



MS-A5001

Digital signal processing amplifier



MS-A5001 FEATURES

- 1 Input-Level Control**
This control is used to match the input sensitivity to the signal voltage for proper analog-to-digital conversion. See page 7 for details. **DO NOT** use this control to set the relative output level of amplifier channels!
- 2 Input Signal Selector**
Lo/HI/Hi2 sets input voltage and impedance range. See page 7 for details.
- 3 Audio Inputs**
Use RCA audio cables for preamp-level connections or attach the included RCA to bare wire adapters for speaker-level input connections.
- 4 Pass-Through Outputs**
Input channel 1 sends signals to Output 1. Input channel 2 sends signals to Output 2. The MS-A5001's filter settings do not affect these channels.
- 5 Onboard Fuses**
2 x 40A ATC type.
- 6 Display Panel**
Displays the amplifier's settings.
- 7 User Controls**
These controls allow you to adjust the amplifier's settings. See page 9 for details.
- 8 +12V Power Input**
Connects to your vehicle's battery with a 80A fuse within 18 inches (45.7cm) of the battery's positive terminal.
- 9 Remote Turn-On Input**
Connects switched +12V to +12V. Note: The MS-A5001 also includes signal-sensing turn-on. You may choose the turn-on method during setup. See pages 5 and 9-10 for details.
- 10 Chassis Ground Input**
Connect to a paint-free spot on the vehicle chassis.
- 11 Speaker Outputs**
Two mono speaker outputs. These outputs send the same output signal (in parallel) for the added convenience of connecting multiple subwoofers. Be sure to account for parallel resistance connections when you determine the load on the MS-A5001's output. Do not connect loads below a total of two ohms.

MS-A5001 DIGITAL SIGNAL-PROCESSING AMPLIFIER PLEASE READ THIS BEFORE YOU BEGIN!

JBL® MS-series amplifiers include many features not found on conventional car-audio amplifiers. As a result, the setup procedure for JBL MS-series amplifiers is different from that of conventional car-audio amplifiers. The following overview of features and functions will help you plan a great system and make the best use of the MS-A5001's innovative features.

About the digital signal processing (DSP) included in MS-series amplifiers:
All of the signal processing in MS-series amplifiers is digital. Digital signal processing, along with the amplifiers' intuitive controls and display, make precise setup easy. Only the input-level controls are analog.

Will I lose my settings if I disconnect the amplifier or the car's battery?
No. The MS-A5001 stores all of the DSP settings in nonvolatile memory, so you will not lose any settings if power is removed.

Why are the input-level controls analog?
In order to provide the best signal-to-noise ratio and to maximize the resolution of the digital-to-analog conversion, the maximum input-signal level to the analog-to-digital (A/D) converters must be precisely set. The control that sets the level must be an analog control. The included setup CD and the procedure described in this manual make setting the level simple and precise. Once you set the input-level control, do not use the control to "tune" the system. Use the digital output-level control to adjust the relative level between amplifier channels to tune the system.

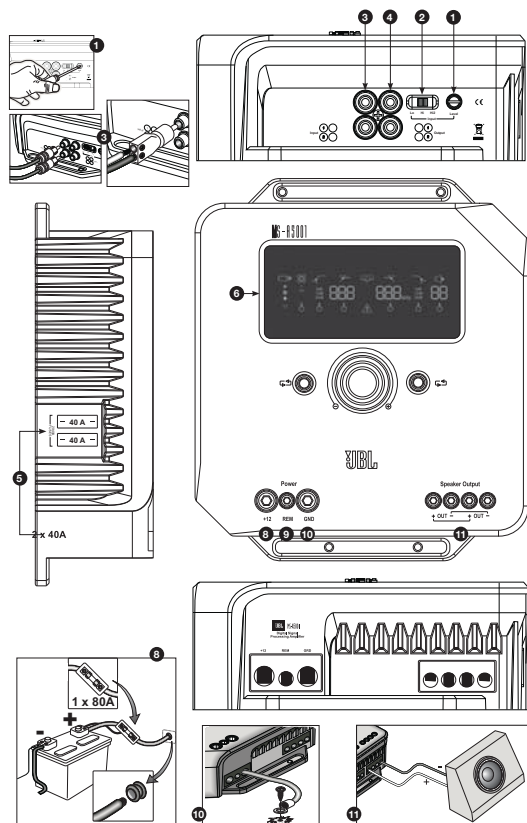
FCC REGULATIONS

Caution:
Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Compliance statement:
1: This device is verified to comply with Part 15 of the FCC Rules. Operation subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

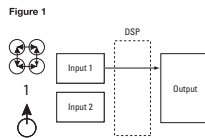
This device complies with RSS 210 of Industry Canada.
Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

USER GUIDE

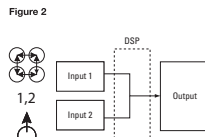


Why are the signal inputs and speaker outputs numbered rather than labeled "right" and "left"?
MS-series amplifiers are designed to make integration into any system simple and straightforward. The amplifier includes a digital input-mixer control that eliminates the need for Y adapters. It allows a mono or stereo signal to drive any pair of output channels for maximum system-building flexibility. Labeling the channels "left" and "right" would be confusing in some applications.

How does the digital input mixer work?
The MS-A5001 converts the signals from each RCA-type input connector into digital signals and sends them to its digital signal processor. The DSP routes the signals to the speaker output according to the selections in the input mixer. There's one input mixer for channels 1 and 2 that feeds the mono output channel. Selecting "1" in the input mixer for channels 1 and 2 will send only the signal connected to input jack 1 to the mono output channel. Use this setup if the subwoofer input is already mono or if the intended signals come from only one channel. (See Figure 1.)



Selecting "1,2" in the input mixer sends a summed mono signal to the output. This selection is useful for sending a stereo signal to the mono output when using subwoofers intended to receive information from both the left and right inputs. (See Figure 2.)



Many system configurations are possible. None of them need Y adapters. See "System Diagrams" (pages 12 and 13) for more examples.

Does the amplifier include speaker-level and line-level inputs?
Yes. MS-series amplifiers can accept any input signal. If your head unit includes RCA-type outputs, simply plug them into the RCA-type input jacks. If your head unit doesn't include RCA-type outputs (as is the case with all factory-installed systems), use the included RCA-to-bare-wire adapters. Be sure to observe proper polarity. The signal inputs are differential and will accept any signal from 100mV (low-level) to 20V (high-level). There's no need to use separate adapters or to determine the signal voltage or type precisely. MS-series amplifiers' on-board tools and the setup procedure described later in this manual will make optimizing the configuration simple.

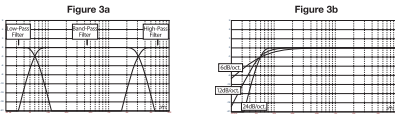
The factory-installed system in my car shows a "speaker disconnected" message or fails to play when a speaker is disconnected or when an amplifier is connected to its output. What should I do?
MS-series amplifiers include three input-level switch positions. Lo, Hi and Hi2. The Hi2 position includes a circuit designed to fool the factory system into "seeing" a speaker connected to its output. If your car has one of these systems, set the input level control to "Hi2" and follow the rest of the setup instructions.

My factory-installed head unit doesn't include a remote-turn-on wire. What should I do?

MS-series amplifiers include signal-sensing turn-on. They never require a remote turn-on connection. The amplifier will sense the presence of an audio signal on its inputs, and it will turn on automatically. A few minutes after the signal stops or after the vehicle's radio is turned off, the amplifier will turn itself off automatically. During the delay, the amplifier draws very little current so that it won't drain the vehicle's battery.

What is the best procedure for choosing a crossover frequency and slope? (Figures 3a & 3b)

A crossover is a pair of filters that divide the audio signal into low frequencies (bass) and high frequencies (treble) so each band of frequencies goes to the speaker designed to play it. For example, a tweeter is designed to play only high frequencies, and too much bass can damage it. A woofer is designed to play only low frequencies and does a poor job of reproducing high frequencies. A midrange speaker is designed to play frequencies between bass and treble (midrange frequencies). Figure 3a shows how these speakers would be divided up across the 20Hz – 20kHz range using the appropriate filters (that is, the appropriate crossovers).



When setting a crossover between a low-frequency speaker and a high-frequency speaker, choose the high-pass filter (HPF) frequency that will keep the high-frequency speaker safe. Set the low-pass filter (LPF) so the hand-off provides smooth response in the region near the crossover frequency. When implementing a crossover between speakers, use steep (24dB/octave) slopes for both filters to maximize the amount of low frequencies that the high-frequency speaker can handle safely and to minimize the interaction of the sound between the low-frequency speaker and the high-frequency speaker. Figure 3b shows the differences of 6-, 12- and 24dB/octave filter slopes.

If I should use 24dB/octave slopes for crossovers, why do MS-series amplifiers include 6dB and 12dB/octave slopes too?

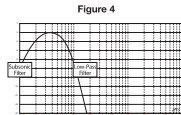
If your MS-series amplifier will power a subwoofer in a vented (ported) box, use a 12dB/octave high-pass filter to protect the subwoofer from damage by limiting the amount of bass below the box's tuned frequency that the amplifier sends to the subwoofer. A 6dB/octave high-pass filter can be useful in slightly limiting the amount of bass that the amplifier sends to full-range speakers in systems that don't use a subwoofer, limiting the amount of high frequencies that the amplifier sends to rear speakers.

Why does each pair of channels include a high-pass filter (HPF) and a low-pass filter (LPF)?

In some systems, it can be useful to limit the high frequencies and the low frequencies that an amplifier sends to a speaker. Use the HPF and the LPF together to create a band-pass filter for a subwoofer, including a subsonic filter as described below. When using the filters to create a band-pass filter, the HPF can never be set to a higher frequency than the LPF. For example, if the LPF is set to 80Hz, the HPF can be set to any frequency below 80Hz. This protection prevents errors in setup.

Do MS-series amplifiers include a subsonic or infrasonic filter for use with vented enclosures?

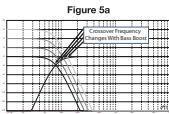
Yes. If you want to use a subsonic or infrasonic filter with your subwoofer, configure the channel's crossover as a band-pass filter. The low-pass filter will limit the high frequencies that the amplifier sends to the subwoofer, and the high-pass filter will be the infrasonic filter. Set the high-pass filter frequency about 10Hz below the frequency at which the enclosure is tuned, and use a 12dB/octave slope (see Figure 4).



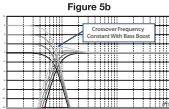
About the wireless bass control (MS-WBC, sold separately):

The MS-series wireless bass control can make installation easy. The circuit is designed for long battery life; a separate, wired connection to a +12V is included for those who never want to replace the battery. The wireless bass control does not need a wired connection to the amplifier. The control sends a radio signal to the DSP in the amplifier; as a result, the control may be mounted in a console or under the dash, and the amplifier may be mounted in the trunk or hidden behind a panel.

The amount of bass included in recordings varies greatly, and the ability to adjust the amount of bass between songs or albums is useful. Unlike conventional remote bass controls, the MS-WBC doesn't simply increase the level of the amplifier's channels that are connected to the subwoofer. Conventional bass controls adversely affect the crossover between the subwoofer and the midbass or midrange speakers any time they are adjusted. This arrangement causes the bass to sound boomy or muddy when it's boosted, and it draws the listener's attention to the subwoofer's location. (See Figure 5a.)



The bass-boost filter in the MS-series amplifiers is a shelf filter that boosts or cuts bass below 60Hz but never above 160Hz. The range of adjustment is +/-10dB. Additionally, the bass boost or cut is sent to all the amplifiers with which the control is paired. The bass control works with the crossover filters to ensure that the amplifier sends the proper amount of boost or cut to the subwoofer and the midbass or midrange speakers so the character and apparent location of bass sounds remain constant. See Figure 5b for the performance of the MS-WBC over the conventional bass controls as would appear in Figure 5a.



CAUTION: Installation of car-audio components requires experience in performing mechanical and electrical procedures. If you feel you lack the required experience or necessary tools, please have a qualified professional technician install your amplifier.

CAUTION: Before installation, disconnect the negative (-) battery terminal to prevent damage to the unit and to prevent the battery from being drained while you work on the car.

Read this before starting installation!

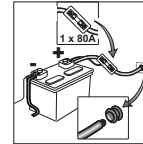
- 1) JBL MS-series amplifiers include many features not found on conventional car-audio amplifiers. As a result, the setup procedure for JBL MS-series amplifiers is different from that of conventional car-audio amplifiers. Carefully read and understand these instructions before attempting installation.
- 2) At the installation sites, locate and make a note of all fuel lines, hydraulic brake lines, vacuum lines and electrical wiring. Use extreme caution when cutting or drilling in and around these areas.
- 3) Choose a mounting location for the amplifier inside the passenger or cargo area that will ensure that the amplifier will have no exposure to moisture. Never mount an amplifier outside the car or in the engine compartment.
- 4) Make sure that there is sufficient air circulation at the mounting location for the amplifier to cool itself.
- 5) Mount the amplifier securely.

MS-A5001 CONNECTIONS

Power Inputs

1 +12V Power Input

Connect this input to the vehicle's battery using a minimum size of 8 AWG (8mm²) wire with a BGA fuse placed within 18 inches (45.7cm) of the positive battery terminal. Use an insulation grommet at every location where the power wires will pass through metal.

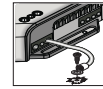


2) Remote Turn-On Input (Optional to Connect)

No discrete remote turn-on connection to the MS-A5001 is necessary. If your head unit includes a remote turn-on lead and you wish to connect it, connect it to this terminal.

3) Chassis Ground Input

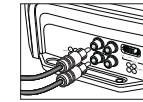
Using at least 8 AWG (8mm²) wire, connect this terminal to a nearby point of the vehicle's chassis (sheet metal). Scrape away the paint from the area to ensure a good connection. Do not ground the amplifier to the vehicle's frame.



Audio Inputs

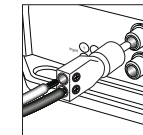
1) Using RCA Outputs

If the unit that precedes this amplifier in the signal chain includes RCA-type output connectors, connect them directly to the amplifier's RCA inputs.



2) Using Speaker-Level Signals

If the equipment that precedes this amplifier doesn't have RCA-type connectors, use the RCA-to-bare-wire adapters included with the amplifier (pictured at right). Connect the signal + to the terminal marked "+" and the signal - to the terminal marked "-".



Pass-Through Audio Outputs (Full Range)

This amplifier sends input channels 1 and 2 to the corresponding RCA outputs. Using these outputs, you can easily add additional amplifiers. For example: When using the MS-A5001 for a subwoofer, you could use these outputs for a second subwoofer amplifier or a high-frequency amplifier to complete a system. The outputs are full-range, based on the input signal. No high-pass or low-pass filters are applied in the MS-A5001 to these outputs.

Speaker Outputs

Connect each speaker to the amplifier + and - terminals. See page 9 ("Setting the Input Mixer") to learn how to assign the input signals to the output channel. Observe proper polarity when connecting the speakers to the outputs.

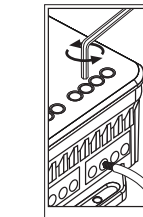
1) Single Connection

Connect the + and - terminals to either + and - speaker output terminal. They are connected internally so the signal is available on either terminal.

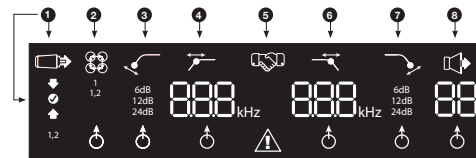
2) Dual Connection

Connect the + and - of each speaker to one + and - terminal at the amplifier. This arrangement is intended for easy connection of dual subwoofers or a dual voice-coil subwoofer using parallel voice coils.

See pages 12 and 13 for examples of the most common system configurations for this amplifier.



MS-A5001 DISPLAY ICONS



1) Input-Level Settings

- Input Setup Mode Active
- Input Sensitivity Too High
- Input Sensitivity Correct
- Input Sensitivity Too Low

6) Pairing Confirmation

- Bass Level Controller Pairing*
- *MS-WBC Wireless Bass Controller is an optional accessory.

9) Adjustment-Selection Indicator

- When lit, the parameter above is selected for adjustment.

2) Input-Channel Mixer

- Input Mixer
- Indicates which signal inputs are selected to feed the mono output.

6) Low-Pass Filter

- Frequency
- Slope
- This setting does not affect pass-through output.

10) Protection

- Amplifier Protection Circuit Engaged

3) High-Pass Filter

- Slope
- Frequency
- Use as a subsonic filter on the MS-A5001.

8) Output Gain Adjustment

- Output Gain Adjustment Active*
- Output Gain Level (0 to 80)
- *Muted when in "Setup Mode"

11) Channel ID

- Indicates the amplifier channels affected by the row of settings to the right in the display. (As the MS-A5001 is a mono amplifier, only two possible input channels exist.)