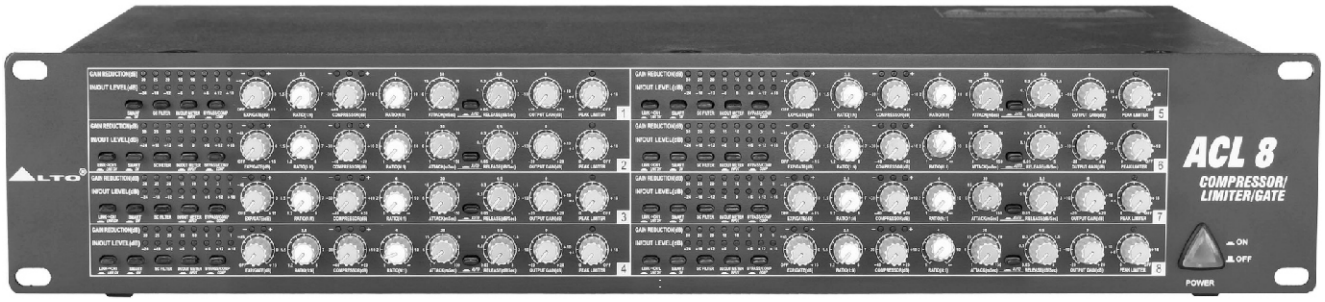
ALTO®

User's Manual

ACL 8

COMPRESSOR /LIMITER /GATE



www.altoproaudio.com
Version 1.0 DEC. 2007

English

IMPORTANT SAFETY INSTRUCTION

CAUTION
RISK OF ELECTRIC SHOCK
DO NOT OPEN

TO REDUCE THE RISK OF ELECTRIC SHOCK PLEASE DO NOT REMOVE THE COVER OR THE BACK PANEL OF THIS EQUIPMENT. THERE ARE NO PARTS NEEDED BY USER INSIDE THE EQUIPMENT. FOR SERVICE, PLEASE CONTACT QUALIFIED SERVICE CENTERS.

This symbol, wherever used, alerts you to the presence of un-insulated and dangerous voltages within the product enclosure. These are voltages that may be sufficient to constitute the risk of electric shock or death.

This symbol, wherever used, alerts you to important operating and maintenance instructions.

Please read.

⏚ Protective Ground Terminal
AC mains (Alternating Current)

ϟ Hazardous Live Terminal

ON: Denotes the product is turned on.

OFF: Denotes the product is turned off.

CAUTION

Describes precautions that should be observed to prevent damage to the product.

1. Read this Manual carefully before operation.
2. Keep this Manual in a safe place.
3. Be aware of all warnings reported with this symbol.
4. Keep this Equipment away from water and moisture.
5. Clean it only with dry cloth. Do not use solvent or other chemicals.
6. Do not damp or cover any cooling opening. Install the equipment only in accordance with the Manufacturer's instructions.
7. Power Cords are designed for your safety. Do not remove Ground connections! If the plug does not fit your AC outlet, seek advice from a qualified electrician. Protect the power cord and plug from any physical stress to avoid risk of electric shock. Do not place heavy objects on the power cord. This could cause electric shock or fire.
8. Unplug this equipment when unused for long periods of time or during a storm.
9. Refer all service to qualified service personnel only. Do not perform any servicing other than those instructions contained within the User's Manual.
10. To prevent fire and damage to the product, use only the recommended fuse type as indicated in this manual. Do not short-circuit the fuse holder. Before replacing the fuse, make sure that the product is OFF and disconnected from the AC outlet.

WARNING

To reduce the risk of electric shock and fire, do not expose this equipment to moisture or rain.

Dispose of this product should not be placed in municipal waste and should be separate collection.

11. Move this Equipment only with a cart, stand, tripod, or bracket, specified by the manufacturer, or sold with the Equipment. When a cart is used, use caution when moving the cart / equipment combination to avoid possible injury from tip-over.

12. Permanent hearing loss may be caused by exposure to \ extremely high noise levels. The US. Government's Occupational Safety and Health Administration (OSHA) has specified the permissible exposure to noise level.
These are shown in the following chart:

HOURS X DAY	SPL	EXAMPLE
8	90	Small gig
6	92	train
4	95	Subway train
3	97	High level desktop monitors
2	100	Classic music concert
1,5	102	
1	105	
0,5	110	
0,25 or less	115	Rock concert

According to OSHA, an exposure to high SPL in excess of these limits may result in the loss of heat. To avoid the potential damage of heat, it is recommended that Personnel exposed to equipment capable of generating high SPL use hearing protection while such equipment is under operation.

The apparatus shall be connected to a mains socket outlet with a protective earthing connection.

The mains plug or an appliance coupler is used as the disconnect device, the disconnect device shall remain readily operable.

IN THIS MANUAL:

1. INTRODUCTION

Thank you for purchasing the ▲LTO ACL 8 Compressor/Limiter/Gate.

The ACL 8 is a very powerful dynamic processor. It presents with 8 channels, and each channel is equipped with the same control elements: 6 push-button switches, 8 rotary controls and 22 LEDs except channel 1 which is short of the LINK→CH1 push-button only. It includes several innovative circuit designs that make the ACL 8 a very versatile processor: smart and fast recognition of the program, adjustable Expander/Gate and very low distortion Voltage Control Amplifier (VCA).

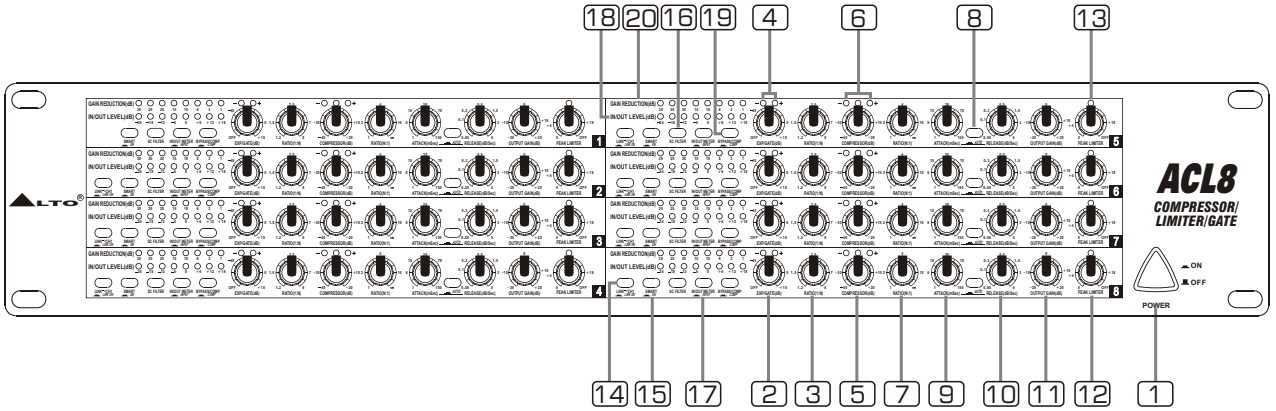
Enjoy your ACL 8 and make sure to read this Manual carefully before operation!

2. FEATURES

- ▲ Illuminated power switch
- ▲ Moutable in a 19" rack unit
- ▲ Smart Knee Control Compressor (SKC)
- ▲ The AUTO Function
- ▲ Attack and Release Controls
- ▲ Smart Ratio Control expander (SRC)
- ▲ Smart Gain Control peak limiter (SGC)

3. CONTROL ELEMENTS

Front Panel



1 POWER Switch

When you set this switch to "ON" position, the unit will be turned on; when you set this switch to "OFF", the unit will be turned off.

2 EXP/GATE Control

This control adjusts the threshold level for the Expander/Gate Section, and the adjustable range goes from "OFF" to +15 dBu. Signals below this level will cause expansion.

3 Ratio Control

This control determines the expansion ratio when the signal drops below the threshold level. The expansion ratio can be set from 1:1.2 to 1:8 (the lower ratio for Expander application, or the higher for Gate).

4 Threshold LED

The "+" LED lights up when the audio signal is below the set threshold level. The "-" LED lights up to indicate the expansion.

5 Compressor Control

This control adjusts the threshold level for the Compressor section, the adjustable range goes from -40 dB to +20 dB. The SKC (Smart Knee Control) is applied to the audio signal, and it is a maximum of 10 dB above the set threshold. Above such level (10 dB), a hard knee compression will be applied.

6 Compressor LED

These LEDs' will show you the state of the input signal in relation to the threshold level. When the input signal falls below the set threshold level, the left "-" LED will light up, this means that no signal is being compressed; When the input signal reaches the set threshold level, the middle LED lights up, this means the compression function hasn't been activated; When the input signal rises above the set threshold level, this signal will be compressed and the "+" LED lights up.

7 Ratio Control

The ratio between the input and output level of audio signals exceeding the set threshold level is determined by this control. This control is manually adjustable from 1:1 to ∞:1.

8 Auto Switch

Activate this switch, the Attack and Release controls will be deactivated. Attack and Release controls will be automatically set by the unit according to the program material.

3. CONTROL ELEMENTS

9 Attack Control

This control determines the speed that the compressor responds to audio signals that will exceed the set threshold. It can be manually adjusted from 1 to 150 milliseconds.

10 Release Control

This control determines the speed that the compressor returns to unity gain when the audio signal falls below the set threshold level. It can be manually adjusted from 0.05 to 5 seconds.

11 Output Gain Control

Through this control you can vary the output signal by a maximum of 20 dB. In this way, you can recover the level that has been lost because of the compression process.

12 Peak Limiter Control

The threshold level of the Peak Limiter is adjusted by this control.

13 Peak Limiter LED

This LED will light up when the Limiter function is activated.

14 Link →CH 1 Switch

Each channel includes the Link →CH1 switch except the CH1. Activating this switch will link the corresponding channel to CH1, and the CH1 will take control of the corresponding channel.

15 Smart Switch

Engaging this button to switch the "Hard Knee" characteristics to SKC (Smart Knee Control). SKC provides a compression of the program material, therefore should be used whenever compression should be more or less inaudible.

16 SC Filter Switch

Engaging this switch to insert a Low-cut filter into the side-chain path, and thus to limit the influence of low frequencies on the ACL 8's control processes.

17 Input/Output Meter Switch

When the switch is "ON", the level indicator will read the input level; When switch it to "OFF", the level indicator will read the output.

18 Input/Output Level Meter

It will read the actual Input or Output Level. The range goes from -24 dB to +18 dB.

19 Bypass Switch

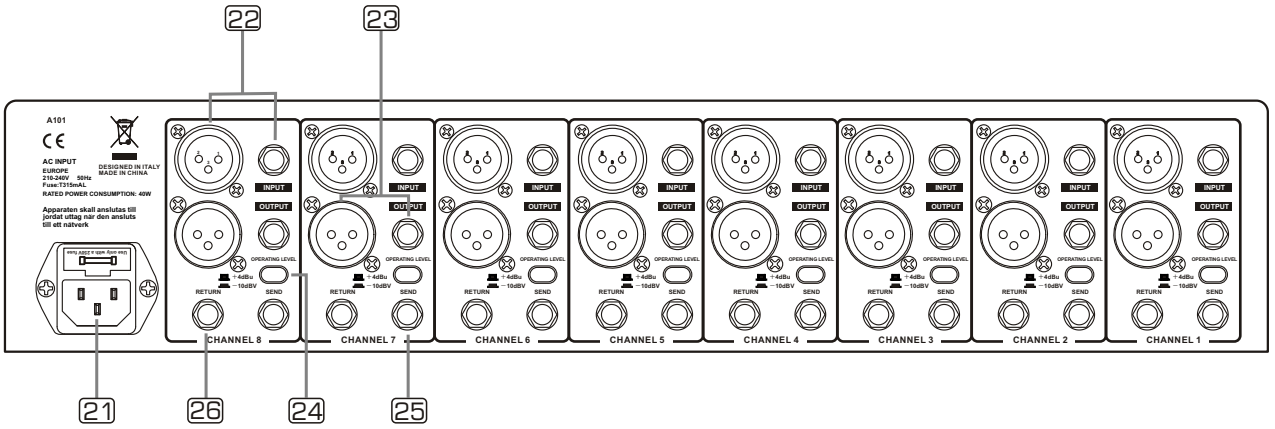
This switch simply turns off the corresponding channel. It can also be used to make an A/B comparison between processed and unprocessed signal.

20 Gain Reduction Meter

It indicates the gain reduction. The displayed range is from 1 dB to 30 dB.

3. CONTROL ELEMENTS

Rear Panel



21 AC Inlet and Fuse Holder

Standard IEC receptacle. Connect your ▲LTO ACL 8 to the AC with the supplied AC power cord. Before powering up your ▲LTO ACL 8 for the first time, make certain the stated power requirement of the unit matches the voltage supplied by the AC socket.
If the fuse blows, replaced with a fuse of the correct type only.

22 Audio In

These connectors are used to input the signal source. You can input the signal via the balanced 1/4" TRS phone jack or XLR connector.

23 Audio Out

These connectors are used to output the signal. You can output the signal via the balanced 1/4" TRS phone jack or XLR connector.

24 Operating Level Button

This button is used to adapt this unit to either the -10 dBV home recording operating level, or the +4 dBu professional studio operating level.
The Input/Output Level Meter (18) is referenced automatically to the selected level, i.e. an optimum operating range of the meter will always be ensured.

25 Send Jack

Through this 1/4" unbalanced jack, the audio signal can be routed to an external processor for side-chain effect.

26 Return Jack

The return signal from an external processor will be input through this 1/4" phone jack.

4. THE CONCEPT BEHIND

4.1 Introducing Audio Dynamics

The human ear can detect the noise generated by falling leaves as well as the roar generated by the taking off space shuttle. Unfortunately, neither analog, nor digital device can reproduce such wide spectrum. Please look at Chart. 1, and you will see the difference dynamic capacity of various devices when compare with the human ear. More problems will occur when handling high and low level signals. When you reach the high level limits, you may incur distortion because of the dynamic range of the instrument, therefore, a certain "reserve" must be maintained to avoid distortion. This "reserve" is known as "headroom", and it is usually set at 10-20 dB. Would be easier just to reduce the operating level? Yes, it would, but you would put low level music signals at the same level of the basic noise floor, so the overall quality of the signal would be highly deteriorated. Please look at Chart. 2, and note the usable dynamic range (including headroom) versus high level distortion generated by peaks, and Noise floor level. So the operating level must be as high as possible, but not high enough to generate distortion.

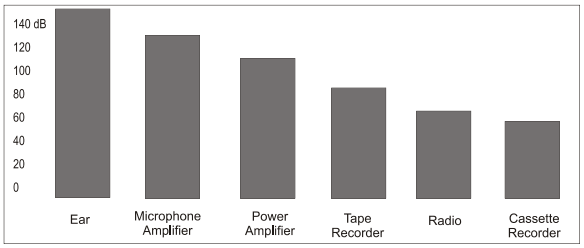


Chart. 1: The dynamic range capabilities of various devices

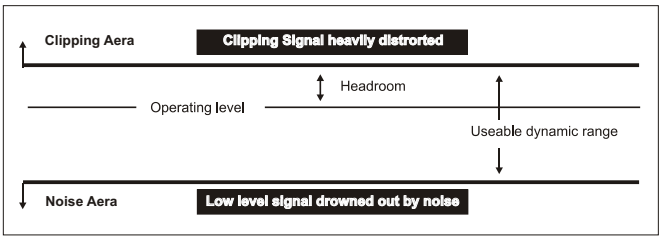


Chart. 2: The interactive relationship between the operating level and the headroom

4.2 More Technical Stuff about Compressors/Limiters

Try to measure the dynamic range of musical instruments. You will find out that your ear will handle such range during which the distortion and overloading will be generated in your audio equipment. To avoid these problems, Compressor/Limiter will be used. Compressors and Limiters more or less do the same job, but Limiters brutally limit the audio signal above the set threshold, while Compressors handle signal in a much more civilised way and over a wide range of levels. If an audio signal exceeds the threshold set by the user, the limiter will kill any audio signal above that threshold. Period! Also Compressors perform their function when the audio signal exceed a certain threshold but the signal is not killed brutally. The audio signal will be reduced in gain in proportion with the amount above the set threshold.

4.3 More about Noise: Expanders and Noise-Gates

A lot of instruments such as microphones, amplifiers, guitar pickups generate some noise, either at low frequencies (hum) or at high frequencies (hiss), such noise will inevitably interfere with the quality of your audio signal. Now, if you scream into a microphone, you will not hear the noise generated by such microphone because such noise will be "masked" by the higher level of the signal, your voice in this case. But if you sing into your microphone more gently in a soft passage, the level of the signal generated by your voice will get much closer to the floor noise level and such floor noise will become disturbing. In order to kill this problem, Expanders and Noise-Gates are used. An expander is the opposite of a compressor: attenuating the signal when the amplitude drops they can limit the floor noise. Now, we don't need dramatic expansion of a signal across the range, this would generate a resulting dynamic range of over 150 dB. For this reason, the amplitude control will be applied only to those audio signals which are below a set threshold. Those audio signals above the set threshold will not be affected. Noise-gate can be regarded as a simple Expander. But the Expander will attenuate the audio signal continuously below the set threshold while the noise-gate will simply dramatically cut-off the audio signal completely.

5. READY TO ROLL

5.1 Expander/Gate Section

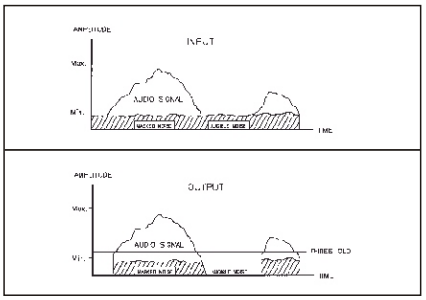


Chart.3: Function of an Expander

As we told you previously in this Manual, the downward expander will reduce automatically the level of the audio signal when such signal is below a set threshold. So the expander is the opposite of the compressor/ limiter. We also explained to you how the ratio curve of the expander is flat while a noise gate it is more brutal processor: It simply cut-off the entire signal below a certain set threshold. The ACL 8 is equipped with a new kind of expander, the SRC (Smart Ratio Control). The ratio of the SRC is automatically adjusted according to the audio signal level. In fact, conventional expanders could easily cut part of the musical program with unacceptable result: The gain changes become audible. We have equipped the SRC with a non-linear ratio curve, which is soft and adjustable by the User. Thanks to the SRC, low passages close to noise floor level will be processed with a minimum ratio of expansion while for signals of reduced level a higher ratio will be used with resultant greater attenuation.

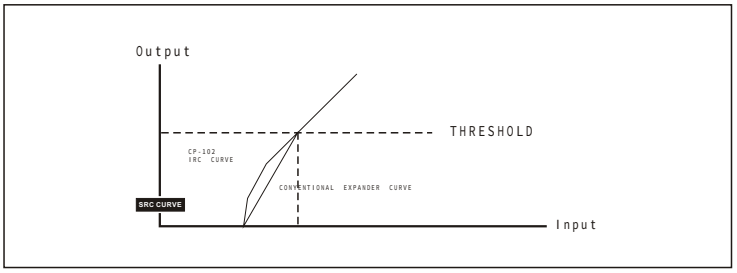


Chart.4: SRC Curve Characteristics of the Adaptive Expander

5.1.1 EXP/GATE Adjustment

The EXP/GATE control covers a very wide range and it is efficient for any working level. Turn the threshold control fully counterclockwise and the Expander/Gate section will be completely off.

5.2 Compressor Section

5.2.1 Another Threshold Control?

The compressor threshold control sets the point where the input level starts to be reduced. the level is +12 dBu and the threshold control is set at +2 dBu: In this case up to 10 dB can be compressed. If the input level is the same and the control is set at -10 dBu, the maximum compression will be 22 dB, The operating range of the threshold control is from -40 dBu to +20 dBu. Turn the threshold control fully clockwise and you will get a threshold level of +20 dBu. You must remember that the degree and the type of compression not only depend on the threshold control, but also depend on the other controls such as Ratio, Attack and Release.

5.2.2 Ratio Control

This control sets the change of input level to output level but only for the signals that exceed the threshold. The scale of the ratio control on the front panel (calibrated in dB) indicates how much input level is required to increase the output level by 1 dB. If you have a ratio equal to 1:1 you will get the same level of input and output signal: So, no level change.

If you have a ratio of 2:1 this means that for every 2 dB increase of the input level (above threshold) you will get an increase of output level of 1dB. On the same way, a ratio of 10:1 means that for every 10 dB increase of the input level (above threshold) you will get an increase in output level equal to 1 dB, and so on.

You need to be aware that higher ratio settings produce less natural sounds so if you wish a more minute effect on the dynamic range of a program you should use a Ratio of 4:1 or lower.

With the SKC circuit (Smart Knee Control) you can avoid aggressive compression generated by using high ratios. How we achieve this? Introducing a "soft knee" curve in the range of up to 10 dB above the threshold level. Hard Knee compression is then used beyond this range.

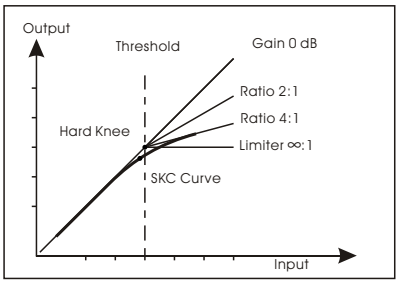


Chart.5: SKC Characteristic of the Compressor Section

5.2.3 Attack Control

The attack time represents the amount of time that passes before the compressor start to lower the output level when the signal is above the threshold point. For very fast transients such as drums, handclaps, etc. a short attack time will be used. These peaks are consequently carefully regulated by the compressor.

Sounds of other nature will get advantages if longer attack times are used. Anyway, our advice is always to begin the process with longer attack times. Then you can start gradually to reduce the attack time. In the ACL8 the attack time can be set in a range of 1 to 150 milliseconds.

5.2.4 Release Control

This control determines how much time the compressor needs to get back to normal gain when the audio signal falls below the set threshold.

A too short release time will make the volume to fluctuate and you will experience pumping effect. A too long release time will give you pumping and breathing effect especially when you have loud passage followed by a quite passage. The release time on ACL 8 can be set from 0.05 to 5 seconds.

5.2.5 Auto Switch

This switch turns off the possibility of manually set the attack and release times. An intelligent program recognition circuit will automatically set the attack and release times. In such way, undesirable effects such as distortion and pumping will be avoided.

5.2.6 Output Control

This Control is indispensable to compensate the loss of level at output level generated by the gain reduction caused by the compression and limiting processing

5.2.7 Bypass Switch

This switch simply turns off the processing of the corresponding channel. This is useful to compare quickly with the processed and unprocessed signal.

5.2.8 Gain Reduction meter

This consists of 8 LEDs on the front of the ACL 8. Through this LED meter you can visualise the amount of gain reduction at any given time.

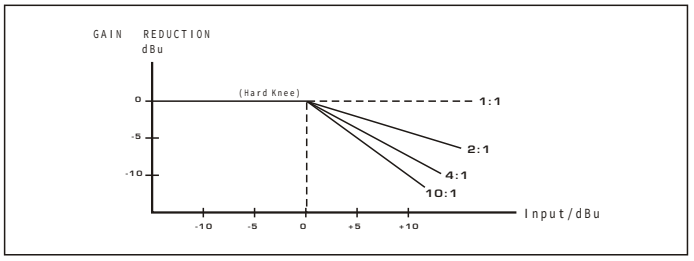


Chart.6: The effect of a compressor can be expressed as the amount of gain reduction that is taking place for any given input

5.3 Peak Limiter Section

How fast is the compressor to react a signal which is above the threshold point? This is determined by the attack time. A longer attack time is advisable to process low frequencies while shorter attack time is preferable for high frequencies. In this way, you will avoid undesired dynamic distortion, but what about if you are mixing a program with a wide range of frequencies? In this case, you should choose a setting that would benefit the low frequency better.

Well, life is not that easy for conventional compressor/limiter. When you handle an audio signal made by a wide range of frequencies, you have chosen a longer attack time. But, if you use the ACL 8 as a limiter, the fast high frequencies will pass through untouched because the attack time is too slow and such transients could cause distortion when the unit is connected to broadcast devices or tape recorders. The solution for ACL 8 is represented by our Smart Gain Control (SGC) limiter circuit. The curve in bold is the output signal, and the dashed curve above it is the input signal. The area between the two is the amount of gain reduction.

The unit will activate the limiter when the signal exceeds the threshold for more than 15 microseconds. Then 1 second after that the signal is below threshold again, reduction goes back to 0 dB and in this case, input and output signals are again identical.

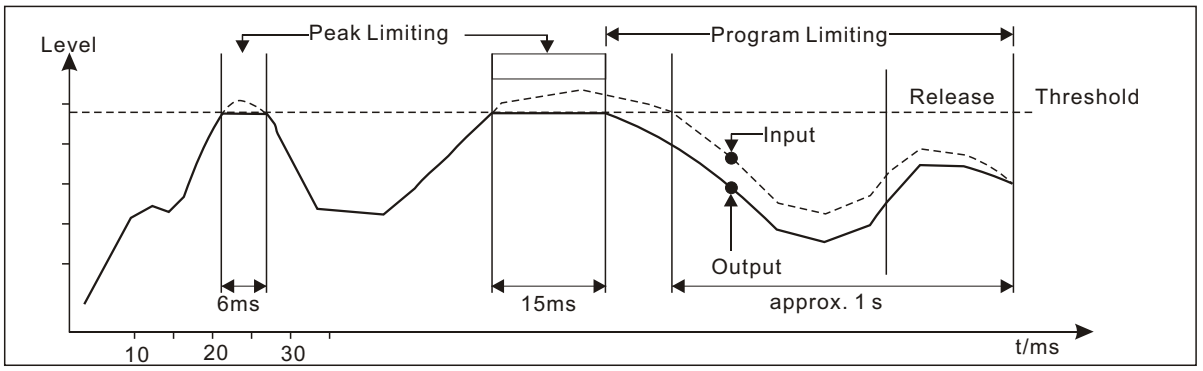


Chart.7: SGC Characteristic of the Limiter Section

5.4 Voltage Controlled Amplifier (VCA)

The VCA is the soul of the ACL 8 and it is one of the best components available today in his category, thanks to its excellent performances in terms of distortion, linearity, noise and temperature stability.

6. INSTALLATION AND CONNECTION

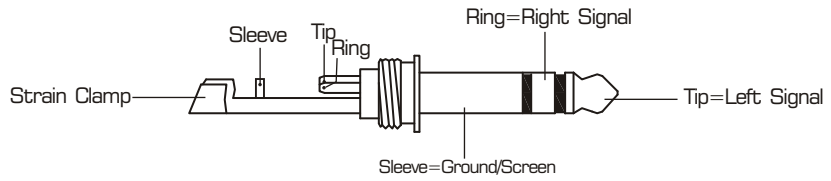
Ok, you have got to this point and you are now in the position to operate your ▲LTO ACL 8 successfully. However, we advise you to read carefully the following section to be the real master of your own unit. Not paying attention enough to the input signal level, to the routing of the signal and the assignment of the signal will result in unwanted distortion, a corrupted signal or no sound at all. So you should follow these procedures for every single channel:

6.1 Mains Connection

Please ensure that the ▲LTO ACL 8 is set to the correct supply voltage before plugging the power cord into the wall outlet, use the same fuse as marked on the fuse holder at the AC power connection. The mains connection of the ▲LTO ACL 8 is made by using the enclosed mains cord and a standard IEC receptacle. It meets all of the international safety certification requirements.

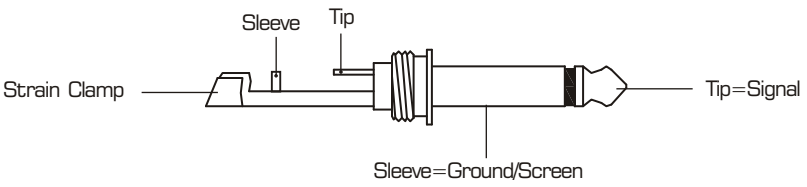
6.2 Audio Connection

The ▲LTO ACL 8 presents with balanced XLR & 1/4" TRS connectors. It can be interfaced in several ways to support a variety of applications without any signal loss. The ▲LTO ACL 8 can be used on a single instrument by connecting to the mixing console's main inserts, or on an entire mix "in-line" between a mixing console's outputs and a power amplifier. The defective wiring may degrade the performance of ▲LTO ACL 8, so please use good quality screened audio cables only. Please follow the guide below to interface ▲LTO ACL 8 without experiencing any noise or signal loss.



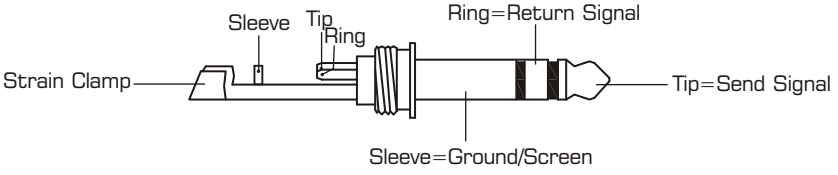
Use for Headphone

1/4" Stereo (TRS) Jack Plug



Use for Mono Line In, Mono 1/4" Jack Plugs

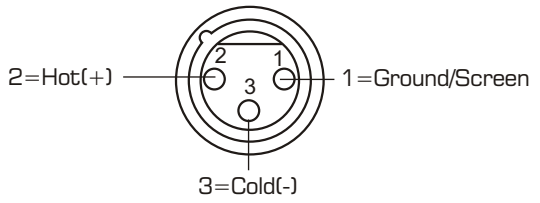
1/4" Mono (TS) Jack Plug



Use for Insert Points

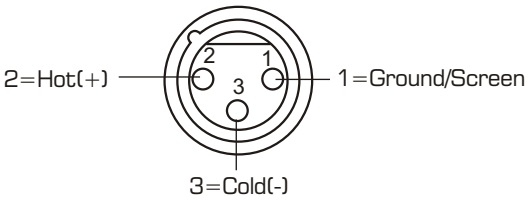
1/4" Stereo (TRS) Jack Plug

6. INSTALLATION AND CONNECTION



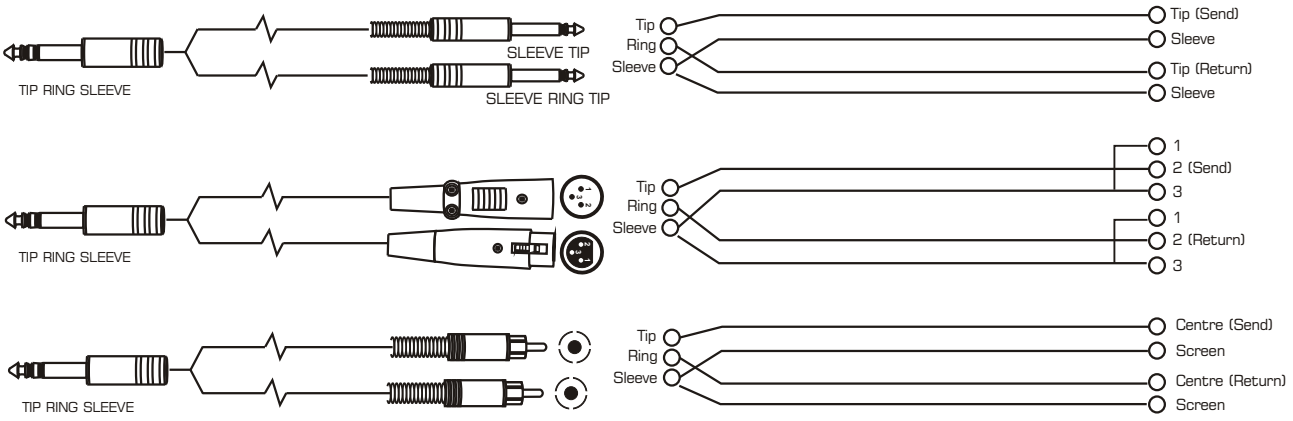
Use for Balanced Mic Inputs
(For unbalanced use, connect pin 1 to 3)

3-pin XLR Male Plug
(seen from soldering side)



Use for Main output
(For unbalanced use, leave pin3 unconnected)

3-pin XLR Line Socket
(seen from soldering side)



Insert Leads

6.3 Rack Mounting

The most secure mounting is on a universal rack shelf available from various rack manufactures or your music dealer. The ACL 8 Compressor/Limiter/Gate fits into one standard 19" rack unit of space, and its height is 4H.

Please allow at least an additional 4" depth for the connectors on the rear panel. Be sure that there is enough air space around the unit for sufficient ventilation and please don't place the ACL 8 Compressor/ Limiter/Gate on high temperature devices such as power amplifiers etc. to avoid overheating.

8. TECHNICAL SPECIFICATIONS

Input Section		
	Type	Active balanced XLR and 1/4" jack
	Impedance	Balanced >50 Kohm, Unbalanced>25 Kohm
	Operating level	+4 dBu/– 10 dBV
	Max input level	+21 dBu balanced and unbalanced
	CMRR	Typically>55 dB at 1KHz
Output Section		
	Type	XLR and 1/4" jack
	Impedance	Balanced 60 Ohm, Unbalanced 30 Ohm
	Max output level	>+21 dBu
Send		
	Type	1/4" jack
	Impedance	2 Kohm
	Max input level	>+21 dBu
Return		
	Type	1/4" jack
	Impedance	>10 Kohm
	Max output level	>+24 dBu
System Specifications		
	Bandwidth	20 HZ to 20 kHz, +0/– 0.5 dB
	Noise	> – 90 dBu, unweighted, 22 Hz to 22 kHz
	THD	<0.01% Typical at +4 dBu, 1 kHz, unity gain
		<0.04% Typical at +20 dBu, 1 kHz, unity gain
	IMD	<0.01% Typical SMPTE
	Crosstalk	< – 100 dB, 22 Hz to 22 Khz
Expander/Gate Section		
	Type	Smart Ratio control Expander
	Threshold	variable (OFF to +15 dB)
	Ratio	variable (1:1.2 to 1:8)
Compressor Section		
	Type	Smart Knee control Compressor
	Threshold	variable (– 40 dB to +20 dB)
	Ratio	variable (1:1 to ∞:1)
	Threshold Characteristic	variable (Smart knee control)
	Manual Attack Time	variable (1ms to 150 ms)
	Manual Release Time	variable from 0.05s to 5s
	Auto Attack Time	Typical 15ms at 10dB, 5 ms at 20 dB, 3ms at 30 dB
	Auto Release Time	Program dependent, typical 125 dB/s
	Output level	variable (– 20 dB to +20 dB)
Peak Limiter Section		
	Type	Smart Gain Control Peak Limiter
	Threshold	variable (0 to OFF (+22 dBu)
	Ratio	∞:1
	Stage 1 Limiter Type	Clipper
	Attack Time	"zero"
	Release Time	"zero"
	Stage 2 Limiter Type	Program Limiter
	Attack	program dependent, typ. <5 ms
	Release	program dependent, typ. 20 dB/s
Function Switches		
	SMART	Enables the "Smart Knee Control" characteristics
	SC FILTER	Allows for frequency dependent processing
	AUTO	Enable the automatic and program dependent
		setting of the Attack/Release times,
		disengaging the manual Attack/Release controls
	I/O METER	Switches between input and output for Level Meter
	BYPASS	Bypass switch.

8. TECHNICAL SPECIFICATIONS

		OPERATING LEVEL	Changes the internal reference level from +4 dBu to – 10 dBu.
		LINK	Linking both channels for stereo operation (Channel1 becomes master)
Indicators			
	GAIN REDUCTION	8-segment LED display:	1/3/6/10/15/20/25/30 dB.
	INPUT/OUTPUT LEVEL	8-segment LED display:	-24/-18/-12/-6/0/+6/+12/+18 dB
	Expander/Gate Threshold	2 LED for under "+" and above " – "	
	Compressor Threshold	3 LEDs for under "+",Interactive "0" and above " – "	
	Peak Limiter Threshold	1 LED for indication of limiter function.	
	Function switch	LED indicator for each	
Power Supply			
	Mains Voltages	USA/Canada	~120VAC, 60 Hz
		U.K./Australia	~240VAC, 50 Hz
		Europe	~230VAC, 50 Hz
		General Export Model	~100 – 120VAC
			~200 – 240VAC,50 – 60 Hz
	Fuse	100 – 120VAC: 630mA (SLOW – BLOW)	
		200 – 240VAC: 315mA (SLOW – BLOW)	
	Power consumption	40 Watts	
	Mains Connection	Standard IEC receptacle	
Physical			
	Dimension (WXDXH)	485.0X233.0X90.0 mm	
	Net Weight	5.2 Kg	

9. WARRANTY

1. WARRANTY REGISTRATION CARD

To obtain Warranty Service, the buyer should first fill out and return the enclosed Warranty Registration Card within 10 days of the Purchase Date.

All the information presented in this Warranty Registration Card gives the manufacturer a better understanding of the sales status, so as to provide amore effective and efficient after-sales warranty service. Please fill out all the information carefully and genuinely, miswriting or absence of this card will voidyour warranty service.

2. RETURN NOTICE

2.1 In case of return for any warranty service, please make sure that the product is well packed in its original shipping carton, and it can protect your unit from any other extra damage.

2.2 Please provide a copy of your sales receipt or other proof of purchase with the returned machine, and give detail information about your return address and contact telephone number.

2.3 A brief description of the defect will be appreciated.

2.4 Please prepay all the costs involved in the return shipping, handling and insurance.

3. TERMS AND CONDITIONS

3.1 ▲LTO warrants that this product will be free from any defects in materials and/or workmanship for a period of 1 year from the purchase date if you have completed the Warranty Registration Card in time.

3.2 The warranty service is only available to the original consumer, who purchased this product directly from the retail dealer, and it can not be transferred.

3.3 During the warranty service, ▲LTO may repair or replace this product at its own option at no charge to you for parts or for labor in accordance with the right side of this limited warranty.

3.4 This warranty does not apply to the damages to this product that occurred as the following conditions:

• Instead of operating in accordance with the user's manual thoroughly, any abuse or misuse of this product.
• Normal tear and wear.
• The product has been altered or modified in any way.
• Damage which may have been caused either directly or indirectly by another product / force / etc.
• Abnormal service or repairing by anyone other than the qualified personnel or technician.

And in such cases, all the expenses will be charged to the buyer.

3.5 In no event shall ▲LTO be liable for any incidental or consequential damages.
Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above exclusion or limitation may not apply to you.

3.6 This warranty gives you the specific rights, and these rights are compatible with the state laws, you may also have other statutory rights that may vary from state to state.