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LSP 28

Index

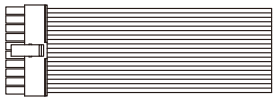
1. PRODUCT DESCRIPTION / PRECAUTIONARY NOTES

The LSP 28 is a digital signal processor essential to maximize the acoustic performance of your car audio system.
It consists of a 32-bit DSP processor and 24-bit AD and DA converters.
It can connect to any factory system, even in vehicles featuring an integrated audio processor, since, thanks to the de-equalization function, the LSP 28 will send back a linear signal.
It features 7 signal inputs: 4 Hi-Level, 1 Aux Stereo, 1 Phone and provides 5 PRE OUT analog outputs.
Each output channel has a 31-band equalizer available. It also features a 66-frequency electronic crossover as well as BUTTERWORTH or LINKWITZ filters with 6-24 dB slopes and a digital time delay line. The user can select adjustments that allow him or her to interact with the LSP 28 through a remote control device called DRC.

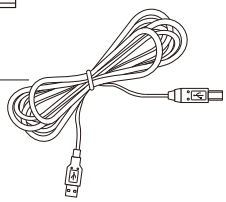
WARNING: 1- a PC provided with Windows XP, Windows Vista or Windows 7 operating system, 1.5 GHz minimum processor speed, 1 GB RAM minimum memory and a graphics card with a minimum resolution of 1024 x 600 pixels are required to install the software and setup the LSP 28.
2- Before connecting your LSP 28, carefully read this manual. Improper connections may cause damage to the LSP 28 or to the speakers in the car audio system.

2. PACKAGING CONTENTS

- LSP 28- Signal Interface Processor



- Power supply cable / Remote / Inputs



- 6.0 m USB cable

- 4 of 4.0 x 15 mm self-tapping, cross-head fixing screws

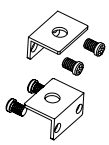
- CD ROM with:
  LSP 28 1.0 software
  This advanced manual (.pdf format)
  Test tracks

- Quick start guide

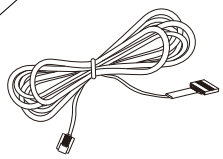
- Warranty

OPTIONAL:

- DRC (Digital Remote Control) control panel



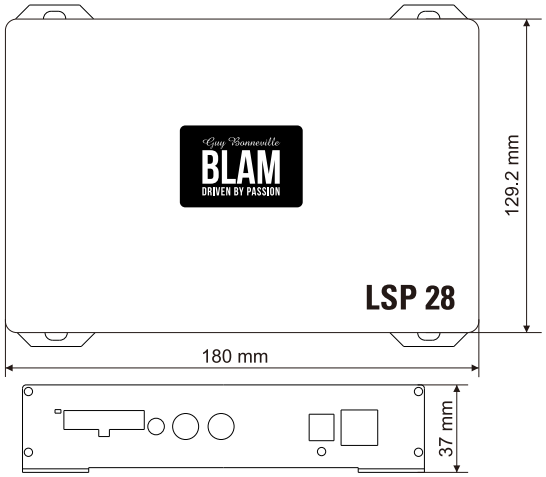
- 2 fixing brackets with 3.0 x 5.0 mm self-tapping, cross-head screws



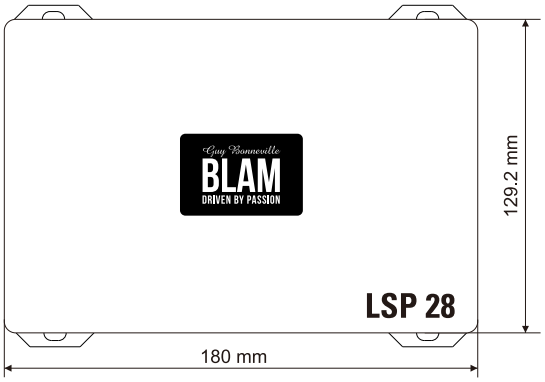
- 5.0 m DRC - AC Link cable

3. LSP 28 AND DRC INSTALLATION

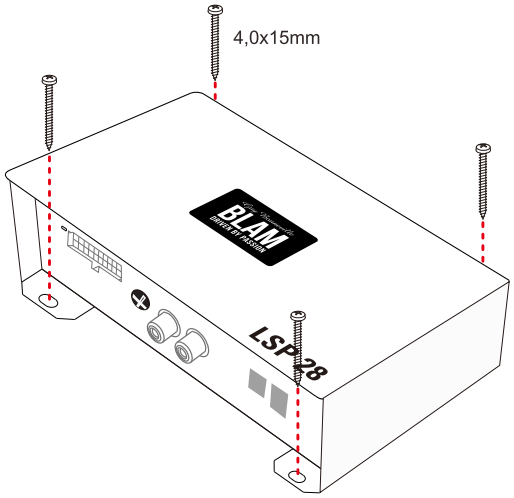
External dimensions



Mounting dimensions

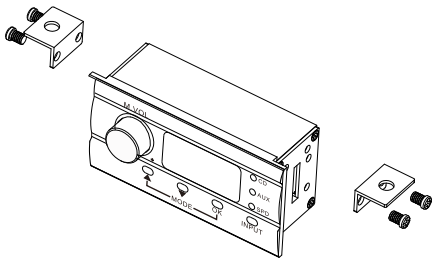


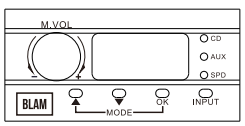
How to install



DRC (optional)

How to install the DRC



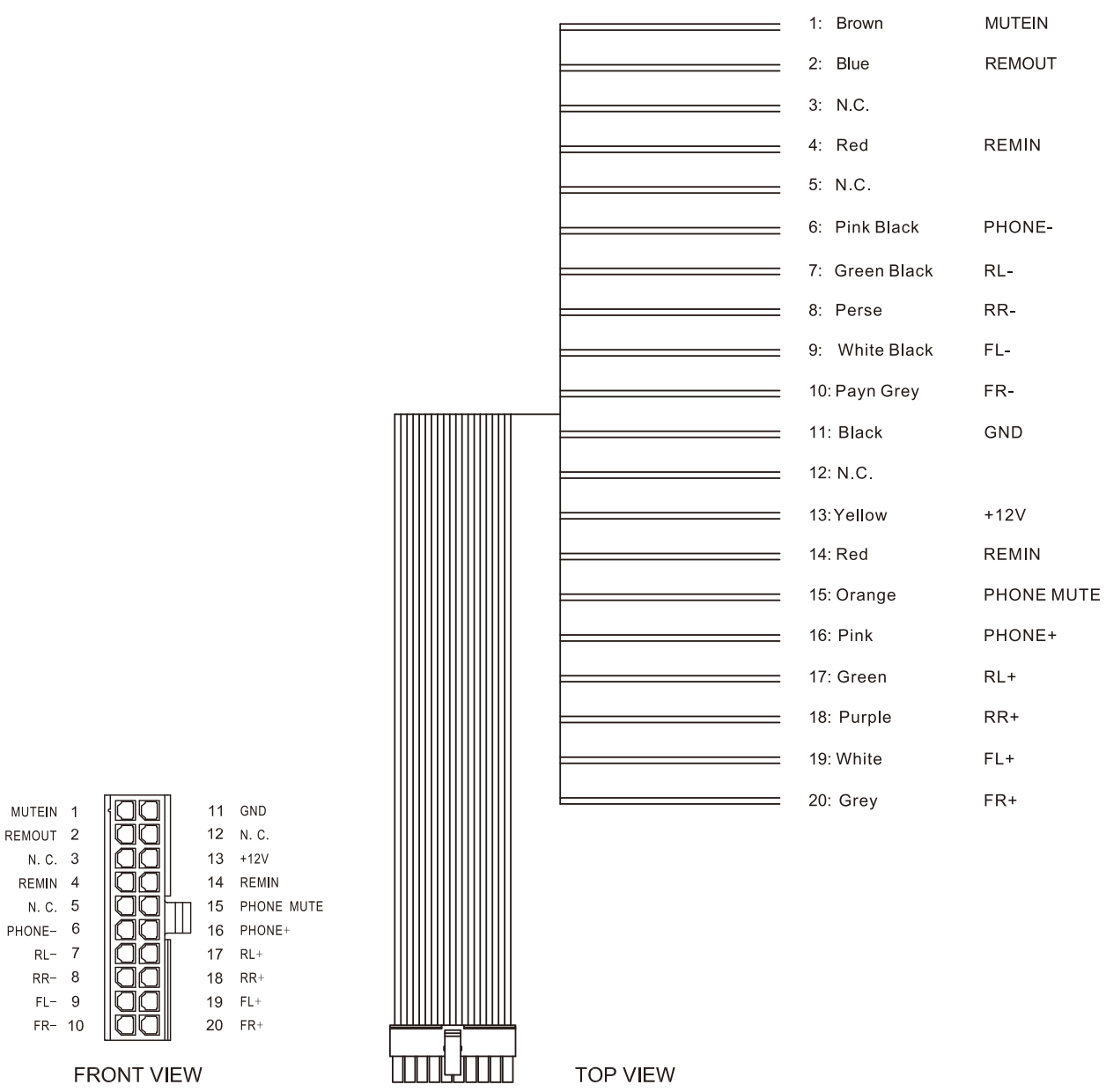


Warning: do not use aggressive cleaning agents or abrasive cloth to clean the display. Simply use a soft cotton cloth lightly damped with water.

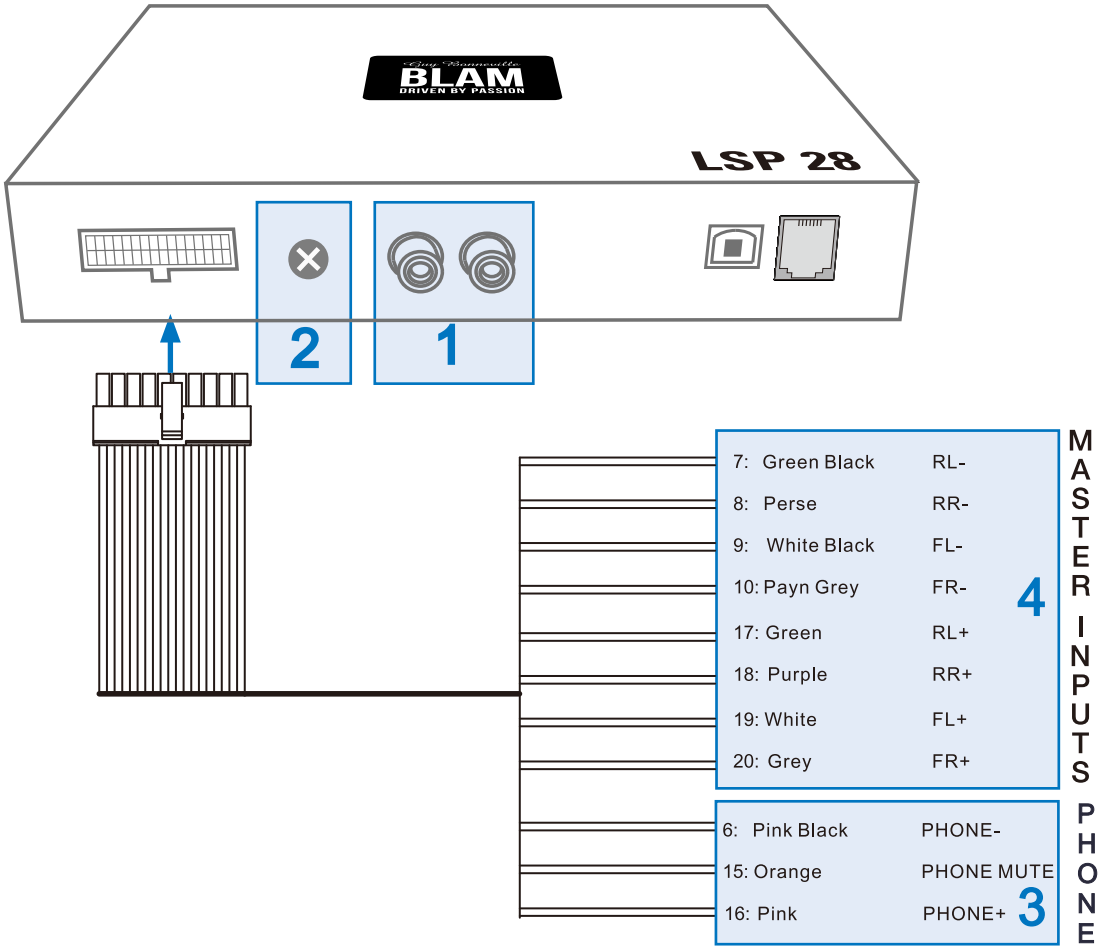
4. CONNECTION PANELS – DESCRIPTION

4.1 MULTIPOLAR CONNECTOR

The LSP 28 comes with a 20 multipolar interface for input signals, power supply and various control connections.



4.2 INPUT SIGNALS



1. **AUX IN L - R;** auxiliary low-level stereo input.
   The LSP 28 comes with an auxiliary stereo signal input to connect an external source, mp3 player, audio sources. Input sensitivity is adjustable from 0.6 to 5 V RMS.

2. **GAIN-LOW LEVEL configuration;** adapt to different head units' output level.

3. **PHONE; input for phone hands-free kits.**
   IN + - : Connect the audio output cables coming from the hands-free kit system in use. Input sensitivity is adjustable from 2 to 15 V RMS.
   MUTE: Connect the hands-free kit remote mute control **(MUTE / PHONE MUTE)**. This control works by earthing the terminal.

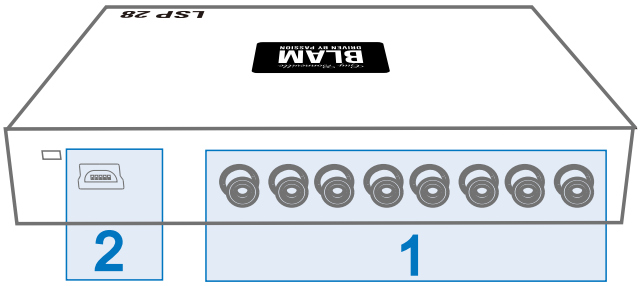
   Remark: The **PHONE MUTE** terminal can be used also to enable the AUX input.
   In this case the **PHONE** input won't be active

4. **INPUTS; RL - FL - FR - RR. Hi-level MASTER inputs (SPEAKERS)** .
   The **LSP 28** comes with **4 HI-LEVEL** signal inputs to connect amplified signal cables coming from the main analog source. Input sensitivity is adjustable from 2 to 15 V RMS.

Remark: If a low-level output source (PRE OUT) with output signal equal or greater than 2 V RMS is available, you can connect it to the high-level MASTER inputs (SPEAKERS).
Sensitivity is increased by adjusting the IN LEVEL controls.

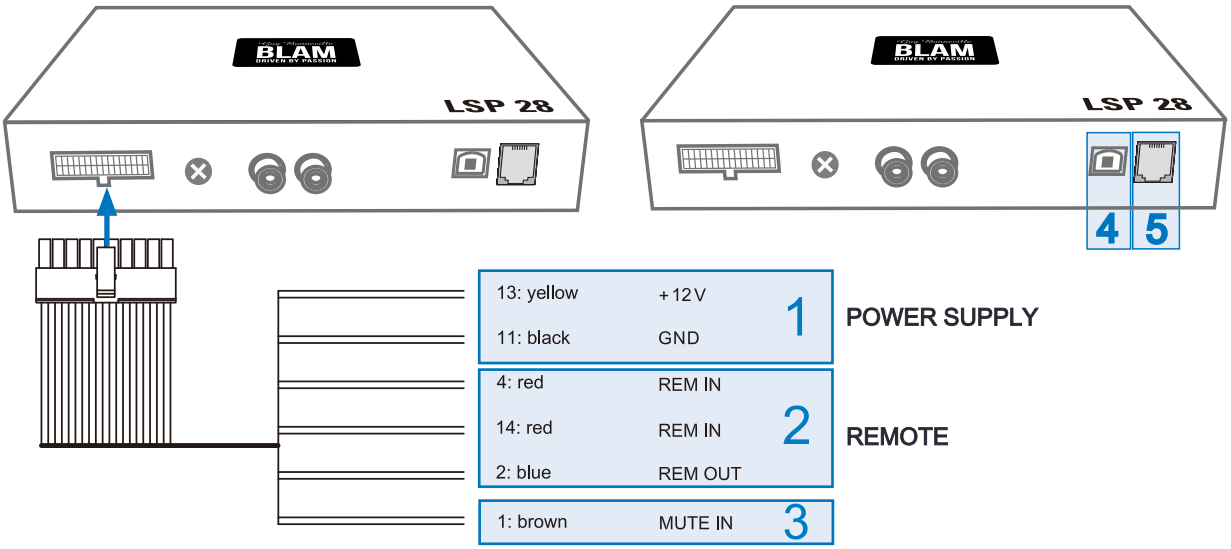
4.3 OUTPUT SIGNALS

1. FRONT1 /1+2 To Midrange
   FRONT2 /3+4 To Tweeter
   Rear /5+6 To Midbass
   Subwoofer /7+8 To Subwoofer



2. **USB**
   USB (type B) connection plug, to connect the processor to a PC and manage its functions through the LSP 28 software. The connection standard is USB 1.1 / 2.0 compatible.

4.4 INPUTS – REMOTE CONTROL OUTPUTS AND POWER SUPPLY



1. **POWER SUPPLY.**
   +12V: Positive connection terminal for car 12V power supply.
   GND: Power supply negative connection terminal (GND).

WARNING: make sure the connection polarity is as indicated on the terminals. A misconnection may result in damage to the LSP 28. After applying power, wait at least 10 seconds before turning the LSP 28 on.

2. **REMOTE IN-OUT.**
   REM IN: input to turn on the processor remotely along with the audio signal Remote Out.
   REM OUT: output to turn on other devices / amplifiers connected after the processor.
   From the REMOTE-IN signal, the processor only takes 1 second to supply the signal to the REM OUT output.
   The 130-mA output current capability can also drive an automotive relay (making sure it doesn't exceed 130 mA).

WARNING: the LSP 28 must be switched on before any amplifiers are turned on.
The system sources Remote Out must be connected to the product REM IN, and the product REM OUT is then to be connected to the Remote In of other devices / amplifiers.

3. **MUTE IN:** To mute the LSP 28 outputs when starting the engine by connecting the terminal to the starter turn-on input or other devices. This control works by jumping the terminal to 12V.

Remark: The MUTE IN terminal can be used to enable the AUX IN input. In this case the output mute function, set by default, will be disabled.

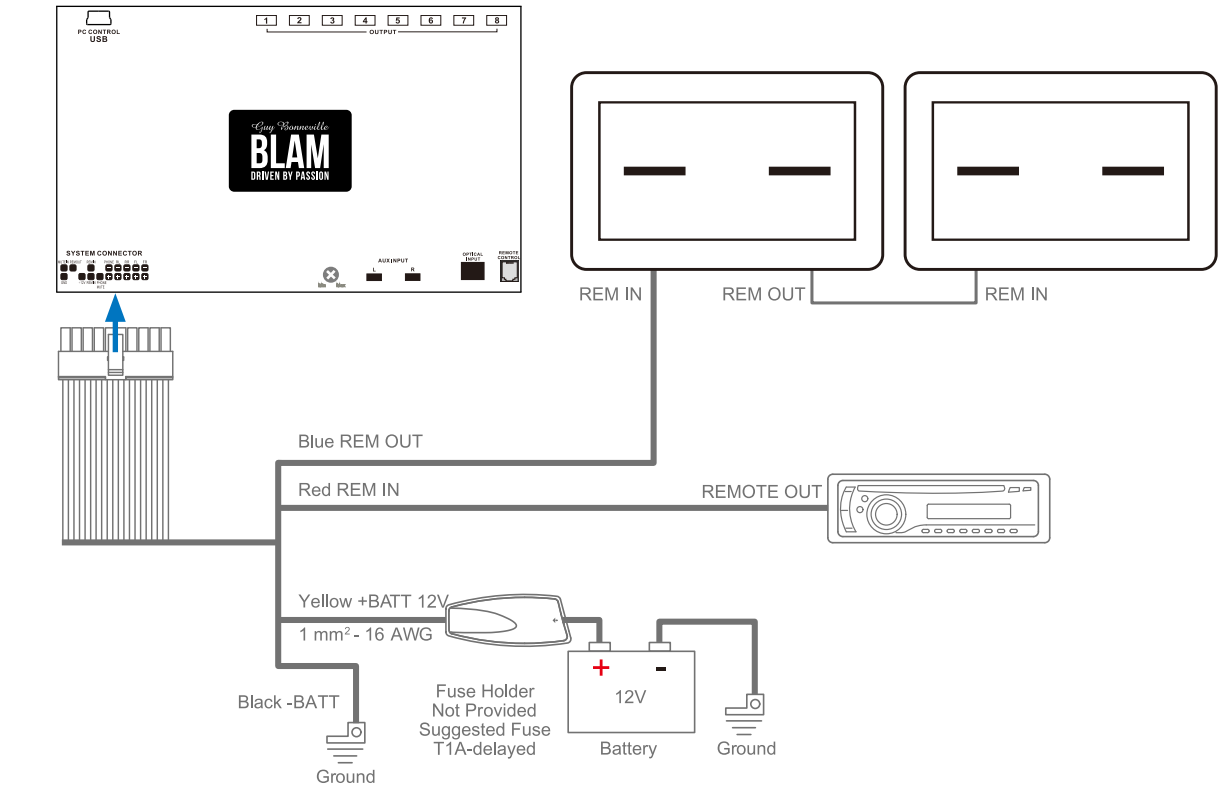
4. **OPTICAL INPUT**

5. **REMOTE CONTROL**
DRC (Digital Remote Control) connection to configure the processor.

5 CONNECTIONS

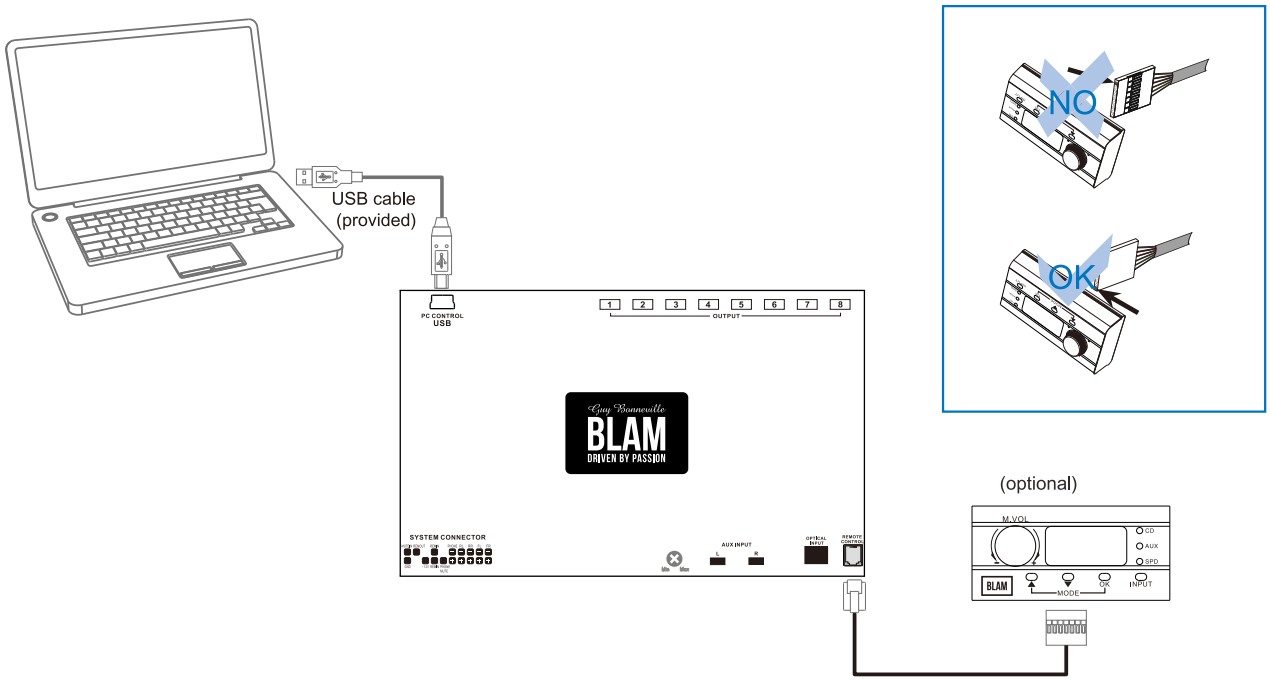
5.1 POWER SUPPLY AND REMOTE TURN ON

WARNING: to power the device, use 1 mm^2 (16 AWG) cables.



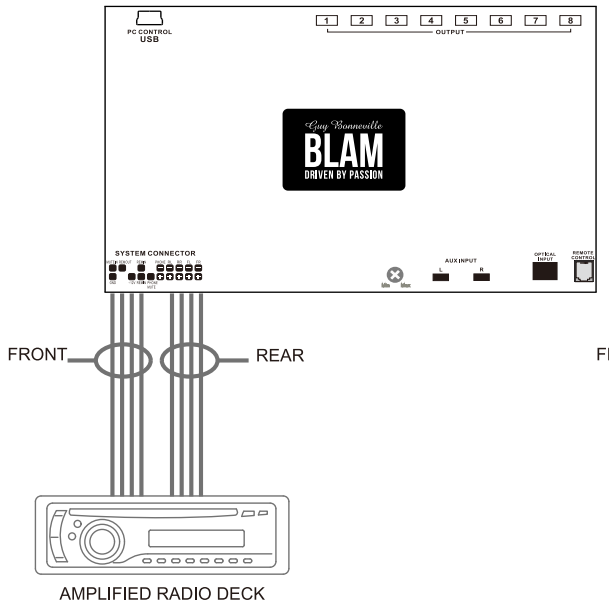
Remark: the LSP 28 is internally protected by a fuse-resistor soldered on its printed circuit board. To replace it contact a service centre. Using an external fuse is recommended, though it is not required.

5.2 PERSONAL COMPUTER AND DIGITAL REMOTE CONTROL (DRC)

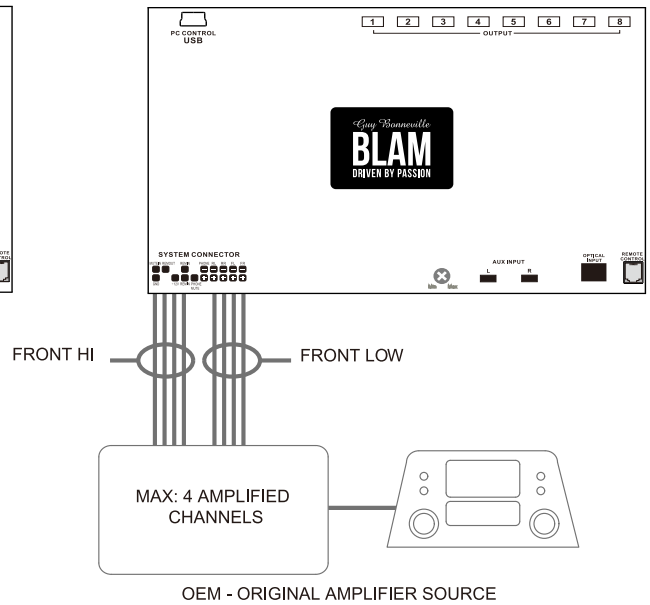


5.3 HIGH-LEVEL INPUT SIGNALS

1. SPEAKERS IN HI-LEVEL STEREO FRONT+REAR

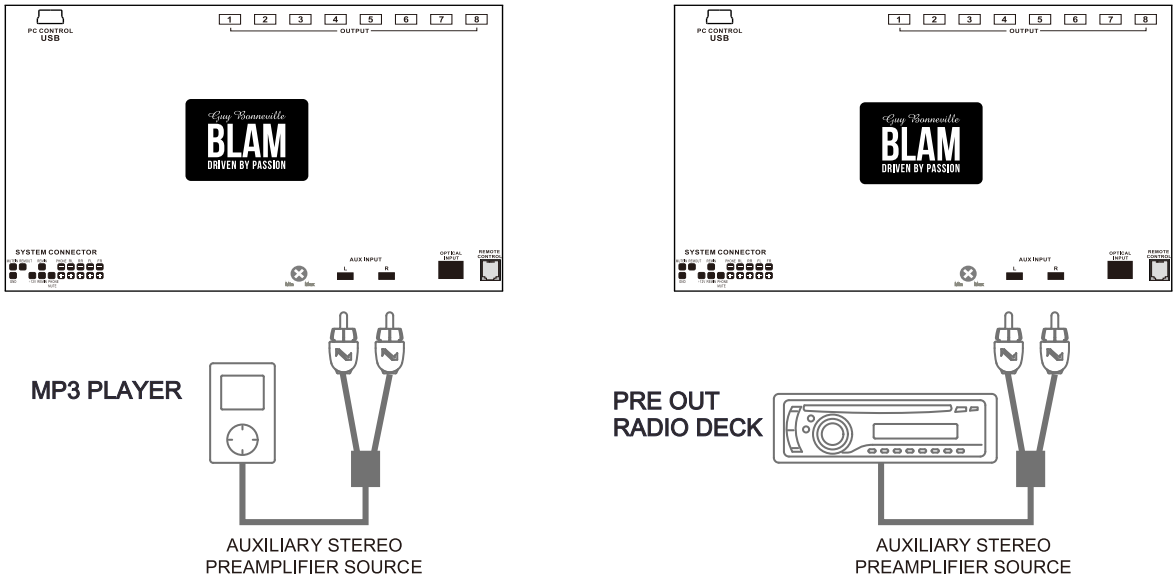


2. SPEAKERS IN HI-LEVEL MULTICHANNEL

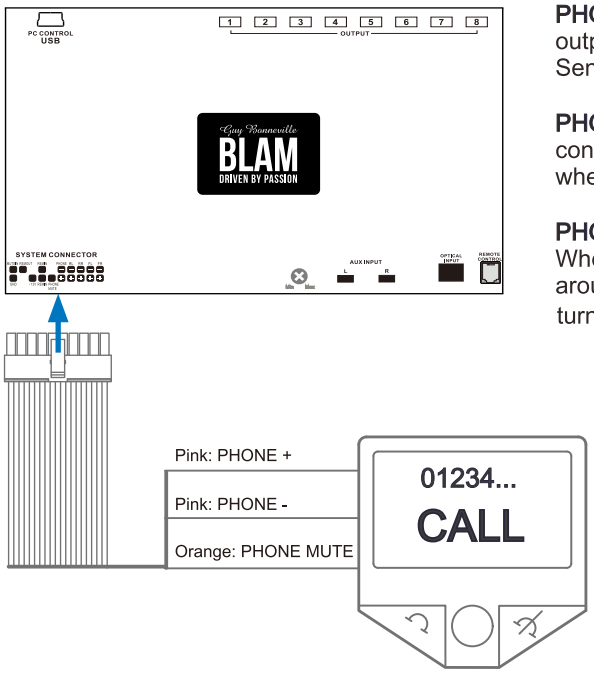


5.4 LOW-LEVEL INPUT SIGNALS

AUX IN L/R: Auxiliary analog stereo signal.
Sensitivity is adjustable from 0.6 to 5 V RMS.



5.5 CONNECTION WITH HANDS-FREE PHONE KIT



PHONE +/- Input compatible with the hands-free kit speaker output (see 4.2.3).
Sensitivity adjustable from 2 to 15 V RMS.

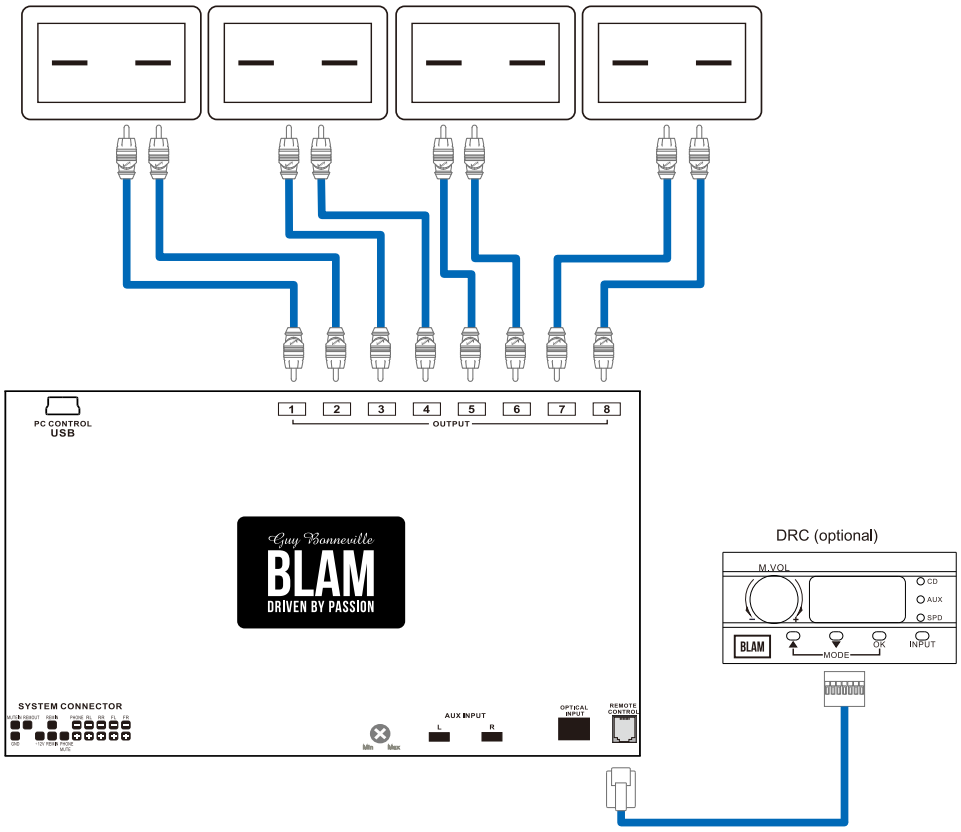
PHONE MUTE: LSP 28 ON. This gives priority to the phone conversation, allowing you to resume audio reproduction when the phone call is finished.

PHONE MUTE: LSP 28 OFF. This turns the **LSP 28** on. When a phone call is received, the ring tone is audible after around 5 seconds. Once the phone call is finished, the **LSP 28** turns off.

Nota: The **PHONE MUTE** terminal can be used to enable the **AUX IN** input. In this case the user won't be able to interface with the hands-free kit through the **LSP 28**.

5.6 OUTPUT SIGNALS

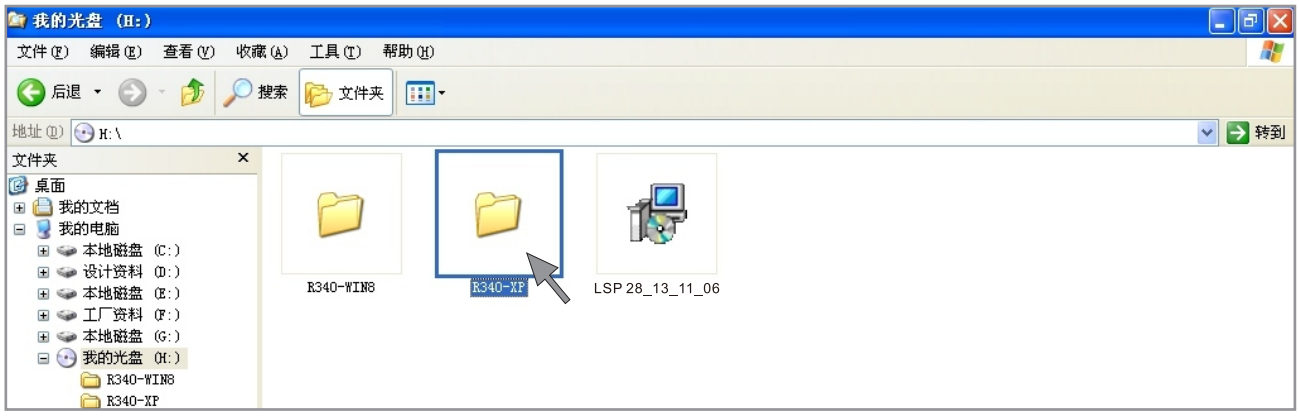
OUTPUT TO AN AMPLIFIER'S SYSTEM



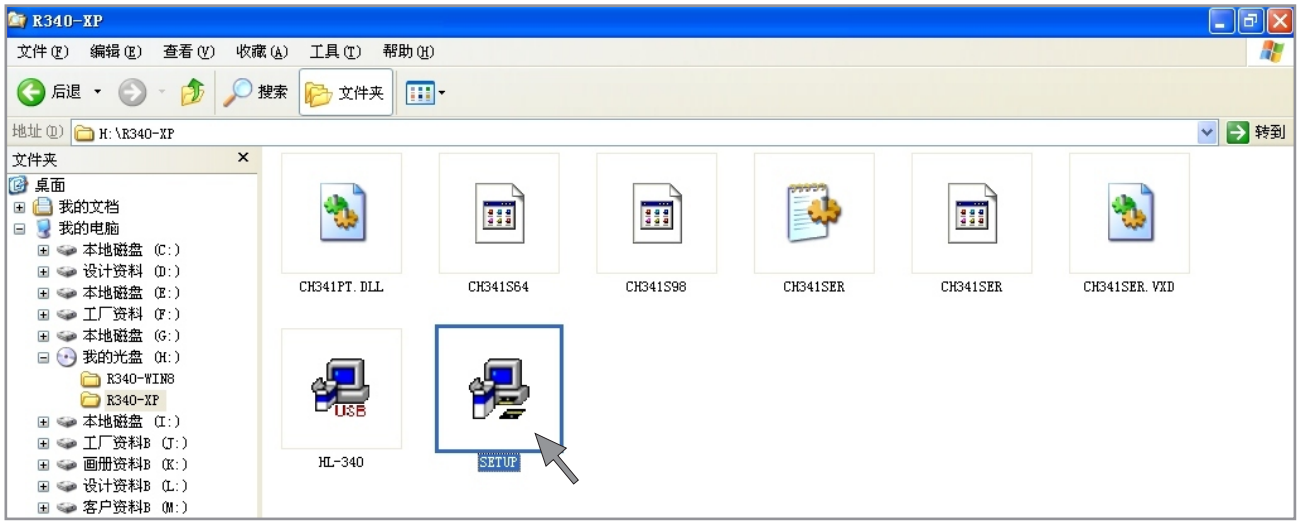
6 SOFTWARE INSTALLATION

6.1 USB DRIVER INSTALLATION

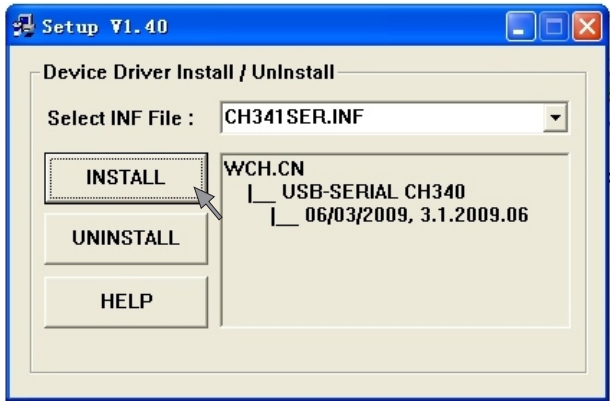
1. Insert CD,select installation file according to your computer system in R340 folder



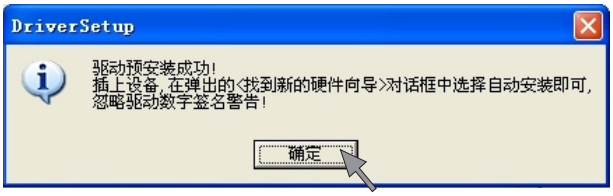
2. Double - Click SETUP to begin installation



3. Start installation

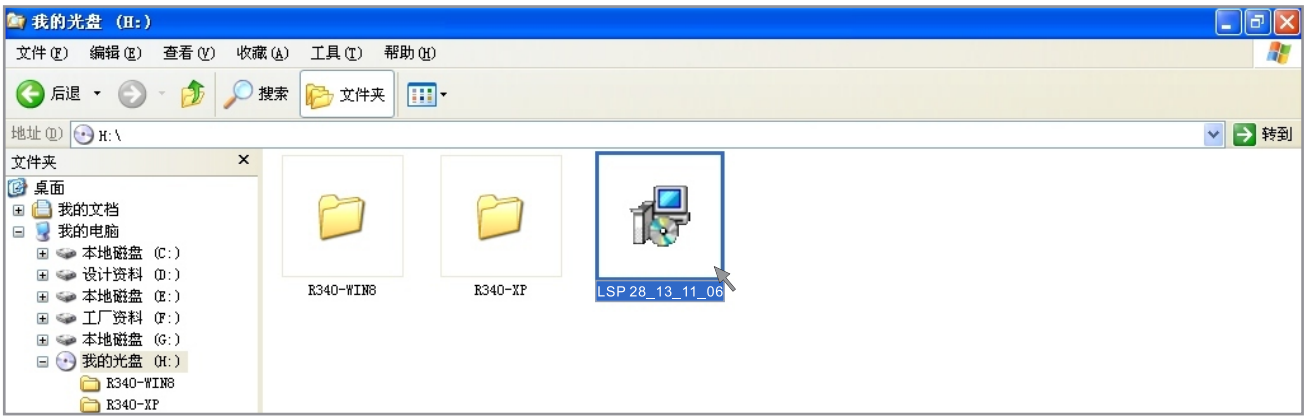


4. Click confirm to finish installation



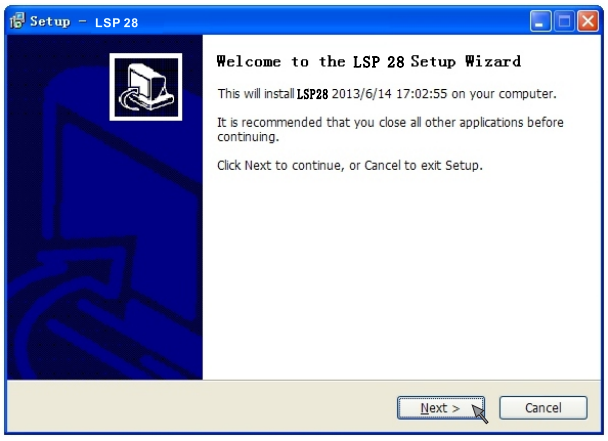
6.2 DSP GUI INSTALLATION

1. Double - click LSP 28

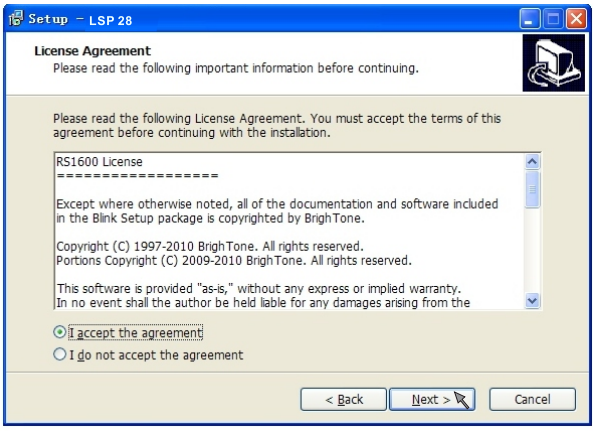


2. Pick you language

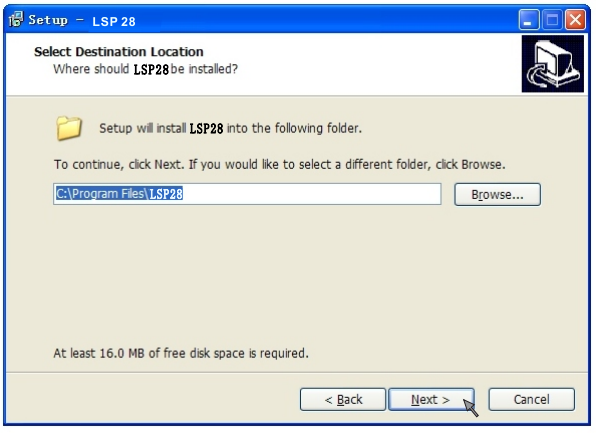
3. Click NEXT



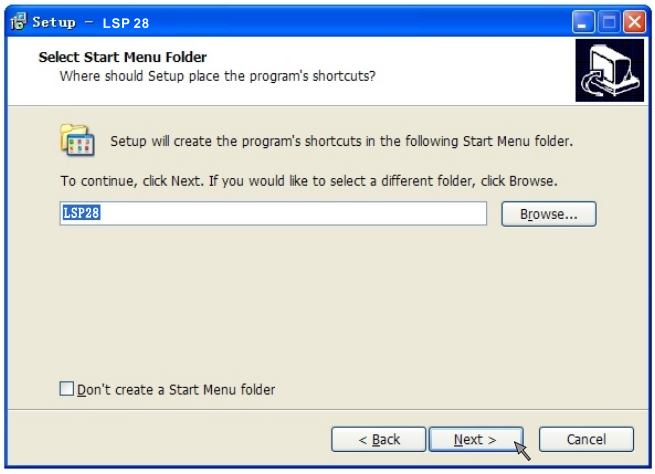
4. Choose "I accept the agreement"



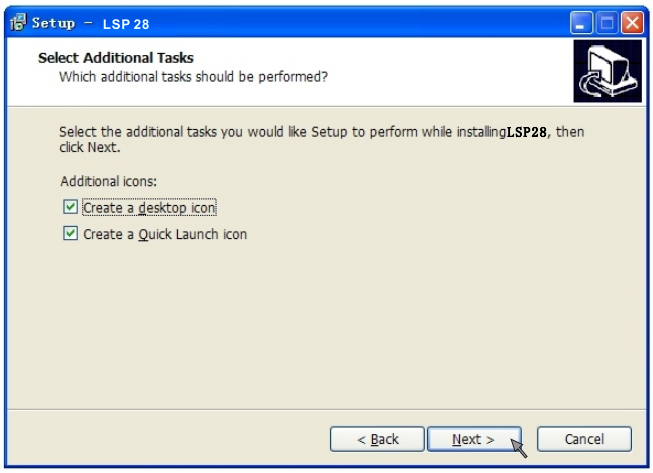
5. Set install location



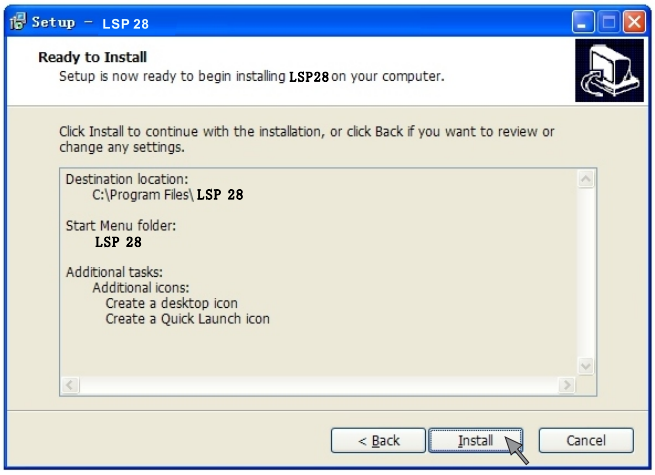
6. Click NEXT



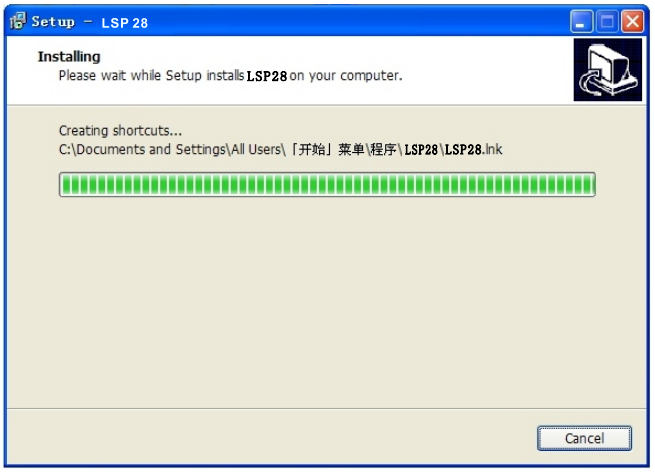
7. Creat shortcut to desktop



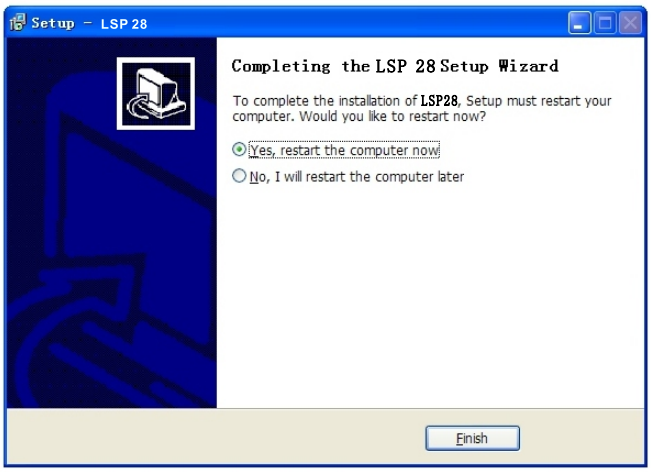
8. Click Install to begin



9. Wait until the process finish



10. Installation completed, reboot computer

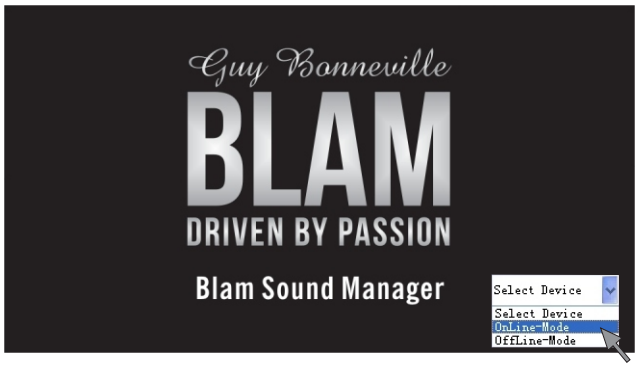


7 GUI OPERATION INSTRUCTION

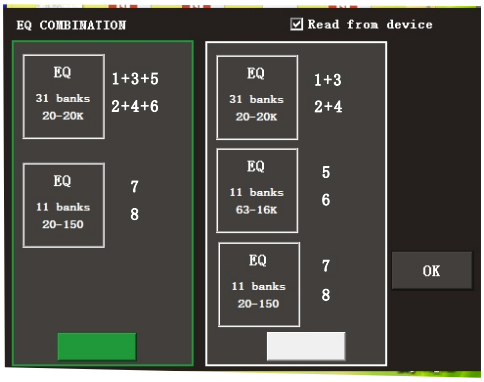
7.1 GUIDE TO GUI AFTER INSTALLATION

1. Double - click icon of DSP

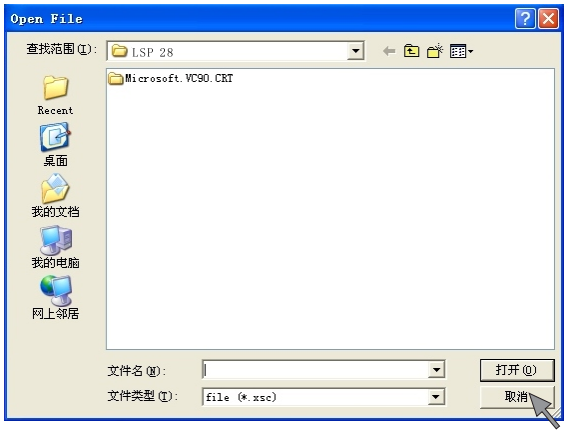
2. Mode selection (Online mode must be selected after PC connected to DSP)



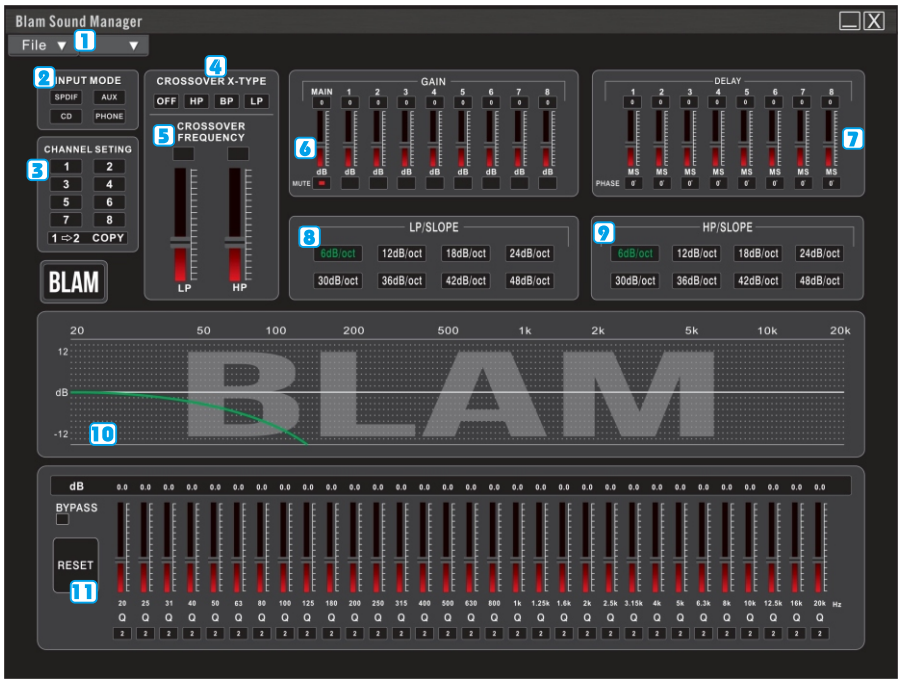
3. Select EQ preset you want



4. If no stored programme was found, click “cancel” to enter GUI

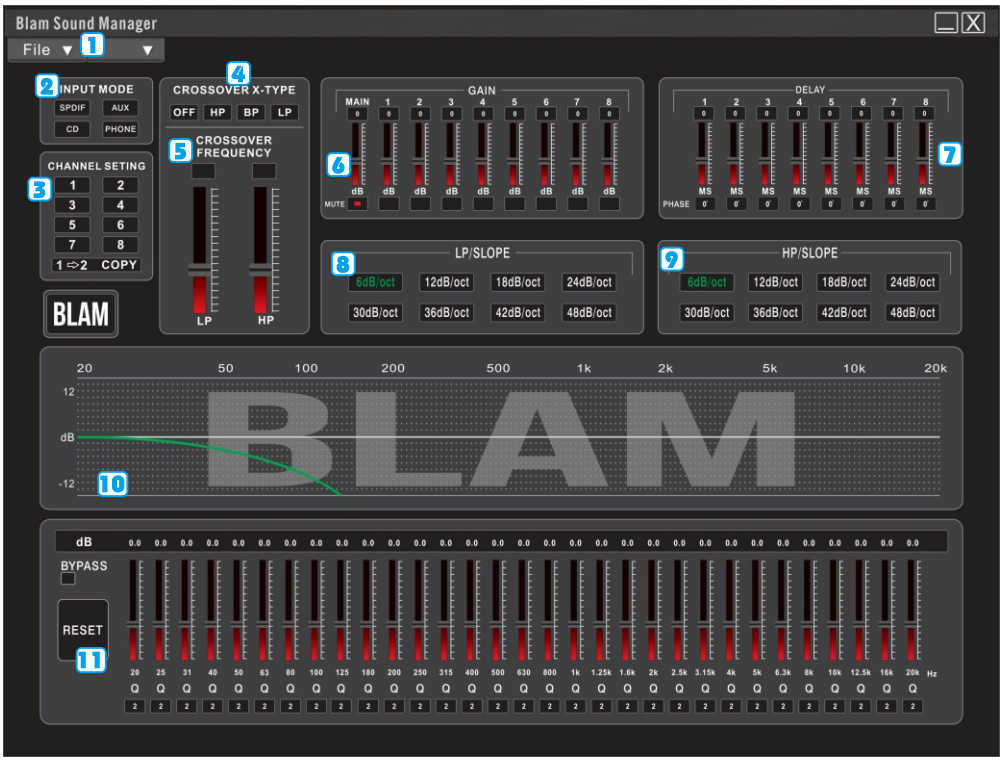


5. Enter the GUI you long for! Now you could tone every sigal details as experts do to bring sound effect on your beloved car to a higher level.

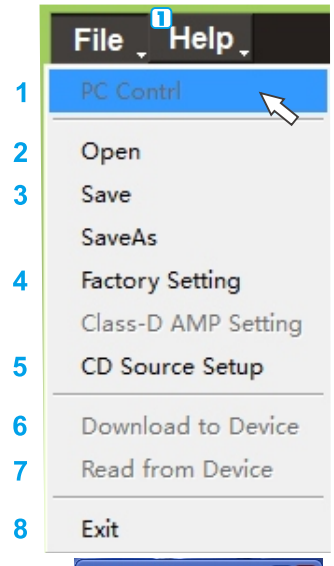


7.2 INTERFACE INTRODUCTION

1. DSP interface guidance

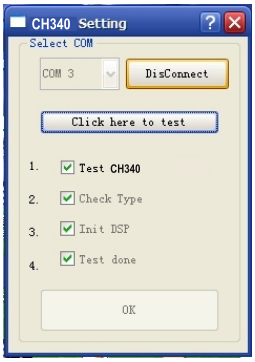


2. "FILE" MAIN MENU 1



1. PC Control (To show PC connection scan interface)

Press OK after all Options passed scan, preset file input and DSP configuration can only be done after DSP-5 PC connected.



2. Open (To load prset file in PC folder)

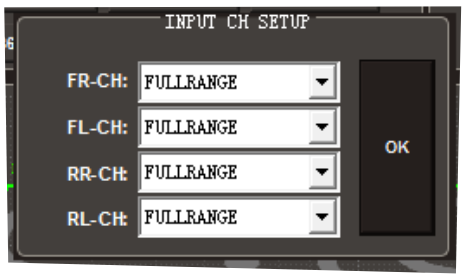
3. Save (To save setting to PC)

4. Factory setting (restore to factory setting)

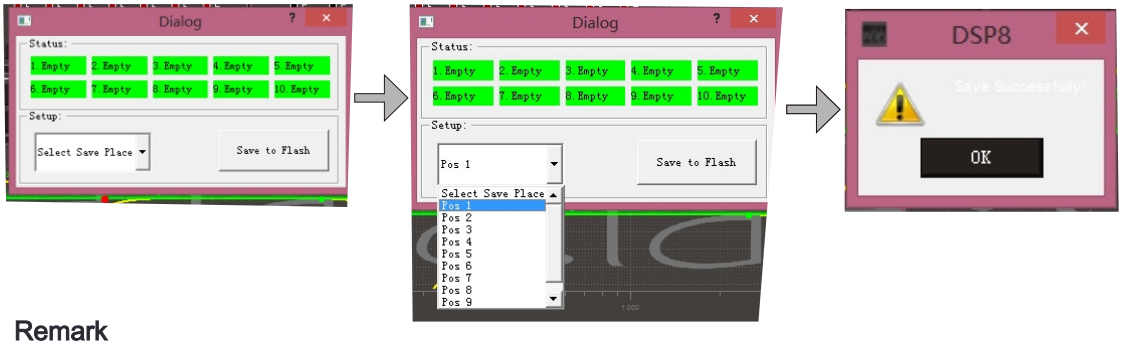
5. CD Source Setup (Crossover Setting for CD input signal)

1). Make sure whether CD/DVD has crossover output, and confirm frequency of each channel.

2). Select crossover according to the frequency in INPUT CH SETUP window.



6. Download (store set configuration into DSP)



Remark

Pleaes save your configurations in numeric order.

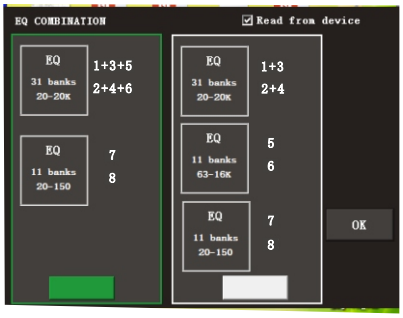
7. Read from Device (Load preset in DSP with PC)

A. Load from opened GUI

1). Select the sequence you want with remote, then press OK.

2). Click File-Read from Device on PC.

B. load on PC software,tick "read from device"on EQ Combination interface.



8. Exit

3. "INPUT MODE" 2

To select different input devices.

4. "CHANNEL SETING" 3

Options on the left side are for combine setting for L CH and R CH.

Options on the right side allow you tone each selected channel respectively.

5. "CROSSOVER X - TYPE" 4

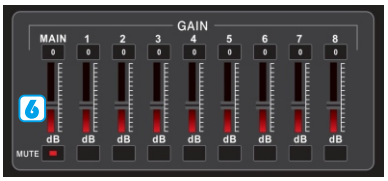
To choose different crossover type, fox example select CH selection on 3rd spot, That would locate CH you want to choose for crossover configuration.

6. "CROSSOVER FREQUENCY" 5

Set frequency of LP/HP individually.

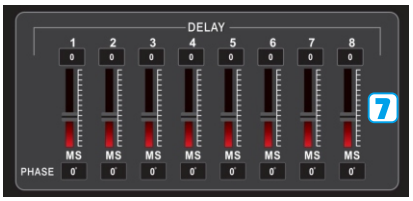
7. "GAIN" 6

"0--40dB" is optiional range for gain control of every CH.



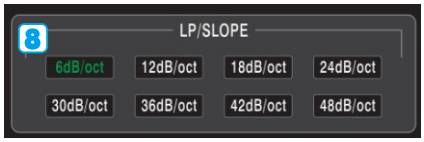
8. "DELAY" 7

1.Auto configuration (base on 1.5 setting)
2.Manual configuration, change specifications in selected CH manually.



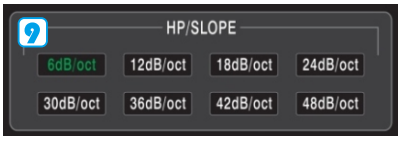
9. "LP/SLOPE" 8

6dB/oct 12dB/oct 18dB/oct 24dB/oct 30dB/oct 36dB/oct 42dB/oct 48dB/oct are available.



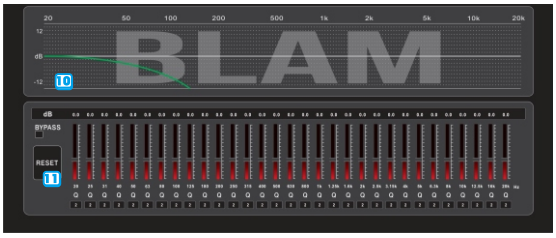
10. "HP/SLOPE" 9

6dB/oct 12dB/oct 18dB/oct 24dB/oct 30dB/oct 36dB/oct 42dB/oct 48dB/oct are available.



11. "X-OVER AND EQ CHARTS" 10

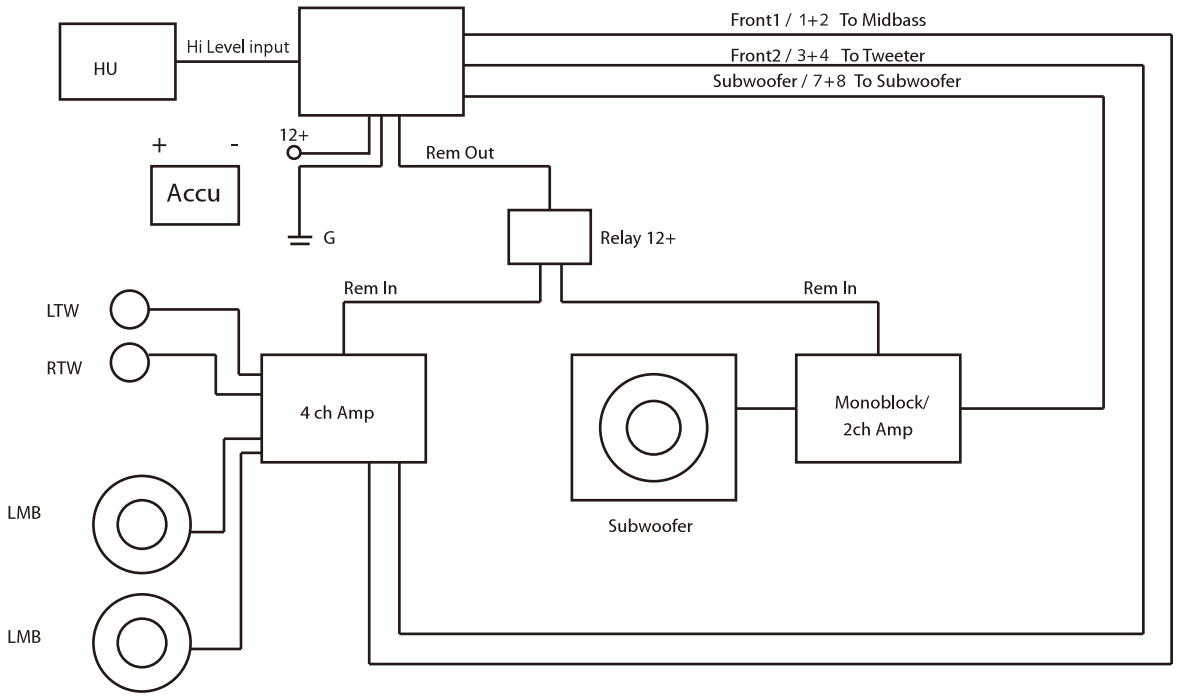
Red lines and slops will change accordingly when HP/LP of crossover and EQ are modified.



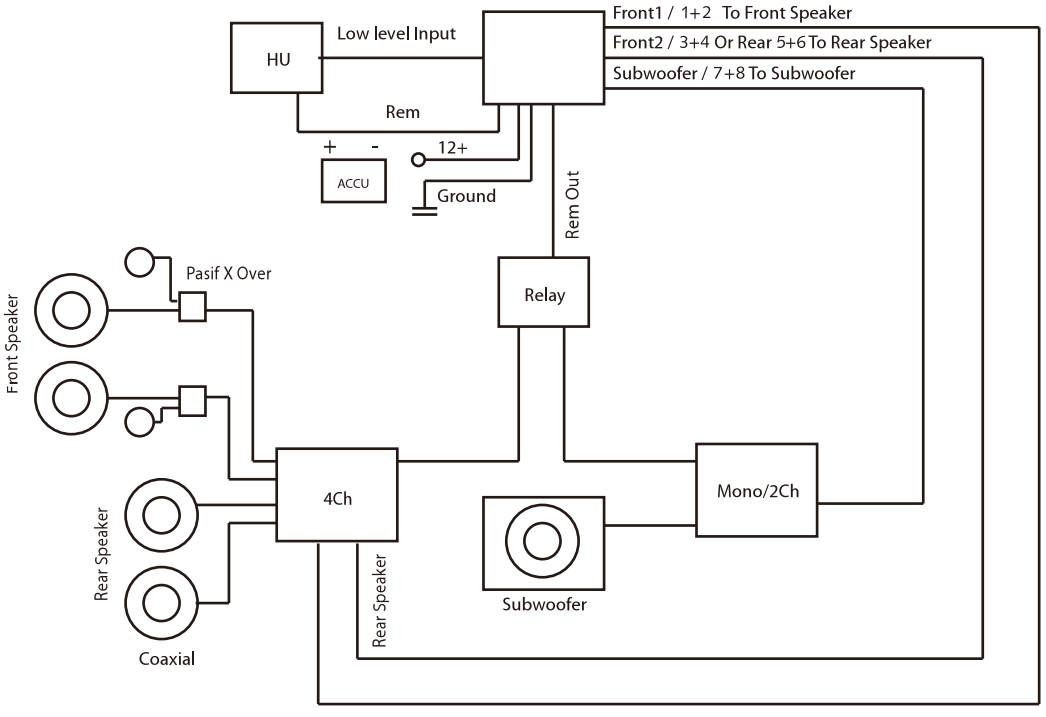
12. "EQ SETTING" 11

8 STANDARD INSTALLTION REFERENCE

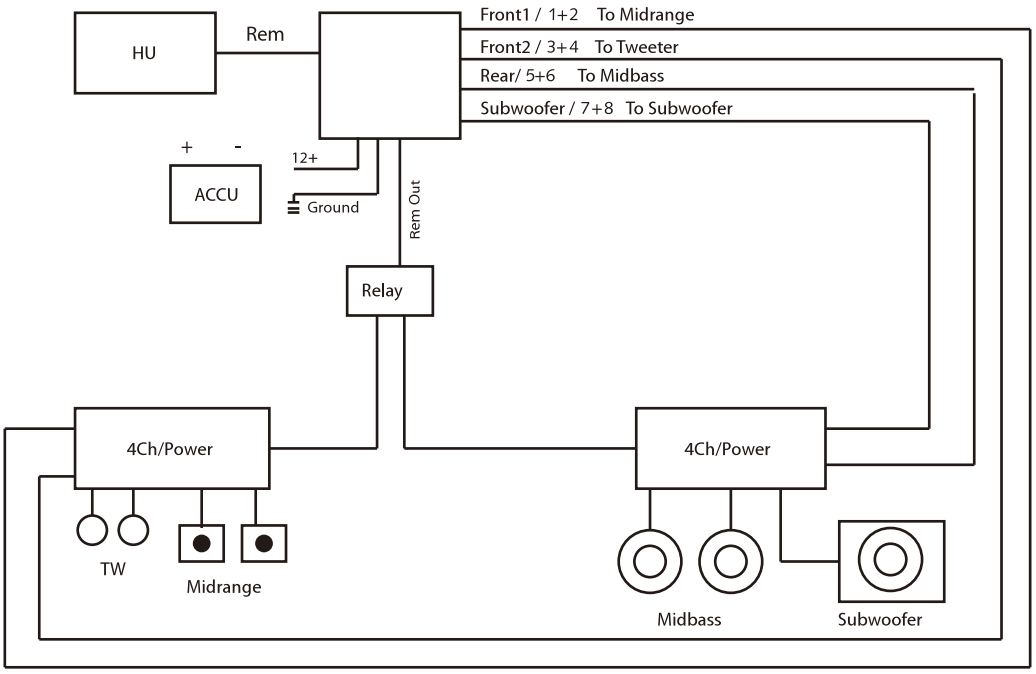
8.1 5 CHANNEL STAND ALONE TREBLE MODE



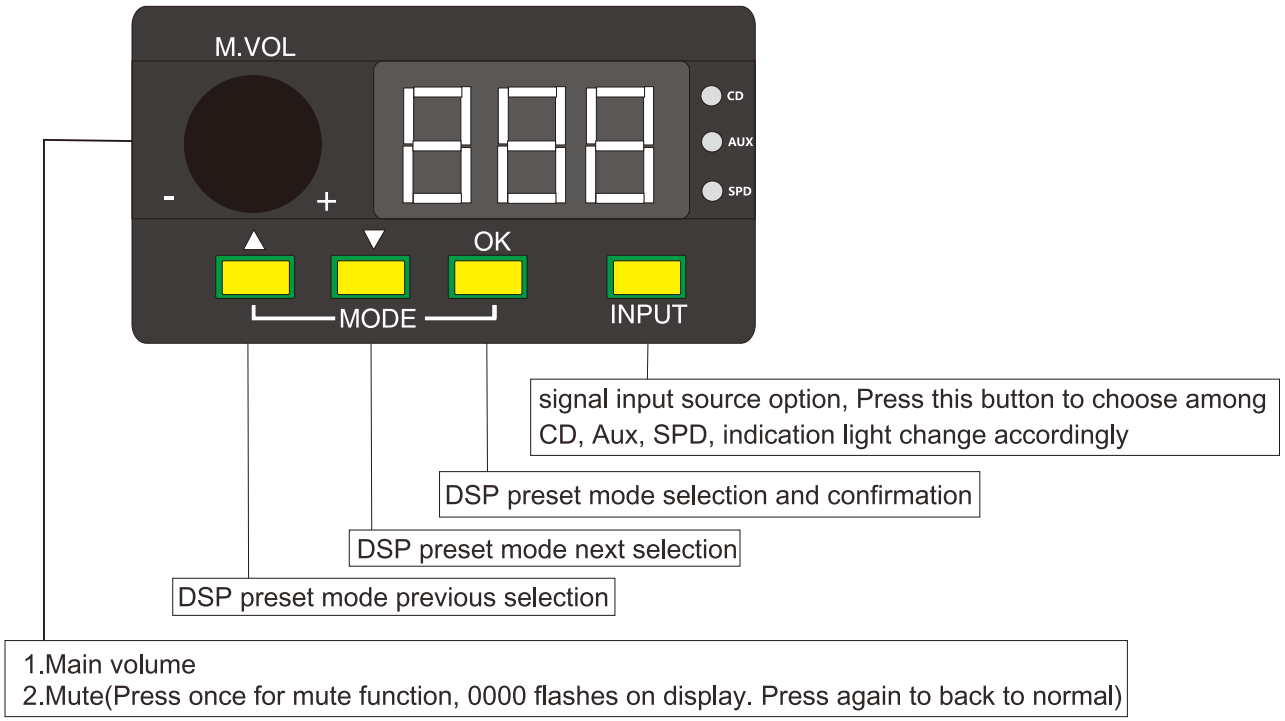
8.2 5 CHANNEL PASIF X-OVER TREBLE MODE



8.3 8 CHANNEL SEPARATE TREBLE, MIDDLE MODE



9 REMOT INTRODUCTION



10 CARATTERISTICHE TECNICHE

POWER SUPPLY	
Voltage	11 - 15 VDC
Idling current	0,4 A
Switched off without DRC	2,5 mA
Switched off with DRC	4 mA
Remote IN voltage	7 - 15 VDC (1.3 mA)
Remote OUT voltage	12 VDC (130 mA)
SIGNAL STAGE	
Distortion - THD @ 1kHz, 1V RMS Output	0,005 %
Bandwith @ -3 dB	10 - 22k Hz
S/N ratio @ A weighted	
Master Input	95 dBA
Aux Input	96 dBA
Channel Separation @ 1 kHz	88 dB
Input sensivity (Speaker In)	2 - 15 V RMS
Input sensivity (Aux In)	0,2 - 5 V RMS
Input sensivity (Phone)	2 - 15 V RMS
Input impedance (Speaker In)	2,2 kΩ
Input impedance (Aux)	15 kΩ
Input impedance (Phone)	2,2 kΩ
Max Output Level (RMS) @ 0.1% THD	4 V RMS
INPUT STAGE	
High Level (Speaker)	FL - FR - RL - RR, Phone IN
Low level (Pre)	AUX IN
OUTPUT STAGE	
Low level Pre (default)	Midrange(1+2)/Tweeter(3+4)/Midbass(5+6)/Subwoofer(7+8)
CONNECTION	
From / To Personal Computer	1 x USB / B (1.1/2.0) 6M
CROSSOVER N.5 (one each output channel)	
Filter Type	Full / High Pass / Low Pass / Band Pass
Slope Setting	6 / 12 / 18 / 24 / 30 / 36 / 42 / 48 dB
Crossover frequency	68 steps @ 10 - 20k Hz
Phase control independent setting for each channel	0° - 180°