Solid State Logic

SOUND || VISION

Super-Analogue™ Outboard

Owner's Manual

82S6XR010F

Document History

82S6XR010A	(September 2005)	Initial Release
82S6XR010B	(April 2006)	Added Mic Amp and EQ Modules
82S6XR010C	(October 2006)	Added Line Return and Master Modules
82S6XR010D	(February 2007)	Added 8 Input Summing Module
82S6XR010E	(October 2008)	Added E Series EQ and Dynamics Modules
82S6XR010E	(January 2009)	Minor updates to Line Return, Master and 8 Input Summing Modules
82S6XR010F	(May 2011)	Added Stereo EQ and Dynamics Modules

Contents

Continued…

…Continued

Continued…

…Continued

Continued…

…Continued

1. Introduction

1.1 Overview

The Solid State Logic X-Rack unit has been developed from the successful range of XLogic outboard equipment and provides a flexible solution to those engineers requiring a larger number of processing units in a compact package.

The additional space provided by the X-Rack allows the processing modules to be vertically orientated, providing a more familiar interface to users of Solid State Logic's renowned range of mixing consoles, and makes it possible to include Solid State Logic's Total Recall system – the first time this has been available on an analogue outboard unit.

1.1.1 This Manual

The object of this manual is to provide purchasers of the X-Rack unit with information in the following areas:

- Operation of the unit
- Safety considerations
- Installation requirements
- Electrical connections and cabling
- Connector pin-outs
- Specifications and physical dimensions

This manual is applicable to X-Rack units from serial number XRK110 onwards and assumes that the X-Rack unit is running V1.4/8 or later software. Please refer to Section 4 of this manual for instructions on how to check the current software version and how to obtain and install a newer version if required.

1.2 Warranty

Pursuant to the Solid State Logic Terms and Conditions, under European consumer law the purchaser has full statutory warranty rights for two years from the date of delivery of the product. The warranty is valid only in those Member States of the European Union (EU) who have adopted the applicable EU law into their national legislation, otherwise a warranty term of one year will apply. The applicable national legislation governing the sale of consumer goods is not affected by this warranty. Warranty claims will only be accepted if the purchased product has been used for its intended purpose. Any purchased product used for an unintended purpose will not be eligible for warranty protection. For all warranty inquiries or claims please address the claim to us if the purchase was directly from us or otherwise to the dealer from which you purchased the product within a period of two months from the date on which you detected its lack of conformity with the terms of the warranty. **Please include your original proof of purchase when initiating the claim**.

1.2.1 Out of Warranty Repairs

In the event of a fault arising after the warranty period has expired the unit should be returned to Solid State Logic either directly or via your local dealer. You will be charged for the time spent on the repair (at Solid State Logic's current repair rate) plus the cost of parts and shipping. Note that no units can be accepted for repair without prior arrangement (see below).

1.2.2 All Returns

- No unit will be accepted for repair by Solid State Logic unless accompanied by a valid RMA (Return Material Authorisation) number, obtainable from Solid State Logic prior to shipping.
- All units should be shipped to Solid State Logic in suitable rigid packaging – Solid State Logic cannot be held responsible for any damage caused by shipping units in other packaging. In such cases Solid State Logic will return the unit in a suitable box, which you will be charged for.
- Please include all items – such as this manual, cables etc. – originally provided with unit.

2. Safety Considerations

This section contains definitions and warnings, and practical information to ensure a safe working environment. Please take time to read this section before undertaking any installation work.

2.1 Definitions

'Maintenance'

All maintenance must be carried out by fully trained personnel. *Note: it is advisable to observe suitable ESD precautions when maintenance to any part is undertaken.*

'Non-User Adjustments'

Adjustments or alterations to the equipment may affect the performance such that safety and/or international compliance standards may no longer be met. Any such adjustments must therefore only be carried out by fully trained personnel.

'Users'

This equipment is designed for use solely by engineers and competent operators skilled in the use of professional audio equipment.

'Environment'

This product is a Class A product intended to form an integrated component part of a professional audio recording, mixing, dubbing, film, TV, radio broadcast or similar studio wherein it will perform to specification providing that it is installed according to professional practice.

2.2 Electrical Safety Warning

When installing or servicing any item of Solid State Logic equipment with power applied, when cover and/or blank panels are removed, HAZARDOUS CONDITIONS CAN EXIST.

These hazards include:

- High voltages
- High energy stored in capacitors
- High currents available from DC power busses
- Hot component surfaces

Any metal jewellery (watches, bracelets, neck-chains and rings) that could inadvertently come into contact with uninsulated parts should always be removed before reaching inside powered equipment.

2.3 Installation

Voltage Selection and Fusing

The X-Rack unit has an auto-sensing power supply that can operate on 100 – 230V without adjustment.

The X-Rack power supply module is internally fused. If the fuse should fail for any reason the unit should be returned to Solid State Logic for repair/replacement as appropriate.

Safety Earth Connection

Any mains powered item of Solid State Logic equipment that is supplied with a 3-core mains lead (whether connectorised or not) should always have the earth wire connected to the mains supply ground. This is the safety earth and grounds the exposed metal parts of the racks and cases and should not be removed for any reason. Note that the earth stud provided on the rear of the equipment is a functional earth *not* a safety earth.

Mains Supply and Phases

To ensure safe operation of this equipment, connect only to an ac. power source that contains a protective earthing (PE) conductor. This equipment is designed for connection to single phase supplies with the neutral conductor at earth potential – category TN or TT – and is fitted with a protective fuse in the live conductor only. This equipment is not designed for use with live and neutral connections reversed or where the neutral conductor is not at earth potential (IT supplies). This equipment should not be connected to a power system that switches open the return (neutral) lead when the return lead also functions as the protective earth (PE).

Mains cables will be coded with the following colour scheme:

LIVE:	Brown
NEUTRAL:	Blue
EARTH:	Yellow/Green

Mains Isolation and Over-Current Protection

An external disconnect device is required for this equipment; a detachable power cord, as fitted to this equipment, is a suitable disconnect device. Note that the socket outlet used for the detachable power cord should be installed near the equipment and should be easily accessible.

An external over-current protection device is required to protect the wiring to this equipment which must be installed according to current wiring regulations. The fusing or breaking-current is defined in the environmental specification in Section 5.0 of this manual. In certain countries this function is supplied by use of a fused plug.

CE Certification

CE Note that the majority of cables supplied with Solid State Logic equipment are fitted with ferrite rings at each end. This is to comply with current European CE regulations and these ferrites should not be removed. If any of the equipment metalwork is modified in any way the CE certification status of the product may be adversely affected.

Note that a frame or chassis terminal stud (functional earth) has been fitted to this equipment to provide a convenient low impedance bonding point for interconnected equipment, should it be required.

FCC Notice

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Instructions for Disposal of WEEE by Users in the European Union

The symbol shown here is on the product or on its packaging, which indicates that this product must not be disposed of with other waste. Instead, it is the user's responsibility to dispose of their waste equipment by handing it over to a designated collection point for recycling of waste electrical and electronic equipment. The separate collection and recycling of your waste equipment at the time of disposal will help to conserve natural resources and ensure that it is recycled in a manner that protects human health and the environment. For more information about where you can drop off your waste equipment for recycling, please contact your local city office, your household waste disposal service or where you purchased the product.

2.4 Graphical Symbols

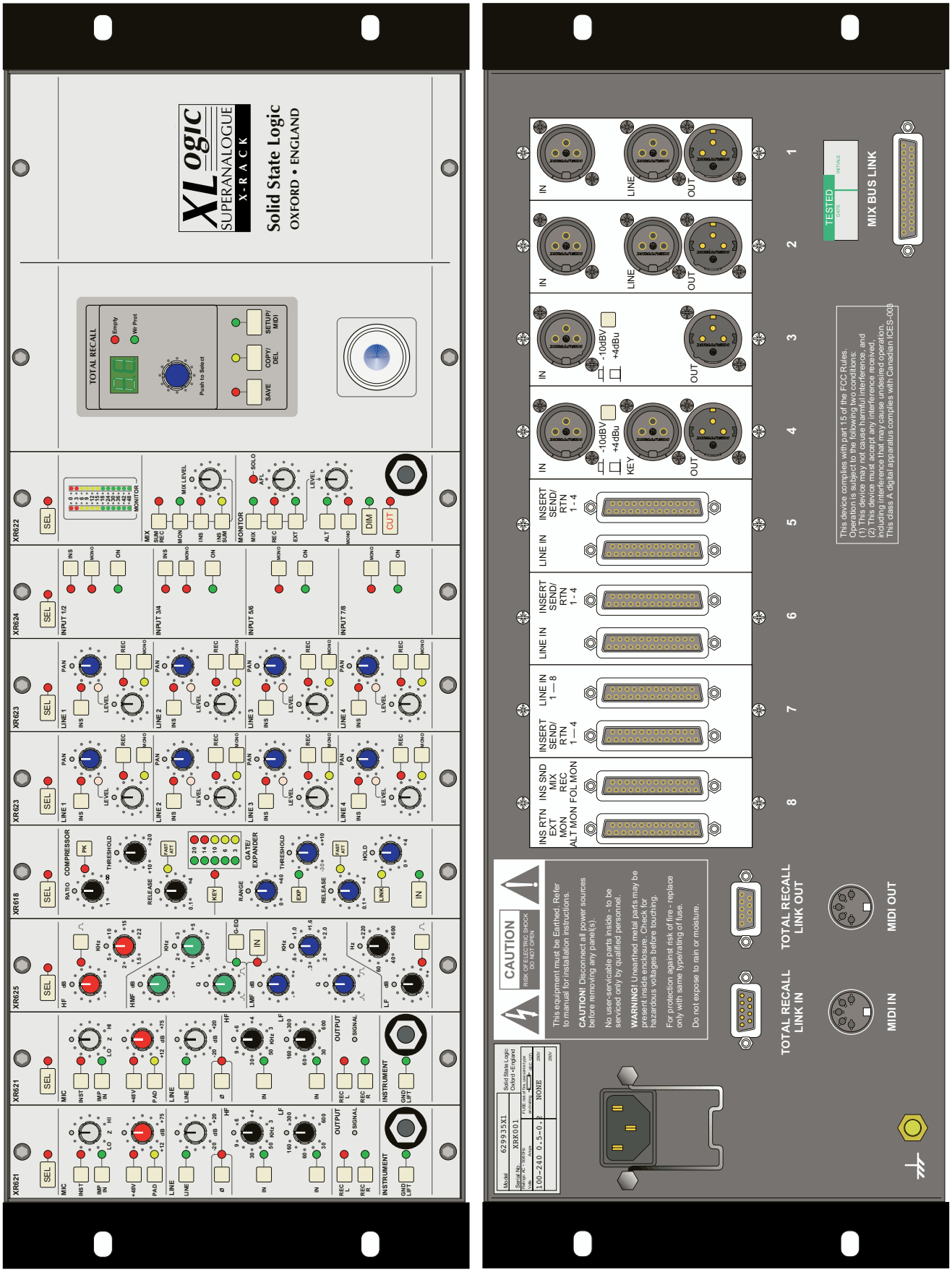
The following symbols may be used either on the product or in this manual:

General hazard – refer to user or service manual for details.

Electrical hazard.

Protective Earth (ground).

Frame or Chassis terminal. (Functional Earth)


XL logic
SUPERANALOGUE
X-RACK
Solid State Logic
OXFORD • ENGLAND
TOTAL RECALL
SAVE
COPY/ DEL
SETUP/ MIDI
Push to Select
CAUTION
RISK OF ELECTRIC SHOCK DO NOT OPEN
This equipment must be Earthed. Refer to manual for installation instructions.
CAUTION! Disconnect all power sources before removing any panel(s).
No user-servicable parts inside - to be serviced only by qualified personnel.
WARNING! Unearthed metal parts may be present inside enclosure. Check for hazardous voltages before touching.
For protection against risk of fire - replace only with same type/rating of fuse.
Do not expose to rain or moisture.
TOTAL RECALL LINK IN
TOTAL RECALL LINK OUT
MIDI IN
MIDI OUT
MIX BUS LINK
TESTED
This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation. This class A digital apparatus complies with Canadian ICES-003

3. X-Rack Installation

3.1 Assembling the X-Rack

The X-Rack unit is normally shipped either as an empty rack (SSL Part No. 729935X1), a part filled (custom) rack or as a fully loaded unit; for example, a unit fitted with eight 729618X1 Dynamics modules (SSL Part No. 729935X2) – if you have purchased a fully loaded unit you should skip the rest of Section 3.1.

In the case of empty or part filled racks, any empty module slots will be covered by blank panels which will need to be removed before fitting additional modules. Panels for module slots and the Total Recall/CPU are secured, top and bottom, by a 'one piece' floating threaded bar. The position of the bar is factory set so that there is adequate space to accommodate eight module panels. The correct position of the threaded bars is initially set when the Total Recall/CPU module is installed and screwed in position against the inside right edge of the rack.

Do not attempt to fit or remove modules with power applied. Always switch the rack off and remove the power cord prior to working on this unit. When fitting or removing modules, it is advisable to observe suitable ESD precautions. Take care when handling modules and blank panels; sharp corners may be present.

Modules are fitted from the front of the X-Rack, normally starting from the left hand end. Note that it is recommended that any required blank panels (SSL Part No. 729618X2) are fitted prior to fitting modules. Each module plugs into the backplane; use the two 8mm M3 counter sunk screws supplied with the module or blank to fix the item to the front of the rack – a 2mm AF hex key is supplied with the X-Rack unit. The rear connector panel or blank should be screwed to the rear of the case using the two 8mm M3 button head screws supplied with the module. The end result should be a unit that is fully loaded with modules and/or blank panels. For ease of fitting, do not tighten the screws until all modules and/or blank panels have been fitted.

To ensure peak operating performance, please ensure all front and rear panel fixing screws are securely tightened; slight warping on the rear of the chassis may be observed – this is no cause for concern.

Generally, any module may be fitted in any position but with the following provisos:

- To use the Dynamics Link function, Dynamics modules must be placed in adjacent slots.
- The Dynamics Link function should only be used with similar types of Dynamics module!
- Only one Master module should be fitted in any one X-Rack.
- When fitting a Master module to X-Rack serial no. XRK0110 or earlier, the module should be fitted immediately to the right of any modules which use either the Mix, Record or Solo/AFL Buses. This limitation does not apply to later X-Rack units.

3.2 Mounting

The X-Rack unit is designed to be rack mounted or free standing. It is 4RU (178mm/7 inches) high. Its depth is:

- 180 mm/7.2 inches
- 255 mm/10.2 inches including connectors

The unit does not require rack shelves. A 1RU space should normally be provided above the unit.

The unit is supplied fitted with both feet and rack ears. If the unit is to be rack mounted the feet should be removed using the supplied 2.5 mm AF hex driver. The same driver can be used to remove the rack ears if the unit is to be free standing.

Feet and rack ears are fixed using M4 x 8mm screws – do not replace them with longer screws as this may damage the rack electronics.

3.3 Connection

3.3.1 Power Connection

The X-Rack unit has an auto-sensing power supply that can operate on 100 – 230V without adjustment. The power connection is made via a standard IEC mains cord to an un-switched IEC mains socket on the rear panel and a latching power switch is provided on the front panel of the unit.

3.3.2 Audio Connection

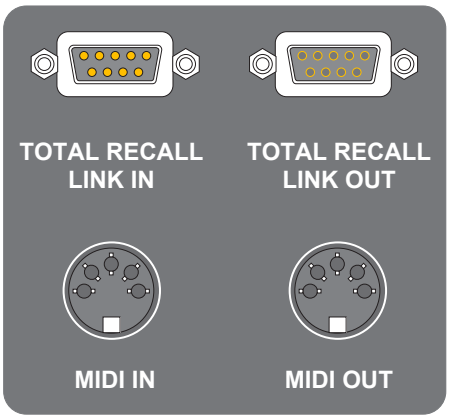
Generally, each module will have an input connector (normally a female XLR) and an output connector (normally a male XLR). Depending upon the type of module other connectors, such as key inputs, may be present also. Connect the module inputs to the insert sends of your console or to your workstation outputs. Connect the module outputs to the corresponding insert returns or to your workstation inputs.

Once the unit is connected switch it on, then route a signal to each channel in turn and check that it is returned to the correct input on your console or workstation.

Some module input and output gains can be set to operate at a nominal level of +4dBu or –10dBV using a switch on the connector panel. Select the appropriate level for the equipment you are connecting to. If in doubt either refer to the section of this manual specific to the particular module or experiment!

3.3.3 Connection to an AWS or Matrix Console

If the X-Rack is being used with an AWS console, connect the **TOTAL RECALL LINK IN** connector (a 9 pin D-type) to Serial Port 1 on the conole's connector panel using the supplied 2 metre cable. If connecting to a Matrix console, connect the cable to the **X-RACK/DIAG** connector. For either console, this cable may be extended to a maximum of 15 metres using a suitable pin to pin extension cable.



If you have more than one X-Rack unit connect the **TOTAL RECALL LINK IN** connector on the second unit to the **TOTAL RECALL LINK OUT** connector on the first unit using the supplied cable. Further units may be connected in the same manner up to a maximum of four (AWS) or six units (Matrix).

3.3.4 MIDI Connection

The MIDI port can be used for several functions:

- Archiving of the 32 internal stores as SysEx (System Exclusive) dumps
- Remote control of the 'soft' functions of the XR622 Master module
- Updating the system software

If you wish to use this facility connect the X-Rack **MIDI IN** connector to a spare MIDI out connector on your MIDI interface and the X-Rack **MIDI OUT** connector to the corresponding MIDI input.

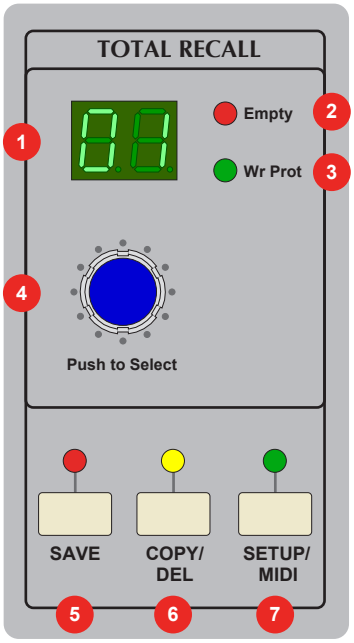
A separate connection is required for each X-Rack.

3.3.5 Mix Bus Link

Some X-Rack modules can route signals onto the X-Rack's internal mix busses. This 25-way 'D' type connector is provided to enable access to these buses and, using this connector, multiple X-Racks may be connected together enabling a large stereo mix system to be constructed. The pinout for this connector is detailed in **Section 5.2**.

4. Operation – Total Recall

4.1 Overview



The Total Recall computer stores all of the switch and rotary control positions for each X-Rack module in one of thirty two internal stores. These can be recalled and compared with the current settings using front panel LEDs to show which controls do not match. If the module layout has changed since the snapshot was taken, only the modules that match will be recalled.

The contents of all the stores can be archived and restored as a MIDI system exclusive data dump.

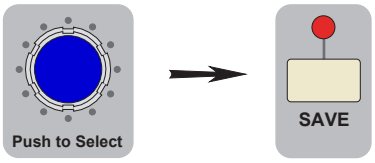
Additionally, the X-Rack can interface with the Total Recall system on AWS 900, AWS 900+, AWS 924, AWS 948 or Matrix consoles. This allows the settings of up to four (AWS) or six (Matrix) X-Rack units to be stored along with the console settings.

4.2 Stand-alone Mode

4.2.1 Saving Stores to Internal Memory

A maximum of 32 stores can be saved in internal non-volatile memory, provided the stores have not been write-protected – indicated by the '**Wr Prot**' LED 3 being illuminated.

First select a store by turning the D-Pot 4, then press **SAVE** 5 to store all of the current control positions.



If the store has already been used the **SAVE** LED will flash. Press the **SAVE** 5 switch a second time to overwrite the store.

4.2.2 Recalling and Displaying Stores

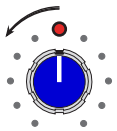
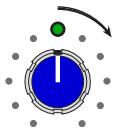
To select a store using the D-Pot 4 then press the D-Pot to select that store.

The current store is displayed on the dual 7-segment display 1.

If the selected store is empty the '**Empty**' LED 2 lights and the unit will not switch to display mode.

With a valid store selected, the X-Rack module **SEL** LEDs will light *if the module type in the store (EQ, Dynamics etc.) matches the module currently fitted in that slot*. A flashing **SEL** LED indicates that some controls on that module do not match the stored positions. A steady LED shows that all controls are matched. The switch LEDs will light if the current switch position does not match the stored positions. Press or release the switch as required to extinguish the LED.

Above each rotary control is a bi-colour LED:

The LED lights red if the control needs turning anti-clockwise.  *or*  The LED lights green if the control needs turning clockwise.

The LED extinguishes when the control matches the stored position.

If a store is already being displayed when you select a different store the display will flash and the new store will not become active until you press the D-Pot for a second time.

4.2.3 Exiting Display Mode

Push the D-Pot 4 a second time to exit display mode.

All **SEL** LEDs will extinguish and the channel switch LEDs will now show the position of their respective switches.

4.2.4 Copy/Swap

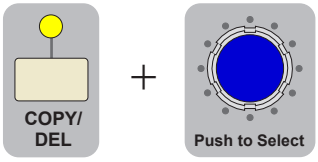
While displaying a TR setup pressing and holding a module **SEL** switch and then pressing a second **SEL** switch will swap the setting of the two channels.

Selecting **COPY/DEL** 6 and then doing the same will copy settings from the first channel to the second.

Note that Copy/Swap is only allowed between similar modules; the unit will not allow you to swap settings between an EQ module and a Dynamics module for instance!

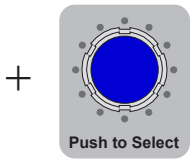
4.2.5 Deleting Stores

Stores can be cleared (to remove unwanted stores before a SysEx dump) by holding down **COPY/DEL** till it's LED flashes and pressing the D-Pot switch (while still holding down the **COPY/DEL** switch). Additional stores can be deleted by holding down the **COPY/DEL** switch, selecting the second store with the D-Pot and pressing the D-Pot again.



4.2.6 Delete All

All stores can be cleared by holding down all three switches until their LEDs flash, then pressing the D-Pot switch.



4.3 Remote Mode

4.3.1 System Requirements

The X-Rack '**TOTAL RECALL LINK IN**' connector must be connected either to AWS serial port 1 or the X-RACK/DIAG connector on Matrix using the pin-to-pin serial lead supplied with X-Rack – see Section 3.3 for more details. If more than one X-Rack is connected each X-Rack must have a different address – refer to the Setup/MIDI Mode Section.

An AWS 900 must be running V1.2/6 or higher software and have Total Recall enabled for this to function. Current AWS 900 software can be downloaded from the SSL website.

4.3.2 Operation

Pressing the Total Recall **STORE** switch on the console will send a message to all attached X-Racks asking for the current control settings to be returned. The returned settings are appended to the console's Total Recall stores and are automatically archived and restored as part of the console Total Recall system.

Similarly, displaying a Total Recall setup on the console will return the selected Total Recall setup to the X-Rack unit(s). The remote load command will always replace the current setup and the X-Rack display will read '- E'.

To display the new settings, press the D-Pot as in 'Stand-alone' mode and to exit display mode press the D-Pot a second time. If the console store does not contain valid data (for example if it was saved on a console not connected to an X-Rack) the '**Empty**' LED will light and it will not be possible to select display mode.

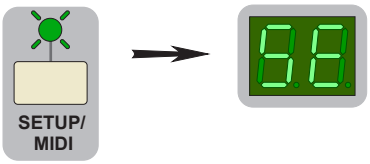
Settings can be saved to X-Rack's local store and recalled at any time by turning the D-Pot (though see the Remote option in the Setup menu section). Storing the Total Recall settings on the console will always save the current state of the X-Rack and displaying a Total Recall setup will replace the store to be displayed with the store from the console.

See the Remote and the Address options in the Setup/MIDI Mode Section.

4.4 Setup/MIDI Mode

4.4.1 Overview

Enter SETUP/MIDI mode by holding down **SETUP/MIDI** 7 until the display reads 'SE'. The **SETUP/MIDI** LED flashes to show you are in this mode. Press and hold the same switch to return to normal operation.



Navigating in the Setup menu

The setup menu contains a number of options. These each contain a number of sub-options. Turn the D-Pot to scroll through the main list of options and push the D-Pot to select an option for editing. The D-Pot will now scroll through the available list of possible settings for that option. Pressing the D-Pot again will save the currently selected setting and return to the normal option menu. The options are:

Option	Display	Setting	Notes
Enter Setup	SE	None	
MIDI	M1	MIDI Channel (CH)	Select the MIDI channel to listen to for remote control of the XR622 Master module (01 to 16 or AL for all)
		MIDI Learn (LE)	Define which MIDI controls operate the XR622 Monitor module controls
		Save (SA) and Load (LO)	Send or receive SysEx data to save or load all internal stores to a MIDI sequencer or librarian
Write Protect	Pr	Off (OF) and On (On)	Toggles write protect on and off
Remote	rE	Off (OF), On (On) or MIDI (M1)	Toggles remote Total Recall mode on and off or enables MIDI remote control of the XR622 Monitor module controls
Set Address	Ad	A1, A2, A3, A4	Sets X-Rack address for AWS Total Recall interface
Record/Mix	rM	Sum (SU) or Alternate (AL)	Record/Mix mode setting for the XR623 Line Return module.
Show Version	uE		Displays software version
Test	tE	Test LEDs (tL)	All module LEDs flash
		Test switches (tS)	Press TR computer switches to light corresponding LEDs
		Test pots (tP)	Shows position of pots
Update Software	FL	Program upgrade mode (tE)	The only exit from this mode, without updating the X-Rack software, is to power-cycle the unit.
Dim Level	d1	–3 (03) to –30 (30) dB	Sets the 'DIM' level for the XR622 Monitor module

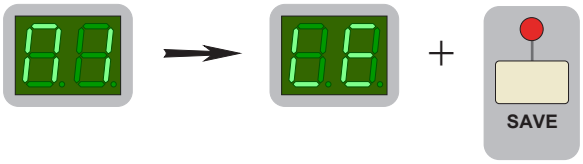
4.4.2 MIDI (MIDI)

Under this menu it is possible to set the MIDI controls which can control parts of the X-Rack XR622 Master module and also to save and load all internal stores to and from a MIDI sequencer or librarian as a SysEx dump.

MIDI Remote Channel (CH)

Under the MIDI menu, use the D-Pot to select MIDI Channel. Then press the D-Pot and turn it to select the required channel ('01' to '16' or 'ALL' for all/any channel). This is the MIDI channel that will be used for remote control of the XR622 Master module. By default X-Rack will listen on all channels.

MIDI Remote Learn (LE)



Under the MIDI menu, use the D-Pot to select MIDI Learn (LE) and press **SAVE**. The green '**Wr Prot**' LED will flash to indicate you are in MIDI Learn mode. Operating any one of the 'soft' controls on the XR622 Master module will cause the LED of the selected control to flash (the module '**SEL**' LED will flash if either of the potentiomenters have been chosen) – indicating it has been chosen. Assign a MIDI controller to the selected function by operating the required MIDI controller. To cancel or change the assignment either operate the Master module control again, or operate a different control. A successful assignment will be indicated by the flashing LED changing to just being illuminated steadily.

Default MIDI Controller Mapping	
MIDI Controller	*Master Module Control*
1	MIX
2	REC
3	EXT
4	ALT
5	MONO
6	DIM
7	CUT
8	AFL Level
9	Monitor LEVEL

Only single controls can be mapped to a MIDI controller. Therefore, mapping an X-Rack control to a MIDI controller which is already in use will remove the previous mapping. The original X-Rack control will require re-mapping itself before it can be controlled again.

To exit MIDI Learn mode, press the D-Pot – the green '**Wr Prot**' LED will stop flashing. Switch assignments can be reset to the system defaults by pressing **COPY/DEL** when in MIDI Remote Learn mode; the '**Empty**' LED indicating when the assignments have been deleted.

MIDI Save and Load

In order to use the MIDI save and load utility the X-Rack must be connected to a computer running a suitable sequencer or MIDI librarian package.

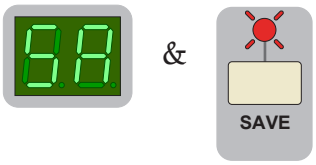
All the stored setups can be saved as a System Exclusive dump to any software package that supports MIDI SysEx dumps. In practice this includes most packages and you would normally save the TR setups to an additional track in your current DAW project so that your setups are stored with the rest of the project.

Saving Setups to a Mac or PC (SA)

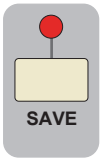
With the X-Rack in Setup Mode, saving TR setups to Mac or PC can be achieved as follows:

- Under the MIDI menu, use the D-Pot to select MIDI Save.

- The display will show 'SA' and both the '**SAVE**' LED and display flash.



- Create an additional MIDI track in your DAW program. Select its input and output to be the MIDI port connected to your X-Rack.
- If available select the track to store System Exclusive data and record enable the MIDI track.
- Press Play and Record on the DAW to put the MIDI track into record.
- Press the **SAVE** switch to start transmission of all saved Total Recall setups. A 'rotatingsegment' display will start and run until all data has been transmitted



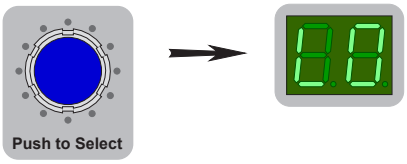
- Once the display changes to 'n 1' stop the DAW to end recording.

An unlimited number of Total Recall setups can be stored in this way.

Loading Setups from a Mac or PC (LO)

Restoring setups from a Mac or PC is even simpler:

- Enter MIDI mode as before, and turn the D-Pot until the display changes to 'LO' and begins to flash.

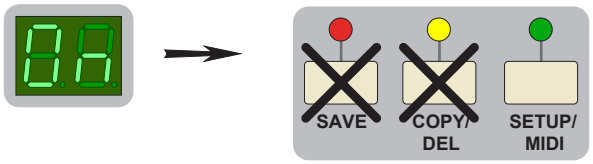


- Locate the DAW to just before the SysEx data containing the setups you wish to load.
- Play through the SysEx block of data. The display will show a rotating segment while data is received. As soon as the X-Rack detects the start of valid data it will delete all the current setups and replace them with the stored ones from the MIDI track.

4.4.3 Write Protect Mode (Pr)

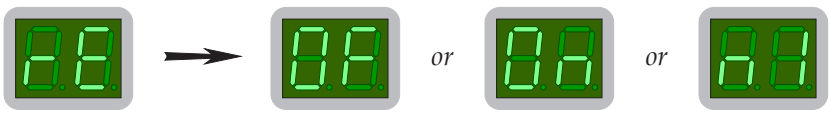
Write Protect prevents existing stores being over written or deleted, providing an extra level of protection for units that have been programmed with particular settings.

When set to 'On' the Save and Delete functions are disabled. When set to 'OF' they are enabled. The '**Wr Prot**' LED lights to show this mode has been selected.



4.4.4 Remote Mode (rE)

This mode enables remote control of X-Rack, either from a console for saving and recalling Total Recall snapshots or from a MIDI controller for control of the XR622 Master module.



When Remote Mode is 'On', selecting a TR setup on the console will change the current X-Rack setup to the one saved in the console. The X-Rack display will change to read 'rE' (remote) and pressing the D-Pot will display the TR setup as normal. When Remote Mode is 'OF', turning the D-Pot will change the current

X-Rack setup to one of the internal stores but when Remote Mode is set to 'On' the D-Pot is disabled once the X-Rack has received a setup from the console. This also prevents saving or deleting of local stores.

When Remote Mode is set to MIDI ('M I'), the 'soft' controls on the XR622 Master module may be remotely operated as MIDI controls. The Master module controls will continue to function until a valid MIDI packet has been received, after which all of the 'soft' controls will be locked out – this condition will be indicated by illumination of the right-hand decimal point in the X-Rack display. Which MIDI channels and controls are used is set through the MIDI learn process (see above).

Setting Remote Mode to MIDI will disable the console Total Recall connection.

4.4.5 Address Setting (Ad)

If more than one X-Rack is to be connected to an AWS 900 then each must have a different address. Enter Address mode and turn the D-Pot so the display reads 'A 1', 'A2', 'A3' or 'A4' then press the D-Pot to save the address:

The order of addressing is not important, but we recommend you address the racks in the order they are connected to the AWS 900. This will increase the chances of data being correctly mapped if you move to a different facility.

4.4.6 Record/Mix (rM)

This function is applicable only to X-Rack units fitted with one or more XR623 Line Return module(s). The 'rM' setting allows the **REC** switches on these modules to opperate in either 'Alternate' mode where the switches flip between the Record and Mix busses or 'Sum' mode where the Mix bus is permanently fed with signal routed to the Record bus only when the **REC** switch is pressed.

Select Record/Mix by turning the D-Pot till the display shows 'rM'.

To select 'Alternate', turn the D-Pot to show 'AL' then press the D-Pot to set it.

To select 'Sum', turn the D-Pot to show 'SU' then press the D-Pot to set it.

4.4.7 Show Version (uE)

Select Show Version by turning the D-Pot till the display shows 'uE'.

Press the D-Pot to show the software version in three blocks. As an example, software version 'V1.3/1' will display in this sequence before returning to display 'uE'.

4.4.8 Test Mode (tE)

This mode is used for testing the front panel switches and LEDs.

There are three test modes available, selected using the D-Pot as for the other Setup functions:

Test LEDs (tL)

This toggles the bi-colour LEDs above the pots between red and green.

Test Switches (tS)

This mode flashes all the channel switch LEDs. Pressing any switch (apart from **SEL**) should make the corresponding LED flash out of time with the other LEDs on the front panel.

Pressing a **SEL** switch should light the corresponding LED.

Pressing any of the switches on the TR computer section should flash the corresponding LED. Pressing the D-Pot should turn off the flashing '**Empty**' LED and flash the '**Wr Prot**' LED.

Test Pots (tP)

This mode scans all the modules from the top left to the bottom right of the unit and displays the value of the last rotary control not turned fully counter clockwise. If all controls are turned counter clockwise then the display shows 'tP'.

To use this diagnostic first turn all controls fully counter clockwise. The module **SEL** LEDs will flash on all modules with a control not in the correct position and the individual pot LEDs will light green on all controls not in the correct position. Turning any control should make the display change from '**02**' to '**255**'. Note that '**02**' is the lowest value that can be read before the pot is skipped.

The decimal points on the two displays are used to show numbers greater than '**99**'. The left hand decimal point lights to indicate that you should add a 100 to the displayed value and both decimal points light to show that you should add 200 to the displayed value, hence:

'**101**' will display like this:  whilst '**201**' will display like this: 

4.4.9 Set DIM Level (dI)

Select DIM Level by turning the D-Pot till the display shows 'dI'.

Press the D-Pot to show the current DIM level. The level can be varied from –3dB ('03') to –30dB ('30'). Press the D-Pot once more to change the DIM level.

4.5 Software Download and Installation

Software to upgrade your X-Rack unit should be downloaded from the SSL website (www.solidstatelogic.com/support).

The X-Rack software is packaged as a 50kB (approximately) java archive, the format of which is compatible with both PC and Macintosh (PowerPC and Intel but OS X only) platforms. *Some users may need to install additional files on their computer before continuing – see* ***System Requirements*** *below.*

4.5.1 System Requirements

PC users should ensure that they have the latest version of Java installed. This can be downloaded from www.java.com. There is a link to this address on the download page.

To enable Java to access external MIDI devices, Mac OS X users may need to download and install either 'Plumstone' (PowerPC) or 'MandolaneMIDI' (Intel) from www.mandolane.co.uk. Drag this file into the '`/Library/Java/Extensions`' folder then restart the Macintosh before running the upgrade utility.

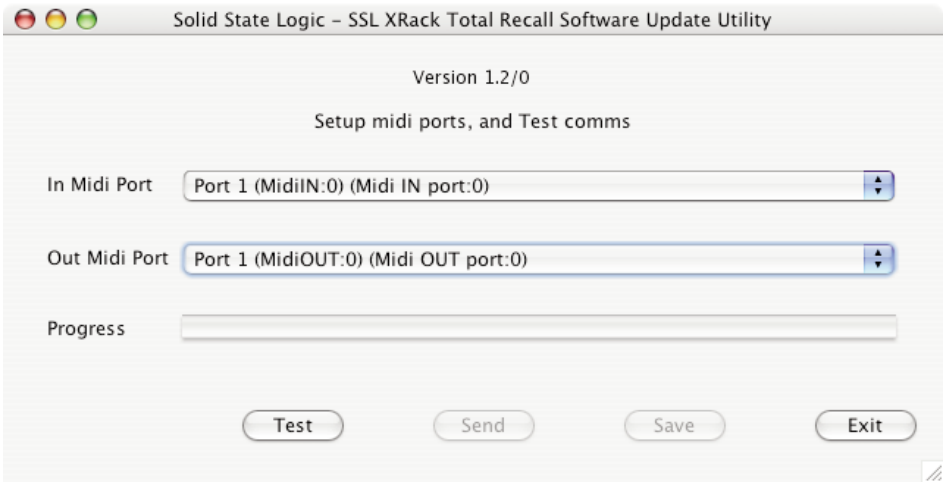
4.5.2 Software Update

Once the software package has been downloaded, it will need to be moved onto a Mac or PC that is connected to the X-Rack via MIDI after which you will be ready to install the new software. The following steps detail this process:

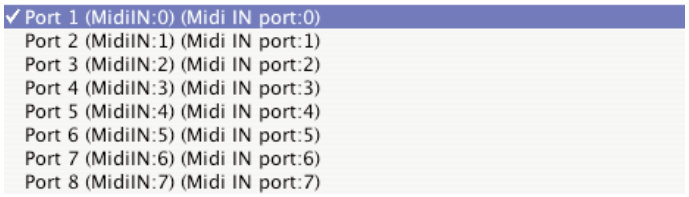
1. Ensure that the X-Rack is turned on and connected to a MIDI port on your PC/Mac.
2. Enter Setup mode and turn the D-Pot until the display shows '`FL`' ('Flash'). Press the D-Pot and the display should change to read '`tE`' ('Test').

To exit from this mode without updating software turn the unit off and on.

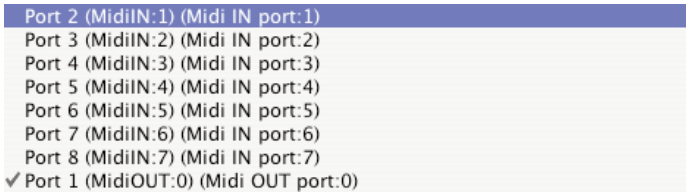
3. Close all current applications on your PC/Mac.
4. If upgrading from V1.0/0 or V1.1/0 double click on the `xrack_flash.jar` file. If upgrading from V1.2/0 or later, double click on the `xrack_vn_n_n.jar` file (where '`n_n_n`' denotes the new version number). You should see the SSL X-Rack Software Update Utility window appear:



5. Go to the In MIDI Port menu. Select the MIDI IN port which is connected to your X-Rack from the drop down list. In the example shown below this was 'port 1' on an 8-Port interface. If nothing appears in the list check that you have installed the files listed in the **System Requirements** section opposite.

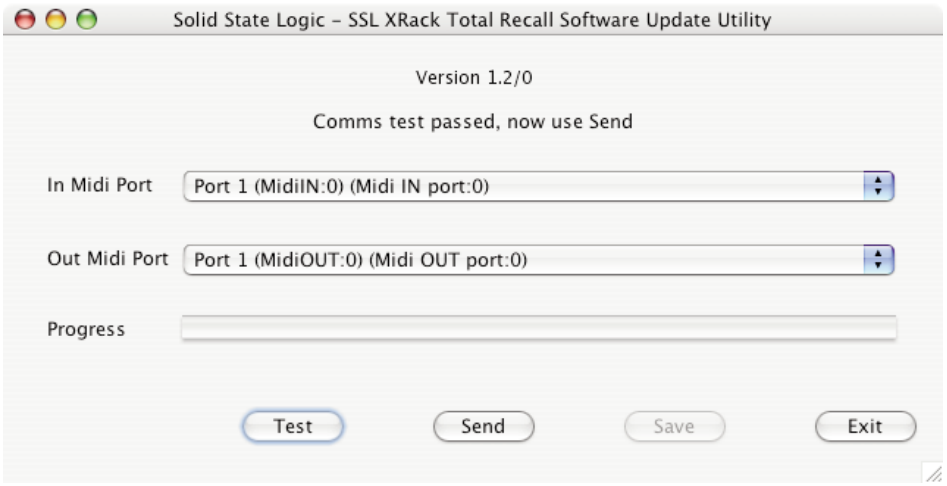


6. Go to the Out MIDI Port menu. Select the MIDI OUT port which is connected to your X-Rack:



   Note that a PowerPC Macintosh (ie. using Plumstone Server) will show all MIDI Inputs at the top of the list, MIDI Outputs at the bottom. You must scroll to the middle of the list to see the MIDI Out ports.

7. Click on the **Test** button. This transmits a packet of data to the X-Rack which should return an acknowledgment to the computer. If the test was successful the message '**Comms test passed, now use send**' will be displayed and the display on the X-Rack should change to read '5E'.



   If the test fails check that the correct MIDI port has been selected and that the X-Rack is in software download mode, then repeat the test.

8. Once you have established a valid connection click on the **Send** button. The new code will now be transferred to memory on the X-Rack. This process will take approximately 20 seconds. A progress bar and transfer counter will be displayed on screen to enable you to observe the transfer progress and the X-Rack displays will show a rotating segment.

   During this time it is important that power to the X-Rack is not interrupted.

9. Once the software has been saved the X-Rack will re-boot. If you ran the 'real' X-Rack updater (a file named `xrack_vn_n_n.jar` where 'n_n_n' relates to the software version) go to step 10. If however you ran the `xrack_flash.jar` updater, the X-Rack will automatically switch to programming mode ready to accept the real X-Rack software. Double click on the `xrack_vn_n_n.jar` file and repeat steps 5 through 8.

10. Once the new software has been saved a message will appear '**Software update completed**' and the X-Rack will re-boot using the new software. Click on '**Exit**' to close the Update Utility.

5. Miscellaneous

5.1 X-Rack Internal Links and Fuses

5.1.1 Fuses (Mains Inlet)

The power supply module is internally fused. In the event of this fuse failing the entire unit should be returned to your nearest SSL Service agent.

5.1.2 Internal Fuses

The internal power rail fuses will automatically reset once a fault condition has been removed and should not need to be replaced.

5.1.3 Links

There are no user settable links.

5.2 X-Rack Connector Details

Total Recall Link In	
Location:	Rear Panel
Conn' Type:	9-pin 'D' Type Male
Pin	*Description*
1	Carrier (linked to 0V)
2	Rx
3	Tx
4	DTR (linked to DSR)
5	0V
6	DSR (linked to DTR)
7	RTS (linked to CTS)
8	CTS (linked to RTS)
9	RI (linked to 0V)

Total Recall Link Out	
Location:	Rear Panel
Conn' Type:	9-pin 'D' Type Female
Pin	*Description*
1	Carrier (linked to 0V)
2	Tx
3	Rx
4	DTR (linked to DSR)
5	0V
6	DSR (linked to DTR)
7	RTS (linked to CTS)
8	CTS (linked to RTS)
9	RI (linked to 0V)

Please note that the 'D' type connector binding posts fitted to the X-Rack chassis are all 4-40 UNC thread.

MIDI In	
Location:	Rear Panel
Conn' Type:	5-pin DIN Female
Pin	*Description*
1	n/c
2	0V
3	n/c
4	Signal +ve
5	Signal –ve

MIDI Out	
Location:	Rear Panel
Conn' Type:	5-pin DIN Female
Pin	*Description*
1	n/c
2	n/c
3	n/c
4	Signal +ve
5	Signal –ve

5.2 X-Rack Connector Details (cont.)

Mix Bus Link		
Location:		Rear Panel
Conn' Type:		25-pin 'D' Type Female
Pin		*Description*
1		Chassis
	14	AFL/Solo Bus Left (–ve)
2		AFL/Solo Bus Left (+ve)
	15	Chassis
3		AFL/Solo Bus Right (–ve)
	16	AFL/Solo Bus Right (+ve)
4		Chassis
	17	Mix Bus Left (–ve)
5		Mix Bus Left (+ve)
	18	Chassis
6		Mix Bus Right (–ve)
	19	Mix Bus Right (+ve)
7		Chassis
	20	Record Bus Left (–ve)
8		Record Bus Left (+ve)
	21	Chassis
9		Record Bus Right (–ve)
	22	Record Bus Right (+ve)
10		Chassis
	23	AFL/Solo Enable
11		n/c
	24	n/c
12		n/c
	25	n/c
13		n/c

Please note that the 'D' type connector binding posts fitted to the X-Rack chassis are all 4-40 UNC thread.

5.3 Physical Specification

Depth:	180mm / 7.2 inches	*excluding front panel knob(s) and connectors*
	255mm / 10.2 inches	*including connectors, excluding front panel knob(s)*
Height:	178mm / 7 inches (4 RU)	*excluding feet*
Width:	440mm / 17.4 inches	*excluding rack ears*
	483mm / 19 inches	*including rack ears*
Weight:	2.8kg / 6.2 pounds	*without modules fitted*
	3.5kg / 7.7 pounds	*with blank panels fitted*
	5.0kg / 11 pounds	*with modules fitted*
Power:	50 Watts / 60VA	*with 8 modules fitted*
Boxed size:	540mm x 300mm x 270mm / 21.25" x 12" x 10.63"	
Boxed weight:	4.3kg / 9.5 pounds	*without modules fitted*
	5.0kg / 11 pounds	*with blank panels fitted*
	6.5kg / 14.3 pounds	*with modules fitted*

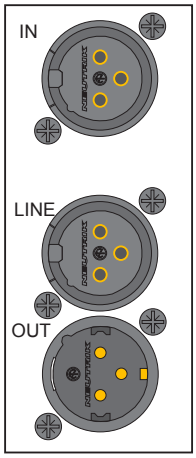
** All values are approximate*

5.4 Environmental Specification

Temperature	Operating:	5 to 30 Deg. C
	Non-operating:	–20 to 50 Deg. C
	Max. gradient:	15 Deg. C/Hour
Relative Humidity	Operating:	20 to 80 %
	Non-operating:	5 to 90 %
	Max. wet bulb:	29 Deg. C (non-condensing)
Vibration	Operating:	< 0.2 G (3 - 100Hz)
	Non-operating, power off:	< 0.4 G (3 - 100Hz)
Shock	Operating:	< 2 G (10mSec. Max.)
	Non-operating:	< 10 G (10mSec. Max.)
Altitude	Operating:	0 to 3000m (above sea level)
	Non-operating:	0 to 12000m

A. Mic Amp Module

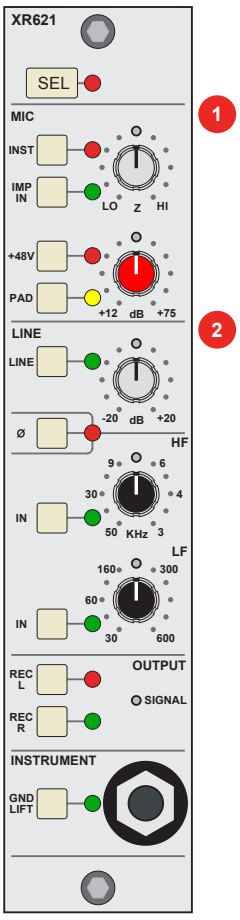
A.1 Connection



The rear panel of the module carries the Mic ('IN') and Line input ('LINE') XLRs along with a single output ('OUT') XLR. The Line input and output operate at a nominal level of +4dBu although the gain of the Line input can be varied by a front panel control. Also contained on the front panel is an additional mono Jack socket for a high impedance Instrument input.

A.2 Operation

The X-Rack Mic module contains three seperate input amplifiers; a Microphone amplifier, an Instrument input and a Line input, any one of which may be selected at any one time. A set of High and Low Pass filters are also provided.



A.2.1 MIC Section 1

Normally, the Microphone input on the rear of the module will be selected ('LINE' and 'INST' switches released); pressing the 'INST' switch selects the mono jack instrument input on the front of the module. This is a very high impedance unbalanced input intended to be used with guitar pickups etc. To help alleviate 'hum', a ground lift ('GND LFT') switch has been provided which places a 1k2Ω impedance in series with the sleeve of this connector and audio ground in the module. The gain of these inputs is continuously variable between +12dB and +75dB.

The impedance of the Microphone input can be varied between ≈1k2Ω and ≈10kΩ by selecting the 'IMP IN' switch and adjusting the 'Z' control. This allows the connection of line level signals to the Microphone input if required, and provides an alternative input impedance for some dynamic microphones.

The 'PAD' switch reduces the signal level of both the Microphone or Instrument inputs by 20dB. Phantom power, for microphones requiring this, can be switched on using the '+48V' switch. *Please note that X-Rack units prior to serial number XRK0110 are* ***not*** *normally enabled for +48V. However, a field retrofit kit (629620XR) is available for these units. Any in-warranty X-Rack units can be upgraded free-of-charge; for units out of warranty a charge will be made. Please contact your local distributor to order this kit, if required.*

Note. Please note that connecting a microphone to the X-Rack Mic module with phantom power switched on is not advised as it may cause damage to either the microphone or the input stage of the X-Rack module. Take care not to connect line level sources (keyboards etc.) to the microphone input with phantom power switched on as this may damage the output stage of the connected unit.

A.2.2 LINE Section 2

The Line input on the rear of the module is selected by pressing the 'LINE' switch. The gain of this input can be varied by ±20dB from the nominal 0dB.

The Ø (Phase) switch reverses the phase of the selected input.

3

4

A.2.3 HF/LF Section 3

This section contains simple high and low pass filters as follows:

HF (Low Pass):	Frequency range 50kHz – 3kHz (–3dB point) Slope: 12dB/Octave
LF (High Pass):	Frequency range 30Hz – 600Hz (–3dB point) Slope: 18dB/Octave

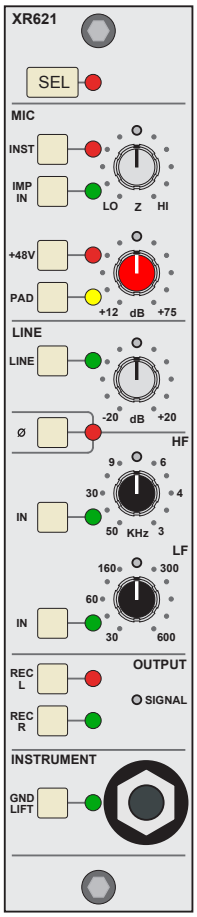
The two filters can be switched into circuit independently.

A.2.4 OUTPUT Section 4

This small section contains a tri-colour signal present indicator and two routing switches ('REC L' and 'REC R') which route the module signal onto a common internal record bus.

The signal present indicator measures signals immediately prior to the output amplifier. It will light GREEN for output signals above the lower threshold of –60dBu, AMBER for signals between +4dBu and +24dBu and lights RED for signals above +24dBu.

The record bus is used by the X-Rack XR622 Master Module which provides stereo mix and monitor facilities, providing a compact solution for mixing and monitoring in the analogue domain.



A.3 Performance Specification

The following pages contain audio performance specification figures for the X-Rack Mic Amp module. No other Solid State Logic products are covered by this document and the performance of other Solid State Logic products can not be inferred from the data contained herein.

A.3.1 Measurement Conditions

For each set of figures on the following pages, the specific unit and test setup will be stated at the beginning of that section. Any changes to the specified setup for any particular figure(s) will be detailed beside the figures to which that difference applies.

A.3.2 Measurement References

Unless otherwise specified the references used in this specification are as follows:

- Reference frequency: 1kHz
- Reference level: 0dBu, where 0dBu ≈ 0.775V into any load
- Source impedance of Test Set: 50Ω
- Input impedance of Test Set: 100kΩ
- All unweighted measurements are specified as 22Hz to 22kHz band limited RMS and are expressed in units of dBu
- All distortion measurements are specified with a 36dB/Octave low pass filter at 80kHz and are expressed as a percentage
- The onset of clipping (for headroom measurements) should be taken as 1% THD
- Unless otherwise quoted all figures have a tolerance of ±0.5dB or 5%
- All measurements are made with the operating level switch set for +4dBu

A.3.3 Microphone Amplifier Performance

Signal applied to Microphone Input and measured at Output. Pad switched out and Input Gain control set to +12dB (minimum).

Gain	Continously variable from +12dB to +75dB Independently switchable 20dB Pad available
Input Impedance	Continously variable from ≈1k2Ω to ≈10kΩ
Output Headroom	> +26dBu at onset of clipping
THD + Noise (-18dBu applied, +28dB gain)	< 0.003% at 1kHz < 0.006% at 10kHz
Frequency Response	+0.05dB/-0.1dB from 20Hz to 20kHz –3dB at 150kHz
Equivalent Input Noise (input terminated with 150Ω)	< –127dB at maximum gain < –90dB at 0dB gain (+20dB with Pad 'IN')
Common Mode Rejection (-10dBu applied, +30dB gain)	> 75dB from 50Hz to 1kHz > 70dB at 10kHz

A.3.4 Instrument Input Performance

Un-balanced signal applied to Instrument Input and measured at Output. Pad switched out and Input Gain control set to +12dB (minimum).

Gain	Continously variable from +12dB to +75dB Independently switchable 18dB Pad available
Input Impedance	1MΩ
Output Headroom	> +26dBu at onset of clipping
THD + Noise (-18dBu applied, +28dB gain)	< 0.03% at 1kHz < 0.05% at 10kHz
Frequency Response	+0.05dB/-0.1dB from 20Hz to 20kHz –3dB at 150kHz
Equivalent Input Noise (Input terminated with 150Ω)	< –82dB at +12dB (minimum) gain < –88dB at +28dB gain (mid' position)

A.3.5 Line Input Performance

Signal applied to Line Input and measured at Output. Input Gain control set to 0dB (indent).

Gain	Continuously variable from –20dB to +20dB
Input Impedance	> 10kΩ
THD + Noise (+24dBu applied, 0dB gain)	< 0.005% from 20Hz to 20kHz
Frequency Response	±0.1dB from 20Hz to 20kHz –3dB at 150kHz
Equivalent Input Noise (Input terminated with 150Ω)	< –90dB

A.4 Calibration Information

The X-Rack Mic Amp module is factory calibrated and should only need calibration if a potentiometer or other component has been replaced or if it is suspected that there is a problem with calibration.

In each of the following instructions it is assumed that the lid of the X-Rack has been removed and that power has been applied. It is also assumed that unless otherwise specified, all switches are released and all front panel potentiometers are at unity or minimum position as appropriate. The required accuracy for each adjustment will be specified along with the target value. All level and distortion measurements should be made with audio-band 20Hz to 20kHz filters unless otherwise specified.

All presets are accessible from the top of the unit.

A.4.1 Microphone Input

Equipment Required:	Calibrated audio oscillator and audio level meter
Test Signal:	50Hz sinewave @ –12dBu, common mode
Input and Output:	Oscillator to Mic Input and Output to the audio level meter
Unit Setup:	Set the Mic Gain to '36dB' (mid-position)

CMRR Trim

Adjustment: Adjust VR7 (CMRR) for minimum level (normally < –40dBu)

A.4.2 Line Input

Equipment Required:	Calibrated audio oscillator and audio level meter
Test Signal:	1kHz sinewave @ 0dBu
Input and Output:	Oscillator to Line Input and Output to the audio level meter
Unit Setup:	Set the Line Gain to indent (0dB) and select 'LINE'

Level Trim

Adjustment:

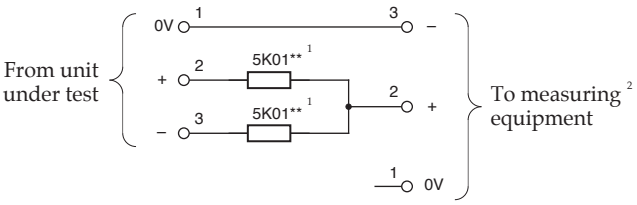
1. Adjust VR6 (0dB) for 0dBu ±0.05dB.

A.4.3 Output Balance

Equipment Required:	Calibrated audio oscillator, audio level meter and a 'balance' adaptor (see below)
Test Signal:	1kHz sine wave at +24dBu
Input and Output:	Oscillator to Line Input and Output to the audio level meter via the 'balance' adaptor
Unit Setup:	Set the Line Gain to indent (0dB) and select 'LINE'
Adjustment:	Adjust VR8 (BAL) for minimum level (< 55dBr)

A.4.4 'Balance' Adaptor

For the output balance adjustment, a 'balance' adaptor such as that illustrated here will be required. This adaptor consists of a pair of close tolerance resistors in an in-line cable and is used to sum together a balanced output in order to correctly adjust the level balance of the measured output; perfect balance should result in complete signal cancellation.



Note 1. Resistor tolerance should ideally be 0.01%
2. Absolute level measured will depend upon the input impedence of the measuring equipment.

A.5 Connector Details

Audio Input	
Location:	Rear Panel
Conn' Type:	XLR Female
Pin	*Description*
1	Chassis
2	Audio +ve
3	Audio –ve

Audio Output	
Location:	Rear Panel
Conn' Type:	XLR Male
Pin	*Description*
1	Chassis
2	Audio +ve
3	Audio –ve

Instrument Input	
Location:	Front Panel
Conn' Type:	Mono 1/4" Jack Socket
Pin	*Description*
Tip	Guitar Input
Sleeve	Chassis

A.6 Physical Specification

Depth:	200mm / 7.9 inches	*including front panel knobs, excluding connectors*
	275mm / 10.9 inches	*including front panel knobs and connectors*
Height:	171mm / 6.75 inches	
Width:	35mm / 1.4 inches	*front/rear panels*
	49mm / 1.9 inches	*overall width (front and rear panels are offset)*
Weight:	260g / 9.5 ounces	
Boxed size:	190mm x 290mm x 70mm / 7.5" x 11.5" x 2.5"	
Boxed weight:	460g / 16.5 ounces	

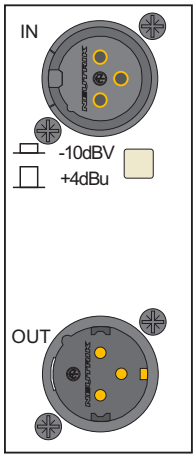
** All values are approximate*

A.7 Environmental Specification

As per X-Rack – see page 19.

B. EQ Module

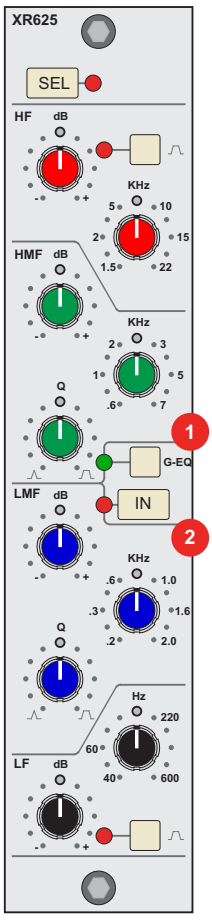
B.1 Connection



The module input and output gains can be set to operate at a nominal level of either +4dBu or –10dBV, using a switch on the connector panel. To select the appropriate level for the equipment you are connecting to, please check the operating manual for your mixer or DAW. The switch should be released for +4dBu operation: push it in for –10dBV operation.

B.2 Operation

The EQ module is a 4-band equaliser that can be switched between two different sets of curves, one based on the latest version of the classic SSL E Series EQ and the other based on SSL's G Series EQ.



The G-EQ button 1 switches the EQ from 'E' operation to 'G' operation.

The IN button 2 switches the entire section in and out of circuit.

B.2.1 Frequency Sections

The different frequency sections are as follows:

HF Section:	Frequency range 1.5kHz – 22kHz Gain ±20dB
LF Section:	Frequency range 40Hz – 600Hz Gain ±16.5dB

The HF and LF sections provide shelving equalisers with variable turnover frequency and a gentle slope. Selecting the 'G-EQ' button provides a slightly steeper slope for both sections with a degree of overshoot/undershoot (depending on whether you are boosting or cutting) below the selected HF frequency (or above the selected LF frequency). Selecting '⎍' ('Bell') in either mode switches the equaliser to a peaking curve.

HMF Section:	Centre frequency 600Hz – 7kHz Gain ±20dB Continuously variable Q (0.7 – 2.5)
LMF Section:	Centre frequency 200Hz to 2.5kHz Gain ±20dB Continuously variable Q (0.7 – 2.5)

Normally, the bandwidth of the HMF and LMF sections will remain constant at all gains – at lower gains the EQ curves are comparatively narrower for a given Q setting. This is particularly useful for drums since relatively high Q is available at low gain settings but is less suitable for overall EQ or subtle corrections because the Q must be adjusted to maintain the same effect as the gain is changed.

When the EQ is switched to 'G-EQ' operation, the bandwidth will vary with gain so an increase in boost or cut increases the selectivity of the EQ. This type of EQ can sound most effective when used at moderate settings; the gentle Q curve lends itself to the application of overall EQ on combined sources and subtle corrective adjustments to instruments and vocals.

B.3 Performance Specification

The following pages contain audio performance specification figures for the X-Rack EQ Module. No other Solid State Logic products are covered by this document and the performance of other Solid State Logic products can not be inferred from the data contained herein.

B.3.1 Measurement Conditions

For each set of figures on the following pages, the specific unit and test setup will be stated at the beginning of that section. Any changes to the specified setup for any particular figure(s) will be detailed beside the figures to which that difference applies.

B.3.2 Measurement References

Unless otherwise specified the references used in this specification are as follows:

- Reference frequency: 1kHz
- Reference level: 0dBu, where 0dBu ≈ 0.775V into any load
- Source impedance of Test Set: 50Ω
- Input impedance of Test Set: 100kΩ
- All unweighted measurements are specified as 22Hz to 22kHz band limited RMS and are expressed in units of dBu
- All distortion measurements are specified with a 36dB/Octave low pass filter at 80kHz and are expressed as a percentage
- The onset of clipping (for headroom measurements) should be taken as 1% THD
- Unless otherwise quoted all figures have a tolerance of ±0.5dB or 5%
- All measurements are made with the operating level switch set for +4dBu

B.3.3 Performance

Signal applied to Input and measured at Output. EQ switched In. All EQ controls set centre as appropriate.

THD + N	< 0.005% at +20dBu 1kHz < 0.007% at +20dBu 10kHz
Frequency Response	±0.5dB from 20Hz to 20kHz –3dB at 200kHz
Output Headroom	> +26dBu at onset of clipping
Noise	< –83dBu (+4dBu operating level) < –92dBu (–10dBV operating level)

B.3.4 Curves

Each channel contains a four band equaliser that can be switched between two different sets of curves, one based on the latest version of the classic SSL E Series EQ and the other based on SSL's G Series EQ.

HF Band controls:

Frequency	Variable from 1.5kHz to 22kHz
Gain	Variable between ±20dB
'Q'	2.5 (on '⎍' setting)

HMF Band controls:

Frequency	Variable from 600Hz to 7kHz
Gain	Variable by > ±20dB
'Q'	Variable from 0.7 to 2.5 (may also vary with gain)

LMF Band controls:

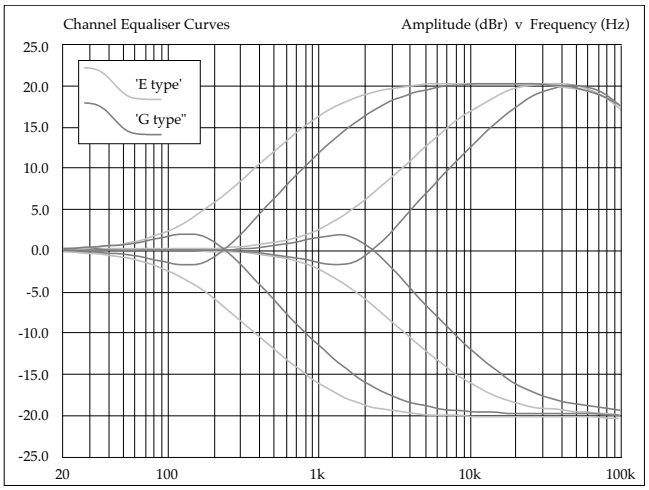
Frequency	Variable from 200Hz to 2.5kHz
Gain	Variable by > ±20dB
'Q'	Variable from 0.7 to 2.5 (may also vary with gain)

LF Band controls:

Frequency	Variable from 40Hz to 600Hz
Gain	Variable between ±16.5dB
'Q'	2.5 (on '⎍' setting)

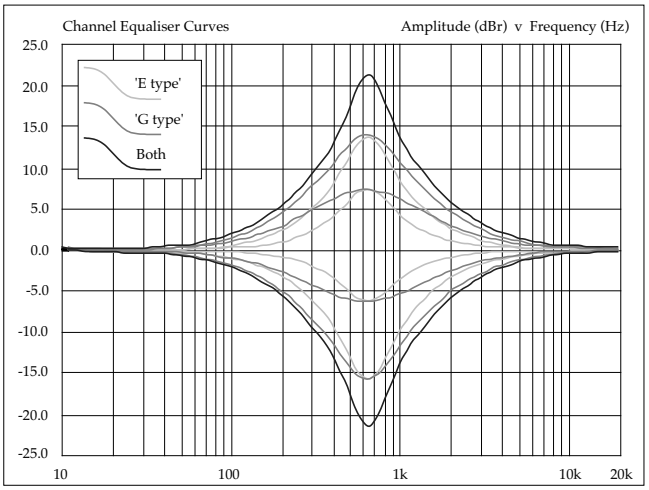
The LF and HF bands have variable turnover frequency with switchable bell/shelving and selectable response curves:

- Normal ('E type') curves with the 'G-EQ' switch OUT follow conventional cut or boost characteristics.
- 'G type' curves with the 'G-EQ' switch IN, have a modified slope with a degree of overshoot/undershoot for increased selectivity.



The two parametric bands have selectable characteristics which affect the relationship between frequency bandwidth and gain:

- With the 'G-EQ' switch OUT, the frequency bandwidth is constant at all gains.
- With the 'G-EQ' switch IN, the frequency bandwidth reduces with increased gain, thereby increasing the selectivity of the EQ as the gain is increased.
- At full boost or cut both are identical.



B.4 Calibration Information

The X-Rack EQ module is factory calibrated and should only need calibration if a potentiometer or other component has been replaced or if it is suspected that there is a problem with calibration.

In each of the following instructions it is assumed that the lid of the X-Rack has been removed and that power has been applied. It is also assumed that unless otherwise specified, all switches are released and all front panel potentiometers are at unity or minimum position as appropriate. The required accuracy for each adjustment will be specified along with the target value. All level and distortion measurements should be made with audio-band 20Hz to 20kHz filters unless otherwise specified.

All presets are accessible from the top of the unit.

Note. The unit should be allowed to warm up with power applied for at least 15 minutes prior to making any adjustments.

B.4.1 EQ Alignment

Equipment Required: Calibrated audio oscillator and audio level meter

Test Signal: Sine wave @ 0dBu, frequencies as specified below

Input and Output: Oscillator to Input, Output to the audio level meter

Unit Setup:

1. Switch the EQ IN and release all other EQ switches.
2. Release the +4dBu/–10dBV switch on the rear panel.
3. Set all of the Q and Frequency controls fully anti-clockwise and all Gain controls to their centre indent.

HF EQ – Maximum Gain

Adjustment:

1. Set HF Gain to maximum and select HF ⎍. Set the audio oscillator for 12kHz and adjust HF Frequency to find the maximum level on the audio level meter.
2. Adjust VR13 (HF Q) for +20dBu ±0.25dB.
3. Reset HF Gain to its centre indent position, de-select HF ⎍ and re-check the audio level meter for 0dBu.

HMF EQ – Maximum Gain

Adjustment:

1. Set HMF Gain to maximum and HMF Q fully anti-clockwise. Set the audio oscillator for 3kHz and adjust HMF Frequency to find the maximum level on the audio level meter.
2. Adjust VR11 (HMF Q) for +21dBu ±0.25dB.
3. Reset HMF Gain to its centre indent position, re-check the audio level meter for 0dBu.

LMF EQ – Maximum Gain

Adjustment:

1. Set LMF Gain to maximum and LMF Q fully anti-clockwise. Set the audio oscillator for 1kHz and adjust LMF Frequency to find the maximum level on the audio level meter.
2. Adjust VR12 (LMF Q) for +21dBu ±0.25dB.
3. Reset LMF Gain to its centre indent position, re-check the audio level meter for 0dBu.

(continued)

LF EQ – Maximum Gain

Adjustment:

1. Set LF Gain to maximum and select LF ⎍. Set the audio oscillator for 80Hz and adjust LF Frequency to find the maximum level on the audio level meter.
2. Adjust VR14 (LF Q) for +16.5dBu ±0.25dB.
3. Reset LF Gain to its centre indent position, de-select LF ⎍ and re-check the audio level meter for 0dBu.

B.4.2 Output Balance

Equipment Required: Calibrated audio oscillator, audio level meter and a 'balance' adaptor (see below).

Test Signal: 1kHz sine wave at +24dBu.

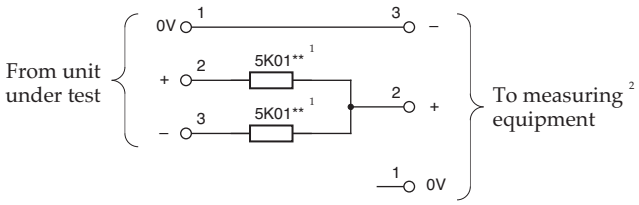
Input and Output: Oscillator to the Input of the channel being tested, Output to the level meter via the 'balance' adaptor.

Unit Setup: Ensure that all front panel switches are off and all controls are set fully anti-clockwise.

Adjustment: Connect the test equipment to the each channel in turn and adjust VR15 (BAL) for minimum level (< 55dBr).

B.4.3 'Balance' Adaptor

For the output balance adjustment, a 'balance' adaptor such as that illustrated here will be required. This adaptor consists of a pair of close tolerance resistors in an in-line cable and is used to sum together a balanced output in order to correctly adjust the level balance of the measured output; perfect balance should result in complete signal cancellation.



Note 1. Resistor tolerance should ideally be 0.01%
2. Absolute level measured will depend upon the input impedence of the measuring equipment.

B.5 Connector Details

Audio Input	
Location:	Rear Panel
Conn' Type:	XLR Female
Pin	*Description*
1	Chassis
2	Audio +ve
3	Audio –ve

Audio Output	
Location:	Rear Panel
Conn' Type:	XLR Male
Pin	*Description*
1	Chassis
2	Audio +ve
3	Audio –ve

B.6 Physical Specification

Depth:	200mm / 7.9 inches	*including front panel knobs, excluding connectors*
	275mm / 10.9 inches	*including front panel knobs and connectors*
Height:	171mm / 6.75 inches	
Width:	35mm / 1.4 inches	*front/rear panels*
	49mm / 1.9 inches	*overall width (front and rear panels are offset)*
Weight:	260g / 9.5 ounces	
Boxed size:	190mm x 290mm x 70mm / 7.5" x 11.5" x 2.5"	
Boxed weight:	460g / 16.5 ounces	

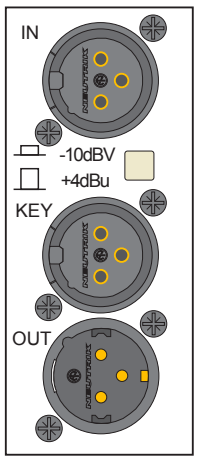
** All values are approximate*

B.7 Environmental Specification

As per X-Rack – see page 19.

D. Dynamics Module

D.1 Connection

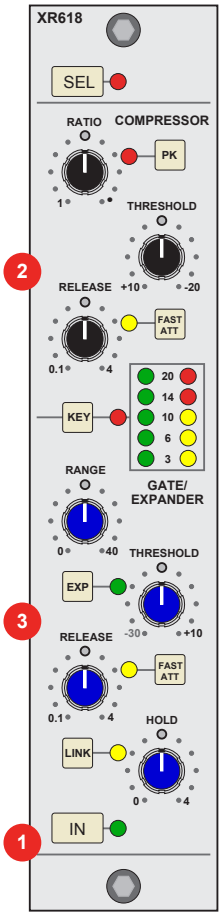


The module input and output gains can be set to operate at a nominal level of either +4dBu or –10dBV, using a switch on the connector panel. Select the appropriate level for the equipment you are connecting to. If in doubt experiment!

To check the input and output gains, set the compressor RATIO and THRESHOLD controls fully clockwise and send a signal close to the nominal operating level of your mixer or DAW to the dynamics module. The lower three (yellow) LEDs of the compression meter should light if the input level matches the selected operating level. Release the switch for +4dBu operation: push it in for –10dBV operation.

D.2 Operation

The X-Rack Dynamics module comprises a compressor/limiter and a gate/expander, both of which use the same gain element.



The IN button 1 switches the entire section in and out of circuit.

D.2.1 Compressor/Limiter Section 2

RATIO – When turned to 1:1, the compressor/limiter section is inactive. Turning the control clockwise increases the compression ratio, giving a true limiter at the fully clockwise position. The compressor normally has an 'over-easy' characteristic. Pressing the **PK** button switches this to peak sensing, and replaces the 'over-easy' characteristic with a hard knee.

THRESHOLD – Whenever a signal exceeds the level set by this control, the compressor will start to act at the ratio set by the **RATIO** control. The **THRESHOLD** and **RATIO** controls also provide automatic make-up gain, so as you lower the threshold and introduce more compression, the output level is increased to maintain (approximately) the same perceived loudness regardless of the amount of compression.

FST ATT – Normally the attack time is program dependent (3mS – 30mS). Press this button to select a fixed fast attack time (3mS for 20dB gain reduction).

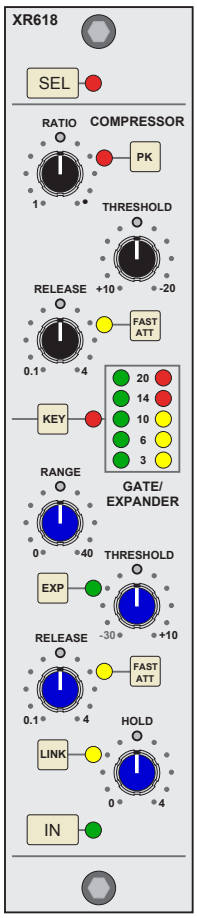
RELEASE – Sets the time constant (speed) with which the compressor returns to normal gain settings once the signal has passed its maximum.

D.2.2 Gate/Expander Section 3

This section can act as a ∞:1 Gate or as a 2:1 Expander when the **EXP** button is pressed.

RANGE – Determines the depth of gating or expansion. When turned fully anticlockwise (Range = 0), this section is inactive. When turned fully clockwise, a gate depth of 40dB can be obtained.

THRESHOLD – Determines the level at which the gate opens or below which gain reduction begins (**EXP** selected), adjustable from +10dBu to –20dBu. Variable hysteresis is incorporated in the threshold circuitry to prevent spurious triggering of the gate when the signal is close to the threshold level. This means that the signal has to decay roughly 2dB below the threshold level before the gate will start to close.



FST ATT – Normally, a controlled linear attack time of 1.5ms per 40dB is provided. Press this button to select a fast attack time (100μs per 40dB). The attack time is the time taken for the Gate/Expander to 'recover' once the signal level is above the threshold. When gating signals with a steep rising edge, such as drums, a slow attack may effectively mask the initial 'THWACK', so you should be aware of this when selecting the appropriate attack time.

RELEASE – This determines the time constant (speed), variable from 0.1 to 4 seconds, at which the Gate/Expander reduces the signal level once it has passed below the threshold. Note that this control interacts with the **RANGE** control.

HOLD – Determines the time after the signal has decayed below the threshold before the gate starts to close. Variable from 0 to 4 seconds.

KEY – Switches the Dynamics side chain to the 'KEY' input on the rear panel of the unit.

LINK – The side chain control signals of multiple modules can be linked by pressing the **LINK** switch on those modules you wish to gang. When two (or more) Dynamics sections are linked, the control voltages of each section sum together, so that whichever section has the most gain reduction will control the other section.

Don't try to link two gates using the **LINK** button when you want the signal on one to open the other. If you need to achieve this effect, take a keying signal from one section to trigger the other. The easiest way to do this is by patching from the 'source' signal to the Key input of the 'destination' channel, and selecting **KEY** (see above) on this module.

D.3 Performance Specification

The following pages contain audio performance specification figures for the X-Rack Dynamics Module. No other Solid State Logic products are covered by this document and the performance of other Solid State Logic products can not be inferred from the data contained herein.

D.3.1 Measurement Conditions

For each set of figures on the following pages, the specific unit and test setup will be stated at the beginning of that section. Any changes to the specified setup for any particular figure(s) will be detailed beside the figures to which that difference applies.

D.3.2 Measurement References

Unless otherwise specified the references used in this specification are as follows:

- Reference frequency: 1kHz
- Reference level: 0dBu, where 0dBu ≈ 0.775V into any load
- Source impedance of Test Set: 50Ω
- Input impedance of Test Set: 100kΩ
- All unweighted measurements are specified as 22Hz to 22kHz band limited RMS and are expressed in units of dBu
- All distortion measurements are specified with a 36dB/Octave low pass filter at 80kHz and are expressed as a percentage
- The onset of clipping (for headroom measurements) should be taken as 1% THD
- Unless otherwise quoted all figures have a tolerance of ±0.5dB or 5%
- All measurements are made with the operating level switch set for +4dBu

D.3.3 Compressor/Limiter

Controls:

Ratio (slope)	Variable from 1 to infinity (limit)
Threshold	Variable from +10dB to –30dB
Attack Time	Normally auto sensing, switchable to 1mS
Release	Variable from 0.1 to 4 seconds

The Compressor/Limiter has two modes of signal detection, Peak and RMS. As their names suggest these modes of detection either act on peaks of the incoming signals or on their RMS levels. This gives two very different modes of compression and limiting with Peak Mode giving far more dramatic compression characteristics.

D.3.4 Expander/Gate

Controls:

Range	Variable from 0 to 40dB
Threshold	Variable from –30dB to +10dB
Attack Time	Normally auto-sensing, switchable to 150μs
Hold Time	Variable from 0 to 4 seconds
Release Time	Variable from 0.1 to 4 seconds

The side chain signal can be sourced either from the signal feeding the dynamic or the external Key input.

LED meters independently indicate amount of compression and expansion.

D.3.5 Measurement Conditions

Signal applied to Input, output measured at Output. All pots anti-clockwise and switches 'out' except for Dynamics 'IN'.

THD + N (+10dBu applied)	< 0.01% at 1kHz
Output Headroom	> +26dBu at onset of clipping
Frequency Response	±0.2dB from 20Hz to 20kHz –3dB at 130kHz
Noise	< –88dBu

Signal at +20dBu applied to Input, Compressor Threshold set at –20, Compressor Ratio adjusted to give +4dBu at Output. RMS sensing mode selected.

THD + N (Fast Attack Mode) †	< 0.3% at 1kHz < 0.05% at 10kHz
THD + N (Slow Attack Mode)	< 0.03% at 1kHz < 0.05% at 10kHz

† LF distortion is consistent with attack and release time constants.

D.4 Calibration Information

The X-Rack Dynamics module is factory calibrated and should only need calibration if a potentiometer or other component has been replaced or if it is suspected that there is a problem with calibration.

In each of the following instructions it is assumed that the lid has been removed and that power has been applied. It is also assumed that unless otherwise specified, all switches are released and all front panel potentiometers are at unity or minimum position as appropriate. The required accuracy for each adjustment will be specified along with the target value. All level and distortion measurements should be made with audio-band 20Hz to 20kHz filters unless otherwise specified.

All presets are accessible from the top of the unit.

Note. The unit should be allowed to warm up with power applied for at least 15 minutes prior to any adjustments being made.

D.4.1 Dynamics Adjustments

If the dynamics circuitry requires adjustment the following procedure should be followed in the order shown.

Equipment Required:	Calibrated audio oscillator, audio distortion analyser, audio level meter, oscilloscope and a (digital) DC volt meter.
Test Signal:	1kHz sine wave unless specified otherwise, level as specified.
Input and Output:	Oscillator to Input, Output to either the distortion analyser or the level meter, as specified below. Use the oscilloscope to monitor the measured signal.
Unit Setup:	Set all of the controls anti-clockwise and release all switches. Switch the dynamics IN.

D.4.2 Distortion

Adjustment:

1. Connect the distortion analyser to the Output and set the oscillator level for +20dBu.
2. Adjust VR12 for minimum distortion (< 0.02%).

D.4.3 Compressor Threshold

Adjustment:

1. Connect the level meter to the Output and set the oscillator level for –28.35dBu.
2. Measure the DC voltage at test point TP14 relative to 0VA and adjust VR9 (COMP_THOLD) for 0V ±10mV.

D.4.4 Compressor Law

Adjustment:

1. Set the oscillator level for +20dBu.
2. Connect the level meter to the Output. Check for +20dBu ±0.5dB.
3. Set the compressor ratio control fully clockwise and press in the compressor FST ATT and PK switches.
4. Adjust VR10 (COMP_LAW) for a level of 14dBu ±0.1dB.
5. Reset the compressor ratio control fully anti-clockwise.

D.4.5 Gate Threshold

Adjustment:

1. Set the oscillator level for +10dBu and connect the level meter to the Output.
2. Set the gate/expander to 'gate' by releasing the EXP switch, set the gate range and gate threshold controls fully clockwise.
3. Adjust VR8 (GATE_THOLD) so that the gate just switches on.
4. Check this adjustment by changing the oscillator level a little. Re-adjust VR8 if necessary so that the gate just opens when a +10dBu signal @ 1kHz is applied.

D.4.6 Output Balance

Equipment Required: Calibrated audio oscillator, audio level meter and a 'balance' adaptor (see below).

Test Signal: 1kHz sine wave at +24dBu.

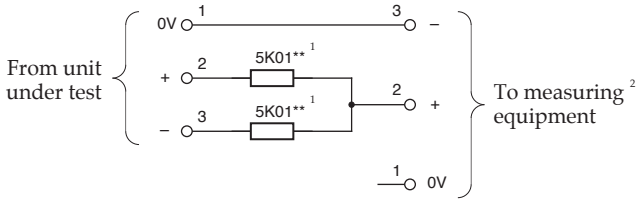
Input and Output: Oscillator to the Input of the channel being tested, Output to the level meter via the 'balance' adaptor.

Unit Setup: Ensure that all front panel switches are off and all controls are set fully anti-clockwise.

Adjustment: Connect the test equipment to the each channel in turn and adjust VR13 (BAL) for minimum level (< 55dBr).

D.4.7 'Balance' Adaptor

For the output balance adjustment, a 'balance' adaptor such as that illustrated here will be required. This adaptor consists of a pair of close tolerance resistors in an in-line cable and is used to sum together a balanced output in order to correctly adjust the level balance of the measured output; perfect balance should result in complete signal cancellation.



Note 1. Resistor tolerance should ideally be 0.01%
2. Absolute level measured will depend upon the input impedence of the measuring equipment.

D.5 Connector Details

Audio Input	
Location:	Rear Panel
Conn' Type:	XLR Female
Pin	*Description*
1	Chassis
2	Audio +ve
3	Audio –ve

Audio Output	
Location:	Rear Panel
Conn' Type:	XLR Male
Pin	*Description*
1	Chassis
2	Audio +ve
3	Audio –ve

Key Input	
Location:	Rear Panel
Conn' Type:	XLR Female
Pin	*Description*
1	Chassis
2	Audio +ve
3	Audio –ve

D.6 Physical Specification

Depth:	200mm / 7.9 inches	*including front panel knobs, excluding connectors*
	275mm / 10.9 inches	*including front panel knobs and connectors*
Height:	171mm / 6.75 inches	
Width:	35mm / 1.4 inches	*front/rear panels*
	49mm / 1.9 inches	*overall width (front and rear panels are offset)*
Weight:	260g / 9.5 ounces	
Boxed size:	190mm x 290mm x 70mm / 7.5" x 11.5" x 2.5"	
Boxed weight:	460g / 16.5 ounces	

** All values are approximate*

D.7 Environmental Specification

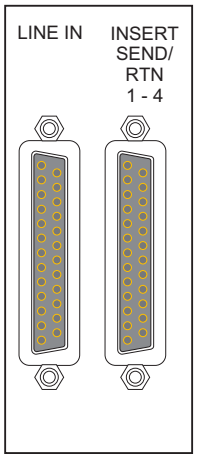
As per X-Rack – see page 19.

E. Line Return Module

E.1 Introduction

The X-Rack Line Return module is designed to operate in conjunction with the X-Rack XR622 Master module to create an expandable, rack mounted, stereo line level mixer. The X-Rack Master module provides the monitoring facilities that would be expected; mix amps, monitor outputs and a headphone feed – please refer to the X-Rack Master module documentation for a full description.

E.2 Connection

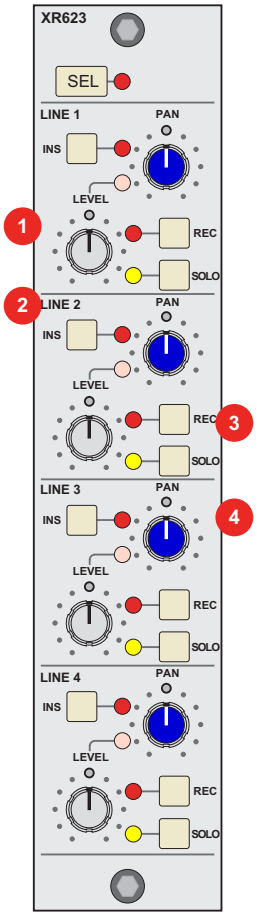


The rear panel of the module carries a pair of 25-way 'D' connectors. The left-hand connector provides four balanced Line Inputs whilst the right-hand connector provides access to the Insert Send and Insert Returns for each of the four Line Inputs.

This module operates at a nominal level of +4dBu although the gain of each Line Input or Insert Return can be varied by a front panel control.

E.3 Operation

The X-Rack Line Return module contains four separate input amplifiers, each equipped with individual Gain and Pan controls as well as Insert, Solo and Record/Mix bus switches.



The 'LEVEL' control (1) allows the gain of each input to be varied from –∞ to +10dB with an indent at unity gain. A signal present indicator measures the signal level immediately prior to the 'LEVEL' control. It will light GREEN for signals above the lower threshold of –60dBu, AMBER for signals between +4dBu and +24dBu and lights RED for signals above +24dBu.

Signals applied to the input of the module will be permanently available on the Insert Send; the Insert Return can be selected in place of the Line Input by pressing the 'INS' switch (2). Note that the Insert Return can also be used to provide an alternative input to each input amplifier.

Normally, each input can be individually routed to either the Mix Bus ('REC' switch released) or the Record Bus ('REC' switch pressed) (3). X-Rack V1.3/1 or later software adds an additional setup item which enables a 'sum' mode for the REC switch such that the Mix bus is permanently fed with signal routed to the Record bus only when the 'REC' switch is pressed – refer to the latest X-Rack Owner's Manual for more details.

The 'SOLO' switch feeds signal, post Level and Pan, to the X-Rack Solo Bus. Each of the three busses feed the X-Rack Master Module, located either in the same X-Rack or remotely if multiple X-Rack units have been linked by the 'MIX BUS LINK' connector (*please note that X-Rack units prior to serial number XRK0110 are* ***not*** *equipped with an 'MIX BUS LINK' connector*).

The 'PAN' control (4) will pan between Left and Right of the selected bus.

E.4 Performance Specification

The following page contains audio performance specification figures for the X-Rack Line Return module. No other Solid State Logic products are covered by this document and the performance of other Solid State Logic products can not be inferred from the data contained herein.

E.4.1 Measurement Conditions

For each set of figures on the following pages, the specific unit and test setup will be stated at the beginning of that section. Any changes to the specified setup for any particular figure(s) will be detailed beside the figures to which that difference applies.

E.4.2 Measurement References

Unless otherwise specified the references used in this specification are as follows:

- Reference frequency: 1kHz
- Reference level: 0dBu, where 0dBu ≈ 0.775V into any load
- Source impedance of Test Set: 50Ω
- Input impedance of Test Set: 100kΩ
- All unweighted measurements are specified as 22Hz to 22kHz band limited RMS and are expressed in units of dBu
- All distortion measurements are specified with a 36dB/Octave low pass filter at 80kHz and are expressed as a percentage
- The onset of clipping (for headroom measurements) should be taken as 1% THD
- Unless otherwise quoted all figures have a tolerance of ±0.5dB or 5%
- All measurements are made with the operating level switch set for +4dBu

E.4.3 Line Input Performance

Signal applied to Line Input and measured at Mix Bus Insert Send on an X-Rack Master module. Input Gain control set to 0dB (indent). Line Input under test routed to Mix Bus, all other Line Inputs routed to Rec Bus.

Gain	Continuously variable from –∞ to +10dB
Input Impedance	> 10kΩ
THD + Noise (+24dBu applied, 0dB gain)	< 0.005% from 20Hz to 20kHz
Frequency Response	±0.1dB from 20Hz to 20kHz –3dB at 150kHz
Equivalent Input Noise (Input terminated with 150Ω)	< –88dBu

E.5 Calibration Information

The X-Rack Line Return module is factory calibrated and should only need calibration if a potentiometer or other component has been replaced or if it is suspected that there is a problem with calibration.

In each of the following instructions it is assumed that an X-Rack Master module is also fitted to the X-Rack and that power has been applied. It is also assumed that unless otherwise specified, all switches are released and all front panel potentiometers are at unity or minimum position as appropriate. The required accuracy for each adjustment will be specified along with the target value. All level and distortion measurements should be made with audio-band 20Hz to 20kHz filters unless otherwise specified.

These presets are *not* accessible from the top of the unit, access to the right-hand side of the module will be required for adjustment.

E.5.1 Line Input

Equipment Required: Calibrated audio oscillator and audio level meter

Test Signal: 1kHz sinewave @ 0dBu

Input and Output: Oscillator to Line Input
Output to the audio level meter from Master module Mix Bus Insert Send (use Left or Right as instructed below)

Unit Setup:

1. Set each Level control to indent (0dB).
2. Set each Pan control Left.

E.5.2 Line 1

Adjustment:

1. Measure Insert Send Left and adjust VR9 for 0dBu ±0.1dB.
2. Set the Pan control to Centre and adjust VR14 for –4.5dBu ± 0.1dB.
3. Measure Insert Send Right and adjust VR13 for –4.5dBu ± 0.1dB.
4. Repeat each step until correct.

E.5.3 Line 2

Adjustment:

1. Measure Insert Send Left and adjust VR10 for 0dBu ± 0.1dB.
2. Set the Pan control to Centre and adjust VR16 for –4.5dBu ± 0.1dB.
3. Measure Insert Send Right and adjust VR15 for –4.5dBu ± 0.1dB.
4. Repeat each step until correct.

E.5.4 Line 3

Adjustment:

1. Measure Insert Send Left and adjust VR11 for 0dBu ± 0.1dB.
2. Set the Pan control to Centre and adjust VR17 for –4.5dBu ± 0.1dB.
3. Measure Insert Send Right and adjust VR18 for –4.5dBu ± 0.1dB.
4. Repeat each step until correct.

E.5.5 Line 4

Adjustment:

1. Measure Insert Send Left and adjust VR12 for 0dBu ± 0.1dB.
2. Set the Pan control to Centre and adjust VR19 for –4.5dBu ± 0.1dB.
3. Measure Insert Send Right and adjust VR20 for –4.5dBu ± 0.1dB.
4. Repeat each step until correct.

E.6 Connector Details

Line In			
Location:		Rear Panel	
Conn' Type:		25-pin 'D' Type Female	
Pin		*Description*	*Cct*
1		Insert Return 4 (–ve)	
	14	Insert Return 4 (+ve)	8
2		0V	
	15	Insert Return 3 (–ve)	
3		Insert Return 3 (+ve)	7
	16	0V	
4		Insert Return 2 (–ve)	
	17	Insert Return 2 (+ve)	6
5		0V	
	18	Insert Return 1 (–ve)	
6		Insert Return 1 (+ve)	5
	19	0V	
7		Line Input 4 (–ve)	
	20	Line Input 4 (+ve)	4
8		0V	
	21	Line Input 3 (–ve)	
9		Line Input 3 (+ve)	3
	22	0V	
10		Line Input 2 (–ve)	
	23	Line Input 2 (+ve)	2
11		0V	
	24	Line Input 1 (–ve)	
12		Line Input 1 (+ve)	1
	25	0V	
13		n/c	

Insert Send/Return			
Location:		Rear Panel	
Conn' Type:		25-pin 'D' Type Female	
Pin		*Description*	*Cct*
1		Insert Return 4 (–ve)	
	14	Insert Return 4 (+ve)	8
2		0V	
	15	Insert Return 3 (–ve)	
3		Insert Return 3 (+ve)	7
	16	0V	
4		Insert Return 2 (–ve)	
	17	Insert Return 2 (+ve)	6
5		0V	
	18	Insert Return 1 (–ve)	
6		Insert Return 1 (+ve)	5
	19	0V	
7		Insert Send 4 (–ve)	
	20	Insert Send 4 (+ve)	4
8		0V	
	21	Insert Send 3 (–ve)	
9		Insert Send 3 (+ve)	3
	22	0V	
10		Insert Send 2 (–ve)	
	23	Insert Send 2 (+ve)	2
11		0V	
	24	Insert Send 1 (–ve)	
12		Insert Send 1 (+ve)	1
	25	0V	
13		n/c	

The Insert Send is simply a parallel of the Line Input. Also, note that the 'D' type connector binding posts fitted to the X-Rack Line Return Module are 4-40 UNC thread.

E.7 Physical Specification

Depth:	200mm / 7.9 inches	*including front panel knobs, excluding connectors*
	275mm / 10.9 inches	*including front panel knobs and connectors*
Height:	171mm / 6.75 inches	
Width:	35mm / 1.4 inches	*front/rear panels*
	49mm / 1.9 inches	*overall width (front and rear panels are offset)*
Weight:	260g / 9.5 ounces	
Boxed size:	190mm x 290mm x 70mm / 7.5" x 11.5" x 2.5"	
Boxed weight:	460g / 16.5 ounces	

** All values are approximate*

E.8 Environmental Specification

As per X-Rack – see page 19.

F. Master Module

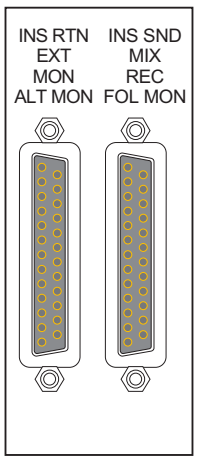
F.1 Introduction

Used in conjunction with the XR623 X-Rack Line Return module, the XR622 X-Rack Master module provides a complete small scale mix and monitor system for studios seeking a compact solution for mixing and monitoring in the analogue domain. A single X-Rack can provide up to 28 line level inputs. Additional racks can be connected via the 'MIX BUS LINK' connector on the rear of the X-Rack unit, allowing additional inputs to be added to the system if required.

X-Rack units prior to serial number XRK0110 are not equipped with a 'MIX BUS LINK' connector.

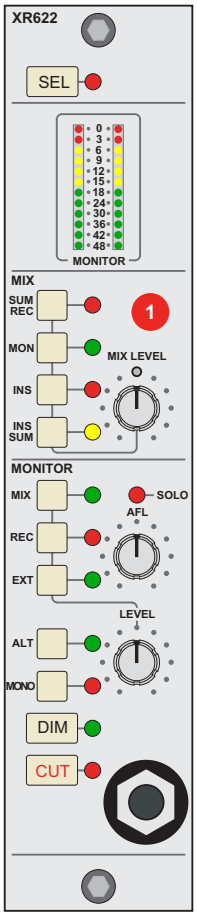
The X-Rack Total Recall system allows session setups to be recalled instantly and can be archived as a MIDI SysEx dump to any MIDI sequencer. The monitor section controls can also be controlled remotely using MIDI controller commands from any MIDI controller. Up to three racks can be connected to an AWS 900 or AWS 900+ and integrated with the AWS 900 Total Recall system via the serial port. Connecting the MIX and REC outputs of the XR622 to the MIX and REC Insert Returns of the AWS 900 and selecting INSERT SUM mode allows almost unlimited expansion of the number of line level inputs to the console.

F.2 Connection



The rear panel of the module carries a pair of 25-way 'D' connectors. The left-hand connector provides the main and alternate Monitor outputs as well as a stereo External Input and the Mix Bus Insert Return. The right-hand connector provides Mix and Record Bus outputs along with the Mix Bus Insert Send and a Follow-Monitor (pre-level control) output.

All outputs (apart from the headphone output) operate at a nominal level of +4dBu and are configured to drive standard line level inputs. Level compensation for feeding 600Ω inputs from the Bus, Insert and Monitor outputs is provided by removable jumpers – refer to **Section F.3.4** for details.



F.3 Operation

As well as a compact stereo monitor section, the X-Rack Master module contains the mix amps and outputs for the X-Rack's internal Mix, Record and Solo / AFL busses. The Mix bus is intended to be used as the main mix bus and includes a balanced insert point immediately before the Mix level control. The Record bus provides a direct path to a DAW (or any other recorder), allowing the Mix bus to be used to provide a monitor mix while recording one or more inputs via the Record bus.

If the X-Rack is fitted with XR621 Mic Amp modules these can be routed directly to the Record bus using the 'REC L' and 'REC R' switches on the XR621 module.

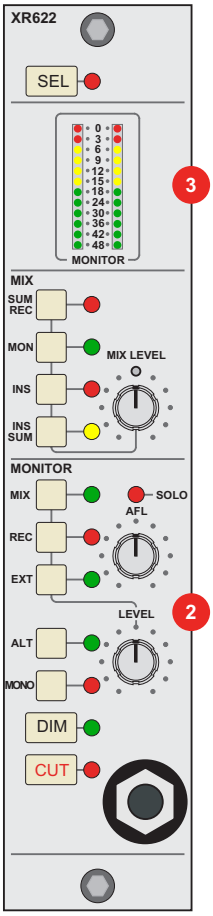
F.3.1 Mix Section 1

This section carries all of the Mix bus controls; the 'MIX LEVEL' control allows the overall gain of the Mix bus to be adjusted (the Record bus level is fixed).

The 'INS' switch brings the Mix Bus Insert Return into circuit (the Insert Send is permanently active) whilst the 'SUM REC' and 'INS SUM' switches allow the Record bus and Insert Return to be summed with the Mix bus to allow for summing of additional mix sources.

The 'MON' switch enables the Mix output to be replaced with whichever source(s) have been selected for the Monitor section.

F.3.2 Monitor Section 2



The Monitor Section enables the Mix and Record busses or a stereo external input to be monitored, the source to monitor being set by either the 'MIX', 'REC' or 'EXT' switches either separately or together, allowing great flexibility in recording and monitoring signals. The 'EXT' input would normally be playback from the main recorder or DAW. The selected monitor signals can be routed back to the Mix output using the MON switch in the Mix Section, allowing composite mixes to be easily recorded back to the master recorder or DAW ADC.

If one of the 'SOLO' switches on any other X-Rack modules is active, the 'SOLO' LED will illuminate and the AFL bus will be switched to the monitor output in place of the selected signal. The level of the AFL signal can be adjusted with the 'AFL' control.

The overall monitor level is set by the 'LEVEL' control and the 'MONO' switch allows quick mono compatibility checking. The 'DIM' and 'CUT' switches provide either partial (between –3 and –30dB) or full attenuation of the monitored signal as required.

Metering of the selected source (or sources) is provided by the stereo bargraph meter 3 which measures the signal level immediately prior to the 'LEVEL' control.

Two sets of stereo loudspeaker outputs plus a headphone amplifier are provided. The headphone socket is driven by a fixed gain amplifier immediately post the 'LEVEL' control and is un-affected by the loudspeaker 'ALT' switch.

F.3.3 Expansion

Each of the three X-Rack busses (Mix, Record and Solo/AFL) are accessible externally through the 'MIX BUS LINK' connector on the rear of the X-Rack. Additional X-Racks can be connected via this connector, allowing additional inputs to be mixed together and feed a single Master module. The pinout for this connector is detailed in **Section 5.2** of the X-Rack Owner's Manual; if the connector listing is not present in your manual, a more recent copy may be downloaded from the Solid State Logic website (www.solid-state-logic.com).

Only one XR622 master module is required per system – connecting two or more X-Rack units fitted with XR622 modules together will cause serious gain errors and distortion (though it will not damage the system electronics).

F.4 Configuration

F.4.1 Dim Level

The attenuation applied to the monitor signal when the 'DIM' switch is active is set by the Total Recall processor. The default level is –15dB, it can be adjusted as follows:

- Press and hold **SETUP/MIDI** until the **SETUP/MIDI** LED flashes.
- Use the D-Pot to select 'dI' (DIM Level). Press the D-Pot to select this option.
- Use the D-Pot to set the required level (between –3dB and –30dB).
- Press the D-Pot once more to set the selected value and return to the setup menu or press and hold **SETUP/MIDI** until the **SETUP/MIDI** LED stops flashing to return to normal operation.

F.4.2 MIDI Remote Control

Controlling the 'soft' controls (see next page for list) on the XR622 Master module via MIDI requires MIDI remote mode to be enabled. Optionally the X-Rack can be configured to use one or all (default) MIDI channels and to map different MIDI controllers to any of the soft controls.

F.4.3 Selecting MIDI remote mode

To select MIDI remote mode:

- Press and hold **SETUP/MIDI** until the **SETUP/MIDI** LED flashes.
- Use the D-Pot to select 'rE' (Remote Mode). Press the D-Pot to select this option.
- Use the D-Pot to select 'On'. The X-Rack monitor controls listed below will now respond to MIDI controller messages.
- Press the D-Pot once more to set the selected value and return to the setup menu or press and hold **SETUP/MIDI** until the **SETUP/MIDI** LED stops flashing to return to normal operation.

Once MIDI remote mode is selected the unit will behave as normal until a MIDI controller message corresponding to one of the soft controls is received. This will lock out all of the 'soft' front panel controls, retaining the current settings until a corresponding controller message is received. The right hand decimal point in the display window lights to show that the unit is in MIDI remote active mode.

F.4.4 Changing the MIDI channel

- Press and hold **SETUP/MIDI** until the **SETUP/MIDI** LED flashes.
- Use the D-Pot to select 'MI' (MIDI Setup). Press the D-Pot to select the MIDI Setup menu.
- Use the D-Pot to select 'CH' (MIDI Channel). Press the D-Pot to select this option.
- Use the D-Pot to set the MIDI Channel to listen to ('01' to '16' or 'AL' for 'all'). Press the D-Pot to leave this option. The default value is all.

F.4.5 Changing the MIDI controller assignments

The default controller mapping is shown below:

Default MIDI Controller Mapping	
MIDI Controller	*Master Module Control*
1	MIX
2	REC
3	EXT
4	ALT
5	MONO
6	DIM
7	CUT
8	AFL Level
9	Monitor LEVEL

Optionally MIDI controllers can be mapped onto different Master module functions. To do this:

- Press and hold **SETUP/MIDI** until the **SETUP/MIDI** LED flashes.
- Use the D-Pot to select 'MI I' (MIDI Setup). Press the D-Pot to select the MIDI Setup menu.
- Use the D-Pot to select 'LE' (MIDI Remote Learn) and press **SAVE** to enable learn mode.
- Operate any one of the 'soft' controls on the XR622 Master module. This will cause the LED of the selected control to flash (the **SEL** LED will flash if either of the potentiometers have been chosen). Assign a MIDI controller to the selected function by operating the required MIDI controller. Repeat the 'operate – assign' process for all required controls.
- Press the D-Pot again to leave this option and return to the setup menu or press and hold **SETUP/MIDI** until the **SETUP/MIDI** LED stops flashing to return to normal operation.
- Switch assignments can be reset to the system defaults by pressing **COPY/DEL** when in MIDI Remote Learn mode; the **Empty** LED indicating when the assignments have been deleted.

Only single controls can be mapped to a MIDI controller. Therefore, mapping an X-Rack control to a MIDI controller which is already in use will remove the previous mapping. The original X-Rack control will require re-mapping itself before it can be controlled again.

F.4.6 Level Compensation

Each of the Insert Send, Mix Bus, Record Bus and Monitor outputs are provided with level compensation for driving low (600Ω) inputs. Level compensation is activated by removing a jumper for each output as follows:

600Ω Output Level Compensation	
Link	*Output*
LK1	Alt/Main Monitor Right
LK2	Record Bus Left
LK3	Record Bus Right
LK4	Alt/Main Monitor Left
LK5	Insert Send Left
LK6	Insert Send Right
LK7	Mix Bus Left
LK8	Mix Bus Right

F.5 Performance Specification

The following page contains audio performance specification figures for the X-Rack Master module. No other Solid State Logic products are covered by this document and the performance of other Solid State Logic products can not be inferred from the data contained herein.

F.5.1 Measurement Conditions

For each set of figures on the following pages, the specific unit and test setup will be stated at the beginning of that section. Any changes to the specified setup for any particular figure(s) will be detailed beside the figures to which that difference applies.

F.5.2 Measurement References

Unless otherwise specified the references used in this specification are as follows:

- Reference frequency: 1kHz
- Reference level: 0dBu, where 0dBu ≈ 0.775V into any load
- Source impedance of Test Set: 50Ω
- Input impedance of Test Set: 100kΩ
- All unweighted measurements are specified as 22Hz to 22kHz band limited RMS and are expressed in units of dBu
- All distortion measurements are specified with a 36dB/Octave low pass filter at 80kHz and are expressed as a percentage
- The onset of clipping (for headroom measurements) should be taken as 1% THD
- Unless otherwise quoted all figures have a tolerance of ±0.5dB or 5%
- All measurements are made with the operating level switch set for +4dBu

F.5.3 Mix Bus Performance

Signal applied to one channel of an X-Rack Line Input module and routed to Mix Bus. Signal measured on Mix Output. All other inputs un-routed from the bus under test. Mix Bus Gain control set to 0dB.

Gain	Continuously variable from –∞ to 0dB
THD + Noise (+24dBu applied, 0dB gain)	< 0.005% from 20Hz to 10kHz, < 0.008% at 20kHz
Frequency Response	±0.1dB from 20Hz to 20kHz –3dB at 150kHz
Equivalent Input Noise (Input terminated with 150Ω)	< –88dBu

F.5.4 Record Bus Performance

Signal applied to one channel of an X-Rack Line Input module and routed to Record Bus. Signal measured on Record Output. All other inputs un-routed from the bus under test.

THD + Noise (+24dBu applied, 0dB gain)	< 0.005% from 20Hz to 20kHz
Frequency Response	±0.1dB from 20Hz to 20kHz –3dB at 150kHz
Equivalent Input Noise (Input terminated with 150Ω)	< –88dBu

F.6 Calibration Information

The X-Rack Master module is factory calibrated and should only need calibration if a potentiometer or other component has been replaced or if it is suspected that there is a problem with calibration.

In each of the following instructions it is assumed that the lid of the X-Rack has been removed and that power has been applied. It is also assumed that, unless otherwise specified, all switches are released and all front panel potentiometers are at unity or minimum position as appropriate. The required accuracy for each adjustment will be specified along with the target value. All level and distortion measurements should be made with audio-band 20Hz to 20kHz filters unless otherwise specified.

All presets are accessible from the top of the unit.

F.6.1 Mix Level Tracking

Equipment Required: Calibrated audio oscillator and audio level meter

Test Signal: 1kHz sinewave @ +24dBu

Input and Output: Oscillator to Insert Return Left
Output to the audio level meter from Mix Bus Output (use Left or Right as instructed below)

Unit Setup: Select 'INS' and set 'MIX LEVEL' to centre.

Adjustment:

1. Measure Mix Bus Output Left and note the reading.
2. Connect the oscillator to Insert Return Right.
3. Measure Mix Bus Output Right and adjust VR6 ('TRACKING') for a level which matches that measured in step 1.

F.6.2 Meter Level

Equipment Required: Calibrated audio oscillator and audio level meter

Test Signal: 1kHz sinewave @ +24dBu

Input and Output: Oscillator to Insert Return Left
Output to the audio level meter from Follow Mon Output (use Left or Right as instructed below)

Unit Setup:

1. Select 'INS' and set 'MIX LEVEL' to maximum.
2. Select

Adjustment:

1. Measure the Left 'Follow Mon' Output. Adjust the oscillator level to obtain +24dBu, if necessary.
2. Adjust VR5 ('0dB LEFT') so that that the top left hand 'red' LED on the bargraph meter just illuminates.
3. Connect the oscillator to Insert Return Right.
4. Measure the Right 'Follow Mon' Output. Adjust the oscillator level to obtain +24dBu, if necessary.
5. Adjust VR4 ('0dB RIGHT') so that that the top right hand 'red' LED on the bargraph meter just illuminates.

F.7 Connector Details

Ins Rtn, Ext, Mon, Alt Mon			
Location:	Rear Panel		
Conn' Type:	25-pin 'D' Type Female		
Pin		*Description*	*Cct*
1		Alt Monitor Out Right (+ve)	
	14	Alt Monitor Out Right (–ve)	8
2		0V	
	15	Alt Monitor Out Left (+ve)	
3		Alt Monitor Out Left (–ve)	7
	16	0V	
4		Main Monitor Out Right (+ve)	
	17	Main Monitor Out Right (–ve)	6
5		0V	
	18	Main Monitor Out Left (+ve)	
6		Main Monitor Out Left (–ve)	5
	19	0V	
7		External Input Right (+ve)	
	20	External Input Right (–ve)	4
8		0V	
	21	External Input Left (+ve)	
9		External Input Left (–ve)	3
	22	0V	
10		Mix Insert Return Right (+ve)	
	23	Mix Insert Return Right (–ve)	2
11		0V	
	24	Mix Insert Return Left (+ve)	
12		Mix Insert Return Left (–ve)	1
	25	0V	
13		n/c	

Ins Snd, Mix, Rec, Fol Mon			
Location:	Rear Panel		
Conn' Type:	25-pin 'D' Type Female		
Pin		*Description*	*Cct*
1		Follow Monitor Right (+ve)	
	14	Follow Monitor Right (–ve)	8
2		0V	
	15	Follow Monitor Left (+ve)	
3		Follow Monitor Left (–ve)	7
	16	0V	
4		Record Output Right (+ve)	
	17	Record Output Right (–ve)	6
5		0V	
	18	Record Output Left (+ve)	
6		Record Output Left (–ve)	5
	19	0V	
7		Mix Output Right (+ve)	
	20	Mix Output Right (–ve)	4
8		0V	
	21	Mix Output Left (+ve)	
9		Mix Output Left (–ve)	3
	22	0V	
10		Mix Insert Send Right (+ve)	
	23	Mix Insert Send Right (–ve)	2
11		0V	
	24	Mix Insert Send Left (+ve)	
12		Mix Insert Send Left (–ve)	1
	25	0V	
13		n/c	

Please note that the 'D' type connector binding posts fitted to the X-Rack Master Module are 4-40 UNC thread.

Headphones	
Location:	Front Panel
Conn' Type:	Stereo 1/4" Jack Socket
Pin	*Description*
Tip	Left
Ring	
Sleeve	0V

PL2	
Location:	Internal
Conn' Type:	16-pin IDC Plug
Pin	*Description*
n/a	*For Future Expansion*

F.8 Physical Specification

Depth:	200mm / 7.9 inches	*including front panel knobs, excluding connectors*
	275mm / 10.9 inches	*including front panel knobs and connectors*
Height:	171mm / 6.75 inches	
Width:	35mm / 1.4 inches	*front/rear panels*
	49mm / 1.9 inches	*overall width (front and rear panels are offset)*
Weight:	260g / 9.5 ounces	
Boxed size:	190mm x 290mm x 70mm / 7.5" x 11.5" x 2.5"	
Boxed weight:	460g / 16.5 ounces	

** All values are approximate*

F.9 Environmental Specification

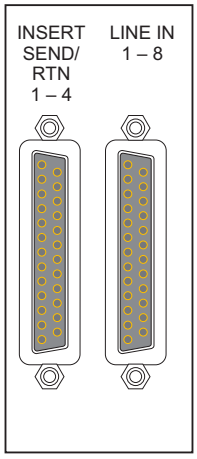
As per X-Rack – see page 19.

G. Summing Module

G.1 Introduction

The Eight Input Summing module was developed in response to requests from X-Rack users for a line input module designed to accommodate larger quantities of stereo line level inputs from studio sources such as multichannel audio interfaces, sub mixers and synthesizers. The module is designed for use with the X-Rack XR622 Master module and is equipped with eight line level inputs configured as four stereo pairs, each pair featuring on/off and mono/stereo switching, routing onto the internal Mix bus. In addition to this, there are stereo inserts available on the first two input pairs. The X-Rack Master module provides the monitoring facilities that would be expected; mix amps, monitor outputs and a headphone feed – please refer to the X-Rack Master module documentation for a full description.

G.2 Connection

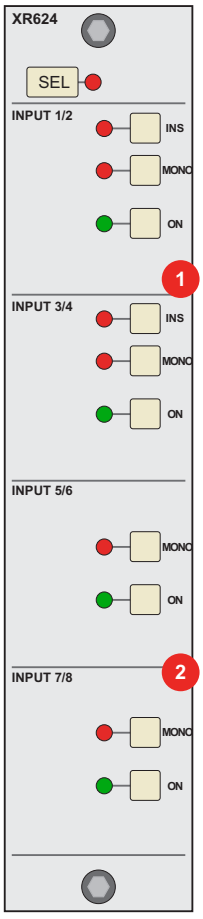


The rear panel of the module carries a pair of 25-way 'D' connectors. The left-hand connector provides Insert Sends and Insert Returns for the first two pairs of Inputs whilst the right-hand connector provides access to the eight balanced inputs (four stereo pairs).

This module contains no variable gain controls and operates at unity gain.

G.3 Operation

This module is a fixed gain summing amplifier and so there are naturally few front panel controls.



G.3.1 Input 1/2 and Input 3/4 1

Signals applied to these inputs will be permanently available on the Insert Sends; the Insert Return for either pair can be selected in place of the Line Input by pressing the appropriate 'INS' switch. Note that the Insert Return can also be used to provide an alternative input to these input amplifiers.

Normally the left hand input of any pair will feed the left mix bus; the right input will feed the right mix bus. The 'MONO' switch will over-ride this behaviour by summing both left and right inputs and feeding both mix busses together at unity gain.

The 'ON' switch will act to un-route the appropriate pair of inputs from the X-Rack mix bus.

G.3.2 Input 5/6 and Input 7/8 2

These two pairs of inputs operate in a similar manner to the first two pairs of inputs above, but lack the Insert Send/Return.

G.4 Performance Specification

The following page contains audio performance specification figures for the X-Rack Summing module. No other Solid State Logic products are covered by this document and the performance of other Solid State Logic products can not be inferred from the data contained herein.

G.4.1 Measurement Conditions

For each set of figures on the following pages, the specific unit and test setup will be stated at the beginning of that section. Any changes to the specified setup for any particular figure(s) will be detailed beside the figures to which that difference applies.

G.4.2 Measurement References

Unless otherwise specified the references used in this specification are as follows:

- Reference frequency: 1kHz
- Reference level: 0dBu, where 0dBu ≈ 0.775V into any load
- Source impedance of Test Set: 50Ω
- Input impedance of Test Set: 100kΩ
- All unweighted measurements are specified as 22Hz to 22kHz band limited RMS and are expressed in units of dBu
- All distortion measurements are specified with a 36dB/Octave low pass filter at 80kHz and are expressed as a percentage
- The onset of clipping (for headroom measurements) should be taken as 1% THD
- Unless otherwise quoted all figures have a tolerance of ±0.5dB or 5%
- All measurements are made with the operating level switch set for +4dBu

G.4.3 Performance

Signal applied to one channel of an X-Rack Summing module and routed to Mix Bus. Signal measured on Mix Output. All other inputs un-routed from the bus under test. Mix Bus Gain control set to 0dB.

Gain	Fixed, 0dB
THD + Noise (+24dBu applied, 0dB gain)	< 0.005% from 20Hz to 10kHz, < 0.008% at 20kHz
Frequency Response	±0.1dB from 20Hz to 20kHz –3dB at 150kHz
Noise (Input terminated with 150Ω)	< –80dBu

G.5 Connector Details

Insert Send/Rtn 1 – 4			
Location:	Rear Panel		
Conn' Type:	25-pin 'D' Type Female		
Pin		*Description*	*Cct*
1		Insert Return 4 (–ve)	
	14	Insert Return 4 (+ve)	8
2		0V	
	15	Insert Return 3 (–ve)	
3		Insert Return 3 (+ve)	7
	16	0V	
4		Insert Return 2 (–ve)	
	17	Insert Return 2 (+ve)	6
5		0V	
	18	Insert Return 1 (–ve)	
6		Insert Return 1 (+ve)	5
	19	0V	
7		Insert Send 4 (–ve)	
	20	Insert Send 4 (+ve)	4
8		0V	
	21	Insert Send 3 (–ve)	
9		Insert Send 3 (+ve)	3
	22	0V	
10		Insert Send 2 (–ve)	
	23	Insert Send 2 (+ve)	2
11		0V	
	24	Insert Send 1 (–ve)	
12		Insert Send 1 (+ve)	1
	25	0V	
13		n/c	

Line In 1 – 8			
Location:	Rear Panel		
Conn' Type:	25-pin 'D' Type Female		
Pin		*Description*	*Cct*
1		Line Input 8 (–ve)	
	14	Line Input 8 (+ve)	8
2		0V	
	15	Line Input 7 (–ve)	
3		Line Input 7 (+ve)	7
	16	0V	
4		Line Input 6 (–ve)	
	17	Line Input 6 (+ve)	6
5		0V	
	18	Line Input 5 (–ve)	
6		Line Input 5 (+ve)	5
	19	0V	
7		Line Input 4 (–ve)	
	20	Line Input 4 (+ve)	4
8		0V	
	21	Line Input 3 (–ve)	
9		Line Input 3 (+ve)	3
	22	0V	
10		Line Input 2 (–ve)	
	23	Line Input 2 (+ve)	2
11		0V	
	24	Line Input 1 (–ve)	
12		Line Input 1 (+ve)	1
	25	0V	
13		n/c	

Note that the 'D' type connector binding posts fitted to the X-Rack 8 Input Summing Module are 4-40 UNC thread.

G.6 Physical Specification

Depth:	200mm / 7.9 inches	*including front panel knobs, excluding connectors*
	275mm / 10.9 inches	*including front panel knobs and connectors*
Height:	171mm / 6.75 inches	
Width:	35mm / 1.4 inches	*front/rear panels*
	49mm / 1.9 inches	*overall width (front and rear panels are offset)*
Weight:	260g / 9.5 ounces	
Boxed size:	190mm x 290mm x 70mm / 7.5" x 11.5" x 2.5"	
Boxed weight:	460g / 16.5 ounces	

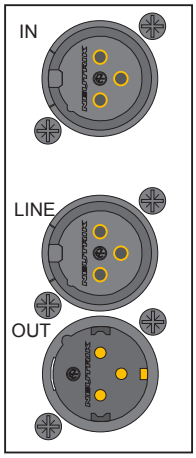
** All values are approximate*

G.7 Environmental Specification

As per X-Rack – see page 19.

H. VHD Mic Amp Module

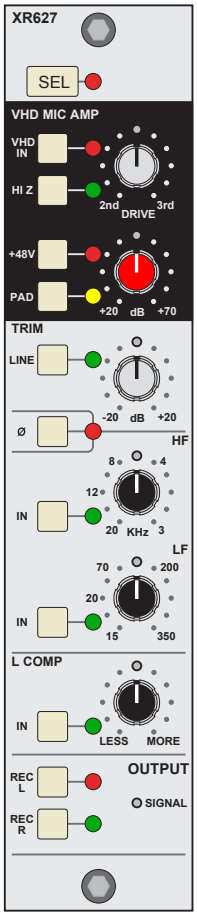
H.1 Connection



The rear panel of the module carries the Mic ('IN') and Line input ('LINE') XLRs along with a single output ('OUT') XLR. The Line input and output operate at a nominal level of +4dBu although the gain of the Line input can be varied by a front panel control.

H.2 Operation

The X-Rack VHD Mic module contains two separate input amplifiers; a Microphone amplifier incorporating SSL's unique variable harmonic drive circuitry and a Line level input, only one of which may be selected at any one time. A set of High and Low Pass filters and an implementation of the famous SSL Listen Mic Compressor are also provided.



H.2.1 VHD MIC AMP Section 1

Normally, the Microphone input will be selected ('LINE' switch released); pressing the 'VHD IN' switch puts the 'DRIVE' control into the signal path, enabling this input to emulate the overload characteristics of a traditional valve/tube design but with the ability to tailor the warmth or musicality. The 'DRIVE' control shapes the overload curve to provide a user controlled blend of 2nd or 3rd harmonic distortion. The gain of this input in either mode is continuously variable between +20dB and +70dB.

The impedance of the Microphone input can be switched from ≈1k2Ω to ≈10kΩ by selecting the 'HI Z' switch. This allows the connection of line level signals to the Microphone input if required, and provides an alternative input impedance for some dynamic microphones.

The 'PAD' switch reduces the signal level of the Microphone input by 20dB. Phantom power, for microphones requiring this, can be switched on using the '+48V' switch. *Please note that X-Rack units prior to serial number XRK0110 are* ***not*** *normally enabled for +48V. However, a field retrofit kit (629620XR) is available for these units. Any in-warranty X-Rack units can be upgraded free-of-charge; for units out of warranty a charge will be made. Please contact your local distributor to order this kit, if required.*

Note. Please note that connecting a microphone to the X-Rack VHD Mic Amp module with phantom power switched on is not advised as it may cause damage to either the microphone or the input stage of the X-Rack module. Take care not to connect line level sources (keyboards etc.) to the microphone input with phantom power switched on as this may damage the output stage of the connected unit.

2

3

4

5

H.3 Performance Specification

The following pages contain audio performance specification figures for the X-Rack VHD Mic Amp module. No other Solid State Logic products are covered by this document and the performance of other Solid State Logic products can not be inferred from the data contained herein.

H.3.1 Measurement Conditions

For each set of figures on the following pages, the specific unit and test setup will be stated at the beginning of that section. Any changes to the specified setup for any particular figure(s) will be detailed beside the figures to which that difference applies.

H.3.2 Measurement References

Unless otherwise specified the references used in this specification are as follows:

- Reference frequency: 1kHz
- Reference level: 0dBu, where 0dBu ≈ 0.775V into any load
- Source impedance of Test Set: 50Ω
- Input impedance of Test Set: 100kΩ
- All unweighted measurements are specified as 22Hz to 22kHz band limited RMS and are expressed in units of dBu
- All distortion measurements are specified with a 36dB/Octave low pass filter at 80kHz and are expressed as a percentage
- The onset of clipping (for headroom measurements) should be taken as 1% THD
- Unless otherwise quoted all figures have a tolerance of ±0.5dB or 5%

H.3.3 Microphone Amplifier Performance

Signal applied to Microphone Input and measured at Output. VHD and Pad switched out with Input Gain control set to +20dB (minimum) and Trim control set to 0dB (indent).

Gain	Continously variable from +20dB to +70dB Independently switchable 20dB Pad available
Input Impedance	Switchable from ≈1k2Ω to ≈10kΩ
Output Headroom	> +26dBu at onset of clipping
THD + Noise (-18dBu applied, +20dB gain) 20kHz)	< 0.2% (20Hz – 20kHz) With VHD, adjustable between < 0.2% and 5% (1kHz –
Frequency Response	±0.3dB from 20Hz to 20kHz –3dB at 50kHz
Equivalent Input Noise (input terminated with 150Ω)	< –126dB at maximum gain < –80dB at minimum gain (with Pad 'IN')
Common Mode Rejection (-10dBu applied, +30dB gain)	> 75dB from 50Hz to 1kHz > 65dB at 10kHz

H.3.4 Line Input Performance

Signal applied to Line Input and measured at Output. Line selected and Trim control set to 0dB (indent).

Gain	Continuously variable from –24dB to +24dB
Input Impedance	> 10kΩ
THD + Noise (+24dBu applied, 0dB gain)	< 0.005% from 20Hz to 20kHz
Frequency Response	±0.1dB from 20Hz to 20kHz –3dB at 50kHz

Equivalent Input Noise (Input terminated with 150Ω)	< –90dB

H.4 Calibration Information

The X-Rack VHD Mic Amp module is factory calibrated and should only need calibration if a potentiometer or other component has been replaced or if it is suspected that there is a problem with calibration.

In each of the following instructions it is assumed that the lid of the X-Rack has been removed and that power has been applied. It is also assumed that unless otherwise specified, all switches are released and all front panel potentiometers are at unity or minimum position as appropriate. The required accuracy for each adjustment will be specified along with the target value. All level and distortion measurements should be made with audio-band 20Hz to 20kHz filters unless otherwise specified.

All presets are accessible from the top of the unit.

H.4.1 Microphone Input

Equipment Required:	Calibrated audio oscillator and audio level meter
Test Signal:	50Hz sinewave @ –12dBu, common mode
Input and Output:	Oscillator to Mic Input and Output to the audio level meter
Unit Setup:	Set the Mic Gain to mid-position, Trim to indent (0dB)

CMRR Trim

Adjustment: Adjust VR9 for minimum level (normally < –40dBu)

H.4.2 VHD Level/Distortion Matching

Equipment Required:	Calibrated audio oscillator and audio level meter
Test Signal:	1kHz sinewave @ –20dBu
Input and Output:	Oscillator to Mic Input and Output to the audio level meter
Unit Setup:	Set the Mic Gain to mid-position, 'VHD IN' selected and 'DRIVE' at minimum. Trim to indent (0dB)

Distortion Trim

Adjustment:

1. Note the output level.
2. De-select 'VHD IN'.
3. Adjust VR8 until the output level matches the level measured in step 1. above. This will match both level and minimum distortion between the two modes.

H.4.3 Line Input

Equipment Required:	Calibrated audio oscillator and audio level meter
Test Signal:	1kHz sinewave @ 0dBu
Input and Output:	Oscillator to Line Input and Output to the audio level meter
Unit Setup:	Set Trim to indent (0dB) and select 'LINE'

Level Trim

Adjustment:

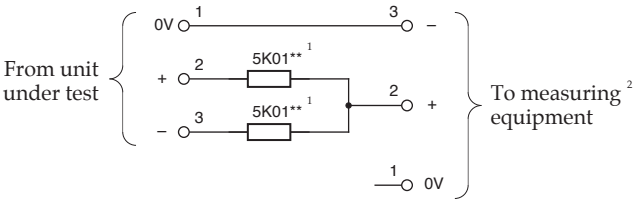
1. Adjust VR7 for 0dBu ±0.05dB.

H.4.4 Output Balance

Equipment Required:	Calibrated audio oscillator, audio level meter and a 'balance' adaptor (see below)
Test Signal:	1kHz sine wave at +24dBu
Input and Output:	Oscillator to Line Input and Output to the audio level meter via the 'balance' adaptor
Unit Setup:	Set the Line Trim to indent (0dB) and select 'LINE'
Adjustment:	Adjust VR10 for minimum level (< 55dBr)

H.4.5 'Balance' Adaptor

For the output balance adjustment, a 'balance' adaptor such as that illustrated here will be required. This adaptor consists of a pair of close tolerance resistors in an in-line cable and is used to sum together a balanced output in order to correctly adjust the level balance of the measured output; perfect balance should result in complete signal cancellation.



Note 1. Resistor tolerance should ideally be 0.01%
2. Absolute level measured will depend upon the input impedence of the measuring equipment.

H.5 Connector Details

Audio Input	
Location:	Rear Panel
Conn' Type:	XLR Female
Pin	*Description*
1	Chassis
2	Audio +ve
3	Audio –ve

Audio Output	
Location:	Rear Panel
Conn' Type:	XLR Male
Pin	*Description*
1	Chassis
2	Audio +ve
3	Audio –ve

H.6 Physical Specification

Depth:	200mm / 7.9 inches	*including front panel knobs, excluding connectors*
	275mm / 10.9 inches	*including front panel knobs and connectors*
Height:	171mm / 6.75 inches	
Width:	35mm / 1.4 inches	*front/rear panels*
	49mm / 1.9 inches	*overall width (front and rear panels are offset)*
Weight:	260g / 9.5 ounces	
Boxed size:	190mm x 290mm x 70mm / 7.5" x 11.5" x 2.5"	
Boxed weight:	460g / 16.5 ounces	

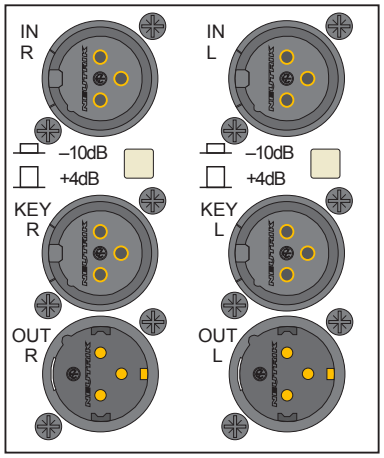
** All values are approximate*

H.7 Environmental Specification

As per X-Rack – see page 19.

J. Stereo Compressor Module

J.1 Connection

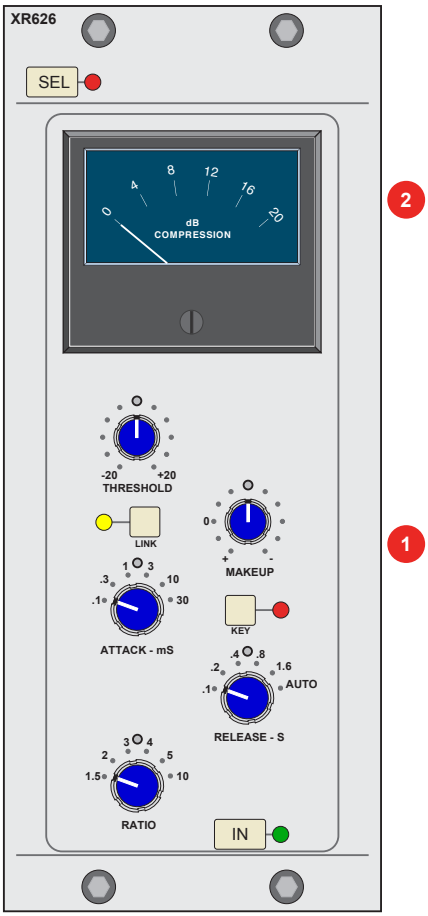


The rear panel of this dual width module carries two Input XLRs ('INL' and 'INR'), two Key Input XLRs ('KEYL' and 'KEYR') and two Output XLRs ('OUTL' and 'OUTR'). Connect the two inputs to the main output insert sends of your console or to your workstation outputs. Connect the outputs to the corresponding insert returns or to your workstation inputs. Once the module is connected switch the X-Rack on, then route signal to each channel in turn and check that the signal is returned to the correct input on your console or workstation.

The module input and output gains can be set to operate at a nominal level of either +4dBu or –10dBV, using the switch on the connector panel – select the appropriate level for the equipment you are connecting to. Note that both switches should be set the same for correct operation!

J.2 Operation

The X-Rack Stereo Compressor module is designed to provide flexible control over a stereo mix. The compressor design is based around the Bus Compressor found in the XL 9000 K Series console.



J.2.1 Compressor Controls 1

The main VCA is permanently in circuit; the compressor sidechain is enabled by the **IN** switch. The other sidechain controls are equally straight forward and hopefully require little explanation. The **ATTACK**, **RATIO** and **RELEASE** controls are multi-position switches; the **THRESHOLD** and **MAKE-UP** controls are continuously variable potentiometers.

It should be noted that the knee point of the compressor, set with the **THRESHOLD** control, purposely changes depending on the setting of the **RATIO** control. Decreasing the **RATIO** setting lowers the effective threshold, hence maintaining the perceived 'loudness' of the compressed signal.

The illuminated compression meter 2 at the top of the module displays gain reduction for the compressor.

J.2.2 Key Input

The compressor sidechain can be driven either by the main stereo channel signal(s) where the loudest signal wins and provides the sidechain signal, or by an external signal applied to the 'KEY' input(s) on the rear of the module. Note that a stereo key input is provided which, in common with normal operation, also operates on a 'loudest wins' basis. Therefore, for a single mono source, either input can be used.

This feature is enabled by the **KEY** switch on the front panel and opens up the possibility to use the unit as a 'ducker' (for audio-follow applications) or, with external EQ, as a 'de-esser'.

J.2.3 Link Bus

J.3 Performance Specification

The following pages contain audio performance specification figures for the X-Rack Stereo Compressor module. No other Solid State Logic products are covered by this document and the performance of other Solid State Logic products can not be inferred from the data contained herein.

J.3.1 Measurement Conditions

For each set of figures, the specific unit and test setup will be stated at the beginning of that section. Any changes to the specified setup for any particular figure(s) will be detailed beside the figures to which that difference applies.

J.3.2 Measurement References

Unless otherwise specified the references used in this specification are as follows:

- Reference frequency: 1kHz
- Reference level: 0dBu, where 0dBu ≈ 0.775V into any load
- Source impedance of Test Set: 50Ω
- Input impedance of Test Set: 100kΩ
- All unweighted measurements are specified as 22Hz to 22kHz band limited RMS and are expressed in units of dBu
- All distortion measurements are specified with a 36dB/Octave low pass filter at 80kHz and are expressed as a percentage
- The onset of clipping (for headroom measurements) should be taken as 1% THD
- Unless otherwise quoted all figures have a tolerance of ±0.5dB or 5%

J.3.3 Performance

Signal applied to either Input and measured at Output. All switches released (including the IN switch – this defeats the sidechain but leaves the main VCA in-circuit).

Input Impedance	> 10kΩ
Output Headroom	> +26dBu at onset of clipping
THD + Noise *	< 0.03% (20Hz – 20kHz)
Frequency Response *	±0.3dB from 20Hz to 20kHz –3dB at 90kHz
Noise (input terminated with 50Ω)	< –90dBu
Crosstalk	< –100dB
Common Mode Rejection	> 70dB from 50Hz to 1kHz > 60dB at 10kHz

* When the compressor is enabled, these measurements will be dependent on attack and release times and signal content.

J.4 Calibration Information

The X-Rack Stereo Compressor module is factory calibrated and should only need calibration if a potentiometer or other component has been replaced or if it is suspected that there is a problem with calibration.

In each of the following instructions it is assumed that the lid of the X-Rack has been removed and that power has been applied. It is also assumed that unless otherwise specified, all switches are released and all front panel potentiometers are at unity or minimum position as appropriate. The required accuracy for each adjustment will be specified along with the target value. All level and distortion measurements should be made with audio-band 20Hz to 20kHz filters unless otherwise specified.

All presets are accessible from the top of the unit. Adjustments for Left and Right are identical.

J.4.1 Distortion Null

Equipment Required: Calibrated audio oscillator, audio distortion analyser and an oscilloscope

Test Signal: 1kHz sinewave @ 0dBu

Input and Output: Oscillator to the Input of the channel being tested, Output to the distortion analyser. Use the oscilloscope to monitor the measured signal.

Unit Setup: Set the Threshold to maximum (fully clockwise) and all other rotary controls to minimum (fully anti-clockwise). Switch the compressor IN.

Adjustment:

1. Adjust VR3 (NULL 1) for minimum distortion
2. Adjust VR1 (NULL 2) for minimum distortion
3. Re-check VR3. Final result should be < 0.005%

J.4.2 VCA Gain (Law)

Equipment Required: Calibrated audio oscillator and audio level meter

Test Signal: 1kHz sinewave @ 0dBu

Input and Output: Oscillator to the Input of the channel being tested, Output to the audio level meter

Unit Setup: Set the Threshold and Makeup to maximum (fully clockwise) and all other rotary controls to minimum (fully anti-clockwise). Switch the compressor In.

Adjustment:

1. Adjust VR2 (dB/V) for +21dBu

J.4.3 Output Balance

Equipment Required: Calibrated audio oscillator, audio level meter and a 'balance' adaptor (see below)

Test Signal: 1kHz sine wave at +24dBu

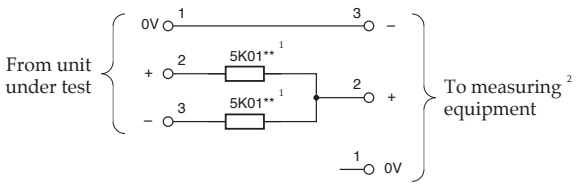
Input and Output: Oscillator to the Input of the channel being tested, Output to the audio level meter via the 'balance' adaptor

Unit Setup: Ensure that the compressor is switched OUT

Adjustment: Adjust VR4 (BAL) for minimum level (< 55dBr)

J.4.4 'Balance' Adaptor

For the output balance adjustment, a 'balance' adaptor such as that illustrated here will be required. This adaptor consists of a pair of close tolerance resistors in an in-line cable and is used to sum together a balanced output in order to correctly adjust the level balance of the measured output; perfect balance should result in complete signal cancellation.



Note 1. Resistor tolerance should ideally be 0.01%
2. Absolute level measured will depend upon the input impedence of the measuring equipment.

J.5 Connector Details

Audio Input	
Location:	Rear Panel
Conn' Type:	XLR Female
Pin	*Description*
1	Chassis
2	Audio +ve
3	Audio –ve

Key Input	
Location:	Rear Panel
Conn' Type:	XLR Female
Pin	*Description*
1	Chassis
2	Audio +ve
3	Audio –ve

Audio Output	
Location:	Rear Panel
Conn' Type:	XLR Male
Pin	*Description*
1	Chassis
2	Audio +ve
3	Audio –ve

J.6 Physical Specification

Depth:	200mm / 7.9 inches	*including front panel knobs, excluding connectors*
	275mm / 10.9 inches	*including front panel knobs and connectors*
Height:	171mm / 6.75 inches	
Width:	70mm / 2.8 inches	*front/rear panels*
	84mm / 3.3 inches	*overall width (front and rear panels are offset)*
Weight:	520g / 1.2 pounds	
Boxed size:	190mm x 290mm x 100mm / 7.5" x 11.5" x 4.0"	
Boxed weight:	760g / 1.7 pounds	

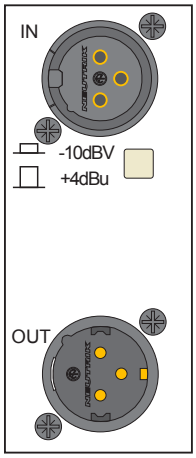
** All values are approximate*

J.7 Environmental Specification

As per X-Rack – see page 19.

K. E Series EQ Module

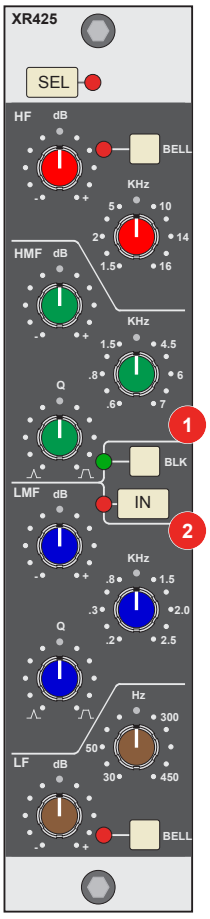
K.1 Connection



The module input and output gains can be set to operate at a nominal level of either +4dBu or –10dBV, using a switch on the connector panel. To select the appropriate level for the equipment you are connecting to, please check the operating manual for your mixer or DAW. The switch should be released for +4dBu operation: push it in for –10dBV operation.

K.2 Operation

The X-Rack E Series EQ module is a re-implementation of two of the classic SSL EQ circuits. The module defaults to the original 'Brown Knob' circuit that was standard on all early production E Series consoles but can be switched to emulate the later 'Black Knob' circuit.



The BLK button (1) switches the module from the default 'Brown Knob' EQ to 'Black Knob' EQ.

The IN button (2) switches the entire section in and out of circuit.

K.2.1 'Brown Knob' EQ

With the BLK button out, the two parametric mid-band sections feature SSL's classic logarithmically symmetric design that ensures that the ±3dB up/down points retain the same musical interval from the centre frequency regardless of frequency and amplitude settings. The two shelving sections are traditional 6dB/octave designs with an option for a fixed Q parametric response (Bell). The '02' EQ, to give it its correct name, was used on countless recordings and mixes in the early eighties.

K.2.2 'Black Knob' EQ

In 1983 a new '242' EQ circuit was developed in conjunction with the legendary George Martin for the first SSL console to be installed in AIR studios. The 'Black Knob' EQ, as it became known, featured enhanced cut and boost ranges (±18dB instead of ±15dB) together with a different control law and a steeper 18dB/octave high pass filter for tighter control of low frequencies. It is this design which is retained today as the 'E Series' EQ option of the AWS 900 and Duality consoles. It is also to be found in use in the X-Rack XR625 EQ module which features this design alongside an implementation of the 'G Series' EQ.

K.3 Performance Specification

The following pages contain audio performance specification figures for the X-Rack E Series EQ Module. No other Solid State Logic products are covered by this document and the performance of other Solid State Logic products can not be inferred from the data contained herein.

K.3.1 Measurement Conditions

For each set of figures on the following pages, the specific unit and test setup will be stated at the beginning of that section. Any changes to the specified setup for any particular figure(s) will be detailed beside the figures to which that difference applies.

K.3.2 Measurement References

Unless otherwise specified the references used in this specification are as follows:

- Reference frequency: 1kHz
- Reference level: 0dBu, where 0dBu ≈ 0.775V into any load
- Source impedance of Test Set: 50Ω
- Input impedance of Test Set: 100kΩ
- All unweighted measurements are specified as 22Hz to 22kHz band limited RMS and are expressed in units of dBu
- All distortion measurements are specified with a 36dB/Octave low pass filter at 80kHz and are expressed as a percentage
- The onset of clipping (for headroom measurements) should be taken as 1% THD
- Unless otherwise quoted all figures have a tolerance of ±0.5dB or 5%
- All measurements are made with the operating level switch set for +4dBu

K.3.3 Performance

Signal applied to Input and measured at Output. EQ switched In. All EQ controls set centre as appropriate.

THD + N	< 0.003% at +20dBu 1kHz < 0.003% at +20dBu 10kHz
Frequency Response	±0.5dB from 20Hz to 20kHz –6dB at 100kHz
Output Headroom	> +26dBu at onset of clipping
Noise	< –80dBu (+4dBu operating level) < –92dBu (–10dBV operating level)

K.3.4 Controls

This is a four band equaliser that can be switched between two different sets of curves; one based on SSL's '02' ('Brown Knob') EQ and the other based on the latest version of the classic '242' E Series ('Black Knob') EQ.

HF Band controls:

Frequency	Variable from 1.5kHz to 16kHz
Gain	Variable between ±15dB ('Brown') Variable between ±18dB ('Black')
'Q' (on 'BELL' setting)	0.8 ('Brown') 1.3 ('Black')

HMF Band controls:

Frequency	Variable from 600Hz to 7kHz
Gain	Variable between ±15dB ('Brown') Variable between ±18dB ('Black')
'Q'	Variable from 0.5 to 2.5 ('Brown') Variable from 0.5 to 4 ('Black')

LMF Band controls:

Frequency	Variable from 200Hz to 2.5kHz
Gain	Variable between ±15dB ('Brown') Variable between ±18dB ('Black')
'Q'	Variable from 0.5 to 2.5 ('Brown') Variable from 0.5 to 4 ('Black')

LF Band controls:

Frequency	Variable from 30Hz to 450Hz
Gain	Variable between ±15dB ('Brown') Variable between ±18dB ('Black')
'Q' (on 'BELL' setting)	0.8 ('Brown') 1.3 ('Black')

K.4 Calibration Information

The X-Rack E Series EQ module is factory calibrated and should only need calibration if a potentiometer or other component has been replaced or if it is suspected that there is a problem with calibration.

In each of the following instructions it is assumed that the lid of the X-Rack has been removed and that power has been applied. It is also assumed that unless otherwise specified, all switches are released and all front panel potentiometers are at unity or minimum position as appropriate. The required accuracy for each adjustment will be specified along with the target value. All level and distortion measurements should be made with audio-band 20Hz to 20kHz filters unless otherwise specified.

All presets are accessible from the top of the unit.

Note. The unit should be allowed to warm up with power applied for at least 15 minutes prior to making any adjustments.

K.4.1 EQ Alignment

Equipment Required: Calibrated audio oscillator and audio level meter

Test Signal: Sine wave @ 0dBu, frequencies as specified below

Input and Output: Oscillator to Input, Output to the audio level meter

Unit Setup:

1. Switch the EQ IN and release all other EQ switches.
2. Release the +4dBu/–10dBV switch on the rear panel.
3. Set all of the Q and Frequency controls fully anti-clockwise and all Gain controls to their centre indent.

HF EQ – Maximum Gain

Adjustment:

1. Ensure that the BLK switch is released.
2. Set HF Gain to maximum and select HF BELL. Set the audio oscillator for 12kHz and adjust HF Frequency to find the maximum level on the audio level meter.
3. Adjust VR11 for +15dBu ±0.25dB.
4. Switch BLK in and re-adjust HF Frequency for maximum level.
5. Adjust VR12 for +18dBu ±0.25dB.
6. Reset HF Gain to its centre indent position, de-select HF BELL and release the BLK switch. Re-check the audio level meter for 0dBu.

HMF EQ – Maximum Gain

Adjustment:

1. Ensure that the BLK switch is released.
2. Set HMF Gain to maximum and HMF Q fully anti-clockwise. Set the audio oscillator for 3kHz and adjust HMF Frequency to find the maximum level on the audio level meter.
3. Adjust VR13 for +15dBu ±0.25dB.
4. Switch BLK in and re-adjust HMF Frequency for maximum level.
5. Adjust VR14 for +18dBu ±0.25dB.
6. Reset HMF Gain to its centre indent position and release the BLK switch. Re-check the audio level meter for 0dBu.

LMF EQ – Maximum Gain

Adjustment:

1. Ensure that the BLK switch is released.
2. Set LMF Gain to maximum and LMF Q fully anti-clockwise. Set the audio oscillator for 1kHz and adjust LMF Frequency to find the maximum level on the audio level meter.
3. Adjust VR15 for +15dBu ±0.25dB.

(continued)

4. Switch BLK in and re-adjust LMF Frequency for maximum level.
5. Adjust VR16 for +18dBu ±0.25dB.
6. Reset LMF Gain to its centre indent position and release the BLK switch. Re-check the audio level meter for 0dBu.

LF EQ – Maximum Gain

Adjustment:

1. Ensure that the BLK switch is released.
2. Set LF Gain to maximum and select LF BELL. Set the audio oscillator for 80Hz and adjust LF Frequency to find the maximum level on the audio level meter.
3. Adjust VR17 for +15dBu ±0.25dB.
4. Switch BLK in and re-adjust LF Frequency for maximum level.
5. Adjust VR18 for +18dBu ±0.25dB.
6. Reset LF Gain to its centre indent position, release the BLK switch and de-select LF BELL. Re-check the audio level meter for 0dBu.

K.4.2 Output Balance

Equipment Required: Calibrated audio oscillator, audio level meter and a 'balance' adaptor (see below).

Test Signal: 1kHz sine wave at +24dBu.

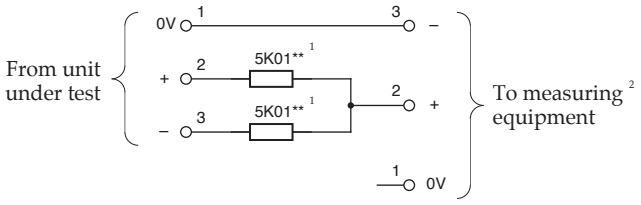
Input and Output: Oscillator to the Input of the channel being tested, Output to the level meter via the 'balance' adaptor.

Unit Setup: Ensure that all front panel switches are off and all controls are set fully anti-clockwise.

Adjustment: Connect the test equipment to the each channel in turn and adjust VR19 (BAL) for minimum level (< 55dBr).

K.4.3 'Balance' Adaptor

For the output balance adjustment, a 'balance' adaptor such as that illustrated here will be required. This adaptor consists of a pair of close tolerance resistors in an in-line cable and is used to sum together a balanced output in order to correctly adjust the level balance of the measured output; perfect balance should result in complete signal cancellation.



Note 1. Resistor tolerance should ideally be 0.01%
2. Absolute level measured will depend upon the input impedence of the measuring equipment.

K.5 Connector Details

Audio Input	
Location:	Rear Panel
Conn' Type:	XLR Female
Pin	*Description*
1	Chassis
2	Audio +ve
3	Audio –ve

Audio Output	
Location:	Rear Panel
Conn' Type:	XLR Male
Pin	*Description*
1	Chassis
2	Audio +ve
3	Audio –ve

K.6 Physical Specification

Depth:	200mm / 7.9 inches	*including front panel knobs, excluding connectors*
	275mm / 10.9 inches	*including front panel knobs and connectors*
Height:	171mm / 6.75 inches	
Width:	35mm / 1.4 inches	*front/rear panels*
	49mm / 1.9 inches	*overall width (front and rear panels are offset)*
Weight:	260g / 9.5 ounces	
Boxed size:	190mm x 290mm x 70mm / 7.5" x 11.5" x 2.5"	
Boxed weight:	460g / 16.5 ounces	

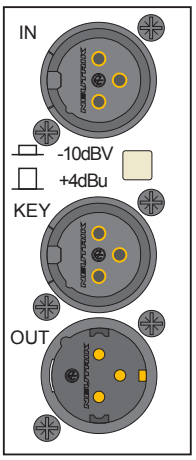
** All values are approximate*

K.7 Environmental Specification

As per X-Rack – see page 19.

L. E Series Dynamics Module

L.1 Connection

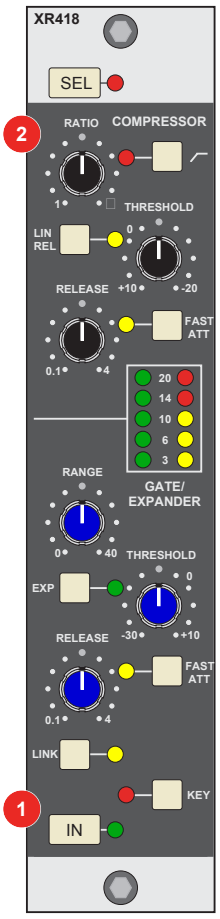


The module input and output gains can be set to operate at a nominal level of either +4dBu or –10dBV, using a switch on the connector panel. Select the appropriate level for the equipment you are connecting to. If in doubt experiment!

To check the input and output gains, set the compressor Ratio and Threshold controls fully clockwise and send a signal close to the nominal operating level of your mixer or DAW to the dynamics module. The lower three LEDs of the compression meter should light if the input level matches the selected operating level. Release the switch for +4dBu operation: push it in for –10dBV operation.

L.2 Operation

The X-Rack E Series Dynamics module comprises a compressor/limiter and an expander/gate, the design of which returns faithfully to the circuit and key components which defined the sound of the original E Series channel strip. A true RMS converter is used in the side chain whilst the gain element is an all discrete design identical to the Class A VCA chip used in the original unit. The compressor contains additional switching options to defeat the over-easy curve and to use a linear release instead of the more usual logarithmic curve. The result is a compressor with three distinct voicings, all of which contributed to the many classic records tracked and mixed on early E Series consoles.



The IN button (1) switches the entire section in and out of circuit.

L.2.1 Compressor/Limiter Section (2)

RATIO – When turned to 1:1, the compressor/limiter section is inactive. Turning the control clockwise increases the compression ratio, giving a true limiter at the fully clockwise position. The compressor normally has an 'over-easy' characteristic. Pressing the ⌐ button switches this to peak sensing, and replaces the 'over-easy' characteristic with a hard knee', providing an alternative for some instruments.

THRESHOLD – Whenever a signal exceeds the level set by this control, the compressor will start to act at the ratio set by the **RATIO** control. The **THRESHOLD** and **RATIO** controls also provide automatic make-up gain, so as you lower the threshold and introduce more compression, the output level is increased, maintaining a steady output level regardless of the amount of compression.

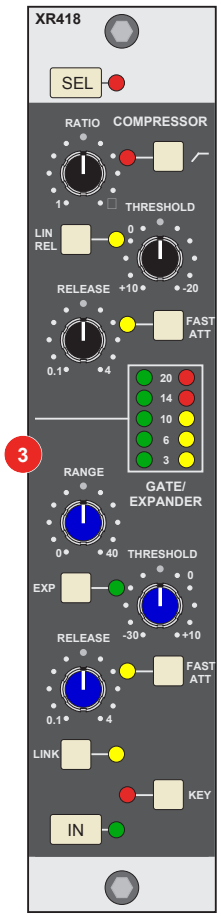
LIN REL – Changes the release curve from logarithmic to linear. This also raises the threshold by 6dB.

FST ATT – Provides a faster attack time (3mS for 20dB gain reduction). When off the attack time is slower and less aggressive (30mS for 20dB gain reduction).

RELEASE – Sets the time constant (speed) with which the compressor returns to normal gain settings once the signal has passed its maximum.

The vertical row of yellow and red LEDs, located centre right, indicate the amount of gain reduction (compression).

L.2.2 Gate/Expander Section 3



This section can act as a ∞:1 Gate or as a 2:1 Expander when the **EXP** button is pressed.

RANGE – Determines the depth of gating or expansion. When turned fully anti-clockwise, this section is inactive. When turned fully clockwise, a gate depth or range of 40dB can be obtained.

THRESHOLD – Determines the level at which the gate opens or the level below which gain reduction begins (**EXP** selected), adjustable from +10dBu to –20dBu. Variable hysteresis is incorporated in the threshold circuitry which increases as the threshold is lowered. This is very useful in music recording as it allows instruments to decay below the open threshold before gating or expansion takes place.

FST ATK – Normally, a controlled linear attack time of 1.5ms per 40dB is provided. Press this button to select a fast attack time (100μs per 40dB). The attack time is the time taken for the Gate/Expander to 'recover' once the signal level is above the threshold. When gating signals with a steep rising edge, such as drums, a slow attack may effectively mask the initial 'THWACK', so you should be aware of this when selecting the appropriate attack time.

RELEASE – This determines the time constant (speed), variable from 0.1 to 4 seconds, at which the Gate/Expander reduces the signal level once it has passed below the threshold. Note that this control interacts with the **RANGE** control.

KEY – Switches the Dynamics side chain to the 'KEY' input on the rear panel of the unit.

LINK – The side chain control signals of multiple modules can be linked by pressing the **LINK** switch on those modules you wish to gang. When two (or more) Dynamics sections are linked, the control voltages of each section sum together, so that whichever section has the most gain reduction will control the other section.

Don't try to link two gates using the LINK button when you want the signal on one to open the other. If you need to achieve this effect, take a keying signal from one section to trigger the other. The easiest way to do this is by patching from the 'source' signal to the Key input of the 'destination' channel, and selecting **KEY** (see above) on this channel.

The vertical row of green LEDs, located towards the centre of the module, indicate Gate/Expander activity (the amount of gain reduction/increase).

L.3 Performance Specification

The following pages contain audio performance specification figures for the X-Rack Dynamics Module. No other Solid State Logic products are covered by this document and the performance of other Solid State Logic products can not be inferred from the data contained herein.

L.3.1 Measurement Conditions

For each set of figures on the following pages, the specific unit and test setup will be stated at the beginning of that section. Any changes to the specified setup for any particular figure(s) will be detailed beside the figures to which that difference applies.

L.3.2 Measurement References

Unless otherwise specified the references used in this specification are as follows:

- Reference frequency: 1kHz
- Reference level: 0dBu, where 0dBu ≈ 0.775V into any load
- Source impedance of Test Set: 50Ω
- Input impedance of Test Set: 100kΩ
- All unweighted measurements are specified as 22Hz to 22kHz band limited RMS and are expressed in units of dBu
- All distortion measurements are specified with a 36dB/Octave low pass filter at 80kHz and are expressed as a percentage
- The onset of clipping (for headroom measurements) should be taken as 1% THD
- Unless otherwise quoted all figures have a tolerance of ±0.5dB or 5%
- All measurements are made with the operating level switch set for +4dBu

L.3.3 Compressor/Limiter

Controls:

Ratio (slope)	Variable from 1 to infinity (limit)
Threshold	Variable from +10dB to –30dB
Attack Slope	Normally 'Over Easy', switchable to 'Hard Knee'
Attack Time	Normally 30mS per 20dB, switchable to 3mS ('Fast Att')
Release	Variable from 0.1 to 4 seconds
Release Slope	Normally 'Logarithmic', switchable to 'Linear'

The Compressor/Limiter has two different attack slope modes and two different release slope modes; 'Hard Knee' & 'Over Easy' and 'Logarithmic' & 'Linear' respectively. As their names suggest these modes affect of manner of response to incoming signals. Combining the two modes provides four very different modes of compression and limiting with the 'Hard Knee' and 'Linear' modes giving far more dramatic compression characteristics.

LED meters independently indicate amount of compression.

L.3.4 Expander/Gate

Controls:

Range	Variable from 0 to 40dB
Threshold	Variable from –30dB to +10dB
Attack Time	Normally 1.5mS per 40dB, switchable to 100μs
Release Time	Variable from 0.1 to 4 seconds

The side chain signal can be sourced either from the signal feeding the dynamic or the external Key input.

LED meters independently indicate amount of gating or expansion.

L.3.5 Performance

Signal applied to Input, output measured at Output. All pots anti-clockwise and switches 'out' except for Dynamics 'IN'.

THD + N (+20dBu applied)	< 0.05% at 1kHz
Output Headroom	> +26dBu at onset of clipping
Frequency Response	±0.25dB from 20Hz to 20kHz –3dB at 130kHz
Noise	< –75dBu

L.4 Calibration Information

The X-Rack E Series Dynamics module is factory calibrated and should only need calibration if a potentiometer or other component has been replaced or if it is suspected that there is a problem with calibration.

In each of the following instructions it is assumed that the lid has been removed and that power has been applied. It is also assumed that unless otherwise specified, all switches are released and all front panel potentiometers are at unity or minimum position as appropriate. The required accuracy for each adjustment will be specified along with the target value. All level and distortion measurements should be made with audio-band 20Hz to 20kHz filters unless otherwise specified.

All presets are accessible from the top of the unit.

Note. The unit should be allowed to warm up with power applied for at least 15 minutes prior to any adjustments being made.

L.4.1 Dynamics Adjustments

If the dynamics circuitry requires adjustment the following procedure should be followed in the order shown.

Equipment Required:	Calibrated audio oscillator, audio distortion analyser, audio level meter, oscilloscope and a (digital) DC volt meter.
Test Signal:	1kHz sine wave unless specified otherwise, level as specified.
Input and Output:	Oscillator to Input, Output to either the distortion analyser or the level meter, as specified below. Use the oscilloscope to monitor the measured signal.
Unit Setup:	Set all of the controls anti-clockwise and release all switches. Switch the dynamics IN.

L.4.2 Unity Gain

Adjustment:

1. Set the oscillator for 0dBu.
2. Adjust VR10 (VCA GAIN) for 0dBu ±0.05dB.

L.4.3 RMS-to-DC Converter DC Offset

Adjustment:

1. Connect the level meter to the Output and set the oscillator level for –40dBu.
2. Measure the DC voltage at test point TP14 relative to 0VA and adjust VR8 (COMP THOLD) for 0V ±10mV.

L.4.4 RMS-to-DC Converter Gain

Adjustment:

1. Set the oscillator level for +24dBu.
2. Connect the level meter to the Output. Check for +24dBu ±0.5dB.
3. Set the compressor RATIO control fully clockwise and press in the ⌐ switch.
4. Adjust VR9 (COMP LAW) for a level of –4dBu ±0.1dB.
5. Reset the compressor RATIO control fully anti-clockwise.

L.4.5 Gate Threshold

Adjustment:

1. Set the oscillator level for +14dBu and connect the level meter to the Output.
2. Set the gate/expander to 'gate' by releasing the EXP switch, set the gate range and gate threshold controls fully clockwise.
3. Adjust VR7 (GATE THOLD) so that the gate just switches on.
4. Check this adjustment by changing the oscillator level a little. Re-adjust VR7 if necessary so that the gate just opens when a +14dBu signal @ 1kHz is applied.

L.4.6 Output Balance

Equipment Required: Calibrated audio oscillator, audio level meter and a 'balance' adaptor (see below).

Test Signal: 1kHz sine wave at +24dBu.

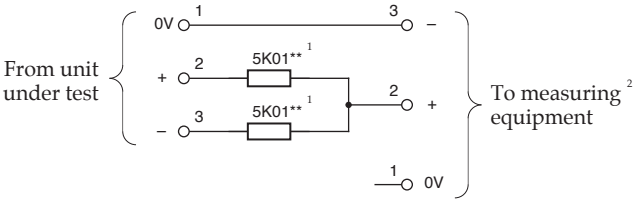
Input and Output: Oscillator to the Input of the channel being tested, Output to the level meter via the 'balance' adaptor.

Unit Setup: Ensure that all front panel switches are off and all controls are set fully anti-clockwise.

Adjustment: Connect the test equipment to the each channel in turn and adjust VR11 (BAL) for minimum level (< 55dBr).

L.4.7 'Balance' Adaptor

For the output balance adjustment, a 'balance' adaptor such as that illustrated here will be required. This adaptor consists of a pair of close tolerance resistors in an in-line cable and is used to sum together a balanced output in order to correctly adjust the level balance of the measured output; perfect balance should result in complete signal cancellation.



Note 1. Resistor tolerance should ideally be 0.01%
2. Absolute level measured will depend upon the input impedence of the measuring equipment.

L.5 Connector Details

Audio Input	
Location:	Rear Panel
Conn' Type:	XLR Female
Pin	*Description*
1	Chassis
2	Audio +ve
3	Audio –ve

Audio Output	
Location:	Rear Panel
Conn' Type:	XLR Male
Pin	*Description*
1	Chassis
2	Audio +ve
3	Audio –ve

Key Input	
Location:	Rear Panel
Conn' Type:	XLR Female
Pin	*Description*
1	Chassis
2	Audio +ve
3	Audio –ve

L.6 Physical Specification

Depth:	200mm / 7.9 inches	*including front panel knobs, excluding connectors*
	275mm / 10.9 inches	*including front panel knobs and connectors*
Height:	171mm / 6.75 inches	
Width:	35mm / 1.4 inches	*front/rear panels*
	49mm / 1.9 inches	*overall width (front and rear panels are offset)*
Weight:	260g / 9.5 ounces	
Boxed size:	190mm x 290mm x 70mm / 7.5" x 11.5" x 2.5"	
Boxed weight:	460g / 16.5 ounces	

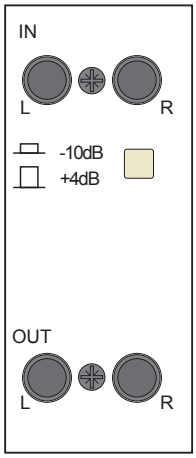
** All values are approximate*

L.7 Environmental Specification

As per X-Rack – see page 19.

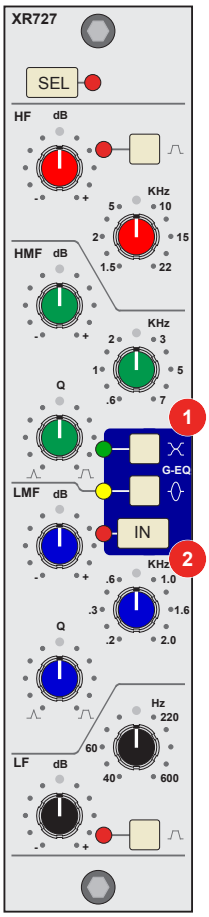
M. Stereo EQ Module

M.1 Connection



The module input and output gains can be set to operate at a nominal level of either +4dBu or –10dBV, using a switch on the connector panel. To select the appropriate level for the equipment you are connecting to, please check the operating manual for your mixer or DAW. The switch should be released for +4dBu operation: push it in for –10dBV operation.

M.2 Operation



The X-Rack Stereo EQ module is a 4-band stereo equaliser that can be switched between two different sets of curves, one based on the latest version of the classic SSL E Series EQ and the other based on SSL's G Series EQ.

The two G-EQ buttons 1 independently switch the HF/LF ('⋋' button) and HMF/LMF ('⋄' button) bands from 'E' operation to 'G' operation.

The IN button 2 switches the entire section in and out of circuit.

M.2.1 Frequency Sections

The different frequency sections are as follows:

HF Section:	Frequency range 1.5kHz – 22kHz Gain ±20dB
LF Section:	Frequency range 40Hz – 600Hz Gain ±20dB

The HF/LF sections provide shelving equalisers with variable turnover frequency and a gentle slope. Selecting the 'G-EQ' ('⋋') button provides a slightly steeper slope for both sections with a degree of overshoot/undershoot (depending on whether you are boosting or cutting) below the selected HF frequency (or above the selected LF frequency). Selecting '⎍' ('Bell') in either mode switches the equaliser to a peaking curve.

HMF Section:	Centre frequency 600Hz – 7kHz Gain ±20dB Continuously variable Q (0.7 – 2.5)
LMF Section:	Centre frequency 200Hz to 2.0kHz Gain ±20dB Continuously variable Q (0.7 – 2.5)

Normally, the bandwidth of the HMF and LMF sections will remain constant at all gains – at lower gains the EQ curves are comparatively narrower for a given Q setting. This is particularly useful for drums since relatively high Q is available at low gain settings but is less suitable for overall EQ or subtle corrections because the Q must be adjusted to maintain the same effect as the gain is changed.

When the HMF/LMF band is switched to 'G-EQ' ('⋄') operation, the bandwidth will vary with gain so an increase in boost or cut increases the selectivity of the EQ. This type of EQ can sound most effective when used at moderate settings; the gentle Q curve lends itself to the application of overall EQ on combined sources and subtle corrective adjustments to instruments and vocals.

M.3 Performance Specification

The following pages contain audio performance specification figures for the X-Rack Stereo EQ Module. No other Solid State Logic products are covered by this document and the performance of other Solid State Logic products can not be inferred from the data contained herein.

M.3.1 Measurement Conditions

For each set of figures on the following pages, the specific unit and test setup will be stated at the beginning of that section. Any changes to the specified setup for any particular figure(s) will be detailed beside the figures to which that difference applies.

M.3.2 Measurement References

Unless otherwise specified the references used in this specification are as follows:

- Reference frequency: 1kHz
- Reference level: 0dBu, where 0dBu ≈ 0.775V into any load
- Source impedance of Test Set: 50Ω
- Input impedance of Test Set: 100kΩ
- All unweighted measurements are specified as 22Hz to 22kHz band limited RMS and are expressed in units of dBu
- All distortion measurements are specified with a 36dB/Octave low pass filter at 80kHz and are expressed as a percentage
- The onset of clipping (for headroom measurements) should be taken as 1% THD
- Unless otherwise quoted all figures have a tolerance of ±0.5dB or 5%
- All measurements are made with the operating level switch set for +4dBu

M.3.3 Performance

Signal applied to Input and measured at Output. EQ switched In. All EQ controls set centre as appropriate.

THD + N	< 0.007% at +20dBu 1kHz < 0.007% at +20dBu 10kHz
Frequency Response	±0.5dB from 20Hz to 20kHz –3dB at 90kHz
Output Headroom	> +26dBu at onset of clipping (+4dBu operating level) > +13.5dBV at onset of clipping (–10dBV operating level)
Noise	< –70dBu (+4dBu operating level) < –72dBV (–10dBV operating level)

M.3.4 Curves

The module contains a four band equaliser that can be switched between two different sets of curves, one based on the latest version of the classic SSL E Series EQ and the other based on SSL's G Series EQ.

HF Band controls:

Frequency	Variable from 1.5kHz to 22kHz
Gain	Variable between ±20dB
'Q'	2.5 (on '⎍' setting)

HMF Band controls:

Frequency	Variable from 600Hz to 7kHz
Gain	Variable by > ±20dB
'Q'	Variable from 0.7 to 2.5 (may also vary with gain)

LMF Band controls:

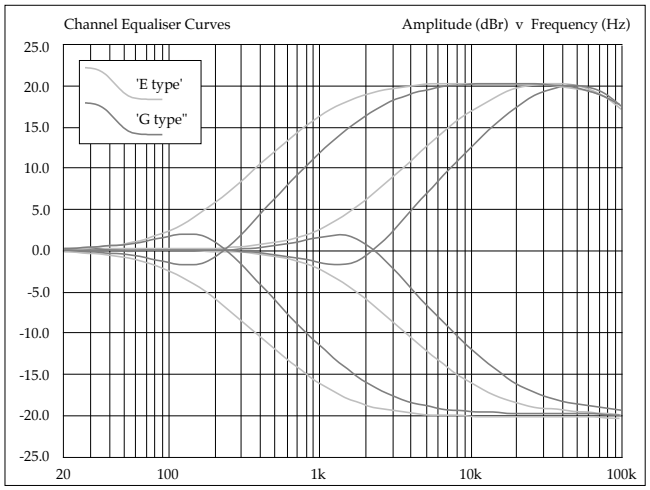
Frequency	Variable from 200Hz to 2.0kHz
Gain	Variable by > ±20dB
'Q'	Variable from 0.7 to 2.5 (may also vary with gain)

LF Band controls:

Frequency	Variable from 40Hz to 600Hz
Gain	Variable between ±20dB
'Q'	2.5 (on '⎍' setting)

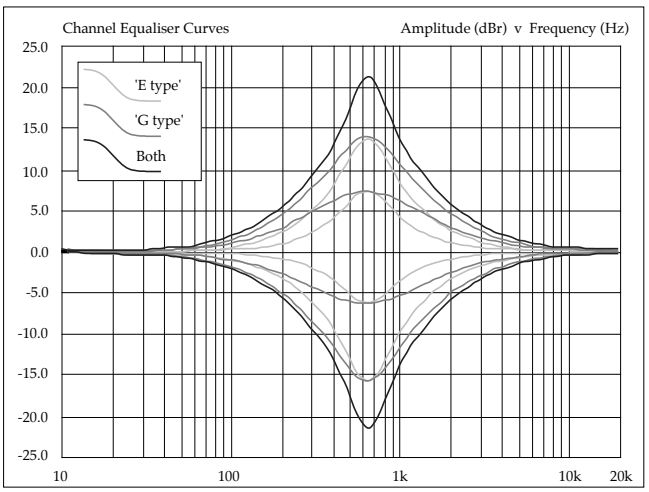
The LF and HF bands have variable turnover frequency with switchable bell/shelving and selectable response curves:

- Normal ('E type') curves – with the 'G-EQ' ('⨯') switch OUT – follow conventional cut or boost characteristics.
- The 'G type' curves – with the 'G-EQ' ('⨯') switch IN – have a modified slope which provides a degree of overshoot/undershoot for increased selectivity.



The two parametric bands have selectable characteristics which affect the relationship between frequency bandwidth and gain:

- With the 'G-EQ' ('⨁') switch OUT, the frequency bandwidth is constant at all gains.
- When the 'G-EQ' ('⨁') is switched IN, the frequency bandwidth will reduce with increased gain, thereby increasing the selectivity of the EQ as the gain is increased.
- At full boost or cut both are identical.



M.4 Calibration Information

The X-Rack Stereo EQ module requires no calibration.

M.5 Connector Details

Audio Input	
Location:	Rear Panel
Conn' Type:	Stereo 1/4" Jack Socket
Pin	*Description*
Tip	Audio +ve
Ring	Audio –ve
Sleeve	Chassis

Audio Output	
Location:	Rear Panel
Conn' Type:	Stereo 1/4" Jack Socket
Pin	*Description*
Tip	Audio +ve
Ring	Audio –ve
Sleeve	Chassis

M.6 Physical Specification

Depth:	200mm / 7.9 inches	*including front panel knobs, excluding connectors*
	275mm / 10.9 inches	*including front panel knobs and connectors*
Height:	171mm / 6.75 inches	
Width:	35mm / 1.4 inches	*front/rear panels*
	49mm / 1.9 inches	*overall width (front and rear panels are offset)*
Weight:	260g / 9.5 ounces	
Boxed size:	190mm x 290mm x 70mm / 7.5" x 11.5" x 2.5"	
Boxed weight:	460g / 16.5 ounces	

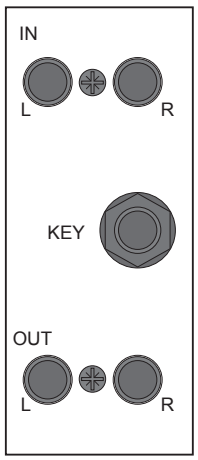
** All values are approximate*

M.7 Environmental Specification

As per X-Rack – see page 19.

N. Stereo Dynamics Module

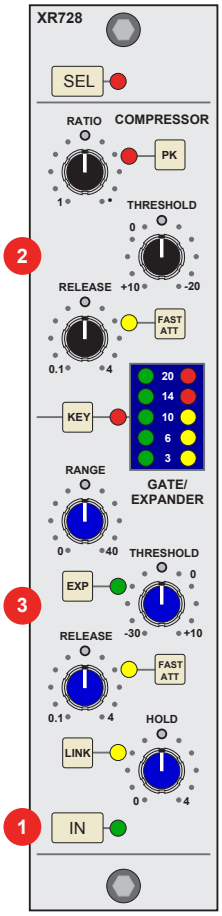
N.1 Connection



The module inputs and outputs are balanced, connecting via ¼" stereo jack sockets. A single Key input is provided, also connected via a ¼" stereo jack socket. The module is configured to operate at a nominal level of +4dBu; operation at a nominal –10dBV level is not possible with this module.

N.2 Operation

The X-Rack Stereo Dynamics module comprises a compressor/limiter and a gate/expander, both of which use the same gain element.



The IN button 1 switches the entire section in and out of circuit.

N.2.1 Compressor/Limiter Section 2

RATIO – When turned to 1:1, the compressor/limiter section is inactive. Turning the control clockwise increases the compression ratio, giving a true limiter at the fully clockwise position. The compressor normally has an 'over-easy' characteristic. Pressing the **PK** button switches this to peak sensing, and replaces the 'over-easy' characteristic with a hard knee.

THRESHOLD – Whenever a signal exceeds the level set by this control, the compressor will start to act at the ratio set by the **RATIO** control. The **THRESHOLD** and **RATIO** controls also provide automatic make-up gain, so as you lower the threshold and introduce more compression, the output level is increased to maintain (approximately) the same perceived loudness regardless of the amount of compression.

FST ATT – Normally the attack time is program dependent (3mS – 30mS). Press this button to select a fixed fast attack time (3mS for 20dB gain reduction).

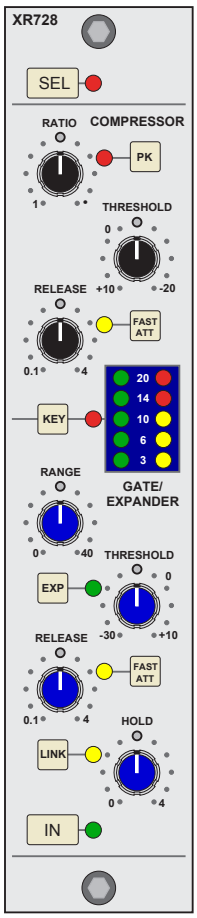
RELEASE – Sets the time constant (speed) with which the compressor returns to normal gain settings once the signal has passed its maximum.

N.2.2 Gate/Expander Section 3

This section can act as a ∞:1 Gate or as a 2:1 Expander when the **EXP** button is pressed.

RANGE – Determines the depth of gating or expansion. When turned fully anticlockwise (Range = 0), this section is inactive. When turned fully clockwise, a gate depth of 40dB can be obtained.

THRESHOLD – Determines the level at which the gate opens or below which gain reduction begins (**EXP** selected), adjustable from +10dBu to –20dBu. Variable hysteresis is incorporated in the threshold circuitry to prevent spurious triggering of the gate when the signal is close to the threshold level. This means that the signal has to decay roughly 2dB below the threshold level before the gate will start to close.



FST ATT – Normally, a controlled linear attack time of 1.5ms per 40dB is provided. Press this button to select a fast attack time (100μs per 40dB). The attack time is the time taken for the Gate/Expander to 'recover' once the signal level is above the threshold. When gating signals with a steep rising edge, such as drums, a slow attack may effectively mask the initial 'THWACK', so you should be aware of this when selecting the appropriate attack time.

RELEASE – This determines the time constant (speed), variable from 0.1 to 4 seconds, at which the Gate/Expander reduces the signal level once it has passed below the threshold. Note that this control interacts with the **RANGE** control.

HOLD – Determines the time after the signal has decayed below the threshold before the gate starts to close. Variable from 0 to 4 seconds.

KEY – Switches the Dynamics side chain to the 'KEY' input on the rear panel of the unit.

LINK – The side chain control signals of multiple modules can be linked by pressing the **LINK** switch on those modules you wish to gang. When two (or more) Dynamics sections are linked, the control voltages of each section sum together, so that whichever section is the 'loudest' will control the other section, be that gain reduction or enabling the gate.

Don't try to link two gates using the **LINK** button when you want the signal on one to open the other. If you need to achieve this effect, take a keying signal from one section to trigger the other. The easiest way to do this is by patching from the 'source' signal to the Key input of the 'destination' channel, and selecting **KEY** (see above) on this module.

Note that the side chain signals for the X-Rack Mono and Stereo Dynamics modules (XR618 and XR728) differ slightly such that there will be a 4dB difference in the compressor and gate thresholds between the two types of module should the link function be used to combine both mono and stereo side chains.

N.3 Performance Specification

The following pages contain audio performance specification figures for the X-Rack Stereo Dynamics Module. No other Solid State Logic products are covered by this document and the performance of other Solid State Logic products can not be inferred from the data contained herein.

N.3.1 Measurement Conditions

For each set of figures on the following pages, the specific unit and test setup will be stated at the beginning of that section. Any changes to the specified setup for any particular figure(s) will be detailed beside the figures to which that difference applies.

N.3.2 Measurement References

Unless otherwise specified the references used in this specification are as follows:

- Reference frequency: 1kHz
- Reference level: 0dBu, where 0dBu ≈ 0.775V into any load
- Source impedance of Test Set: 50Ω
- Input impedance of Test Set: 100kΩ
- All unweighted measurements are specified as 22Hz to 22kHz band limited RMS and are expressed in units of dBu
- All distortion measurements are specified with a 36dB/Octave low pass filter at 80kHz and are expressed as a percentage
- The onset of clipping (for headroom measurements) should be taken as 1% THD
- Unless otherwise quoted all figures have a tolerance of ±0.5dB or 5%
- All measurements are made with the operating level switch set for +4dBu

N.3.3 Compressor/Limiter

Controls:

Ratio (slope)	Variable from 1 to infinity (limit)
Threshold	Variable from +10dB to –30dB
Attack Time	Normally auto sensing, switchable to 1mS
Release	Variable from 0.1 to 4 seconds

The Compressor/Limiter has two modes of signal detection, Peak and RMS. As their names suggest these modes of detection either act on peaks of the incoming signals or on their RMS levels. This gives two very different modes of compression and limiting with Peak Mode giving far more dramatic compression characteristics.

N.3.4 Expander/Gate

Controls:

Range	Variable from 0 to 40dB
Threshold	Variable from –30dB to +10dB
Attack Time	Normally auto-sensing, switchable to 150μs
Hold Time	Variable from 0 to 4 seconds
Release Time	Variable from 0.1 to 4 seconds

The side chain signal can be sourced either from the signal feeding the dynamic or the external Key input.

LED meters independently indicate amount of compression and expansion.

N.3.5 Measurement Conditions

Signal applied to Input, output measured at Output. All pots anti-clockwise and switches 'out' except for Dynamics 'IN'.

THD + N (+10dBu applied)	< 0.01% at 1kHz
Output Headroom	> +26dBu at onset of clipping
Frequency Response	±0.2dB from 20Hz to 20kHz –3dB at 150kHz
Noise	< –88dBu

Signal at +20dBu applied to Input, Compressor Threshold set at –20, Compressor Ratio adjusted to give +4dBu at Output. RMS sensing mode selected.

THD + N (Fast Attack Mode) †	< 0.3% at 1kHz < 0.05% at 10kHz
THD + N (Slow Attack Mode)	< 0.03% at 1kHz < 0.05% at 10kHz

† LF distortion is consistent with attack and release time constants.

N.4 Calibration Information

The X-Rack Stereo Dynamics module is factory calibrated and should only need calibration if a potentiometer or other component has been replaced or if it is suspected that there is a problem with calibration.

In each of the following instructions it is assumed that the top edge of the module is accessible and that power has been applied to the X-Rack. It is also assumed that, unless otherwise specified, all switches are released and all front panel potentiometers are at unity or minimum position as appropriate. The required accuracy for each adjustment will be specified along with the target value. All level and distortion measurements should be made with audio-band 20Hz to 20kHz filters unless otherwise specified.

All presets are accessible from the top edge of the module.

Note. The unit should be allowed to warm up with power applied for at least 15 minutes prior to any adjustments being made.

N.4.1 Dynamics Adjustments

If the dynamics circuitry requires adjustment the following procedure should be followed in the order shown.

Equipment Required:	Calibrated audio oscillator, distortion analyser and level meter. DC volt meter.
Test Signal:	1kHz sine wave unless specified otherwise, level as specified.
Input and Output:	Oscillator to Input, Output to either the distortion analyser or the level meter, as specified below. An oscilloscope may be used to monitor the measured signal.
Unit Setup:	Set all of the controls anti-clockwise and release all switches. Switch the dynamics IN.

N.4.2 Distortion

Adjustment Left:

1. Connect the oscillator to the Left Input and the distortion analyser to the Left Output. Set the oscillator level for +20dBu.
2. Adjust VR13 for minimum distortion (< 0.02%).

Adjustment Right:

3. Connect the oscillator to the Left Input and the distortion analyser to the Left Output.
4. Adjust VR15 for minimum distortion (< 0.02%).

N.4.3 Compressor Threshold

Adjustment Left:

1. Connect the oscillator to the Left Input and set the level for –28.35dBu.
2. Measure the DC voltage at test point 'RMS_L' relative to 0VA and adjust VR10 for 0V ±10mV.

Adjustment Right:

3. Connect the oscillator to the Right Input and set the level for –28.35dBu.
4. Measure the DC voltage at test point 'RMS_R' relative to 0VA and adjust VR11 for 0V ±10mV.

N.4.4 Compressor Law

Adjustment Left:

1. Set the compressor ratio control fully clockwise and press in the compressor FST ATT and PK switches.
2. Connect the oscillator to the Left Input and set the level for +20dBu. Connect the level meter to the Left Output. Check for +20dBu ±0.5dB.
3. Adjust VR9 for a level of 14dBu ±0.1dB.

Adjustment Right:

4. Connect the oscillator to the Right Input and set the level for +20dBu. Connect the level meter to the Right Output. Check for +20dBu ±0.5dB.
5. Adjust VR12 for a level of 14dBu ±0.1dB.
6. Reset the compressor ratio control fully anti-clockwise. release the FST ATT and PK switches.

N.4.5 Gate Threshold

Adjustment:

1. Set the gate/expander to 'gate' by releasing the EXP switch, set the gate range and gate threshold controls fully clockwise.
2. Connect the oscillator to the Left Input and set the level for +10dBu. Connect the level meter to the Left Output.
3. Adjust VR8 so that the gate just switches on.
4. Check this adjustment by changing the oscillator level a little. Re-adjust VR8 if necessary so that the gate just opens when a +10dBu signal @ 1kHz is applied.
5. Connect the oscillator to the Right Input and set the level for +10dBu. Connect the level meter to the Right Output.
6. Check that the right side tracks the left by changing the oscillator level a little. Repeat from step 2. if necessary.

N.5 Connector Details

Audio Input	
Location:	Rear Panel
Conn' Type:	Stereo ¼" Jack Socket
Pin	*Description*
Tip	Audio +ve
Ring	Audio –ve
Sleeve	Chassis

Audio Output	
Location:	Rear Panel
Conn' Type:	Stereo ¼" Jack Socket
Pin	*Description*
Tip	Audio +ve
Ring	Audio –ve
Sleeve	Chassis

Key Input	
Location:	Rear Panel
Conn' Type:	Stereo ¼" Jack Socket
Pin	*Description*
Tip	Audio +ve
Ring	Audio –ve
Sleeve	Chassis

N.6 Physical Specification

Depth:	200mm / 7.9 inches	*including front panel knobs, excluding connectors*
	275mm / 10.9 inches	*including front panel knobs and connectors*
Height:	171mm / 6.75 inches	
Width:	35mm / 1.4 inches	*front/rear panels*
	49mm / 1.9 inches	*overall width (front and rear panels are offset)*
Weight:	260g / 9.5 ounces	
Boxed size:	190mm x 290mm x 70mm / 7.5" x 11.5" x 2.5"	
Boxed weight:	460g / 16.5 ounces	

** All values are approximate*

N.7 Environmental Specification

As per X-Rack – see page 19.

Solid State Logic
SOUND | | VISION

Begbroke, Oxford, England, OX5 1RU • +44 (0)1865 842300

320 West 46th Street, 2nd Floor, New York, NY 10036, USA • +1 (1) 212 315 1111
3700 Wilshire Blvd, Suite 720, Los Angeles, CA 90010, USA • +1 (1) 213 249 9229
3-55-14 Sendagaya, Shibuya-Ku, Tokyo 151-0051, Japan • +81 (0)3 5474 1144
7 bis, rue de la Victoire, le Blanc Mesnil, Paris 93150, France • +33 (0)1 48 67 84 85
Via Timavo 34, 20124 Milano, Italy • +39 (0)39 2328 094
82/509 Prachachuen Rd, Ladyao, Jatujak, Bangkok, 10900 Thailand • +66 (0)2 587 5111
1 Bukit Batok Crescent, 04-08 Wcega Plaza, Singapore 658064 • +65 6438 2272

Visit SSL at URL: www.solidstatelogic.com

© Solid State Logic
All Rights reserved under International and Pan-American Copyright Conventions

Solid State Logic, SSL and XLogic are trademarks of Solid State Logic

All other product names and trademarks are the property of their respective owners
and are hereby acknowledged

No part of this publication may be reproduced in any form or
by any means, whether mechanical or electronic, without the
written permission of Solid State Logic, Oxford, England

As research and development is a continual process, Solid State Logic reserves the right
to change the features and specifications described herein without notice or obligation

E&OE