is applied. Off means 24V power is not supplied or the amplifier module is faulty. Steady on means the module is not communicating with the Controller, or the module is faulty.
- **FAULT** will flash yellow when there is a fault with any of the 100V outputs, internal amplifiers, GP outputs, cooling fans or the module itself. A sequence of 17 flashes is shown, with a long flash indicating that the specific fault is present, and a short flash that the specific fault is not present. For example, if the fourth flash is long, then 100V Output #4 has a wiring fault present.

Amplifier Module FAULT LED Flash Indications

Flash Number	Description	Explanation / Action
1-4	Open or short circuit on the corresponding 100V output 1-4. Connection of 100V output to earth, +24V, or 0V.	Field wiring issue. Check the connected loudspeakers and field wiring. Check the EOL resistor(s) are the correct value and fitted. Check for connection of 100V output wires to earth, or to 24V or 0V of the QE20.
5-8	Failure of the internal amplifier for the output 1-4	Faulty module. It will need replacement.
9-12	Fault on GP Output 1-4	Short circuit or overload of the corresponding GP Output. Open circuit when the output is off. Check the load and field wiring of the output.
13	Configuration file fault	The configuration file(s) from the Controller are missing, or invalid data is present in the files. Check for the Amplifier Module not configured in the site configuration, or a firmware mismatch. Note this fault will show while the configuration is being downloaded after a change.
14	Fan 1 failure	Faulty cooling fan. Check for an air blockage, otherwise replace the module.
15	Fan 2 failure	Faulty cooling fan. Check for an air blockage, otherwise replace the module.
16	Not communicating with the Controller over QBus	Amplifier not configured in site configuration, incorrect address set on the rotary switches, QBus wiring not connected between the

		Controller and the module, or a faulty module on QBus. Check the site configuration, address switch settings, QBus wiring, and for a different module that is faulty or mis-addressed.
17	Other Fault	Internal fault such as: Firmware CRC wrong, I2C/I2S communications failed, internal memory failure, temperature sensor failed, or over-current draw by the module. Check with JCI Technical Support as may need a firmware upgrade. Otherwise replace module.

### 3.2.6		Splitter Module LED Indications

There are two LED indicators on each PCB of the QE20 2 x 4 Way 100V Splitter Module. The LEDs on one PCB may be seen directly, while the LEDs on the other are reflected off the metalwork at the back of the module.

Splitter Module FAULT LED Flash Indications

LED Name	Colour	Description
POWER /LINK	Green	OFF – no power applied Flashing – should not occur other than on start-up. If present indicates restarting or factory test mode. ON – 100V Splitter Module is operating.
FAULT	Yellow	OFF – no fault present. Flashing – fault present When a Fault is present the FAULT LED shows a sequence of 13 flashes followed by a pause, with each flash short (250msec) if that fault is not present and long (750msec) if that fault is present. The faults are indicated in this order: 1. OUT1 100V output has a short circuit fault – the output is isolated from the T-Gen2. 2. OUT2 100V output has a short circuit fault – the output is isolated from the T-Gen2. 3. OUT3 100V output has a short circuit fault – the output is isolated from the T-Gen2. 4. OUT4 100V output has a short circuit fault – the output is isolated from the T-Gen2. 5. OUT1 100V output has an open circuit or undefined fault – the output is still connected to the T-Gen2. 6. OUT2 100V output has an open circuit or undefined fault – the output is still connected to the T-Gen2. 7. OUT3 100V output has an open circuit or undefined fault – the output is still connected to the T-Gen2. 8. OUT4 100V output has an open circuit or undefined fault – the output is still connected to the T-Gen2. 9. Always no fault. 10. Always no fault. 11. Firmware CRC Incorrect. Replace the 100V Splitter Module. 12. Software Fault. Will not occur. 13. Unexpected restart occurred. Something happened to cause the 100V Splitter Module microprocessor to restart. If does not clear, even after power down/up, replace the 100V Splitter Module.

3.2.7   RS485 Network Module LED Indications

There are three LED indicators on the RS485 Network Module.

- **ETH ACT** is on green if an Ethernet connection is present and blinks with Ethernet activity. It is off if there is no Ethernet connection or the Controller is powered down.
- **POWER** is on green, blinking off every few seconds as the RS485 Network Module communicates with the Controller over Ethernet. Off means 24V power is not supplied or the RS485 Network Module is faulty. Steady on means the RS485 Network is not communicating with the Controller – check the Ethernet connection, the address switch and the Site configuration.
- **FAULT** will flash yellow when there is a fault with any of the GP OUTPUTS, RS485/PA/WIP network connections, PIB / Fibre network connections, Controller Ethernet connection, QEComms to the VIF, or the RS485 Network module itself. A sequence of 16 flashes is shown, with a long flash indicating that the specific fault is present, and a short flash that the specific fault is not present. For example, if the second flash is long, then GP OUTPUT 2 is in fault – probably open circuit.

RS485 Network Module FAULT LED Flash Indications

Flash Number	Description	Explanation / Action
1	GP OUTPUT 1 supervision fault	For a supervised GP Output 1: When the output is off – a fault occurs on open circuit to the load, failure of the external supply (<12V), or short circuit of the output to 0V. When the output is on, an overload can cause a fault. Check the field wiring.
2	GP OUTPUT 2 supervision fault	For a supervised GP Output 2: When the output is off – a fault occurs on open circuit to the load, failure of the external supply (<12V), or short circuit of the output to 0V. When the output is on, an overload can cause a fault, Check the field wiring.
3	PIB connection fault	The RS485 Network Module is configured for Fibre networking and no response is being received from the PIB. Check the PIB cable is plugged into the TTL Port of the Network Module and power is supplied to the Fibre Networking Kit and PIB.
4	PIB Input Fault	FAS1 Input on the PIB is in fault. Check for the fibre ring being broken (Fault LED on the fibre switch is on) or the fibre switch is powered down or disconnected.
5	Ethernet fault	Ethernet connection to the Controller is open or not configured correctly, or the Address switch is wrong.

6	Watchdog fault	A watchdog fault has occurred. If this does not clear, or keeps occurring, then the RS485 Network Module may be faulty. Check with JCI Technical Support if a firmware update is available, otherwise replace the Module.
7	Active Firmware fault	CRC fault detected in the operational firmware. Check with JCI Technical Support if a firmware update is available, otherwise replace the Module.
8	QEComms fault	One or more configured VIF modules is not responding on the QEComms port. Check the internal wiring to and addressing of the VIF module(s).
9	Network Port A fault	There is no connection established with the next RS485 Network Module on the RS485 Network Port A.
10	Network Port B fault	There is no connection established with the next RS485 Network Module on the RS485 Network Port B.
11	PA Bus wiring fault	Open or short circuit on the Network PA audio connection. Check the field wiring, and the link settings on this and any other RS485 Network Module.
12	WIP Line wiring fault	Open or short circuit on the Network WIP audio connection. Check the field wiring, and the link settings on this and any other RS485 Network Module.
13	WIP AUDIO LEFT fault	Open or short-circuit on the WIP AUDIO CHAIN LEFT port connection to the Right port of the next module.
14	WIP AUDIO RIGHT fault	Open or short-circuit on the WIP AUDIO CHAIN RIGHT port connection to the Left port of the next module.
15	No configuration	No configuration has been received from the QE20 Controller. Check the Ethernet connection, the address switch of the RS485 Network Modules, the Controller is operating and the site configuration has the RS485 Network Module configured.
16	Other Fault	Refer to the QE20 LCD Fault Recall for details.

3.2.8   WIP / Input Module LED Indications

There are four LED indicators on the QE20 WIP / Input Module.

- **LDB1 FAULT** will flash yellow when there is a fault with any of the configured circuits, the WIP AUDIO CHAIN connections, or with the module itself. A sequence of 10 flashes is shown, with a long flash indicating that a specific fault is present, and a short flash that the specific fault is not present. The Table below explains each of the fault indications. Note the LED flashes for 5 seconds after power up and continuously if a remote terminal connection is active from the Controller.
- **LDB2 PWR/COMM** is on green, blinking off every second or so as it communicates with the QE20 Controller Module, when power is applied. Off means 24V power is not supplied or the module is faulty. Steady on means the module is not communicating with the Controller, or the module is faulty.
- **LDB3 WIP ACT** is on red when any WIP circuit is active (off-hook), i.e, ringing, calling, in talk mode, or on hold.
- **LDB4 FIP / MCP** is on red when any input configured as FIP or MCP is in the alarm condition.

In Bootloader mode all four LEDs flash together at ~8Hz. To exit Bootloader mode select the correct address on the rotary switches and power the module down and up again.

WIP / INPUT Module FAULT LED Flash Indications

Flash Number	Description	Explanation / Action
1	No configuration	There is no configuration in the WIP module. Check the site configuration includes this WIP module. Will be present on power up until communications with the QE20 Controller is established.
2	Short circuit fault	A WIP, MCP or FIP circuit is short circuit. Refer to the QE20 LCD for the circuit(s) in fault. Check the wiring, the WIP phone, etc.
3	Open circuit fault	A WIP, MCP or FIP circuit is open circuit. Refer to the QE20 LCD for the circuit(s) in fault. Check the wiring and termination at the WIP phone / MCP / alarm contacts, presence of correct EOL resistor, etc.
4	WIP AUDIO CHAIN Left port open circuit	The Left port of the WIP AUDIO CHAIN is open circuit. This should be connected to the Right port of the previous WIP/Input, Controller or RS485 Network module.
5	WIP AUDIO CHAIN Right port open circuit	The Right port of the WIP AUDIO CHAIN is open circuit. Connect to the Left port of next WIP module. Will not be shown on WIP Address #1 as this port is left open.

6	Not communicating with the Controller over QBus	Will be present on power up until communications with the QE20 Controller is established. Check: WIP Module is enabled in the site configuration; correct address is set on the rotary switches, QBus wiring is connected between the Controller and the module (may be via other modules), faulty module on QBus, or another WIP Module with the same address is present.
7	Invalid address on the ADDRESS rotary switches	Address is set to 00, which is an invalid QBus address (00 is used for Bootloader mode). Select a valid address 01 – 16 to match the site configuration. Addresses > 16 are currently not used, but do not set this fault indication. Otherwise, could be a faulty Module. Check with JCI Technical Support first, as the module could require a firmware upgrade. Otherwise replace it.
8	Firmware CRC fault	Faulty Module. Check with JCI Technical Support first, as the module could require a firmware upgrade. Otherwise replace it.
9	Software Fault	Should not occur in an operating system. Diagnostic function only. If powering the module down and up again does not clear the fault, replace the module.
10	System Fault	Unexpected restart. Should clear 30s after communications with the Controller is established. Check with JCI Technical Support as may need a firmware upgrade. Otherwise replace module.
Continuous	Remote Connection Active	A remote terminal connection is active from the QBM.

3.2.9   Relay Output Module (ROM) LED Indications

There are two LED indicators on the QE20 Relay Output Module.

- **LDB1 POWER** is on green, blinking off every few seconds or so as it communicates with the Controller Module, when power is applied. Off means 24V power is not supplied or the module is faulty. Steady on means the module is not communicating with the Controller, or the module is faulty.
- **LDB2 FAULT** will flash yellow when there is a fault with any of the supervised (VAD) outputs or with the module itself. A sequence of 23 flashes is shown, with a long flash indicating that a specific fault is present, and a short flash that the specific fault is not present. For example, if the fourth flash is long, then a short circuit fault or excessive current draw is present on Output 4.

If both **POWER** and **FAULT** are flashing at ~8Hz then the ROM is in Bootloader mode. Change the address switches to the required address and power the ROM down and up again to exit Bootloader mode.

Relay Module LDB2 FAULT LED Flash Indications

Flash Number	Description	Explanation / Action
1-8	Short circuit or excessive current draw (>1A) on VAD outputs 1-8	Field wiring issue, or incorrect setting of the links on the module. Check the connected loads, field wiring and link settings.
9-16	Open circuit on VAD outputs 1-8	Field wiring issue, no 2k7 EOL resistor fitted, or incorrect setting of the links on the module. Check the field wiring, EOL and link settings.
17	Over Current	Total load on the VAD outputs exceeds maximum. Determine which outputs are drawing excessive current and reduce the load.
18	Not communicating with the Controller over QBus	Module not configured in site configuration. Incorrect address set on the rotary switches, QBus wiring not connected from the Controller to the module (possibly via other modules), faulty module on QBus. Check the site configuration, address switch settings, QBus wiring, and for a different module that is faulty or mis-addressed.
19	Invalid address on the ADDRESS rotary switches	Check the rotary switches are not set to 00 (an address not generally used in QE20). Check with JCI Technical Support, as the module could require a firmware upgrade. If powering the ROM down and up again does not clear the fault, the ROM is faulty so replace it.
20	Firmware CRC fault	Check with JCI Technical Support, as the module could require a firmware upgrade. Otherwise, it is faulty so replace it.

21	Software Fault	Should not occur in operating system. Diagnostic function only. If powering the ROM down and up again does not clear the fault, the ROM is faulty so replace it.
22	System Fault	Unexpected restart (watchdog). Should clear after 30s comms with Controller. Check with JCI Technical Support as may need a firmware upgrade. Otherwise replace module.
23	I2C connection fault between the Terminal and Main Bds	Faulty Module. Replace the module.

3.2.10   Power Supply Module (PSE) LED Indications

There are two LED indicators and two 7-Segment displays on the 27A PSE.

- **"LOAD" Load Current** This green LED indicator (LD3) flashes at a rate determined by the load current, averaged over the previous few seconds. With no load, the flash rate is 0.5Hz. As the load increases, so does the flash rate, up to 10Hz at full load.

- **"CHG" Charge Current** This green LED indicator (LD4) flashes at a rate determined by the battery charging current. With no charging current, the flash rate is 0.5Hz. As the charging current increases, so does the flash rate, up to 10Hz at full charge current. If charging is disabled on the PSE this indicator will not flash at all. If the system load is being supplied by the battery (e.g., due to mains failure), this indicator will be continuously on.

If both LOAD and CHG are flashing together at ~8Hz, then the PSE is in Bootloader mode. Check the Address Rotary switches are not set to 00. If so, change the rotary switches to the correct address, power the PSE down totally, then power up again.

- **QBus Communications** The decimal point on the seven-segment display will blink on every few seconds when the PSE is operating and communicating correctly with the QE20 Controller.

Fault Codes – 7 Segment Display

The two-digit 7-segment display labelled **FAULT CODES** will light when the PSE detects a fault condition. When multiple faults are present, the codes will be displayed sequentially. The codes are:

Fault	Display Code	Detail
Mains Fail	**AF**	"AC Mains Fail" (instant). The mains fail fault is delayed.
Battery Capacity Low	**bc**	A long-term battery test has failed – the battery voltage dropped too low. This fault latches until a successful long term battery test occurs.
Battery Discharged	**bd**	The battery voltage is extremely low and has been disconnected to protect the battery. The system is non-functional when this code is displayed.
Battery Fail	**bF**	Battery Fail fault (below 21.6V). The battery is severely discharged. May take up to 30 seconds to detect.

Battery Low	**bL**	Battery Low fault (below 24.2V). The battery is at least 50% discharged.
Battery Shorted or Reversed	**br**	May take up to 30 seconds to detect.
Charger Fault	**cF**	Charger is not delivering charge to the battery when it should.
Comms failure	**co**	No QBus messages received from the QE20 Controller. Check the QBus connections, PSE Address Switches, Controller operation, site configuration, and perhaps for another faulty module on the QBus chain.
EEPROM Corrupt	**Ec**	Failed self test on the PSE Board. Replace the PSE.
Battery not connected	**nb**	"No battery" (or battery voltage is <13V). May take up to 30 seconds to detect. Check the battery connection and in-line fuse.
24V output overload	**OL**	Peak 24V output current has exceeded the nominal capacity too often in the last 30 seconds. Check the system design, amplifier loads, etc. Updates at 6s intervals. As the overload threshold is set at 24A, this may occur on a heavily loaded PSE when Alert or Evacuate is running. It does not generate a fault condition. Check the wiring – which amplifiers are powered by this PSE, to make sure additional amplifiers have not been inadvertently connected.
Program corrupt	**Pc**	Failed self test on the PSE Board. Replace PSE.
Temperature probe wiring fault	**tP**	The temperature probe is disconnected or shorted.

At initial power on, the PSE software version (Major.Minor) will be displayed, followed by a "walking segment" display test.

3.2.11   PIB LED Indications

LD3 RUN flashes on/off every second when the PIB is operating.
LD6 RX and **LD7 TX** flash when the PIB communicates with the RS485 Network Module.
LD5 PIB to PIB flashes when data is transmitted to or received from another PIB on the QE20 network.
LD9 SYSTEM FAULT A is on yellow if any PIB on the network has a fault condition.
LD1 Activity flashes with data Tx/Rx on the Ethernet port.
LD2 Link OK is on steady if the Ethernet port is connected to the switch.

3.2.12   VIF LED Indications

LD7 RUN flashes On/Off ~2 times per second when the VIF is operating.
LD8 QE90 Comms flashes approximately every 2 seconds in response to **QEComms** messages being received from the RS485 Network Module.
LD1 – LD3 indicate the state of PA calls on the fibre network.
LD4 – LD6 indicate the state of WIP calls.
Refer to LT0732 for details on these LED indications and how they show the stages of VoIP calls on fibre networking.

3.2.13   ATA LED Indications

Power is on steady green when the ATA is powered up, has an IP address and is ready to be used. Flashing indicates a problem with the ATA.

Network (globe symbol) is on green if connected to the switch and flashes when data is sent on to the fibre network.

Phone 1 and **Phone 2** are off when PA and WIP are idle. They slow flash green while a call is being set up or is in progress. If they fast-flash green there is a problem with registration or a factory-reset has been performed.

The **Problem Report Tool** LED may be on or flashing red / amber / green. It is meaningless in the QE20 application.

3.2.14   Fibre Switch LED Indications

PWR1 is on when power is applied (PWR2 is usually off as it is not connected).

FAULT on red indicates the loop is broken or the switch is faulty.

MSTR/HEAD is on if the switch is configured as the master of the ring and flashing if the ring is broken or the switch has become a master due to a break in the ring.

CPLR/TAIL is on when the switch is coupling data around the ring due to a break in the ring.

Port 4 and **5 100M** should be on and flash when data is transmitted around the ring (assuming the two fibre ports 4 and 5 are the ring ports).

Link / Activity LEDs for each Ethernet port. These will be on if a connection is present and flash as data is transmitted on the port.

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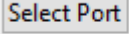
4.   Diagnostics Facilities

4.1   Connecting to the Controller

A laptop computer with QE20Config installed and licenced (or other serial terminal program such as SmartConfig, Wincomms, Tera Term, PuTTY, etc) can be used to access diagnostics on the QE20. The username and password that has the **Date/Recall** and **Diagnostics** options ticked in the QE20's site configuration will also be required.

User ID	User Name	Password	Site Specific Configuration	Firmware Programming	Date/Recall	Diagnostics	LCD Level 3
0	diag	••••••••	☑	☑	☑	☑	☐

Connect the computer's USB cable to the MicroUSB connector on the Controller module in the QE20. Run QE20Config and open the terminal using the **Window | Terminal** menu command or click on the terminal icon 🖥 .
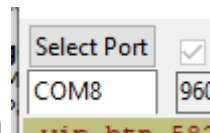
Click on the **Select Port** button and select the COM port that corresponds to the QE20 that is to be accessed. If there are multiple serial ports present the port for the QE20 will need to be identified. If using a different terminal program, select the port identified as \Device\USBSER000 (a baud rate of 115200 can be used). Click into the terminal window and press the Enter key. Check the prompt for a username is given.

```
ENTER USERNAME
->
```

Enter the username followed by the Enter key. Then enter the password (followed by Enter) when requested. The QE20 will indicate a successful log on by displaying the Controller firmware version and build date, followed by the site name and SID number, and then the main menu. For example.

```
QE20 Controller 0.3 Build date : Sep 14 2022 13:42:02
SID 10 40U Test 4100HLI SID #10

--- Main menu ---
h          : help
date       : show/set date
time       : show/set time
off        : show off normals
ver        : show firmware versions
dg         : diagnostics
his        : show latest 20 event history
his x      : show latest x event history
his clear  : Clear event history
q          : logoff
main++
```

The Main Menu displays the commands that are available. Of particular interest are the **off** and **ver** commands. The **off** command is described in Section 4.3 and the **ver** command is described in Section 5.4.

The **his** commands can be used to display (or capture) the historical log of events that have occurred on the QE20 – refer Section 4.3.

The **dg** menu command can be used to access diagnostic facilities. Refer Section 4.5.

The **time** and **date** commands can be used to view and enter the time and date.

The **q** command logs off from the diagnostic terminal (the same as removing the USB cable from the QE20 or the PC).

4.2	**Off Command**

The **off** command lists the off-normal status of the QE20 along with some useful information. If there are no off-normals present the report is quite short. Otherwise, it details the zones and WIP buttons that are not normal – in Alert, Evacuate, Speech, and Disabled, or calling, ringing etc. Then it lists the off-normals by inputs and then by the zones affected. If a * prefixes the input or zone number, then the condition is currently present. If there is no * then the condition is latched. Then the report lists all the modules that have faults present. For example, this report shows a QE20 with a number of zones active, faults present, and alarms latched.

```
main++off
main++
===============================================================
SID 10 40U Test 4100HLI  SID 10
Off normal conditions.
* means condition is active, no * means condition is latched
Thu Sep 22 15:03:44 2022
===============================================================


Main Controller Off normals
---------------------------
WIP System fault
Alert Zone 17
Evac Zone 24
Speech Zones 19,20
Disabled Zones 1-4

Relay Output Faults on circuits *1.1
WIP circuits active as MCP/FIP inputs *1.10
*Bus segment 1 PA SPEECH fault detected at SID 10
*Bus segment 1 WIP SPEECH fault detected at SID 10
FIP Alarms affecting zones *10
Card Failure or HLL Failure on FIP inputs affecting zones *18 *19 *20 *21
*22 *2
3 *24 *25 *26 *27 *28 *29 *30 *31 *32 *50 *51 *52 *53
Modbus Master Comms fault

Link Integ Ch A not received here from SIDs *11
Link Integ Ch B not received here from SIDs *11
Link Integ Channel A not received here from *Fire Panel* SIDs *200
```

```
Link Integ Channel B not received here from *Fire Panel* SIDs *200

-----------------------------------------

U Variables True <None>
V Variables True <None>

Local SID 10  PSE Card 3  Off normals
-----------------------------------------
Mains fail
Mains fail non delayed state

Local SID 10  ROM Card 1  Off normals
-----------------------------------------
Relay 1 : Open circuit

Local SID 10  Network Card 1  Off normals
-----------------------------------------
Ring port A fault
Ring port B fault
PA line open
WIP line open

Buzzer state = 0


================================================================
End of off normal list  Thu Sep 22 15:03:44 2022
================================================================
```

4.3   His Commands

The **his** command displays the historical list of events, from the most recent to the oldest. The output can be viewed or captured into a PC file for analysis.

If just the **his** command is entered (with no parameters) then the most recent 20 events are listed (approximately a screen full on a full screen window). If a number is entered as a parameter, then up to that many events are displayed. For example, **his 5** will show the five most recent events.

If **clear** is entered as the parameter then the entire events history is cleared. Note this history is the same as shown on the LCD touchscreen for the **EVENTS** command, so be sure that clearing the events history is what is wanted before using this command.

4.4   Script Diagnostics

The **dg** command gives access to the diagnostics menu.

```
diag++h
--- Diagnostics menu ---
H          : Help
Q          : Quit Menu (escape)
LOG        : Message monitor & debug
EX         : Execute script statement
EV         : Evaluate script expression
EXEC       : Run script command menu
OFF        : Show off normals

diag++
```

Of most use is the **EXEC** command to start the script command menu. When **EXEC** is entered the Execute script commands menu is displayed, along with the cmd++ prompt. For example.

```
diag++exec
--- Execute script commands ---
Commands are case insensitive. Script tokens are case sensitive.
?<script expression>      : evaluate script & display result
<script assignment>       : execute script & assign
help                      : display help
quit                      : quit menu
cmd++
```

The valid commands at this prompt follow the format and syntax of the script commands in QE20Config. There are two general formats:

```
?script_expression
Destination=script_expression
```

The ?script_expression format will evaluate the script expression and then display the result. This can be used to display the status of script tokens, variables, inputs, and zone states. For example, these commands display the alert state of zone 17 (1 = on), the evacuate state of zone 24 (1 = on), and the result of the formula 24+16, which is 40.

```
?A17 : 1
?E24 : 1
?(24+16) : 40
```

The destination=script_expression format will evaluate the script expression and then assign the result to the destination. This can be used to activate conditions on zones or outputs, or set variables and internal states. For example, the following commands will: turn background music on for zone 24, assign the logical OR of an input open circuit on the Controller and the UI module to named variable Var1, and turn on the relay output 1 on module 1 if zone 4 is in Evac.

```
M24=1
$Var1=(CTIPOC1 | UIIPOC4)
RM1.1=E4
```

These commands are extremely useful in testing script operation, activating outputs to test that they work, verifying the state of inputs, or simulating conditions so that script operation can be initiated.

Care should be taken in using the destination=script_expression commands as they might bypass rules that limit when they can be used on the user interface, for example.

Make sure that any assignments that affect system operation are cleared or the QE20 is restarted after using these commands, so that all manually entered commands are cleared and do not affection on-going operation (many assignments =1 latch until a new assignment = 0).

Refer to the QE20Config User Manual or help pages for details on the script language, expression format, input tokens and destinations, etc.

4.5   Log Menu

The LOG command in the diagnostics menu can be used to enable logging of communication messages between modules in the QE20.

A description of these commands and the data therein is beyond the scope of this manual. JCI Tech Support or R&D will provide guidance if use of these commands is required.

4.6   Module Diagnostics

Some of the other QE20 modules have an in-built diagnostics function.

A description of these facilities is beyond the scope of this manual. JCI Technical Support or R&D staff will provide instructions if these facilities need to be used.

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5.   Configuration & Firmware Updates

5.1   Site Configuration Details

Most site settings are entered into QE20Config to form the site configuration. This is downloaded to the QE20 and stored in non-volatile memory in the Controller, so it is available each time the QE20 is turned on.

Details of the site configuration currently stored in the QE20 can be determined as follows.

On the LCD touchscreen touch the **STATUS** button in the main menu, then the **SYSTEM** button to display the System Information, including details of the configuration. This includes the System Name, SID, filename and time and date of creation of the site configuration, and the quantity of each type of module and function present.

SYSTEM INFORMATION (1/15)		
System Name	LT0711 QE20 Operator Manual	>>
SID Number	1	PgUp
Time Zone	Pacific/Auckland	PgDn
CFG File Name	...uments\QeConfig\LT0711 Operator Man.qe20	
CFG File Date	20/09/2022 11:01am	
CFG File CRC	ae53badb	BACK

The CFG File CRC shown on this screen will match the CRC shown in QE20Config using the Show CRC command if the two configurations are the same.

5.2   Updating QE20 Site Configuration

QE20Config is used to update the site configuration. Refer to the QE20Config User Manual LT0704 for details on preparing the site configuration and downloading to the QE20.

The existing site configuration username and password for downloading the configuration will need to be known to download the new configuration into the QE20. If these are not known, then it is possible to request a one-time password. Refer to Section 5.3.

When preparing the site configuration or downloading it to the QE20 make sure the username and password are known for the user that has the **Site Specific Configuration** option ticked.

5.3   Obtaining Password To Download Configuration

The username and password for downloading the configuration in the existing site configuration will need to be known to download a new configuration (or even just a

modification of the existing one) into the QE20. If the username and password are not known, then it is possible to request a one-time password to download the new configuration.

Connect the laptop with QE20Config installed and licenced to the QE20 (refer Section 5.1) and use the following QE20Config menu command:

Tools | QE20 Lost Password | Get Request

to prepare a request. This will extract a signature from the specific QE20 and issue a prompt to save the details on the computer. Save the file and then send it to JCI Tech Support, who will provide a response file. Save this file on the computer and reconnect to the same QE20. In QE20Config use this menu command:

Tools | QE20 Lost Password | Install Response

to select the saved response file and send it to the QE20 to allow download of the new configuration. This will create an Authentication Bypass Fault.

Make sure the username and password of the user option that has the **Site Specific Configuration** option ticked in the new site configuration are known. Download this configuration to the QE20. Note any username and password can be entered at the prompt – as the QE20 is in Authentication Bypass mode.

When the new site configuration is downloaded the QE20 will clear the CTRL Authentication Bypass fault condition.

5.4   Determining Module Firmware Versions

There are two ways to determine the firmware version of the QE20 Controller and all the modules in the QE20.

1) On the LCD touchscreen touch the **STATUS** button in the main menu, then the **FIRMWARE** button to display all the configured modules together with their firmware version number and firmware CRC. For example.

2) Log on to the Controller Diagnostic facility using QE20Config (refer Section 4.1) and use the **ver** command to list all the configured modules and their firmware versions. This displays the Controller firmware and configuration details, the OS information, and then the QBM, MUI, MKI and Network Module version details. Then it lists all the configured modules and their details. Finally, the amount of the data storage used and available on the Controller is listed. For example.

```
QE20 Controller 0.3 Build date : Sep 14 2022 13:42:02
SID 10 40U CSIRO Test 4100HLI SID #10

Linux OS = 4.9.288

QBUS Manager :    0.56  0E0B9C1D
MUI LCD Module :   0.35  B5CA1733
MKI :   0.8   05E67F59
Network Modules : 1:  0.57  4D9CE24B

8 Zone Extender Modules
 1:  0.4  86AD299F 2:  0.4  86AD299F 3:  0.4  86AD299F 4:  0.4  86AD299F
 5:  0.4  86AD299F 6:  0.4  86AD299F 7:  0.4  86AD299F 8:  0.4  86AD299F

8 WIP Extender Modules
 1:  0.4  7B6F061B 2:  0.4  7B6F061B 3:  0.4  7B6F061B 4:  0.4  7B6F061B
 5:  0.4  7B6F061B 6:  0.4  7B6F061B 7:  0.4  7B6F061B 8:  0.4  7B6F061B

Amplifier Modules
 1:  0.60 870B99F0 2:  0.60 870B99F0 3:  0.60 870B99F0 4:  0.60 870B99F0

WIP Modules
 1:  0.9  43B2BE0E 2:  1.2  7D7E7F78 3:  1.2  7D7E7F78 4:  1.2  7D7E7F78

ROM Modules
 1:  1.8  34E0259A 2:  1.2  7D7E7F78 3:  1.2  7D7E7F78 4:  1.2
7D7E7F78

PSE Modules
 1:  1.8  0DC2C921 2:  1.8  0DC2C921 3:  1.8  0DC2C921

Data Storage: 5.2 MiB used of 220.1 MiB total
```

5.5   Updating Firmware

5.5.1   General

When updating firmware in the QE20 precautions may need to be taken to ensure that outputs are not accidently activated. Press the **Silence Warning** button to turn off all speaker and VAD outputs (note they will turn on if a new alarm is detected).

5.5.2   Controller

The Controller firmware will be supplied as a package ready for installation. It will be called SF0577 (with some other details) and have a suffix of .qe20controller. It will also contain firmware for the QBM (on the Controller Module), RS485 Network Module and Amplifier Module.

Instructions for doing the update are covered in the QE20Config Help file and User Manual (LT0704).

A PC running QE20Config is required, along with a USB-A to Micro-USB cable. The username and password configured to do firmware updates in the specific QE20 site configuration will also be required. If this is not known then the lost password function could be used to download a new site configuration for which the usernames and passwords are known.

Connect the USB cable to the PC and to the Micro-USB socket on the front of the QE20 Controller Module.

Start QE20Config and use the **Tools | Program Firmware | QE20** command from the menu to bring up a dialog box to select the firmware package. Select the appropriate SF0577 Controller package (not the MUI package) and click Open.

QE20Config will prompt for the username and password that is enabled to download firmware into this specific QE20 panel (the site configuration will need to contain a Username and password that has the "Firmware Programming" checkbox ticked). If the site configuration does not have such a user configured or the username / password combination is not known, then it will be necessary to obtain the site configuration, update it to include a user that has "Firmware Programming" ticked, and for this configuration to be downloaded to the QE20. This will require the site configuration username / password to be known. If it is not known, then use the method described in Section 5.3 to recover from a lost password.

Enter the Username and password, then check the PC Comms Port is displaying the name of the QE20 site configuration. Click OK. QE20Config will then download the file to the QE20, and the Controller will automatically restart using the new firmware.

If the firmware for the QBM, RS485 Network Module or Amplifier Module in the new package is a higher version number than the firmware in the corresponding modules in the QE20, then the firmware in those modules will be automatically updated as well. This will be shown on the MUI LCD. Allow this to complete.

If the MUI firmware also needs updating refer to the following section.

Refer to Section 5.4 to confirm the Controller and module firmware versions installed.

5.5.3   MUI Firmware Updating

The firmware package for the Master User Interface (MUI) module is usually provided alongside, but separate to an update of the Controller firmware. The MUI firmware will be supplied as a package for installation. It will be called SF0578 (with some additional details) and have a suffix of .qe20mui.

QE20Config is used to do the firmware update. Details are covered in the QE20Config Help file and User Manual (LT0704).

A PC running QE20Config is required, along with a USB-A to Micro-USB cable. The username and password configured to do firmware updates in the QE20 site configuration will also be required.

Connect the USB cable to the PC and to the Micro-USB socket on the front of the QE20 Controller Module.

Start QE20Config and use the **Tools | Program Firmware | QE20** command from the menu to bring up a dialog box to select the firmware package. Select the appropriate SF0578 MUI package (not the Controller) and click Open.

QE20Config will prompt for the username and password that is enabled to download firmware into this specific QE20 panel (the site configuration will need to contain a username and password that has the "Firmware Programming" checkbox ticked).

Enter the username and password, then check the PC Comms Port is displaying the name of the QE20 site configuration. Click OK. QE20Config will then download the file to the QE20, and it will automatically update the MUI with the new firmware.

Allow the MUI to update its firmware and restart, then use the method in Section 5.4 to confirm the MUI firmware version installed.

5.5.4   QBM, Amplifier, RS485 Network Module Firmware Update

When new Controller firmware is supplied, the corresponding firmware versions for the QBM (the second microprocessor on the Controller module), Amplifier and RS485 Network Modules will be included as well. These modules will automatically update their firmware, if there is a new version contained in the Controller firmware package installed.

Manual updating of the firmware on these modules should not be required.

5.5.5   PSE, WIP, ROM Firmware Update

Updating the firmware of the PSE, WIP, or ROM modules involves the use of a PC, special programming software – PIC-Writer (SF0576) and a programming lead (FP2030 FP, QE20, PIC Module Programming Lead).

Obtain the module firmware, PIC-Writer programming software, and the programming lead. Install PIC-Writer onto the PC, along with the firmware file(s) to download. Connect the programming lead to a USB port of the PC.

One module can be updated at a time.

Disconnect the QBus 4 wire cable from the Controller QBus connectors (J23 or J24) and connect it to the programming lead.

For the module being updated change the address switch to 00 and power up the module. This will put the module into Bootloader mode – shown by the LEDs flashing at about 8Hz.

Module Type	Bootloader Mode Indication
WIP	All 4 LEDs (FAULT, PWR/COMM, WIP ACT, FIP/BGA) flash together at ~8Hz.
ROM	Both LEDs (POWER & FAULT) flash together at ~8Hz.
PCC	The LOAD and CHG LEDs flash together at ~8Hz.

Run PIC-Writer (refer section 5.5.6) with the selected module type to be updated and the firmware file to be downloaded. Make sure the correct file is selected for the module being updated.

This will download the file to the module – taking approximately 30s. On completion the module will check the downloaded file is correct and then start the module firmware. Check the module LEDs are no longer showing bootloader mode, and restore the address to the correct address in the system.

Once all required modules are updated, reconnect the QBus 4-wire cable to the Controller and check the version numbers are correct as described in Section 5.4.

5.5.6   8 Zone, 8 WIP Extender Modules & MKI

Updating the firmware of the Extender and MUI modules involves the use of a PC, special programming software – PIC-Writer (SF0576) and a programming lead (FP2030 FP, QE20, PIC Module Programming Lead).

Obtain the module firmware, PIC-Writer programming software, and the programming lead. Install PIC-Writer onto the PC, along with the firmware file(s). Connect the programming lead to a USB port.

One module can be updated at a time.

<u>8 Zone & 8 WIP Extenders</u>

Disconnect the UBus 4 wire cable from the relevant MKI UBus connector (J2 or J3) and connect it to the programming lead. 24V will need to be provided from the QE20 to the programming lead 24V connector. This could be obtained from the J5 or J6 connectors on the MUI Module.

For the 8Z or 8W Extender module being updated change the address switch to 00 and power up the module. Check the module has entered Bootloader mode.

<u>MKI Module</u>

Disconnect the UBus 4 wire cable that leads from either MKI UBus connector (J2 or J3) to a Zone/WIP Extender from the Extender Module and connect it to the programming lead (so the programming lead is connected to the MKI UBus Connector).

Press and hold the **SILENCE BUZZER**, then the **ALL ALERT** button on the MKI. While holding both buttons down press and hold the RESET button on the MUI board for ~5s until the RESET LED on the MUI comes on. Release the RESET button, then release the ALL ALERT and SILENCE BUZZER buttons. This will put the MKI into bootloader mode.

Bootloader mode is shown by specific LEDs on the module flashing at about 8Hz.

Module Type	Bootloader Mode Indication
8 Zone Extender	Both internal LEDs (POWER/LINK & SYSTEM FAULT) flash together at ~8Hz.
8 WIP Extender	Both internal LEDs (POWER/LINK & SYSTEM FAULT) flash together at ~8Hz.
MKI	The front POWER and the internal POWER/LINK LEDs flash together at ~8Hz.

Run PIC-Writer (refer section 5.5.7) with the selected module type being updated and the firmware file to be downloaded. Make sure the correct file is selected for the module type.

This will download the file to the module –taking approximately 30s. On completion the module will check the downloaded file is correct and then start the module firmware. Check the module LEDs are no longer showing bootloader mode, and restore the address to the correct address in the system.

Once all required modules are updated, reconnect the UBus 4-wire cables correctly and check there are no faults and the version numbers are correct as described in Section 5.4.

5.5.7   Using PIC-Writer

PIC-Writer (SF0576) is a Windows command line tool for downloading firmware to the PIC-based QE20 Modules - WIP, ROM, PCC, MKI and 8 Zone/WIP Extenders.

It will update one module in bootloader mode at a time over a QBus / UBus connection using the FP2030 Programming lead.

The parameters are entered after the command on the Windows command line. I.E.

Picwriter "hex filename" module_type address com_port

Where:

"Hex filename" is the name (and location if not in the same folder as picwriter.exe) of the module software file to be downloaded.

Module_type is a number identifying the type of module to be updated.
6 = PCC, 7 = ROM, 8 = WIP, 14 = MKI, 15 = 8WIP, 16 = 8Zone

Address is the address of the module, 0 if the module is in bootloader mode, otherwise the address switch setting.

Com_port is the PC COM port number assigned to the programming lead.

For example:

Picwriter SF0547_WIP_V1.1.hex 8 0 11

Will update the firmware of WIP/INPUT Module at address 0, using com port 11.

The command line details could be saved in a Windows .bat file to make operation easier and repeatable.

5.6   Fibre Networking - PIB, VIF, ATA, Switch

Updating the firmware of the PIB, VIF, ATA, and switch contained in the Fibre Networking kit is possible.

Refer to the PIB User Manual LT0519 for information on updating the PIB firmware.

Refer to the QE20 Fibre Networking User Manual LT0732 for information on updating the VIF firmware.

Refer to the relevant manuals for the ATA and fibre switch for updating their firmware.

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6.   Spare Parts

6.1   Spare Parts

Note most QE20 products are labelled with the part number of their replacement part.

Part Number	QE20 Module Spare / Additional Item
FP2000	QE20 Controller Module
FP2001	QE20 27A Power Supply Equipment (PSE)
FP2002	QE20 Relay Output Module (ROM)
FP2003	QE20 WIP/Input Module
FP2005	QE20 RS485 / Network Module
FP2006	QE20 Quad 25W Amplifier Module
FP2007	QE20 Quad 60W Amplifier Module
FP2008	QE20 Dual 120W Amplifier Module
FP2009	QE20 Single 240W Amplifier Module
FP2010	QE20 Master User Interface Module (LCD & All-Zone Controls)
FP2011	QE20 8 WIP / 8 Zone Extender Module
FP2012	QE20 16 WIP Extender Module (8 WIPs fitted)
FP2013	QE20 16 Zone Extender Module (8 zones fitted)
FP2014	QE20 WIP Tray and Speech Microphone
FP2015	QE20 Extender Module Blank
FP2019	QE20 Rack Cab Cooling Module (Fan Module, 2 x baffles, filter)
FP2020	QE20 Battery Shelf
FP2021	QE20 8 Zone Expansion Board c/w Loom and Mtg
FP2022	QE20 8 WIP Expansion Board c/w Loom and Mtg
FP2023	QE20 2 x 4 Way 100V Splitter Module
FP2024	QE20 Fibre Networking Kit, Single mode fibre
FP2025	QE20 Fibre Networking Kit, Multi-mode fibre
FP2026	QE20 SECP Controller Module
FP2027	QE20 Power Distribution Fuse Board
FP2028	QE20 Cooling Fan Air Filter Kit
FP2029	QE20 GP Mounting Bracket
FP1186	Kit, QE20 Module Mounting Frame C/w Mtg
FP1187	Kit, QE20 5 Module Support Kit 15U
FP1189	Kit, QE20 9 Module Support kit 27U

Part numbers for some of the peripherals commonly used with QE20 panels:

Part Number	Peripheral Parts
FP0539B	QE20 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	QE20 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