

User's Manual

BK 2.0

COMPRESSOR /LIMITER /GATE



www.altoproaudio.com

Version 2.0 Dec. 2002

— English —

SAFETY RELATED SYMBOLS



The symbol is used to indicate that some hazardous live terminals are involved within this apparatus, even under the normal operating conditions.



The symbol is used in the service documentation to indicate that a specific component shall be only replaced by the component specified in that documentation for safety reasons.



Protective grounding terminal.



Alternating current /voltage.



Hazardous live terminal.

ON: Denotes the apparatus is turned on.

OFF: Denotes the apparatus is turned off, because it uses the single pole switch, be sure to unplug the AC power to prevent any electric shock before you proceed with your service.

WARNING: Describes precautions that should be observed to prevent the danger of injury or death to the user.

CAUTION: Describes precautions that should be observed to prevent danger of the apparatus.

WARNING

• Power Supply

Ensures the source voltage matches the voltage of the power supply before turning ON the apparatus. Unplug this apparatus during lightning storms or when unused for long periods of time.

• External Connection

The external wiring connected to the output hazardous live terminals requires installation by an instructed person, or the use of ready-made leads or cords.

• Do not Remove any Cover

There are maybe some areas with high voltages inside, to reduce the risk of electric shock, do not remove any cover if the power supply is connected.

The cover should be removed by qualified personnel only.

No user serviceable parts inside.

• Fuse

To prevent a fire, make sure to use fuses with specified standard (current, voltage, type). Do not use a different fuse or short circuit the fuse holder.

Before replacing the fuse, turn OFF the apparatus and disconnect the power source.

• Protective Grounding

Make sure to connect the protective grounding to prevent any electric shock before turning ON the apparatus.

Never cut off the internal or external protective grounding wire or disconnect the wiring of protective grounding terminal.

• Operating Conditions

This apparatus shall not be exposed to dripping or splashing and that no objects filled with liquids, such as vases, shall be placed on this apparatus.

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

Do not use this apparatus near water.

Install in accordance with the manufacturer's instructions. Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.

Do not block any ventilation openings.

No naked flame sources, such as lighted candles, should be placed on the apparatus.

IMPORTANT SAFETY INSTRUCTIONS

- Read these instructions.
- Follow all instructions.
- Keep these instructions.
- Heed all warnings.
- Only use attachments/accessories specified by the manufacturer.

• Power Cord and Plug

Do not defeat the safety purpose of the polarized or grounding type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wide blade or the third prong are provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet. Protect the power cord from being walked on or pinched particularly at the plug, convenience receptacles, and the point where they exit from the apparatus.

• Cleaning

When the apparatus needs a cleaning, you can blow off dust from the apparatus with a blower or clean with a rag etc. Don't use solvents such as benzol, alcohol, or other fluids with very strong volatility and flammability for cleaning the apparatus body.

Clean only with a dry cloth.

• Servicing

Refer all servicing to qualified personnel. To reduce the risk of electric shock, do not perform any servicing other than that contained in the operating instructions unless you are qualified to do so.

Servicing is required when the apparatus has been damaged in any way, such as the power supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.

PREFACE

Dear Customer:

Thanks for choosing ▲LTO BK 2.0 Compressor/Limiter/Gate 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 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 BK 2.0 is the result of many hours of listening and tests involving common people, area experts, musicians and technicians.

The results of this effort is that you can acquired an extremely efficient and universal dynamics processor. It Contains several new circuit design which make the unit an ultimate dynamic processor: intelligent program recognition, interactive Expander/Gate and a new Dynamic Enhancer.

Nothing else to add, but that we would like to thank all the people that made the ▲LTO BK 2.0 a reality available to our customers, and thank our designers and all the ▲LTO staff, people who make possible the realization of products containing our idea of music and sound and are ready to support you, our customers, in the best way, conscious that you are our best richness.

Thank you very much.

▲LTO AUDIO TEAM

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1. INTRODUCTION

You are now the owner of an ▲LTO BK 2.0 Compressor/Limiter/Gate. The BK 2.0 is a very powerful dynamic processor. We have included in it several innovative circuit designs that make the BK 2.0 a very versatile processor: smart and fast recognition of the program, adjustable Expander/Gate and very low distortion Voltage Control Amplifier (VCA).

Feature List:

- **Smart Knee Control Compressor (SKC)**

Soft knee or hard knee? This is the question! SKC combines both: In the "soft knee" mode you control the program material so that the compression will be the most musical and inaudible. ON the other end, the hard knee function is used for better precision, limiting signal peaks with precision and will allow you to add creativity to the dynamic processing. This function also allows you to protect other equipment in the signal loop against distortion.

- **The AUTO Function**

Your BK 2.0 includes an AUTO function switch on the front panel. Thanks to the AUTO function attack and release times of the program materials are automatically analysed. Then the dynamic range of the program is heavily compressed in a very musical way so that there will not be any audible breathing or pumping effect.

- **Attack and Release Controls:**

Ok,Ok, you do not want to get advantage of our AUTO function and be the Master of your own mix. We have provided your BK2.0 with User Adjustable attack and release time for the best total manual control.

- **Smart Ratio Control expander (SRC)**

During music pauses or when a quiet session occurs, the noise floor maybe highly amplified and this effect may be exaggerated because of inappropriate use of the compression ratio. The SRC control will adjust the expansion depending on the input signal so that those signals, which are slightly above the noise floor level, will get the major benefits.

- **Smart Gate Control peak limiter (SGC)**

This function includes two important functions: Clipper and program limiter. The peak limiter will be activated above a certain threshold that is adjusted by the User and will radically restrict signal peaks. But what about if the threshold of the Limiter is surpassed only for a few milliseconds? SGC will turn on automatically and reduce the output signal so that you will not hear any distortion. Smart, isn't it? The SGC proves to be very efficient in loudspeaker protection and to reduce undesired peaks in digital situations.

2. THE CONCEPT BEHIND

2.1 Some technical stuff

Good old analog technology: It will allow us to manufacture audio equipment with a very high dynamic range: up to 125 dB. But the dynamic range of digital equipment is more or less 25 dB less. A further reduction in dynamic range occurs with the use of tape recorders and/or vinyl records.

2.1.1 It is not just Music

Yes, a piece of electronic will produce some noise. When the current flows through a conductor this will generate a certain movement of the electrons and therefore: noise. And throughout the whole spectrum of audio. Imagine what happens when this inherent noise will be amplified. Yes, today one can use "low-noise" components but still such components will present a certain level of residual noise.

For example with tape recorders it will not be possible to get an S/N (signal to noise) ratio better than 70dB.

This level would not be accepted today by the increased sensitivity of the Listeners. It is possible to improve the performance of a tape recorder: Absolutely no!

2.1.2 Introducing Audio Dynamics

The human ear can detect the noise generating by falling leaves as well as the roar generated by the taking off space shuttle. Unfortunately no analog, nor digital device can reproduce such wide spectrum. Please look at Chart. 1 and you will see the difference if dynamic capacity of various devices when compare to the human ear. More problems occur when handling high level signals and low level signals. When you reach the high level limit you may incur in 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 not 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.

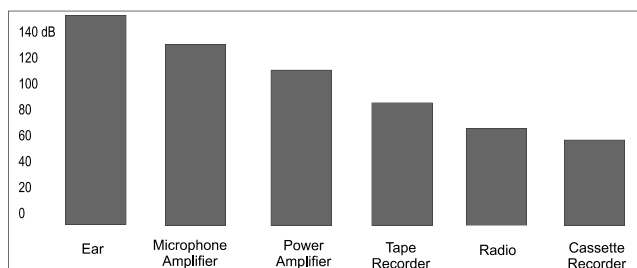


Chart.1: The dynamic range capabilities of various devices

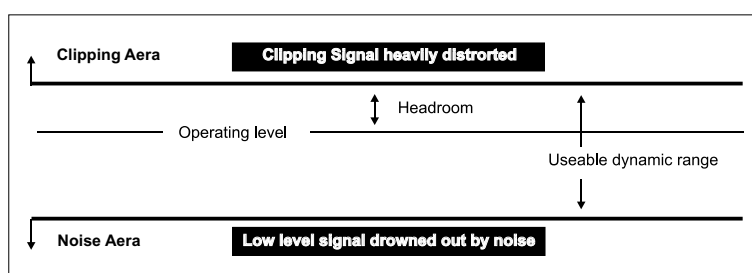


Chart.2: The interactive relationship between the operating level and the headroom

So the operating level must be as high as possible but not high enough to generate distortion. Thriky uh?

There is a very easy way to obtain this. With the volume knob in hand you increase the volume during low passages and decrease the volume during loud passages. Unfortunately even the Great Houdini would not be fast enough to monitor carefully the speed of the musical signal and it would be impossible to detect signal peaks and consequently levelling them out. Manual control is therefore out of question. The answer is AGC (automatic gain control); a device that will monitor the signal in real time and that will adjust the gain for the best S/N ratio without producing distortion. So, the name of this device is "Compressor/limiter".

2.1.3 More technical stuff about Compressor/Limiters

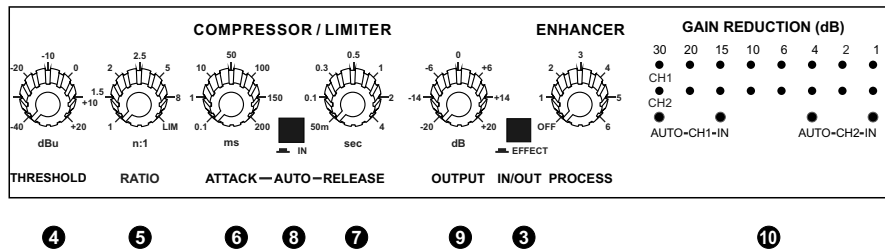
Try to measure the dynamic range of musical instruments. You will find out that your ear will handle such range. Your audio equipment will not and distortion and overloading will be generated.

To avoid these, compressor/Limiters will be used. Both Compressors and Limiters more or less do the same job but Limiters brutally limit the audio signal above a set threshold, while Compressors handle signal in a much more civilised way and over a wide range of levels. If an audio signal exceed 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.

2. Close LED

This LED illuminates when expansion occurs.

3.2 Compressor Section



Pic.3: Controls of the Compressor/Limiter section

3. EFFECT Switch

Engage this switch to activate the corresponding channel. It can be used to make an A/B comparison in between processed and unprocessed signal.

4. THRESHOLD Control

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

5. 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 LIM:1.

6. Attack Control

This control determines how fast the compressor is to respond to audio signals that will exceed the set threshold. It can be manually adjusted from 0.1 to 200 milliseconds.

7. Release Control

This control determines how fast is the compressor to return to unity gain when the audio signal falls below the set threshold level. It can be manually adjusted from 0.05 to 4 seconds.

8. Auto Switch

Who needs Attack and release control? Activate this switch and these controls will be deactivated. Attack and release controls will be automatically set by the unit depending on the program material.

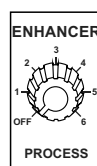
9. Output Gain Control

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

10. Gain Reduction Meter

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

3.3 Dynamic Enhancer Section



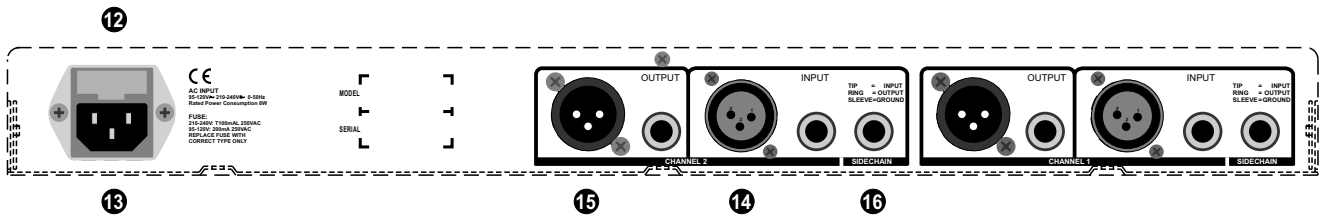
11

Pic.4: Controls of the Dynamic Enhancer section

11. PROCESS control

This control renews any high frequencies lost through the compression process for natural sounding dynamics control, which can be varied from off to 6. Please note that the enhancer control is only used when compression is taking place.

3.4 The Back Panel

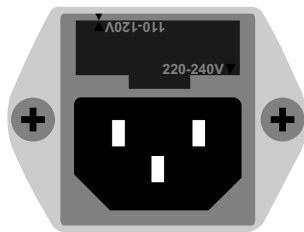


Pic.5: The Back Panel Layout Of The BK 2.0

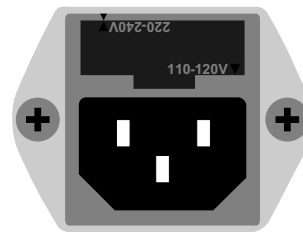
12. Fuse holder / Voltage Selector

This is a dual voltage unit. Before you attempt to connect and operate the unit, please make sure that your local voltage matches the voltage on the fuse-holder cover.

Caution: The fuse protecting the AC supplies circuits of this unit. The fuse can only be changed by a qualified technician, in the event of a fault or changing the supply voltage. If the fuse continues to blow after replacing, discontinue use of this unit before repaired.



THIS IS SET FOR
110V AC TO 120V
AC OPERATION



THIS IS SET FOR
220V AC TO 240V
AC OPERATION

The fuse-holder above the AC connector on the rear of the chassis has 3 triangular markers (please refer to the above pictures), with two of these triangles opposing each other, your unit is set to the operating voltage printed next to these markers.

To change, pull fuse-holder out and rotate 180°, then push in again.

13. AC Inlet

This connector is meant for the connection of the supplied main cord. Do not insert power cable into unit until voltage has been correctly set. Do not plug power cable into AC power until voltage has been correctly set.

14. 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.

15. 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.

16. Sidechain Insert

The connector can be regarded as insert point, which allows the unit to be controlled externally, of course the connector must be stereo (Ring output/Tip input). You can also use the connector as a control input (mono connector).

4. READY TO ROLL?

4.1 Expander/Gate Section

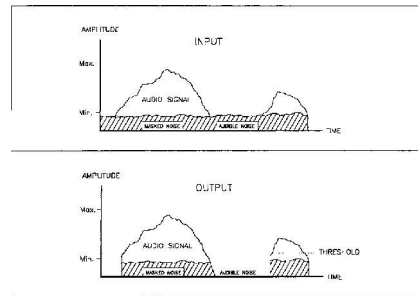


Chart.3: Function of an expander

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 BK 2.0 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 minute ratio of expansion while for signals of reduced level a higher ratio will be used with resultant greater attenuation.

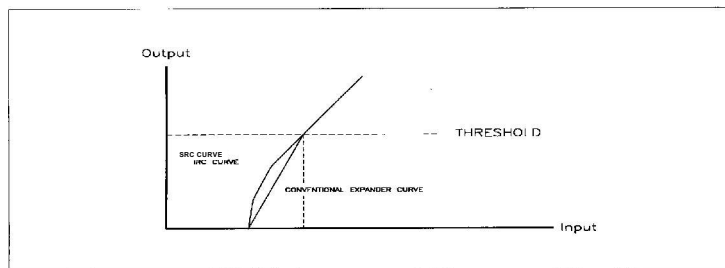


Chart.4: SRC Curve characteristics of the Adaptive Expander

4.1.1 Threshold Adjustment

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

4.2 Compressor Section

4.2.1 Another Threshold Control?

The compressor threshold control sets the point where the input level starts to be reduced. Let's say the level is +12dBu and the threshold control is set at +2dBu: In this case up to 10 dB can be compressed. If the input level is the same and the control is set at 10dBu the maximum compression will be 22 dB, The operating range of the threshold control is -40 to +20dBu. Turn the threshold control fully clockwise and you will get a threshold level of +20dBu.

You must remember that the degree and the type of compression not only depend by the threshold control but also by other controls such as Ratio, Attack and Release.

4.2.2 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 2dB increase of the input level (above threshold) you will get an increase of output level of 1 dB. 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 1dB, 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 10dB above the threshold level. Hard Knee compression is then used beyond this range.

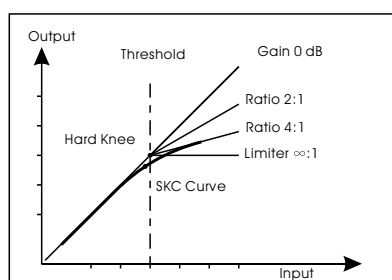


Chart.5: SKC characteristic of the compressor section

4.2.3 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 BK 2.0 the attack time can be set in a range of 1 to 200 milliseconds.

4.2.4 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 BK 2.0 can be set from 0.05 to 4 seconds.

4.2.5 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.

4.2.6 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

4.2.7 Effect switch

This switch simply turns off the correspondent channel. This is useful to compare quickly the processed and unprocessed signal.

4.2.8 Gain Reduction Meter

This consists of 8 LED on the front of the BK 2.0. Through this Led meter you can visualise the amount of gain reduction at any given time.

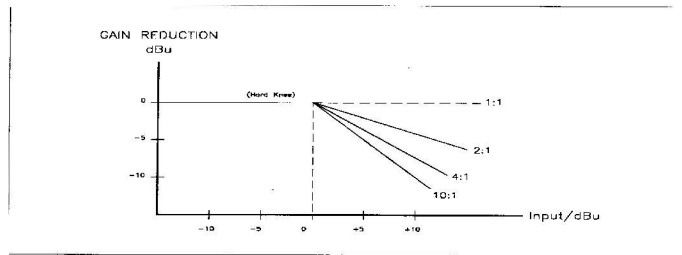


Chart.6: The effect of a compressor can be expressed as the amount of gain reduction that is taking place for any given input

4.3 Limiter Section

How fast is the compressor to react to 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/limiters. Ok you handle an audio signal made by a wide range of frequencies and you have chosen a longer attack time. But, if are using your BK 2.0 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 taper recorders.

The solution in BK 2.0 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 in 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 0dB and in this case input and output signals are again identical.

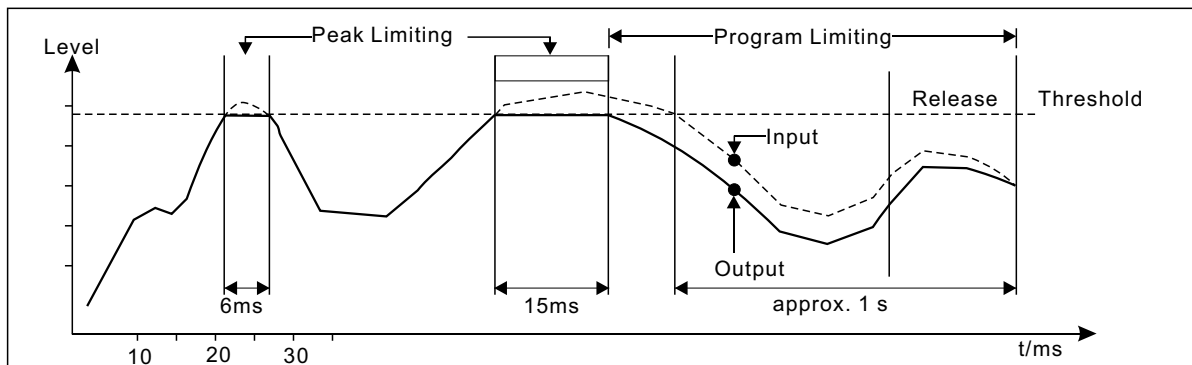


Chart.7: SGC characteristic of the limiter section

5. INSTALLATION AND CONNECTION

5.1 Mains Connection

BK 2.0 is provided with dual voltage plug. You must check the power supply Voltage available in your Country before connecting the power cord in the wall outlet. Please see Page, paragraph 12 for further info.

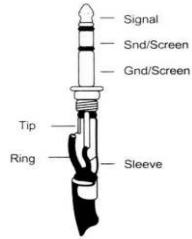
5.2 Audio connection

The BK 2.0 Compressor/Limiter/Gate is equipped with balanced XLR connectors as well as 1/4" phone jack and can be connected with other units in different ways to support a vast range of applications without experiencing a signal loss.

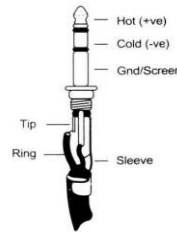
a. Wiring Configuration

Both types of connectors available on BK 2.0 can be wired in balanced and unbalanced modes. Please see following drawing for details:

- For 1/4" TRS jack

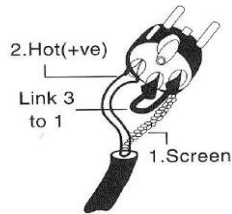


1/4" TRS jack
Unbalanced input

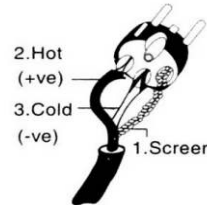


1/4" TRS jack
Balanced input

- For XLR connector



XLR Unbalanced input

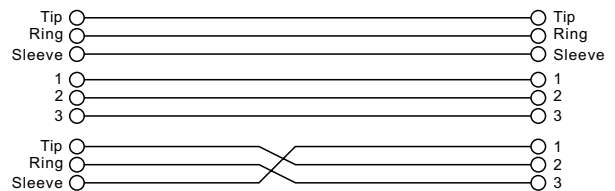
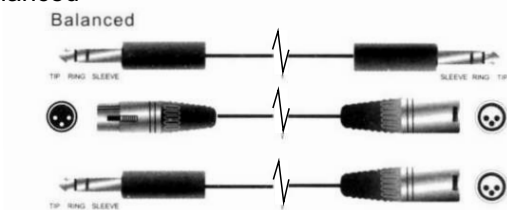


XLR Balanced input

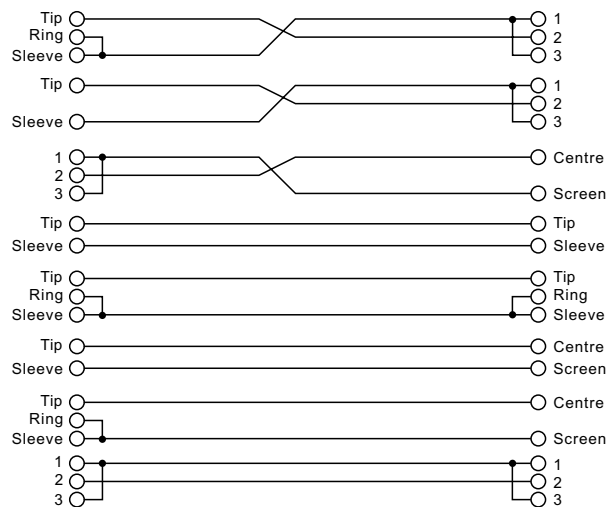
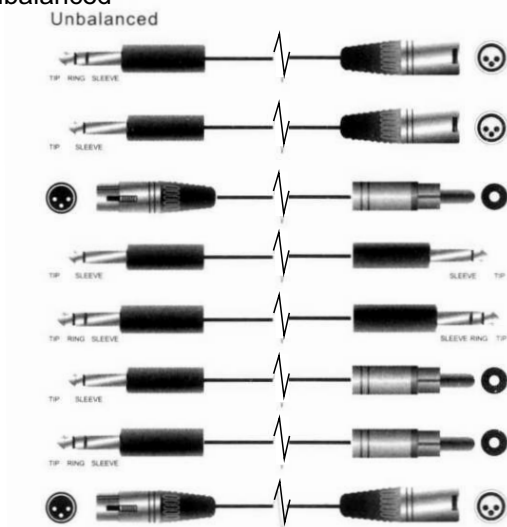
b. In Line Connection

Please see following drawing for details.

- Balanced



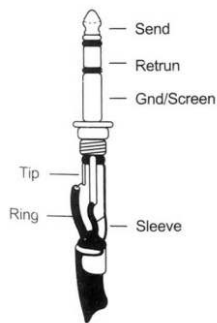
- Unbalanced



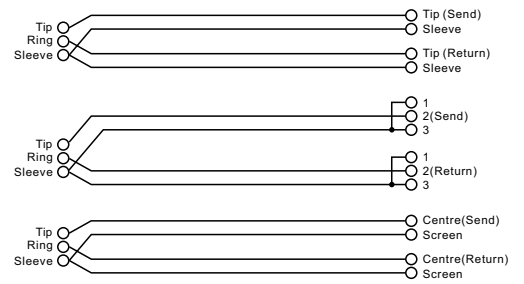
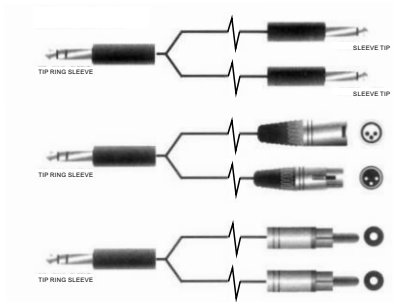
c. Insert Points Connection

In case you are using the main inserts of your mixing console and you have a single jack for SEND and RETURN, you can use an insert Y cable . Please see following drawing.

1/4" TRS insert



Insert Leads



5.3 Rack Mounting

The most secure mounting is on a universal rack shelf available from various rack manufactures or your music dealer. The BK 2.0 Compressor /Limiter /Gate fits into one standard 19" rack unit of space.

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 do not place the BK 2.0 Compressor /Limiter /Gate on high temperature devices such as power amplifiers etc. to avoid overheating.

6. TECHNICAL SPECIFICATIONS

AUDIO INPUT	Type	Active balanced XLR and 1/4"JACK
	Impedance	60k ohm balanced
	Maximum input level	+21 dBu balanced and unbalanced
AUDIO OUTPUT	Type	XLR and 1/4" JACK
	Impedance	< 40k ohm unbalanced
	Maximum output level	+21 dBu
	Frequency response	20Hz to 20KHz at +0,- 1dB
	THD +N% @ 1kHz, +4dBu	0.05% tap.
	IMD (SMPTE) @+10dBu	0.01%
	Noise & Hum unity gain	>-93dBu
	Noise & Hum, fully off	>-97dBu
	Cross talk @ 20kHz	>-85dBu
	CMR @ 1kHz	>60dB
COMPRESSOR SECTION	Type	Interactive Compressor
	Threshold	Variable from - 40dB to +20dB
	Ratio	Variable from 1:1 to LIM
	Attack	Attack variable from 0.1 to 200ms/20dB
	Release	Variable from 0.05ms to 4s/20dB
	Output level	From - 20 to +20dB
GATE SECTION	Type	Interactive Expander/Gate
	Threshold	Variable from OFF to +15dB
DYNAMIC ENHANCER SECTION	Type	Dynamically controlled frequency correction
	Process	Variable from off to 6
FUNCTION SWITCHES	Effect	Bypass switch
	Auto	Programme- dependent attack and release time
INDICATORS	CLOSE LED for the Expander/Gate	
	8 element red LED Gain Reduction meter	
	AUTO LED;Indicator for AUTO function and COMPRESSOR status	
POWER SUPPLY	95-120V~/210-240V~,60-50Hz	
DIMENSIONS	483(W)×217(D)×44(H)mm (19"×8.54"×1.7")	
WEIGHT	3kg(6.62lb)	

7. BLOCK DIAGRAM

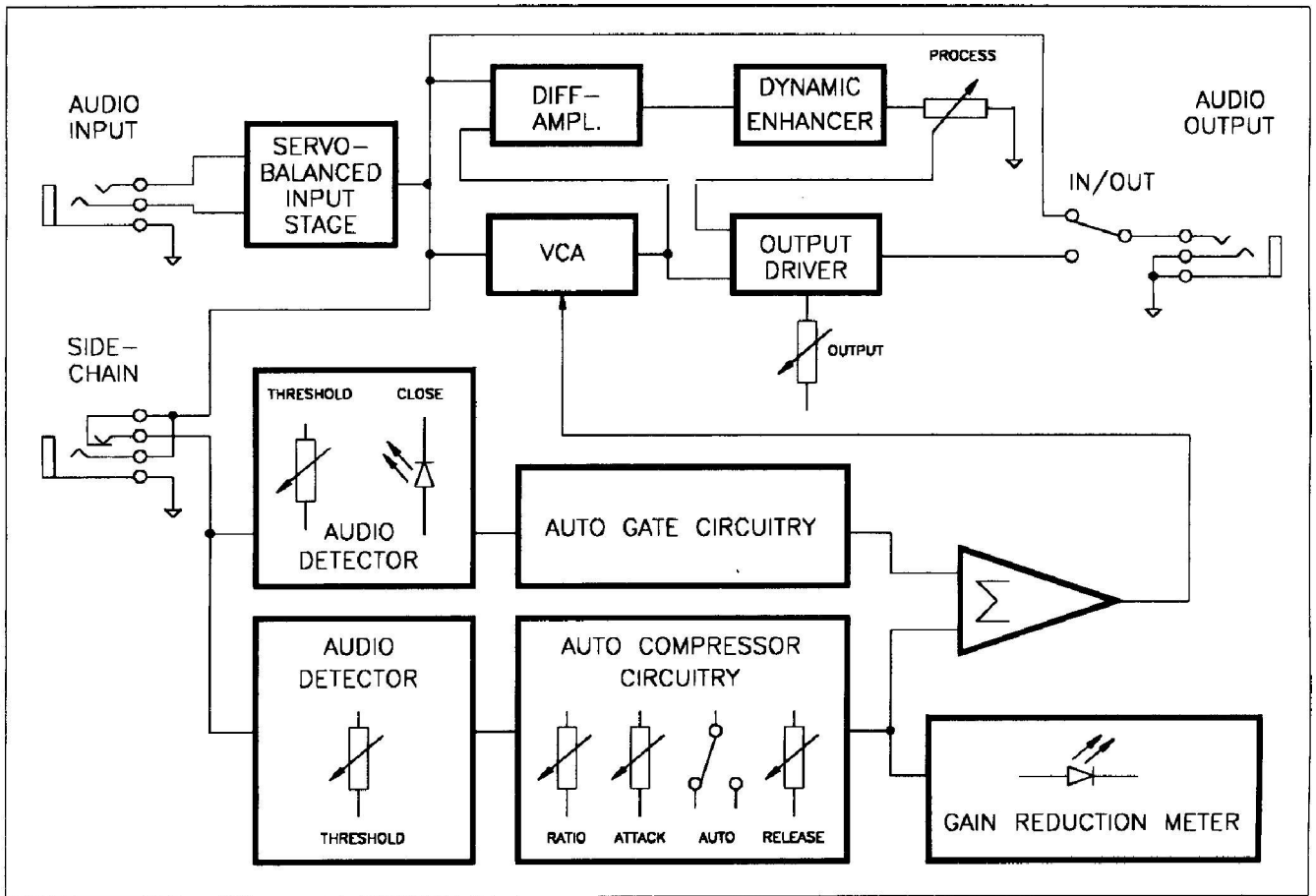


Chart.8: Block diagram of the BK2.0

8. 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 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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