

MASSIVE[®]

8CH+8V DIGITAL SIGNAL PROCESSOR AND INTERFACE

DSP48



®

Introduction

Welcome to Your DSP48

Thank you for choosing the Massive Audio DSP48! This powerful digital signal processor (DSP) is packed with features to take your vehicle's audio system to the next level. Whether you're upgrading a factory setup or building a custom soundstage, the DSP48 allows you to fine-tune every aspect of your sound for crystal-clear highs, punchy mids, and deep bass. Its compact aluminum housing allows for easy installation in hidden locations, and with both analog and digital inputs, the DSP48 is compatible with a wide range of audio systems.

In this manual, we'll guide you step by step—from installation to advanced tuning. If you have questions, visit our support site at www.massiveaudio.com/support.

Quick Tip: Download the DSP48 from the App Store (iOS) or Google Play (Android) before starting. It's free and essential for setup!

Download the APP

QR Code for iOS APP



QR Code for Android APP



Key Features at a Glance

The DSP48 is designed for flexibility and high performance. Here's what it offers:

- **Inputs:** 4-channel high-level (speaker wire) or low-level (RCA) inputs, with summing for up to 4 channels (e.g., combine factory highs and lows into full-range signals).
- **Outputs:** 8-channel RCA outputs for connecting to external amps.
- **DSP Core:** Analog Devices processor with 48 kHz sampling rate for pro-grade audio processing.
- **App Control:** User-friendly GUI app for Android/iOS via Bluetooth or USB—adjust everything in real-time without a PC.
- **Equalizer:** Switchable 7-band or 15-band parametric EQ (25 Hz–16 kHz, ± 12 dB gain, Q-factor 0.5–10) per channel.
- **Filters:** High-pass (HPF), low-pass (LPF), and band-pass (BPF) filters (10 Hz–20 kHz, slopes: 12/24/36/48 dB/octave; types: Bessel, Butterworth, Linkwitz-Riley).
- **Phase & Delay:** 0°/180° phase shift per channel; time delay up to 108 ms in 0.01 ms steps.
- **Input Sensitivity:** Adjustable from 0.5 V to 22 V for seamless integration.
- **Power:** 9–16 V DC supply; stand-alone AD/DA converter.
- **Extras:** Bluetooth® music streaming, USB/MP3 playback, remote-out trigger, key controls (no mouse needed), and external controller for 4 presets + main volume.

Pro Tip: For best results, pair with Massive Audio amplifiers and speakers.

Important Precautions

Safety first!

Follow these guidelines to avoid damage, injury, or voiding your warranty.

General Installation Tips

 **Warning:** Disconnect your vehicle's battery negative (-) terminal before starting. This prevents shorts, fires, or damage to the DSP48.

- Install in a dry, well-ventilated spot for cooling. Avoid direct sunlight or moisture.
- Mount securely to a flat surface using screws (not included). Check behind the surface for wires, brake lines, or fuel tanks—drill carefully!
- If you're not experienced with car audio installs, consult a professional installer.

Electrical Guidelines

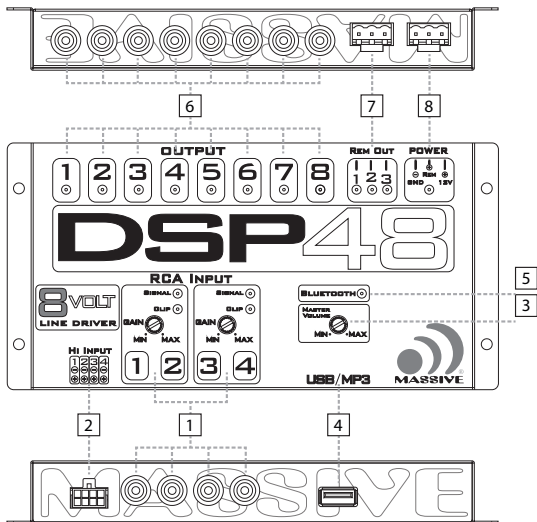
The DSP48 works only in 12V negative-ground vehicles (common in most cars).

- **Power Wiring:** Use 18–20 AWG wire. Connect +12V to a fused battery line (fuse $\leq$ 45 cm/18 in from battery). Ground to chassis (same point as amps/head unit to avoid noise).
- **Fuse Recommendation:** 2A slow-blow fuse (based on max 1A draw). Total system fuse value = sum of all audio components' draws.
- **Connectors:** Use only the supplied plugs. Wrong cables can damage the DSP48, head unit, amps, or speakers.
- **Routing:** Keep wires away from moving parts, heat sources, or noise-makers (e.g., motors, power accessories). Use zip ties and grommets to protect against pinching.

 **Caution:** Improper wiring can cause ground loops (hum) or electrical faults. Test connections with a multimeter before powering on.

Connectors and Controls Overview

The DSP48 is compact but feature-packed. Here's a labeled diagram and breakdown:



- RCA Inputs (1–4):** Low-level inputs for aftermarket head units. Includes gain controls and 2-stage clip indicators (green = good; red = clipping—turn down!).
- High-Level Inputs:** 4 Channel speaker level input via 8-pin Phoenix-style pluggable terminal block for factory/OEM integration.
- Master Volume Knob:** Quick analog control for overall volume.
- USB Port:** For app connection, firmware updates, or MP3 playback.
- Bluetooth Indicator LEDs:** Shows pairing status (blue = connected; flashing = searching).
- RCA Outputs (1–8):** Processed signals for amps (e.g., CH1/2 = fronts, CH7/8 = subs). Each output channel includes an LED indicator for visual confirmation of signal activity.
- REM OUT:** 12V trigger to turn on amps automatically with LEDs to indicate activity.
- Power Terminals:** Ground (GND), Remote (REM IN), +12V Battery.

The DSP48 APP Program

It is possible to freely configure the DSP48 with our DSP APP-Tool software.

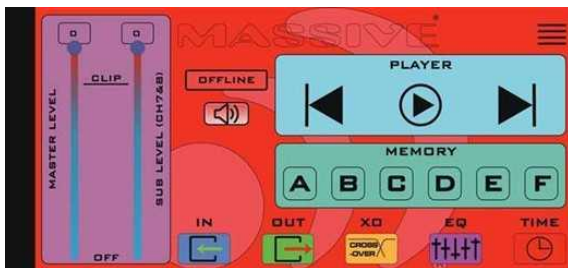
The user interface is designed for easy handling of all functions and allows an individual adjustment of each of the eight DSP channels. Prior to connecting the signal processor to your mobile phone, download the **latest version of the DSP APP-Tool software**.

Check from time to time for software updates.

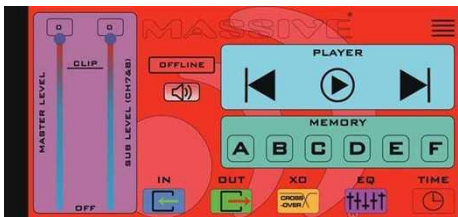
Important: Before beginning the setup be sure all signal sources are turned fully down so there is no volume until after the crossovers are set.

1. Download the DSP APP-Tool from the App Store (iOS) or Google Play (Android) before starting and install it on your mobile phone.
2. First turn on the signal processor, connect to the unit in the bluetooth menu of the phone, and then open the app. Alternatively, you can connect to the device via a USB interface.
3. Select the processor and enter the password, **the factory password is 000**.
4. Now you are able to configure your DSP48 with our intuitive DSP APP-Tool software.

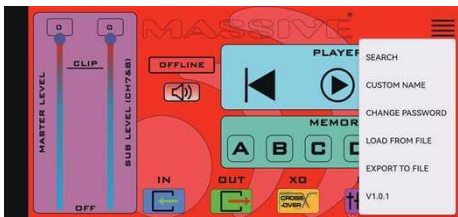
Caution: We highly recommend to set the volume of your car radio to the minimum position during first start-up. Additionally no devices should be connected to the signal processor until general settings in the DSP APP-Tool software have been made. Especially if the DSP48 will be used in fully active applications, as an incorrect configuration could damage your speakers.



Homepage



- **Master Level:** Overall volume slider (-60 dB to 0 dB). Keeps channel balance intact.
- **Sub Level (CH7/8):** Bass boost/cut for subs without affecting the main channels.
- **Offline Indicator:** Shows if app loses connection—reconnect via Bluetooth/USB.
- **Mute Button:** Quick silence for all outputs.
- **Memory:** Save/load up to 6 presets (e.g., "Daily Drive" vs. "Bass Mode"). Export to phone for backups.



Additional Options:

- **Custom Name:** Rename your DSP48 (e.g., "MyCarDSP") for multi-device setups.
- **Change Password:** Secure settings with a PIN. The factory password is 000.

Save to File:

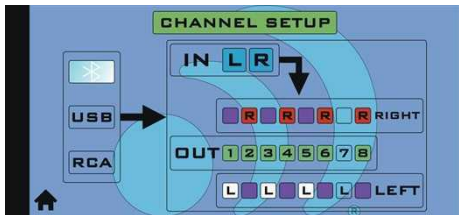
- **Export to File:** Save the adjusted DSP settings to a specified folder on your phone.
- **Load from File:** Load from file in the app to instantly import and apply the settings.

You can also share your own saved presets with other DSP48 users (or receive theirs) for quick and easy setups.

Note: Preset files are model-specific. You can only load or share files created for the DSP48—files from other DSP models or products are not compatible.

Channel Setup

Define your inputs and outputs here to match your system.

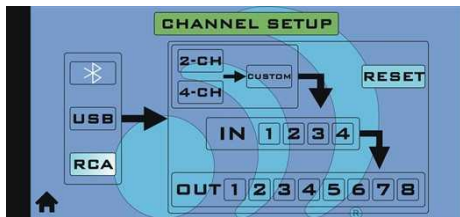


Bluetooth® / USB

When using Bluetooth streaming or USB audio:

- These are fixed 2-channel sources (Left + Right only).
- The app clearly shows the Left/Right mapping on the screen.

Simply check this mapping to route the input channels to the correct output channels (odd numbers = Left, even numbers = Right). No extra summing needed.



2CH Mode

Input CH1 → Output CH1, 3, 5, 7
Input CH2 → Output CH2, 4, 6, 8
CH7/8 receives the combined signal from Input CH1 + CH2

4CH Mode

Input CH1 → Output CH1, 5, 7
Input CH2 → Output CH2, 6, 8
Input CH3 → Output CH3, 7
Input CH4 → Output CH4, 8

RCA & High-Level Inputs

When using RCA (low-level) or high-level speaker inputs, the DSP48 gives you two easy ways to route signals to your 8 output channels.

Quick Modes (2CH or 4CH)

- Select 2CH or 4CH in the app.
- The inputs are automatically mapped to all 8 outputs.
- Left inputs go to odd channels (1, 3, 5, 7)
- Right inputs go to even channels (2, 4, 6, 8)

Perfect for simple stereo setups—no extra steps needed.

Custom Mode (for advanced routing or summing)

1. Tap CUSTOM — it will highlight to show it's active.

2. Select the output channel you want to configure (CH 1–8).
3. Choose one or more input channels to send to that output (you can link multiple inputs to sum signals, like factory highs + lows).

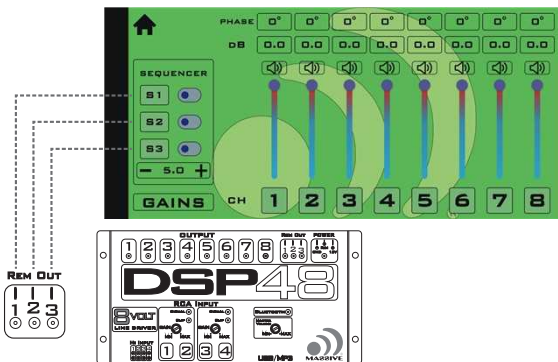
This gives you full control to create any combination you need.

Tip: Use Custom mode for OEM factory systems or when you want to sum signals (e.g., tweeters + mids into a full-range output). Changes happen instantly — just tap and go!

Phase/Level

The Phase/Level section in the DSP APP-Tool is essential for balancing your system's volume and ensuring all speakers work together harmoniously. Here, you can adjust individual channel levels (gain) to fine-tune loudness without distortion, and check/fix polarity (phase) to prevent cancellation issues—where speakers "fight" each other, causing weak bass or muddled sound.

Proper phase alignment means all speakers push and pull air in sync, creating a unified, powerful response. If they're out of phase, no amount of EQ or delay can fully fix the problems, like phase "suck-outs" (dips in frequency response).



REM OUT Settings

After turning on the "ON" button behind **S1** on the APP, the LED for terminal **1** on the REM OUT port of the device will activate.

Once the **S1** button is enabled on the APP, the +/- buttons below can be used to set the REM OUT output voltage delay time, which can be freely adjusted from 0.5 to 23.3 seconds. The REM OUT delay time starts counting after the Bluetooth® LED lights up.

S2 and **S3** can be configured in the same way.

Adjusting Levels

Levels control the output volume for each channel (-60 dB to 0 dB). This helps match speaker sensitivities and create a balanced soundstage.

1. **Select Channels:** Tap channel boxes or pairs (as in the Channel Selection section) to adjust.
2. **Set Gains:** Drag sliders or type values. Start low and increase gradually while playing music.
3. **Monitor Clipping:** Watch the CLIP indicators—green is safe; red means distortion (overdrive). If red, reduce input gain on the DSP48 hardware or head unit volume.

Example Setup: For a sub-heavy system, boost CH7/8 by +3 dB for more bass punch, but cut CH1–6 by -2 dB to avoid overpowering mids.

Checking and Adjusting Phase (Polarity)

Phase toggles between 0° (normal) and 180° (inverted) per channel. Inverting flips the speaker's polarity, which can resolve issues from wiring errors or speaker placement.

Why It Matters: Out-of-phase speakers cancel each other (e.g., left sub pushes while right pulls), leading to thin sound or dead spots.

Step-by-Step Phase Check

There are several ways to verify phase—here's a simple method using the app:

1. **Play a Test Tone:** Use a 100 Hz sine wave (download free tones from massiveaudio.com/downloads) or pink noise. Play at moderate volume.
2. **Listen for Bass Buildup:** With all channels on, toggle phase on one speaker (e.g., CH1). If bass gets stronger, it's now in phase—keep it. If weaker, revert to 0°.
3. **Group Test:** Check pairs (e.g., fronts vs. subs). Sit in the listening position and note if sound "blooms" (in phase) or "cancels" (out).
4. **Advanced Tool:** Use a phase checker app or SPL meter (e.g., free on your phone) to measure output—aim for the highest dB reading.

Pro Tip: Always phase-check after installs or tweaks. For complex systems, test with mono music (center-panned vocals) to spot imaging shifts. If issues persist, reverse speaker wires at the amp (but not at the DSP48—use the app toggle).

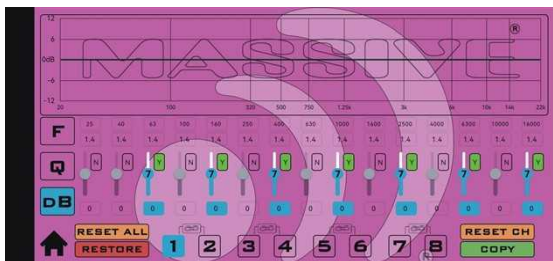
 **Caution:** Test at low volumes to protect speakers. Phase flips can cause sudden loud pops—mute first!

For more methods, see the "Advanced Tuning Examples" supplement located in the Manuals and Downloads TAB on the DSP48 product page. Once levels and phase are set, move to EQ for tonal shaping.

Equalizer (EQ) Configuration

The Equalizer (EQ) section in the DSP APP-Tool is your tool for shaping the tone of your audio system. A parametric equalizer (PEQ) like this one allows precise control over specific frequencies to fix issues like boomy bass, harsh highs, or muddy mids—resulting in clearer, more balanced sound tailored to your car and preferences. The DSP48 features a switchable 7-band or 15-band PEQ per channel, covering 25 Hz to 16 kHz with gain adjustments from -12 dB to +12 dB and Q-factors (bandwidth) from 0.5 to 10.

Use EQ after setting crossovers and levels—it's for refinement, not major overhauls. Boosting too much can cause distortion or speaker damage, so focus on cutting problem areas first.



(App view showing band controls, channel selection, and toggle options for 7-band or 15-band mode.)

Selecting Channels for EQ

As with crossovers, select channels by tapping speaker icons in the car diagram or numbered boxes (1–8).

- Tune one channel at a time for custom tweaks, or link pairs (e.g., 1 & 2 for left/right) by double-tapping the dot between them.
- Linking is recommended for initial EQ to keep left/right symmetry—unlink later if needed for asymmetric cabin corrections (e.g., driver's side adjustments).

Configuring EQ Bands

Each band is fully parametric, meaning you control frequency (center point), gain (boost/cut), and Q (how wide/narrow the effect is). Adjustments are real-time—play music while tweaking.

1. **Toggle Band Mode:** Switch between 7-band (simpler for beginners) or 15-band (more precision) using the "7-Band / 15-Band" buttons. The app defaults to 7-band.

2. Adjust a Band:

- **Frequency (Hz):** Tap the freq box (e.g., 25 Hz, 100 Hz) and type a value (25 Hz–16 kHz) or use up/down arrows. Start with common problem spots like 200 Hz (boom) or 3 kHz (harshness).
- **Gain (dB):** Set boost (+12 dB max) or cut (-12 dB max). Positive for emphasis, negative for reduction.
- **Q-Factor:** Controls bandwidth (0.5 = wide/smooth; 10 = narrow/surgical). Higher Q for pinpoint fixes without affecting nearby frequencies.
- **ON/OFF:** Toggle to enable/disable a band—great for A/B testing.

3. Global Controls:

- **RESET ALL:** Clears all EQ settings across channels—use for starting over.
- **RESET CH:** Resets the selected channel(s) only.
- **BYPASS:** Temporarily disables EQ on selected channels to hear the "flat" sound.
- **COPY:** Duplicates settings from one channel/pair to another—saves time.

Example Band Setup for Common Fixes:

Band	Freq (Hz)	Gain (dB)	Q	Purpose
1	40	-4	2.0	Reduce low-end rumble
2	250	+2	1.5	Add vocal warmth
3	4000	-3	3.0	Tame sibilance (harsh "S" sounds)

EQ Techniques

- **Shelf Filters:** Use low Q (e.g., 0.7) on edge bands (25 Hz or 16 kHz) for gentle boosts/cuts across a range—like extending bass or adding "air" to highs.
- **Notch Filters:** High Q (e.g., 8–10) for narrow cuts to eliminate resonances (e.g., -9 dB at 178 Hz for door panel buzz).
- **Workflow:** Play pink noise or a frequency sweep track (free downloads at massiveaudio.com/downloads). Use a real-time analyzer (RTA) app on your phone to measure and correct peaks/dips.

Pro Tip: EQ by ear in your car—acoustics change with doors closed and engine running. Save "flat" and "tuned" presets for comparison. For advanced setups, see the "Advanced Tuning Examples" located on the DSP48 website product page.

 **Caution:** Avoid boosting > +6 dB per band—it can clip signals (watch CLIP indicators) or overwork speakers. Always test at moderate volumes, and never EQ while driving! If distortion occurs, reduce gains or check input levels.

Channel Selection and Crossover

Pick channels and set filters to protect speakers and optimize frequency response.

HP / LP , 10Hz~20kHz, Slope : 12dB / 24dB / 36dB / 48dB, Bessel/Butterworth / Linkwitz-Riley

Selecting Channels

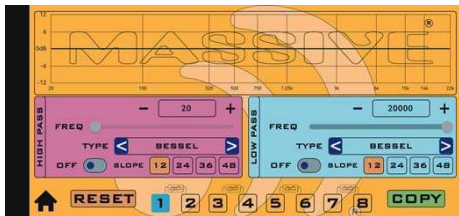
To tune a channel:

- Tap the desired speaker icon in the car diagram (Delay section) or its numbered box in the DSP Channel column (e.g., "1" for Left Front).
- Select one channel at a time for precise tweaks, or group them in pairs (e.g., Channels 1 & 2 for left/right fronts).

Linking Pairs:

- Double-tap the dot between two channels (e.g., between 1 and 2) to link them—changes to one apply to both.
- If one channel is already selected, single-tap the dot to pair it with the adjacent one.

Why Link Pairs? Linking ensures left and right speakers match exactly, which is crucial for balanced sound. Always set crossovers by pairs to avoid imaging issues (e.g., sound pulling to one side). It's also simpler for initial EQ—tune pairs first, then unlink for fine adjustments if needed.



Setting Crossovers

Every channel has independent HPF and LPF controls (combine them for BPF). Adjustments are real-time, so play music while tweaking.

1. **Frequency (FREQ):** Set the cutoff point (10 Hz–20 kHz). Tap the FREQ box, type a value, or use your device's up/down arrows.
 - **Example:** HPF at 3 kHz for tweeters (blocks lows to prevent distortion).
2. **Slope:** Choose how steeply the filter rolls off (6/12/24/36/48 dB/octave) via the drop-down menu. Steeper slopes (e.g., 48 dB) create sharper cuts but may introduce phase shifts.

3. **Type (Shape):** Select from the drop-down:

- ☐ **Linkwitz-Riley (default):** Flat summing when paired with another filter—ideal for seamless blends (e.g., mid to tweeter).
- ☐ **Butterworth:** Sums with a +3 dB peak at crossover—good for punchy response but check for overlaps.
- ☐ **Bessel:** Gentle roll-off for natural sound, less phase distortion.

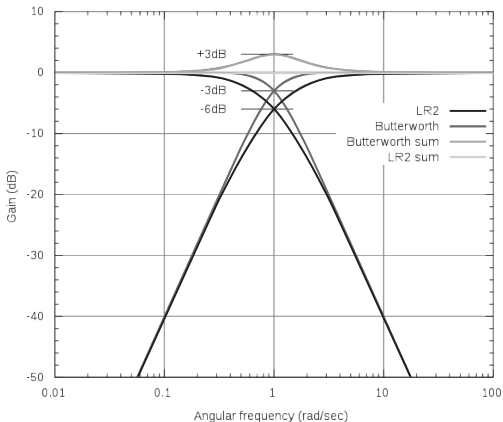
Defaults are 24 dB/octave Linkwitz-Riley on all channels—great for most setups.

Pro Tip: Consult your speaker manufacturer's specs for optimal crossovers. They'll recommend frequencies, slopes, and power handling to avoid damage (e.g., a tweeter might handle 50W at 12 dB/oct but only 20W at 6 dB/oct). If unsure, start conservative—use higher HPF for highs and lower LPF for lows.

⚠ Caution: Incorrect crossover settings can blow speakers! Test at low volume, and monitor clip indicators. For active systems (no passive crossovers), set filters before connecting amps.

For examples, see the "Advanced Tuning Examples" supplement located on the DSP48 product page.

Difference between Butterworth and Linkwitz-Riley characteristics.



Comparison of the response of summed Butterworth and Linkwitz-Riley crossover filters. The Butterworth crossovers have a +3dB peak at the crossover frequency, whereas the L-R filters have a flat summed output.

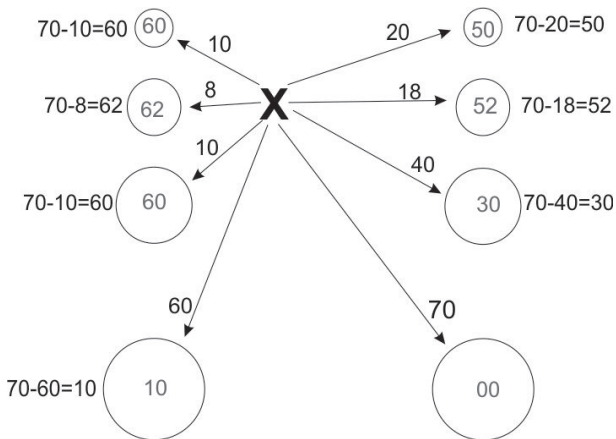
Time Alignment Configuration

The time delay for each channel is adjustable in 0.01ms steps from 0~108 ms

Time alignment is a key feature in the DSP APP-Tool that creates a balanced soundstage in your car.

Since the driver's seat isn't perfectly centered, sounds from closer speakers arrive first, making the audio feel off-balance. The Delay section (on the left side of the app's main screen) lets you "delay" those nearer speakers electronically, so all audio hits your ears at the same time—as if you're sitting right in the middle of the car.

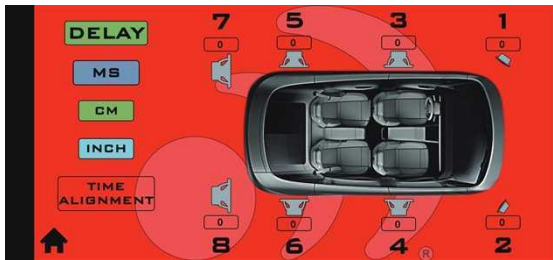
This results in clearer imaging, where instruments and vocals seem to come from specific spots on a virtual stage. Setting it up is simple and can dramatically improve your listening experience.



Step-by-Step Setup

1. **Measure Distances:** Use a tape measure to find the distance from each speaker to your ears in the listening position (usually the driver's seat). Measure in inches or centimeters for accuracy—aim for the center of your head.
2. **Identify the Farthest Speaker:** Compare all measurements and note the longest one (e.g., the rear subwoofer at 70 inches).
3. **Calculate Delays:** For each closer speaker, subtract its distance from the farthest. Convert the result to milliseconds (ms) using the app's built-in converter (or formula: 1 inch $\approx$ 0.029 ms; 1 cm $\approx$ 0.011 ms). Enter these values in the Delay fields (adjustable in 0.01 ms steps, up to 108 ms max).
4. **Example Calculation:** If the farthest speaker is 70 inches away:
 - Left Tweeter: 48 inches $\rightarrow$ Delay = $(70 - 48) = 22$ inches $\rightarrow 22 \times 0.029$ ms $\approx$ 0.64 ms
 - Right Midbass: 62 inches $\rightarrow$ Delay = $(70 - 62) = 8$ inches $\rightarrow 8 \times 0.029$ ms $\approx$ 0.23 ms

Enter these in the app's Delay chart. Switch between inches (INCH), centimeters (CM), or milliseconds (MS) views for easy input.

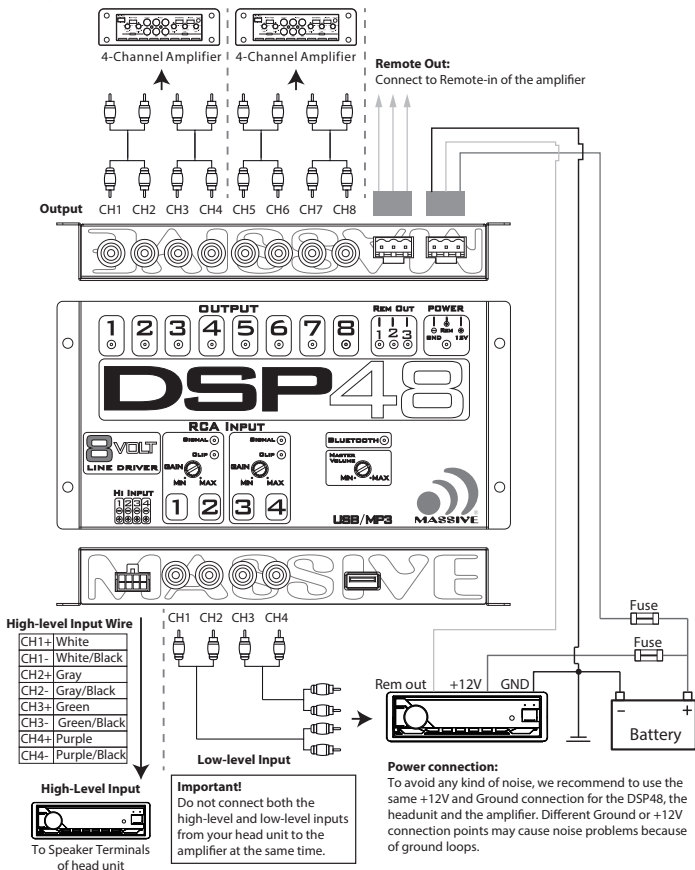


Pro Tip: Play a centered vocal track (like a podcast) while adjusting. Fine-tune by ear in 0.01 ms steps until the sound "snaps" to the dashboard center. If your car has passengers, save multiple presets for different seating positions.

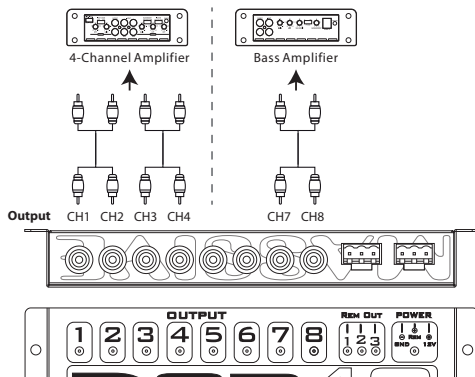
⚠ Caution: Always start with small adjustments—extreme delays can cause phase issues. Test at low volume to avoid speaker strain.

Wiring Diagram

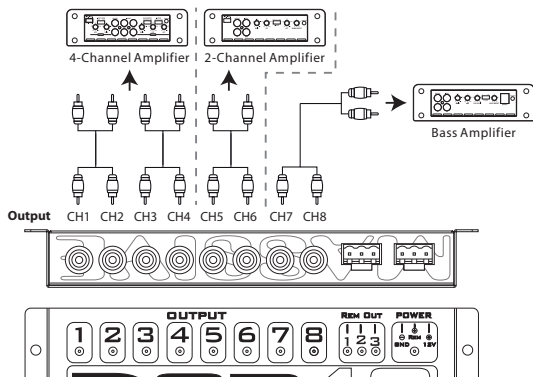
Wiring Option 1: 4-Channel Amplifier + 4-Channel Amplifier



Wiring Option 2: 4-Channel Amplifier + Bass Amplifier



Wiring Option 3: 4-Channel Amplifier + 2-Channel Amplifier + Bass Amplifier



Specifications

MODEL	DSP48
Input Channels	4
Output Channels	8
SPK Input Sensitivity Max	8 Vrms
RCA Input Sensitivity Max	4 Vrms
Operating Voltage	9-16 Vdc
High-Level Input Impedance	20 K Ω
RCA Input Impedance	25 K Ω
RCA Output Impedance	220 Ω
RCA Output Voltage	8 Vrms
High-Level Input S/N	>100 dB
RCA Input S/N	>100 dB
High-Level Input THD	<0.01%
RCA Input THD	<0.01%
REM OUT Output Current	100mA
Parametric / Graphic EQ	15 Bands
Sampling Frequency	48KHz
Bit Depth	24bit
Idle Current	<500 mA
Dimensions mm (LxWxH)	190.4 x 95 x 24



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