ALCHIMIST

AD12H-1500

12-Channel Class AB DSP Amplifier

1500W RMS | Hi-Res 96kHz/24bit

Complete User Guide

Version 2.0 | 2026

www.alchimists.com

More than your Passion!

Table of Contents

Chapter 1: Product Overview

Welcome

Thank you for choosing the ALCHIMIST AD12H-1500, a premium 12-channel Class AB DSP car amplifier from the Lossless Sound Car Series. This unit represents the pinnacle of automotive audio processing, combining high-fidelity amplification with advanced digital signal processing in a compact, aluminum-bodied package. Whether you are a professional car audio installer or an enthusiast seeking audiophile-grade sound in your vehicle, the AD12H-1500 delivers uncompromising performance with powerful RMS output and Hi-Res 96kHz/24-bit audio processing.

This user guide provides comprehensive instructions for installing, configuring, and optimizing your AD12H-1500. Please read this manual carefully before installation and keep it for future reference.

Product Description

The AD12H-1500 is a 12-channel DSP amplifier designed specifically for car audio applications. It integrates a powerful Class AB amplifier stage with a sophisticated digital signal processor, providing 10 channels at 95W RMS and 2 channels at 60W RMS into 4 ohms. The built-in DSP offers 31-band graphic EQ, parametric EQ, Butterworth/Linkwitz-Riley/Bessel crossover filters, per-channel time delay alignment, phase control, and noise gate functionality. The unit supports multiple input sources including high-level speaker inputs, optical SPDIF, Bluetooth 5.0, USB audio, and coaxial input.

Key Features

- **12 Output Channels:** 10 x 95W + 2 x 60W RMS at 4 ohms for complete system control
- **Class AB Amplification:** High-efficiency Class AB topology for clean, powerful sound
- **Hi-Res Audio Processing:** 96kHz / 24-bit internal processing for pristine audio quality
- **31-Band Graphic EQ:** Per-channel 31-band GEQ with adjustable Q factor and gain
- **Parametric EQ (PEQ):** Fully adjustable center frequency, Q, and gain for surgical corrections
- **Advanced Crossover Filters:** Butterworth, Linkwitz-Riley, and Bessel filter types with slopes from -6dB/oct to -48dB/oct
- **Per-Channel Time Delay:** Precise delay alignment in ms, cm, or inches for perfect imaging
- **Per-Channel Phase Control:** 0 degree / 180 degree phase inversion per channel
- **Noise Gate:** Adjustable noise gate to eliminate background hiss and alternator whine
- **Multiple Input Sources:** High-level, Optical SPDIF, Bluetooth 5.0, USB, and Coaxial inputs
- **6V RCA Line Level Output:** 8 RCA outputs (OUT1-OUT8) for external amplifier connectivity
- **AUX Output:** Dedicated AUX L/R RCA output pair
- **8 Preset Memory Slots:** Store and recall up to 8 complete tuning configurations
- **PC Software Control:** Full-featured Windows tuning application via USB connection
- **Android App Control:** Integrated Android mobile tuning application via Bluetooth
- **Compact Design:** 175mm x 116mm x 40mm black aluminum chassis, only 0.85kg
- **Boot Delay:** Configurable startup delay (0-10 seconds) to prevent speaker pop
- **Operating Voltage:** 10V to 15V DC for universal vehicle compatibility

Box Contents

- 1x ALCHIMIST AD12H-1500 DSP Amplifier Unit
- 1x Power/Speaker wiring harness
- 1x High-level input wiring harness
- 1x USB Type-B cable (for PC connection)
- 1x Optical (Toslink) cable
- 1x Remote controller
- 4x Mounting screws
- 1x Quick Start Guide
- 1x Warranty card

Figure 1.1: AD12H-1500 with Android and PC tuning applications

Chapter 2: Hardware Overview

The AD12H-1500 features a compact black aluminum chassis with all connections accessible from two sides of the unit. The front panel provides audio inputs and power connections, while the rear panel provides the USB PC connection and RCA line-level outputs. Understanding each connection point is essential for proper installation.

2.1 Unit Dimensions

The AD12H-1500 is designed for easy installation in tight automotive spaces.

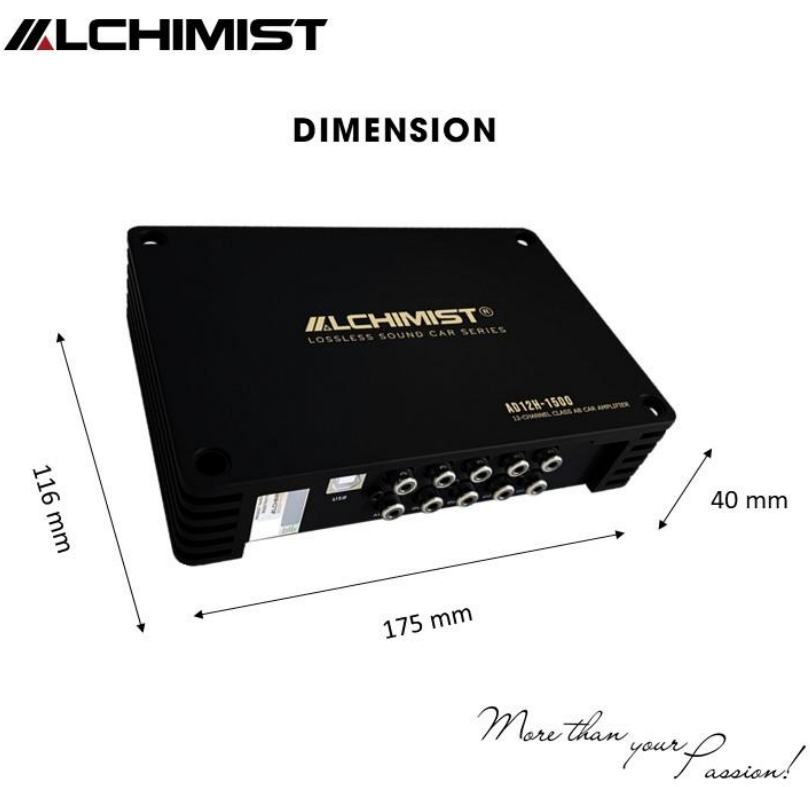

Figure 2.1: AD12H-1500 dimensions - 175mm x 116mm x 40mm

Dimension	Value
Length	175 mm
Width	116 mm
Height	40 mm
Weight	0.85 kg
Material	Black Aluminum

2.2 Front Panel Connections

The front panel of the AD12H-1500 contains the primary input connections and power terminals. All connectors are clearly labeled on the chassis for easy identification during installation.

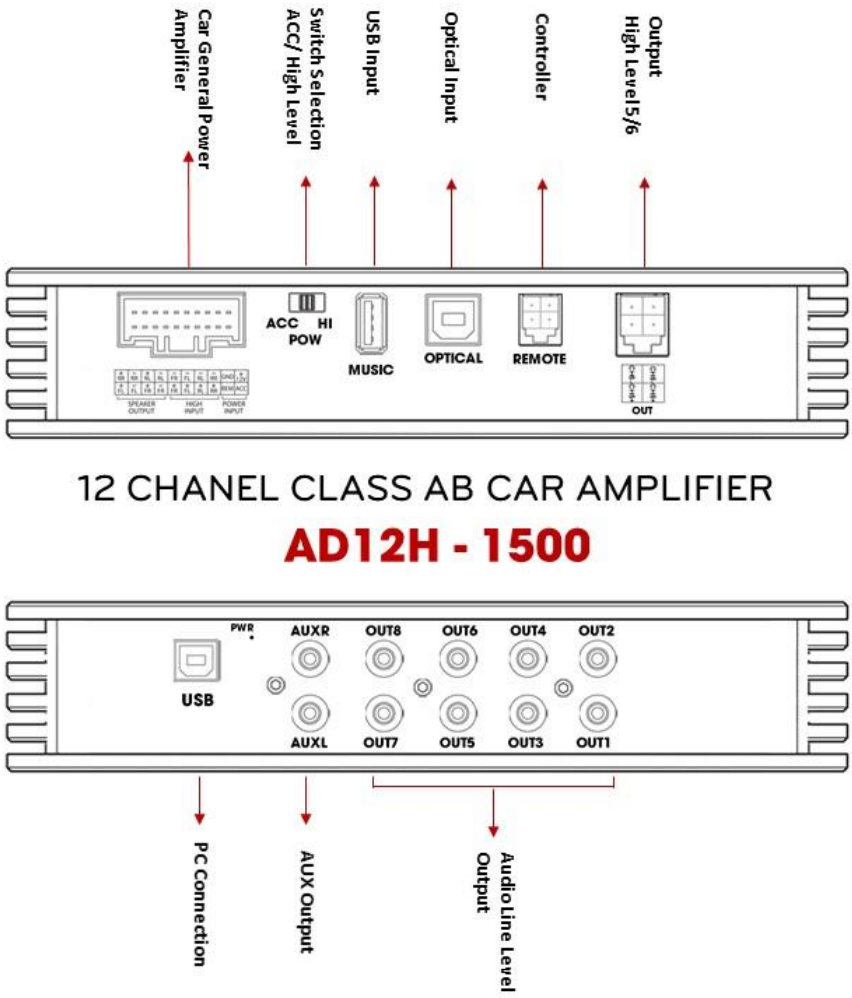

Figure 2.2: AD12H-1500 hardware connection diagram - Front and Rear panels

Speaker Output

Located on the left side of the front panel, the speaker output terminal block provides direct connections for up to 12 speaker channels. The outputs are arranged in pairs and support speakers with impedance of 4 ohms or higher. Each channel pair delivers its rated power as follows:

- Channels 1-10: 95W RMS per channel at 4 ohms
- Channels 11-12: 60W RMS per channel at 4 ohms

High Input (HI)

The high-level speaker input accepts speaker-level signals directly from your factory head unit or aftermarket stereo. This allows the AD12H-1500 to be integrated into existing factory audio systems without requiring a line-level output from the head unit. The high-level input supports signals up to 30V RMS and features automatic signal sensing for seamless operation.

Power Input (ACC / POW)

The power input connector requires three connections:

- **ACC (Accessory):** Connect to switched +12V source (turns on/off with ignition)
- **POW (Power):** Connect to constant +12V battery source (fused at 30A minimum)
- **GND (Ground):** Connect to clean vehicle chassis ground point

Important: Always use appropriate gauge wiring (minimum 10 AWG for power and ground) and install an inline fuse within 18 inches of the battery connection. The unit operates on 10V to 15V DC.

USB Input (MUSIC)

The front-panel USB port accepts a standard USB flash drive for direct music playback. The unit supports common audio formats including MP3, WAV, FLAC, and WMA files. The USB port is Type-A and supports USB 2.0 flash drives up to 64GB. For best audio quality, use FLAC or high-bitrate WAV files stored on a FAT32-formatted drive.

Optical Input (OPTICAL)

The SPDIF optical (Toslink) input accepts digital audio signals from compatible head units, DACs, or other digital sources. This input bypasses any analog-to-digital conversion, providing the purest possible signal path. The optical input supports PCM audio up to 96kHz/24-bit resolution. Use a high-quality Toslink cable and ensure the connector clicks securely into place.

Controller (REMOTE)

The remote controller input allows connection of the included external remote control unit. The remote provides convenient access to volume control, source selection, and preset switching from the driver's position. Mount the remote controller in an accessible location on the dashboard or center console using the included mounting hardware.

Output High Level 5/6 (OUT)

These additional high-level outputs can be used to feed speaker-level signals to additional amplifiers or powered speakers. They mirror the processed signal from channels 5 and 6, allowing for system expansion without additional RCA connections.

2.3 Rear Panel Connections

The rear panel provides the PC connection port and all RCA line-level outputs for connecting to external amplifiers.

USB (PC Connection)

The rear USB Type-B port connects the AD12H-1500 to a Windows PC for software-based tuning and configuration. Use the included USB cable to connect to your computer. The connection status is displayed in the software interface. This port is used exclusively for PC communication and does not play audio files.

AUX L / AUX R (AUX Output)

The auxiliary RCA output pair provides a line-level stereo signal that can be routed to additional equipment such as a secondary amplifier, powered subwoofer, or recording device. The AUX output level is adjustable through the software interface.

OUT1 through OUT8 (Audio Line Level Output)

Eight RCA line-level outputs deliver processed audio signals at up to 6V RMS to external amplifiers. The high output voltage ensures excellent signal-to-noise ratio even with long cable runs. The recommended channel assignment is as follows:

Output	Recommended Assignment	Description
OUT1 / OUT2	Front Left / Front Right	Full-range, tweeter, or component high
OUT3 / OUT4	Rear Left / Rear Right	Full-range, midrange, or component mid
OUT5 / OUT6	Center / Rear Fill	Custom assignment for center channel or rear fill
OUT7 / OUT8	Subwoofer Left / Subwoofer Right	Dedicated subwoofer output pair

2.4 LED Indicators

The AD12H-1500 features the following LED indicators on the front panel:

- Power LED (Blue): Illuminates when the unit is powered on and operating normally
- Bluetooth LED (Blue/Flashing): Solid when paired, flashing when in pairing mode
- USB LED (Green): Illuminates when a USB flash drive is detected and ready
- Protection LED (Red): Illuminates if the unit enters protection mode due to overheating, short circuit, or overvoltage

2.5 Wiring Guidelines

Proper wiring is critical for optimal performance and safety. Follow these guidelines when installing the AD12H-1500:

- Use minimum 10 AWG (5.26 mm2) wire for power and ground connections
- Install a 30A inline fuse within 18 inches (45 cm) of the battery positive terminal
- Ground the unit to a clean, bare metal point on the vehicle chassis within 18 inches of the unit
- Use high-quality RCA cables with proper shielding to minimize noise
- Route signal cables away from power cables to prevent interference
- Secure all wiring with cable ties and grommets to prevent chafing and shorts
- Do not run speaker wires parallel to power cables for extended distances
- Verify polarity on all speaker connections before powering on

Chapter 3: Software Installation

3.1 System Requirements

The ALCHIMIST CAR DSP PRO tuning software requires the following minimum specifications:

Requirement	Specification
Operating System	Windows 7 / 8 / 10 / 11 (32-bit or 64-bit)
Processor	Intel Core i3 or equivalent (minimum)
RAM	4 GB minimum (8 GB recommended)
Storage	200 MB free disk space
Display	1280 x 800 minimum resolution (1920 x 1080 recommended)
USB Port	USB 2.0 Type-A port
Other	Internet connection for initial driver download (optional)

3.2 Downloading the Software

Follow these steps to obtain the latest version of the tuning software:

- Visit the official ALCHIMIST website: www.alchimists.com/documents
- Navigate to the Downloads or Documents section
- Locate the file: ALCHIMIST CAR DSP PRO v8.rar (or latest version)
- Download the archive to your computer
- Extract the contents using WinRAR, 7-Zip, or the built-in Windows extraction tool

3.3 Installing the Software

After extracting the software archive:

Step 1: Open the extracted folder and locate setup.exe or the application executable.

Step 2: Right-click setup.exe and select "Run as Administrator" for proper installation.

Step 3: Follow the on-screen installation wizard. Accept the default installation directory or choose a custom location.

Step 4: If prompted, install the USB driver for the AD12H-1500. This driver enables communication between the PC and the DSP unit.

Step 5: Once installation is complete, launch the ALCHIMIST CAR DSP PRO application from the Start Menu or desktop shortcut.

3.4 First Connection

To connect the AD12H-1500 to your PC for the first time:

- Ensure the AD12H-1500 is powered on (connected to a 12V power source or bench supply)
- Connect the included USB Type-B cable from the rear USB port of the unit to your PC
- Windows will detect the device and install drivers automatically (allow 30-60 seconds)

- Launch the ALCHIMIST CAR DSP PRO software
- The status indicator in the top-right corner should change from "not connect" (red) to "connected" (green)
- If the connection fails, check Device Manager for any driver issues and reinstall if necessary

Note: The software can be opened without a connected unit for offline editing, but changes cannot be sent to the device until a connection is established.

Chapter 4: Main Interface Overview

The ALCHIMIST CAR DSP PRO software provides a comprehensive single-window interface for all tuning operations. The interface is divided into several functional areas: the top menu bar, left panel controls, center EQ display, bottom channel strips, and source volume controls.

[Figure 4.1: Main EQ Interface - 31-band Graphic Equalizer view with channel strips and controls]

4.1 Top Menu Bar

The top menu bar provides access to the primary functions and views of the software. Each button highlights in red when active.

Button	Function	Description
EQ	Equalizer View	Opens the main equalizer display showing GEQ or PEQ curves. Default view.
Inout Gain	Input/Output Gain Matrix	Opens the routing matrix for assigning input sources to output channels with adjustable gain.
Input sett	Input Settings	Configure input source parameters including sensitivity and detection thresholds.
Call	Load Preset	Recall a previously saved preset configuration from one of the 8 memory slots.
Save	Save Preset	Store the current configuration to one of the 8 preset memory slots.
Reset	Factory Reset	Reset all parameters to factory defaults. Use with caution.
Delay Cal	Delay Calculator	Opens a delay calculation tool based on speaker distances.
Delay Lin	Delay Settings	Opens the per-channel delay configuration dialog for time alignment.
1-8	Preset Slots	Quick-access buttons to switch between 8 stored preset configurations.
connected	Connection Status	Shows green "connected" when linked via USB, red "not connect" when disconnected.

4.2 Left Panel Controls

The left panel contains critical system-level controls for crossover filters, source selection, and global processing options.

HPF (High Pass Filter)

The High Pass Filter section allows you to set a high-pass crossover on the selected channel. This filter removes low frequencies below the set cutoff point, protecting small speakers from excessive bass excursion.

- Freq: Set the crossover frequency from 20Hz to 20,000Hz
- Type: Choose filter type - Butterworth (maximally flat), Linkwitz-Riley (flat summed response), or Bessel (best transient response)
- Slope: Select filter steepness - Off, -6dB/Oct, -12dB/Oct, -18dB/Oct, -24dB/Oct, -36dB/Oct, or -48dB/Oct

LPF (Low Pass Filter)

The Low Pass Filter section sets a low-pass crossover on the selected channel. This filter removes high frequencies above the cutoff point, typically used for subwoofer channels.

- Freq: Set the crossover frequency from 20Hz to 20,000Hz
- Type: Butterworth / Linkwitz-Riley / Bessel
- Slope: Off, -6dB/Oct, -12dB/Oct, -18dB/Oct, -24dB/Oct, -36dB/Oct, or -48dB/Oct

PEQ / GEQ Toggle

Click this button to switch between Parametric EQ (PEQ) and Graphic EQ (GEQ) modes. In GEQ mode, 31 fixed-frequency bands are displayed. In PEQ mode, you can set custom center frequencies with adjustable bandwidth (Q factor) for more precise corrections.

Main Source

Select the primary audio input source for the system:

- High - High-level speaker input from head unit
- Low - Low-level RCA input
- BT - Bluetooth 5.0 wireless audio
- USB - USB flash drive audio playback
- SPDIF - Optical digital audio input

Attenuation (atten)

The attenuation slider controls the blend level when a Mix Source is active. Adjust from 0% (full main source) to 100% (full mix source) to create the desired blend between two audio sources.

Mix Source

Select a secondary audio source to mix with the Main Source. Options are the same as Main Source plus OFF. Useful for mixing navigation prompts over music or phone calls over current playback.

Delay Unit (DLY Unit)

Select the measurement unit for time delay values: ms (milliseconds), cm (centimeters), or inch (inches). The software automatically converts between units when switching.

Noise Gate (NoiseG)

Enable or disable the noise gate function and set the threshold level. The default threshold is -65dB. When enabled, the noise gate silences output when the input signal falls below the threshold.

Boot Delay

Set the startup delay time from 0 to 10 seconds. This delay prevents speaker pop or thump sounds when the vehicle ignition is turned on. A value of 2-3 seconds is recommended for most installations.

Link L/R

When enabled, adjustments made to the left channel are automatically mirrored to the corresponding right channel, and vice versa. Useful for maintaining stereo balance during system-wide changes.

Link All

When enabled, adjustments made to any channel are applied to all channels simultaneously. Use for global level changes or uniform EQ curves.

File Operations

The File button provides import and export functions for saving your complete DSP configuration to a file on your computer. Exported files can be shared with other installers or used as backups.

4.3 Equalizer Display (Center Area)

The central area of the interface displays the frequency response curve for the currently selected channel. The graph spans the full audible frequency range from 20Hz to 20kHz on the horizontal axis, with a gain range of +20dB to -20dB on the vertical axis.

The display features color-coded frequency zones for quick visual reference:

Zone	Color	Frequency Range	Description
SUB	Purple	20 - 40 Hz	Deep sub-bass, primarily felt as physical vibration
BASE	Blue	40 - 100 Hz	Bass fundamentals, kick drums, bass guitar
MID BASE	Light Blue	100 - 400 Hz	Warmth and body of instruments, lower vocals
MID	Green	400 - 1,000 Hz	Vocal presence, instrument clarity
MID HIGH	Yellow-Green	1,000 - 5,000 Hz	Detail, attack transients, intelligibility
HIGH	Yellow	5,000 - 16,000 Hz	Brilliance, air, cymbal shimmer
SUH	Orange-Red	16,000 - 20,000 Hz	Ultra-high harmonics, spatial cues

Below the frequency response graph, 31 red slider controls provide quick adjustment of each frequency band. Each slider shows the band number (Num), frequency (Freq), Q factor, and current gain value. A green dot on the curve indicates the currently selected/editing frequency position.

4.4 Channel Strip (Bottom Area)

The bottom section contains individual channel strips for each of the 8 primary output channels:

Control	Function	Details
Channel Label	Channel identification	Displays assigned name (FL-Full, FR-Full, RL-Full, RR-Full, Custom, L-SUB, R-SUB)
Volume Fader	Channel output level	Vertical slider from 0 to 100, with numeric dB readout
Level Display	Current level	Shows the output level in dB (e.g., 0.0 dB)

	readout	
Mute	Mute/Unmute	Click to toggle mute. Red when muted, gray when active
Phase	Phase inversion	Toggle between 0 degrees (normal) and 180 degrees (inverted)
EQPass	EQ Bypass	Bypasses all EQ for the channel. Useful for A/B comparison
DLY: ms	Delay display	Shows the current time delay value for this channel

4.5 Source Volume Bar (Bottom)

At the very bottom, individual volume controls are provided for each input source for level matching:

- Source Vol (High): Controls the volume level of the high-level speaker input
- Low: Controls the volume of the low-level RCA input
- BT: Controls the Bluetooth audio volume
- USB: Controls the USB flash drive playback volume
- SPDIF: Controls the optical digital input volume
- SUB: Controls the overall subwoofer output level across all sources

Chapter 5: Equalizer (EQ) Configuration

The AD12H-1500 provides two powerful equalization modes: a 31-band Graphic EQ (GEQ) and a fully parametric EQ (PEQ). Both modes can be configured independently per channel, giving you complete control over the frequency response of each speaker in your system.

5.1 Graphic EQ (GEQ) Mode

The 31-band Graphic EQ is the default equalization mode. It divides the audible frequency spectrum into 31 bands spaced at 1/3-octave intervals, following the ISO standard center frequencies. Each band can be boosted or cut by up to 20dB.

The 31 center frequencies are:

20Hz, 25Hz, 31.5Hz, 40Hz, 50Hz, 63Hz, 80Hz, 100Hz, 125Hz, 160Hz, 200Hz, 250Hz, 315Hz, 400Hz, 500Hz, 630Hz, 800Hz, 1kHz, 1.25kHz, 1.6kHz, 2kHz, 2.5kHz, 3.15kHz, 4kHz, 5kHz, 6.3kHz, 8kHz, 10kHz, 12.5kHz, 16kHz, 19.4kHz

To adjust a GEQ band:

- Select the target channel from the channel strip at the bottom of the interface
- Click on the frequency band slider you wish to adjust in the graph area
- Drag the slider up to boost or down to cut the selected frequency
- The frequency response curve updates in real-time to show the effect
- Fine-tune using the numeric Gain value displayed below the slider
- Adjust the Q factor to widen or narrow the bandwidth of each band if needed

Understanding Q Factor

The Q factor (Quality factor) determines the bandwidth of each EQ band. A higher Q value creates a narrower, more focused adjustment. A lower Q value creates a broader adjustment.

Q Value	Bandwidth	Best Used For
0.5 - 1.0	Very wide (2+ octaves)	Broad tonal shaping, gentle room correction
1.0 - 2.0	Wide (1-2 octaves)	General tone adjustments, sweeping boosts/cuts
2.0 - 4.0	Medium (0.5-1 octave)	Targeted adjustments, instrument emphasis
4.0 - 8.0	Narrow (< 0.5 octave)	Problem frequency reduction, feedback control
8.0 - 16.0	Very narrow	Surgical notch filtering, resonance removal

5.2 Parametric EQ (PEQ) Mode

The Parametric EQ mode provides even greater control by allowing you to define custom center frequencies. Each PEQ band offers three adjustable parameters:

- Center Frequency: Set to any frequency between 20Hz and 20kHz
- Q Factor: Adjustable bandwidth from very wide to ultra-narrow
- Gain: Boost or cut from -20dB to +20dB

PEQ mode is particularly useful for addressing specific problem frequencies such as room resonances, speaker peaks, or vehicle-specific acoustic anomalies.

To use PEQ mode:

- Click the PEQ button in the left panel to switch to parametric mode
- Click on the frequency response graph to add a new PEQ point
- Drag the point vertically to adjust gain, horizontally to change frequency
- Use the Q control to adjust the bandwidth of the selected point
- Multiple PEQ points can be added for complex frequency shaping
- Switch back to GEQ mode at any time without losing PEQ settings

5.3 EQ Tips and Best Practices

Start Flat: Begin with all EQ bands at 0dB. Listen to familiar reference tracks before adjusting.

Cut Before You Boost: Reducing problem frequencies is better than boosting desired ones. Cutting prevents clipping.

Use Reference Tracks: Use high-quality recordings you know well for tuning. Songs heard on reference systems provide a reliable baseline.

A/B Compare: Use the EQPass button frequently to compare processed vs. unprocessed sound.

Small Adjustments: Make adjustments in 1-3 dB increments. Large boosts often indicate installation issues.

Listen at Multiple Volumes: Human hearing perceives frequencies differently at different volumes (Fletcher-Munson curves). Verify at both low and high levels.

Chapter 6: Crossover Filter Settings

Crossover filters direct the correct frequency range to each speaker type. The AD12H-1500 provides both HPF and LPF on every channel, with multiple filter types and adjustable slopes.

6.1 High Pass Filter (HPF)

A High Pass Filter allows frequencies above the cutoff to pass while attenuating those below it. HPF protects small speakers from low-frequency energy that could cause distortion or damage.

- On tweeter channels to prevent bass from reaching the tweeter voice coil
- On midrange channels to remove sub-bass frequencies
- On full-range speakers to prevent excessive cone excursion

6.2 Low Pass Filter (LPF)

A Low Pass Filter allows frequencies below the cutoff to pass while attenuating those above it. LPF is primarily used on subwoofer channels.

6.3 Filter Types Explained

Butterworth: Maximally flat passband response with -3dB at the crossover frequency. Good balance of rolloff and phase behavior. Recommended for most general applications.

Linkwitz-Riley: Designed for audio crossovers with -6dB at the crossover frequency. When HPF and LPF are summed acoustically, the result is flat. Preferred for most active car audio systems.

Bessel: Preserves waveform shape (best group delay) with a gentler rolloff. Ideal where transient response and phase linearity matter more than steep separation.

6.4 Slope Selection

Slope	Filter Order	Characteristics
-6 dB/Oct	1st Order	Gentle slope, wide overlap. Minimal phase shift.
-12 dB/Oct	2nd Order	Moderate slope. Good for overlapping drivers.
-18 dB/Oct	3rd Order	Good balance of steepness and phase behavior.
-24 dB/Oct	4th Order	Steep rolloff. Most popular for active systems.
-36 dB/Oct	6th Order	Very steep. Strong driver isolation.
-48 dB/Oct	8th Order	Maximum steepness. Near-brick-wall filtering.

6.5 Recommended Crossover Settings

Speaker Type	HPF Frequency	LPF Frequency	Recommended Slope	Filter Type
Tweeter (25mm)	3,500 - 5,000 Hz	Off	-24 dB/Oct	Linkwitz-Riley
Tweeter (28mm)	2,500 - 4,000 Hz	Off	-24 dB/Oct	Linkwitz-Riley
Midrange (3-4 in)	400 - 800 Hz	3,000 - 5,000 Hz	-24 dB/Oct	Linkwitz-Riley
Midbass (6.5 in)	60 - 100 Hz	400 - 800 Hz	-24 dB/Oct	Linkwitz-Riley
Full Range (6.5 in)	80 - 100 Hz	Off	-24 dB/Oct	Butterworth
Subwoofer (10 in)	Off	80 - 100 Hz	-24 dB/Oct	Linkwitz-Riley

Subwoofer (12 in)	Off	60 - 80 Hz	-24 dB/Oct	Linkwitz-Riley

Chapter 7: Time Delay Alignment

Time delay alignment is one of the most powerful features of the AD12H-1500 DSP. It electronically delays the audio to individual speakers so sound from all speakers arrives at the listening position simultaneously, creating a coherent soundstage with precise stereo imaging.

7.1 Why Time Delay is Important

In a car, the listener is positioned much closer to some speakers than others. The front-left speaker may be only 60 cm from the driver while the front-right could be 130 cm away. Sound travels at approximately 343 m/s, so the difference in arrival time is significant.

Without time alignment, the closer speaker's sound reaches your ears first, pulling the stereo image to one side. By adding delay to closer speakers, all sounds arrive simultaneously, resulting in a centered stereo image with depth, width, and height.

7.2 Delay Settings Dialog

Access the delay settings by clicking "Delay Lin" in the top menu bar. The dialog shows all channels with:

[Figure 7.1: Per-channel delay configuration dialog with ms/cm/inch units and phase control]

Control	Description
Channel Name	Identifies the output channel (e.g., CH1-FL, CH2-FR)
Delay (ms)	The delay value in the currently selected unit
Phase	Per-channel phase: 0 degrees (normal) or 180 degrees (inverted)
Distance (cm)	Equivalent distance when using cm or inch units
Mute	Per-channel mute toggle within the delay dialog
Unit Buttons	Switch between ms, cm, inch
Set Empty	Reset all delay values to zero

7.3 How to Calculate Delay Values

Step 1 - Measure Distances: Using a tape measure, measure the distance from each speaker to your listening position (driver's head). Record all measurements.

Step 2 - Find the Farthest Speaker: The farthest speaker receives zero delay since it already takes the longest for its sound to reach you.

Step 3 - Calculate Differences: For each speaker, subtract its distance from the farthest speaker's distance.

Step 4 - Enter Values: Select cm as the delay unit, then enter the calculated difference for each channel.

Step 5 - Fine Tune: Play a mono vocal track and listen for the voice to appear centered. Adjust in 0.5 cm increments.

7.4 Example Delay Calculation

Speaker	Distance to Driver	Farthest Distance	Delay Needed
Front Left Tweeter	65 cm	155 cm	90 cm (2.62 ms)
Front Left Midrange	72 cm	155 cm	83 cm (2.42 ms)
Front Right Tweeter	135 cm	155 cm	20 cm (0.58 ms)
Front Right Midrange	140 cm	155 cm	15 cm (0.44 ms)
Rear Left	95 cm	155 cm	60 cm (1.75 ms)
Rear Right	130 cm	155 cm	25 cm (0.73 ms)
Subwoofer (trunk)	155 cm	155 cm	0 cm (0.00 ms)

Conversion formula: Delay (ms) = Distance (cm) / 34.3, based on the speed of sound at ~343 m/s. The Delay Cal tool performs this calculation automatically.

Chapter 8: Input/Output Routing & Gain Matrix

The Input/Output Gain Matrix controls how each input source is distributed to output channels and at what gain level. Access this by clicking "Inout Gain" in the top menu bar.

8.1 Understanding the Gain Matrix

The gain matrix is a grid where rows represent input sources and columns represent output channels. Green sliders at each intersection control the gain level for that routing path.

[Figure 8.1: Input Gain routing matrix showing BT, USB, SPDIF inputs routed to High and Low outputs]

Input Source	Description
BT L / BT R	Bluetooth Left and Right channels
USB L / USB R	USB audio Left and Right channels
SPDIF L / SPDIF R	Optical digital Left and Right channels

Output	Description
High 1 - High 6	High-level output channels 1 through 6
Low 1 - Low 2	Low-level output channels 1 and 2

8.2 How to Configure Routing

- Set the slider above 0 to enable a routing path
- Adjust the slider to control gain for that path
- Set to 0 (minimum) to disable routing
- Multiple inputs can be routed to the same output for mixing
- A single input can be routed to multiple outputs for distribution

8.3 Source Selection Examples

- Daily driving: Main Source = BT (phone audio), Mix Source = OFF
- USB playback: Main Source = USB, Mix Source = BT (phone calls)
- Audiophile: Main Source = SPDIF (high-quality DAC), Mix Source = OFF
- Factory head unit: Main Source = High, Mix Source = BT

Chapter 9: Presets & File Management

9.1 Understanding Presets

The AD12H-1500 provides 8 preset memory slots storing complete tuning configurations: EQ curves, crossover points, delay values, gain levels, source routing, phase settings, and noise gate parameters.

9.2 Saving a Preset

- Configure all settings to your desired values
- Click "Save" in the top menu bar
- Select the preset slot number (1-8)
- Optionally assign a descriptive name
- Click Save/OK to confirm

9.3 Loading a Preset

- Click "Call" to open the preset selection dialog
- Select the preset number to load
- Click Load/OK to apply
- Or click numbered buttons (1-8) in the top-right for quick switching

9.4 Importing and Exporting Settings

Export: Saves configuration to a file on your computer for backup or sharing with other installers.

Import: Loads a previously exported file. This overwrites current settings, so save first.

Tip: Always export a backup before making major changes to allow reverting to a known-good state.

Chapter 10: Noise Gate Configuration

10.1 What is a Noise Gate?

A noise gate silences the audio output when the input signal falls below a specified threshold, eliminating background noise, hiss, alternator whine, and other low-level interference.

10.2 Configuring the Noise Gate

- Enable/Disable: Check "NoiseG" checkbox
- Threshold: Set the activation level (default -65dB)
- When input drops below threshold, output is muted
- When input rises above threshold, output is unmuted

10.3 Recommended Settings

Scenario	Threshold	Notes
Clean installation	-70 dB or Off	No noise gate needed
Mild alternator whine	-65 dB	Default, sufficient for most installs
Moderate ground loop hum	-55 dB	Higher threshold for louder noise floor
Significant noise	-45 dB	May cut quiet passages. Fix root cause first

Important: The noise gate is a workaround, not a solution. Investigate grounding, cable shielding, and signal routing issues rather than relying solely on the noise gate.

Chapter 11: Android App Control

The AD12H-1500 supports wireless tuning via a dedicated Android application through Bluetooth 5.0. This allows real-time adjustments from the driver seat without a laptop.

11.1 Installing the Android App

- Download the ALCHIMIST DSP app from Google Play Store or alchimists.com/documents
- Install on Android 6.0 or later
- Enable Bluetooth on your device
- Power on the AD12H-1500 and enable pairing mode
- Scan for devices and select AD12H-1500
- Once paired, the full tuning interface appears

11.2 App Features

- Full EQ control (GEQ and PEQ modes)
- Crossover filter configuration (HPF/LPF)
- Time delay alignment settings
- Source selection and volume control
- Preset management (save, load, switch)
- Real-time parameter adjustment
- Dark mode interface for in-car use

11.3 Tips for Mobile Tuning

- Pair before starting the vehicle
- Use the app for fine-tuning after initial PC-based setup
- Keep the app updated for firmware compatibility
- Stay within 10m Bluetooth range during tuning

Chapter 12: Troubleshooting

12.1 Connection Issues

Problem	Possible Cause	Solution
"not connect" in software	USB cable not connected	Check USB cable on both ends. Try different cable.
"not connect" in software	USB driver not installed	Reinstall USB driver. Check Device Manager.
"not connect" in software	Unit not powered on	Verify ACC and POW connections have 12V.
Software crashes	Incompatible Windows	Run as Administrator. Check requirements.
Bluetooth won't pair	BT already connected	Power cycle unit. Clear pairing history.

12.2 Audio Issues

Problem	Possible Cause	Solution
No sound (all channels)	All channels muted	Check Mute buttons. Unmute as needed.
No sound (all channels)	Volume at zero	Check channel faders and source volumes.
No sound (all channels)	Wrong source selected	Verify Main Source matches input.
No sound (one channel)	Channel muted	Check specific channel Mute button.
No sound (one channel)	Crossover incorrect	Verify HPF/LPF for speaker type.
Distortion	Input gain too high	Lower source volume and input sensitivity.
Distortion	EQ boost too aggressive	Reduce EQ boost levels.
Hum or buzz	Ground loop	Ensure single-point grounding.
Alternator whine	Poor power filtering	Add power filter. Check grounds.
Image off-center	Time delay incorrect	Re-measure distances. Recalculate delays.
Image off-center	Phase inverted	Check phase settings on all channels.
Weak bass	Subwoofer phase wrong	Toggle sub phase between 0/180 degrees.
Popping on startup	No boot delay	Set boot delay to 2-3 seconds.

12.3 Protection Mode

If the red protection LED illuminates:

- Overheating: Ensure adequate ventilation. Do not enclose without airflow.
- Short circuit: Check all speaker wiring for shorts.
- Overvoltage: Verify supply voltage is within 10V-15V.
- Low impedance: Ensure all speakers are 4 ohms or higher.

To reset: Turn off ignition, wait 30 seconds, then restart. If protection recurs, resolve the root cause.

Chapter 13: Technical Specifications

Figure 13.1: AD12H-1500 specification overview

Parameter	Specification
Model	ALCHIMIST AD12H-1500
Type	DSP Class AB Car Amplifier
Total Channels	12 (10 full-range + 2 subwoofer)
Output Power (CH1-10)	95W RMS x 10 at 4 ohms
Output Power (CH11-12)	60W RMS x 2 at 4 ohms
Operating Voltage	10V - 15V DC
Frequency Response	20Hz - 20kHz
Sample Rate	96 kHz / 24-bit
Distortion (THD+N)	< 0.005%
Signal-to-Noise Ratio	> 93 dB
EQ Bands (GEQ)	31 bands per channel
EQ Types	GEQ (31-band) / PEQ (parametric)
Crossover Filter Types	Butterworth / Linkwitz-Riley / Bessel
Crossover Slopes	Off, -6, -12, -18, -24, -36, -48 dB/Oct
Time Delay	Per-channel (ms / cm / inch)
Phase Control	0 / 180 degrees per channel
Noise Gate	Adjustable threshold
Inputs - High Level	6-channel speaker input
Inputs - Low Level	2-channel RCA
Inputs - Digital	Optical SPDIF (Toslink)
Inputs - Wireless	Bluetooth 5.0
Inputs - USB	USB Type-A (music)
Outputs - Speaker	12 channels direct

Outputs - RCA	8 x RCA line-level (6V RMS)
Outputs - AUX	2 x RCA (AUX L/R)
PC Connection	USB Type-B
Adjustment	PC (Windows) / Android (Bluetooth)
Preset Memory	8 slots
Boot Delay	0 - 10 seconds
Dimensions	175mm x 116mm x 40mm
Weight	0.85 kg
Material	Black Aluminum

Chapter 14: Safety & Compliance

14.1 Important Safety Information

- Disconnect the vehicle battery negative terminal before beginning installation
- Do not install in locations exposed to water, moisture, or excessive dust
- Ensure adequate ventilation to prevent overheating
- Do not open the unit casing. No user-serviceable parts inside
- Use only the specified operating voltage range (10V-15V DC)
- Install appropriate fuses on power lines as specified in this manual
- Route all wiring away from moving parts, sharp edges, and heat sources
- Do not operate if the unit shows signs of physical damage
- Keep away from strong magnetic fields and direct sunlight
- Designed for automotive use only. Not for marine, aviation, or industrial use

14.2 Certifications

- CE (European Conformity)
- FCC Part 15 (United States)
- RoHS (Restriction of Hazardous Substances)
- ISO 9001:2015 Quality Management System

14.3 Environmental Information

This product contains electronic components and should be disposed of in accordance with local e-waste regulations. Do not dispose in household waste. Contact your local waste management authority.

Chapter 15: Warranty & Support

15.1 Warranty Coverage

The ALCHIMIST AD12H-1500 is covered by a manufacturer warranty against defects in materials and workmanship. Please retain your proof of purchase and warranty card.

The warranty covers:

- Manufacturing defects in components and assembly
- Premature failure of electronic components under normal use
- Software defects affecting core functionality

The warranty does not cover:

- Damage from improper installation, wiring, or use
- Operation outside the specified voltage range
- Physical damage from impact, water, fire, or natural disasters
- Modifications by unauthorized personnel
- Normal wear and cosmetic damage
- Use of incompatible accessories or components

15.2 Technical Support

For support, installation assistance, or warranty inquiries:

Contact Method	Details
Website	www.alchimists.com
Email	support@alchimists.com
Phone	Contact number available on website
Software Downloads	www.alchimists.com/documents
Social Media	Follow @ALCHIMIST on Facebook and Instagram

When contacting support, please have: product model (AD12H-1500), serial number (bottom of unit), purchase date, and a detailed description of the issue.

ALCHIMIST

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support@alchimists.com