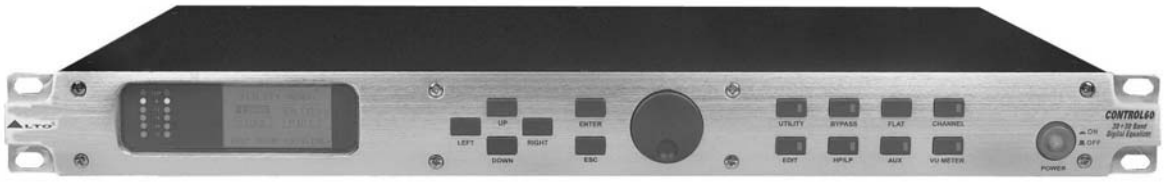
User's Manual

CONTROL60

30+30 Band
Digital Equalizer



www.altoproaudio.com
Version 2.3 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.

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.

- **Servicing**

  Refer all servicing to qualified service personnel only.

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

PREFACE

Dear Customer:

Thanks for choosing ▲LTO CONTROL60 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 would 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 CONTROL60 is the result of many hours of listening and tests involving common people, area experts, musicians and technicians.

The result of this effort is a DSP hi-performance equalizer that can be used in applications as musical performances, installation and sound reinforcement.

Besides we offer to you a number of factory EQ curves that we collected and transformed in presets now available in our small, efficient and easy to use ▲LTO CONTROL60.

Nothing else to add, but that we would like to thank all the people that made the ▲LTO CONTROL60 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

TABLE OF CONTENTS

1. INTRODUCTION

Purchasing ▲LTO CONTROL60, you purchase a very powerful equalizer, easy to use and contain in a very efficient single unit rack package.

Our new CONTROL60 is a versatile and very powerful parametric/graphic PRE-EQ. It is based on 2 extremely powerful high speed 24×32-bit DSPs and very high quality 20-bit A/D and 24-bit D/A converters, preserving the pureness of analogue sound in your digital applications. It can be operated in 6 different modes:

- Graphic 2×30 Dual Mono 1/3 oct(GR.D.M)
- Graphic 2×30 Stereo 1/3 oct(GR.ST)
- Graphic 1×60 Mono 1/6 oct(GR.Mono)
- Parametric 2×30 Dual Mono(PAR.D.M)
- Parametric 2×30 Stereo (PAR.ST)
- Parametric 1×60 Mono (PAR.Mono)

allowing the user to obtain the desired sound and timbre out of the musical signals easily.

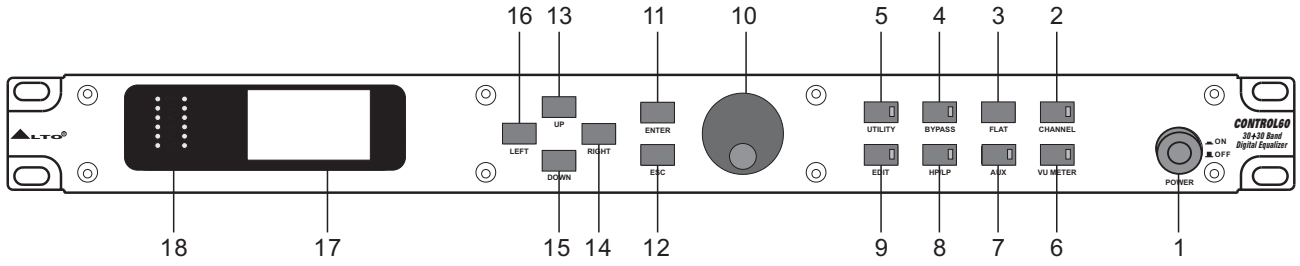
These algorithms are fully dual mono/stereo algorithms and use very powerful high precision and symmetrical filters, designed for professional use, able to modify the sound color improving the over all sound quality without introducing any loss or distortion.

2. FEATURE LIST

- Robust and Compact Design
- Digital Stereo Equalizer with 24/32-bit High-Speed DSP Processor
- Very High-Quality BurrBrown 20-bit A/D and 24 D/A Converters for Pure and Clean Audio Quality
- Easy to Operate Front Panel Controls and Display
- Open Architecture for Easy Software Updates
- MPU Control
- 2×30 or 1×60 Band Parametric Equalizer
- Windows Editor for Easy to Use and Powerful Pc Based MIDI Remote Control
- SMT Design for Greater Reliability
- Optimized Signal Path to Provide Superior Sound
- Manufactured Under QS9000, VDA6.1 Quality System

3. CONTROL ELEMENTS

3.1 The Front Panel

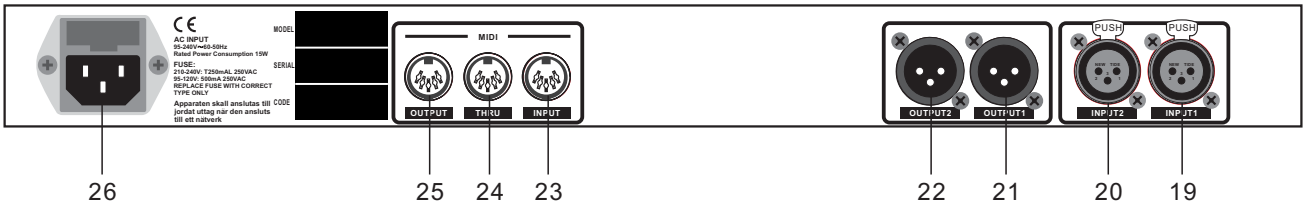


1.Power Switch with LED
2.Channel key with LED
3.Flat key
4.Bypass key with LED
5.Utility key with LED
6.VU meter key with LED
7.AUX key with LED
8.HP/LP key with LED
9.Edit key with LED
10.Dial Control knob
11.Enter key
12.Esc key

13.Up key
14.Right key
15.Down key
16.Left key
17.LCD graphical display 128×64
18.Vu-meter

- **Power Switch With LED (1)**
  Turns the apparatus on and off. Press the SW, the power LED inside the SW will turn on.
- **Dial Control Knob (10)**
  Used only to change editable values.

3.2 The Rear Panel



- **Input (19/20)**
  These are XLR balanced connectors which connect to sources such as the channel inserts of mixing consoles. They may be used with nominal input levels from consumer to professional audio.
- **Outputs (21/22)**
  These are XLR balanced connectors which connect to devices such as the channel inserts on a mixing console or power amplifier input. For mono applications, use the output1 and/or output2.
- **MIDI Connectors**
  MIDI in (23): 5-poles DIN connector for the MIDI input to the CONTROL60.
  MIDI thru (24): 5-poles DIN connector for the MIDI thru.
  MIDI out (25): 5-poles DIN connector for the MIDI output from the CONTROL60.
- **Power Connector (26)**
  This is an IEC 3-pole socket for connecting the AC power supply to the CONTROL60.

4. INSTALLATION & CONNECTION

4.1 Power Up and Audio Connections

a. Audio Connections

The connections between the CONTROL60 and the other audio devices have to be made using high quality cables so to prevent bad performances of the CONTROL60 itself. So it should be good to use low-capacitance shielded cables with a flexible internal conductor. Connect the cables to the CONTROL60 properly by observing the following precautions:

- Do not bundle audio cables with AC power cords.
- Do not place audio cables and CONTROL60 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 CONTROL60'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 CONTROL60 and plug the power cord into an AC outlet.
Turn on the power of the CONTROL60, pushing the ON/OFF button on the front panel.
Turn on the power of the amplifier/mixer, and adjust the volume.

4.2 Installation

a. Standard Use

The CONTROL60 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 CONTROL60 away from other audio equipment that may induce fields, and away from the signal wiring.
It is possible that CONTROL60 may pick up noise fields generated by other equipment such as large power amplifiers; in this case, move the CONTROL60 until the noise goes away.

b. Application Examples

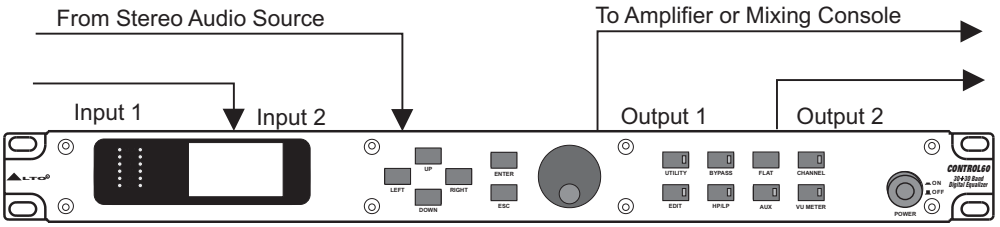
- line instrument

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.
CONTROL60 has two XLR balanced inputs and two XLR balanced outputs allowing the CONTROL60 to be used in a classical Stereo in and Stereo Out connection or in Mono configuration as described below.

• MONO. Select the mono way in EQ TYPE. Connect one audio cable to the Input1 of the CONTROL60 from a mono source, and one or two other audio cables from the Output1 and Output2 of the CONTROL60 to a mono/ stereo amplification system or one/two mixer inputs.

• STEREO. Select the stereo way in EQ TYPE. Connect two audio cables to the Input1 and Input2 of the CONTROL60 from a stereo source, and two other audio cables from the Output1 and Output2 of the CONTROL60 to a stereo amplification system or two mixer inputs.

This connection scheme is suitable also for processing Hi-Fi stereo sources like CD players or recording decks. To process the signal coming from low signal voltage devices such as Hi-Fi turntable cartridges or microphones, please insert before CONTROL60 a suitable pre-amplifier (i.e. a RIAA stage for turntables, our α MicTube for microphones).

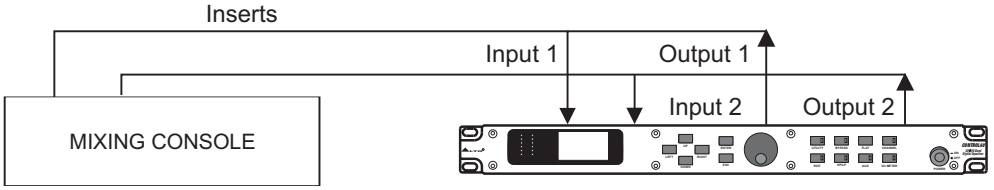


- mixer

Interfacing to a Mixing Console

The CONTROL60 can accept mono or stereo sends at all system levels. The input circuitry of the CONTROL60 can easily accept professional levels while having enough input and output gain to interface with the low signal levels of home recording systems.
The CONTROL60 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 CONTROL60 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 CONTROL60 to a couple of channels arriving to a mixing console, in order to apply the desired equalization to single 'instruments' 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 CONTROL60 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 CONTROL60 via jack-XLR adapters. Fitting this kind of cabling will virtually insert into one mixer's channel the EQ process. Take good care in adjusting CONTROL60 input and output levels, in order to satisfy the dynamics needs of both the processed channels. Do not use for the CONTROL60 the effects send/return connections found on most mixers for effect modules, as they could lead to heavy frequency response alterations.

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

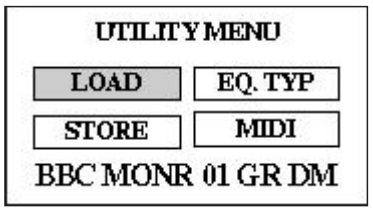
4.3.Operational Overview

Switching ON the CONTROL60, at system startup these screens will appear:

This phase lasts some seconds, then, the system loads the last used preset and proceed to the utility menu, the related LED on, if the system was not bypass when switched on.

4.3.1 UTILITY KEY

To access the UTILITY menu it's necessary to push the **UTILITY** key. When pressing the utility key (utility LED on), this screen will appear:

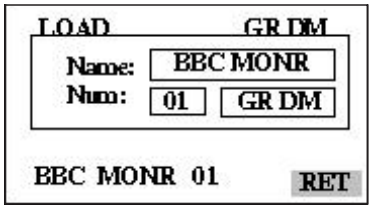


a. Load Preset

This function allows the loading of one of the 99 available presets, where the first 36 presets (6 for each EQ type) are factory presets, and the presets from 37 to 99 are the user's configurable presets and all not initialized (empty) when CONTROL60 is shipped.

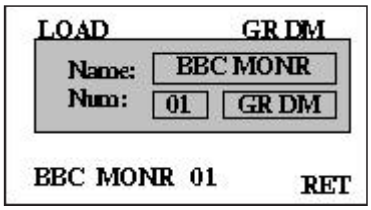
To load a preset:

The starting screen is this:



Here can be found the name, number, type of the current preset. Pressing enter when on the RET item causes the system to return to the main menu.

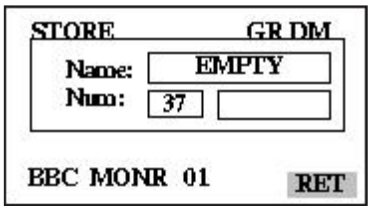
Move into the screen with **UP/DOWN** keys; the user can select the preset field, the selected items are reversed to underline them. To load a preset it is necessary to select the preset item, choose the desired preset with the dial knob and at last press enter.



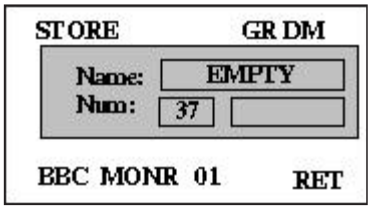
To load the preset. If the EQ is Dual Mono (DM), first choose the channel with the Channel key. It is very important that the preset to be loaded belong to the same type (PAR ST, MN, etc) indicated in the upper right corner to the window. If the user tries to load a different type or EMPTY preset, a warning "NO LOADING" will be shown. To return to main menu select the item RET and press **ENTER**.

b. Store Preset

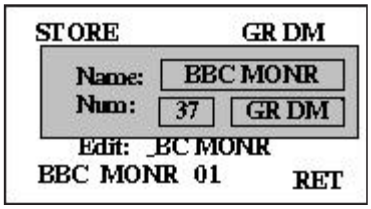
With this function the user can store a preset into one of the 63 locations available to the user. This is the access screen.



In this window the user can find the position in which to save the current preset. With up/down it's possible to select the item RET or the field preset; selected items are graphically reversed.
To save a preset the item Preset has to be selected, with the dial it's possible to choose the desired position and lastly press **ENTER** to save.



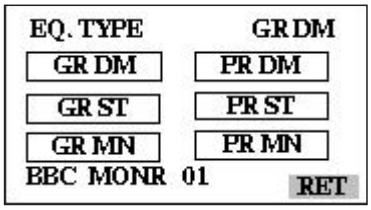
After saving the preset a string of characters will be shown, in which the user will edit the preset's name (max. 8 characters). With Left/Right it's possible to move inside the string, the dial selects the blinking char, Enter confirms, Esc cancels operation allowing to retain the old preset's name.



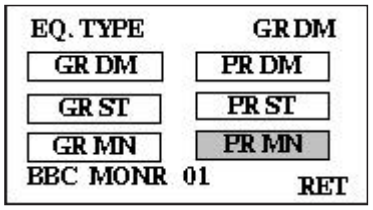
If confirmed, the new name will be shown in the left lower corner and in the preset field.
To return to the main menu, select RET and press.

c. EQ. Type

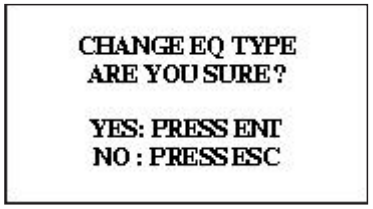
With this function it's possible to change the EQ type.



With Up/Down select one of the 6 possible EQ type (ex. Parametric mono 1×60). Selection is shown reversing the item.



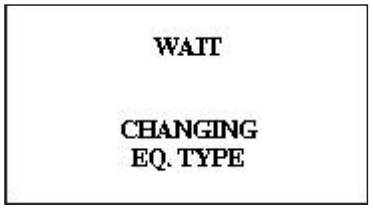
To confirm press enter. The following warning will be shown to the user:



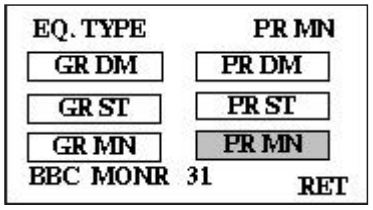
If confirmed, the system will load the new EQ type with a default preset. Whatever editing info which was not stored will be lost.

Use **UP/DOWN/LEFT/RIGHT** key to select one of the 4 fields. Use **ENTER** to access selected function sub-menu.

If the CONTROL60 is already working on UTILITY menu, each further use of the button will have no effect.



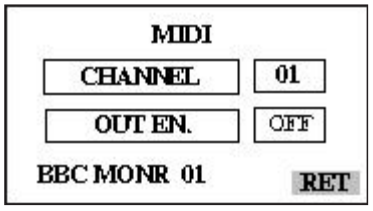
At the end the user will be presented with a window containing the updated preset.



To return to the main menu, select RET and press **ENTER**.

d. MIDI Setup

With this function the user can set the MIDI configuration. This is the starting screen.

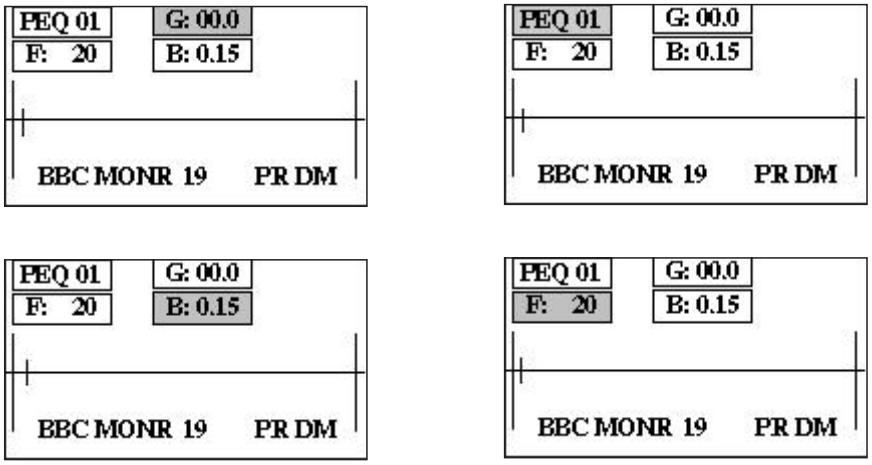


With Up/Down the user can select the MIDI channel and/or the output enable. The selection is shown reversing the item.

With the dial knob the parameter values can be changed (no confirmation needed). To get back to the main menu select RET and press **ENTER**. These two are system parameters and do not belong to any preset.

4.3.2 EDIT EQ

Press **EDIT** key, the related LED on, this screen will present:



Use **UP/DOWN/LEFT/RIGHT** to select an item; filter number, Gain, Freq, Bandwidth.

If the selected item is filter number, then with the dial knob it's possible to change it between 1 and 60 PEQ or GEQ if EQ type is Mono, otherwise 30 PEQ or GEQ per channel. Filter frequency will be shown by a vertical segment crossing the frequency axis.

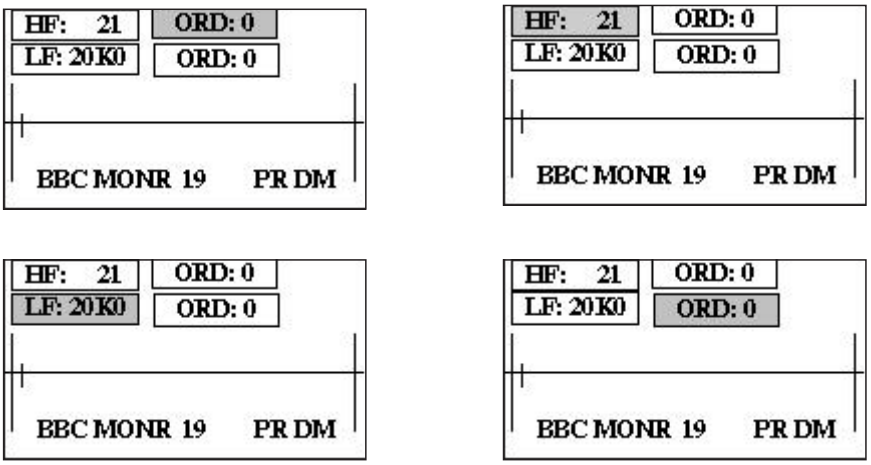
If the selected item is Gain, Freq or Bandwidth, then with the dial it's possible to change the value of the selected parameter. The filter characteristics are varied in real time and immediately audible (no confirmation needed), while the graphics is updated after a small delay. While the system is calculating the new curve an asterisk is shown in the upper right corner of the window.

If the EQ type is graphic it will be possible to select only Gain and filter number.

When into this menu, using the **FLAT** key sets all the gains to 0dB (Edit LED ON).

4.3.3 HP/LP

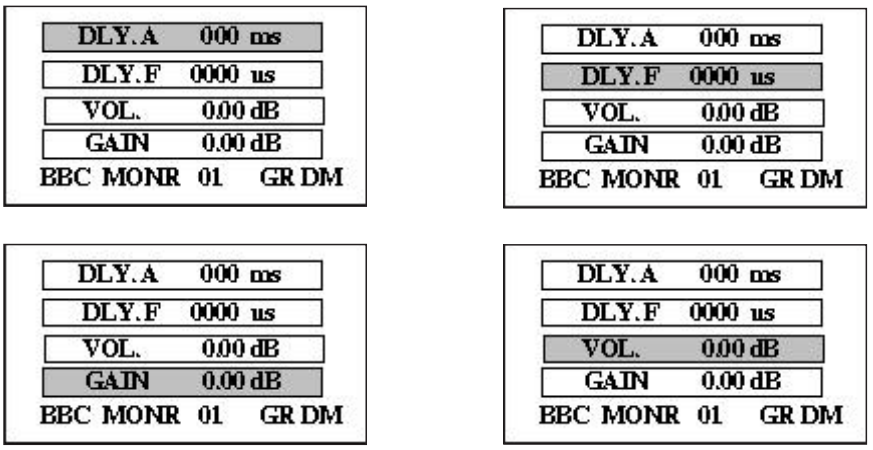
Press **HP/LP** key (the associated LED is ON). This screen will present:



Use **UP/DOWN/LEFT/RIGHT** to select between Freq, Order relative to HP and LP (Butter worth).
Dial changes selected values, while updating the graphics, the asterisk will be shown as above. The filter will be inserted into the signal path in real time (no confirmation needed).

4.3.4 AUX

Press **AUX** key (the related LED is ON), this screen will present:



Use **UP/DOWN/LEFT/RIGHT** to select between Delay Adjust, Delay Fine, Output Volumes and Input Gain.
Dial changes selected values, no confirmation is needed.

When finished editing the EQ preset, if desired the result can be saved with the STORE function; otherwise whatever preset loading will overwrite all the parameters. In the same way when the EQ is switched off all unsaved data will be lost. If the system is switched off while in bypass mode, when switched on again it will start in bypass mode. In this mode all the keys are disabled until the user presses again the **BYPASS** key restoring the system to normal operation.

Bypass key: Using this key is possible to bypass the process, sending to the CONTROL60 outputs exactly the input signals. this is a digital bypass and the input signal is anyway converted digitally before to be sent to the outputs. When the CONTROL60 is in this mode (bypass LED will on), all the keys except the **BYPASS** key are disabled.

Up/Down/Left/Right key: These keys are used to navigate menus.

Enter/Esc key: These keys are used to access or to leave the menus, or to confirm the parameter values.

Edit key: This key allows the user to enter the EDIT menu (the Edit LED will be On).
When entered the edit menu, the user will be able to access and modify all the parameters related to the process. When the user modifies one parameter value, the LED starts to blink to signal the update. The LED will blink until the storing of the new modified preset in one of the 64 available locations.

Vu-meter key: This function allows the user to set visualization of input (LED OFF) or output (LED ON) signal on the LED bar-graphs.

Channel key: Selects the channel to be edited if the EQ type is dual mono; the channels are indicated by different LED colors.

Graphic display: 128×64 pixel

Flat key: By means of this key it is possible to reset all the parametric filters, i.e. Set all the gains to 0dB. This key works only when the edit LED is lit. When entering into EDIT EQ , flat key should be used to set all the gains to 0dB.

5. MIDI STANDARD CONTROL

Control60 Midi standard control

PROGRAM CHANGE

Parameter	Value	Legend
Preset 01 to preset 06	0, 1, 2, 3, 4, 5	Graphic Equalizer 2x30 dual mono
Preset 07 to preset 12	6, 7, 8, 9, 10, 11	Graphic Equalizer 2x30 stereo
Preset 13 to preset 18	12, 13, 14, 15, 6, 17	Graphic Equalizer 1x60 mono
Preset 19 to preset 24	18, 19, 20, 21, 22, 23	Parametric Equalizer 2x30 dual mono
Preset 25 to preset 30	24, 25, 26, 27, 28, 29	Parametric Equalizer 2x30 stereo
Preset 31 to preset 36	30, 31, 32, 33, 34, 35	Parametric Equalizer 2x30 mono
Preset User	36,....., 98	User

Notes:

- If the system is in **bypass** whatever program change command is ignored.
- If the EQ type is Graphic or Parametric **dual mono**, please first af all select the channel on which to load the preset.

CONTROL CHANGE

Parameter	Controller	Value	Bank	Legend
System Bypass	86	0		0=No Bypass; Led Off
System Bypass	86	1		1 = Bypass; Led ON
Bank	0	0, 1, 2		0, 1, 2 = channel Left
Bank	0	3, 4, 5		3, 4, 5 = channel Right
Output Volume	7	0,..., 48	0 = channel L; 3 = channel R	−12 / +12 dB
Input Gain	83	0,..., 48	0 = channel L; 3 = channel R	−12 / +12 dB
Delay Line Adj	82	0,..., 127	0 = channel L; 3 = channel R	508 ms step 4ms
Delay Line Fine	82	0,..., 95	1 = channel L; 4 = channel R	1995 us step 21us
High Pass Filter	80	0,..., 120	0 = channel L; 3 = channel R	HP Frequency
High Pass Filter	80	0, 1, 2	1 = channel L; 4 = channel R	HP Order
Low Pass Filter	81	0,..., 120	0 = channel L; 3 = channel R	LP Frequency
Low Pass Filter	81	0, 1, 2	1 = channel L; 4 = channel R	LP Order
Filer 01, 02,..., 20	12, 13,..., 31	0,..., 60	0 = channel L; 3 = channel R	Amplitude
Filer 01, 02,..., 20	12, 13,..., 31	0,..., 120	1 = channel L; 4 = channel R	Frequency
Filer 01, 02,..., 20	12, 13,..., 31	0,..., 59	2 = channel L; 5 = channel R	Band Width
Filer 21, 22,..., 30	70, 71,..., 79	0,..., 60	0 = channel L; 3 = channel R	Amplitude
Filer 21, 22,..., 30	70, 71,..., 79	0,..., 120	1 = channel L; 4 = channel R	Frequency
Filer 21, 22,..., 30	70, 71,..., 79	0,..., 59	2 = channel L; 5 = channel R	Band Width
Mode	84	0	Mode=0 select filter 01 to filter 30	
Mode	84	1	Mode=1 select filter 31 to filter 60	
Equ. Type	85	0, 1, 2	0 = G2x30DM; 1 = G2x30St; 2 = G1x60M;	
Equ. Type	85	3, 4, 5	3 = P2x30DM; 4 = P2x30St; 5 = P1x60M;	

Notes:

- If the system is in **bypass** whatever control change command is ignored, except controller # 86.
- Select the channel to edit by means of the controller 0 (bank).
- If the type of EQ is Graphic or Parametric **mono (1x60)**, assign to controller 84 (Mode) the value to edit the first 30 filters and the value 1 to edit the following 30 filters.
- At EQ type change, the system loads a default preset belonging to the same EQ type.

Warnings:

1. Before starting a MIDI session please set on the Control60 the same MIDI channel used by the external controller.
2. During a MIDI control session the unit's graphic display is NOT updated.
3. After MIDI use of Control60 it's advisable to run a manual STORE to save preset changes done by means of the external controller. After saving, reboot the Control60 to use it as a stand-along unit.

MIDI Controllers Values

Amplitude −15dB / +15dB step 0.5dB
(Value = d+u)

d \ u	0	1	2	3	4	5	6	7	8	9
0	−15.0dB	−14.5dB	−14.0dB	−13.5dB	−13.0dB	−12.5dB	−12.0dB	−11.5dB	−11.0dB	−10.5dB
10	−10.0dB	−09.5dB	−09.0dB	−08.5dB	−08.0dB	−07.5dB	−07.0dB	−06.5dB	−06.0dB	−05.5dB
20	−05.0dB	−04.5dB	−04.0dB	−03.5dB	−03.0dB	−02.5dB	−2.0dB	−1.5dB	−1.0dB	−00.5dB
30	00.0dB	+00.5dB	+01.0dB	+01.5dB	+02.0dB	+02.5dB	+03.0dB	+03.5dB	+04.0dB	+04.5dB
40	+05.0dB	+05.5dB	+06.0dB	+06.5dB	+07.0dB	+07.5dB	+08.0dB	+08.5dB	+09.0dB	+09.5dB
50	+10.0dB	+10.5dB	+11.0dB	+11.5dB	+12.0dB	+12.5dB	+13.0dB	+13.5dB	+14.0dB	+14.5dB
60	+15.0dB									

Frequency 20Hz- 20KHz step 1/12 oct
(value = d+u)

d \ u	0	1	2	3	4	5	6	7	8	9
0	20	21,2	22,5	23,7	25	26,6	28,3	29,9	31,5	33,6
10	35,8	37,9	40	42,5	45	47,5	50	53,5	57	59,5
20	63	67	71,5	76	80	85	90	95	100	106,5
30	113	119	125	134	143	151,5	160	170	180	190
40	200	212,5	225	237,5	250	266,5	283	299	315	336,5
50	358	379	400	425	450	475	500	532,5	565	597,5
60	630	672,5	715	757,5	800	850	900	950	1000	1062
70	1125	1187	1250	1337	1425	1512	1600	1700	1800	1900
80	2000	2125	2250	2375	2500	2662	2825	2987	3150	3362
90	3575	3787	4000	4250	4500	4750	5000	5325	5650	5975
100	6300	6725	7150	7575	8000	8500	9000	9500	10000	10625
110	11250	11875	12500	13375	14250	15125	16000	17000	18000	19000
120	20000									

Bandwidth 0.05 oct - 3 oct step 0.05 oct
(value = d+u)

d \ u	0	1	2	3	4	5	6	7	8	9
0	0,05	0,1	0,15	0,2	0,25	0,3	0,35	0,4	0,45	0,5
10	0,55	0,6	0,65	0,7	0,75	0,8	0,85	0,9	0,95	1
20	1,05	1,1	1,15	1,2	1,25	1,3	1,35	1,4	1,45	1,5
30	1,55	1,6	1,65	1,7	1,75	1,8	1,85	1,9	1,95	2
40	2,05	2,1	2,15	2,2	2,25	2,3	2,35	2,4	2,45	2,5
50	2,55	2,6	2,65	2,7	2,75	2,8	2,85	2,9	2,95	3

Input Gain & Output Volume −12dB/+12dB step 0.5dB
(value = d+u)

d \ u	0	1	2	3	4	5	6	7	8	9
0	−12.0dB	−11.5dB	−11.0dB	−10.5dB	−10.0dB	−09.5dB	−09.0dB	−08.5dB	−08.0dB	−07.5dB
10	−07.0dB	−06.5dB	−06.0dB	−05.5dB	−05.0dB	−04.5dB	−04.0dB	−03.5dB	−03.0dB	−02.5dB
20	−2.0dB	−1.5dB	−1.0dB	−00.5dB	00.0dB	+00.5dB	+01.0dB	+01.5dB	+02.0dB	+02.5dB
30	+03.0dB	+03.5dB	+04.0dB	+04.5dB	+05.0dB	+05.5dB	+06.0dB	+06.5dB	+07.0dB	+07.5dB
40	+08.0dB	+08.5dB	+09.0dB	+09.5dB	+10.0dB	+10.5dB	+11.0dB	+11.5dB	+12.0dB	

6.TECHNICAL SPECIFICATIONS

Parametric Filters	Gain	- /+15dB step 0.5dB
	Freq	20Hz - 20KHz step 1/12 oct
	Bandwidth	0.05oct - 3oct step 0.05oct
Band Pass Filters	High pass Butterworth	
	Freq	20Hz - 20KHz step 1/12 oct
	Slope	Bypass, 1st ord (- 6dB/oct), 2nd ord (- 12dB/oct)
	Low pass Butterworth	
	Freq	20Hz - 20KHz Step 1/12 oct
	Slope	Bypass, 1st ord (- 6dB/oct), 2nd ord (- 12dB/oct
AUX Section	Delay line	Up to 512 ms min step 21us
	Digital input gain	- /+12dB step 0.5dB
	Digital output volume	- /+12dB step 0.5dB
Analog Input Section	Inputs	2 XLR - F electronically balanced
	Input Impedance	>40 Kohms
	Max. Input Level	+12dBv
Analog Output Section	Outputs	2 XLR - M electronically balanced
	Output Impedance	<200 Ohms
	Max. Output Level	+12dBv
Digital/Analog Interface	Amplitude Response	20Hz - 20KHz
	Signal to Noise Ratio	>99 dB
	THD+N	0.01% @ 1KHz - 3 dBFS
	Sampling Frequency	46.875 KHz
	Conversion	Input 20 bits Sigma-Delta
	Conversion	Output 24 bits Sigma-Delta
Memory	Factory preset	36 (6 for each EQ type)
	User preset	63
MIDI Section	Connections	Input/output/thru
	Sockets	5 - poles DIN(female)
	mode	Photocoupled
Power Supply	Connector type	3 - pole IEC, grounded
	Type	Servo controlled, switching
	fuse	210 - 240V: T250mAL 250VAC
		95 - 120V: 500mAL 250VAC
	AC Input	95 - 240V~60 - 50Hz
	Rated power consumption	15W
User Interface	Graphic Display	128× 64 dot
	Keyboard	14 user keys/8 LEDs
	Vu - meter	2×6 LEDs
Physical	Size	Standard 19"rack mounting
	Dimensions	483(W)×232.5(D)×44(H)mm(19"×9.3"×1.7")
	weight	3.5Kg(7.72lb)

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 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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