

SCL2™

Dual/ Stereo Compressor/ Expander/ Gate/ Limiter



USER'S GUIDE



IMPORTANT SAFETY INSTRUCTIONS – READ FIRST



This symbol, wherever it appears, alerts you to the presence of uninsulated dangerous voltage inside the enclosure. Voltage that may be sufficient to constitute a risk of shock.



This symbol, wherever it appears, alerts you to important operating and maintenance instructions in the accompanying literature. Please read manual.

Read instructions:

Retain these safety and operating instructions for future reference. Heed all warnings printed here and on the equipment. Follow the operating instructions printed in this user guide.

Do not open:

There are no user serviceable parts inside. Refer any service work to qualified technical personnel only.

Power sources:

Only connect the unit to mains power of the type marked on the rear panel. The power source must provide a good ground connection.

Power cord:

Use the power cord with sealed mains plug appropriate for your local mains supply as provided with the equipment. If the provided plug does not fit into your outlet consult your service agent. Route the power cord so that it is not likely to be walked on, stretched or pinched by items placed upon or against.

Grounding:

Do not defeat the grounding and polarization means of the power cord plug. Do not remove or tamper with the ground connection on the power cord.

Ventilation:

Do not obstruct the ventilation slots or position the unit where the air required for ventilation is impeded. If the unit is to be operated in a rack, case or other furniture, ensure that it is constructed to allow adequate ventilation.

Moisture:

To reduce the risk of fire or electrical shock do not expose the unit to rain, moisture or use in damp or wet conditions. Do not place a container of liquid on it, which may spill into any openings.

Heat:

Do not locate the unit in a place close to excessive heat or direct sunlight, as this could be a fire hazard. Locate the unit away from any equipment, which produces heat such as: power supplies, power amplifiers and heaters.

Environment:

Protect from excessive dirt, dust, heat, and vibration when operating and storing. Avoid tobacco ash, drink spillage and smoke, especially that associated with smoke machines.

Handling:

To prevent damage to the controls and cosmetics avoid rough handling and excessive vibration. Protect the controls from damage during transit. Use adequate padding if you need to ship the unit. To avoid injury to yourself or damage to the equipment take care when lifting, moving or carrying the unit.

Servicing:

Switch off the equipment and unplug the power cord immediately if it is exposed to moisture, spilled liquid, objects fallen into opening, or the power cord or plug becomes damaged during a lightning storm or if smoke odor or noise is noted. Refer servicing to qualified technical personnel only.

Installation:

Install the unit in accordance with the instructions printed in the user guide.

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INTRODUCTION

Thanks for purchasing Applied Research and Technology's SCL2™ Offering a superb level of sound quality, SCL2™ has a unique design that will enhance the sonic textures of your audio system for years to come. Developed in partnership with studio and live-sound engineers, the SCL2™ is very musical.

The SCL2™ was designed and constructed with high quality components, assuring a lifetime of quiet, reliable performance.

SCL2™ offers:

- Two channels of dynamics processing
- Selectable stereo linking of channels
- Master volume and balance control in *Link Mode*
- LED metering of output level
- XLR balanced inputs and outputs
- 1/4" TRS active balanced inputs and outputs
- Variable Threshold & Ratio controls
- Hard/ Soft Knee selection
- Variable Attack and Release controls
- Selectable Auto attack/ release mode
- Variable output level rotary controls
- Noise reduction is selectable between Expander and Gate
- Hardwire bypass
- 8-segment Gain Reduction LED array
- 10Hz to 100kHz frequency response (+/-0.5dB)
- Internal power supply
- 3-year parts and labor warranty

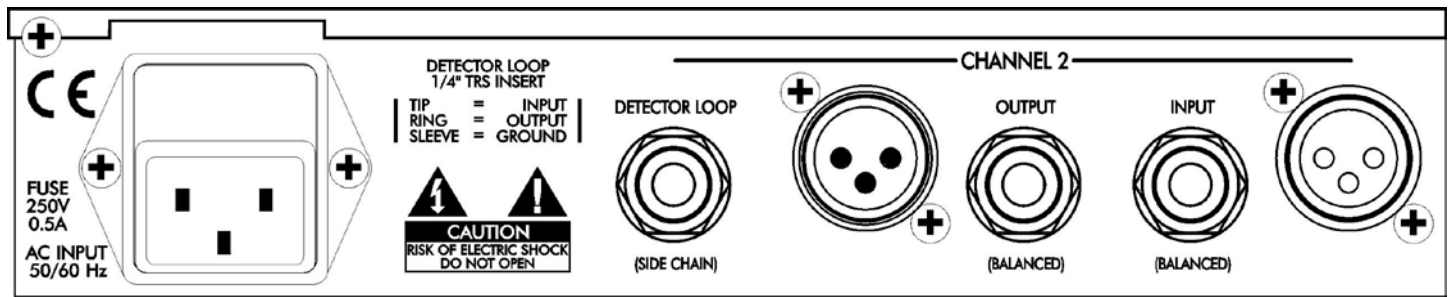


FIGURE 1 – Rear Panel

REAR PANEL I/O

Balanced Inputs

The SCL2™ provides both an XLR and 1/4" input jack. These jacks are balanced, but the 1/4" jack can be used with unbalanced signals by simply plugging in an unbalanced cable.

The inputs are designed for use with line level signals ranging from -30dBm to $+20\text{dBm}$. While it is possible to plug an instrument directly into the SCL2™, it is desirable to run the instrument into a preamp ahead of the unit. This will provide a stronger signal and will keep noise to a minimum. Microphones must connect through a microphone preamplifier (like the ART Pro MPA II) before connecting into the SCL2™.

NOTE: The SCL2™ has a passive (hardwire) bypass. This means that the bypass works even if the power is off.

Balanced Outputs

The analog output of the SCL2™ is available on both a 1/4" TRS balanced jack and an XLR jack. This output is impedance balanced. The output has a 100 Ohm impedance into an unbalanced load or 200 Ohms into a balanced load.

The LED meter monitors the level present at this output. "0" on the output meter corresponds 0dBu (.775 VRMS) at the output jacks.

Detector Loop

The Detector loop is an insert point between the buffered input signal and the Detector of the compressor.

Connecting an EQ to process this signal can contour the compressor's response to perform de-essing by boosting 5kHz-8kHz information. Connect an audio signal to the Detector Loop Input and have the SCL2™ reduce gain when a signal is present to provide *Ducking* (see the APPLICATIONS section for more information).

FRONT PANEL CONTROLS and INDICATORS

Power

The POWER switch turns the power on and off to the unit. The SCL2™ should be turned “on” with all monitor levels turned down to protect against any thumping caused by power up. Likewise, the SCL2™ should be turned off only after turning all monitor levels down. Power on the SCL2™ before any monitoring outputs or power amps are turned on.

If the SCL2™ fails to power up when the POWER switch is turned on, check to see that its power cord is plugged into an active outlet. If the unit still fails to operate properly, turn it off and unplug it. You can inspect the fuse as long as the unit's AC power cord is unplugged. Consult an ART dealer or the ART Customer Service Department if the fuse continues to blow.

Bypass Switch

The SCL2™ BYPASS switch physically connects the input jack to the output jack on each respective channel (also known as a hardwire bypass). The switch is lit when the unit is bypassed and the unit's power is on. The analog signal still passes from input to output if the Bypass switch is depressed even when power is off.

Threshold Control

The THRESHOLD control sets the point at which the SCL2™ will act on a signal. Turning this control counter-clockwise lowers the threshold (adding more compression to a signal). Turning this control clockwise raises the threshold.

Proper setting of the INPUT THRESHOLD control is dependent on the input signal. The easiest way to set this control is to start with the control fully clockwise. Slowly turn the control counter-clockwise (lowering the threshold) until the yellow (0) LED light on the COMPRESSOR ATTENUATION meter begins to light. Next adjust the control (either lower or higher) for the desired amount of compression. Use the attenuation meter as a visual guide to the amount of compression applied.

Knee switch

This switch selects either Hard or Soft knee operation. A "Hard" knee is one where above the threshold the compressor applies the ratio setting immediately. "Soft" knee operation gradually increases the slope above the threshold setting until it reaches the ratio setting. This gradual increase of slope happens over an input range of 10dB or so and subtly applies the gain reduction until it is really needed.

Ratio Control

The RATIO Control selects the “amount” of compression applied to the input signal once that signal reaches or exceeds the threshold. This compression amount is expressed as a ratio of input to output. For example if a 4:1 compression ratio is chosen, for every 4dB over the threshold the input signal rises, the output level only rises by 1dB. In this case if the input signal increased 12dB over the threshold, the output level would only rise by 3dB. Setting the ratio to 1:1 effectively disables the compressor.

In general, compression ratios of 10:1 and greater are considered “limiting”. The SCL2™ may be used as either a compressor or a limiter with all of the following:

- Multitrack recorder, DAT machine, hard disk recorder, or analog recorder.
- In a mixer's channel insert points.
- Between a microphone preamp and signal processors.
- Between pre-amplified electronic musical instruments (synthesizers, guitars, bass, samplers, acoustic instruments with pickups) and other line-level equipment.

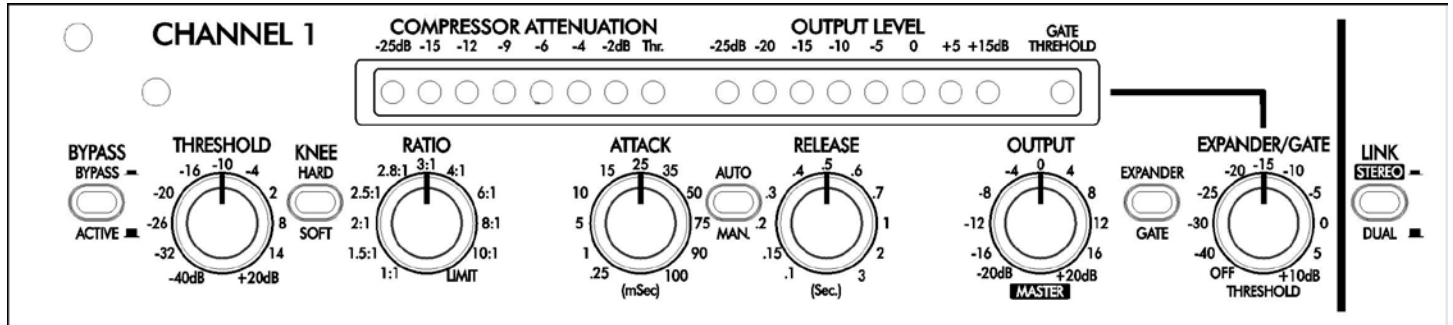


FIGURE 2 – Channel 1 Controls

Attack Control

The ATTACK control sets the time it takes the Compressor/Limiter to respond to increases in signal level (by reducing gain) and shape the *front end* of the dynamics envelope.

One example is to listen to a snare hit and adjust the ATTACK control. A short attack makes the snare sound “thin”. As the attack time goes longer (the knob is turned clockwise) more of the thump in the compressed snare can be heard. The downside is that this creates an overshoot, or “transient”, the length of which is the time set by the ATTACK control.

Overshoots less than 1 mSec. are very hard to hear even when they are clipped. If the ATTACK is set too fast, the gain may be reduced too much and thereby create a *pumping* sound¹.

Auto/ Man. Switch

The attack and release control settings are applied when this switch is in the *Manual* mode. The *Auto* mode changes the operation of the detector to apply an optimized attack and release that cannot be achieved with manual control over attack and release. The ATTACK and RELEASE controls have no effect when in the *Auto* mode.

Release Control

The RELEASE control sets the time the Compressor/Limiter takes to increase the gain after the input level drops.

Longer settings maintain the dynamics of the input signal, while shorter settings reduce the dynamics. Shorter settings will also increase the apparent reverberation, and at extreme gain reduction settings, lead to *breathing* artifacts².

Output Control

The OUTPUT control serves two functions.

¹ “Pumping” in a Compressor/Limiter sounds like the signal is attenuated when it shouldn’t be.

² “Breathing” is the sound of the Compressor/Limiter turning up the gain so quickly breathing noises between words during vocal processing are heard.

The Channel 1 knob always controls the output level of Channel 1, but can also serve as a *master* output level when the *Link Mode* is active.

The Channel 2 LEVEL control operates as a standard Channel 2 level control in *Dual mode* or as a *balance* control when *Link Mode* is active. In *Link Mode* when the BALANCE control is turned fully counter-clockwise the Channel 1 output is fully on and Channel 2 output is muted 20dB. When centered, both channels have equal gain. When turned fully clockwise the Channel 2 output is fully on and Channel 1 output is muted 20dB.

The Expander/Gate Switch

The Expander/Gate switch selects the slope of the noise reduction section. The out position of the switch selects the gate mode. This quickly acts to either pass or attenuate the audio signal to reduce the background or system noise.

Depressing the switch selects the expander mode, providing a smooth application of noise reduction below the selected threshold. This mode works best with instruments that you need to hear fade off gradually.

The Expander/Gate Threshold Control

The Expander/gate Threshold control adjusts the input level below which noise reduction takes place. This control is adjusted in conjunction with the yellow Gate Threshold LED adjacent to the Output Meter. The LED lights when there is at least 0.5dB of output attenuation in *expander* mode or the gate is attenuating the output in *gate* mode.

Compressor Attenuation LED Meter

The attenuation meter displays the SCL2™ compressor/limiter action. The meter covers a very large range while offering high resolution. The yellow (0) LED illuminates when the input signal reaches or exceeds the compressor detector threshold setting (Threshold control) and results in a reduction of 0.5dB or more.

Output Level LED Meter

This meter displays the signal level present at the output of the unit. "0" on the meter corresponds to 0dBu (.775 VRMS) at the output jacks.

The Link Switch

The two channels of the SCL2™ can be configured for stereo operation by depressing the LINK switch. *Link Mode* connects the gain reduction of the two channels together for stereo operation. The Detector signals of the two channels are summed so either channel's signal can trigger gain reduction. Channel 1's controls (THRESHOLD, RATIO, ATTACK, RELEASE, NR THRESHOLD) become the master and Channel 2's controls are ignored. The Channel 2 OUTPUT LEVEL control becomes an output balance control. *Link Mode* ensures that each channel of the stereo input signal is processed identically to prevent any shifting or distortion of the stereo image.

Bypass switches remain independent in *link* mode.

APPLICATIONS

Compressor/ Limiter

The main application of the SCL2™ is to control the dynamic range of an audio signal. Plug a line level (post preamplifier or other gain stage) source into either input, and set the threshold and output controls to provide the desired amount of compression to the input signal.

To keep the compression effects to a minimum, adjust the THRESHOLD and RATIO controls such that the Compressor Attenuation meter reads 6dB or less.

Stereo Mix and Mastering

Because of its low noise and excellent tonal qualities, the SCL2™ is ideal for processing mixes when recording to DAT, hard disk or analog recording devices. Used as a mastering device, the SCL2™ is capable of adding volume and impact to the overall signal level. The SCL2™ is ideal for live use as well.

Putting the unit into *link mode* simplifies the control usage while maintaining the stereo image of the source material. The knobs and switches on Channel 1 control everything but the output balance and bypass.

The SCL2™ really does a good job of controlling the peak content when setting the attack and release short and the ratio to "Limit". Make sure not to set the Threshold too low however. Only 6-9 dB indicated on The Compressor Attenuation meter is required to maximize the level of digital recordings.

Vocal and Instrument Leveling

The musical nature of the SCL2™ makes it ideal for use on a wide range of instruments and vocals. Place the SCL2™ into a channel insert, after a preamplifier, or in line with the direct output of a mixer channel. Adjust the controls of the SCL2™ to achieve the desired amount of compression.

A good starting point for speech is a Ratio of 2:1 and gain reduction of 3-9dB. Apply the Gate to eliminate the breath noises brought up by compression.

Adding sustain to instruments requires more aggressive settings for ratio (start at 4:1) and threshold. Gain reduction in the 15dB range is not uncommon. If the noise brought up by severe compression is an issue, apply the expander to provide a smooth *tail*.

Vocal processing may require tailoring of the detector response to prevent excessive sibilance. Connect a graphic EQ to the detector loop and boost the 5-8 kHz bands 6dB or more to reduce vocal sibilance.

Ducking

One application of *ducking* is muting the background music whenever someone talks into a mic. Simply connect the background music to be *ducked* to the audio input of the SCL2™ and connect the line level buffered mic signal to the Detector Loop jack. Set the RATIO control to "Limit". Adjust the THRESHOLD control for the amount of muting required when someone is talking into the mic. Set the ATTACK control to 1 to 2 mSec to guarantee the music fades off quickly. Adjust the RELEASE control to set the time it takes to fade the music back in after there is no mic signal.

For a stereo music source, depress the LINK switch and make sure that the Channel 2 Detector Loop jack has a shorting plug inserted or the same mic signal applied.

WARRANTY INFORMATION

Limited Warranty (USA only):

Applied Research and Technology will provide warranty and service for this unit in accordance with the following warrants:

Applied Research and Technology, (A R T) warrants to the original purchaser that this product and the components thereof will be free from defects in workmanship and materials for a period of three years from the date of purchase. Applied Research and Technology will, without charge, repair or replace, at its option, defective product or component parts upon prepaid delivery to the factory service department or authorized service center, accompanied by proof of purchase date in the form of a valid sales receipt.

Exclusions:

This warranty does not apply in the event of misuse or abuse of the product or as a result of unauthorized alterations or repairs. This warranty is void if the serial number is altered, defaced, or removed.

A R T reserves the right to make changes in design or make additions to or improvements upon this product without any obligation to install the same on products previously manufactured.

A R T shall not be liable for any consequential damages, including without limitation damages resulting from loss of use. Some states do not allow limitations of incidental or consequential damages, so the above limitation or exclusion may not apply to you. This warranty gives you specific rights and you may have other rights, which vary from state to state.

The warrantee terms listed above are only valid within the United States of America. For units purchased outside the United States, an authorized distributor of Applied Research and Technology will provide service. For information on warranty and service policies outside the U.S., please contact your local distributor.

SERVICE

The following information is provided in the unlikely event that your unit requires service.

1) Be sure that the unit is the cause of the problem. Check to make sure the unit has power, all cables are connected correctly, and the cables themselves are in working condition. You may want to consult with your dealer for assistance in troubleshooting or testing your particular configuration.

2) If you believe that the ART unit is at fault, go to **www.artproaudio.com**. Select "*Support*", then "*Return Authorization Request*" to request a return authorization number.

3) If you are returning the unit for service, pack the unit in its original carton or a reasonable substitute. The original packaging may not be suitable as a shipping carton, so consider putting the packaged unit in another box for shipping. Print the RA number clearly on the outside of the shipping box. Print your return shipping address on the outside of the box.

4) Include, with your unit, a note with the RA number and your contact information, including a return shipping address (we cannot ship to a P.O. box) and a daytime phone number, and a description of the problem, preferably attached to the top of the unit. Also include a copy of your purchase receipt

SPECIFICATIONS

Input Impedance 10k Ohms

Output Impedance

Balanced/Unbalanced..... 200/100 Ohms

Maximum Levels

Inputs..... +21dBu

Output..... +21dBu

Output Gain +20dB max

Frequency Response 10Hz to 100kHz (+/- 0.5dB)

Dynamic Range >124dB (20-20kHz)

THD @ 0dBm Out: 0.05% (typical)

Equivalent Input Noise (EIN) -97dBu (20-20kHz)

Attack Time 0.25mSec. to 100mSec., variable

Release Time 100mSec. to 3 Sec., variable

Slope 1:1 to 20:1, variable

Dimensions 1.75" x 19.0" x 5.9" (44.5 mm x 482.6 mm x 150mm)

Weight..... 4.7 lbs. (2.1 kg.)

Power Requirements USA – 105 to 125 VAC / 60 Hz Export units configured for country of destination.

..... 60 Watts Maximum - 10 Watts Idle

Note: 0 dBu = 0.775 V_{RMS}

ART maintains a policy of constant product improvement. ART reserves the right to make changes in design, or make additions to, or improvements upon, this product without any obligation to install same on products previously manufactured. Therefore, specifications are subject to change without notice.



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