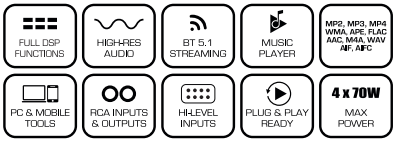
HARMONY

# HB 46 ADSP
# HB 48 ADSP




# Quick Guide

BLUE NOTE
DSP/AMPLIFIER

DSP

Before operating the unit, please read this manual throughly
and retain it for future reference.
Any updates are available on harmonycar.it

## Table of Contents

## Before you start installation

We recommend that a fuse or circuit breaker be placed within 18" of the battery. Although you will add a fuse or fuse block near the amplifier it is still a possibility that a pinched power wire between the component fuse and the battery could result in a short, or even a fire. The protection device should be placed where it can be accessed easily and all wiring should be routed safely and correctly according to the following guidelines:

- Do not run wiring close to hot or spinning objects.
- Use wire grommets when routing wire through the firewall or any other metal panels
- Make sure that the potential for pinched wiring is avoided by routing all wires away from moving objects, including brake, gas and clutch pedals, etc.

When connecting our amplifiers to pre-wired stock speakers, care must be taken that there are no common connections between left and right speaker wires, i.e. two or more speakers using the same ground connection (very common in pre-85 cars), as this will cause the amplifier to go into immediate protection or may cause damage to the amplifier. Output connections are not common chassis ground. Please follow the hookup instructions in this owner's manual. Any questions should be directed to your local dealer.

## All wire is not created equal

It is easy to think of wire as just wire but the fact is there are major differences between the types of wires being offered today. The price of copper has gone up quite a bit lately, but you will notice that you can still buy heavy primary wire at very reasonable prices. How can this be? Simple... That lower price wire is not all copper, it is CCA wire. CCA stands for Copper Clad, Aluminum. That means it is aluminum wire with a thin coating of copper around the outside of the wire. Does it conduct electrical current like copper? Absolutely not. If the wire does not say OFC Copper wire or Solid Copper wire do not use it. Two things can and likely will happen:

- Because CCA wire can not conduct DC electrical current like copper wire can, your amp will not get the current it needs to produce its rated power. That means you get less power and more distortion. It also taxes the amplifier that is trying to make its power, shortening the life of the amp.
- CCA wire corrodes quickly and causes terminals that used to be tight to become loose. This causes arcing when electrons to fly around all the open space lookin for more copper. This causes heat that damages connections and can even eventually melt the terminal blocks on your amplifier.

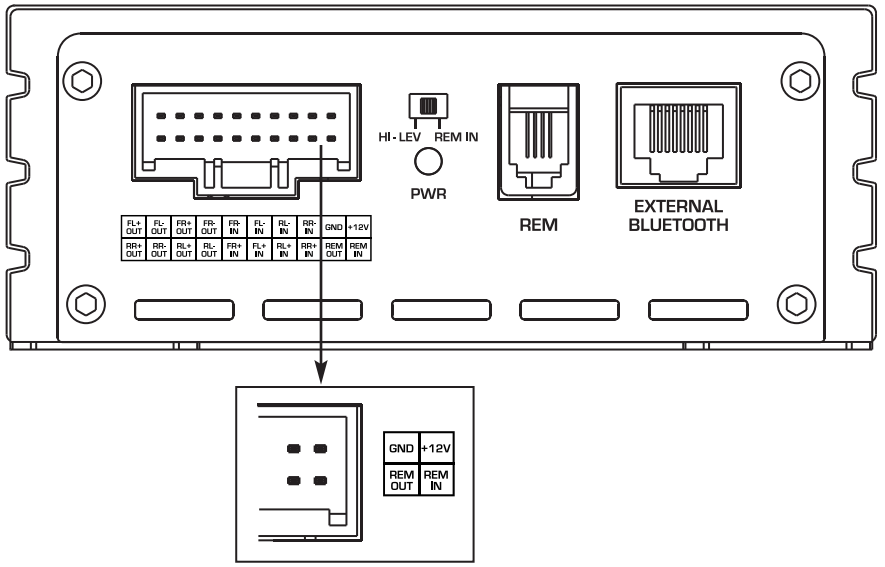


In short: While CCA wire is excellent for high frequency AC current (like tweeter voice coils), it is absolutely bad for high current 12V DC like power and ground for a car audio amplifier. We have seen CCA wire become a major cause of amplifier failures as buyers are offered CCA as a low cost alternative to pure copper wire. So always look at the description of the contents of wire that you purchase. When someone offers to save you some money with CCA wire just say "No, thank you". Protect your investment with real copper wire.

## Planning your power connections

The power end plate has the main 12-volt power input, the 12-volt turn-on wire, and the main Ground connection.

- The 12-volt power input must be connected the vehicle battery's positive (+) terminal, and a main system fuse should be placed close to the battery.
- The Ground connection must be securely attached to bare metal at the vehicle frame, or other heavy chassis component with a direct connection to the frame.
  **Note: Seat bolts and seat belt bolts are NOT good ground points**
- The REM In input can be connected to the head unit turn-on output wire.
  If none is available it can be connected to an accessory (ACC) terminal. You should avoid using any ignition-on (IGN) wire, as they can be noisy.



## More words about Power and Ground

The second most common cause of under performing amplifiers is insufficient power current or a poor power connection. The most common cause of under performing amplifiers is insufficient ground current or a bad ground connection.
12-volt current: Battery power works only if it travels in a complete circuit from the battery positive terminal to the battery negative terminal. Main power input, of course, is attached to the battery positive terminal. Ground current is returned to the battery through the chassis to the point where the battery is grounded.
The current available for your amplifier to use to produce power will be restricted by the smallest gauge of wire in the circuit and by the weakest physical connection in the circuit.

## Wire Size

It's often surprising how many people will obsess about signal wire but routinely provide the amplifier with only a fraction of the current it needs to do its job. The most common wire gauge used in car audio is 10-gauge, and the most common location for amplifiers is in the trunk. That will only be good for about 100 watts (See the chart).

| | ◄---------- Length of Run ----------► | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 4 ft | 7 ft | 10 ft | 13 ft | 16 ft | 19 ft | 22 ft | 28 ft |
| 0-20 amps | 14 | 12 | 12 | 10 | 10 | 8 | 8 | 8 |
| 20-35 amps | 12 | 10 | 8 | 8 | 6 | 6 | 6 | 4 |
| 35-50 amps | 10 | 8 | 8 | 6 | 6 | 4 | 4 | 4 |
| 50-60 amps | 8 | 8 | 6 | 4 | 4 | 4 | 4 | 2 |
| 65-85 amps | 6 | 6 | 4 | 4 | 2 | 2 | 2 | 0 |
| 85 -105 amps | 6 | 6 | 4 | 2 | 2 | 2 | 2 | 0 |
| 105-125 amps | 4 | 4 | 4 | 2 | 2 | 0 | 0 | 0 |
| 125-150 amps | 2 | 2 | 2 | 2 | 0 | 0 | 0 | 0 |

Let's look at a fairly small system. If you use a 50 watt/ch amp (25 amps) for the highs and a 100 watt/ch amp (40 amps) for the woofers, you need at least a 4-gauge and maybe a 2-Guage wire to provide 65 amps at the trunk. Use the Wire Sizing Chart. Add up the fuse values on the amplifier(s) then choose the proper size wire based on the distance from the car battery to the amplifier location. Always use the same gauge wire for the main ground as you do for the main power. Always make your ground as short as possible and secure it to a clean solid surface, preferably the vehicle frame.

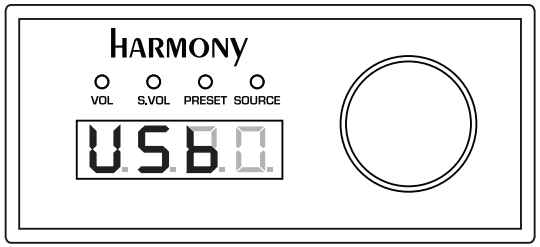


## Mounting your unit

Mounting your unit is easy. Just keep in mind a few guidelines:

- The unit can be mounted in any direction, on wood, metal, or carpet but not upside down as heat rises and will build up if it is mounted upside down.
- The metal chassis of the amp can be grounded or left isolated.
- The amplifier requires adequate ventilation. Creating power creates heat, and cooling requires air. Position the amplifier with sufficient surrounding area for air supply and keep the end plates clear for future access.
- Keep the unit out of the engine compartment or other locations that may cause excessive heat or moisture.
- Do not mount the unit to a subwoofer box or other place that may have excessive vibration.

## Remote Control (optional)



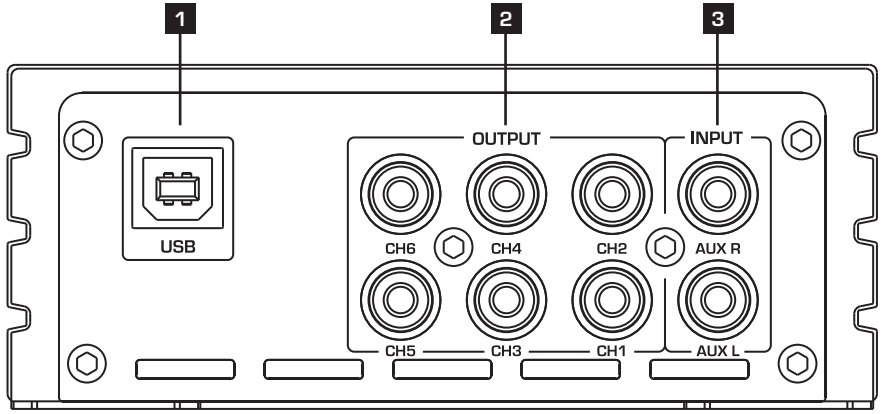

Here the remote controls.
Press the knob to switch between:

- **VOL.** Rotate the knob to increase/decrease the main volume.
- **S.VOL.** Rotate the knob to increase/decrease the subwoofer volume.
- **PRESET.** Rotate to switch between presets, then press to enter. Press and hold for 3 sec. to go back to volume mode.
- **SOURCE.** Rotate to switch between available input sources.

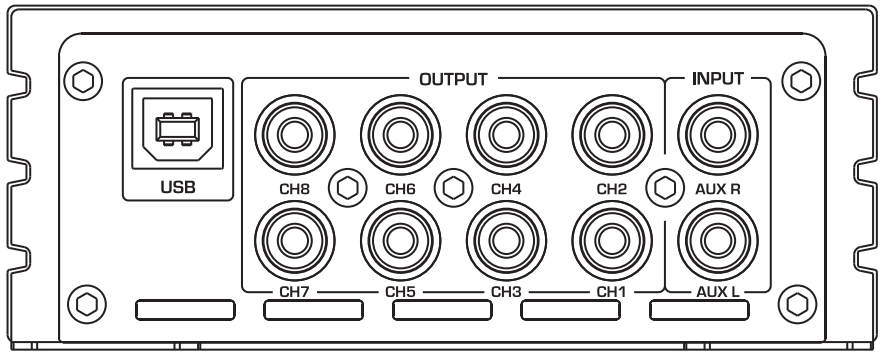
**PLAYER Mode**. Connect a USB device to the external BT module and plug-in into the dedicated port. Press the knob to select SOURCE then rotate the knob to select USB. Press to confirm, then rotate the knob to go to the previous or the next song. Press and hold to go back to volume mode.

## Control Panel (RCA, USB)

HB 46 ADSP




HB 48 ADSP



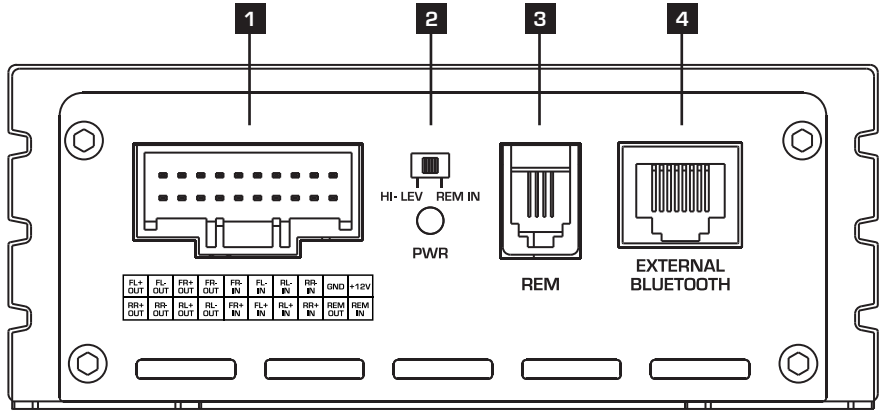

Both the units share the same panel, except the RCA outputs.

**1** - USB Port, to connect your PC for DSP calibration and updates.

**2** - 6- Channels (HB 46 ADSP), 8-Channels (HB 48 ADSP) RCA Outputs.

**3** - 2-Channels RCA Inputs.

## Control Panel (Power, Hi-Lev, REM, BT)




Both the units share the same panel.

**1** - Hi-Level Speaker Inputs and Outputs, Power/Ground/Rem Connections.
Use only the original harness provided. Here a detail of the connector functions.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| FL+ OUT | FL- OUT | FR+ OUT | FR- OUT | FR- IN | FL- IN | RL- IN | RR- IN | GND | +12V |
| RR+ OUT | RR- OUT | RL+ OUT | RL- OUT | FR+ IN | FL+ IN | RL+ IN | RR+ IN | REM OUT | REM IN |

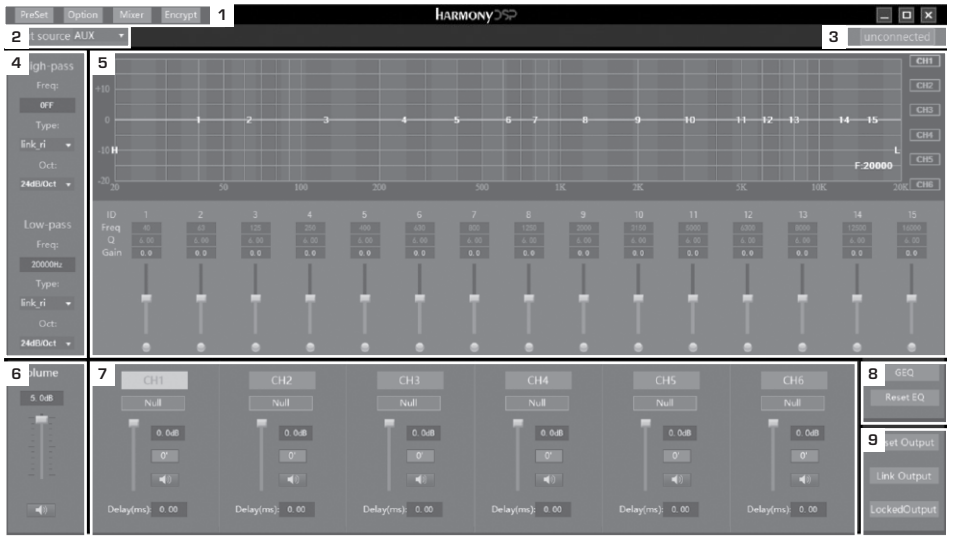
**2** - Hi-Level/Rem In Switch.

**3** - Remote Control Port.

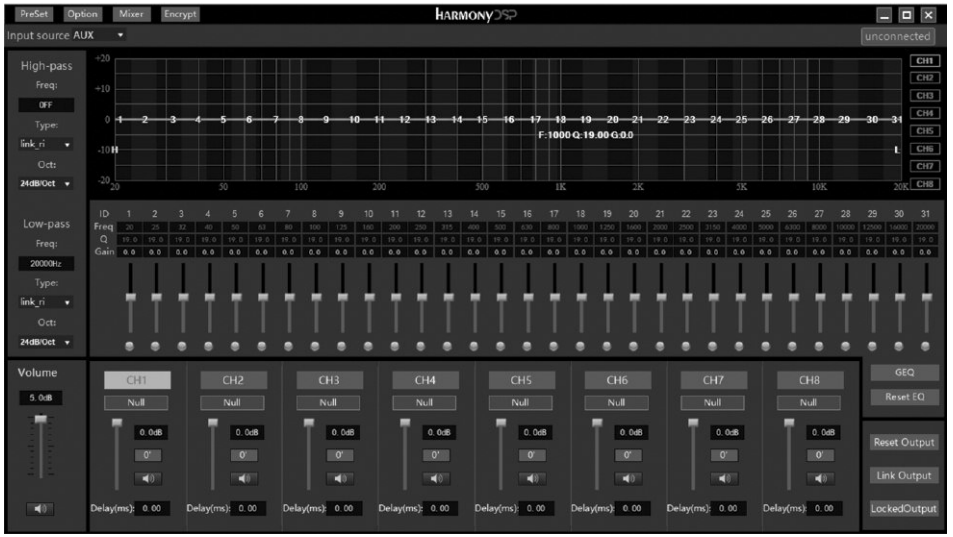
**4** - Bluetooth Port for external BT/Player module.

## PC Control Program

The Control Program requires installation. Download the file from the Harmony website, double click on it and follow the instructions. You should check back on the site regularly to assure you have the most up-to-date version of the software. Below is the layout of the main screen (6-Ch./15-bands EQ for the HB 46 ADSP model and 8-Ch./31-bands EQ for the HB 48 ADSP model).




HB 46 ADSP Main Screen




HB 48 ADSP Main Screen

## Main Screen

Both the units share the same GUI, but the HB 46 ADSP has a 6-Channels DSP with a 15-bands EQ, while the HB 48 ADSP has a 8-Channels DSP with a 31-bands EQ.

**1** - At the very top of the GUI there is the **File Menu** (Pag. 14). The Preset button is where you will save setups to memory presets and load setups from those saved. Option let you choose Language and other tools like BT/USB volume. The Mix button opens the I/O Matrix screen, where you can manually determine which inputs will be used for each output and how much of each input the output will receive. Encrypt is where you manage your password.

**2** - Here you choose the **Input** you will use while tuning. You can choose AUX which can be an aftermarket head unit, or a factory head unit using the HI-LEV option. You also have USB and BT (Bluetooth) input if you add the optional module.

**3** - Connection status.

**4** - **High-Pass and Low-Pass Filter** for each channel. You can type in the frequencies and choose crossover style and slope or turn the crossovers off, if you do not want them for some channels. Always check the speaker makers recommendations for crossovers before you make the crossover decisions.

**5** - **EQ area**. Here are 15-bands (HB 46 ADSP) or 31-bands (HB 48 ADSP) of parametric equalization for each output channel and you can vary Frequency, Gain, and Q (the shape of the adjustment) for each band. Frequency: Each band is numbered. You can simply click onto a band button and drag it to where you want it. When you click onto a band there is a "Heads-up display" of the Frequency, Gain, and Q of the band.

**6** - Here you find the master level control.

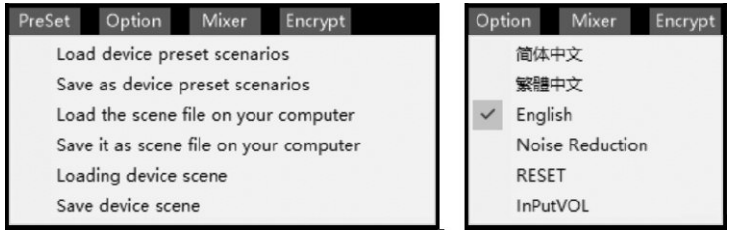
**7** - The **Output Channels** section is for Speaker Assignment, Delay, adjusting Levels and checking Polarity to be sure all speakers are in phase with each other. There are a number of systems for checking System Phase. If the systems speakers are not all in phase there will be issues you can not fix by tuning. You can see the section on System Phasing (Pag. 12) to see one method of Phase checking. The MUTE buttons allow you to turn off any speakers that you do not want to hear while you are tuning other speakers. The purpose of Delay is to make every speaker the same distance from you, so you are in the middle.

**8** - Here you choose between **GEQ (Graphic)** and **PEQ (Parametric)** equalizers, or Reset EQ, if you want to reset channels to default positions with no equalization.

**9** - Here you Reset, Link or Lock Output Channels.

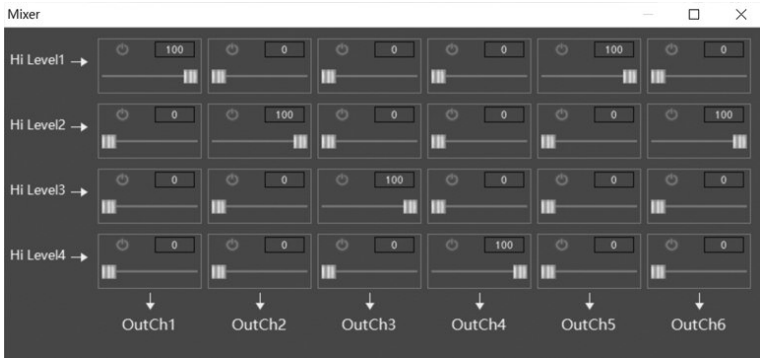
## File Menu

At the very top of the GUI there is the File Menu. The **Preset** button is where you will save setups to memory presets and load setups from those saved. Here you can also save setups into your PC. **Option** button let you choose between Languages, Noise Reduction, Reset function, Input volume, and informations about your device and software. **MIX** will open the I/O Matrix screen (see below). With **Encrypt** you can manage your Password.




## I/O Matrix

With the Mixing Set, you can manually determine which inputs will be used for each output (processing channel) and how much of each input the output will receive. The inputs are listed down the left side and the output channels are listed across the bottom.




## System Phasing

Before equalization you should assure that all speakers are in phase as a system at the listening position. All speakers need to have the same polarity so they move the same direction at the same time. If they are not, you will not be able to get a proper tune. There are a number of methods for doing this. We offer one.



**Tweeters (A)**: Mute all speakers except the tweeters and play a high female vocal solist. You should hear the voice at a single point near upper middle of the windshield. If the speakers are out of phase the voice will not be localized but will seem to come from everywhere. To test, using the Phase buttons, change the phase of the right speaker and listen for the difference. Do this a couple of times as needed. The position that puts the voice in a small single location on the window is the correct phase.

**Tweeters (B)**: Note where the Tweeter center is located. It should be just slightly above and to the left of the center of the windshield (for left hand drive cars). If it is off to the opposite side of center or too far to the left, and if you have measured correctly, then you have a gain difference and you can correct by a slight level adjustment reduce the right tweeter to bring it left or reduce the left channel to take it right. No more that 1dB or 2dB. Now the tweeters are set. From here on out you cannot change the levels or phase of either tweeter.

**Mids, Mid-Woofers, and Subs**: Now mute the tweeters and un-mute the midranges. The process is the same for each pair of speakers. The sound should come from a single focused point near the center of the windshield. For midranges and larger drivers, you want to use a deeper male vocal. The larger drivers are much easier to tell the differences between in-phase and out of phase. Also, with the larger speakers you will hear a dramatic reduction of bass if the speakers are out of phase. So, for midrange and larger speakers you will look for a focused sound source in the windshield with stronger bass.
**NOTE: Once each channel pair is adjusted, they cannot be separated. Any change of phase must be done by the pair.**

**Phasing the pairs**: Again, listening to a single vocalist. Mute all channels again except the tweeters. Then bring in the midranges. If these pairs are in proper phase the sound should be near center in the upper part of the windshield. If they are not in phase the sound will be pulled down lower. You can reverse the phase of BOTH mids now and listen for the difference in the sound location. Choose the phase position that puts the sound high near the center.
Once you have these phased you can bring in the mid-bass with the same process. Again, the focus should be high in the dash. If the mid-bass is out of phase with the tweeters and mids then they will pull the sound down toward the floor.

**Woofers or Subs**: There will be bass! You have phased the woofers, so we know there will be bass. What you need to listen for here is location, and mid-bass (something with kick drums is ideal). Proper woofer phasing will work with the mid-bass drivers to give good solid, crisp mid-bass. Out of phase will result in a soft, low-impact mid-bass. Bass out of phase with the mid-bass will also be more located in the back of the vehicle while a properly phased bass will blend better into the front soundstage.

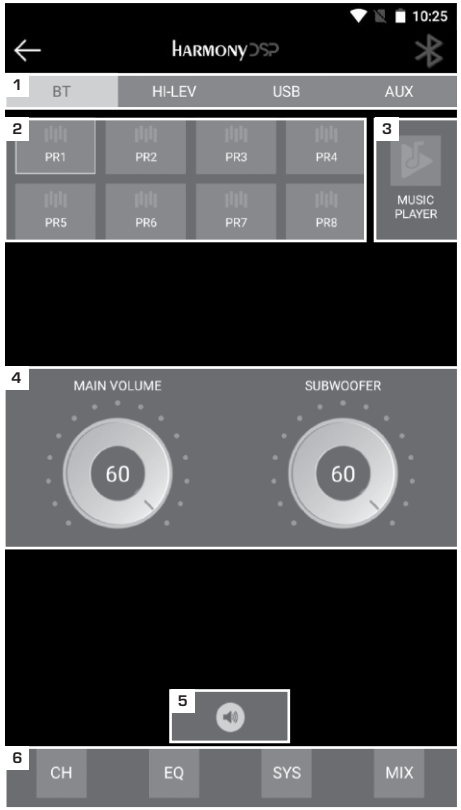
## Mobile Control Program (APP)

The HB 46 ADSP and HB 48 ADSP apps are identical, except for the number of channels and EQ bands, depending on the models, (6-Ch./15-bands EQ for the HB 46 ADSP model and 8-Ch./31-bands EQ for the HB 48 ADSP model). The goal is to have a control system that made sense in a smaller platform but would allow the user to do everything necessary for a complete setup and tune with a smartphone or tablet.

Turn on your unit and connect the ext. BT module. It will enter into pairing mode with blue light flash alternately. Open the Bluetooth of your smart device and search the DSP for pairing. Red BT icon means not connected.

## Main Screen

**1** - In the main screen you will find the Input Source menu where you can choose BT, HI-LEV, USB and AUX.
**2** - Here you find 8 Presets (saved into your device) to choose from.
**3** - Here you open the Music Player.
**4** - Main and Subwoofer Volume.
**5** - System MUTE.
**6** - The advanced menu with Channels, EQ, System and Mixing buttons.

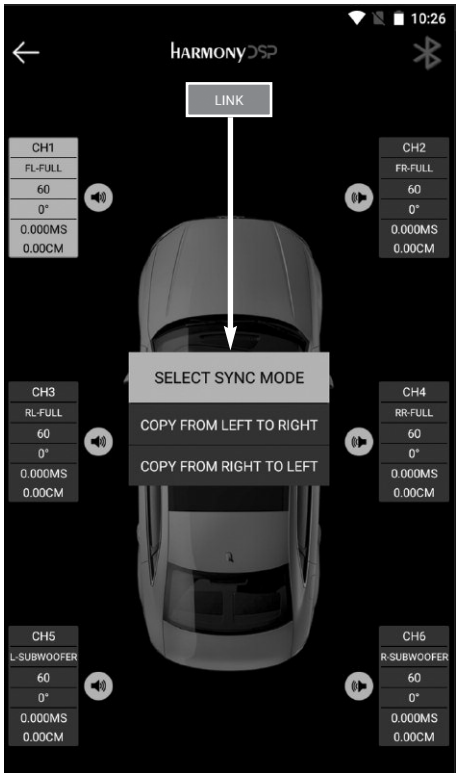



## Channels Setup

Click on CH button in the main screen and you will have the Channel setup screen. Choose from 1 to 6 (model HB 46 ADSP) or from 1 to 8 (model HB 48 ADSP) to setup:

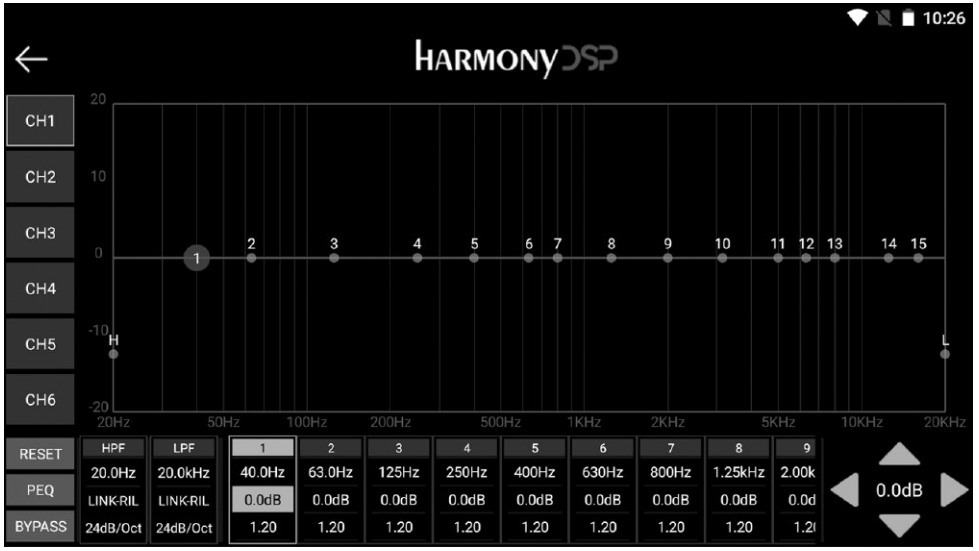
- Channel Assignment
- Gain
- Phase
- Delay (in MS and CM)

You can also mute each channel with the individual speaker icon. LINK button let you link channels between them.



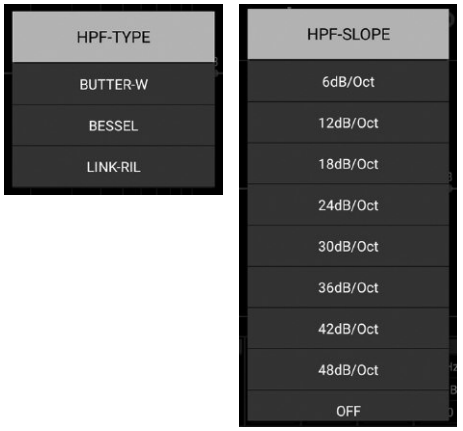

## Equalizer

Click on EQ button in the main screen and you will have the EQ main page (6-Ch./15-bands EQ for the HB 46 ADSP model and 8-Ch./31-bands EQ for the HB 48 ADSP model).



## Crossover

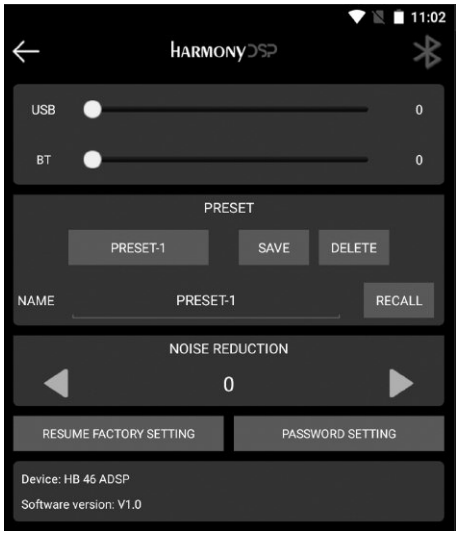
High-Pass and Low-Pass Filter for each channel. You can type in the frequencies and choose crossover style and slope or turn the crossovers off, if you do not want them for some channels. Always check the speaker makers recommendations for crossovers before you make the crossover decisions.

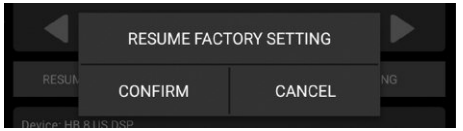


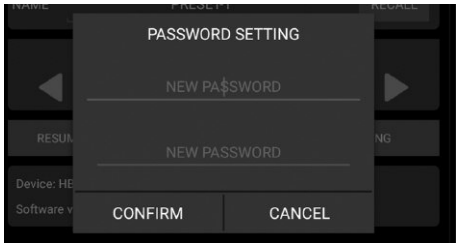

## System

Click on SYS button in the main screen and you will have the System screen with the following functions.

- USB/BT Levels.
- Manage Presets
- Noise Reduction
- Resume Factory Setting / Password
- Device and Software informations

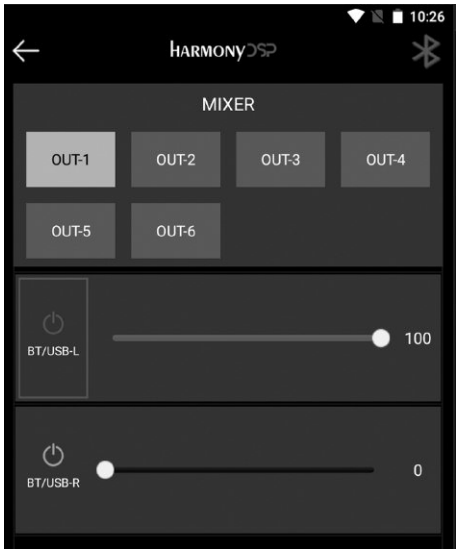


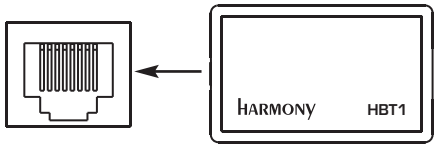

## I/O Matrix

Click on MIX button in the main screen to enter the I/O Matrix.
You can manually determine which inputs (USB-L/R, Digital-L/R, BT-L/R) will be used for each output (processing channel) and how much of each input the output will receive.

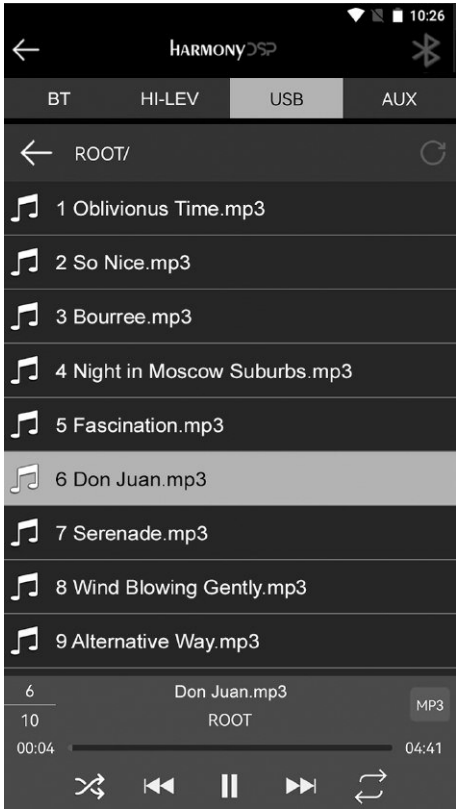



## Music Player

Connect a USB device to the external BT module and plug-in into the dedicated port.




Click on USB button on input source menu, then click on Music Player button in the main screen to enter the Player. Be sure the USB device contains audio files in the supported format (MP2/4, WMA, APE, FLAC, AAC, M4A,WAV, AIF, AIFC). From the App it is possible to access the folders and the contained audio files.



# Technical Specifications

## Main Features

| | |
|---|---|
| DSP Channels | 6 (HB 46 ADSP) - 8 (HB 48 ADSP) |
| High Level Inputs | 4-Channels |
| RCA Inputs | 2-Channels |
| RCA Outputs | 6-Channels (HB 46 ADSP) - 8-Channels (HB 48 ADSP) |
| Amplifier Power | 4 x 70W (Max) |
| Plug & Play Ready | Yes |
| BT 5.1 Streaming | Yes |
| Music Player | Yes (APP) |
| Audio Format | MP2/4, WMA, APE, FLAC, AAC, M4A,WAV, AIF, AIFC |
| DSP Tools | PC and APP |

## DSP Features

| | |
|---|---|
| DSP Equalizer | 15-Bands (HB 46 ADSP) - 31-Bands (HB 48 ADSP) |
| Input Choice: | AUX, BT, HI-LEV, USB |
| I/O Mixing Matrix | Yes |
| Crossover | High-Pass - Low-Pass Filter |
| Crossover Type | Butterworth, Bessel, Linkwitz–Riley |
| Crossover Slope | 6-12-18-24-30-36-42-48 dB/Oct. |
| Delay | 0.00-20.00 ms, 0.00-692.00 cm, 0.00-273.00 in. |

## Technicals

| | |
|---|---|
| Active Range | > 110dB |
| S/N Ratio | > 100dB |
| THD | < 0.05% |
| Sampling Rate | 48KHz/24Bit |
| Frequency Response | 20Hz - 20KHz |
| Amplifier Power | 4 x 35W (Normal), 4 x 70W (Max) |
| Input Impedance | 20 KOhm (Low), 240 Ohm (High) |
| Signal I/O Range | RCA Input 6Vpp, RCA Output 9Vpp, High-Lev. 26Vpp |
| Power Supply | DC 9V-16V |
| Power Consumption | < 0.1W |
| Dimensions: | 135 (159) x 115 x 45.5 mm (HB 46 ADSP)<br>160 (184) x 115 x 45.5 mm (HB 48 ADSP)<br>81.8 x 36.8 mm (optional Remote) |

HARMONY

HARMONY is a Brand of APEX Group

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