

# Solid State Logic

SOUND | | VISION



## Super-Analogue™ Outboard

### X-Rack VHD Mic Amp User's Guide

This documentation package contains the User's Guide for your new X-Rack VHD Mic Amp module. Depending on the age of your X-Rack, these pages may already be present in your X-Rack Owner's Manual – please check to see if these pages match your Manual. If they do not, these pages should be filed alongside it.

*Please Note.* X-Rack units prior to serial number XRK0110 are not 100% compatible with the X-Rack VHD Mic Amp as these units can not provide +48V phantom power unless field retrofit kit 629620XR has been fitted. This kit is available free-of-charge from your local distributor, if the X-Rack unit concerned is in warranty. For units that are out of warranty a small charge will be made. The absence of this kit is indicated by the buscard in the X-Rack being a '629620X1 RE 1' (rev 1), with a number of components (ie. 'IC2', 'C4', 'L4') missing.

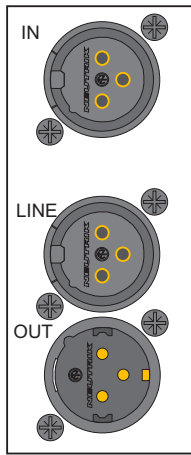
For correct operation of Total Recall™, your X-Rack unit must be running V1.3/1 or later software. Please refer to your X-Rack Owners Manual for instructions on how to check the current software version and how to obtain and install a newer version if required.

There may be a newer version of the X-Rack Owner's Manual available for download from our website ( [www.solid-state-logic.com](http://www.solid-state-logic.com) )



## 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.

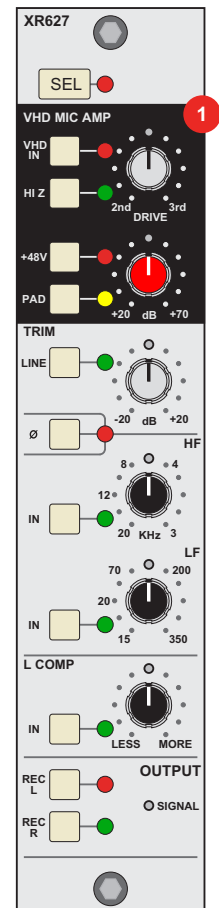
#### H.2.1 VHD MIC AMP Section 1

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  $\approx 1k\Omega$  to  $\approx 10k\Omega$  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.*



**H.2.2 TRIM Section 2**

The TRIM control provides  $\pm 24\text{dB}$  of gain adjustment for either the Microphone or Line inputs; the Line level input can be selected in place of the Microphone signal by pressing the 'LINE' switch.

The  $\emptyset$  (Phase) switch reverses the phase of the selected input.

**H.2.3 HF/LF Section 3**

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

HF (Low Pass):            Frequency range 20kHz – 3kHz ( $-3\text{dB}$  point)  
                                  Slope: 12dB/Octave

LF (High Pass):            Frequency range 15Hz – 350Hz ( $-3\text{dB}$  point)  
                                  Slope: 18dB/Octave

The two filters can be switched into circuit independently.

**H.2.4 L COMP Section 4**

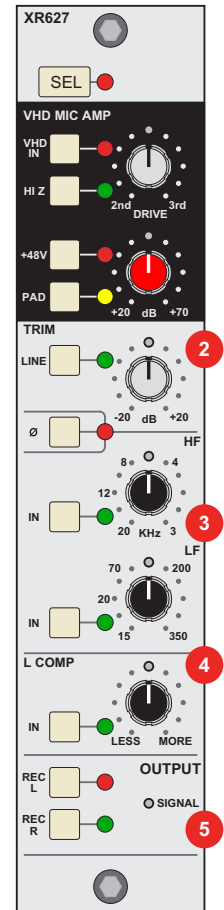
The SSL 'Listen Mic' Compressor was, throughout the 1980's, the secret weapon in many producers sonic arsenal of recording techniques. Originally designed to prevent overloading the return feed from a studio communications mic, its fixed attack and release curves were eminently suitable for use on ambient drum mics. The console surgery required to gain access to the compressed output was performed on many early E Series consoles before it became a standard modification on later production systems. The original circuit has been added into the XRack VHD Mic Pre, enhanced with the addition of a front panel threshold adjustment – due to the vagaries of the original design, the range of the threshold control is indicated as either LESS or MORE! The circuit follows after the Trim and Filter stages enabling either microphone or line level signals to be trimmed and shaped before benefiting from the sonic possibilities provided by this compressor.

**H.2.5 OUTPUT Section 5**

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  $-60\text{dBu}$ , AMBER for signals between  $+4\text{dBu}$  and  $+24\text{dBu}$  and lights RED for signals above  $+24\text{dBu}$ .

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.



### 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  $\approx$  0.775V into any load
- Source impedance of Test Set: 50 $\Omega$
- Input impedance of Test Set: 100k $\Omega$
- 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  $\pm 0.5$ dB 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	Continuously variable from +20dB to +70dB Independently switchable 20dB Pad available
Input Impedance	Switchable from $\approx 1k2\Omega$ to $\approx 10k\Omega$
Output Headroom	> +26dBu at onset of clipping
THD + Noise (-18dBu applied, +20dB gain)	< 0.2% (20Hz – 20kHz) With VHD, adjustable between < 0.2% and 5% (1kHz – 20kHz)
Frequency Response	$\pm 0.3$ dB from 20Hz to 20kHz -3dB at 50kHz
Equivalent Input Noise (input terminated with 150 $\Omega$ )	< -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	> 10k $\Omega$
THD + Noise (+24dBu applied, 0dB gain)	< 0.005% from 20Hz to 20kHz
Frequency Response	$\pm 0.1$ dB from 20Hz to 20kHz -3dB at 50kHz
Equivalent Input Noise (Input terminated with 150 $\Omega$ )	< -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:

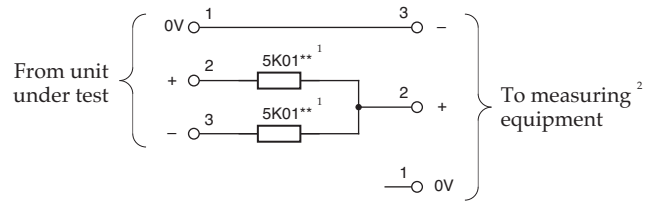
1. Adjust VR7 for 0dBu  $\pm$ 0.05dB.

#### 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 impedance of the measuring equipment.

### H.5 Connector Details

Audio Input	
Location:	Rear Panel
Conn' Type:	XLR Female
<i>Pin</i>	<i>Description</i>
1	Chassis
2	Audio +ve
3	Audio -ve

Audio Output	
Location:	Rear Panel
Conn' Type:	XLR Male
<i>Pin</i>	<i>Description</i>
1	Chassis
2	Audio +ve
3	Audio -ve

### H.6 Physical Specification \*

Depth: 200mm / 7.9 inches  
275mm / 10.9 inches

*including front panel knobs, excluding connectors  
including front panel knobs and connectors*

Height: 171mm / 6.75 inches

Width: 35mm / 1.4 inches  
49mm / 1.9 inches

*front/rear panels  
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.*