

User's Manual

α Comp

24 × 32 Bit Digital Compressor
Module





www.alto proaudio.com
Version 1.1 September 2005




— English —

SAFETY RELATED SYMBOLS



 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)
-  Hazardous Live Terminal

ON: Denotes the product is turned on.


OFF: Denotes the product is turned off.

WARNING

Describes precautions that should be observed to prevent the possibility of death or injury to the user.

CAUTION

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

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

WARNING

• Power Supply

Ensure that the mains source voltage (AC outlet) matches the voltage rating of the product. Failure to do so could

result in damage to the product and possibly the user.

Unplug the product before electrical storms occur and when unused for long periods of time to reduce the risk of electric shock or fire.

• External Connection

Always use proper ready-made insulated mains cabling (power cord). Failure to do so could result in shock/death or fire. If in doubt, seek advice, from a registered electrician.

• Do not Remove any Covers

Within the product are areas where high voltages may present. To reduce the risk of electric shock do not remove any covers unless the AC mains power cord is removed.

Covers should be removed by qualified service personnel only.

No user serviceable parts inside.

• Fuse

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.

• Protective Ground

Before turning the product ON, make sure that it is connected to Ground. This is to prevent the risk of electric shock.

Never cut internal or external Ground wires. Likewise, never remove Ground wiring from the Protective Ground Terminal.

- **Operating Conditions**

Always install in accordance with the manufacturer's instructions.

To avoid the risk of electric shock and damage, do not subject this product to any liquid/rain or moisture. Do not use this product when in close proximity to water.

Do not install this product near any direct heat source.

Do not block areas of ventilation. Failure to do so could result in fire.

Keep product away from naked flames.

- **Servicing**

Refer all servicing to qualified service personnel only.

Do not perform any servicing other than those instructions contained within the User's Manual.

IMPORTANT SAFETY INSTRUCTIONS

Read these instructions

Follow all instructions

Keep these instructions. Do not discard.

Heed all warnings.

Only use attachments/accessories specified by the manufacturer.

- **Power Cord and Plug**

Do not tamper with the power cord or plug. These 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.

- **Cleaning**

When required, either blow off dust from the product or use a dry cloth.

Do not use any solvents such as Benzol or Alcohol.

For safety, keep product clean and free from dust.

Preface

Dear Customer,

Thanks for choosing ▲LTO α Comp and thanks for choosing one of the results of ▲LTO AUDIO TEAM job and researches.

For our ▲LTO AUDIO TEAM, music and sound are more than a job ...are first of all passion and let us say ...our obsession!

We have been designing professional audio products for a long time in cooperation with some of the major brands in the world in the audio field.

The ▲LTO line presents unparalleled analogue and digital products made by Musicians for Musicians in our R&D Centers in Italy, Netherlands, United Kingdom and Taiwan. The core of our digital audio products is a sophisticated DSP (Digital sound processor) and a large range of state of the art algorithms which have been developed by our Software Team for the Last 7 years.

Because we are convinced you are the most important member of ▲LTO AUDIO TEAM and the one confirming the quality of our job, we'd like to share with you our work and our dreams, Paying attention to your suggestions and your comments. Following this idea we create our products and we will create the new ones! From our side, we guarantee you and we will guarantee you also in future the best quality, the best fruits of our continuous researches and the best prices.

Our ▲LTO α Comp is the result of many hours of listening and tests involving common people, area experts, musicians and technicians.

The result of this effort is the realization of dynamic process presets ,useful for complex sound sources as CD or for single instruments sound improvement, collected and transformed in presets now available in our small (half rack space), efficient and easy to use ▲LTO α Comp.

Nothing else to add, but that we would like to thank all the people that made the ▲LTO α Comp a reality available to our customers, and thank our designers and all the ▲LTO staff, there to make possible the realization of products containing our idea of music and sound and there to support you , our customers, in the best way, conscious that you are our best richness.

Thank you very much.

▲LTO AUDIO TEAM

Table of Contents

1. Introduction	6
2. Feature List	6
3. Front and Back Panels description	6
3.1 Control Panel (Front Panel)	
a. Program and Variations Selections	
b. Analog Levels	
c. LED and Illuminated Power Switch	
3.2 Analog Connections (Back Panel)	
a. Analog Inputs/Outputs	
b. Compressor Bypass Pedal Input	
c. Power Connector	
4. Installation & Connection	8
4.1 Audio Connections and Power Up	
a. Audio Connections	
b. Power Up Setting	
4.2 Analog	
a. Input Jack Wiring	
b. Levels Setting	
c. Compression Process Bypass	
4.3 Installation	
a. Standard Use	
b. Application Examples	
-Line Instrument	
-Mixer	
4.4 Rackmount	
5. Preset Functions Descriptions	12
5.1 Stereo AGC	
5.2 Dynamic Compression Process	
5.3 Stereo 2 Bands Compressor	

5.4 Stereo 2 Bands Compressor Presets

- a. agc pure
- b. acoustic
- c. master
- d. clean
- e. dance
- f. kick drum
- g. mixdown
- h. jumping up

5.5 Mono 2 Bands + 5 Bands Eq Compressor

5.6 Mono 2 Bands + 5 Bands Eq Compressor Presets

- a. classic 1
- b. classic 2
- c. classic 3
- d. classic 4
- e. classic 5
- f. classic 6
- g. classic 7
- h. classic 8

5.7 Compression Effects Summary Table

6. Technical Specifications	18
6.1 Block Diagram	
6.2 Specifications	
7 Warranty	20

1. Introduction

Purchasing ▲LTO α Comp, you purchased a very powerful dynamic processor, easy to use and contained in a very efficient half rack package.

▲LTO α Comp is divided in two groups of 8 compression algorithms and 16 AGC configurations for each of these algorithms.

The first 8 compression algorithms have been designed for a general purpose use and very powerful when processing "full band" input signals as CD sources or as final results of mixing sessions. These algorithms are fully stereo algorithms and do not introduce heavy modifications in sound's colour.

The second 8 algorithms have been designed for the processing of mono signals and mono sound sources as musical instruments or voice. These algorithms may change quite heavily the colour and the phase of the input signal, so as the balance between low and high frequencies of the signal itself.

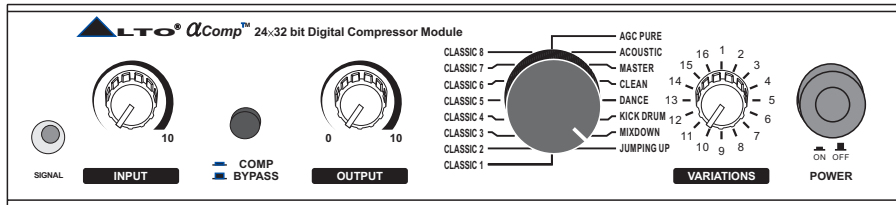
All the algorithms are based on classical algorithms for the dynamic compression of audio signals, modified and optimized thanks to the experience of ▲LTO AUDIO TEAM researchers.

2. Feature List

- Robust and Compact design
- 24/32 bits Digital Audio Processor
- MPU Control
- Automatic Bypass Switch Detection
- 16 Great Sounding Programs
- Variation Adjust Knob (16 positions)
- Analog "Process Bypass" Switch
- Variable Input / Output Gain
- Stereo/Mono Jack inputs
- Illuminated Power Switch
- Digital Saturation Led
- Up to 9dBu Line Level
- Easy to Operate Front Panel Controls
- SMT Design for Greater Reliability
- Short Signal Path and no Internal Cabling to Provide Superior Sound
- Manufactured Under ISO9001 Quality system

3. Front and Back Panels Description

3.1 Control panel (Front Panel)



a. Program and Variations Selections

- **Program Select Knob:** The Program Select Knob is used to choose the program you wish to perform.
- **Variations Select Knob :** Each program on this apparatus has the AGC parameter which can be adjusted by means of this knob.

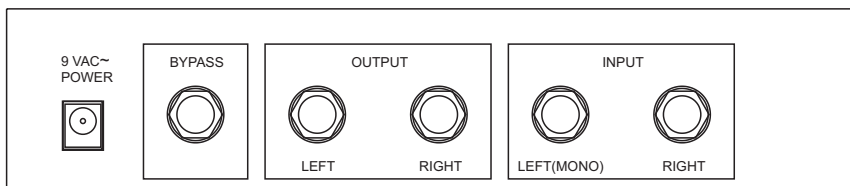
b. Analog Levels

- **Analog Input Level Potentiometer :** The input level control sets the main input gain, before the signal reaches the input bus. It controls both the Left (Mono) and Right input levels simultaneously.
- **Analog Output Level Potentiometer :** The output level control sets the level going to the amplifier or mixer from this apparatus.
- **"Process Bypass" Switch:** The "Process Bypass" switch allows to bypass the digital process so to have the input signal available on the outputs.

c. LED and Illuminated Power Switch

- **Digital Saturation LED :** Displays the signal level coming into the input during normal operation, if the signal level is too high, this LED will light and you will begin to hear the signal distortion.
- **Power On/Off Switch :** Turns the apparatus on and off.

3.2 Analog Connections (Back Panel)



a. Analog Inputs/Outputs

- **Inputs :** These are 1/4" unbalanced phone jacks which connect to sources such as Channel inserts of a mixing console. They may be used with Line input levels up to 8/9 dBu. For mono application, use the Left / Mono input.
The Left / Mono input jack is normal to the Right jack. This means that when nothing is plugged into the Right input jack, the signal present at the Left / Mono input is routed to the Right as well.

- **Outputs** : These are 1/4" unbalanced phone jacks which connect to devices such as the channel inserts on a mixing console or power amplifier inputs.

b. Compressor Bypass Pedal Input

- **Compressor Bypass** : This is a 1/4" phone jack which connects to a footswitch (with latching), either normally-open or normally-closed. When the footswitch is in the state of " OFF ", the function will be " Compressor "; On the other hand, when the footswitch is in the state of " ON ", the function will be " Bypass ".

c. Power Connector

- **Power connector** : This is a plug for connecting the 9VAC power supply adapter provided by the manufacturer.

4. Installation & Connection

4.1. Audio Connections and Power Up

a. Audio Connections

The connections between the α Comp and the other audio devices have to be made using high quality cables so to prevent bad performances of the α Comp itself. So it should be good to use low-capacitance shielded cables with a flexible internal conductor. Connect the cables to the α Comp properly by observing the following precautions:

- Do not bundle audio cables with AC power cords.
- Do not place audio cables and α Comp near sources of electromagnetic interference such as transformers, monitors, computers, etc.
- Always unplug cables by firmly grasping the body of the plug and pulling directly outward.
- Do not place cables where they can be stepped on.
- Avoid twisting a cable or having it make sharp right angle turns.

b. Power Up Setting

Before turning on the α Comp's power, check if:

- All connections have been made correctly.
- The volume controls of the amplifier or mixer are turned down.

Insert the Power plug into the [POWER] input on the rear panel of the α Comp and plug the power adapter into an AC outlet.

Turn on the power of the α Comp, pushing the ON/OFF button on the front panel.

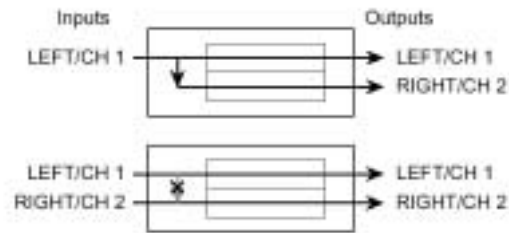
Turn on the power of the amplifier/mixer, and adjust the volume.

4.2. Analog

a. Input Jack Wiring

The α Comp's LEFT INPUT jack is also mono input for the α Comp. If you only connect a single mono cable to the LEFT INPUT jack, it will be

also routed automatically to the RIGHT INPUT. However, if we are using stereo input signals, connecting a cable to the RIGHT INPUT jack, the automatic routing will be avoided and the LEFT INPUT jack will feed only the LEFT INPUT, and the RIGHT INPUT jack will feed only the RIGHT INPUT.



b. Levels Setting

Proper setting of the input and output levels is crucial in order to achieve the maximum signal-to-noise ratio. It is possible to say that it is usually best to set both input and output level controls at 3/4 or 75% of full. This will decrease the possibility of overload distortion and keep the amount of background noise to a minimum. If the Signal LED on the α Comp start lighting, signaling a process saturation, turn down the Input level or decrease the volume of the source (instrument, mixer send, etc.). If the α Comp's level is causing the mixer or amp to distort, turn the Output Level down.

c. Compression Process Bypass

At any time you can bypass the process, there by allowing the direct signal to pass through the α Comp unchanged. This can be done in two ways:

- by pushing the BYPASS switch
- by connecting a footswitch to the BYPASS jack and pressing the footswitch. On the back panel you will find a footswitch jack labelled BYPASS. This is a mono jack with connections for a standard footswitch. The footswitch must be plugged in before the α Comp has its power turned on: α Comp will automatically recognise the right "polarity" of the pedal.

4.3 Installation

a. Standard Use

The α Comp may be placed almost anywhere on a table, on top of an amp, next to a mixing console. If it will be on furniture, check the rubber feet provided to the bottom of the unit. Make sure to place the α Comp's power supply away from other audio equipment that may induce fields, and away from the signal wiring. It is possible that α Comp may pick up noise field generated by other equipment such as large power amplifiers; in this case, move the α Comp until the noise goes away.

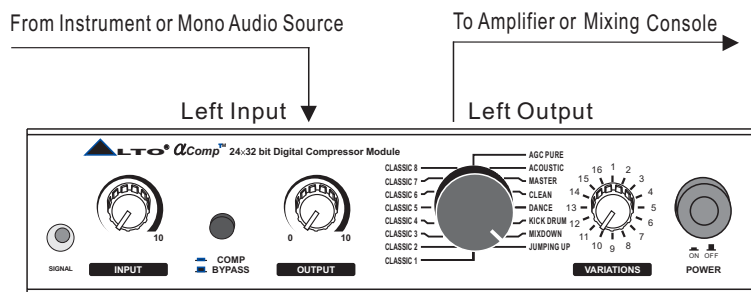
b. Application Examples

– **line instrument**

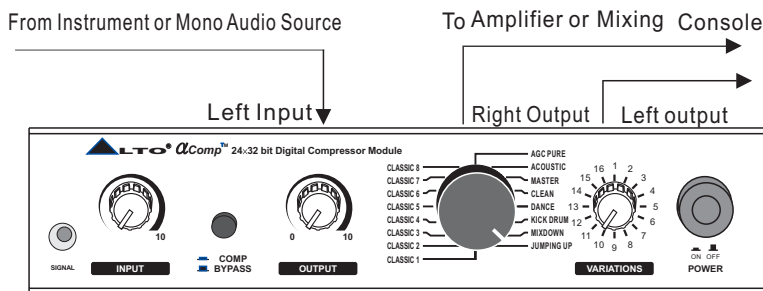
When connecting audio cables and/or turning power on and off, make sure that all devices in your system have their volume controls turned down.

The α Comp has two 1/4" unbalanced inputs and two 1/4" unbalanced outputs. These input/output configuration may provide three different audio connections options:

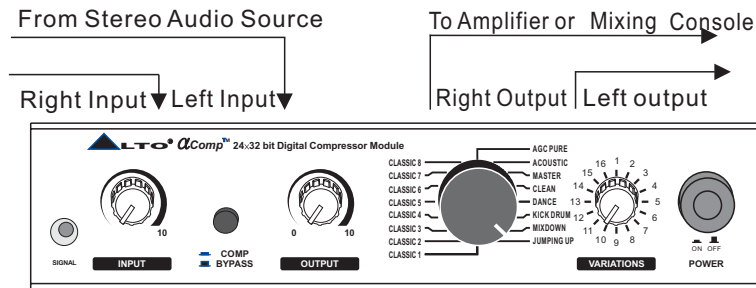
- **MONO.** Connect an audio cable to the [LEFT] INPUT of the α Comp from a mono source, and another audio cable from the [LEFT] output of the α Comp to an amplification system or mixer input.



- **MONO IN, STEREO OUT.** While still using the LEFT mono input, you could connect two audio cables to the LEFT and RIGHT outputs of the α Comp to a stereo amplification system or two mixer inputs.



- **STEREO.** Connect two audio cables to the LEFT and RIGHT INPUTS of the α Comp from a stereo source, and two other audio cables from the LEFT and RIGHT OUTPUTS of the α Comp to a stereo amplification system or two mixer inputs.



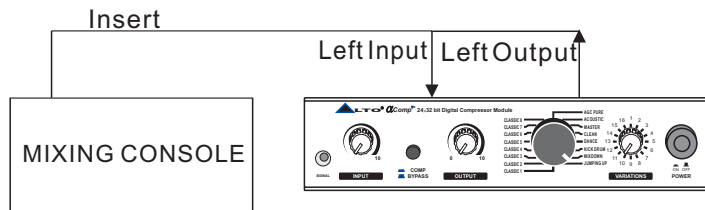
—mixer

Interfacing to a Mixing Console

The α Comp can accept mono or stereo sends at all system levels. The input circuitry of the α Comp can easily accept professional +8/9 dBu levels while having Enough input And output gain to interface with the low signal levels of home recording systems.

The α Comp may be connected to a mixing console connecting the unit directly to the channel insert socket of a single channel that is to be processed. Another way of interfacing the α Comp to a mixer or recording console would be in-line between the output of your mixing console and the input of a tape deck or power amplifier. This last setup would be used only if you wanted to process the entire mix.

Using Inserts



In the above figure it is described the situation in which you want to apply the α Comp to apply the desired dynamic process to single instrument's signals; in this case you will have to use a mixer which features individual channel inserts. Insert jacks on the back of a mixer provide a way of 'inserting' external processing equipment into the signal path. The insert occurs after the input amplifier, and before the channel fader; essentially it is the same as connecting the source (instrument or mic) into the α Comp before the mixer's channel input. Usually, insert connections require a special, stereo-splitting Y-cord to be connected, known as TRS connector. This connector has a stereo jack which plugs into mixer's channel insert socket, and a couple of mono jacks (input and output) which will plug into α Comp. Fitting this kind of adapters will virtually insert into one mixer's channel the compression processing.

Take good care in adjusting α Comp input and output levels, in order to satisfy the dynamics needs of both the processed channels. If you don't hear any sound, try to swap the Input and Output ends of the TRS cable plugged into the α Comp. Do not use for the α Comp the effects send/return connections found on most mixers for effect modules, as they could lead to heavy frequency response alterations.

MONO IN

If you only want to use α Comp for a mono input signal and to connect both of its outputs back to the mixer, you will need three audio cables. Connect a channel insert from the console to LEFT mono input of the α Comp via TRS, and another audio cable from the LEFT or RIGHT output of the α Comp to an adjacent mixer input.

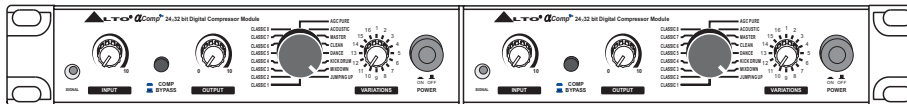
STEREO IN - STEREO OUT.

This connection is similar to the one described above. However, by utilizing two TRS and console channel inserts, we can process a couple of signals or a stereo signal coming ie. from a keyboard. This operation mode is the one used with the algorithms from 1 to 8, designed to process audio stereo sources as CD.

Improper level setting when using a dynamic processor is the most common cause of noise and distortion problems

4.4 Rackmount

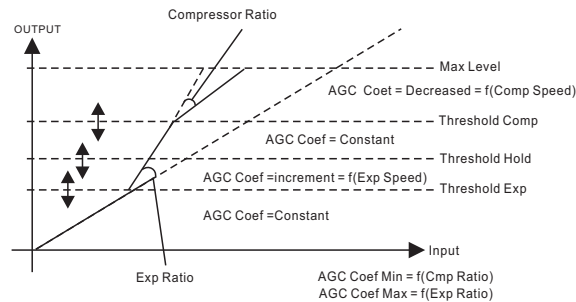
The most secure mounting is on an "universal" rack shelf, available from various rack manufacturers or music dealer. Up to two α Comp's may be mounted side-by-side in a standard universal EIA 19" equipment rack.



5. Preset Functions Descriptions

5.1 Stereo AGC

The α Comp's dynamic process algorithm includes also a stereo Automatic Gain Control (AGC) "block" that, if used, is able to maintain almost stable during the time the mean amplitude of the input signal, increasing it when the "average" of the input signal amplitudes seems to be low and decreasing it when the "average" of the input signal amplitude seems to be too high. This process is useful when the sound reaching the input of α Comp is coming from different sources having different output levels and it is necessary to "NORMALIZE" the input level of the α Comp to obtain better performances from the dynamic process operating as "second block" of the algorithm.

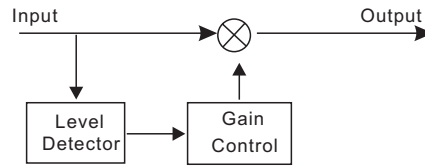


1. **Expander Speed:** The parameter Expander Speed represents the speed with which the signal is expanded beyond the Expander Threshold, this is true only if the Max value is different from 0dB.
2. **Compressor Speed:** This parameter represents the speed with which the signal is compressed once it goes beyond the Compressor Threshold. This is true only if the Min value is different from 0dB.
3. **Expander Threshold:** Expander Threshold is the threshold beyond which the signal is expanded.
4. **Compressor Threshold:** This is the threshold beyond which the signal is compressed.
5. **Hold Threshold:** When this threshold is crossed by the signal level, coming from the compression region, the compression coefficient is maintained steady. When the crossing is from the expansion region, then is the expansion coefficient that is kept the same.
6. **Max:** This is the maximum expansion ratio between input and output in the expansion region.
7. **Min:** This is the maximum compression ratio between input and output in the compression region.
The AGC = Const. areas are regions where the multiplying coefficient value assumes the last calculated before crossing the different thresholds, so in the expansion area the COEF_{agc} value is increasing, while in the compression area the COEF_{agc} value is decreasing.

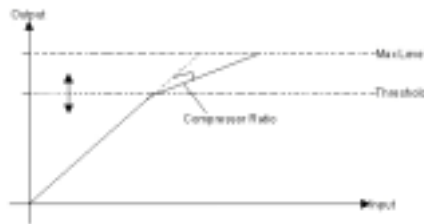
5.2 Dynamic Compression Process

As the name implies, compression reduces the dynamic range of a signal. It is used extensively in audio recording, production work, noise reduction, and live performance applications, but it does need to be used with care.

A compressor is basically a variable gain device, where the amount of gain used depends on the level of the input. In this case, the gain will be reduced when the signal level is high which makes louder passages softer, reducing the dynamic range.



A compressor's input/output relationship is often described by a simple graph:

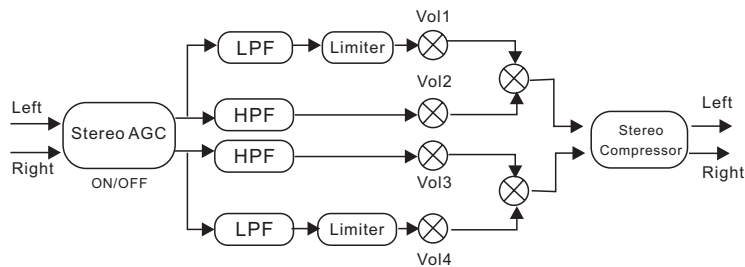


The horizontal axis corresponds to the input signal level, and the vertical axis is the output level (both measured in decibels). A line at 45 degrees corresponds to a gain of one - any input level is mapped to exactly the same output level. The compressor changes the slope (makes it more horizontal) of that line above some value called the threshold (which is most often adjustable). The height of the line defines the dynamic range of the output and the slope of that line is the same as the compressor's gain.

5.3 Stereo 2 Bands Compressor

The α Comp's Stereo 2-bands dynamic process algorithm is based on a "multi-band" process concept, splitting the full band of the input signals in 2 "sub-bands" the low frequencies band and the mid/high frequencies band, so to be able to differentiate the dynamic processes operating on the low frequencies (with higher energy content) and on the mid/high frequencies (with lower energy content). This technique allows to avoid the well know "pumping" effect appearing often when operating a dynamic process on sound signal.

Once splitted the input signal in 2 "sub-bands", α Comp operate a first limiting process on the low frequencies band, and after, once recreated the full band, apply a powerful stereo dynamic process on the two "recombined" channels.



This kind of dynamic process is very useful for the dynamic control of complex sounds as the ones coming from CD or orchestras etc.

5.4 Stereo 2 Bands Compressor Presets

a. Agc pure

This process is a simple automatic level control. Its speed varies with the different 'variation' control positions. From the timbre point of view it's a rather neutral process, and it doesn't alter the general balance of the original signal. It simply keeps the level in proximity of a fixed level, correcting the source variations. It can be noticed that variation 1 disables the AGC. It does so even in the compressor presets. This variation can be considered a sort of bypass.

b. Acoustic

The general impression this preset gives is of definition and power. The timbre is lively and brilliant, ideal for small ensemble music and to keep live soft passages. Frequency response is slightly rolled off in the low end.

c. Master

Master is very neutral and it is usable as a hi-performance AGC. It can be put before power amps and recorders in order to optimize their dynamic range. Timbre is very similar to original signals' and so the unique appreciable differences are in the dynamic range corrections. variations 2 through 16 activate even the AGC to help compressor action.

d. Clean

This is a high definition preset, giving great brilliance and dynamic impression. Nevertheless it is never fatiguing and 'pushes' the sound without unbalancing it. Highs in good evidence, punch range in good evidence, too, lows not too attenuated. Good to underline female voices details.

e. Dance

With this program, medium range and mid-low region are well in evidence, while high frequencies are slightly attenuated in order to control dance music intrinsic brilliance in this region. Well suited to match dynamic and brilliant recordings, while increasing their "punch".

f. kick drum

In this preset, mid-low region very well in evidence, while high and mid frequencies are slightly attenuated. Special preset extremely well suited for drum recordings. It makes an excellent work in underlining drums low range in multitrack recordings or mixed microphones environments.

g. Mixdown

Mixdown is less brilliant than Clean Preset and has mid-low end more in evidence. Good underlining bass and drums without losing definition in the rest of the range. Suited even for harmonically complex instruments, like double bass, which have a non negligible high frequency range.

h. jumping up

The sound of Jumping Up Preset is quite similar to Clean Preset as general timbre, but this preset underlines very well male voices and is capable to keep up the level in soft passages of the music program. For female voices the Clean Program is probably better.

5.5 Mono 2 Bands + 5 Bands Eq Compressor

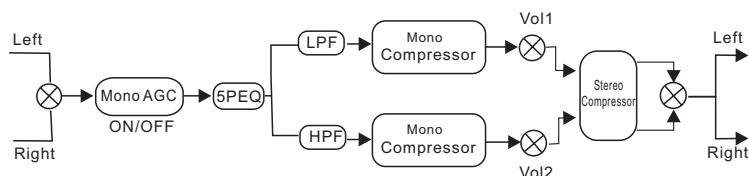
The α Comp's Mono 2 Bands+5 Bands Eq dynamic process algorithm is based on a "multi-band" process concept, splitting the full band signal entering the dynamic process algorithm in 2 "sub-bands", the low frequencies band and the mid/high frequencies band, so to be able to differentiate the dynamic processes operating on the low frequencies (with higher energy content) and on the mid/high frequencies (with lower energy content).

This technique allows to avoid the well known : "pumping" effect appearing oftenly when operating a dynamic process on sound signal.

Once splitted the input signal in 2 "sub-bands", α Comp operates a first separate limiting process on the low frequencies band and on the mid/high frequencies, and after, once recreated the full band, applies a powerful stereo dynamic processor on the "recombined" channel.

The input signal to the dynamic compression "block", is the sum of the input signals filtered with a 5 bands parametric Eq.

This feature allows to modify the "colour" of the input signal before to operate the dynamic process on it.



This kind of dynamic process is very useful for the dynamic control of instruments or "single" sounds.

5.6 Mono 2 Band +5 Bands Eq Compressor Presets

All the presets made using the above algorithms, and named:

- a. **Classic 1**
- b. **classic 2**
- c. **classic 3**
- d. **classic 4**
- e. **classic 5**
- f. **classic 6**
- g. **classic 7**
- h. **classic 8**

have been made thinking for them an use with single instruments. More, the presets are well tailored on classic guitars or acoustic instruments, where different equalizations of the sound can give to the instruments more or less character and deepness, passing from bright equalizations to warmer ones.

5.7 Compression Effects Summary Table

LIMITER

	band split [Hz]	Limiter Low Band [dB]	Volume Low Band [dB]	Volume High Band [dB]
AGC PURE	800	0	0	0
ACOUSTIC	2500	-2	2	6,5
MASTER	630	-2	4	-4,5
CLEAN	3150	-3	0	5
DANCE	160	-1,5	6,5	2
KICK DRUM	250	-1,5	8	2,5
MIX DOWN	5000	-3	2	2
JUMPING UP	1250	-1	2	4

COMPRESSOR

	Threshold [dB]	Release [dB/s]	Attack [dB/s]
AGC PURE	0	-	-
ACOUSTIC	-2	33	111
MASTER	-2	34	29
CLEAN	2,5	30	111
DANCE	-1,5	50	72
KICK DRUM	-0,5	86	137
MIX DOWN	-2	32	25
JUMPING UP	-1,5	57	72
Classic 1,2,3,4,5,6,7,8	-6	6,5	85,5

AGC

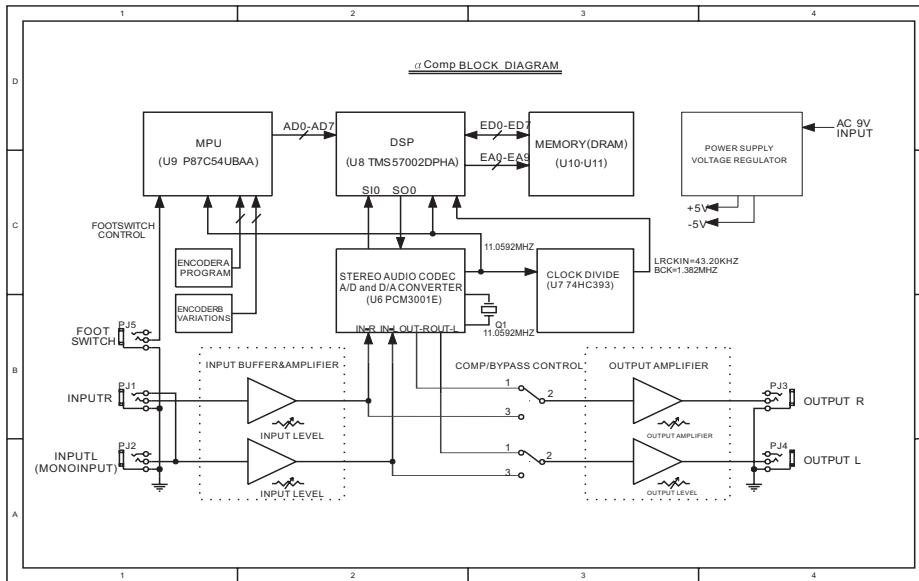
	EXP SPEED [dB/s]	CMP SPEED [dB/s]	EXP THR [dB]	CMP THR [dB]	THR HOLD [dB]	EXP RATIO [In:Out]
AGC 1	3,5	23	-61	-26	-44	1:2
AGC 2	3,5	19,5	-34	-29	-32	1:2
AGC 3	3,5	19,5	-42	-26	-38	1:2
AGC 4	4	24	-34	-29	-31	1:2
AGC 5	3,2	24	-44	-29	-31	1:2
AGC 6	3,3	22,5	-44	-29	-42	1:2
AGC 7	3,2	24,3	-37	-29	-33	1:2
AGC 8	4,1	23	-37	-22	-31	1:2
AGC 9	4,1	23	-37	-27	-31	1:2
AGC 10	4,5	24,3	-37	-27	-30	1:2
AGC 11	4,5	22,5	-44	-27	-29	1:2
AGC 12	5,6	24	-44	-27	-42	1:2
AGC 13	6	19,5	-42	-27	-31	1:2
AGC 14	6	19,5	-34	-27	-30	1:2
AGC 15	6	23	-61	-27	-32	1:2

Eq Classic Preset

	PEQ 1	PEQ 2	PEQ 3	PEQ 4	PEQ 5
Classic 1	G=1dB; F=75Hz; Q=1	G=0dB	G=0,5dB; F=1KHz; Q=1	G=0dB	G=1dB; F=12KHz; Q=1
Classic 2	G=1dB; F=75Hz; Q=1	G=-1dB; F=600Hz; Q=5	G=-1dB; F=1KHz; Q=1	G=1dB; F=3,7KHz; Q=5	G=-1dB; F=12KHz; Q=1
Classic 3	G=1dB; F=75Hz; Q=5	G=-1dB; F=600Hz; Q=5	G=-1dB; F=1KHz; Q=1	G=-2dB; F=3,7KHz; Q=5	G=1dB; F=7KHz; Q=5
Classic 4	G=2dB; F=50Hz; Q=5	G=-10dB; F=100Hz; Q=5	G=-6dB; F=1KHz; Q=1	G=-4,5dB; F=3,7KHz; Q=1	G=2dB; F=10KHz; Q=5
Classic 5	G=1dB; F=75Hz; Q=1	G=-1dB; F=600Hz; Q=5	G=-1dB; F=1KHz; Q=1	G=1dB; F=3,7KHz; Q=5	G=-1dB; F=12KHz; Q=1
Classic 6	G=1dB; F=75Hz; Q=1	G=0dB	G=0,5dB; F=1KHz; Q=1	G=0dB	G=1dB; F=12KHz; Q=1
Classic 7	G=1dB; F=75Hz; Q=5	G=-1dB; F=600Hz; Q=5	G=-1dB; F=1KHz; Q=1	G=-2dB; F=3,7KHz; Q=5	G=1dB; F=7KHz; Q=5
Classic 8	G=2dB; F=50Hz; Q=5	G=-10dB; F=100Hz; Q=5	G=-6dB; F=1KHz; Q=1	G=-4,5dB; F=3,7KHz; Q=1	G=2dB; F=10KHz; Q=5

6 Technical Specifications

6.1 Block Diagram



6.2 Specifications

Electrical	
Frequency Response:	+0.5 / -1.5 dB from 20Hz to 20 kHz
S/N Ratio (process)	80 dB "A" wtg, 20 Hz-22kHz
S/N Ratio (bypass)	>90 dB "A" wtg, 20 Hz-22kHz
THD+Noise:	<0.008% @ 1kHz (0dBV, bypass)
Input	
Number of Channels:	2
Format:	1/4" unbalanced
Maximum Level (bypass):	+9 dBu
Impedance:	>500 kOhms
A/D - D/A Conversions	
A/D converter:	1 bit Sigma-Delta
D/A converter:	1 bit Sigma-Delta
Output	
Number of Channels:	2
Format:	1/4" unbalanced
Maximum Level (bypass):	+9 dBu
Output Impedance:	<500 ohms
Front Panel	
Controls	IN/OUT levels (ANALOG) PROGRAM selections (2 knobs)
Indicators	Power, Signal clip LED
Rear Panel	
Input (LEFT/MONO, RIGHT)	1/4" 2-conductor (mono)
Output (LEFT, RIGHT)	1/4" 2-conductor (mono)
BYPASS	1/4" 2-conductor (auto-sense pedal type) for momentary footswitches
Power	9 Volt AC Power Transformer
Processing and Memory	
Processor Speed:	12 MIPs (million instructions per second)
Internal DSP resolution:	52 bit MPY accumulator
Main Preset Programs	16
Preset Total Combinations	256
Internal digital audio memory:	3000 milliseconds
Physical	
Net Weight:	1kg(2.20lb)
Dimension:	200(W)×150(D)×45(H)mm(7.87"×5.91"×1.77")

7. 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 purport a more effective and efficient after-sales warranty service.

Please fill out all the information carefully and genuinely, miswriting or absence of this card will void any of your 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.

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