



ZAPCO HB 84D DSP Amplifiers User Guide

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HB 46 ADSP
HB 48 ADSP
HB 410 ADSP
HB 84D
Quick Guide

HARMONY
BLUE NOSE
Series
DSP/AMPLIFIERS

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

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General Instructions

The installation of the product must be done by professional technicians. Always contact a ZAPCO Authorized Dealer.

Before you start your installation

ZAPCO highly recommends that a fuse or circuit breaker be placed within 18" of the battery. The protection device should be placed where it can be accessed easily and all wiring should be routed safely and correctly according the following guidelines:

- Do not run wiring close to hot or spinning objects
- Always 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.

Planning your power connections

- The +12V B is the main power input. This must be connected the vehicle battery's positive (+) terminal
- The GND is the main ground or negative connection. This must be securely attached to bare metal at the vehicle frame
- The terminal between the main power and ground is the +12 turn-on input (REM) and can be connected to the head unit turn-on output wire. If none is available it can be connected to an accessory (ACC) terminal

Mounting your amplifier

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

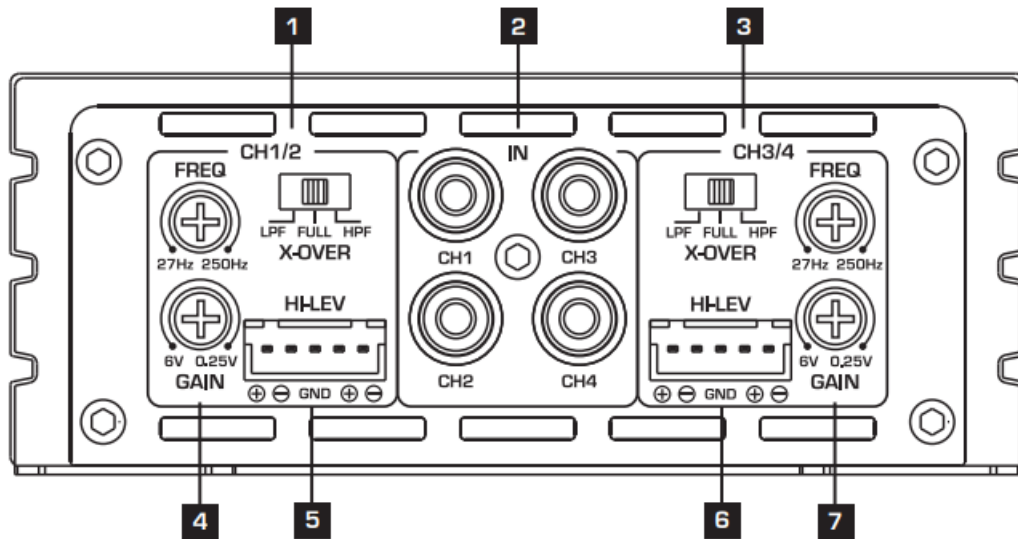
- The amplifier requires adequate ventilation. Creating power creates heat, and cooling requires air
- Keep the amplifier out of the engine compartment or other locations that may cause excessive heat or moisture
- Do not mount the amplifier to a subwoofer box or other place that may have excessive vibration

Setting Gains

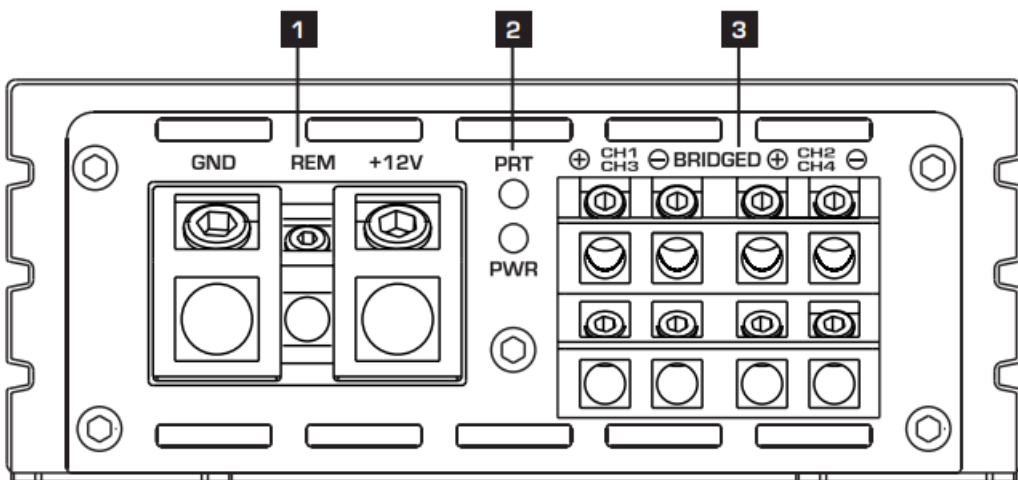
Gain pots are not volume controls and should be used only if absolutely necessary. Turning up gain controls causes increased noise, makes distortion more likely and reduces the dynamic range of your system.

Continuous exposure to excessive sound pressure levels may cause hearing damage. ZAPCO strongly advises that you use common sense when setting volume levels. Everything written in this manual is for the proper use of the products. Some features or specifications could be modified during production to improve the product performance. The technical specifications and functionalities stated here are current as of the time of publication.

HB 84D Control Panels

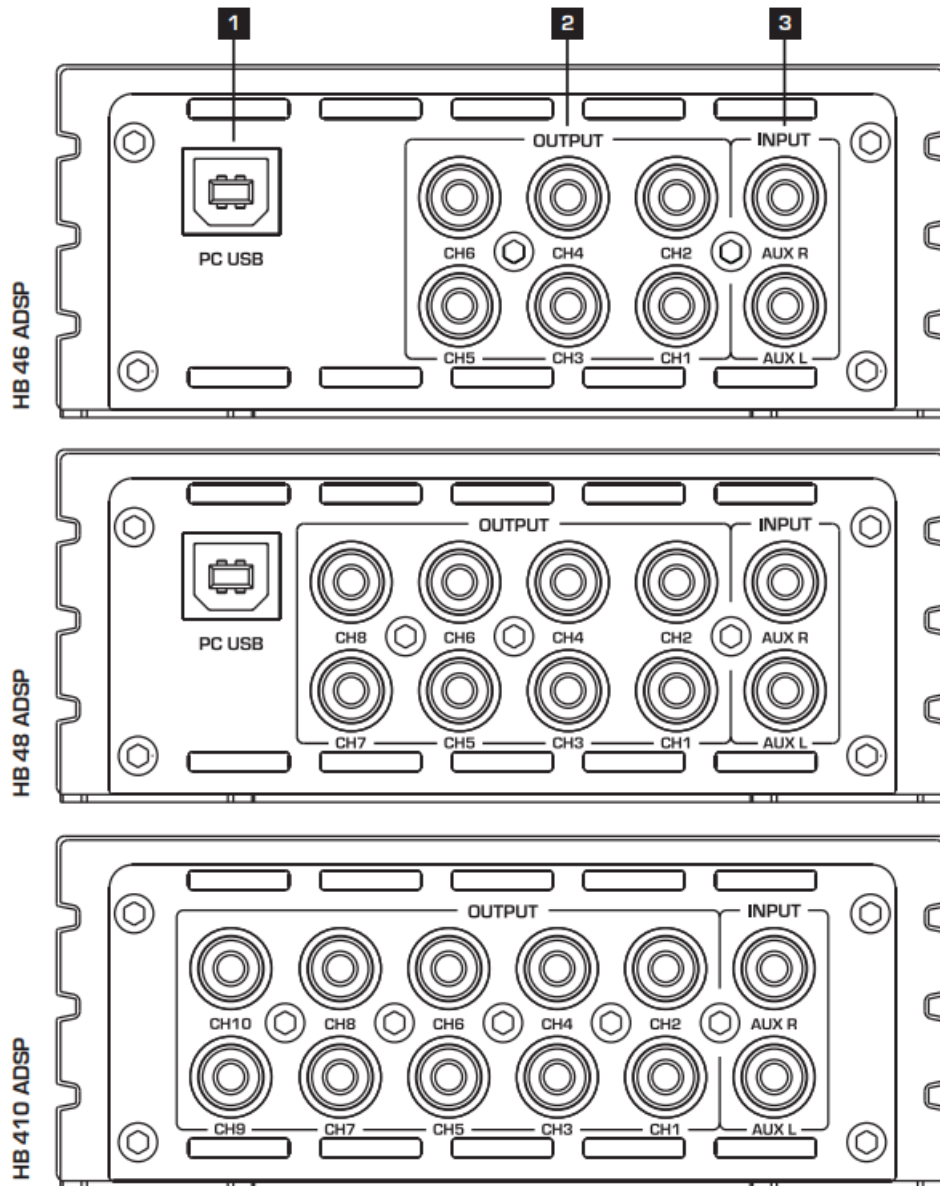


1. CH1, 2 Frequency Control and Switch (LPF/Full/HPF).
2. Low Level RCA Inputs.
3. CH3, 4 Frequency Control and Switch (LPF/Full/HPF).
4. CH1, 2 Gain Control.
5. CH1, 2 Hi-Level Inputs.
6. CH3, 4 Hi-Level Inputs.
7. CH3, 4 Gain Control.

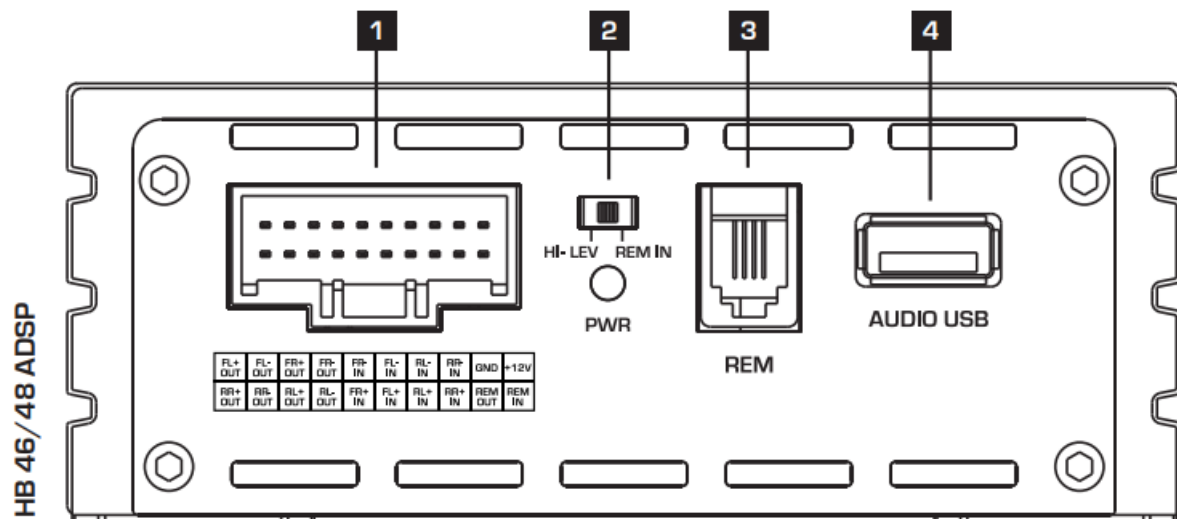


1. Power/Ground/Rem Connections.
2. Power and Protection Led.
3. Speaker Outputs.

HB 46/48/410 ADSP Control Panels



1. USB Port, to connect your PC for DSP calibration and updates.
2. 6- Ch. (HB 46 ADSP), 8-Ch. (HB 48 ADSP), 10-Ch. (HB 410 ADSP) RCA Outputs.
3. 2-Channels RCA Inputs.



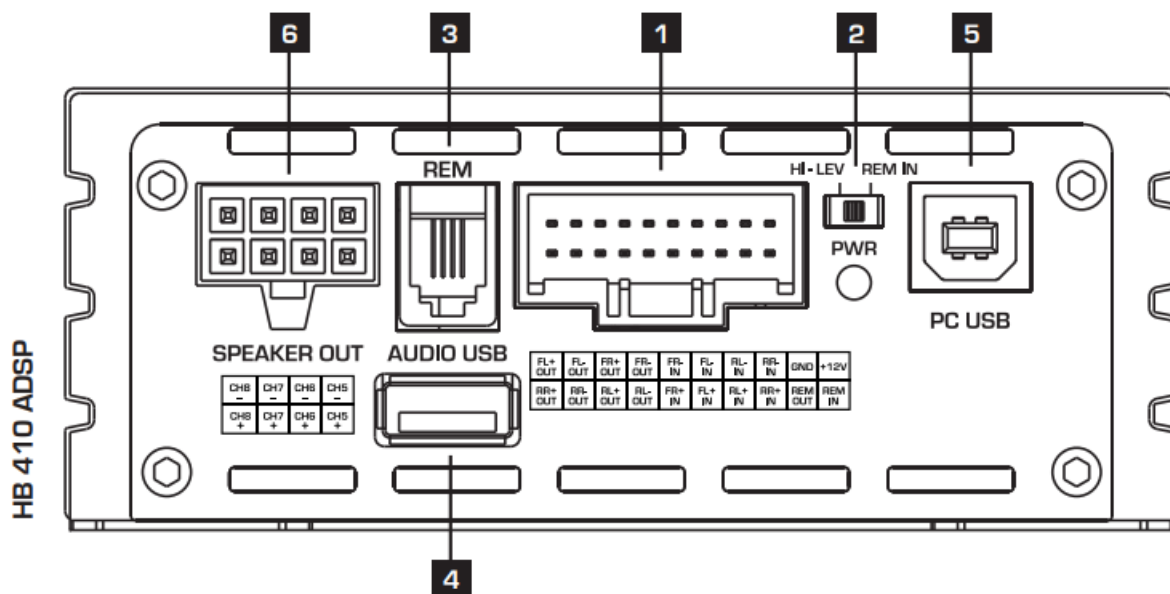
1. Hi-Level Speaker Inputs and Outputs, Power/Ground/Rem Connections.

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. USB Port for Audio Files.

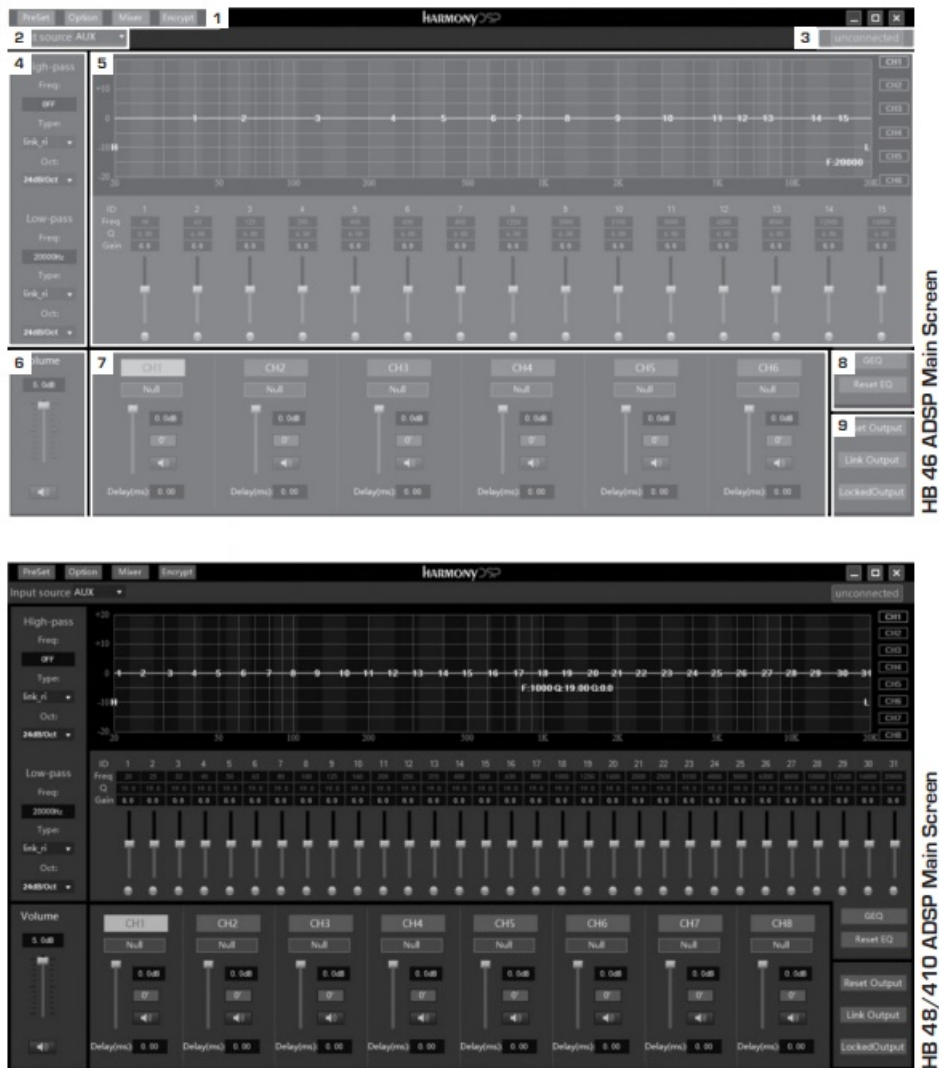


5. USB Port, to connect your PC for DSP calibration and updates.

6. Ch. 5, 6, 7, 8 Speaker Output.

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.



Main Screen

All the units share the same GUI, but the HB 46 ADSP has a 6-Channels DSP with a 15-bands EQ, the HB 48 ADSP has a 8-Channels DSP with a 31-bands EQ, and the HB 410 ADSP has a 10-Channels DSP with a 31-bands EQ.

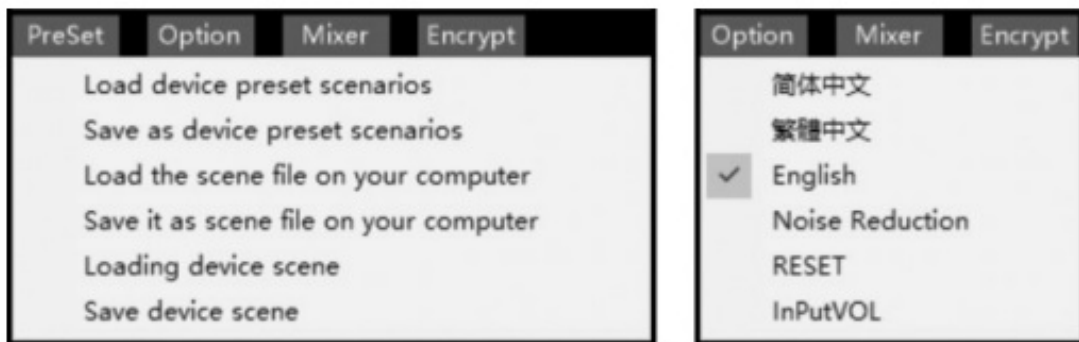
1. At the very top of the GUI there is the File Menu (Pag. 14). The Preset button is where you will save setups to memory presets and load setups from those saved.
Option let you choose Language and other tools like BT/USB volume. The Mix button opens the I/O Matrix screen, where you can manually determine 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.
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, HB 410 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.

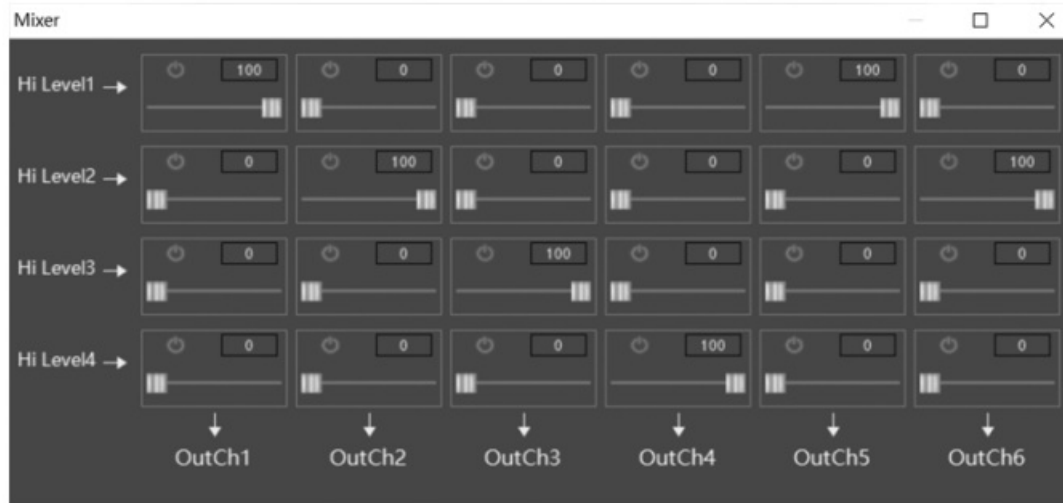
File Menu

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 eduction, 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)

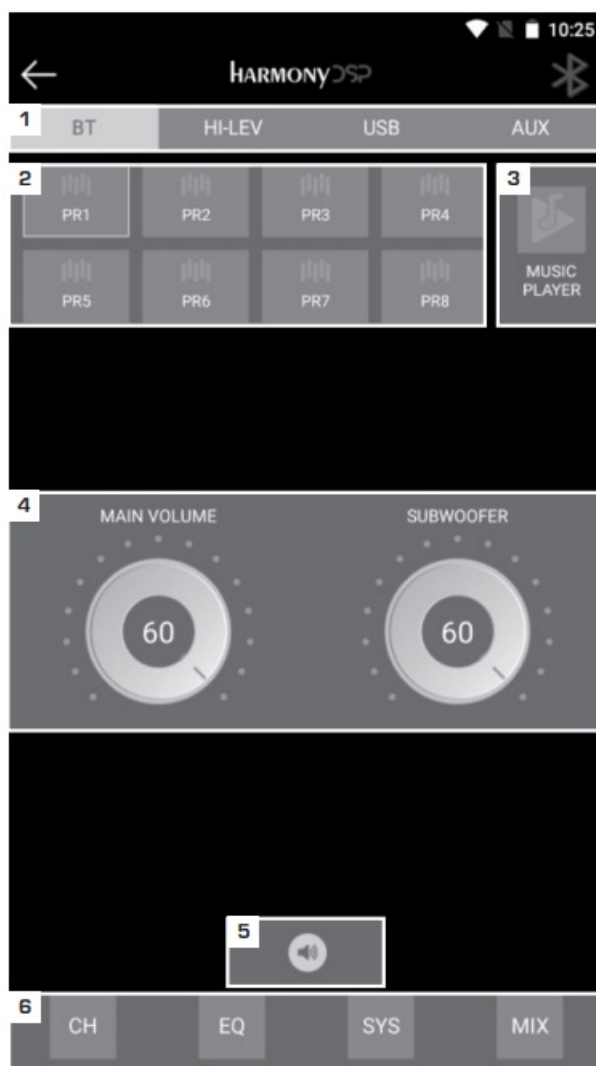
The HB ADSP Apps are identical, except for the number of channels and EQ bands, depending on the models, (6-Ch./15-bands EQ for the HB 46 ADSP model, 8-Ch./31bands EQ for the HB 48 ADSP model, and 10-Ch./31-bands EQ for the HB 410 ADSP model). The goal is to have a control system that made sense in a 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. 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.



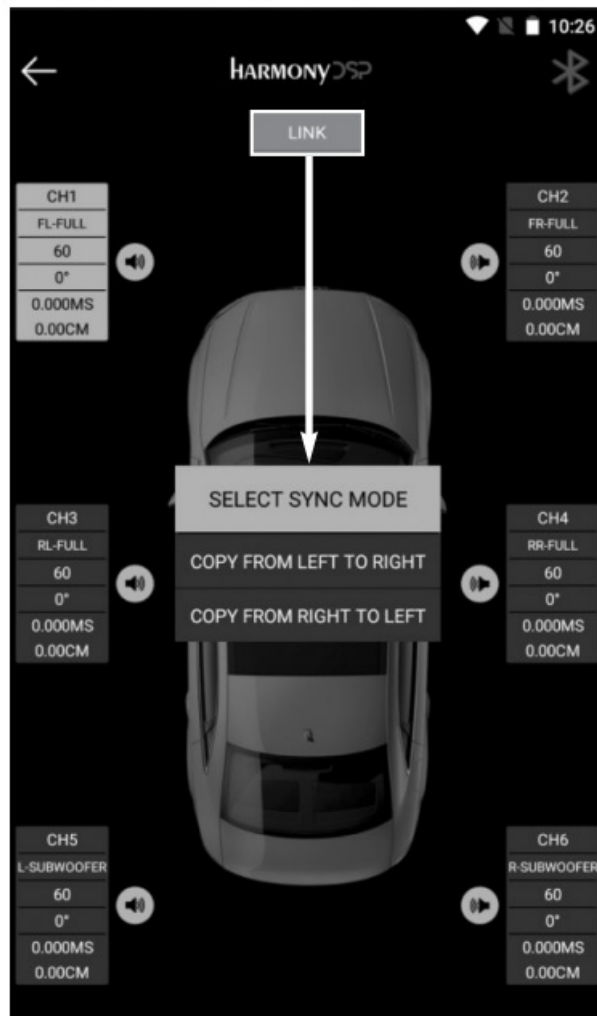
Channels Setup

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), from 1 to 8 (model HB 48 ADSP) or from 1 to 10 (model HB 410 ADSP) to setup:

- Channel Assignment
- Gain
- Phase

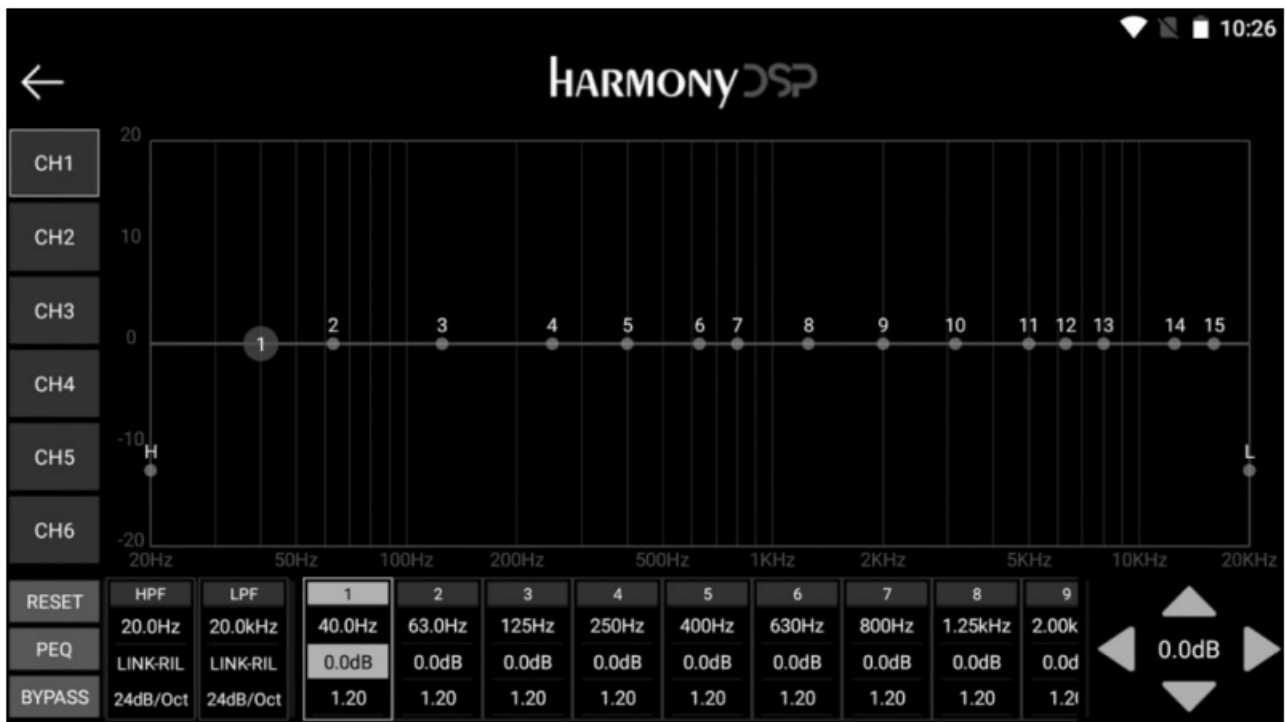
- Delay (in MS and CM)

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



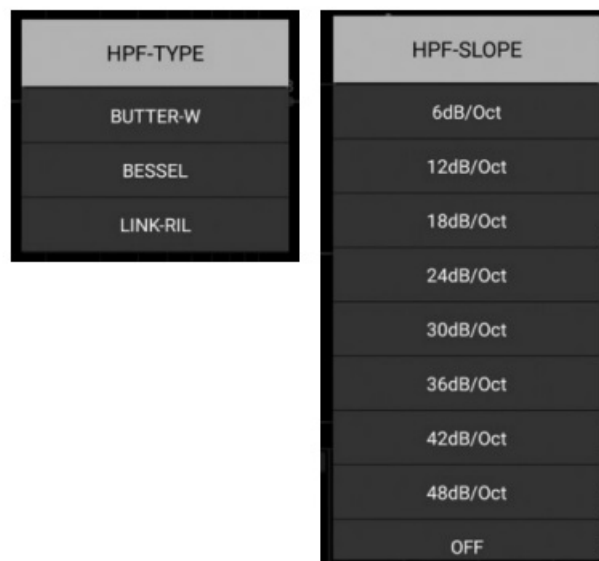
Equalizer

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, 8-Ch./31-bands EQ for the HB 48 ADSP, 10-Ch./31-bands EQ for the HB 410 ADSP)



Crossover

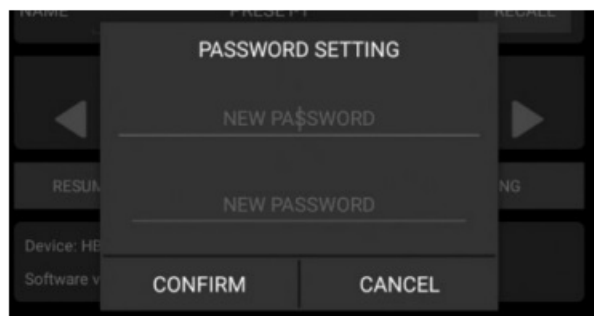
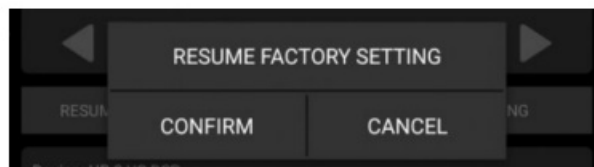
High-Pass and Low-Pass Filter for each channel. You can type in the frequencies and choose crossover style and slope or turn the crossovers off, if you do not want them for some channels. Always check the speaker makers recommendations for crossovers before you make the crossover decisions.



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

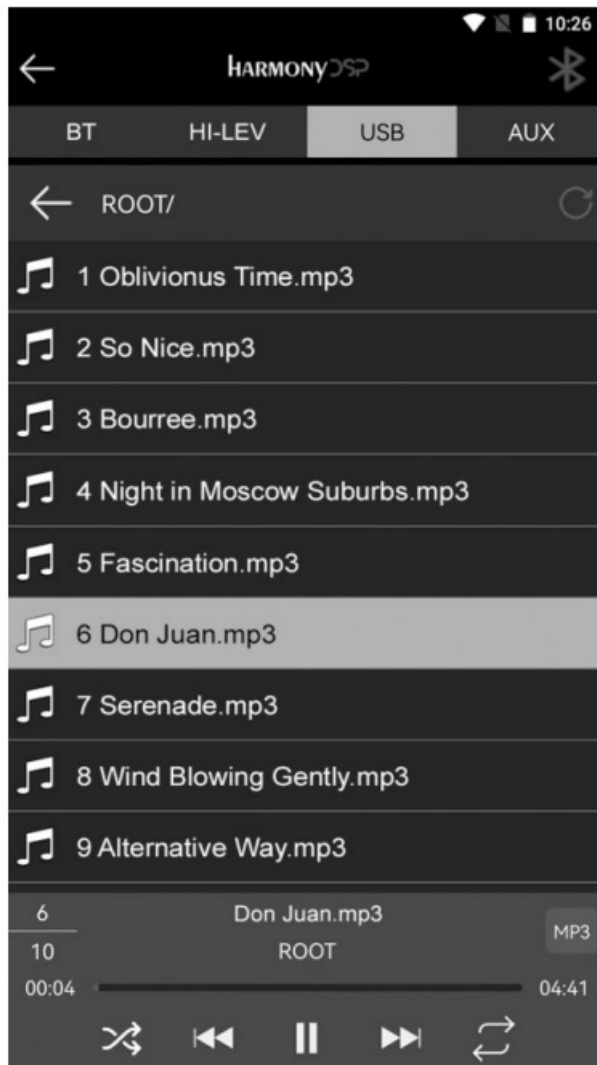
Click on MIX button in the main screen to enter the I/O Matrix.

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 Audio USB 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.

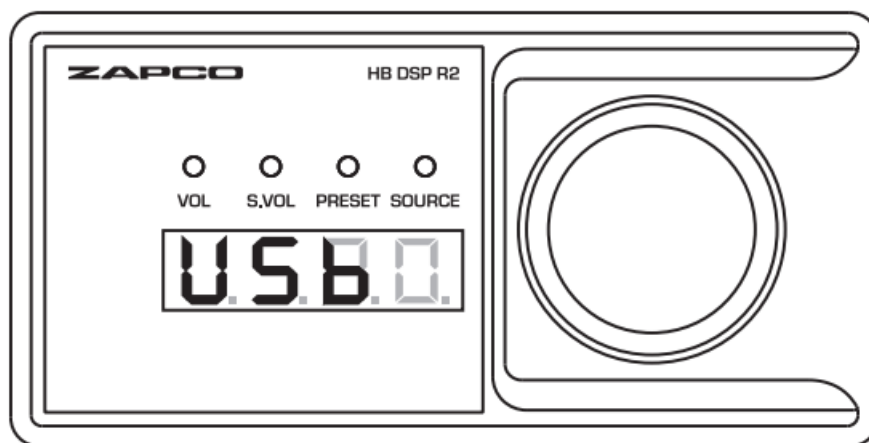


Remote Control (optional for HB 46/48/410 ADSP)

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 Audio USB port (be sure the USB device contains audio files in the supported format: MP2/4, WMA, APE, FLAC, AAC, M4A, WAV, AIF, AIFC). 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.

Technical Specifications

Main Features	HB46	HB48	HB410	HB84D
DSP Channels	6	8	10	
High Level Inputs	4-Channels	4-Channels	4-Channels	4-Channels
RCA Inputs	2-Channels	2-Channels	2-Channels	4-Channels
RCA Outputs	6-Channels	8-Channels	10-Channels	–
Amplifier Power (Max)	4 x 70W	4 x 70W	8 x 70W	
IPlud S. Play Ready	Yes	Yes	Yes	Yes
BT 5.1 Streaming	Yes	Yes	Yes	
Music Player	Yes (AP P)	Yes (AP P)	Yes (AP P)	
DSP Tools	PC + APP	PC + APP	PC + APP	

DSP Features

DSP Equalizer	15-Bands	31-Bands	31-Bands	–
Input Choice:	AUX, BT, HI-LEV, USB			–
I/O Mixing Matrix	Yes	Yes	Yes	–
Crossover	HP-Full-LP	HP-Full-LP	HP-Full-LP	–
Crossover Type	Butterworth, Bessel, Linkwitz–Riley			–
Crossover Slope	6-12-18-24-30-36-42-48 dB/Oct.			–
Delay	.00-20.00 ms, .00-692.00 cm, .00-273.00 in.			–



Other Technicals

S/N Ratio	> 100dB	> 100dB	> 100dB	> 95dB
THD	< 0.05%	< 0.05%	< 0.05%	< 0.1%
Frequency Response	20Hz – 20KHz			
Amplifier Power (4 Ohm)	4 x 20W	4 x 20W	8 x 20W	4 x 75W
Amplifier Power (2 Ohm)	4 x 35W	4 x 35W	8 x 35W	4 x 120W
Amplifier Power (Max)	4 x 70W	4 x 70W	8 x 70W	–
Input Impedance	20 KOhm (Low), 240 Ohm (High)			
Signal I/O Range	RCA Input 6Vpp, RCA Output 9Vpp, High-Lev. 26Vpp			
Power Supply Cons.	DC 9V-16V, < 0.1W			
Unit Dimensions (mm):	135-159 (L)	160-184(L)	160-184(L)	160-184(L)
	115 (W)	115 (W)	115 (W)	115 (W)
	45.5 (H)	45.5 (H)	45.5 (H)	45.5 (H)
Remote Dimensions (mm):	90 (L) x 45 (H)			



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Documents / Resources

  Quick Guide	ZAPCO HB 84D DSP Amplifiers [pdf] User Guide HB 84D, HB 46 ADSP, HB 48 ADSP, HB 410 ADSP, HB 84D DSP Amplifiers, DSP Amplifiers, Amplifiers
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References

-  [ZAPCO - The Driving Force](#)
- [User Manual](#)

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