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PBX-DSP8

8 CHANNEL DIGITAL SIGNAL PROCESSOR

Owners Manual

Please read through this manual to familiarize yourself with your new equalizer. Should your PowerBass DSP ever require service, you will need to have the original dated receipt.

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DIGITAL SIGNAL PROCESSOR

Thank you and Congratulations

Thank you for purchasing the PBX-DSP8 Digital Signal Processor. The PBX-DSP8 has been designed and manufactured to exacting standards in order to ensure superior quality and years of musical enjoyment in your vehicle. For the best results, we highly recommend that you have your PBX-DSP8 installed by a PowerBass authorized dealer. Our authorized dealers have the training expertise and installation knowledge to ensure optimum performance without compromising your vehicle's audio system integrity and durability. Due to the



complexity of modern vehicle systems, we do not recommend DIY installation unless you have extensive experience in 12V electrical systems and tuning. Should you decide to install this product yourself, please take the time to read this manual thoroughly to familiarize yourself with its installation setup and tuning procedures. If you have any questions regarding the instructions in this manual or any aspect of the product's operation, please contact your authorized dealer for assistance. If you need further assistance, please contact at tech@powerbassusa.com

Δ Caution Δ

High powered audio systems in a vehicle are capable of generating higher then "Live Concert" levels of sound pressure. Continued exposure to excessively high volume sound levels will cause hearing loss or damage. Also, operation of a motor vehicle while listening to audio equipment at high volume levels may impair your ability to hear external sounds such as horns, warning signals, or emergency vehicles—thus creating a potential traffic hazard. In the interest of safety, PowerBass USA highly recommends listening at lower volume levels when driving.

The PBX-DSP8 digital signal processor is engineered to deliver the ultimate in system tuning capabilities, in an easy-to-use format. Combined with a state-of-the-art 32-bit DSP processor, The PBX-DSP8 gives you the ability to do DSP tuning and signal summing via your smart phone or tablet using the downloadable PBX-DSP8 app.

INCLUDED WITH YOUR PBX-DSP8

- (1) PBX-DSP8 Processor
- (1) 8-Channel RCA Level Input Harness with Power/Ground/REM Wire
- (1) 8-Channel High Level Input Harness with Power/Ground/REM Wire
- (1) 8-Channel RCA Level Output Harness
- (1) Installation manual

FEATURES

- Digital Signal Processor for system integration for use when adding aftermarket amplifiers to a factory or aftermarket head unit.
- Wireless / APP Control compatible with PBX-DSP8 App available on iOS or Android devices. Download Free in the app store.
- Auto Turn on with DC Offset
- High and Low level input with Low Level user adjustable Outputs
- 8 Channels input / 8 channels output
- Amplifier remote turn on with user selectable delay

SIGNAL PROCESSING FEATURES

- 32-Bit Digital Signal Processing
- 31 Band User Adjustable Equalization per channel
- User Adjustable Delay and Gain per channel
- User Adjustable Crossover Network with adjustable slopes 6 48db
- User Selectable Phase control per channel 0 / 180 degrees
- Adjustable input voltage per channel pairings 250mV 9V

APP DOWNLOAD

Open your iOS app store or google play store and search for PBX-DSP8 then select install. Or use the QR codes below to take you directly to the download page.









INPUT WIRING DIAGRAMS

NOTE: Proceed only if you are a qualified installer, otherwise; see your authorized Powerbass Dealer to professionally install and tune your Digital Signal Processor



INSTALLATION AND SET UP INSTRUCTIONS **AFTERMARKET RADIO INTEGRATION**

Allows for installation of aftermarket amplifier in virtually any vehicle with a factory / OEM source unit



INSTALLATION AND SET UP INSTRUCTIONS AFTERMARKET RADIO INTEGRATION

Allows for installation of aftermarket amplifier in virtually any vehicle with a factory / OEM source unit





RCA OUTPUT CONNECTIONS

1-4. GAIN CONTROL - Fine tune the input voltage by adjusting each paired channel from 250mV up to 9V of input gain allows for compensation due to lack of input signal from the head unit to ensure a stronger and cleaner signal out to your amplifiers.

5. RCA OUTPUT CONNECTOR HARNESS - Connect each RCA channel to the appropriate amplifier input channel.

APP CONNECTION AND CHANNEL ASSIGNMENT

All CONTROLS can be found by pushing the upper LEFT (system menu) or RIGHT (DSP Control) Buttons that will drop down the submenus

CONNECTION / DEVICE LIST

Open the app and enter the DSP menus. Select the GEAR icon to access SETTINGS on the screen you will see a device list of all connected / available sources. Select your PBX-DSP8 from the list

REFRESH DEVICE LIST

This is useful so that your installer can also connect to the PBX-DSP8 and help with adjustments, tuning or troubleshooting. Refresh the list and allow the installer to select the PBX-DSP8 on their device after turning it off on your device.

RESET DSP TUNING

Want to start over completely? Only use this button if you are ready to clear all settings and start fresh. Press and HOLD this button to RESEST ALL SETTINGS back to the factory settings.

First select your input channel configuration near the bottom of the screen.

2CH INPUT - select this if you have only 1 pair of RCA inputs or high level channels to be used

6CH INPUT - select this if you have 3 pairs of RCA inputs or high level channels to be used

CUSTOM - select this if you want a custom setting for your RCA inputs or have 8 High Level input channels.

Summing when integrating into an OEM system allows you to take multiple input signals and sum them together for a full range output. Many of the Factory Head units have filters set in place for each output channel by summing you are now able to take the High Frequency and Mid range Frequency and combine them into one full range output.

SUMMING

Fig. D1 - Summing 1





Fig. C2 - Reset DSP



FOLLOW THESE STEPS TO SET UP CHANNEL SUMMING WITH AN OEM FACTORY HEADUNIT

- 1. Determine the frequency response for each of the factory channels.
- 2. Choose the output channel that will receive the summed signal
- 3. Choose the input channels to sum together to provide your output with a full range signal output.





4. Repeat for each output channel

Summing when using an aftermarket headunit allows you to select one RCA input to be sent to a single channel output channel or to multiple channels. This is ideal for using 6 channels IN and 8 channels OUT for example.

Follow these steps to set up channel SUMMING with an Aftermarket Headunit

- 1. Choose the output channel you want to assign an input to.
- 2. Choose the input channel you want to send signal to your desired output channel or channels
- 3. Repeat for each output channel



Fig. D3 - Summing 3

CROSSOVER GROUPINGS AND SETTINGS

NOTE: Proceed only if you are a qualified installer with knowledge of frequency response and acceptable ranges. Improper tuning will result in damage to your speakers. We recommend allowing your authorized PowerBass Dealer to professionally install and tune your Digital Signal Processor

The Crossover settings are the beginning stages of tuning, we recommend that your amplifier is set to FULL RANGE to allow the PBX-DSP8 to control all of the signal processing. With the amplifier crossover set to any position it will limit the signal passed from the PBX-DSP8 thus making your DSP settings not effective.

It is usually best to MUTE the channels you are not working on until you are ready to hear your work as a whole, to do so enter into the GAIN setting and MUTE / UNMUTE channels as you progress in your set up.

GROUPING CHANNELS

Grouping Channels allows for you to make crossover settings that will effect multiple channels the same. This method allows you to group channels based on the sound profile desired. NOTE you do not have to group channels to use the crossover however you will need to set each channel independently if you choose not to group them.

STEPS FOR GROUPING:

- 1. Choose the channels you want to group together such as tweeter channels 1 and 2 from the buttons at the bottom of the screen. This will group channels 1 and 2 together and so forth.
- Select the benchmark channel. This is the channel you will do the adjustments in that will then control the entire grouped channels.
- 3. To remove a grouping, press and hold the group button at the bottom of the screen.



The PBX-DSP8 allows full control of your Crossover Settings. Each channel or grouped channel can be set for HIGHPASS, LOWPASS, BYPASS or also using a combination of HIGHPASS and LOWPASS to achieve a BANDPASS Setting.







Fig. E2 - Crossover 1

HIGHPASS is used for high frequency drivers such as tweeters and generally you will want to start around 3500Hz and up. Lower frequency range can damage your tweeters be sure to check the frequency range prior to picking your crossover setting

LOWPASS is used for midbass and subwoofer drivers that will be able to play the lower frequencies and is variable depending on the size of the driver and its acceptable frequency range.

BANDPASS is used for Midrange drivers to allow a more controlled frequency range in the higer frequencies as well as in the lower frequency range. For this you will set both Highpass and Lowpass frequencies.

BYPASS can be selected if you are using external crossovers and do not want the PBX-DSP8 to control the crossover points.

SETTING THE CROSSOVER

Setting up your crossover will require you to choose the type of filter as well as the slope by following these instructions:

- 1. Select the Channel or Channel Group you want to adjust.
- 2. Select the proper filter setting
- 3. Select the slope 6, 12, 24, 36, 48db this determines how wide the frequency range allowed will be smaller slope provides a very narrow tune window while a larger slope allows for a wider frequency range.
- 4. Use the slider or manually enter your desired crossover frequency.
- 5. Repeat these steps for each channel or channel groupings.



Fig. E3 - Crossover HPF









Fig. E6 - Crossover Entry

OUTPUT GAIN AND POLARITY SETTINGS

NOTE: Proceed only if you are a qualified installer with knowledge of frequency response and acceptable ranges. Improper tuning will result in damage to your speakers. We recommend allowing your authorized PowerBass Dealer to professionally install and tune your Digital Signal Processor

GAIN SETTINGS

Gain settings allow you to boost the output signal sent to your amplifiers. Before setting this up it is best to lower the gains on your amplifier to 1/4, you will then go back to make final adjustments after you have set your output gain. This will ensure a strong clean signal from the DSP so that you will not need to use more gain directly at the amplifier.

When setting the gain it is important not to over adjust this setting. System hiss, or distortion are common signs of over use of the gain. Improper use of gains can also damage your speakers and amplifiers it is best to start lower and gradually work up to your desired listening level. To properly set up your Gain Settings follow these steps:

- 1. Select all channels in the LINKED section then push MUTE this will mute the output of all channels.
- Unselect any channels in the LINKED section you do not want to adjust to the same setting and adjust. Then deselect those channels and select the next channel for adjustment as you move through all channels.
- Set your head unit to the desired listening level please note that most head unit outputs will enter into distortion the closer to the maximum level setting
- 4. Set your PBX-DSP8 master volume to the desired listening level this is located in the middle of the screen
- 5. Start by un-muting the first channel or linked channels then adjust the gain using the slider or the + and - buttons. Using Pink noise is a great way to hear the increase or decrease and potential change in pitch which helps with cleaner output gain settings.
- 6. Repeat Step 5 for all remaining channels



Fig. F1 - GAIN

PHASE SETTINGS

Phase refers to the drivers being wired in the correct polarity but this can sometimes need to be adjusted based on positioning to help with possible staging issues of the sound floor.

When wiring up your system be sure to follow the Positive and Negative terminals to be sure that all are wired in the same correct phase. When wiring backwards this can make the speaker move in reverse which is called out of phase.

If you find you need to adjust the Phase due to a speaker being wired incorrectly or to help with staging of the sound by taking a specific driver out of phase simply select the channel or linked channels and use the O-degree button located under the sliders beside the mute button.

0 degrees represents "In Phase" 180 degrees represents "Out of Phase



Fig. F2 - PHASE

31 BAND PARAMETRIC EQUALIZER

NOTE: Proceed only if you are a qualified installer with knowledge of frequency response and acceptable ranges. Improper tuning will result in damage to your speakers. We recommend allowing your authorized PowerBass Dealer to professionally install and tune your Digital Signal Processor

The 31 Band Parametric Equalizer gives you complete control on your sound profile. By knowing how to adjust the EQ properly you can make fine adjustments to each channel to adjust specific frequencies to accent them or decrease them to smooth out the peaks and dips in the curve until the desired response curve is achieved. This is generally different by listener and is recommended that you work with each channel separately before final adjustments with all channels activated. For advanced users we recommend using an RTA to visually see your adjustments providing a more detailed tuning experience.

FREQUENCY ADJUSTMENT

The 31 Band Parametric Equalizer is shown on the screen of your device in increments of 8 bands. To access the next group of 8 simply slide your finger to the left or right or use the arrows << >> underneath the sliders.

All Bands have been set to the factory default however you may also manually enter the exact frequency you want to set into a specific band. To do this tap the Freq. box and use the slider or manually enter the frequency into the box this will change the set frequency for this band.



Fig. G1 - Equalizer 1



Fig. G2 - Equalizer Entry

To make Equalizer adjustments follow these steps:

1. Select the frequency band you would like to adjust.

2. Determine if the factory frequency is to your liking if not make adjustments using the slider or manual entry.

3. Set the Q or width of the frequency being adjusted the lower the Q the wider the frequencies affected are, the higher the Q the more narrow the frequencies affected become. To adjust use the horizontal slider or tap the + and - buttons.

4. Set the boost or cut of the band using the vertical slider or the + and - buttons.

5. Repeat these steps for each band that needs adjustment and for each channel or channel grouping.



Fig. G3 - Equalizer Adjust 1





TIME DELAY ALIGNMENT SETTINGS

NOTE: Proceed only if you are a qualified installer with knowledge of frequency response and acceptable ranges. Improper tuning will result in damage to your speakers. We recommend allowing your authorized PowerBass Dealer to professionally install and tune your Digital Signal Processor

The PBX-DSP8 is packed with tons of great tools to enhance your in car listening experience. Time Delay or Time Alignment is one of the best tools to really set your sound stage apart from the norm allowing you to adjust the timing that the sound comes to your listening area.

This brings the sound to life much like hearing it live like a concert on your dash board! With proper adjustment the sound should immerse your ears with a great listening experience by adjusting for the distance and size difference of the various speakers in your system enabling you to hear them all at the same time and in the proper position.

TIME DELAY / ALIGNMENT

Adjusting time alignment helps to raise the sound stage and focus the sound to your desired positioning. This can be used to shift sound toward the driver as the primary focus or can center up the sound and bring everything up and out on your dashboard for that live performance feel.

To adjust the time alignment, open the DELAY section of the app here you can also select to adjust in centimeters, inches, or milliseconds.

When using centimeters or inches you may choose to physically measure the distance from the center of the speaker to the desired listening area and adjust accordingly. For example, if the driver's position is the desired focus, the driver door mid-range will be closer than the passenger side so we need to move it farther out thus adding delay so the passenger side can seem closer.

You would use this same approach to all speakers until you are happy with the positioning of your sound. Do this to each speaker one at a time then listen to the grouping as you have each pair and then each set adjusted. Time Alignment or Delay is very useful but also can be tedious work to get correct. We highly recommend leaving this to a professional to make these fine tune adjustments.



Fig. G5 - Delay

PRO TIP

To easily set up time alignment to a great front listening stage setting we recommend the following steps:

- Leave your Subwoofer channels as they are do not add delay
- Turn off or MUTE the SUBWOOFER channels
- Increase the delay on all other channels to 100%
- Decrease the delay on front mids first slowly until you start to hear them higher toward the dash and closer to the desired listening position
- Decrease the delay on the front tweeters slowly until you start to hear them blend in with the position of the mid-range / mid-bass
- Listen to only the front mid / tweeter combination. Adjust the delay until you have the mid-range / mid bass aligned with the tweeter and the listening position is where you want it focused
- Decrease the rear all speakers until they reach slightly behind the listening position but are not overpowering, this can also be adjusted more by lowering the output of these channels
- Finally turn your Subwoofer channels back on and give it a listen
- · Make any additional fine tune adjustments at this time



Fig. G6 - Time Delay

SAVE & LOAD SETTINGS

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UPLOAD FROM DSP

Once your app is connected to the PBX-DSP8 you will see a prompt asking if you want to UPLOAD the data from the DSP.

- Select YES the DSP will then transfer its current settings to your app for further adjustment

- Select NO and the DSP will await new settings to be sent from the app

NOTE: The UPLOAD from DSP button is to send the current DSP settings from the DSP to your APP only.

SAVE TO APP

After you have made your adjustments and it is time to SAVE your work you will need to first SAVE to your app.

- Select SAVE from the upper left menu drop down

- To SAVE without password protection select Basic Tuning Presets. Name your Preset and press OK

- To SAVE with password protection to avoid any adjustments to be made without the correct password select Advanced Tuning Presets. Enter your desired password, confirm it and press OK. Next you will name your preset and press OK



Fig. H1 - Upload



Fig. H2 - Save Advanced

LOAD TO DSP

To LOAD your custom saved settings into your PBX-DSP8:

- Press the SAVE icon from the upper left drop down menu

- Select your saved preset and it will then upload to the DSP

If you are using an Advanced tuning Preset then you will need to enter the password to proceed and upload to the DSP.



Fig. H3 - Load Tune

Problem	Solution
No Sound	 Check "Power" and remote turn-on for the proper voltage. Check Master Volume / CH Mute in Gain Setting Check the Ground connections Push the "Source" button
Hiss	 Turn down the amplifier gains Adjust the Source unit output Check for kinked or faulty RCA interconnect cables
Distorting Speakers	 Adjust the equalization levels Lower the volume of the Source unit See your Dealer
Amplifier popping noise / turn-on and turn-off thump	 BATT+ must be connected to a constant 12VDC source Check wiring on the Power Plug for proper hook up of Power and Remote leads

TROUBLESHOOTING TIPS

SPECIFICATIONS

Signal Input: 8 High-Low Level Inputs Signal Output: 8 RCA Outputs Output Impedance: 200 Ohms Frequency Response: 20Hz – 20kHz +/-0.5dB Input Voltage: 0.02V – 8V Input Impedance: 20k Ohms Output Voltage: Up to 8V THD+N: <1.0% Signal-to-Noise: >100 dBA (A-weighted)

DIGITAL SIGNAL PROCESSING (DSP) Speed: 147 MIPS Precision: 32-Bit Accumulators: 72-bit

DIGITAL TO ANALOG (DAC) Precision: 24-Bit Dynamic Range: 108 dB THD+N: -98 dB

ANALOG TO DIGITAL (ADC)

Precision: 24-Bit Dynamic Range: 105 dB THD+N: -98 dB

Operating Voltage: 9 – 16 VDC Crossover Frequency: Variable: 20 Hz to 10 kHz Crossover Slope: Selectable Slope:6/12/18/24/36/48 dB/Octave EQ Frequency Controls: Selectable Q: 0.05 to 20.0 Dimensions (H x W x D): 1.26 x 4.04 x 5.12 (32 mm x 102.5 mm x 130 mm)

(Due to continuing improvement, features and specifications are subject to change without notice)

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PowerBass Xtreme Electronics are to be free of defects in material and workmanship for a period of one (1) year.

This warranty applies only to PowerBass products sold to consumers by Authorized PowerBass Dealers in the United States of America. Products purchased by consumers from a PowerBass dealer in another country are covered only by that country's Distributor and not by PowerBass USA.

This warranty covers only the original purchaser of PowerBass product. In order to receive service, the purchaser must provide PowerBass with the receipt stating the consumer name, dealer, product and date of purchase.

Products found to be defective during the warranty period will be repaired or replaced (with a product deemed to be equivalent) at PowerBass's discretion and will not be liable for incidental or consequential damages. PowerBass will not warranty this product under the following situations:

- · Electronics received with apparent rust or corrosion
- Any evidence of liquid damage or exposure to excessive heat
- Attempted repairs or alterations of any nature
- · Product that has not been installed according to this owners manual

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Please call (909) 923-3868 for PowerBass Customer Service. You must obtain an RA# (Return Authorization Number) to return any product to PowerBass. The RA number must be prominently marked on the outside of the shipping carton or the delivery will be refused. Please pack your return carefully; we are not responsible for items damaged in shipping. Return the defective product along with a copy of the original dated retail sales receipt, plus \$12.00 for handling and diagnostic evaluation to:

PowerBass USA, Inc., Attn: Returns (RA#_____) 2133 S. Green Privado, Ontario, CA 91761

Residents of HI, AK and US territories will be charged for return shipping. All inquires regarding service and warranty should be sent to the above address.

Removed or altered serial numbers will void this warranty



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