



FROM SERIAL NO: **03001**
Version 1.4

**USER'S MANUAL
SPL CONTROLLER**

MRC AUDIO

LD- 500

1. INTRODUCTION

Congratulations by the acquisition of MRC AUDIO Controller LD-500, the system to watch the emissions of music in public leisure places. This is an equipment that regulates the maximum level of sound emission of a musical equipment acting smoothly on the signal of audio. This avoids infringing Municipal ordinances on the matter and assures a perfect coexistence with its neighbours possibly affected.

In order to detect the SPL level, a calibrated microphone is used within this equipment. The signal generated by this one is weighted according to the curve "A" and it is constantly displayed in a digital remote display calibrated in decibels. Optional remote display has been arranged in a separated box of the main equipment to be able to fix it to the most appropriate place.

This signal compares with levels set tings during the programming and shown in display LCD. In the case of limitation, no matter how much the input signal or the amplification in the power stages is increased, the level in the room will not surpass the fixed one like threshold. The performance of the limiter is indicated by a series of leds marked with 5, 10, 15 and 20 dB of attenuation in remote display. Although it does not indicate over these amounts, the equipment will even continue limiting if the signal is increased more than 60 dB. The AUDIO LED in the frontal and in remote display indicates the overload of the audio input.

In facilities where it is required to use the own signal of audio as limitation control, we can choose it during the programming. The circuit of limitation is one of the important advantages of this equipment since its design avoids the disagreeable effect of pumping or sound of breathing of most of the limiters, obtaining therefore a great quality in listening even with high levels of attenuation.

In addition, it is provided with a memory that maintains the last level of attenuation when the signal of audio is interrupted. So, when starting again itself the sound, does not have an abrupt sound, maintaining the previous level.

The circuit of control is based on a microprocessor that shows in a LCD display of 2x20 characters the number of alarms that take place and the time that has passed in each one of these along with the date, hour and level in dB of each event, storing these registries in a permanent non-volatile memory. It regulates the total schedule of operation with 4 different levels of work for every day of the week with automatic change of hour for winter-summer. Store and shows the date of the accumulated programming and resets. Program six off duty periods between two dates, in which it will not count alarms and set the work level to the maximum.

All these adjustments are only possible through a frontal keyboard with code of access and identification that prevents any no authorized manipulation. As additional security against the manipulation exists a circuit that detects an alarm if the microphone is disconnected, moved from the original positioning or is covered, registering the moment at which it was manipulated. For a greater security, we also counted on a protector flap of the audio connections with seal screws.

As complement for its installation and setup, the equipment incorporates a pink noise generator with internal and external output. All these elements are described in the block diagram of **fig.1**.

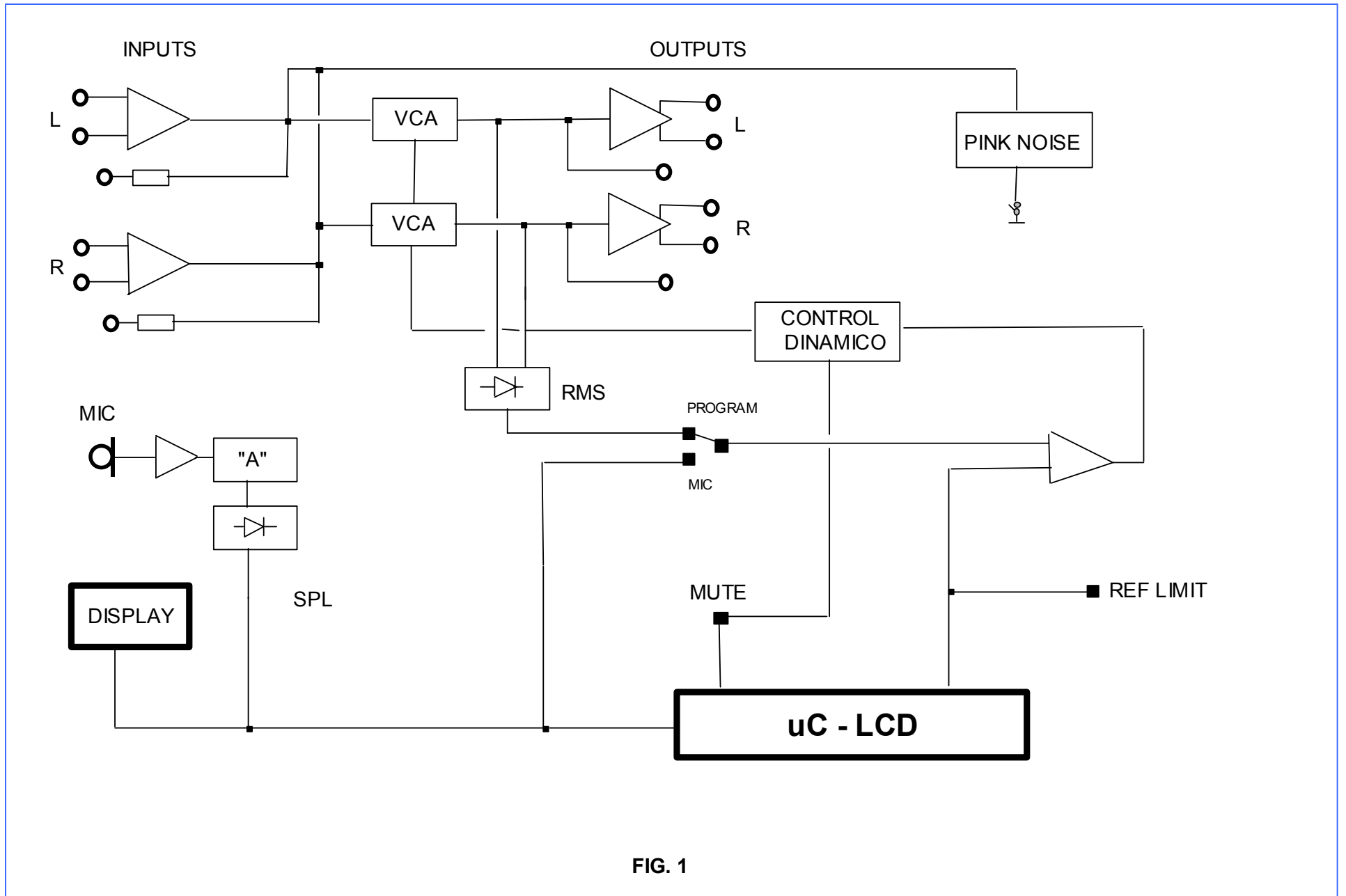


FIG. 1

2. DESCRIPTION

Next we are going to talk about to the fig 2 that shows the necessary controls and connectors for a correct use of LD- 500

1. **OUT NOISE** -- The equipment has an internal pink noise generator that will allow a more practical adjustment of the installation. When activating the NOISE switch, the signal of this generator are mixed with the audio inputs or in the jack output, when introducing a male plug. The audio level is about 1 V rms
2. **DISPLAY** -- Backlighted LCD display that shows all parameters
3. **AUDIO LEVEL** -- Three LED indicate the state of the sound: Green it indicates Normal input signal, Yellow means Prealarm and RED means audio mute.
4. **KEYBOARD** -- Different keys that allow us to move through the different screens of the LCD and set all the parameters
5. **RS232** -- Sub-D connector for link to a computer in future applications
6. **STATUS LED** -- Leds that indicates the status of Programming, Alarm and audio input level
7. **ID KEY** -- Sensor for the personal Identifier
8. **POWER SWITCH** -- Switch for power on the apparatus
9. **MAINS INPUT** -- Standard IEC mains input socket with earth link and internal fuse. Normally is connected to work to 220 volts, but if it is necessary you can reconnect the inner jumper for 110 v. For reasons of personal security is recommended that you always use the earth connection
10. **GROUND LINK** -- Sliding switch to link the electronic ground of the equipment to the electrical earth and chassis. In position ON they are linked.
11. **DISPLAY** -- Connector for remote display. It is recommended to switch off the equipment before handle it.
12. **ALARM OUT**-- Outlet for external equipment feeding on alarm status and activated by the circuit of control. Max. Output load 600W
13. **XLR OUT** -- Connectors of balanced audio outputs for left and right channels.
14. **IN/OUT** -- RCA connectors for unbalanced audio inputs and outputs of the left and right channels
15. **XLR IN** -- Connectors of balanced audio inputs for left and right channels.
16. **SENSE MIC** -- Connector for specific sense microphone. Not use any other microphone for this purpose.

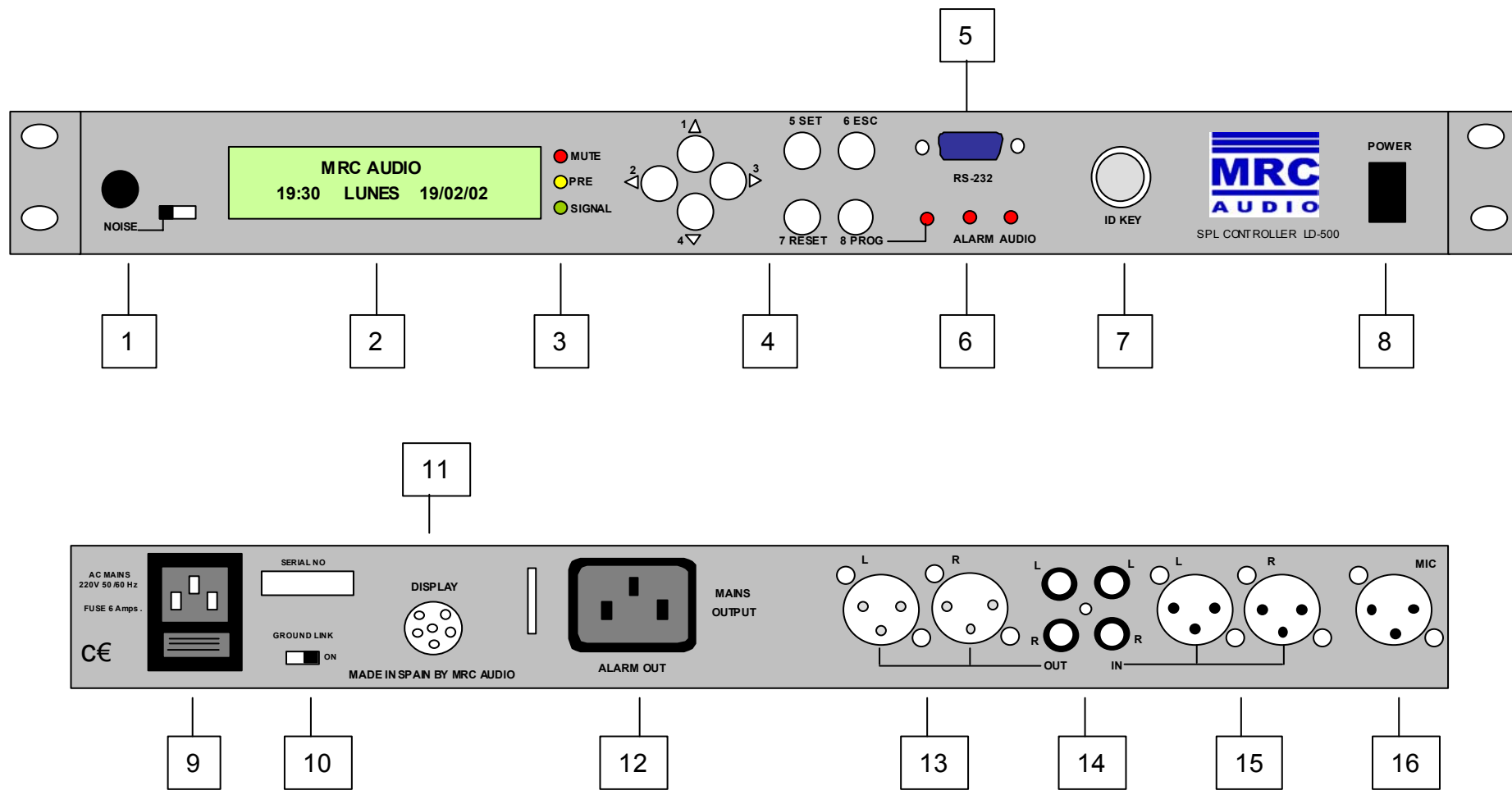


FIG. 2

3. INSTALLATION

1. Connect remote display by means of its cable to connector DISPLAY (11). This cable has a length of 4 meters.
2. Connect the microphone to sense mic socket

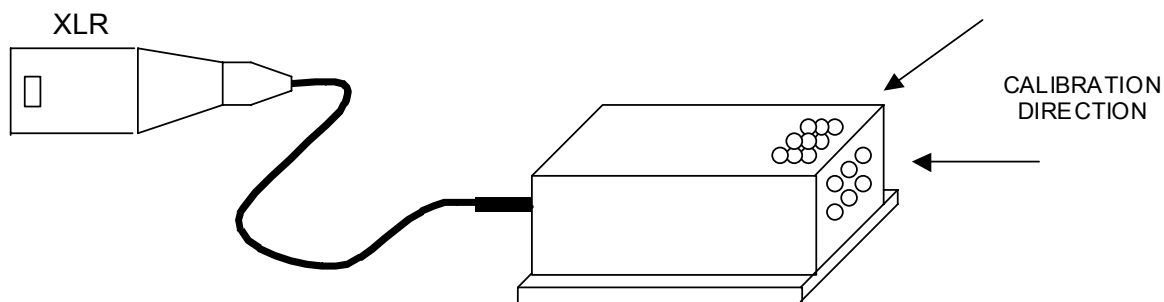


FIG. 3

3. Place it in an average position between all the sound sources in order to detect both channels of audio. We must always place the microphone in the zone where logically the competent Authority will carry out the level measurement, so that the alarm activates with the real level of SPL.
4. Connect the audio inputs and outputs to RCA connectors (14) or XLR's (13 and 15) so that the equipment is immediately connected before the stage of power or frequency crossover.
5. Finally, we will connect the provided cable to the mains supply, always trying to use the electrical earth for personal security. Check that display works and make sure that the sound is correct. If hum noise appear, please, slide the switch (10) to the position we avoided the problem. Possibly it will be necessary to verify a similar switch in other equipment of the chain until reaching the best solution.

The brackets of subjection to rack can be cleared to install it in furniture with measures for standard Hi-fi equipment

The equipment must settle far from sources of humidity, heat, smoke or dirt that could cause failures.

4. DISPLAY DESCRIPTION

In the LCD display screens, we have reflected all the parameters that regulate the operation of the equipment and the registry of events related to their operation.

When power on the equipment, first that we see is the brand name and serial n° along three seconds during which the equipment does not sound.

MRC AUDIO N° Serial 02345A

Next, appears the screen that will be the default one where we can see the actual SPL level measured by the microphone and in the lower line, the date, day of the present week and time. The internal clock is programmed to consider the leap year days of the month, automatic time changing for summer and winter, advancing one hour the last Sunday of March changing from **1: 59** to **3: 00** and the last Sunday of October backs one hour from **1: 59** to the **1: 00**

SPL 100.5 dBA 10 / 07 / 01 Jue. 12 : 00
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If the date and hour corresponds to a no authorized period of work, in the superior line appears the label Status:**Out of time** and the sound is muted.

If the date and hour corresponds to an off duty period, in the superior line appears the label Status: **Bypass** and does not exist limitation nor registry of Alarms.

When audio signal is in input, noticeable LED SIGNAL on. When the level exceeds or another alarm takes place, LED PRE is on and if this situation of alarm is continuous during some seconds, will on the LED MUTE and the sound is muted, whenever we have a Mute Time assigned in the corresponding screen.

When taking place any situation of Alarm, we will see reflected in the inferior line the type of produced alarm: LEVEL, MIC, MANIP and in superior the time of Mute and its reduction until returning to sound when the Alarm disappears.

In normal situation of work, display will be almost extinguished to prolong its life and to save energy. When pressing any key or if an alarm takes place, will on again.

5. PROGRAMMING

The way to change values of the different parameters from operation is the following one:

When we go to programming by means of push button **PROG - 8**, appear the screen

Introd. Clave:
o ID ACCESS

Introduce in the keyboard the four digits of the access key that by defect are: **1234** and that later we will be able to change. Also we can enter with the ID button that authorizes and identifies with date and time the last access. If we have introduced the correct PIN or we have the authorized button, appears the screen

Allowed access

and next

Select Param
Adjust Gain

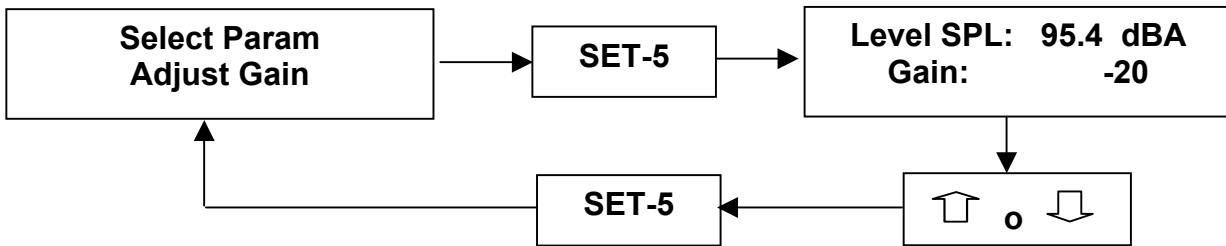
If now we pressed the **UP-1** key, in the inferior line appearing the different parameters that we can visualize and modify in the following order. Pressing the **DOWN-4** key, we move in the opposite order.



1. Adjust Gain
2. Select Mic/LIne
3. Adjust Level Mic/Line
4. Working Levels
5. Program. Mute Time
6. Off duty periods
7. Set the clock
8. Change Language
9. Change Access Key
10. Historic erase
11. Totals erase
12. Unblock the system

When we arrive at desired parameter, we pressed **SET- 5** and we have the possibility of change the values within each screen.

5.1. ADJUST OF GAIN

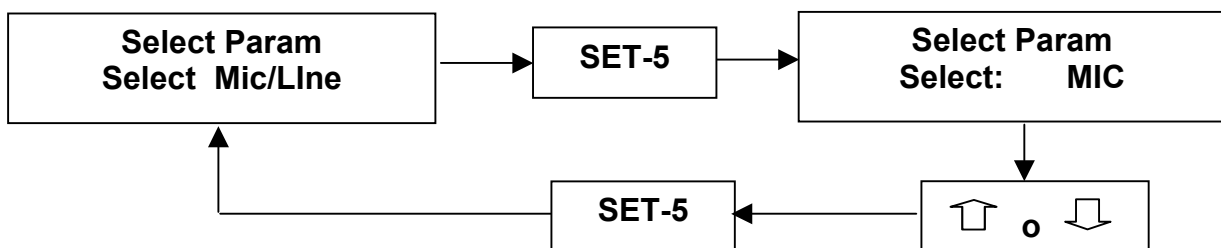
This adjustment allows us to fix a level of global attenuation for the signal through the equipment. This way, we can fix a gain of the chain adapted at the level of work without having to compress so much the signal. Example: if the musical chain can produce a maximum level of 115 dBA of SPL, but the allowed maximum level is 90 dBA, we can reduce to the GAIN about 20 dB so that the total level is now of only 95 dBA without limitation. Later we will fit the level to 90 dBA and 5 dB of difference will already only have to reduce.




When pressing **SET-5**, blinks the digits of Gain and with the keys  or  we varied the value until arriving at the correct one. At the same time we see the reading of measured Level SPL. We press again **SET-5** and the value is set.

5.2. SELECT MIC/LINE

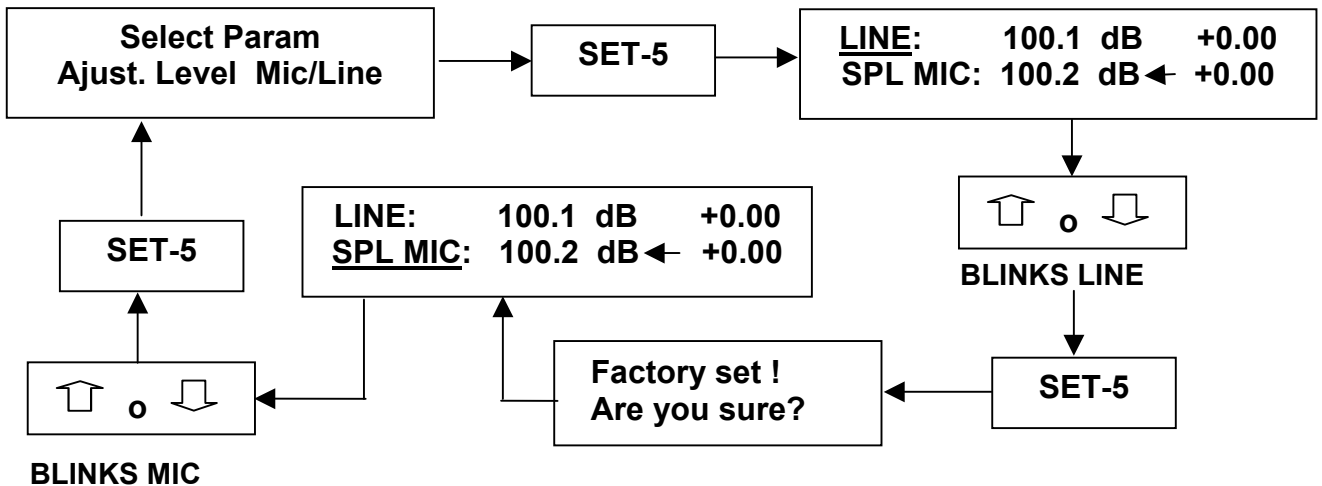
We can choose the signal that controls the limitation: the signal measured by the microphone or the audio program at the output. In places with an maximum level allowed than 90 dBA, is preferable to use the limitation by audio Program or LINE, since the voices of the public would surpass the level and would make descend the music level which become in a deficient listening.



When pressing the keys  or  successively appear the words MIC and LINE, when we have in screen the desired one, we pressed **SET-5** and is fixed.

5.3. ADJUST LEVEL MIC/LINE

In this screen we fit the measurement of the audio output, blinking, to equal it with the SPL measurement, already calibrated in factory. At the same time, we see the one that is chosen as control of the limitation by means of an arrow in the corresponding line. For a correct operation, we must equal both readings once the audio installation is complete and ready to work. The adjustment of the measurement of microphone MIC, comes calibrated from factory, reason why its adjustment will be only made in exceptional cases to calibrate the measurement in the present location of the microphone if it does not correspond with the measurement of a calibration sound level meter. In any case, if we tried to modify it, a screen warns to us of the risk and requests confirmation. If it is completely necessary to do it, is necessary to have a **precision sound level meter** to compare the adjustment.



When entering the first window, blinks that the magnitude we can modify. With **UP-1** and **DOWN-4**, we modify the value and when pressing **SET-5** fit the adjustment and start to blink the other line. Now, we can modify the value of this and fixing it with SET-5, that move again to the parameter screen.

5.4. WORKING LEVELS

In this section we can fit four different periods of working time, with its corresponding levels of limitation. These periods of time can be fit for every day of the week. We can distribute the 24 hours of the day in four sections with different working levels but we cannot superpose two periods with different level for two different screens. The end time **always** must be greater than the beginning one.

Select Param
Working Levels

With this parameter in the window, we pressed the key SET-5 and appears the screen corresponding to the working Level L- 1 blinking

L1 100 dB 10:00 12:30
Days: M t w Th F s S

If we want to fit anyone of the other three periods or levels, we move by its 4 screens with the **LEFT-2** and **RIGHT-3** keys and when we arrived at which we want to fit we press **SET - 5** again and begins to blink the number of dB in the following screen of Mod. Level and Time

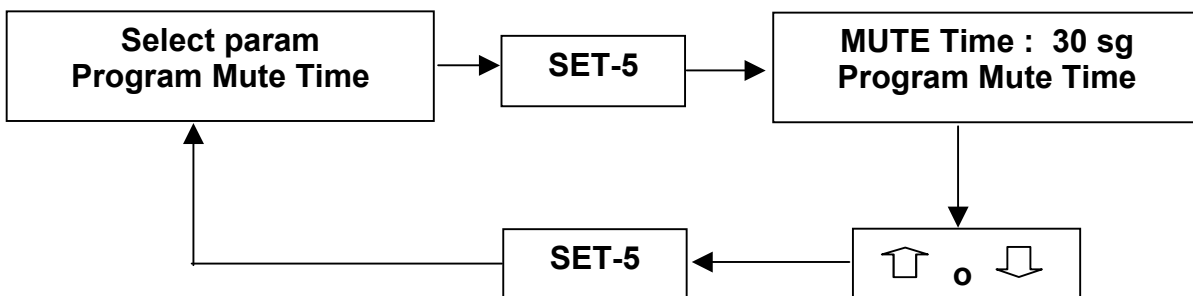
N1 100 dB 10:00 12:30 Mod. Level Time
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With the keys **UP-1** and **DOWN-4** we can vary the value in dB. When it is fit, we go to the schedule time with the **LEFT-2** and **RIGHT-3** keys and in the same way, we change values. When these values are the desired ones, we pressed **SET-5** again and we go to program the days of the week in which that fitted working level will be operative. With the **UP-1** and **DOWN-4** keys we change the days of small letters to **capital letters**, where they will be active.

Program day of week Days: M t w Th F s S

5.5. PROG. MUTE TIME

In this window we fit the time of punishment that will be added to the mute of audio signal produced by an alarm. If we wrote 00 sg. There will be no punishment time even don't show the alarm, but if it will count it in the registry of events

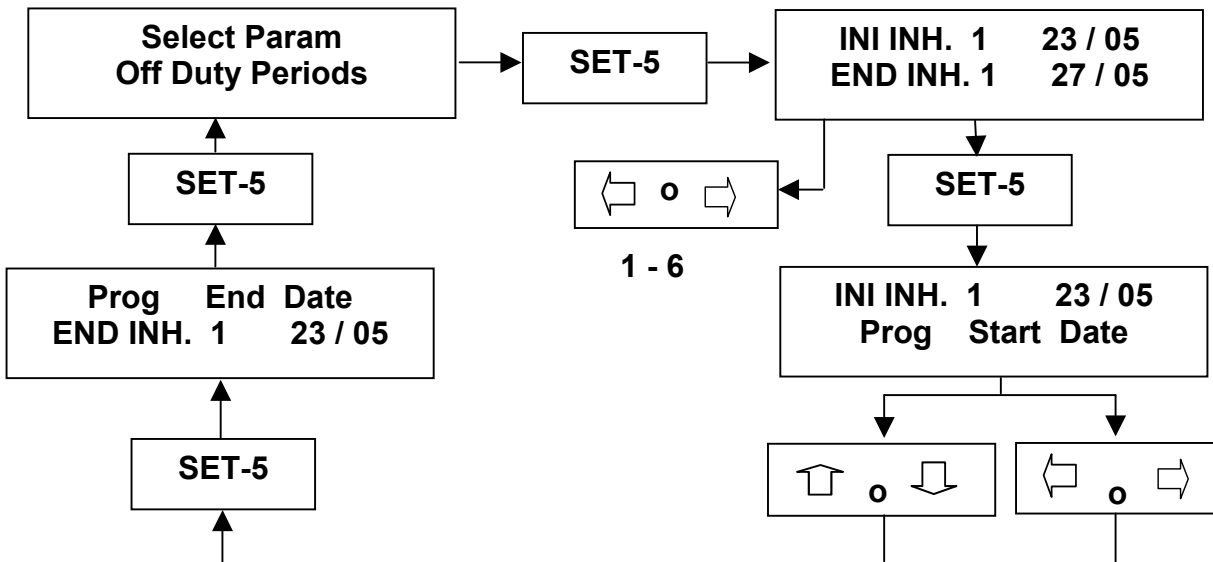


When the alarm situation takes place, it appears another window that indicates the state of Mute and the time of punishment. When stopping the alarm, begins to downwards discount until reaching zero where it begins to sound again.

Estado Mute	0:30
Nivel Manip Microf	

5.6. OFF DUTY PERIODS

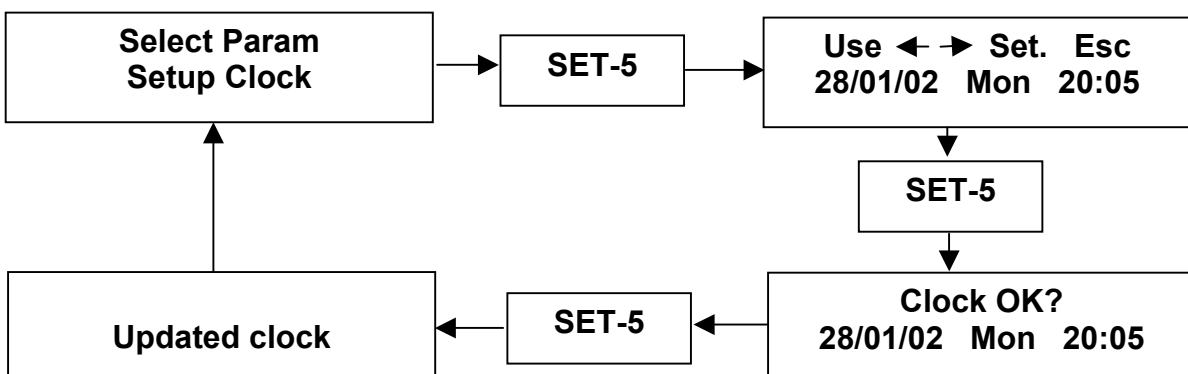
Six periods can be programmed in which the equipment inhibits Limiting and register Alarms behaving like total bypass. The upper line indicates date **INI** in that when arriving at 00:00 the off duty period will begin. And lower, show the date **END** in which also at 00:00 the equipment is deactivated this period and returns to limiting and to register the alarms that takes place. In this screen we must program always some date. If we wrote the same date in both lines, there will be no off duty period.



Next we repeated the operations for the Off Duty Periods from 2 to 6 moving trough with the keys of displacement **LEFT-2** and **RIGHT-3**

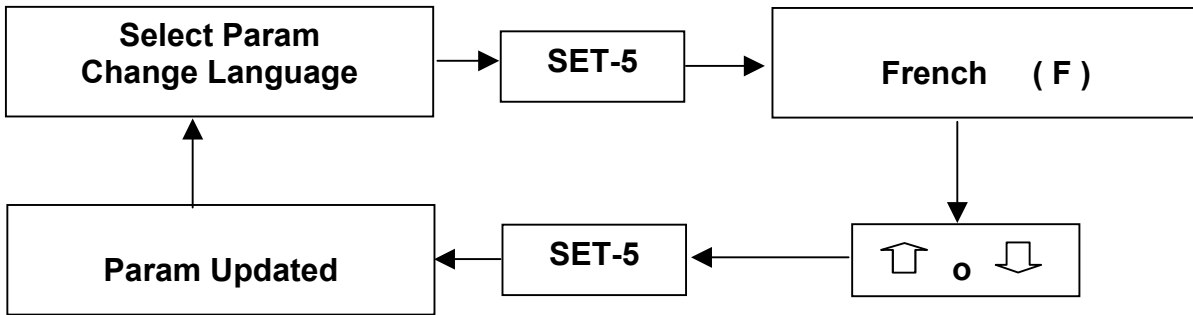
5.7. UPDATE CLOCK

Here we can fit to the time and actual date of the equipment. Before leaving the Programming, please, verify that the data are correct, since all the registries will become in reference with this clock



5.8. CHANGE LANGUAGE

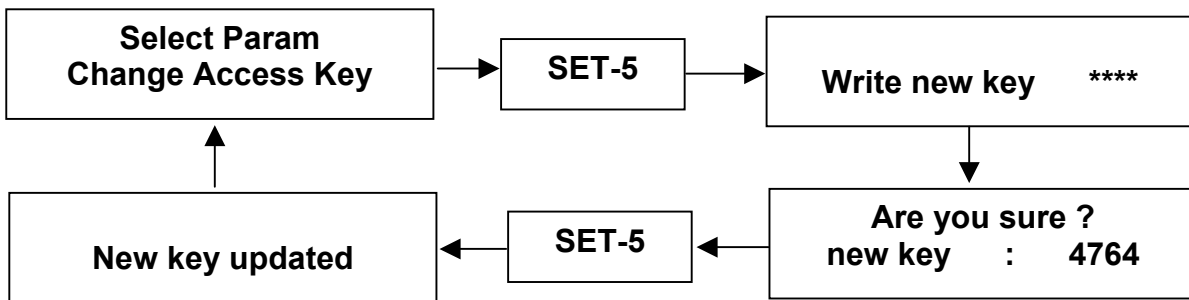
We can choose the language of all instructions in: Spanish, French or English



Once is selected, press **SET-5** and appears the screen of the first Language. With the **UP-1** and **DOWN-4** keys, we can change the Language and once selected, press again **SET-5** and is activated forever until we change it again

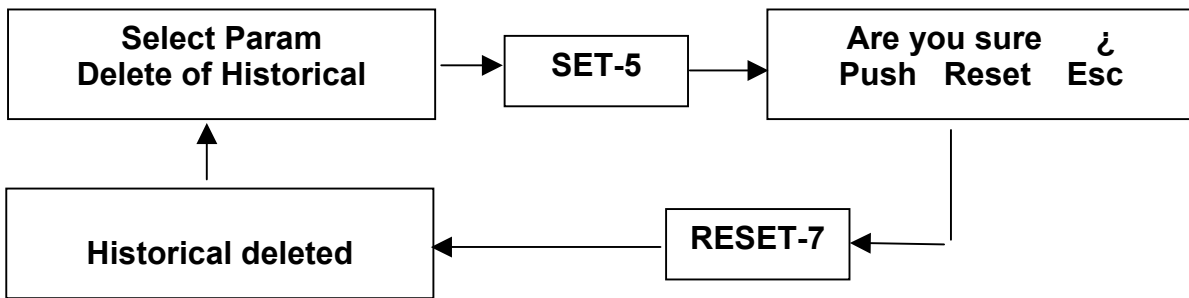
5.9. CHANGE ACCESS KEY

Although by default the unit access key is **1 2 3 4**, at any time we can change it on this screen, introducing by means of the keyboard new four digits that will be our personal key of access to the equipment for the new access.



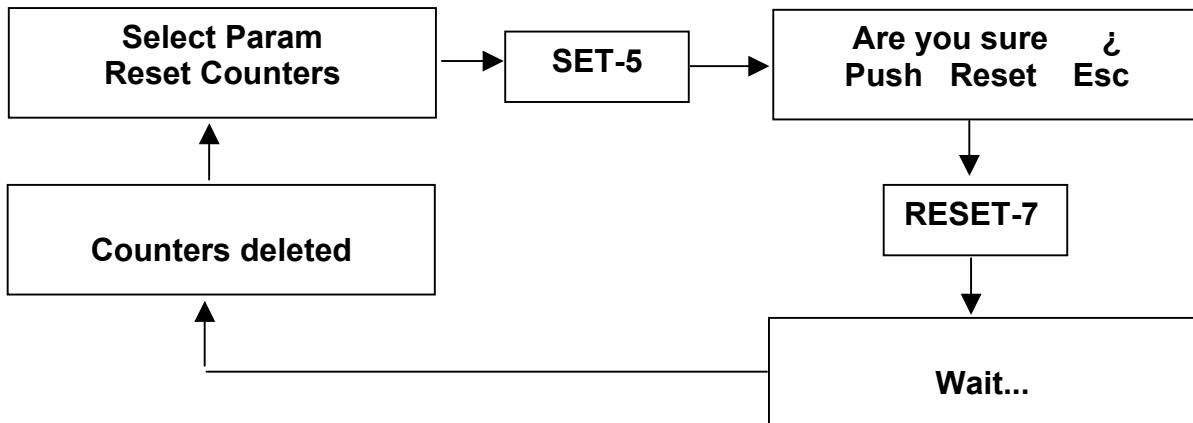
5.10. DELETE OF HISTORICAL

Here, we can erase the list of all the accumulated events from last complete reset. Be sure that always had checked the accumulated data by the inspecting Authority



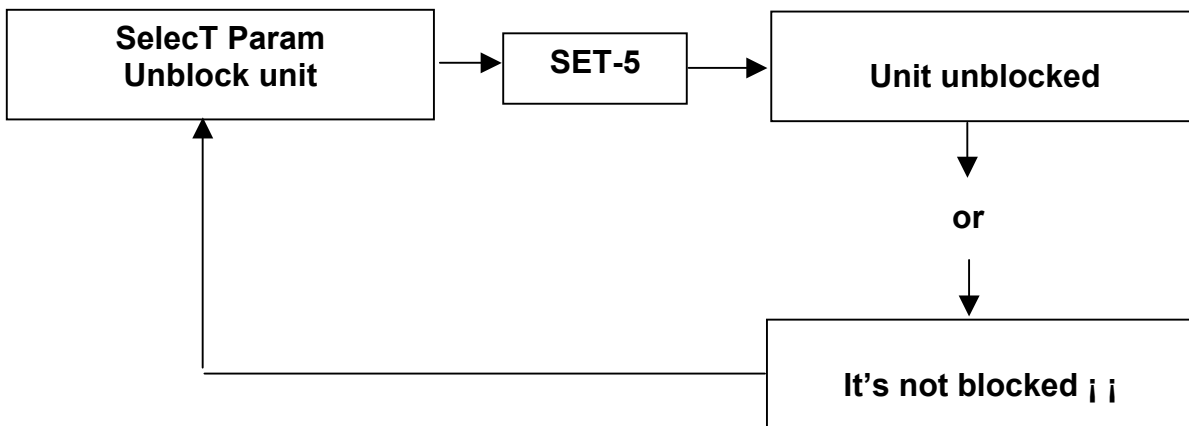
5.11. BORRADO DE TOTALES

This control all counters resets and increase one count the total and undeleted reset counter



5.12. UNBLOCK UNIT

When 6 successive Level Alarms, in the term of 1 hour take place, a Total Mute takes place that maintains the equipment blocked without sound until it is freed through this screen (ONLY IN EQUIPMENTS DISTRIBUTED IN FRANCE)



With all these steps we have set the equipment for a perfect operation. In the home screen, they will appear the labels LEVEL, MIC and MANIP in the lower line when one of the respective alarms takes place. After fitting all the necessary parameters, to leave programming, press the ESC-6 key the times that are necessary to leave from the programming window in which we were. If we did not touch any key, the equipment itself goes away from the programming after 5 minutes of inactivity.

6. WORKING PARAMETERS CHECK

To check all the working parameters and Alarms counters, press the **SET-5** key from the home window

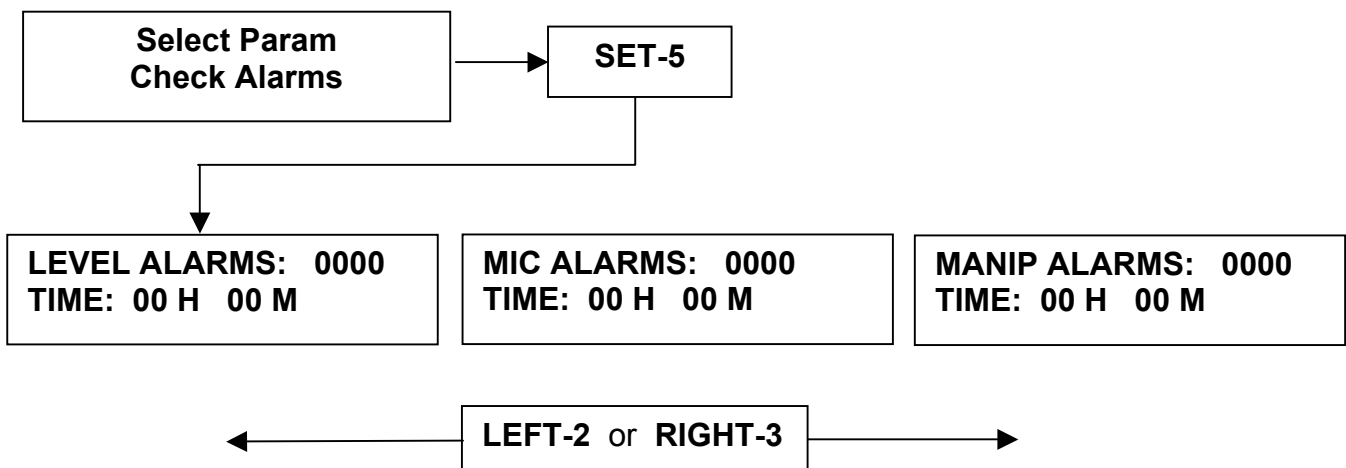
Select Param
Check Alarms

Pressing **UP-1** and **DOWN-4** you can choose the parameters you want to check.

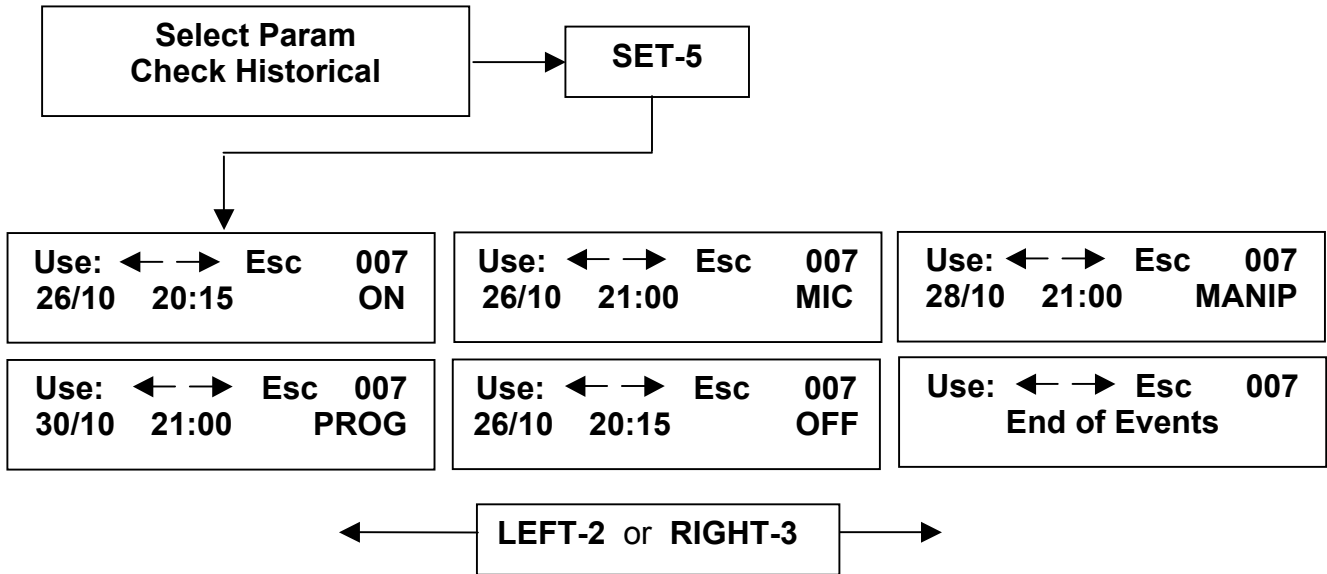
1. Check Alarms
2. Historical
3. Working Levels
4. Off duty Periods
5. Last setting
6. Last Reset
7. MIC/LINE Control
8. Gain

When we get the desired one, press again **SET- 5** and appear the corresponding data in the screens that that section contains. To move along them, we used the keys **LEFT-2** and **RIGHT-3**. If we want to return to the previous screen, we pressed **ESC-6**. If it only has a screen, we can use to leave the keys **UP-1** and **DOWN-4** that take us to following or previous one of the list. If we did not touch any key, the equipment automatically takes us to the previous menu and thus until the home screen.

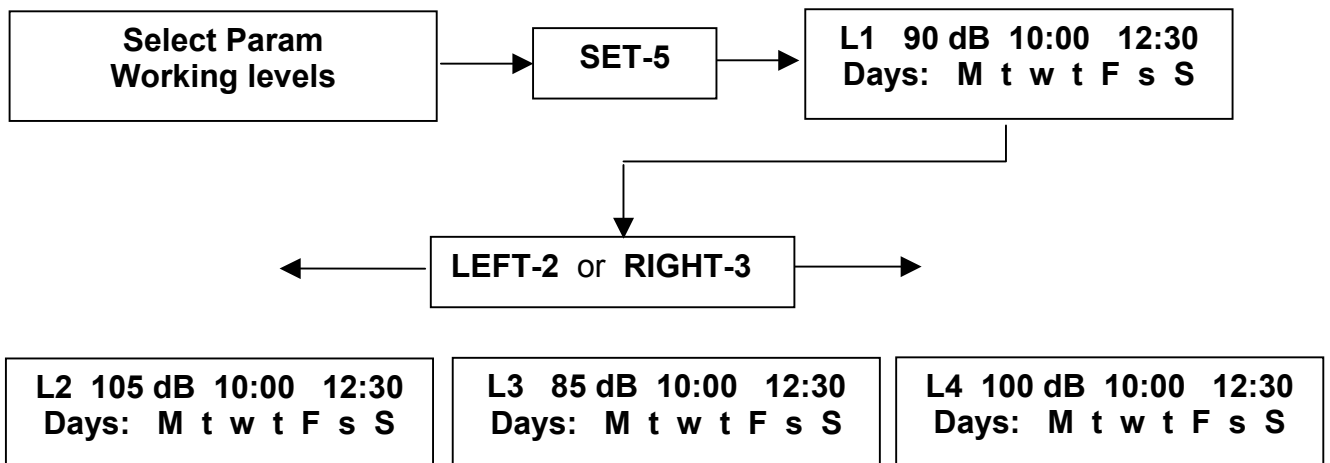
6.1. ALARMS



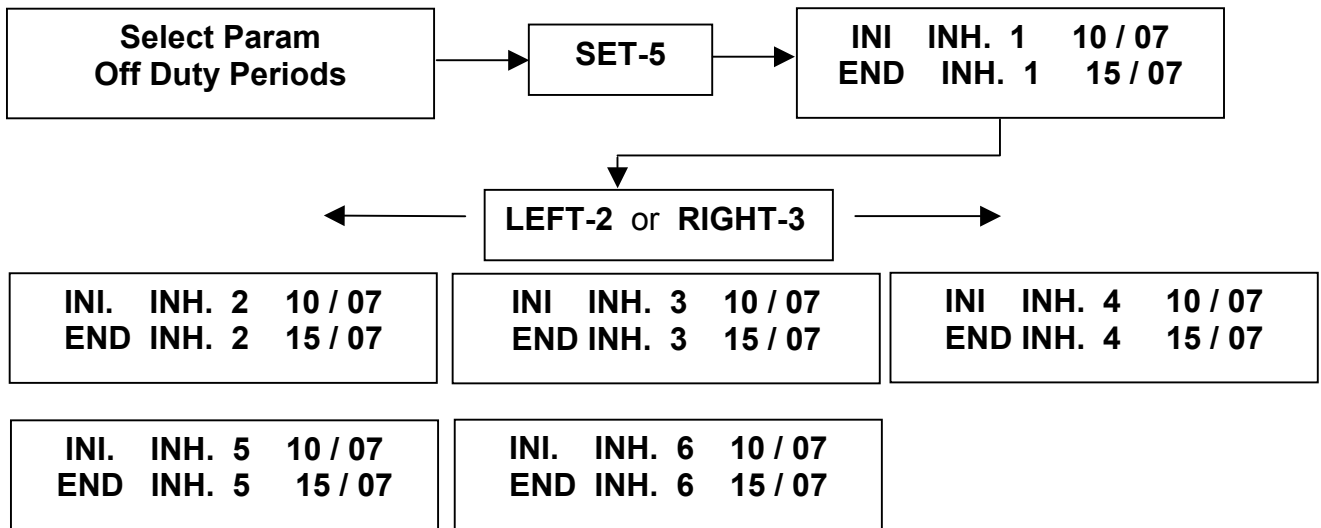
6.2. HISTORICAL



6.3. WORKING LEVELS



6.4. OFF DUTY PERIODS



6.5. LAST PROGRAMMING

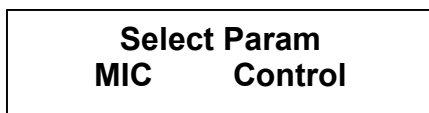
Here, we can check the last programming date and the number of working sessions from the last reset



6.6. LAST RESET



6.7. MIC/LINE CONTROL



6.8. GANANCIA



7. ADJUSTMENTS

After to have finished all the process of installation and once verified the normal sound, and after 5 minutes of operation, then, we will follow the procedure of adjustment of the equipment.

- First, we will verify in display the level of measured sound pressure level SPL, must vary with the level of noise in the room. If the measurement is fixed and of about 35 dBA it means that the microphone is incorrectly wired and will ON the MIC alarm, muting the sound and increasing the counter.
- Connect the internal pink noise with NOISE slide switch and use it in internal way or feed it to the mixer from PINK NOISE output jack.
- Set the gain controls along the sound chain in its normal working settings
- Set Gain of the equipment while increasing the level of amplification in the power amplifiers to the maximum to obtaining a real measurement of SPL in the room, about 6-8 dB higher the maximum level allowed in anyone of the schedules times
- Set the penalty time that we want to add to the ALARM mute or to avoid its activation if we write 0 sg.
- The reading of SPL MIC comes calibrated from factory, so that if we really want to vary this value, it will request confirmation.

If we really need to change the original calibration of the internal sound level meter, must do it with much awareness and with a precision sound level meter to always compare the measures

- Now we must calibrate LINE signal level respect to the SPL one. Comparing it visually with the SPL level, we will adjust level to make equal to SPL–MIC level showed in the other line of the screen. It's useful to recheck this adjust with music instead pink noise.
- Once both signals are equals, if we want to use output line as the control signal, we can change the selection of MIC to inferior position LINE, with which, the own audio program signal will serve to us as control for the limitation.
- Set each one of the 4 different work levels to its schedules and days of activation
- According to the day and hour in which we are, the equipment will begin to limit the sound to the maximum that corresponds in this time. In display remote or anyone of the screens that measure SPL, we will have the reading of the actual level
- With display remote of SPL and **with a calibration sound level meter** we will measure the real level and we will verify that no matter how much we raise the level of audio in the entrance, the SPL will not increase in the room.

- The excess of input level will indicate the AUDIO led located in display remote and in front panel to let now that we began to signal clipping and therefore do not have to increase more this input level, since we did not obtain more sound pressure in the room
- Recheck now GAIN adjustment to obtain with different kind of music and the controls in his normal working position, that the amount of limitation is between 15 and 20 dB of attenuation, as it were indicated previously.

Alarms Description:

One is a microprocessor that controls the accumulated number of alarms that take place and time that has passed in each, also registering the moment at which they took place.

The equipment detects and counts three types different from alarms: LEVEL, MIC and MANIP.

The alarms LEVEL take place when the sound pressure level SPL in the room surpasses for whatever reason during a time, the threshold marked by anyone of the Working Level screens and according to scheduled time. After a determined number of level alarms (programmable in factory) the equipment will cut the sound definitively until the authorized person deactivates it.
French version only

Alarms MIC take place when disconnecting or short circuit the sense microphone.

Alarms MANIP take place when detecting that the microphone has changed of its original position or it has been covered reducing his sensitivity.

8. TECHNICAL SPECIFICATIONS

- Unbalanced audio inputs 20 K Ω impedance. Max. Input level + **20** dBV
- Unbalanced audio outputs 100 Ω impedance. Max. Output level + **20** dBV
- Balanced inputs 20 K Ω impedance. Max. Input level + **26** dBV
- Balanced outputs 100 Ω impedance. Max. Output level + **26** dBV
- T.H.D. At 1kHz and 0 dBV :< **0,01%** (CCIR 468 - 22Hz a 22kHz)
- I.M.D. : < **0,02 %** IMD 250 4:1
- Frequency response : from **30 Hz** to **30 kHz**. - 1 dB
- Signal/Noise Ratio : **110 dBq** (CCIR 468 - 22Hz a 22kHz) @ +20 dBV
- Noise voltage: < **45 μ Vq** (CCIR 468 - 22Hz a 22KHz)
- Crosstalk : > **75 dB**
- Manual Gain : 0 to - **50 dB**
- Audio peak display : **+ 15 dBu**
- Measurement range: From **45 dBA** to **126 dBA**
- Alarm and limiting: From 60 to 130 dB. More than 60 dB limiting range
- Alarm output: 220V a.c. voltage with a max power outlet of 600W
- Measures: 1 rack unit height (43 mm); 19 inches (483 mm) width and 11 inches (280 mm) total depth with back cover
- Weight: 3,5 Kg
- Power Supply : 50 / 60 Hz. 220 V AC (switchable to 110 v) 40 VA

The manufacturer reserves the right to modify the characteristics of this equipment, without previous notice

9. WARRANTY

The sound pressure level Controller MRC AUDIO LD- 500, has been manufactured with high quality components and its operation has been verified before the shipment.

The manufacturer guarantees each equipment to the original buyer during ONE YEAR from the purchase date. If within this period, it has any failure, we will repair it or substitute components by any failure due to defects in the materials and manual labour during the manufacture. Excepts of this guarantee all defect due to erroneous manipulation, damages in transport, operation different from indicated in this manual, repairs conducted by no authorized personnel and any fortuitous or deliberate action beyond of the manufacturer's control. The costs and risks of the shipment and installation of the equipment, will be on behalf of the buyer. The transport to Technical Service will be always made in original packing.

The manufacturer reserves the right to introduce improvements in next designs without it forces to modify the equipment already made.

CUSTOMER
SERIAL N°
PARCHASE DATE
SOLD BY

11. HELP FOR CONTROLLERS

The LEVEL alarms take place when the limit fit in the corresponding schedule time is surpassed without mute the sound; therefore really exceed this allowed maximum level. In normal conditions when exceeding the level, the adjustment of time in MUTE will cause that it mute the sound.

Alarms MIC take place when disconnecting or short circuit the microphone input being demonstrated an attempt to avoid the control.

Alarms MANIP are the produced ones by a displacement from original installation of the microphone or even if the system is covered to alter the measurement. This alarm only acts if the microphone is the limitation control used.

If only type LEVEL account exists, being activated the MUTE; it will be because the level has been exceeded by some means other ways out of the equipment controlled by the limiter.

The number of times that takes place an alarm indicates in the superior row of its window and in inferior the number of hours and minutes that had accumulated in that situation of alarm. In addition it is a historical of all the registries with date and hour.

Registered events list

On	Time when the unit is turn On
Off	Time when the unit is turn Off
Nivel	LEVEL Alarm (100 dBA)
Micf	MIC Alarm
Manip	MANIP Alarm
Prog	Time when any parameter is altered
R. Hist	Reset of History
E. Clv	Keyboard code entry
E.C.M	Master code entry
Reset	Counters total reset
Bloq.	The unit is blocked with a total mute
Desb.	The unit is unblocked by programmation