

Designed and created by:-



16 Channel Cue Light System

A visual signalling system for theatres that allows silent cues to be given to actors and technicians

- Up to 36 programmable Cue Lights
- Multiple Cue Lights per channel
- 2,000m (6500ft)+ total cable length
- Uses a single 1 pair cable

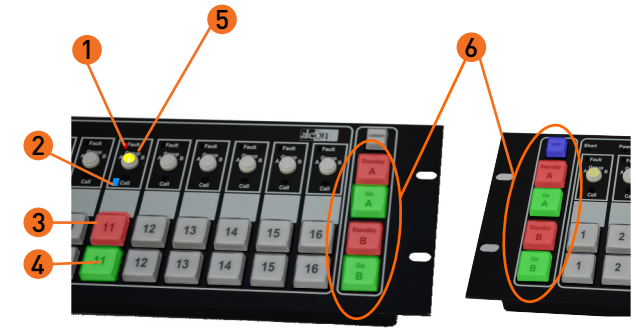
Supplied By



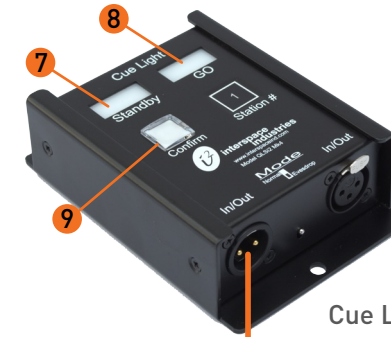


Quick Start Guide

- Using a standard 3 pin XLR **microphone cable** **10**, connect one or more Outstations to either XLR connector on the Master Station's rear panel.
Both XLRs on the Master Station can be used at the same time.
- Both **Go and Standby lamps** **3 4** on the Master Station will light dimmed once the Outstation has performed a lamp test.
- Press a **Standby button** **3** on the Master Station.
Standby lamps **3 7** on the Master Station & Outstation flash.
- Press the Outstation's **Confirm button** **9**
The **Standby lamps** **3 7** burn steadily.
Pressing the Confirm button when the Standby lamp is not flashing will light the **Call lamp** **2**
- Press the **Go button** **4**
The **Go lamps** **4 8** light.
The Standby lamp goes out if it was on.
After 3 seconds the Go lamp flashes.
After a total of 15 seconds, the Go lamp turns itself off.
- Trigger cues across multiple channels by the press of a single master **Group button** **6**
Assign channels to **Group A or B** **5**
- When an Outstation is unplugged, the **Fault lamp** **1** flashes.
Reset the Fault lamps by pressing both the red and blue buttons on the Master Station.



Master Station's front panel Right side and Left side.
Group controls are located on both sides.



Cue Light Outstation

Power.
36V DC 1.9A



Master Station's rear panel

Supplied By



Designed and created by:-



Index

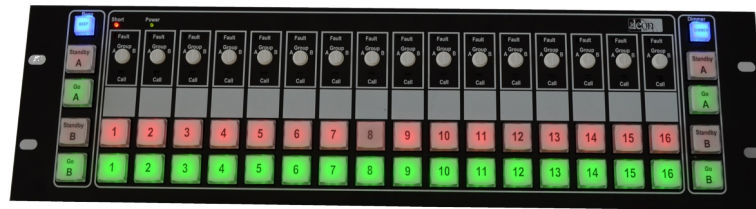
- 2 Quick start Guide
- 4 The Cue Light Components
- 7 16 Channel Master Station. QLM16i2 Mk4
- 13 Cue Light Outstation types and configuration
- 14 Cue Light Outstations
 - Standard Outstation. QLSi2 Mk4
 - Beeper Outstation. QLSi2-B Mk4
- 14 Standard Outstation features in detail
- 18 Multiple Outstations per channel
- 19 Relay Outstation. QLRI2 Mk4
- 22 Changing an Outstation's channel
- 27 Outstation Cables
- 32 Linking multiple Master Stations
- 34 Master Station Configuration Editor
- 46 Diagnostics
- 47 System design suggestions
- 48 Specifications
- 50 Warranty, Declarations and Standards.

Supplied By





The Cue Light Components



Cue Light Master Station.

Cue Light Master Station. Model QLM16i2 Mk4 Details on page 7

- 16 channel digital Cue Light Master Station can be used with any number of Cue Light Outstations from 1 to 40.
- Any number of Outstations (up to the maximum 40) can be connected to any channel
- Up to 6 Master Stations can be linked for larger systems.
- Dual Master Stations can be used on the same wiring universe. (this feature coming soon)
- Can be controlled from a PC running show control software.
- 5 types of Outstation including Relay.
- Up to 16 programmable options for each individual channel.
- Outstations can be wired using daisy chain, star and/or loop wiring topologies on a single 3 pin XLR microphone cable.
- Total cable length can be greater than 2,000m (6,500 feet).
- Powered from a universal 90/264V 50/60Hz external power supply.



Standard Cue Light Outstation
Model QLSi2 Mk4

Cue Light Outstation with Beeper
Model QLSi2-B Mk4

Standard Cue Light Outstation. Model QLSi2 Mk4 Details on page 14

- 20mm Go and Standby LED lamps are bright, wide angle and dimmable.
- Red or yellow Standby lamp option programmable per Outstation.
- Backlit Acknowledge button can also signal the Master Station.
- Eavesdrop mode switch enables the use of multiple Outstations per channel.
- 16 programmable options for each individual Outstation.

Cue Light Outstation with Beeper. Model QLSi2-B Mk4 Details on page 14

- As per the Standard Outstation, but with an inbuilt beeper.
- The beeper is triggered by the Beep button on the Master Station and/or programmable **Beep-on-Go** option.
- It can be used as a Standard Outstation (without beeps) as it only beeps when specifically commanded to do so.

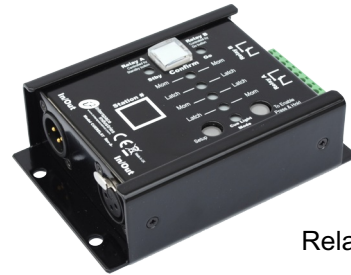
All Outstations are available individually.

Supplied By





The Cue Light Components (Continued)



Relay Outstation



RS232/RS485
Computer interface

Relay Outstation. Model QLRI2 Mk4

Details on page 19

- This Outstation has two relays with changeover contacts which allows for direct control of other circuits such as smoke machines, door bells and stage telephones etc.
- The relays are controlled by the Go and Standby buttons on the Master Station.
- Cue Light/Latching/Momentary operating modes are selectable.
- Connection to the voltage free relay contacts is via Phoenix compatible connectors.
- There is provision for an external Confirm button.
- 10 programmable options for each individual Outstation.
- It can function as a Standard Outstation although the Go and Standby lamps are only 5mm in diameter.

PC Interface QL2-PCi Mk4

- Connects between the Master Station and a PC running 3rd party show control software to provide remote control for up to 6 Master Stations via RS232 or RS485.
- Allows control from a touch screen or show control script.

Supplied By



Designed and created by:-



The Cue Light Components (Continued)

Coming Soon

- Simultaneous control from 2 Master stations.
- Ethernet bridge.
- Splitter with 2 or 4 ports.
2,000m of cable on each port. Master and Outstations can connect anywhere on any port.

Supplied By





16 Channel Master Station QLM16i2 Mk4



The system consists of a Master Station and any number of Cue Light Outstations from 1 to a maximum of 40.

Cue Light Outstations have an **Eavesdrop** mode which allows an unlimited number of Outstations to be assigned to the same channel (up to the system's maximum of 40).

The wiring between a Master Station and its Outstations is known as a wiring **universe**. A universe supports a maximum of 16 channels. With multiple Outstations per channel, there may be up to 40 Outstations connected to these 16 channels.

The Master Station can be connected at any point in the wiring **universe**. This allows the Master Station to be easily moved from any mode to any other mode on the wiring, such as from prompt corner to a production desk in the auditorium during rehearsals.

Two Master Stations can be connected to the same wiring **universe** allowing for dual control of 16 channels. (this feature coming soon)

Up to 6 Master Stations can be linked for larger systems. Each Master Station must have its own wiring universe of 16 channels.

The digitally addressed Cue Light Outstations are connected using a single 3 pin XLR microphone cable although screened data cable is preferable. CAT5/6 cable may be used. Outstations may be connected using either daisy chain, star and/or loop wiring topologies. The Master Station provides power to all Outstations over this same cable.

Cable faults are reported as soon as they happen as Outstations are in continuous communication with the Master Station.

A **Short** lamp lit indicates a short circuit in the external wiring to the Outstations. External wiring is protected by an electronic current limiter which is backed up by a self resetting fuse.

A white designation strip runs between all channels.

Supplied By





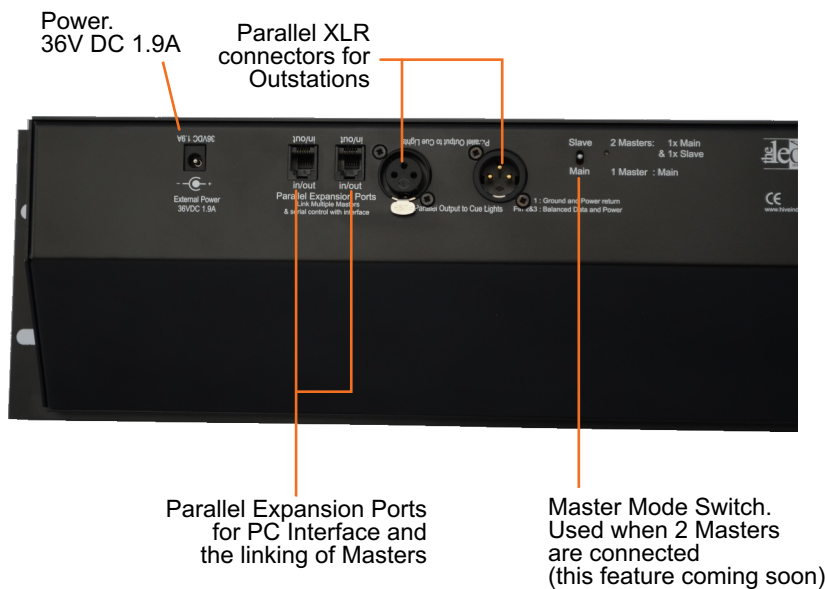
16 Channel Master Station (Continued)



Go and Standby buttons 1 2

The illuminated Go and Standby buttons on the Master Station light dim once an Outstation is connected and has performed a lamp test. These 2 buttons are used to send cues to a Cue Light Outstation.

The Go and Standby buttons light brightly in response to a Go or Standby cue. They are driven by data returned from the Outstations. This is known as **positive monitoring**. They are not just a local indication that a button has been pressed.



Master station's rear panel

Eavesdrop Outstations

On any channel, set only one Outstation to **Normal Mode**. This Outstation will send **return monitoring** to the Master station for driving the **Go and Standby lamps** 1 2

All additional Outstations assigned to that same channel must be set to **Eavesdrop Mode**. These additional Outstations respond to commands from the Master Station but send no return monitoring. They can however, send **Call** signals. (see the following page)

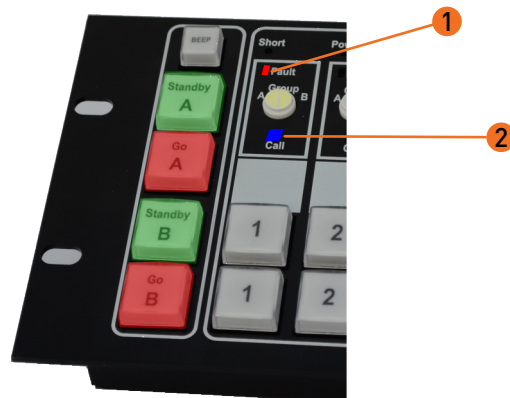
For more details on Eavesdrop Mode see the section on **Multiple Outstations per channel** (page 18).

Supplied By





16 Channel Master Station (Continued)



Call Lamps 2

Each channel has a blue **Call** lamp to enable an Outstation to signal the Master Station.

An Outstation's Confirm button has 2 functions.

- If a Standby cue is waiting to be acknowledged (Standby lamps flashing), pressing the Confirm button will cause the Standby lamps to burn steadily.
- Pressing the Confirm button at any other time will light the Call lamp.

The Call lamps can be disabled as well as set to flash or burn steadily on a channel by channel basis. These changes are made via the Master Station's **Configuration Editor**. (page 34)

While Outstations set to **Eavesdrop Mode** do not send return monitoring to the Master Station, they do send **Call** signals.

Fault Lamps 1

A red Fault lamp at the top of each channel indicates when an Outstation is not communicating with the Master Station. This could be due to an unplugged Outstation or a cable fault.

The Fault lamp has 3 states. On, Off and Flashing.

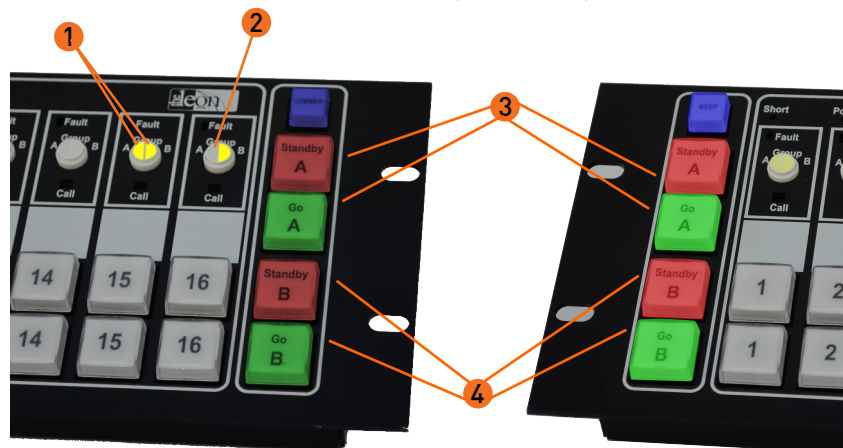
- The Fault lamp is off when a channel is unused (no Outstation connected). Go and Standby buttons will also be off. The Fault lamp is also off when an Outstation is connected but in this case the Go and Standby buttons will light dimmed.
- The Fault lamp is on if a channel has an Outstation connected in **Eavesdrop Mode** but no Outstation in **Normal Mode**. The **Eavesdrop Mode** Outstation will still respond to Go and Standby cues but the Go and Standby buttons on the Master Station will not light as there is no return monitoring from Outstations in **Eavesdrop Mode**.
- The Fault lamp flashes when all Outstations on that channel are unplugged.

Flashing Fault lamps can be reset by pressing both the Beep and Dimmer on the Master Station.

The Master Station and Outstations are in continuous communication with each other, enabling prompt detection of cable faults or disconnected Outstations.



16 Channel Master Station (Continued)



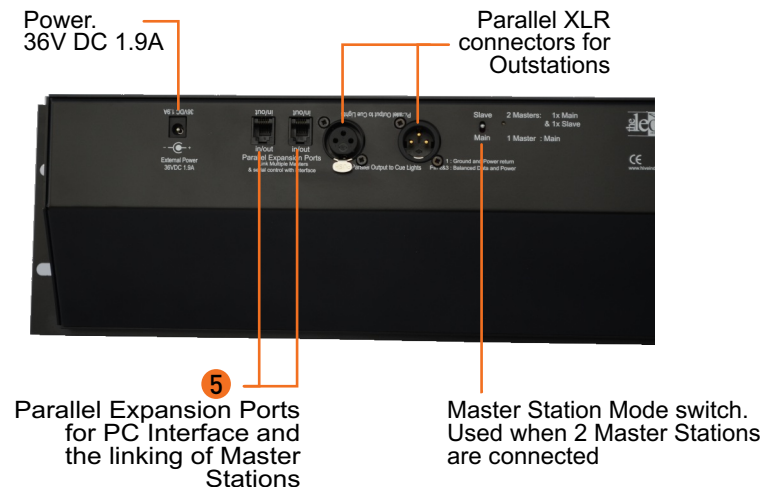
Group buttons, Right side and Left side

The group feature allows cues across multiple channels to be triggered by the press of a single button. Any channel can be assigned to one of two Group Master buttons **Group A** ③ and **Group B** ④

The group assignment for each channel is controlled by the **Group button** ② and its associated **amber lamps** ①. Pressing a Group button cycles through four possible group assignments: A, B, A+B and none. Pressing either of the Group Master Go or Standby buttons is exactly the same as pressing the corresponding Go or Standby button on any channel that has been assigned to that group master.

The channel's Go and Standby buttons still remain fully operational independent of any group assignment. The status of each channel's Group button is saved in memory and is restored when the Master Station is powered up.

To quickly clear group assignments across multiple channels, press and hold any two Group buttons for 0.5 seconds. All channels between (and including) those two buttons will have their Group assignments set to off.



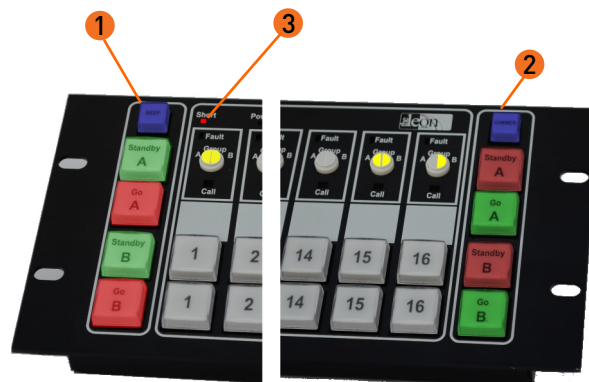
Linking Multiple Masters Stations

When multiple Master Stations are used, the 4 **Group Master buttons** ③ ④ can be linked across the Master Stations via an **expansion port** ⑤ on the rear panel. Up to 6 Master Stations can be linked.

Pressing any of the four Group Master buttons on any Master Station will electronically **press** the corresponding Group Master button on all linked Master Stations. This allows cues across multiple Master Stations to be triggered by the press of a single button.



16 Channel Master Station (Continued)



Beep button ① Left side....

The Blue **Beep button** works like a shift key in conjunction with a channel's Go and Standby buttons. The Beep function requires a Beeper Outstation (Model QLSi2-B) which is basically a standard Cue Light outstation fitted with a beeper. This Outstation functions just like a standard Outstation when the Master Station's beep button isn't pressed. The beeper can be triggered to emit either a very short beep (which sounds like a click), or beep for as long as the button is pressed, up to a maximum of one second.

Beep button + Standby button = very short beep.
Beep button + Go button = long beep.

The beep is accompanied by the flashing of the Standby lamp on the triggered Outstation(s). The Beep button can also be used in conjunction with the group master buttons. The beep function can be disabled on a channel by channel basis via the Master Station **Configuration Editor**. (page 34)

The Beep command is ignored by Outstations not fitted with a beeper.

Short Lamp ③

The Short lamp indicates short circuits on the external XLR wiring. Fault current is electronically limited to approximately 1.6 amps.

If the short is maintained for more than 400mS, the power supply enters a hiccup mode where power to the Outstations is turned off and reapplied once every few seconds until the fault is cleared.

If the short is persistent, the period before reapplying power increases from 2 seconds to 8 seconds.

Dimmer button ②Right Side....

The Outstation lamps can be dimmed in five steps from 5% to 100%.

Press and hold the Blue **Dimmer button** on the Master Station. Use the Standby button to increase intensity or the Go button to decrease intensity.

Once 5% or 100% is reached, further presses are ignored. Four presses of the Standby button will set an Outstation to 100% irrespective of its initial setting. The Dimmer button can also be used in conjunction with the group master buttons.

The Go and Standby lamps on the selected Outstation flash alternately as the intensity is adjusted.

The intensity can also be adjusted from an Outstation. Press and hold the Dimmer button on the Master Station. Pressing the Confirm button on an Outstation starts the Go and Standby lamps flashing alternately. Subsequent presses of the Confirm button increase the intensity by 1 step. When 100% is reached, it rolls back to 5%. The lamps flash faster when at 100%.

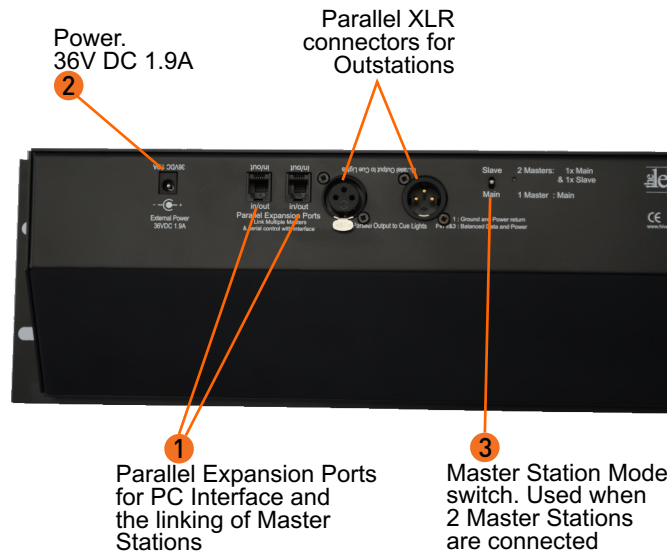
The dimmer settings for each channel are saved in the Master Station memory and are restored when the Master Station is powered up.

Tip:

Multiple channels can be dimmed simultaneously by assigning channels to one of the 2 Groups and then using that Group's Master Go and Standby buttons to increase or decrease the dimmer intensity.



16 Channel Master Station (Continued)



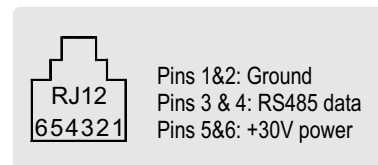
Expansion Port 1

An **Expansion Port** consisting of two parallel RJ12 connectors allows for the linking of multiple Master Stations (see page 10) and also for connection of the PC Interface unit (see page 5).

The cable is of the 6 core flat telephone type. Suitable cables are supplied with the PC Interface and multiple Master Station purchases.

These cables are intended to be short patch leads because they are unscreened and untwisted, however, lengths up to 100m (300 ft) will work.

RJ12 cables with only 4 of the 6 pins wired can also be used. (pins 1 & 6 not wired)



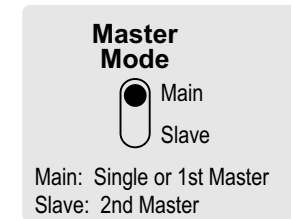
Expansion Port wiring
(looking at the socket on the rear of the Master Station)

Master Mode Switch 3 (This feature coming soon - not yet available)

When two Master Stations are connected to the same wiring **universe** for dual control of 16 channels, set the **Master Mode switch** on one Master Station to **Main** and the other to **Slave**.

The configuration settings stored in the Main Master Station will be those used to run the Cue Lights. These configuration settings will also be copied across to the **Slave** Master Station so that either Master Station can then run the show.

If only one Master Station is connected, set the mode switch to the **Main** position.



Master Mode switch

Power Connector 2

The Master Station is powered from an external AC adaptor rated at 36V DC and 1.9 amps.

Input to the adaptor is 90 to 264 volts 50/60Hz

The Master Station provides power to all Outstations via the interconnecting 3 pin XLR cables.

The Master Station can be powered from a supply as low as 24 volts DC although the cable length to the Outstations may need to be reduced as there are less volts available to overcome losses in the interconnecting cables.



Outstation types and configuration

Outstation Configuration

There are currently 2 main different types of Outstation that can be connected to the Cue Light Master Station.

- Standard Outstation (QLSi2 Mk4)
Variants: Beeper (QLSi2-B Mk4)
Relay Outstation (QLRi2 Mk4)
- There are a number of options that can be configured for each type of Outstation. Details of these options can be found in the following pages describing each type of Outstation. All options can be changed using the Master Station **Configuration Editor**. (page 34)

Any of the two Outstation types can be connected to any channel. The Master Station stores configuration (option) settings for each type of Outstation for each channel. When an Outstation is connected, the configuration data for that specific type of Outstation is used to configure that channel. When an Outstation is swapped for a different type the configuration data for the newly connected type of Outstation is used by the Master Station to reconfigure that channel.

The Relay Outstation (QLRi2 Mk4) also allows for their configurations to be changed from their front panel. Any configuration changes made this way are sent to the Master Station and saved in the Master Station's memory for recall next time the system is powered up.

The Master Station has seven **files** (presets) that can be recalled by the user. There are two **Factory Default** files, one **Installer Default** file and four **User** files.

The configuration settings **stay with the channel** and do not **follow the Outstation**. If an Outstation is re-addressed to a different channel, it will take on the configuration settings assigned to the new channel. When an additional Outstation (in **Eavesdrop Mode**) is added to a channel it will take on the configuration settings assigned to that channel.

Different Types: Same channel

Different types of Outstation (QLSi2 or QLRi2) can be connected to the same channel at the same time but only one type will be operational.

The first Outstation type to be connected will become operational. Other Outstation type(s) added later will be non-operational until the first (operational) Outstation is unplugged.

When 2 or more different types of Outstation are connected at power up, the type with the highest precedence will become operational. Types with lower precedence will be non-operational until the operational type is unplugged.

The order of precedence is:-

- Standard outstation QLSi2 (highest)
- Relay Outstation QLRi2 (lowest)



Cue Light Outstations

Standard QLSi2 Mk4
With beeper QLSi2 -B Mk4



Standard Cue Light Outstation QLSi2 Mk4
Outstation with Beeper QLSi2-B Mk4

The Beeper Outstations can be used as a Standard Outstation. They only beep when the red **Beep** button on the Master Station is pressed in conjunction with the Go or Standby button on the required channel.
Beep button + Standby button = very short beep.
Beep button + Go button = long beep.
They beep independently of whether a cue is active or not.

Beeper Outstations can also be programmed to beep when ever a Go cue is received. See **Beep-on-Go** on page 39.

Typical Operation (with factory default settings)

- **Press a Standby button on the Master Station.**
Standby lamps on both the Master Station and Cue Light Outstation flash.
- **Press the Outstation's Confirm button.**
The Standby lamps burn steadily.
- **Press a Go button on the Master Station.**
The Go lamp lights. The Standby lamp goes out if it was on.
After 3 seconds the Go lamp flashes.
After 15 seconds, the Go lamp turns off.

It is not necessary to give a Standby cue before giving a Go cue. Go and Standby cues can be given at any time regardless of any previous cue state.

The Go or Standby lights can be turned off or cancelled at any time by pressing their respective buttons a second time. Multiple Go cues are simply done by using the Go button only. Press Go to turn the Go Light on, press it again to turn it off.

The Go lamp is also programmable (on a per channel basis) between latching or non-latching (momentary acting) to allow for even faster cueing. Options can be changed using the Master Station **Configuration Editor**. (page 34)



Cue Light Outstations(Continued)

Anywhere from 1 to 40 Outstations can be connected to the Master Station.

Rectangular 25mm/10mm Go and Standby lamps are bright, wide angle and dimmable in 5 steps from 5 to 100%.

The Go and Standby lamps consist of four LEDs for each colour. The LEDs are fed from 2 drive circuits with two LEDs per circuit to provide redundancy should any of the LEDs or drive circuits fail.

The Confirm button is back lit so you can find it in the dark. The back light only comes on when error free communication is established with the Master Station. The backlight winks slowly if data is lost as can happen if the 2 data conductors are shorted together.

Any Outstation can **Call** the Master Station. An Outstation's Confirm button has 2 functions. If a Standby cue is waiting to be acknowledged (Standby lamp flashing), pressing the Confirm button will cause the Standby lamps to burn steadily. Pressing the Confirm button at any other time will light the **Call** lamp on the Master Station.

The address of any Outstation can be changed in a few seconds without the use of any tools or fiddly DIP switches. See **Changing an Outstation's address** (page 22).

Outstations may be connected using either daisy chain, star and/or loop wiring topologies. Outstations can be wired up in any order. Outstation #2 does not have to follow #1 in a daisy chain.

Multiple Outstations can be used on the same channel by setting additional Outstations to **Eavesdrop Mode**. See **Multiple Outstations per channel** (page 18).

Outstations can be added or removed while the power is on.

Flush mounted Confirm button, Go and Standby lamps are virtually impossible to break or shear off.

The 2mm steel outer case has a total of 6 mounting holes including a 10mm hole for attaching a hook clamp. A 3/8" microphone stand mount is at the centre of the rear cover. When mounted to a microphone stand with the front of the Outstation facing the ceiling, the Outstation can be viewed from 360 degrees.

Technical note

The Outstation data is balanced and uses transformer isolated RS485. (RS485 is what DMX uses.)

The data uses a Group Encoding scheme with digital FM modulation for excellent noise immunity and error detection.

Data is slow rate limited to reduce radiated electrical noise to a minimum.

Outstations are powered by the **Phantom Power** principle where power is sent down the data pair with a ground return.



Cue Light Outstations(Continued)

The following Outstation options can be programmed individually for each channel from the Master Station. To change any of these settings, see the **Master Station Configuration Editor** on page 34.

Option	Factory Default	User Selectable Option
S/by colour	Yellow	Red
S/by Flash on Outstation	Flashes	Steady
S/by Flash on Master	Flashes	Steady
S/by latches	Latches	Momentary
S/by Dim on ACK	No	Dims on ACK
Go Flickers	Steady	Flickers
Go times out	Times out	Stays on
Go flashes	Flashes	Steady
Go latches	Latches	Momentary
Go & S/by interlocked	Interlocked	Independent
Call LED enabled	Enabled	Call LED off
Call LED Flashes	Flashes	Steady
ACK button backlight	On	Off
Beeper (QLS-B only) *	Enabled	Disabled
Beep on Go (QLS-B only)*	Silent	Beeps on Go
Dimmer	100%	5 steps: 5-100%

Cue Light options for the following Outstation types: Standard (QLSi2), Beeper (QLSi2-B).

These 16 options can be combined in 48,152 different ways for each channel. Hopefully there is a combination that suits any special applications that may arise. Please let us know if there are any options that you would like but are not provided.

- **Standby Colour**
Selectable between red and yellow (default).
- **Standby Flash on Outstation**
Default setting is to flash.
Some users prefer a non-flashing standby lamp. The Outstation's standby lamp can be set to flash or not independently of the standby lamp on the Master Station. To indicate an acknowledged cue on the Outstation, the Outstation can be set to **DIM on Confirm** if required.

- **Standby Flash on Master Station**

Default setting is to flash.

If the Outstation's standby lamp is set to not flash, it is desirable to have the Master Station's lamp flash so that an indication of a Confirm cue can be seen.

Some applications use the Outstations to indicate a safe/unsafe condition. In this situation the Standby lamps on both the Master Station and Outstation are set to not flash.

- **Standby Latches**

Default setting is to latch.

If set to unlatched (momentary action), the Standby lamp will only be lit for as long as the Master Station's Standby button is pressed.

- **Standby Dim on Confirm**

Default setting is not to dim.

When an Outstation's Standby lamp is set to not flash, the Outstation can be set to dim its Standby lamp to indicate a confirm cue.

- **Go lamp flickers**

Default setting is not to flicker.

As an aid for colour blind users, the Go lamp can be set to flicker instead of burning steadily.

The flicker rate is approximately 30Hz.

- **Go lamp times out**

Default setting is to time out after 15 seconds.

Once a Go button on the Master Station has been pressed, the cue will cancel itself after 15 seconds allowing the stage manager to attend to other duties. It can be set to not time out and will stay on until either the Go or Standby button is pressed.

- **Go lamp flashes**

Default setting is to flash.

Once a Go button on the Master Station has been pressed, the Go lamp will initially burn steadily but will flash after 3 seconds. It can be set to not flash and will burn steadily until it times out or is cancelled.

- * **Beeper** and **Beep-On-Go** options only apply when a Beeper Outstation (QLSi2-B) is connected to that channel. Outstations without a beeper ignore the beeper settings.



Standard Outstations (Continued)

- **Go Latches**

Default setting is to latch.

If set to unlatched (momentary action), the Go lamp will only be lit for as long as the Master Station's Go button is pressed. Handy for rapid fire cues.

- **Go and Standby Interlocked**

Default setting is interlocked.

When interlocked, pressing the Go button will cancel a Standby cue if it is active. Likewise, pressing the Standby button will cancel a Go cue if it is active. If set to non-interlocked, both Go and Standby lamps can be on at the same time.

One application is when Outstations are used as under stage path lights where the Cue light system can also be easily fed from a battery backed supply for added under stage safety.

- **Call Lamps enabled**

Default setting is enabled.

If disabled, the Call lamp on the Master Station will not light.

If a Standby cue is waiting to be confirmed (Standby lamp flashing), pressing the Outstation's Confirm button will cause the Standby lamps to burn steadily. Pressing the Confirm button at any other time will light the blue Call LED on the Master Station.

- **Call Lamps flash**

Default setting is to flash.

The blue Call lamp on the Master Station can be set to flash or burn steadily.

- **Confirm button back light**

Default setting is to be lit.

The Confirm button's back light can be turned off.

One well known circus uses the Outstations to indicate the safety status of acrobatic equipment. In this case the back light is turned off.

- **Beeper (QLSi2-B Outstation only)**

Default setting is to beep.

Beeper Outstations can have their beeper disabled. This is not normally required as the beeper only sounds when the red **Beep** button on the Master station is pressed.

- **Beep-on-Go (QLSi2-B Outstation only)**

Default setting is to not beep.

Beeper Outstations can be set to beep whenever a Go cue is received.

The beep can be programmed to be off, 5mS, 50mS or 200mS duration. Changes are made by using the Master Station **Configuration Editor** (see page 34).

A 5mS beep is heard as a discreet click rather than a beep.

- Handy for sound and lighting operators.

Dimmer

The Outstation's lamp intensity can be dimmed in 5 steps from 5 to 100%



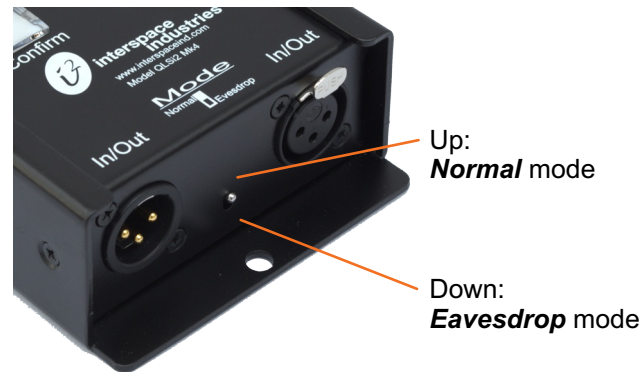
Multiple Outstations per channel

Eavesdrop Mode

One might use multiple Outstations assigned to the same channel for some permanent function such as the fly floor, leaving the two groups free on the Master Station for other uses.

- When there is only one Outstation on a channel, set the Outstation's Mode switch to **Normal**. This Outstation will send return monitoring to the Master Station for driving the illuminated and Standby buttons.
- When there is more than one Outstation on a channel, set additional Outstations to **Eavesdrop** Mode. These Outstations do not send return monitoring to the Master Station for driving the Go and Standby lamps.
- Cues can be Acknowledged from both **Normal** and **Eavesdrop** mode Outstations.

If more than one Outstation on any one channel is set to **Normal** mode, incorrect operation may result but no damage will be done.



The Outstation's Mode switch selects between Normal and Eavesdrop modes.

Important:

On any one channel:

Set one Outstation to **Normal** Mode.

Set the additional Outstation to **Eavesdrop** Mode.

Should only **Eavesdrop** Mode Outstations be connected to a channel, the Outstations will respond to Go and Standby cues but the Go and Standby lamps on the Master Station will not light as there is no return monitoring. The Fault LED on that channel will light steadily to show that only **Eavesdrop** Mode Outstations are connected.

Any number of Outstations (up to the system maximum of 40) may be assigned to a single channel.

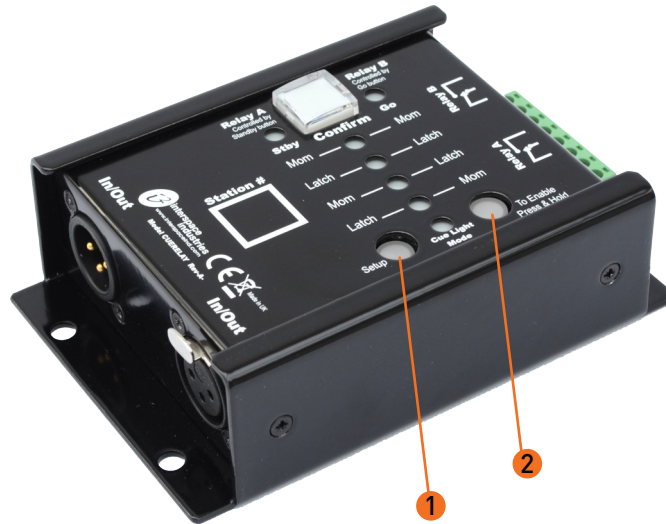
Tip:

If an **Eavesdrop** Mode Outstation is on the end of a cable run and it is disconnected, there will be no indication on the Master Station as there will be no loss of return monitoring to be detected.

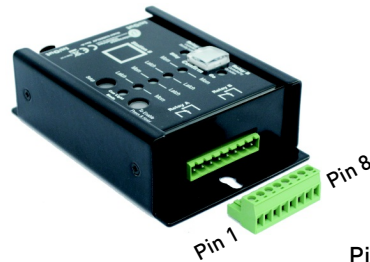
If possible, arrange the Outstations so that a **Normal** Mode Outstation (of any channel) is on the far end of a cable run. Should the cable break or become disconnected, the return monitoring from **Normal** Mode Outstation will stop. This loss of return monitoring will be indicated by flashing Fault lamp on the Master Station.



Relay Outstation QLRi2 Mk4



Relay Outstation QLRi2 Mk4



Relay connections

Pin	Relay A	Relay B
1	Common	
2	N.C.	
3	N.O.	
6		Common
7		N.C.
8		N.O.

pins 4 & 5 not used

The Relay Outstation provides two voltage free changeover relay contacts controlled by the Master Station.

Relay A is controlled by the Standby button.

Relay B is controlled by the Go command.

The relay contacts are rated at 2 amps 30 volts AC or DC.

An external **normally open momentary acting** Confirm button may be connected if required.

The Relay Outstations have 5 modes of operation.

Relay A	Relay B
Controlled by Standby button	Controlled by Go button
Momentary	Momentary
Latched	Latched
Momentary	Latched
Latched	Momentary
Cue Light Mode	Cue Light Mode

These 5 modes can be programmed via the Master Station **Configuration Editor** (page 34) or by using the **Setup button 1** on the Relay Outstation.

To prevent accidental mode changes, the Setup button is interlocked with an **Enable button 2**.

To change the mode, press and hold the **Enable button 2**. After a 500mS delay, the Setup button will light indicating that it is enabled. Pressing the Setup button will step through the modes.

Any configuration changes made this way are sent to the Master Station and saved in the Master Station's memory for recall next time the system is powered up.



Relay Outstation (Continued)

The standard Relay Outstations do not have an Eavesdrop switch. They are available with an Eavesdrop switch to special order, thereby allowing multiple Relay Outstations to be used on the same channel.

Changing the mode via the front panel of an Outstation will simultaneously change the mode of all Relay Outstations connected to that channel.

When the Relay's **Cue Light mode** is selected, the following options are also available. These features can be programmed individually for each channel via the **Master Station Configuration Editor** (page 34).

Option	Factory Default	User Selectable Option
S/by Flash on Master	Flashes	Steady
S/by Flash on Outstation	Flashes	Steady
S/by latches	Latches	Momentary
Go times out	Times out	Stays on
Go flashes	Flashes	Steady
Go latches	Latches	Momentary
Go & S/by interlocked	Interlocked	Independent
Call lamp enabled	Enabled	Call LED off
Call lamp Flashes	Flashes	Steady
All Outstation lamps	Enabled	Off

These options function in the same manner as the options on a Standard Cue Light Outstation.

See pages 16-17 for details of these options.

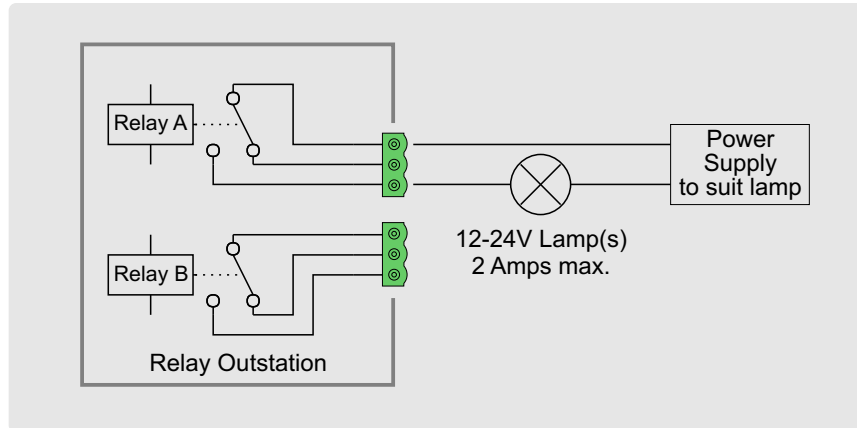
Supplied By



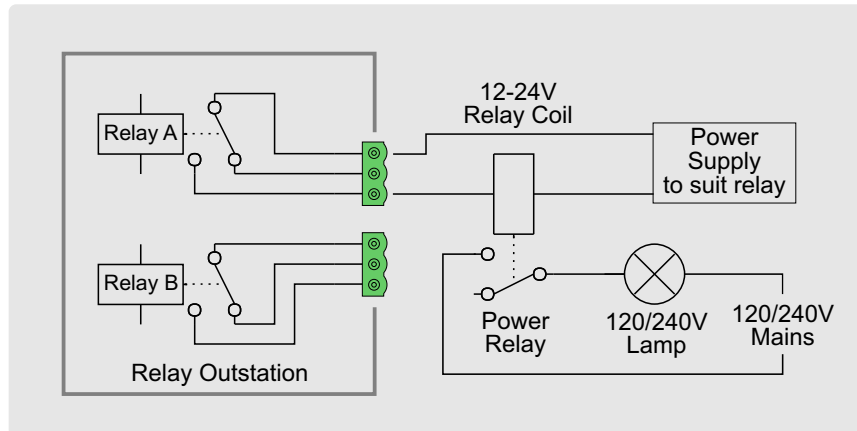


Relay Outstation (Continued)

Wiring examples for the Relay Outstation



Relay Outstation driving a low voltage lamp



Relay Outstation driving a mains voltage lamp or a high power load

Bright Outdoor Cue Light Idea



The relay contacts are *NOT* to be connected direct to mains wiring

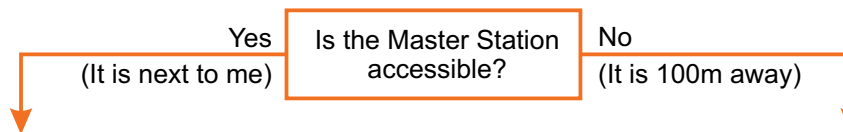


Changing an Outstation's channel

... without the use of any tools or DIP switches.

An Outstation's channel is stored in non-volatile EEPROM memory so that it will be remembered even when the power is off.

- 1: Press & hold the Confirm button while plugging in the Outstation's XLR cable.
Release the button when the button lights.
- 2: The Outstation will flash its Standby lamp the number of times corresponding to the unit's currently programmed channel.
It will repeat after a short pause.
To leave the channel unchanged, jump to step 4.



- 3: Press the Go button on the Master Station of the channel who's number you wish to assign to the Outstation.
The Outstation will reboot and be ready for use.

All done.

- 3: Press the Outstation's Confirm button the number of times coinciding with the new channel. e.g. 3 times for channel 3.
It will flash the newly saved channel after a 2 second pause.
Valid channels are 1 to 16 inclusive.
More than 16 presses of the button are ignored.
If you make a mistake, just repeat step 3.
- 4: Exit the channel programming mode by doing any one of the following:
 - Unplug the XLR, wait a few seconds and plug it back in again.
 - Press and hold the Confirm button until it reboots (takes about 3 seconds).
 - Nothing. It will keep flashing its channel for about 20 seconds and then it will reboot.All done.

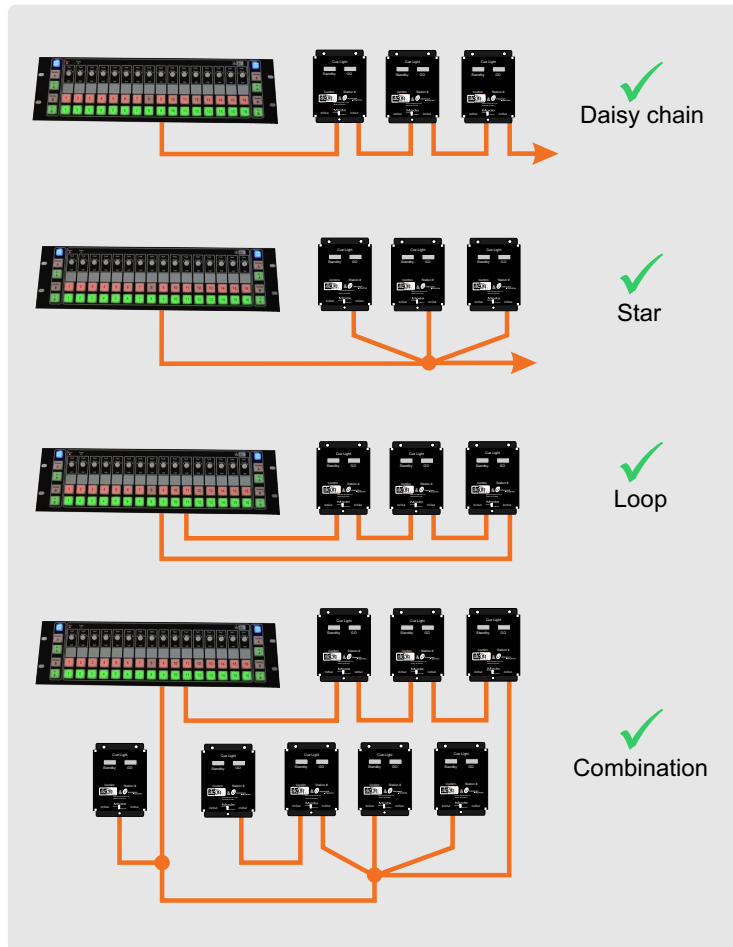


Outstation Cables

Design objective:

Wire up the venue in any manner using almost any type of three core cable, and then plug anything in anywhere.

We have come very close to meeting the design objective with only few limitations on cable type when lengths exceed 500m. The Outstations may be wired using either daisy chain, star and/or loop wiring topologies. Any combination is permitted. Even with a cable break in the loop configuration, the system remains 100% operational.



Permitted Outstation wiring topologies

It is suggested that the Cue Light system be restricted to a maximum of about 40 Outstations and a total of 2,000m (6500 ft) of cable. These numbers can often be exceeded. See **What's the Limit** on page 31.

The Outstations are connected by a one pair screened cable fitted with 3 pin XLR connectors. All Outstations are powered from the Master Station by the Phantom Power principle where power is sent down the data pair (XLR pins 2&3) and returned through the ground/screen conductor (XLR pin1). Outstations can be connected or disconnected while the power is on.

Star Quad and multicore (snake) cables may be used. Digital snakes cannot be used as they do not pass power or allow bi-directional signals to be sent down the cable.

Even though the system is very resistant to interference, it is good engineering practice to install the Cue Light wiring away from mains wiring. It will also work with cables wired with XLR pins 2 & 3 swapped.

It is permitted to have dozens or even hundreds of sockets spread around a venue. The Master Station can be plugged into any one of these sockets. Outstations are then connected to the nearest convenient socket.

Outstations can be wired up in any physical sequence. Outstation #2 does not have to follow #1.



Outstation Cables (Continued)

There are literally hundreds of different cable types that are suitable for use with the Cue Light system. The two primary cable characteristics of interest for the Cue Light application are **wire size** and **cable capacitance**.

A brief cable guide

Where the total cable length is:-

less than 500m (1640 ft)

Standard XLR microphone cable or virtually any 1 pair 24AWG screened cable can be used.

greater than 500m (1640 ft)

18-22 AWG cables with **core to core** capacitance of less than 80pF/m (24pF/ft) should be selected.

Suitable cables include:-

- 24 AWG: Belden 9501, 9841
Alphawire 5471C
- 20 AWG: Belden 9463

Wire Size

The size of the copper wire in a cable determines the voltage drop on that cable. Larger copper wires decrease the voltage drop and allow for longer cable runs with more Outstations connected.

The size of the copper wire is measured in either cross sectional area such as **square mm** or by wire gauge such as **AWG** (American Wire Gauge). Bigger AWG numbers represent smaller wires. 24 AWG is the smallest size that should be used with 18-22 AWG being preferable. The actual wire size required for an installation will depend on the length of the cable runs and the maximum number of Outstations to be connected to each run.

A following table (see page 28) gives a guide as to wire size Vs length Vs number of Outstations that can be connected to each cable run.

The cable's screen provides the return path for the Outstation's power. A screen with low resistance is preferred. A woven copper screen usually has lower resistance than a wrapped foil screen.

Characteristic Impedance (measured in ohms) is a common cable specification. It can be ignored in this application. It is not a measure of a cable's resistance.

If many Outstations are placed on the end of a cable run that is either very long and/or very thin, there may be excessive voltage drop for the Outstations to keep working normally. Rather than stop working due to the lack of voltage, the Outstations automatically dim their lamps to reduce power consumption and hence reduce the voltage drop.

Lower cable resistance = longer possible cable runs due to lower voltage drop.

Supplied By





Outstation Cables (Continued)

Cable Capacitance

Cable capacitance reduces the amplitude of the data signal by storing some of that signal as an electric charge in the cable.

Cable branches with nothing plugged into them will also decrease the data signal's amplitude due to the cable's capacitance which is still connected to the circuit.

Cable capacitance is measured in pF (Pico Farad) per foot or metre and is determined by the cable's construction and insulating materials used.

Cable capacitance can be ignored where the total cable length in an installation is less than about 500m (1640 ft). Where more than 500m of cable is used, cables with a **core to core** capacitance of less than 80pF/m (24pF/ft) should be selected.

Low capacitance cables have core insulation materials like polyethylene or polypropylene. They are often specified as Industrial Twinax or for use in applications such as RS485, AES/EBU digital audio or DMX. Any of these low capacitance cables are suitable for the Cue Light system (but we still need to check that their wire size is adequate for the cable length proposed).

See table on page 28.

Cables using PVC insulation for the inner conductors have high capacitance and high losses for digital signals. They should be avoided for long cable runs or permanent wiring. PVC outer jackets however are OK.

Most analogue microphone cables use PVC insulation and can be used where the total cable length in an installation is less than about 500m (1640 ft).

PVC insulated cables are also OK for use as tails between permanently installed 3 pin XLR outlets and the Outstations in large installations. In this case they only form a small percentage of the total cable in the system and do not degrade the overall system performance significantly.

Lower cable capacitance = longer possible cable runs due to less attenuation of the data signal.



Outstation Cables (Continued)

It is suggested that the Cue Light system be restricted to a maximum of about 40 Outstations and a total of 2,000m (6500 ft) of cable, however, these numbers can usually be exceeded. See **What's the Limit** on page 31

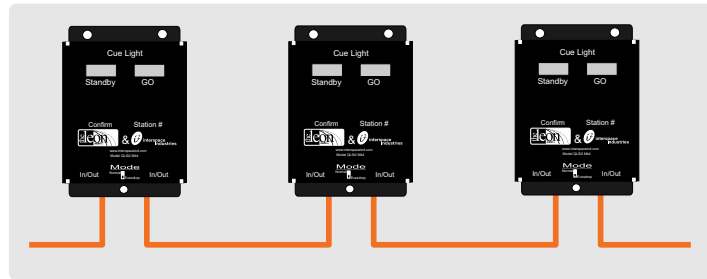
Unused cable branches must be included in the total cable length because the cable's capacitance is still connected to the circuit even if no Outstations are connected to that cable run.

There are three basic wiring configurations; these are **daisy chain, star** and **loop**. Most installations use a combination of star and daisy chain.

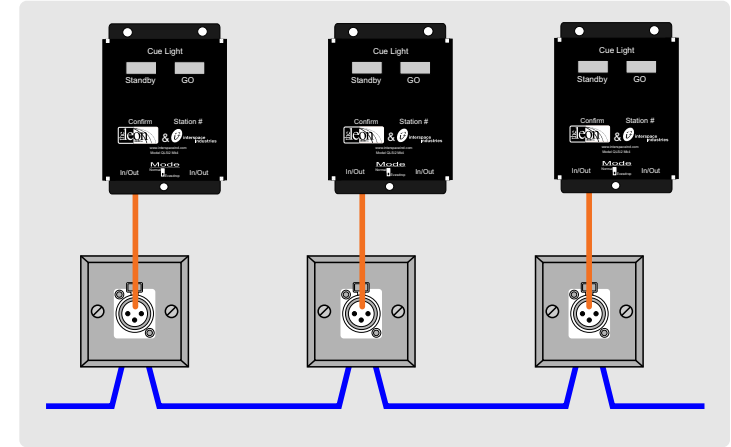
Daisy Chain wiring

Daisy chain wiring uses less cable than star wiring, but it may need to be of a heavier gauge because many Outstations may be connected to any given cable run. As the daisy chain uses the least amount of cable it has the lowest cable capacitance resulting in the strongest possible data signal allowing the recommended total of 2,000 metres to be easily exceeded.

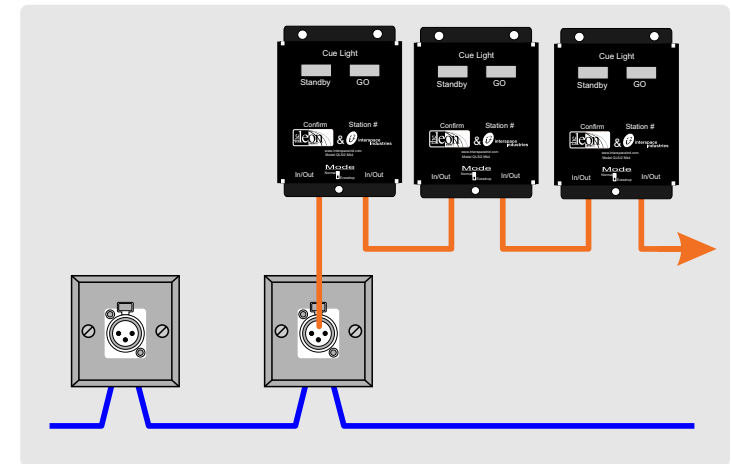
There are two main variations for the daisy chain wiring: Temporary and permanently wired.



Temporary wiring:
Unplugging an Outstation disconnects other Outstations.



Permanent wiring:
XLR wall sockets are permanently wired (blue).
Unplugging an Outstation does not affect other Outstations.



Multiple Outstations may be connected at each wall socket.



Outstation Cables (Continued)

Star wiring

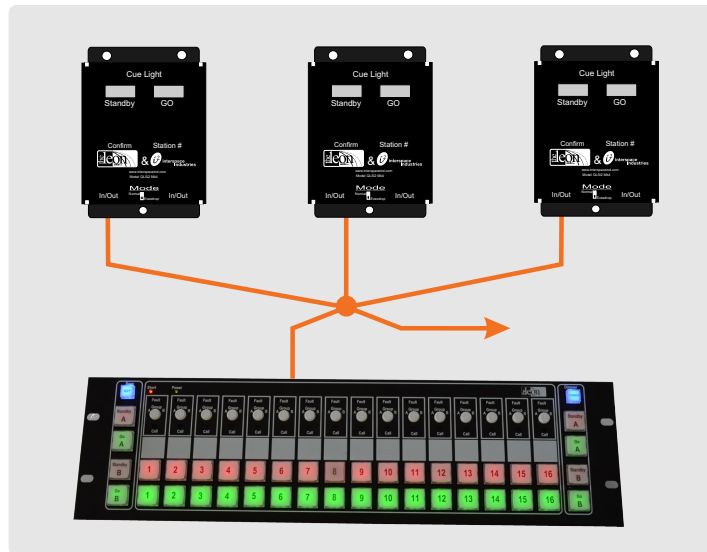
Star wiring uses more cable than daisy chain wiring, and as a result has higher overall cable capacitance (this is not desirable).

At the star point, all the cables are simply wired in parallel. This is often done at a patch panel.

The star configuration also has considerable attenuation for signals travelling from an outer extremity towards the star point.

Cable branches with nothing plugged into them will also decrease the data signal's amplitude due to the cable's capacitance which is still connected to the circuit.

For star wiring, do not exceed the recommended **total** of 2,000 metres.



Star wiring.

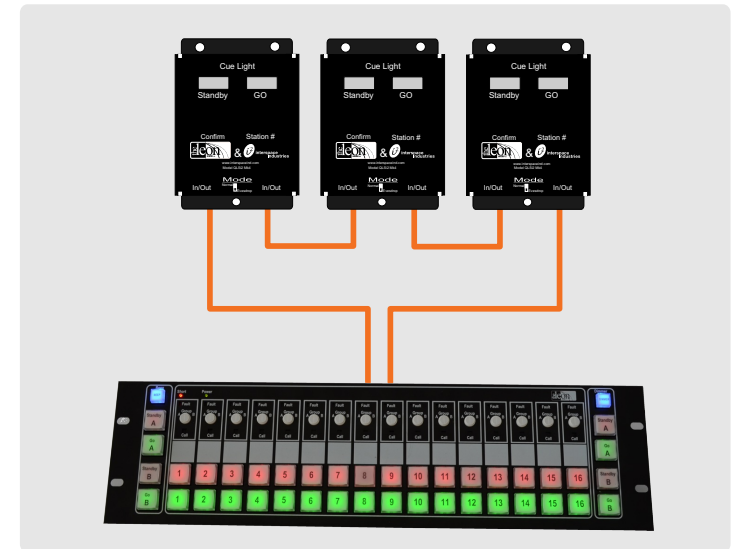
While the star configuration works well and may be convenient, it is not the optimum wiring arrangement due to its increased attenuation of the data signal. It is best used in combination with daisy chain and loop configurations.

Loop wiring

Loop wiring has the advantage that when a cable breaks or becomes disconnected, the system remains 100% operational.

When designing a loop configuration, allow for the worst case scenario where either of the 2 cables are unplugged at the Master Station. The cable gauge needs to be selected such that all of the Outstations can operate on what has now become a single long run.

Refer to the table on page 32.



Loop wiring

Technical note

The lumped capacitance of all the legs of a star driven in parallel via the impedance of one leg makes a very nice low pass filter which attenuates the data.



Outstation Cables (Continued)

		Nominal wire size (AWG)		Metres	Cable Length														Notes
		Conductor	Screen		200	400	600	800	1000	1200	1400	1600	1800	2000	3000	4000			
					Feet	650	1300	2000	2600	3300	4000	4600	5200	5900	6500	9850	13100		
Belden	9860	16	12	204	102	68	51	40	34	29	25	22	20	13	10	3			
Generic	14 AWG	14	14	171	85	57	42	34	28	24	21	19	17	11	8	3			
Belden	9250 (9816)	18	10	165	82	55	41	33	27	23	20	18	16	11	8	3			
Mogami	3173	18	14	134	67	44	33	26	22	19	16	14	13	8	6	3			
Generic	16 AWG	16	16	108	54	36	27	21	18	15	13	12	10	7	5	3			
Belden	9463	20	16	80	40	26	20	16	13	11	10	8	8	5	4	3			
Belden	8719	16	18	79	39	26	19	15	13	11	9	8	7	5	3	3			
Apollo	Scroller cable	22	24	71	35	23	17	14	11	10	8	7	7	4	3	1, 3			
Generic	18 AWG	18	18	69	34	23	17	13	11	9	8	7	6	4	3	3			
Belden	9463F	20	18	69	34	23	17	13	11	9	8	7	6	4	3	3			
Belden	3105A	22	16	68	34	22	17	13	11	9	8	7	6	4	3	3			
Belden	8760 (2421C)	18	20	54	27	18	13	10	9	7	6	6	5	3	2	3			
Belden	9460	18	20	50	25	16	12	10	8	7	6	5	5	3	2	3			
Belden	9841 (6412)	24	16	45	22	15	11	9	7	6	5	5	4	3	2				
Belden	8762	20	20	44	22	14	11	8	7	6	5	4	4	2	2				
Generic	20 AWG	20	20	44	22	14	11	8	7	6	5	4	4	2	2				
CAT5	(3 pairs as gnd)	24	20 equiv	38	19	12	9	7	6	5	4	4	3	2	1	2			
Mogami	3159	24	20	35	17	11	8	7	5	5	4	3	3	2	1				
Generic	22 AWG	22	22	27	13	9	6	5	4	3	3	3	2	1	1				
Belden	1419A & 9729	24	24	25	12	8	6	5	4	3	3	2	2	1	1				
Canare	L-2E5AT	24	24	24	12	8	6	4	4	3	3	2	2	1	1				
Electra	EAS7201P	24	24	19	9	6	4	3	3	2	2	2	1	1	0				
Olex	JD1PS485A3	24	24	18	9	6	4	3	3	2	2	2	1	1	0				
Klotz	OT206	24	24	17	8	5	4	3	2	2	2	1	1	1	0				
Generic	24 AWG	24	24	17	8	5	4	3	2	2	2	1	1	1	0				

Lower loss cables

Alphawire.com equivalent in brackets

Number of Outstations connected Vs Cable Length and Size

An installation usually consists of a number of cable runs of different lengths. Use this table as a guide as to how many Outstations may be connected on the end of **each** run for various cable types and lengths. Most installations would be covered by cables in the shaded area.

If a cable is not listed here, it does not mean it is not suitable. All of these cables are of the low capacitance variety and consist of a mix of generic, general purpose data, and types used by various customers.

For cable lengths not shown, halving a given length will allow double the number of Outstations shown.

If in doubt about your favourite cable, please contact your distributor.

AWG (American Wire Gauge) is the nominal size of the conductors. Bigger AWG numbers represent smaller wires. The screen (shield) might be bigger or smaller than the conductor size. A bigger screen will move a cable towards the top of the table (this is desirable).

Note 1: Scroller cable. 22 AWG data pair wired to XLR pins 2 & 3. 2 x 14 AWG power cores wired in parallel with the 24 AWG screen to XLR pin 1.

Note 2: Cat5/6 cable. One pair wired to XLR pins 2 & 3. Remaining 3 pairs wired to XLR pin 1.

Note 3: Red numbers are outside the system's power supply capability and cannot be achieved. Restrict the number of Outstations to 45 or less.

Supplied By



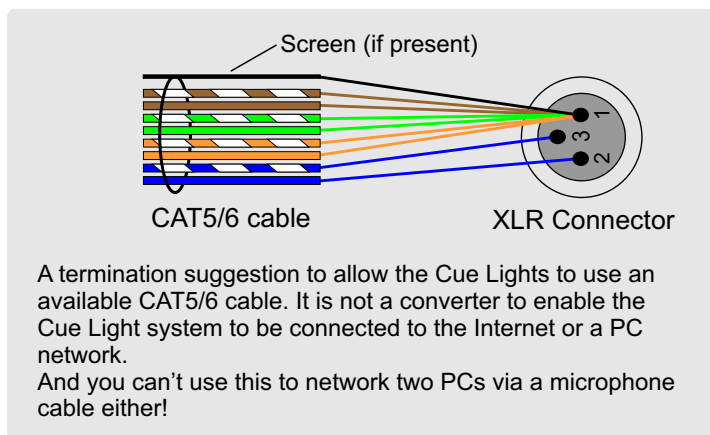


Outstation Cables (Continued)

Cat 5/6 cables

CAT5/6 cable can be used but the screened variety is preferred to reduce noise pickup from adjacent cables. If the CAT5/6 cable has a screen, tie it to XLR pin 1 at both ends.

It is suggested that any CAT5/6 cables used for the Cue Light wiring be terminated in 3 pin XLR connectors so that they cannot be accidentally cross patched with PC network cabling as power from the Cue Light system may damage computer network components.



Suggested Cue Light XLR to CAT5/6 wiring

The **star** configuration is often wired using CAT5/6 cable as this follows the convention used for computer networks. There is no technical reason to do this. The Cue Light system is also not bound by the 100m (330 ft) limit imposed on computer networks. It also does not use (or need) a hub at the star point. Cables at the star point are simply wired in parallel. This is often done at a patch panel.

By limiting the maximum length of all legs of a star wired using CAT5/6 to 200m (650 ft), a Master Station and up to 19 Outstations can be placed anywhere on the star. The Master Station does not need to be at the star (common) point.

The 200m figure is derived from the cable table on the previous page where it can be seen that 19 Outstations can be connected at the end of 400m (1,300 ft) of CAT5/6. The distance between any 2 extremities on a star with a 200m per leg limit is 400m.



Outstation Cables (Continued)

A wiring example

This example shows how a theatre might be permanently wired using a mix of daisy chain and star wiring. Backbone cable segments in green are wired with a thicker cable as these have a larger number of outlets attached to them.

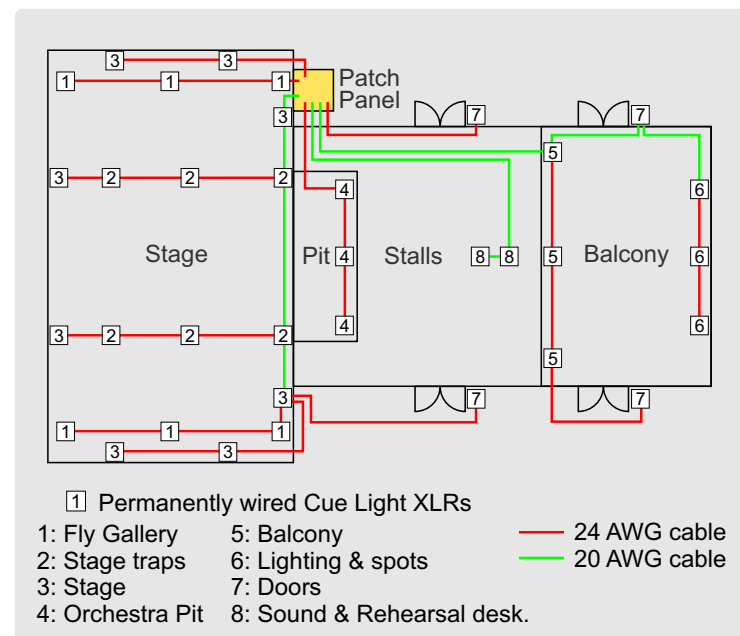
The Master Station unit could be located at XLR point #8 during rehearsals. The cable between the patch panel and points #8 would have to carry 100% of the Outstation load, hence the thicker cable.

Small venues, or those using 8 or less Outstations, could be cabled entirely in 24 AWG.

Typical cables would be:-

24 AWG - Belden 9841

20 AWG - Belden 9463



Theatre wiring example.

Supplied By





Multiple Master Stations

More than 16 channels

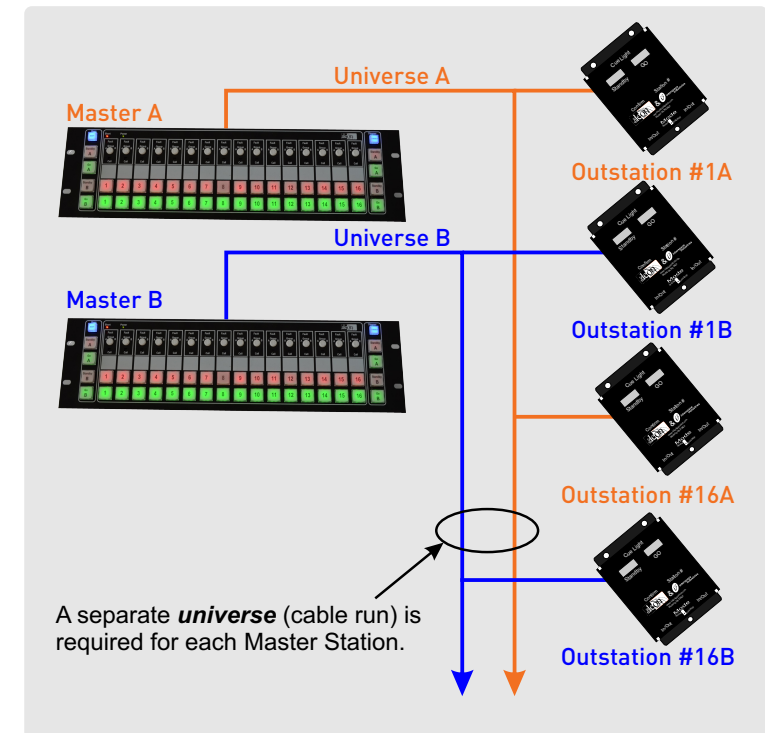
The wiring between a Master Station and its Outstations is known as a wiring **universe**. A Master Station and its associated universe supports a maximum of 16 channels. With multiple Outstations per channel, there may be up to 40 Outstations connected to these 16 channels.

Where more than 16 channels are required, multiple Master Stations must be used.

A separate **universe** (cable run) is required for each Master Station.

A 2 pair cable can be used but avoid foil screened cables that use one drain wire for the whole cable.

We need a screen with a low resistance as this is the return path for power from the Outstations.



Multiple Master Stations require one wiring **UNIVERSE** per Master Station



Multiple Master Stations (continued)

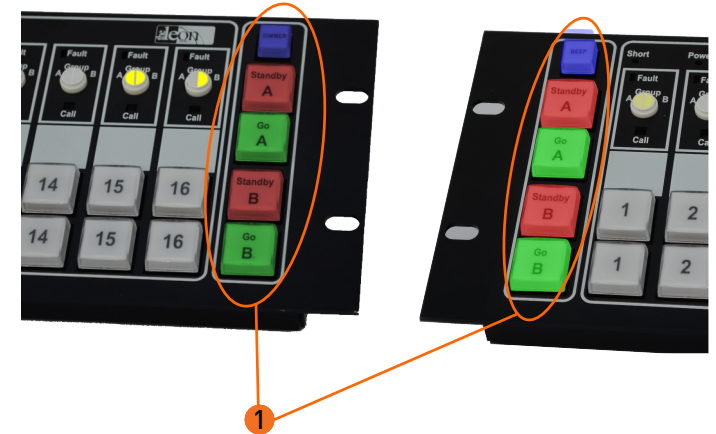
When multiple Master Stations are used, the 4 **Group Master** buttons ① can be linked across the Master Stations via an **Expansion Port** ② on the Master Stations' rear panels.
(The group feature allows cues across multiple channels to be triggered by the press of a single button).
Up to 6 Master Stations can be linked.

Pressing any of the four Group Master buttons on any linked Master Station, will electronically press the corresponding Group Master button on all other linked Master Stations. This allows cues across multiple Master Stations to be triggered by the press of a single button. Group buttons are discussed in detail on page 10.

Multiple Master Stations are linked by daisy chaining their Expansion Ports ② with the supplied RJ12 patch leads. Either Expansion Port can be used as they are simply wired in parallel.

The cable is of the 6 core flat telephone type. These cables are intended to be short patch leads because they are unshielded and untwisted, however, lengths up to 100m (300 ft) will work.

The Expansion ports are also used for connection of the PC Interface unit.



The 4 Group A & B Master buttons are linked, (either side)



RJ12 Expansion Ports



Master Station Configuration Editor

The **Configuration Editor** allows the Master Station and individual Outstations to be customized to suit specific needs.

The Configuration Editor is very simple to use **once** you have read the instructions. These instructions should be read in conjunction with having a Master Station in front of you.

Read at least pages 36 and 37 first or you may waste a lot of time.

Two alternate button overlays are used when the editor is active. These overlays are on the following page and will be the only page you will need to refer to for all common configuration changes, once you are familiar with how the Configuration Editor works.

The Cue Light system's settings are stored in an internal file called **ShowTime** which can be edited by the user. When shipped from the factory, the **ShowTime** file contains factory default settings so that the Cue Lights are ready to run straight out of the box.

Changed settings can be saved to one of 4 internal user files which can be recalled as needed. Two sets of Factory default settings and set of Installer's default settings can also be recalled.

To recall any one of these files to run the Cue Light system, open the required file in the **Configuration Editor**, save to the ShowTime file and then exit the Editor.

There are 8 files that can be opened and edited. Changes can be saved to 5 of them.

- 1: ShowTime file (read/write)
- 2: Factory Defaults with red Standby lamps. (read only)
- 3: Factory Defaults with yellow Standby lamps. (read only)
- 4: Installer's Defaults (read only)
- 5: User settings #1 (read/write)
- 6: User settings #2 (read/write)
- 7: User settings #3 (read/write)
- 8: User settings #4 (read/write)

1: ShowTime file (read/write)

When the Master Station powers up, it reads the ShowTime file to run the Cue Light system.

After editing any file, changes must be saved to the ShowTime file if you want those settings to run the Cue Light system.

Temporary changes to the system can be made by editing the ShowTime file (and saving changes to it) without saving changes to any of the 4 User files.

The ShowTime and 4 User files are stored in non-volatile EEPROM memory within the Master Station so that their contents will be remembered even when the power is off.

2 & 3: Factory Defaults (read only)

These 2 files contain a standard setup. Both files are identical except that one configures the Outstation Standby lamps to red and the other to yellow.

To recall the Factory Default settings, open one of the two Factory Default files in the **Configuration Editor**, save to the ShowTime file and then exit the Editor.

4: Installer's Defaults (read only)

This file contains settings that the installer decided should be the default for your system. You may edit these settings and save changes to the ShowTime file and/or one of the four User files. Changes cannot be saved by the user to the **Installer's Default** file.

To recall the Installer's Default settings, open the Installer's Default file in the **Configuration Editor**, save to the ShowTime file and then exit the editor.

(If you are an installer or system integrator, please contact us for details on how to save your custom settings to the Installer's Default file)

5 - 8: User settings 1 to 4 (read/write)

These 4 files are used to save any configurations that the user creates. To recall saved User settings, open one of the four User files in the **Configuration Editor**, save to the ShowTime file and then exit the editor.

Configuration Editor

Alternate button overlays

Read pages 36 & 37 first or you may waste a lot of time. These pages will walk you through the basic steps of using the Editor.

- 1 Start the Configuration Editor. (hold Beep and Group A STBY and GO buttons)
Editor starts with the ShowTime file opened and option #1 selected.
- 2 Open one of 8 files
- 3 Select options page 1 or 2 - Sensor Lights on top of unit
- 4 Select an Option to edit
from the yellow & red boxes
- 5 Edit options on a channel by channel basis
Green button lit = option active
- 6 Save to the Show Time file if you want those settings to run the Cue Light system.
Save to User files 1-4 (optional)
- 7 Exit the Editor

To start the Editor
press 3 buttons
for 4 seconds

1

4 Cue Light Options

4 Master Options

5 Edit Channel

7 Exit

2 Standby A Open

Edit all 16 ch.

6 Save

3 Go B

Select page

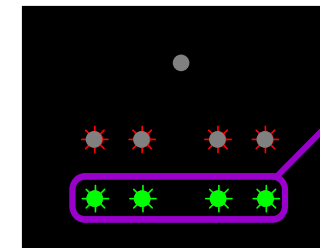
Page 1: Cue Light Outstation and Master Station configuration

defaults

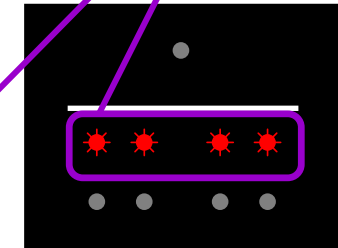
Read only files

Read/write files

Read/write files



Page 2
Relay & Sensor.



Page 1
Cue Light & Master.

Page 2: Relay and Sensor configuration shown on page 42



Master Station's Configuration Editor (continued)

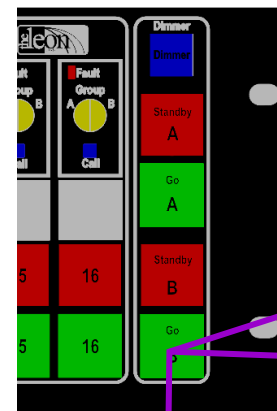
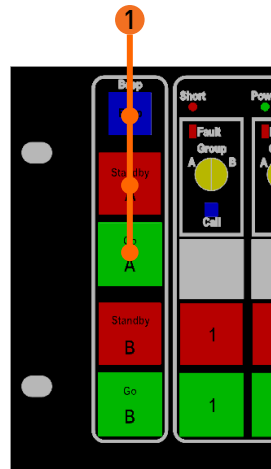
The editing sequence is:

- 1: Start the **Configuration Editor**
- 2: Open one of 8 files *
- 3: Select an option to edit
- 4: Edit that option on a channel by channel basis using the Green buttons. (Green button lit = option active)
- 5: Save changes to 1 of 5 files
(Save to the **ShowTime** file if you want those settings to run the Cue Light system)
- 6: Exit the Editor

Configuration settings for each of the 3 types of Outstation:-
 QLSi2: Cue Light Outstation
 QLRI2: Relay Outstation
 QTSi2: Sensor Outstation (future product)
 are stored in each channel's settings. The Master Station uses the appropriate configuration data for the type of Outstation that is connected.

It is not necessary to have any Outstations connected to be able to edit the Cue Light's settings.

To start the Editor
 press these 3 buttons
 for 4 seconds
 Beep, Stby & Go "A"



Toggle Pages 2

Starting the Configuration Editor

To start the Configuration Editor, press and hold these 3 buttons 1 until the 16 blue Call lamps light (takes about 4 seconds).
 Release the 3 buttons.

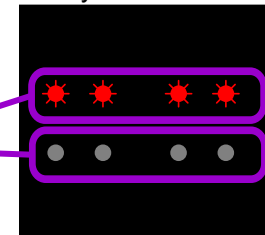
The Configuration Editor has 2 pages.
 Toggle between the 2 pages with this button 2

Page 1: Settings for the Master Station and Cue Light Outstations:
 Standard Outstation (QLSi2)
 Beeper Outstation (QLSi2-B)
 When page 1 is selected, these lamps flash 3

Page 2: Settings for the Relay (QLRI2)
 When page 2 is selected, these lamps flash 4

* The Editor starts with the ShowTime file opened at page 1 and with option #1 (Yellow Standby) selected.
 If you wish to edit the ShowTime file, there is no need to re-open it but no harm is done should you do so.

Sensor Lights on top of System



3 Page 1. Cue Light Outstation and Master Station configuration.

4 Page 2. Relay & Sensor configuration.



Master Station Configuration Editor (continued)

To Open a file.

- Press and hold the **File Open** button ①
- Eight yellow buttons will light showing the 8 files that can be opened.
- Select one of these 8 files by pressing its yellow button.
- Release the buttons.

To Save a file.

- Press and hold the **File Save** button ③
- 5 Yellow buttons will light showing the 5 files that can be written to. These are **User 1-4** and **ShowTime** files.
- Select one of these 5 files by pressing its yellow button.
- Release the buttons.
- Save to the **ShowTime** file if you want those settings to run the Cue Light system.
- Exit the Editor once done ②
- Any unsaved changes will be lost when exiting.

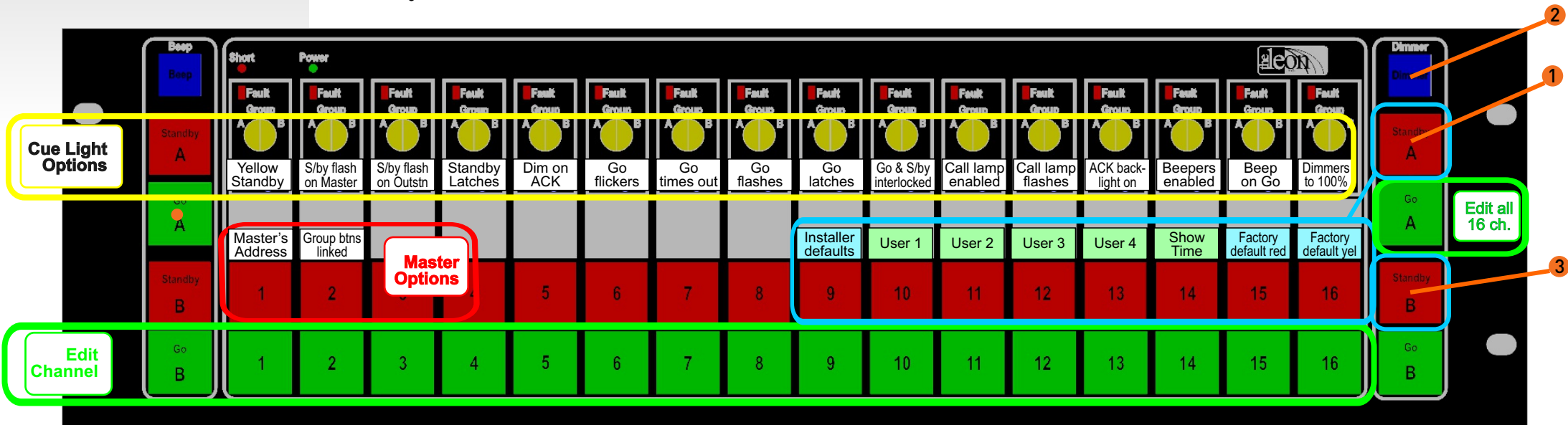
Restoring default or previously saved settings.

- Start the Editor
- Open the required file.
- Save to the **ShowTime** file.
- Exit the Editor.

Important!

After editing or opening any file, the file must be saved to the **ShowTime** file if you want those settings to run the Cue Light system.

Configuration settings for each of the 3 types of Outstation:-
 QLSi2: Standard Cue Light Outstation
 QLRi2: Relay Outstation
 are stored in each channel's settings. The Master Station uses the appropriate configuration data for the type of Outstation that is connected.



File controls. Common to pages 1 and 2



Master Station Configuration Editor (continued)

Cue Light Outstation options

Each Outstation has a number of options that can be edited. Outstations do not need to be connected to be able to edit a channel's options.

Use the buttons within the top Yellow outline **3** to select a Cue Light option to be edited. When any of these buttons are pressed, two adjacent orange lamps **1** will light to indicate the selected option.

Edit that option on a channel by channel basis using the Green buttons **4** (Green button lit = option active)
Toggle all 16 channels at once by using the **Edit all 16 ch** button **5**

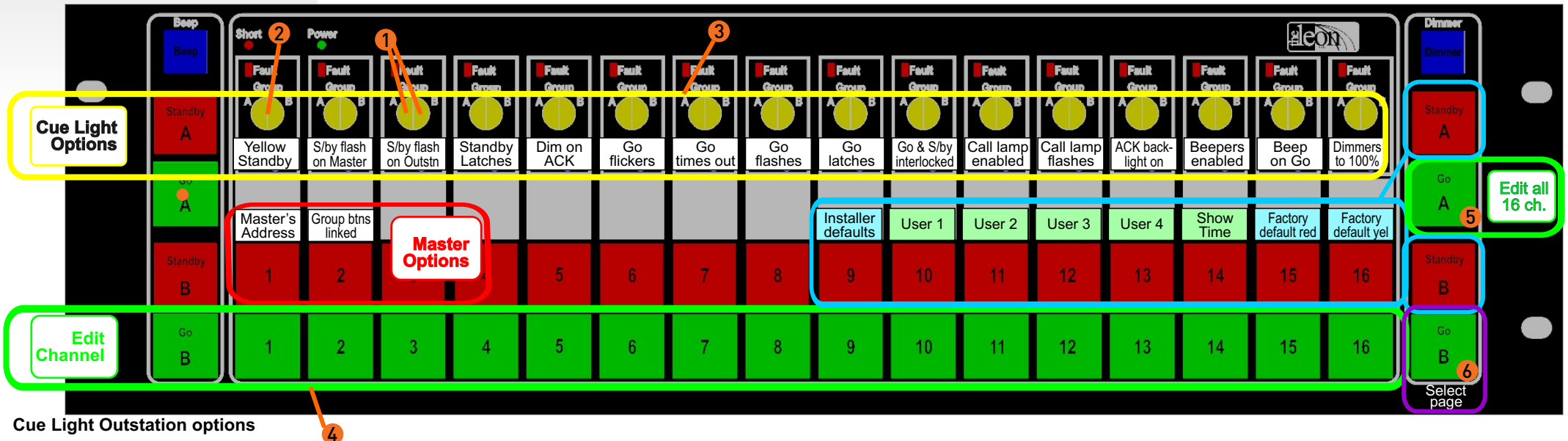
Example: Change the Outstation's Standby colour

Start the Configuration Editor.
Select Page 1 **6** (check with Sensor Lights)
Select **Yellow Standby** option **2**
When Green button (1-16) is lit, Standby colour = yellow.
When it is not lit, Standby colour = red.
Save to the ShowTime file.
Save to User file 1-4 (optional).
Exit the Configuration Editor.

Options	Factory Default	User Selectable Option
1 S/by colour	Yellow	Red
2 S/by Flash on Master	Flashes	Steady
3 S/by Flash on Outstation	Flashes	Steady
4 S/by latches	Latches	Momentary
5 S/by Dim on ACK	No	Dims on ACK
6 Go Flickers	Steady	Flickers
7 Go times out	Times out	Stays on
8 Go flashes	Flashes	Steady
9 Go latches	Latches	Momentary
10 Go & S/by interlocked	Interlocked	Independent
11 Call lamp enabled	Enabled	Call lamp off
12 Call lamp flashes	Flashes	Steady
13 ACK button back-light	On	Off
14 Beeper *	Enabled	Disabled
15 Beep-on-Go *	Silent	Beeps (4 choices)
16 Dimmer	100%	5-100% in 5 steps

Cue Light options for the following Outstation types:
Standard (QLSi2), Beeper (QLSi2-B) and Small (QLSi2-SM)

* **Beeper** and **Beep-On-Go** options only apply when a Beeper Outstation (QLSi2-B) is connected to that channel. Outstations without a beeper ignore the beeper settings.



Cue Light Outstation options



Master Station Configuration Editor (continued)

Beep-On-Go option

There are 3 beep durations that can be programmed for each channel as well as an **off** option.

The **Beep-On-Go** Modes are:

1= off, 2 = 1mS, 3 = 50mS, 4 = 200mS

The Fault lamps **1** at the top of channels 1 to 4 are used as an indicator of the **Beep-On-Go** mode.

Example: Edit Beep-on-Go (single channel)

Start the Configuration Editor.

Select Page 1 **4**

Select **Beep-On-Go** option **2**

Press a Green button (1-16) for the channel to be edited.

Use the red button **3** to cycle through the four

Beep-On-Go modes as indicated on red lamps 1-4 **1**

1 = off, 2 = 1mS, 3 = 50mS, 4 = 200mS

Save to the ShowTime file.

Save to User file 1-4 (optional).

Exit the Configuration Editor.

Editing multiple channels

When more than one channel (green buttons 1-16) is initially selected, the red mode indicator lamps **1** will be off. This is done to prevent an ambiguous display should the channels be set to different modes.

Pressing the red button will cause a mode lamp to light as all selected channels are now set to the same mode.

Example: Edit Beep-on-Go (multiple channels)

Start the Configuration Editor.

Select Page 1 **4**

Select **Beep-On-Go** option **2**

Press multiple Green buttons (1-16) for the channels to be edited.

Using the red button **3** cycle through the four

Beep-On-Go modes as indicated on red lamps 1-4 **1**

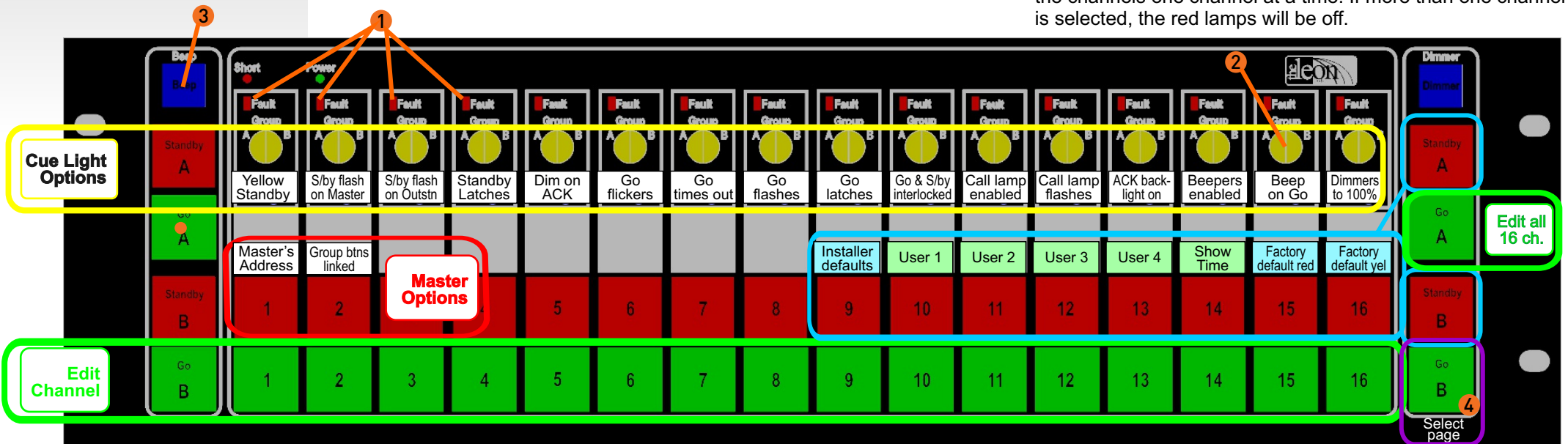
1 = off, 2 = 1mS, 3 = 50mS, 4 = 200mS

Save to the ShowTime file.

Save to User file 1-4 (optional).

Exit the Configuration Editor.

The editor will only allow you to review the mode settings for the channels one channel at a time. If more than one channel is selected, the red lamps will be off.



Cue Light Outstation options



Master Station Configuration Editor (continued)

Dimmer option

The **Dimmers to 100%** button **1** resets the dimmer intensity for all 16 channels to 100%.

The green **Edit Channel** buttons **2** are not used. There is no provision to set individual channels to intensities lower than 100%.

If dimmer intensities other than 100% need to be saved to one of the User files, do the following:

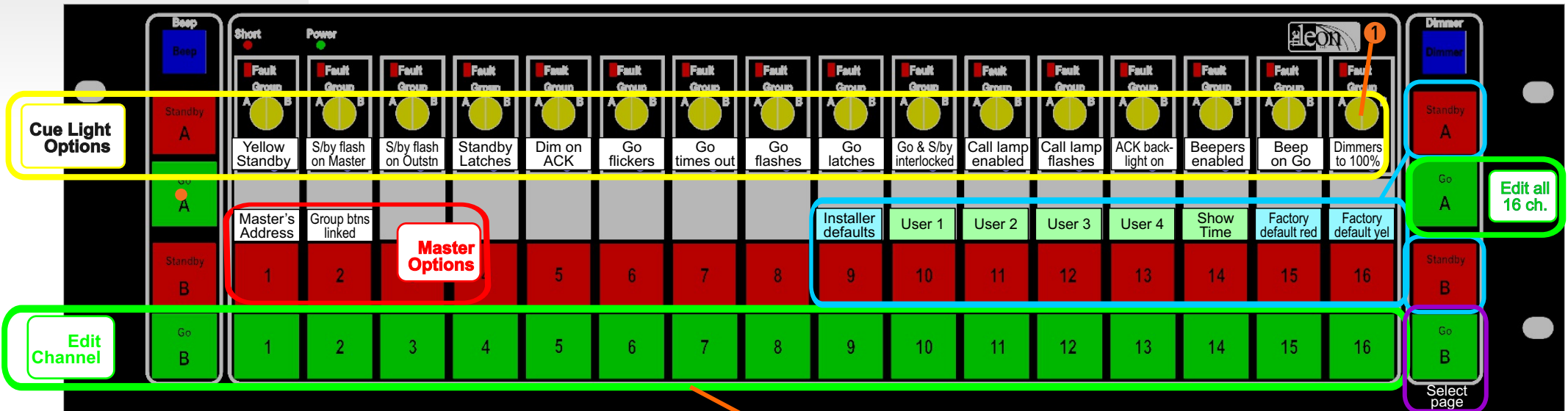
- Save your initial configuration to the **ShowTime** file.
- Exit the Editor. The **ShowTime** file will be loaded by the Master Stations' operating system to run the Cue Lights.
- Press and hold the blue **Dimmer** button. Now press either the Standby (increase) or Go (decrease) button on the desired channel to adjust the dimmer intensity to that required.

Any changes made are written to the **ShowTime** file.

- Start the Editor. The Editor starts with the **ShowTime** file already loaded. This will also include the dimmer changes just made.
- Save to one of the four User files.
- Exit the Editor.

Tip:

Multiple channels can be dimmed simultaneously by assigning channels to one of the 2 Groups and then using that Group's Master Go and Standby buttons to increase or decrease the dimmer intensities. (This tip only applies when the Editor is not active)



Cue Light Outstation options

2



Master Station Configuration Editor(continued)

Relay Outstation options

Each Relay Outstation has a number of options that can be edited. Outstations do not need to be connected to be able to edit a channel's options.

Configuration settings for each of the 2 types of Outstation:-
 QLSi2: Cue Light Outstation
 QLRI2: Relay Outstation
 are stored in each channel's settings. The Master Station uses the appropriate configuration data for the type of Outstation that is connected.

The Relay Outstation's options can be grouped into 3 different classes.

- 1: Five modes determine how the Relay Station contacts operate ①
- 2: Seven additional options for when the **Cue Light mode** is selected ②
- 3: Three miscellaneous options ③

The Relay Outstation has 5 operating modes which can be changed from either the Relay Outstation's front panel or from the **Configuration Editor**.

When a mode is changed by using the Outstation's front panel buttons, the change is sent to the Master Station and saved in the Master Station **ShowTime** file for recall next time the system is turned on. To save **ShowTime** file changes to one of the 4 User files, follow the steps in the example below.

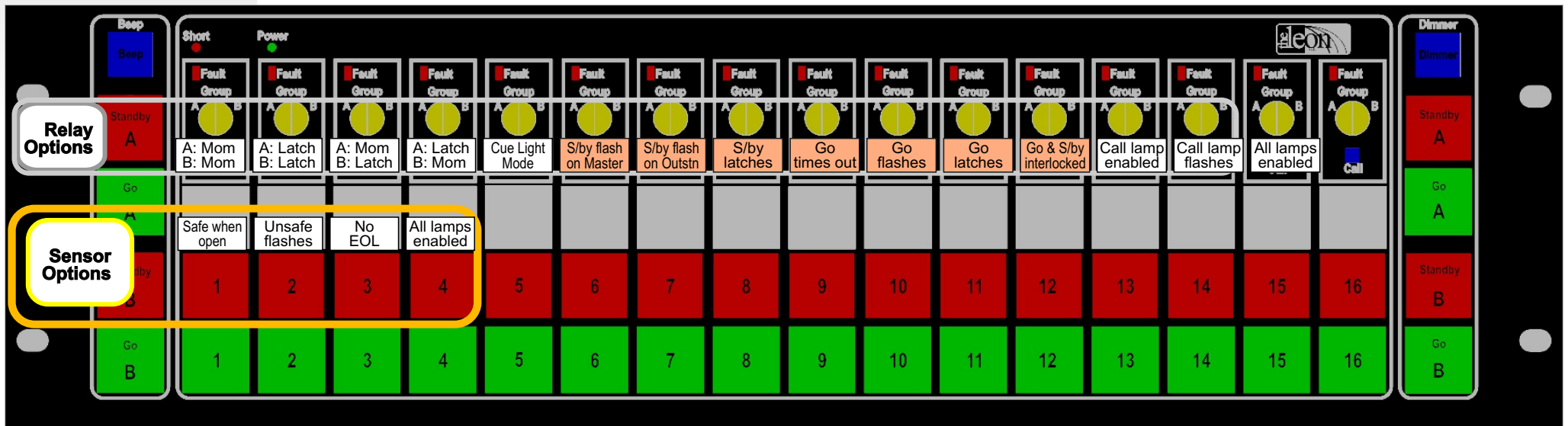
Example: Saving changes made to the ShowTime file

1. Start the Configuration Editor.
2. The Editor opens with the **ShowTime** file already loaded.
3. Save the **ShowTime** file to User file 1-4.
4. Exit the Configuration Editor.

5 modes for each Relay ①

Options for Relay's Cue Light Mode ②

More Relay Options ③



Relay options (grey buttons)



Master Station Configuration Editor (continued)

Relay Outstation options

Relay Mode

Each Relay must be assigned to one of 5 modes.
 Select a **Relay Mode** from these 5 buttons ①
 When any of these buttons are pressed, two buttons will illuminate yellow lamps ④ to indicate the selected option.

The green buttons ⑥ indicate the status of the selected mode for each of the 16 channels. When a green button is illuminated, that channel is assigned to the selected mode. ①

Pressing a green button assigns that Relay to the selected mode. Once assigned to a particular mode, that channel cannot be deselected by pressing its green button a second time. To deselect a Relay from a particular mode, just assign it to the required mode and that action will deselect it from all other modes.

Example: Change mode for Relay #12

Assign Relay #12 to **A:momentary B:Latch** mode.

- Start the Configuration Editor
- Select Page 2 ⑧
- Select **A:momentary B:Latch** mode ⑤
- Press green button for channel 12 ⑦
- Save to the **ShowTime** file
- Save to User file 1-4 (optional)
- Exit the Configuration Editor

	Relay A	Controlled by Standby button	Relay B	Controlled by Go button
1	Momentary		Momentary	
2	Latched		Latched	
3	Momentary		Latched	
4	Latched		Momentary	
5	Cue Light Mode		Cue Light Mode	

The 5 Relay Modes

- Momentary:** Relay operates only while the button is pressed.
- Latching:** Press the button to set (turn on) the Relay.
Press it again to reset (turn off) the Relay.

5 modes for each Relay ①

Options for Relay's Cue Light Mode ②

More Relay Options ③

The screenshot shows a control panel with several sections:

- Relay Options:** A vertical column on the left with buttons for Standby A, Go A, Standby B, and Go B.
- Sensor Options:** A yellow box highlights buttons for Safe when open, Unsafe flashes, No EOL, and All lamps enabled.
- Relay Mode Selection:** A row of 16 buttons, each with a yellow lamp. The first four buttons are labeled 'A: Mom', 'A: Latch', 'A: Mom', and 'A: Latch'. The next four are 'Cue Light Mode', 'S/by flash on Master', 'S/by flash on Outstn', and 'S/by latches'. The last eight are 'Go times out', 'Go flashes', 'Go latches', 'Go & S/by interlocked', 'Call lamp enabled', 'Call lamp flashes', 'All lamps enabled', and 'Call'.
- Cue Light Mode Options:** A blue box highlights buttons for Installer defaults, User 1, User 2, User 3, User 4, Show Time, Factory default red, and Factory default yellow.
- Relay & Sensor Page 2:** A vertical column on the right with buttons for Dimmer, Standby A, Open, Go A, Standby B, Save, Go B, and Select page.

Relay options (grey buttons)

⑥

⑦

⑧

Relay & Sensor Page 2



Master Station Configuration Editor (continued)

Cue Light Mode

The **Cue Light mode** is one of five possible modes that a Relay can be assigned to. There are seven additional options for this mode which only come into effect when the Relay is assigned to the **Cue Light mode**.

Select a **Cue Light mode** option to be edited using the buttons **2**

The green buttons **5** indicate the status of this option for each of the 16 channels. When a green button is illuminated, the option for that channel is active/selected.

Toggle all 16 channels at once by using the **Edit all 16 ch** button **6**

More Relay Options

There are three additional options **3** for the Relay Outstation that are independent of the Relay's mode settings.

Two of these options control the behaviour of the **Call** lamp on the Master Station. The third option, **All lamps enabled** blanks all lamps on the Relay Outstation. This is useful when the Relay Outstation needs to hide from public view.

When the lamps are disabled, pressing the **Enable** button on the Relay Outstation will momentarily light the Outstation's lamps so that its operation can be monitored or its mode changed.

When the Cue Light mode is selected, the following 7 options are available. All options can be programmed individually for each channel.

Options	Factory Default	User Selectable Option
S/by Flash on Master	Flashes	Steady
S/by Flash on Outstation	Flashes	Steady
S/by latches	Latches	Momentary
Go times out	Times out	Stays on
Go flashes	Flashes	Steady
Go latches	Latches	Momentary
Go & S/by interlocked	Interlocked	Independent

Cue Light Mode options for the Relay (QLRi2) Outstation **2**

There are three more Relay options:

Options	Factory Default	User Selectable Option
Call lamps enabled	Enabled	Call lamp off
Call lamp Flashes	Flashes	Steady
All lamps enabled	Enabled	Off

5 modes for each Relay **1**

Options for Relay's Cue Light Mode **2**

More Relay Options **3**

Relay options

Relay & Sensor Page 2



Master Station Configuration Editor (continued)

Sensor options

(this feature coming soon- not yet available)

The Sensor Outstation has 4 options ①, 3 of which are programmable from the Outstation's front panel. When an option is changed from the Outstation, the change is sent to the Master Station and saved in the Master Station's **ShowTime** file for recall next time the system is turned on. To save **ShowTime** file changes to one of the 4 User files, follow the steps in the example below.

Example: Saving changes made to the ShowTime file

Start the Configuration Editor.
The Editor opens with the **ShowTime** file already loaded.
Save the **ShowTime** file to User file 1-4.
Exit the Configuration Editor.

Options	Factory Default	User Selectable Option
Safe when open	when open	Safe when closed
Unsafe lamp Flashes	Flashes	Steady
No End-of-Line resistors	No resistors	2 EOL resistors
All lamps enabled	Enabled	Off

Sensor Outstation options

Select an option to edit by using the yellow buttons ①
The button will light to indicate the selection.

Edit that option on a channel basis by channel basis using the Green buttons ④ (Green button lit = option active)
Toggle all 16 channels at once by using the **Edit all 16 ch** button ⑤

The **All lamps enabled** option can only be edited by using the Master Station Configuration Editor. This option blanks all lamps on the Sensor Outstation which is useful when the Sensor Outstation needs to hide from public view. When the lamps are disabled, pressing the Grey **Enable** button on the Outstation will momentarily light the Outstation's lamps so that its operation can be monitored or its mode changed.

Example: (set Sensor #4 to use 2 End-of-Line resistors)

Start the Configuration Editor
Select Page 2 ⑥
Select **No EOL** option ②
Press the green button for channel 4 ③ to deselect the **No EOL** option.
(Green button lit = no EOL resistors)
(Green button not lit = 2 EOL resistors)
Save to the **ShowTime** file
Save to User file 1-4 (optional)
Exit the Configuration Editor

The screenshot shows the Master Station Configuration Editor interface. It features a grid of buttons for configuring various options. On the left, there are 'Relay Options' and 'Sensor Options' sections. The 'Sensor Options' section includes buttons for 'Safe when open', 'Unsafe flashes', 'No EOL', and 'All lamps enabled'. The 'Relay Options' section includes buttons for 'Go A', 'Go B', and 'Edit all 16 ch'. The main grid consists of 16 columns, each representing a channel, and 4 rows of options. The top row of the grid contains 'Fault Group' buttons for each channel. The second row contains 'Go' buttons for each channel. The third row contains 'Show Time' and 'Factory default' buttons. The bottom row contains 'Go' buttons for each channel. Numbered callouts 1 through 6 point to specific buttons: 1 points to the 'Sensor Options' label, 2 points to the 'No EOL' button, 3 points to the 'Go' button for channel 4, 4 points to the 'Go' button for channel 9, 5 points to the 'Edit all 16 ch' button, and 6 points to the 'Go B' button.



Diagnostics

Outstation test

This test is used to check operation of Outstation lamps, communication to and from the Master Station and cable voltage drop.

Press 2 buttons **8** until all lamps on the Master Station's front panel light (takes about 4 seconds), then release the buttons.

To exit this test, press either of the 2 buttons **8** or cycle the mains power.

The Go and Standby lamps on all outstations flash alternately. Outstation Standby colour changes between red & yellow on every 2nd flash of the Standby lamp.

As all Outstations are active, this provides the maximum voltage drop* on the interconnecting cables. When the number of Outstations placed on the end of a cable run exceeds the number specified in the table on page 28, the excessive voltage drop will cause the Outstations to automatically dim their lamps to reduce power consumption and hence reduce the voltage drop. The automatic dimming of the Outstation lamps is an indicator that the limits of the cable run are being approached.

* The maximum voltage drop will be higher if Outstations are configured to allow both Go and Standby lamps to be on at the same time.

Button & Lamp test

This test is used to check the operation of buttons and lamps on the Master Station.

Press 3 buttons **7** until all lamps on the Master Station's front panel light (takes about 4 seconds), then release the buttons.

To exit this test, press the 3 buttons **7** again or cycle the mains power.

The lamps on channels 1-16 will chase sequentially in rows. The sequence is **1 2 3 4 5 6** followed by **5** and **6** on together but dimmed. The sequence then repeats. Lamps to the right of channel 16 also flash sequentially.

Pressing any button will halt the chase sequence and light lamp(s) adjacent to the button that was pressed.

Pressing the Go or Standby buttons on channels 1-16 will light the button pressed. Pressing the Group button on channels 1-16 will light the Fault, Group A & B and Call lamps for the channel pressed.

Pressing the 6 buttons to the right of channel 16:-

Pressing the red Beep button will light lamps **1 2 3 4** on channels 1 to 8.

Pressing the blue Dimmer button will light the same lamps on channels 9 to 16.

Pressing Group A Standby or Go button lights the button of same name on channels 1-8.

Pressing Group B Standby or Go button lights the button of same name on channels 9-16.





System Design Suggestions

For Cue Light designers and consultants

The Master Station has 16 channels for Cue Lights, but you can connect any number of Outstations from 1 to 40. Using the ability to connect more than one Outstation to the same channel will free up the Groups which are used to trigger cues on multiple Outstations.

The Beeper Outstation **QLSi2-B Mk4** can be used as a standard Outstation as it only beeps when specifically commanded to do so. Some customers order Beeper Outstations exclusively. The advantage is that the end user doesn't need to keep track of which Outstations have beepers and which don't.

The Relay Outstation **QLRi2 Mk4** adds versatility to a system.

One would be sufficient for a small system while 2 or 3 may be in order for a large system. Systems with specific needs may have a dozen or more.

The standard Relay Outstations do not have an Eavesdrop switch. They are available with an Eavesdrop switch to special order, thereby allowing multiple Relay Outstations to be used on the same channel.

Future Product

The Sensor Outstation **QTSi2 Mk4** also adds versatility to a system. The Master Station has a dedicated display for 4 Sensor Outstations.

These Sensor Outstations are numbered 1 to 4. More than 4 Sensor Outstations can also be included in a system. Sensor Outstations 5 to 16 use Cue Light channels 5 to 16. Other Outstations can not share a channel with a Sensor Outstation on channels 5 to 16.

If used, Sensor Outstations count towards the system total of 40 Outstations.

Some typical systems

Here are some suggested systems based on customer orders.

Basic systems

4-12 Channels
1 x Master Station QLM16i2 Mk4
4-12 x Standard Outstation QLSi2 Mk4
1-4 x Beeper Outstation QLSi2-B Mk4

16 Channels (16 Outstations)
1 x Master Station QLM16i2 Mk4
12 x Standard Outstation QLSi2 Mk4
4 x Beeper Outstation QLSi2-B Mk4

Not so basic systems

12-16 Channels (16-22 Outstations)
1 x Master Station QLM16i2 Mk4
12-20 x Beeper Outstation QLSi2-B Mk4 (multiple Outstations per channel)
1 x Relay Outstation QLRi2 Mk4
1 x Sensor Outstation QTSi2 Mk4 (TBC)

16 Channels (26-38 Outstations)
1 x Master Station QLM16i2 Mk4
16-30 x Beeper Outstation QLSi2-B Mk4 (multiple Outstations per channel)
4 x Relay Outstation QLRi2 Mk4
4 x Sensor Outstation QTSi2 Mk4 (TBC)

Executive Summary:

- Specify Beeper Outstations in preference to Standard Outstations.
- Include some Relay & Sensor Outstations.



Specifications

Master Station QLM16i2 Mk4

Outstation Connectors

XLRs. 3 pin male and female in parallel

Power

70 watts maximum. 10 to 30 watts typical.

External universal power supply:-

Input: 90 to 264 volts 50/60Hz

Output: 36V DC 1.9 amps.

Continuous short circuit protection (Auto recovery).

Over-voltage protection.

Dimensions

Width: Standard 483mm(19") rack mount chassis.

Height: 2 units high. 88mm (3.5")

Depth (excluding connectors): 90mm (3.6")

The unit can be table or rack mount depending on how the brackets are mounted.

Chassis

2mm aluminium front panel with 1.6mm sub chassis.

1.6mm welded aluminium rear cover. Black powder coat finish.

Weight

2.7kg (5.95 lbs) including power supply.

Standard Outstation QLSi2 Mk4

Lamps

Long Life high brightness LEDs used for Green, Red and Yellow indication.

Connectors

XLRs. 3 pin male and female in parallel

Power

Powered from the Master Station via the XLR data cable

Dimensions

Width: 92mm (3.7")

Length (excluding connectors): 148mm (5.8")

Height: 38mm (1.5")

Chassis

2mm steel rear and sides. 1.6mm aluminium front and ends.

Black powder coat finish.

7 mounting points

Weight

505g (1.11 lbs)

Beeper Outstation QLSi2-B Mk4

Lamps

Long Life high brightness LEDs used for Green, Red and Yellow indication.

Connectors

XLRs. 3 pin male and female in parallel

Power

Powered from the Master Station via the XLR data cable

Dimensions.

Width: 92mm (3.7")

Length (excluding connectors): 148m (5.8")

Height: 38mm (1.5")

Chassis

2mm steel rear and sides. 1.6mm aluminium front and ends.

Black powder coat finish.

7 mounting points

Weight

510g (1.12 lbs)

Designed and created by:-



Specifications

Relay Outstation QLRI2 Mk4

Connectors

XLRs. 3 pin male and female in parallel

Power

Powered from the Master Station via the XLR data cable

Dimensions

Width: 92mm (3.7")

Length (excluding connectors): 143mm (5.6")

Height: 43mm (1.7")

Chassis

2mm steel rear and sides. 1.6mm aluminium front and ends.

Black powder coat finish.

6 mounting points

Weight

540g (1.19 lbs)

Sensor Outstation QTSi2 Mk4 (Future product)

Connectors

XLRs. 3 pin male and female in parallel

Power

Powered from the Master Station via the XLR data cable

Dimensions

Width: 92mm (3.7")

Length (excluding connectors): 143mm (5.6")

Height: 43mm (1.7")

Chassis

2mm steel rear and sides. 1.6mm aluminium front and ends.

Black powder coat finish.

6 mounting points

Weight

530g (1.17 lbs)

Supplied By





DECLARATION OF CONFORMITY

We declare under our sole responsibility that the product

**Leon Audio TheatreCue V4 system
manufactured by Hive Industries Ltd under
licence from Leon Audio Co.**

To which this declaration relates is in conformity with the following standards or other normative documents:

EN55103-1 & EN55103-2 1966
(Specific for professional Audio Visual Products).
Used in environment as defined under E2 Commercial and
Light industry (example Theatres)

EN 60950 2006/A1: 2010

Following the provisions of the EEC Directive 89/336/EEC
and 73/23/EEC

A handwritten signature in black ink that reads 'Dave J. Humphrys'.

Dave Humphrys
Managing Director, Hive Industries Ltd
Issued: June 2012

**This product carries a 3 year
limited factory warranty.**

Environmental

WEEE and RoHS Compliance. TheatreCue and its associated accessories have been manufactured and sold in accordance with the requirements of the EC WEEE and RoHS directives. Please return all end-of-life items to your supplier, or Interspace Industries directly, for appropriate disposal.

Packaging Materials:

Cardboard box:
Grade 150 K/T 'B' (Single Walled Corrugated - Brown Kraft)
Foam:

Electrical

CE Mark. TheatreCue and its associated accessories have been designed, manufactured and certified to comply with all requirements of the European CE standard. Including EN 550103

**Technical Support or Sales Enquiries
Stage Electrics
0844 870 0077**

**Web site ; www.stage-electrics.co.uk
Email ; sales@stage-electrics.co.uk**

**Stage Electrics Bristol
Encore House
Patchway Trading
Estate
Unit 3 Britannia Road
Bristol
BS34 5TA**

Supplied By

