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XLogic
SUPERANALOGUE
X-RACK

Super-Analogue™ Outboard

X-Rack Stereo Dynamics User's Guide

This documentation package contains the User's Guide for your new X-Rack Stereo Dynamics 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. *For correct operation of this module, your X-Rack unit must be running V1.4/9 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There may be a newer version of the X-Rack Owner's Manual available for download from our website (www.solidstatelogic.com)

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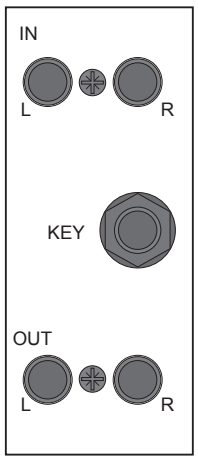
N. Stereo Dynamics Module

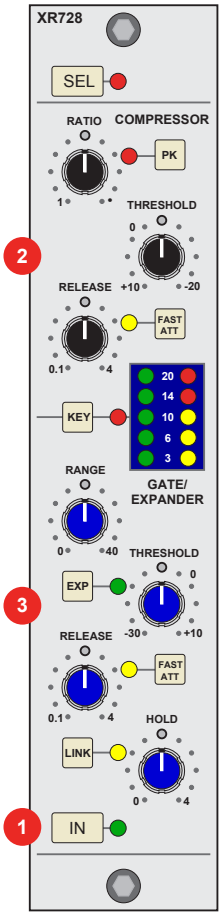
N.1 Connection



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).

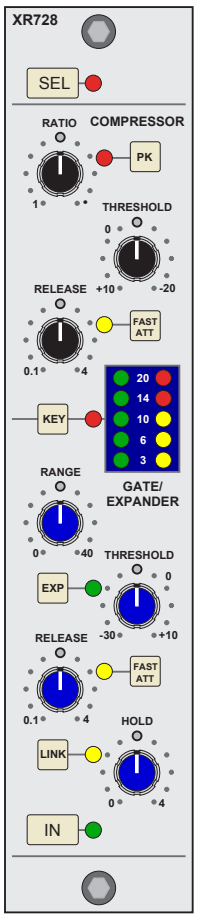
RELEASE – Sets the time constant (speed) with which the compressor returns to normal gain settings once the signal has passed its maximum.

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.