OWNER'S MANUAL

MHD900/5

5-Channel Class-D Marine System Amplifier



Thank you for purchasing a JL Audio amplifier for your marine sound system.

Your amplifier has been designed and manufactured to exacting standards in order to ensure years of musical enjoyment in your vessel. For maximum performance, we highly recommend that you have your new amplifier installed by an authorized JL Audio dealer. Your authorized dealer has the training, expertise and installation equipment to ensure optimum performance from this product. Should you decide to install the amplifier yourself, please take the time to read this manual thoroughly so as to familiarize yourself with its installation requirements and setup procedures.

If you have any questions regarding the instructions in this manual or any aspect of your amplifier's operation, please contact your authorized JL Audio dealer for assistance. If you need further assistance, please call the JL Audio Technical Support Department at (954) 443-1100 during business hours.

JL AUDIO®

PROTECT YOUR HEARING!

We value you as a long-term customer. For that reason, we urge you to practice restraint in the operation of this product so as not to damage your hearing and that of others in your vessel. Studies have shown that continuous exposure to high sound pressure levels can lead to permanent (irreparable) hearing loss. This and all other high-power amplifiers are capable of producing such high sound pressure levels when connected to a speaker system. Please limit your continuous exposure to high volume levels.

While driving, operate your audio system in a manner that still allows you to hear necessary noises to operate your vessel safely (horns, sirens, etc.).

SERIAL NUMBER

In the event that your amplifier requires service or is ever stolen, you will need to have a record of the product's serial number. Please take the time to enter that number in the space provided below. The serial number can be found on the bottom panel of the amplifier and on the amplifier packaging.

Serial Number:

_____

INSTALLATION APPLICATIONS

This amplifier is designed for operation in vessels with 12 volt, negative-ground electrical systems. Use of this product in vessels with positive ground and/or voltages other than 12V may result in damage to the product and will void the warranty.

This product is not certified or approved for use in aircraft.

Do not attempt to "bridge" the outputs of this amplifier with the outputs of a second amplifier, including an identical one.

PLANNING YOUR INSTALLATION

It is important that you take the time to read this manual and that you plan out your installation carefully. The following are some considerations that you must take into account when planning your installation.

Cooling Efficiency Considerations:

The outer shell of your JL Audio amplifier is designed to remove heat from the amplifier circuitry. For optimum cooling performance, this outer shell should be exposed to as large a volume of air as possible. Enclosing the amplifier in a small, poorly ventilated chamber can lead to excessive heat build-up and degraded performance. If an installation calls for an enclosure around the amplifier, we recommend that this enclosure be ventilated with the aid of a fan. In normal applications, fan-cooling is not necessary.

! IMPORTANT

Mounting the amplifier upside down is strongly discouraged.

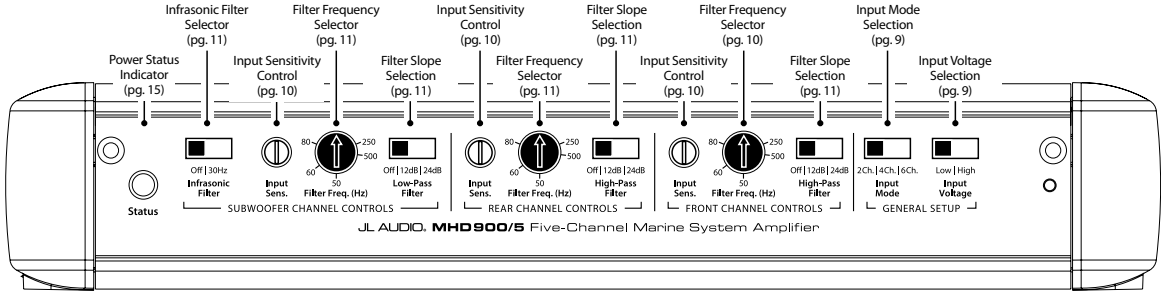
If mounting the amplifier under a seat, make sure there is at least 1 inch (2.5 cm) of space above the amplifier's outer shell to permit proper cooling.

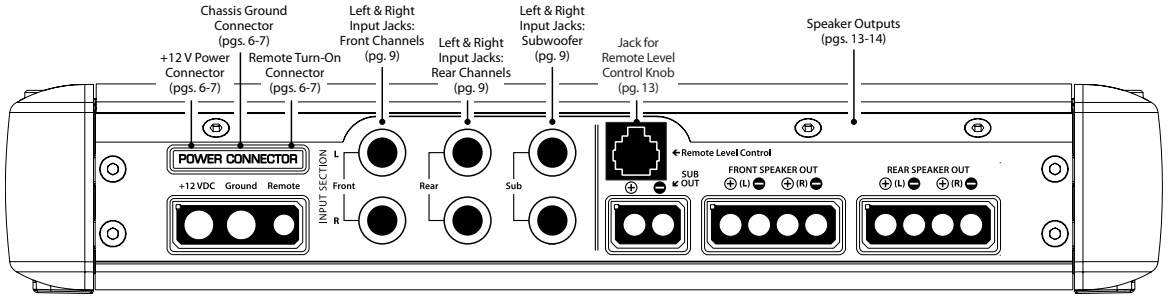
Safety Considerations:

Your amplifier needs to be installed in a dry, well-ventilated environment and in a manner which does not interfere with your vessel's factory installed electronic devices. You should also take the time to securely mount the amplifier so that it does not come loose in the event of a collision/ sudden jolt or as a result of the repeated vibrations the vessel is prone to during normal operation.

Stupid Mistakes to Avoid:

- Check before drilling any holes in your vessel to make sure that you will not be drilling through the hull, a fuel tank, fuel line, wiring harness or other vital vessel system.
- Do not run system wiring outside or underneath the vessel. This is an extremely dangerous practice which can result in severe damage to your vessel and person.
- Protect all system wires from sharp edges (metal, fiberglass, etc.) by carefully routing them, tying them down and using grommets and loom where appropriate.
- Do not mount the amplifier in the engine compartment or in any other area that will expose the amplifier circuitry to the elements.





! IMPORTANT

While this amplifier is specially designed for marine applications, it is not waterproof and it should not be mounted where it is likely to get wet.

PRODUCT DESCRIPTION

The JL Audio MHD900/5 is a very powerful and compact five-channel amplifier utilizing patented Single Cycle Control™ Class D technology for all channels. This groundbreaking technology delivers reference-grade, full-range sonic performance while requiring far less current from the vessel's electrical system than a conventional amplifier.

JL Audio's exclusive R.I.P.S. power supply design optimizes the output of each channel section for any impedance between 1.5 and 4 ohms per channel (3-8 ohms bridged on front and rear sections) allowing you to get full use of the MHD900/5's performance capabilities with a wide range of speaker systems.

The tightly regulated power supply design also means that the MHD900/5's clean power output capability remains stable over a wide range of vessel voltages, resulting in enhanced fidelity.

The MHD900/5 flexible, studio-grade signal processing allows it to be deployed in several different system configurations:

1) As a five-channel amplifier in a bi-amplified system, driving four satellite speakers (100W x 4), plus a subwoofer system (500W x 1).

2) As a very powerful three-channel amplifier in a bi-amplified system, driving two satellite speakers (150W x 2, bridged), plus a subwoofer system (500W x 1).

3) As a five-channel amplifier in a tri-amplified system, driving two tweeters (100W x 2), plus two woofer/mids (100W x 2), plus a subwoofer system (500W x 1). An external 2-way crossover is required for this application.

The MHD900/5's flexible input and crossover sections permit operation with a wide variety of source units and system configurations. It can be operated with a single pair of stereo inputs, with two pairs of stereo inputs (front and rear) or with separate inputs for its front, rear and subwoofer channels.

As we said, it's very flexible.

TYPICAL INSTALLATION SEQUENCE

The following represents the sequence for a typical amplifier installation, using an aftermarket source unit or OEM Interface processor (like the CleanSweep® CL441dsp). Additional steps and different procedures may be required in some applications. If you have any questions, please contact your authorized JL Audio dealer for assistance.

1) Disconnect the negative battery post connection and secure the disconnected cable to prevent accidental re-connection during installation. **This step is not optional!**

2) Run positive and negative power wire from the battery location to the amplifier mounting location, taking care to route it in such a way that it will not be damaged and will not interfere with vessel operation. 4 AWG is the minimum recommended wire size for this amplifier. Use a 2 AWG or 1/0 AWG main power wire with a power distribution block when additional amplifiers are being installed with the MHD900/5 and powered from the same main power wire.

3) Connect power wire to the positive battery post. Fuse the wire with an appropriate fuse block (and connectors) within 18 inches (45 cm) wire length of the positive battery post. This fuse is essential to protect the vessel. Do not install the fuse until the power wire has been connected to the amplifier.

4) Connect negative power wire to the negative battery post. Use the same size power wire as the wire connected to the "**+12V**" connection.

5) Run signal cables (RCA cables) and remote turn-on wire from the source unit or interface processor to the amplifier mounting location.

6) Run speaker wire from the speaker systems to the amplifier mounting location.

7) Securely mount the amplifier using appropriate hardware. (See page 8 for detailed mounting instructions).

8) Connect the remote turn-on wire and the positive and negative power wires to the amplifier's power connector plug. Then insert the power connector plug into the amplifier's power connector receptacle, pushing firmly.

9) Connect the RCA input cables to the amplifier.

10) Connect the speaker wires to the speaker connector plugs and insert the plugs firmly into the speaker connector receptacles.

11) Carefully review the amplifier's control settings to make sure that they are set according to the needs of the system.

12) Install power wire fuse (60A for a single MHD900/5) and reconnect the negative battery post terminal.

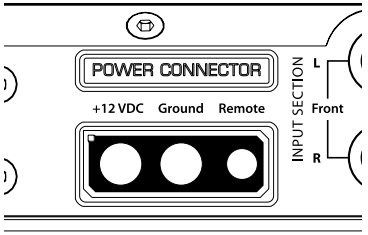
13) Turn on the source unit at a low level to double-check that the amplifier is configured correctly. Resist the temptation to crank it up until you have verified the control settings.

14) Make necessary adjustments to the input sensitivity controls to obtain the right overall output and the desired balance in the system. See Appendix C (pages 18, 19) for the recommended input sensitivity setting method.

15) Enjoy the fruits of your labor with your favorite music.

POWER AND TURN-ON CONNECTIONS

Before installing the amplifier, disconnect the negative (ground) wire from the vessel's battery. This will prevent accidental damage to the system, the vessel and your body during installation.



+12V Battery Connection

You will need to connect a power wire to the vessel's positive battery terminal, using an appropriate power ring or specialized battery terminal connector, such as the JL Audio XB-BTU. This connection must be tight and corrosion-free to ensure proper connectivity. This wire MUST be fused appropriately for safety. Any positive power wires run through metal barriers , must be protected with a high quality insulating grommet to prevent damage to the insulation of the wire. Failure to do so may result in a dangerous short circuit.

Power Wire Requirements

The MHD900/5's **"+12 VDC"** and **"Ground"** connections are designed to accept 4 AWG power wire. 4 AWG pure copper wire is the minimum recommended wire size for this amplifier. Use of smaller gauge wire (including cheap wire that is fraudulently sold as 4 AWG wire) can create a fire hazard.

If you are installing the MHD900/5 with other amplifiers and wish to use a single main power wire, use 2 AWG or 1/0 AWG pure copper wire as a main power wire. This 2 AWG or 1/0 AWG power wire should terminate into a distribution block mounted as close to the amplifiers as possible and should connect to the MHD900/5 with 4 AWG pure copper power wire, with each smaller wire fused appropriately for each amplifier or other electronics in the system.

Please note that lower AWG numbers mean bigger wire and vice-versa (1/0 AWG is the largest, 2 AWG is smaller, then 4 AWG, then 8 AWG, etc.).

! IMPORTANT

We do not recommend the use of "copper-clad aluminum wire" or "CCA" wire because this wire is significantly less conductive than pure copper wire. Only use pure copper power wire, such as JL Audio's MetaWire™. Tinned copper wire (silver color) is acceptable as the tin-plating is only a very minor component of the wire.

Fuse Requirements

The installation of a fuse on the main power wire, within 18 wire inches (45 cm) of the positive battery terminal is vital to protect the wire and the vessel from fire in the event of a collision or short-circuit. The fuse value at each power wire should be just high enough for all of the equipment being run from that power wire. Do not use a fuse with a value that far exceeds the total fuse rating of the electronics connected to the wire.

If only the MHD900/5 is being run from a single power wire, install a 60A fuse to protect the wire: AGU (big glass fuse). AFS (small blade fuse) or MaxiFuse™ (big plastic-body fuse) types are recommended.

If other amplifiers are also being powered from a main power wire and exceed 80 amps in total fuse rating, we recommend the use of an ANL (large-blade) fuse and holder. Each amplifier can then be fused independently at the outputs of the power distribution block. Use JL Audio part XC-FOA-2PAK and appropriate MaxiFuse™ type fuses with JL Audio distribution blocks.

Please consult with your JL Audio dealer to make sure that the wire, fuse holder and fuse ratings are appropriate for your system's needs. The safety of your installation depends on appropriate power connections and fuse protection.

Ground Connection

The ground connection should be made using the same gauge wire as the power connection. It is common for the alternator to be grounded through its chassis. If the alternator is not grounded through its chassis and instead employs a small (10 AWG - 6 AWG) wire to connect to ground, this wire should also be upgraded to 4 AWG when installing amplifier systems with main fuse ratings above 60A.

! IMPORTANT

Many vessels employ small (10 AWG - 6 AWG) wire to ground the battery to the vessel chassis and to connect the alternator's positive connection to the battery. To prevent voltage drops, these wires should be upgraded to 4 AWG pure copper wire when installing amplifier systems with main fuse ratings above 60A.

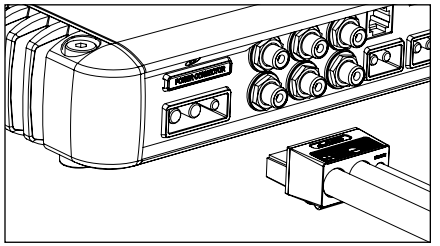
Turn-On Wire

The MHD900/5 uses a conventional +12V remote turn-on wire, typically controlled by the source unit's remote turn-on output. The amplifier will turn on when +12V is present at its **"Remote"** input and turn off when +12V is switched off. If a source unit does not have a dedicated remote turn-on output, the amplifier's turn-on lead can be connected to +12V via a switch that derives power from an ignition-switched circuit.

The MHD900/5's **"Remote"** turn-on connector is designed to accept 18 AWG – 12 AWG wire. 18 AWG is more than adequate for this purpose. To connect the remote turn-on wire to the amplifier, first back out the set screw on the bottom of the Power Connector Plug, using the supplied hex wrench. Strip 1/2 inch (12mm) of wire and insert the bare wire into the receptacle, seating it firmly so that no bare wire is exposed. When using smaller wire, it may be necessary to strip 1 inch of insulation from the wire and fold the bare wire in half prior to insertion. While holding the wire in the terminal, tighten the set screw firmly using the supplied 2.5 mm hex wrench, taking care not to strip the head of the screw and making sure that the wire is firmly gripped by the set screw.

Amplifier Power Connector Plug

To connect the power wires and the remote turn-on wire to the amplifier, unplug the power connector plug from the amplifier chassis (pull back firmly) and back out the set screws on the connector plug, using the supplied 4 mm hex wrench for the **+12 VDC"** and **"Ground"** connections and the supplied 2.5 mm hex wrench for the **"Remote"** connection. Strip 3/8 inch (10 mm) of insulation from the end of each wire and insert the bare wire into the receptacle on power connector plug, seating it firmly so that no bare wire is exposed. While holding each wire in place, tighten each set screw firmly, taking care not to strip the head of the screw.



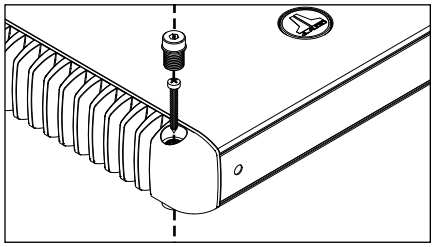
! IMPORTANT

Never make power connections with a "live" wire. Always disconnect the negative battery post before making any connections or adjustments to a 12V power connection!

AMPLIFIER MOUNTING OPTIONS

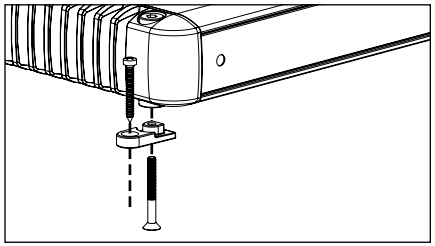
The MHD900/5 has two mounting options to ease in installation.

Standard Mounting



The standard method of mounting requires removal of the four corner caps with the 4 mm hex wrench included with your amplifier. Using appropriate mounting screws (not included), secure the amplifier in all four corners and replace the corner caps to cover the screws.

Lateral Mounting Feet



Lateral Mounting Feet are also included with your MHD900/5 to provide an alternative mounting option. Each mounting foot should be attached to the bottom of the amplifier by screwing the provided bolt into the bottom of the amplifier and up into the corner cap with the supplied 2.5 mm hex wrench. Next, using appropriate mounting screws (not included), secure the amplifier by its four Lateral Mounting Feet.

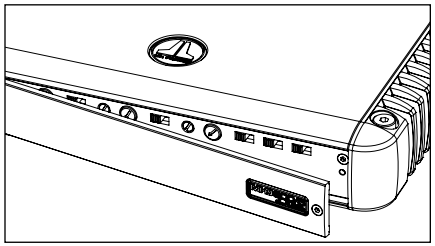
! IMPORTANT

Check before drilling any holes in your vessel to make sure that you will not be drilling through a gas tank, brake line, wiring harness or other vital vessel system.

CONTROL PANEL SECURITY COVER

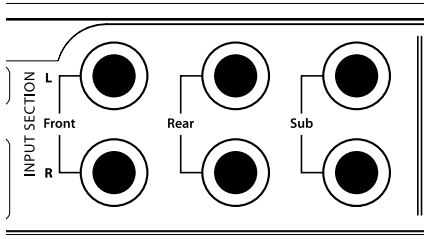
The MHD900/5 features a Control Panel Security Cover. When installed, the cover ensures that your amplifier settings are not accidentally changed while creating a clean aesthetic for the amplifier and your installation. The control panel security cover is pre-installed at the factory and must be temporarily removed for access to the controls described throughout this manual.

The security cover is secured by a single 2.5 mm hex-head screw at the far right of the panel. Loosen the hex-head screw to release the security cover (it is not necessary to completely remove the screw). To re-install the security cover once all adjustments have been made, insert the tongue on the cover's left edge into the groove where the left-side heatsink meets the control panel, hinge the panel closed and secure the screw using the supplied 2.5 mm hex wrench. Do not overtighten the screw.



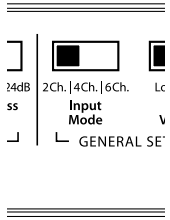
AMPLIFIER INPUTS

The MHD900/5 has three separate input sections, one for the "Front" left and right channels, another for the "Rear" left and right channels and one for the Subwoofer Channel. Each section consists of a pair of RCA-type input jacks on the Connection Panel of the amplifier and input controls on the Control Panel of the amplifier: a single "**Input Voltage**" switch, an **"Input Mode"** switch and three individual "**Input Sens.**" rotary controls (one in each channel section).



"INPUT MODE" SWITCH

The **"Input Mode"** switch is located under the **"General Setup"** heading at the far right of the control panel. This switch allows operation of all five amplifier channels with only one pair of input signals (2 ch.) or with independent front and rear input signal pairs (4 ch.) or with discrete front, rear and subwoofer signal pairs (6 ch.).



"6 Ch." Input Mode

In this mode, you will connect separate pairs of input cables to the **"Front"**, **"Rear" and "Sub"** amplifier inputs, allowing you full channel control from the source unit. If the source unit only provides a mono (single) subwoofer output, use a y-adaptor cable to feed both the **"Left"** and **"Right"** subwoofer inputs of the MHD900/5 with the mono signal. Failure to do so will result in reduced gain and possible distortion.

"4 Ch." Input Mode

In this mode, you will connect separate pairs of input cables to the **"Front"** and **"Rear"** amplifier inputs and leave the **"Sub"** inputs unused. The subwoofer channels will receive signal from the sum of the signals at the **"Front"** and **"Rear"** inputs so that front-to-rear fading of the main channels does not significantly affect the subwoofer level.

"2 Ch." Input Mode

To operate all five channels of the MHD900/5 with a single pair of stereo inputs, select the **"2 Ch."** position on the **"Input Mode"** switch and connect a single pair of input cables to the **"Front"** input jacks only. The **"Rear"** and **"Sub"** input jacks will remain unused. In this mode, the amplifier will route the signals connected to the **"Front"** inputs to the Front, Rear and Subwoofer channels. Front-to-rear fading will not be available.

"Input Voltage" Switch

A wide range of signal input voltages can be accommodated by each of the MHD900/5's differential-balanced inputs (200mV – 8V RMS). This wide range is split up into two sub-ranges, accessible via the **"Input Voltage"** switch located next to the **"Input Mode"** switch under the **"General Setup"** heading.

The **"Low"** position of the **"Input Voltage"** switch selects an input sensitivity range between 200mV and 2V for all the amplifier channels. This means that the **"Input Sens."** rotary controls will operate within that voltage window. If you are using an aftermarket source unit, with preamp-level outputs, this is most likely the position that you will use (regardless of what voltage output capability is claimed by the source unit).

The **"High"** position of the **"Input Voltage"** switch selects an input sensitivity range between 800mV and 8V. This is for use with speaker-level outputs from source units and small amplifiers found in many OEM (factory-installed) systems. To use speaker-level sources, splice the speaker output wires of the source unit or small amplifier onto a pair of RCA plugs for each input pair or use the JL Audio ECS Speaker Wire to RCA adaptor (XB-CLRAIC2-SW). It is not necessary (or advisable) to use "Line Output Converters" with your MHD900/5.

! IMPORTANT

The output of the amplifier decreases for a given input voltage when the "Input Range" switch is placed in the "High" position. The output increases with the switch in the "Low" position. While this may sound counter-intuitive, it is correct as described.

CHANNEL CONTROL SECTIONS

To the left of the **"General Setup"** section on the Control Panel of the amplifer are three sets of controls: one for the **"Rear Channel Controls"** one for the **"Front Channel Controls"** and one for the **"Subwoofer Channel Controls".**

In each of these sections you will find a rotary control labeled **"Input Sens."** (Input Sensitivity). These controls are designed to match the input sensitivity of each channel section of the MHD900/5 to the specific signal source that is feeding the amplifier. These controls must be adjusted, with care, following the procedures outlined in this manual. Failure to make correct adjustments can result in weak output, excessive distortion and/or undesirable noise in the audio output of the amplifier!

Note: The Channel Control sections also house **"High-Filter" or "Low-Pass Filter"** and **"Filter Freq."** controls. These are crossover filter controls and will be discussed in the next section of this manual. This section will explain the Input Controls only.

"Input Sens." Controls

Once the appropriate **"Input Voltage"** range has been selected in the "General Setup" section of the amplifier, the "Input Sens." controls are used to match the source unit's output voltage to the input stage of each pair of amplifier channels for maximum clean output. Rotating the control clockwise will result in higher sensitivity (louder for a given input voltage). Rotating the control counter-clockwise will result in lower sensitivity (quieter for a given input voltage). To properly set each pair of amplifier channels for maximum clean output, please refer to Appendix C (pages 18, 19) in this manual.

After using this procedure, you can then adjust the relative level of each channel pair by adjusting the input sensitivity downward on any of the channel sections, if they require attenuation to achieve the desired system balance.

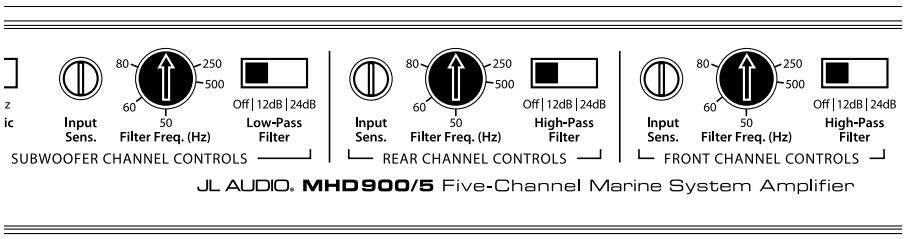
Do not increase the **"Input Sens."** setting for any amplifier or channel section in the system beyond the maximum level established during the procedure outlined in Appendix C (pages 18, 19). Doing so will result in audible distortion and possible speaker damage.

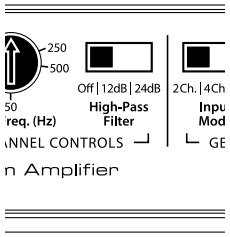
Be aware that all three **"Input Sens."** adjustments will need to be made, regardless of how many input cables are feeding the amplifier. These controls will allow you to set the appropriate relative levels for the **"Front"** channels relative to the **"Rear"** channels and the **"Sub"** channel (and any other amplifier channels in the system).

CROSSOVER CONTROLS

Crossovers are groups of electronic filters designed to control the frequency ranges that each speaker in a system will be tasked with reproducing. Proper crossover setup is critical to sound quality and reliability.

The MHD900/5 has three individually adjustable filter controls, one for the **"Front"** channels, one for the **"Rear"** channels and another for the **"Sub"** channel. The "Front" and "Rear" filters are high-pass filters (they attenuate low frequencies), while the **"Sub"** channel filter is a low-pass filter (attenuates high frequencies). For each filter, the user can select from a shallow (12dB/octave) filter slope or a more aggressive (24dB/octave) slope.





1) "High-Pass Filter" Controls (Front and Rear channels) or "**Low-Pass Filter**" Control (Sub Channel): These switches allow you to select filter slopes or defeat the filter(s) completely.

"Off": Defeats the filter completely. Useful when using an external crossover, such as one built into a head unit or signal processor.

"12dB": Configures the filter to attenuate frequencies above or below the selected filter frequency at a rate of 12 dB per octave (Butterworth alignment).

"24dB": Configures the filter to attenuate frequencies above or below the selected filter frequency at a rate of 24 dB per octave (Linkwitz-Riley alignment).

Depending on the speaker system and the vessel, different filter slopes may be required to produce a smooth transition between the sound of different speakers in the system.

In high-pass mode, the sharper **"24dB"** setting will do a better job of protecting small speakers with limited power handling. In low-pass mode, the **"24dB"** setting can also help by more aggressively removing lower midrange output from a subwoofer system.

The shallower **"12dB"** octave setting allows for more output overlap between the speakers being crossed over. In many cases, this will result in a smoother "blend" or transition between speaker systems.

Experiment to find the slope or combination of slopes which best matches the acoustic requirements of your system.

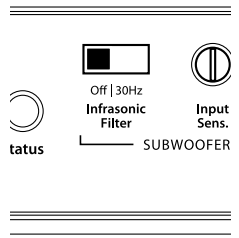
2) "Filter Freq. (Hz)" Control:
This control selects the frequency at which the filter begins to attenuate the signal and refers specifically to the frequency at which output has been attenuated by -3dB.

The filter frequency markings surrounding this rotary control are for reference purposes and are generally accurate to within 1/3 octave or better. If you would like to select the filter cutoff frequency with a higher level of precision, consult the charts in Appendix B (page 18) of this manual.

"80 Hz" is a good starting point for most systems where a subwoofer is connected to the Subwoofer Channel and component systems or coaxials to the four main channels.

INFRASONIC FILTER (Subwoofer Ch. Only)

The **"Infrasonic Filter"** is a 24 dB/octave high-pass filter, with a fixed cutoff frequency of 30 Hz. This filter is designed to conserve amplifier power and protect subwoofer systems, without audibly degrading the sub-bass output.



With ported enclosures, the use of the **"Infrasonic Filter"** is highly recommended to protect the speaker(s) from excessive excursion below box tuning.

With sealed enclosures, the use of the filter is less necessary, but can still help protect the speaker system from excessive excursion.

The **"Infrasonic Filter"** can be completely defeated by selecting the **"Off"** position on its switch. This bypasses all signal from flowing through the circuit.

BI-AMPLIFIED SYSTEMS

Bi-amplified systems are defined as systems in which separate amplifier channels drive low-frequency (LF) and high-frequency (HF) speakers and are separately filtered to send appropriate frequency ranges to each speaker system.

The most common application of bi-amplification in mobile audio is to drive a subwoofer system from one or more amplifiers or channels and component speakers from separate amplifiers or channels.

The MHD900/5 can be easily configured to drive a complete bi-amplified system consisting of a subwoofer and four main speakers or a subwoofer and two main speakers.

Bi-Amplified System with one MHD900/5 driving four main speakers plus subwoofer (5-Channel Mode)

In this configuration, the **"Front"** channels of the MHD900/5 will drive front component speakers (stereo 100W x 2 @ 4Ω) with high-pass filtering. The **"Rear"** channels will drive rear component speakers in stereo (100W x 2 @ 4Ω) with high-pass filtering. The subwoofer channel will drive the subwoofer system (500W x 1 @ 1.5-4Ω) with low-pass filtering.

Once the input sections have been configured appropriately, go to the **"Front Channel Controls"** Section. Select **"12dB"** or **"24dB"** on the **"High-Pass Filter"** and an appropriate **"Filter Freq."** (80-90 Hz is a good starting point).

Next, turn your attention to the **"Rear Channel Controls"** Section and select **"12dB"** or **"24dB" "High-Pass Filter"** switch and an appropriate **"Filter Freq."** (again, 80-90 Hz is a good starting point).

Finally, in the **"Subwoofer Channel Controls"** Section, select **"12dB"** or **"24dB"** on the **"Low-Pass Filter"** Switch and a **"Filter Freq."** of 80-90 Hz.

After proper adjustment of the MHD900/5's **"Input Range"** and **"Input Sens."** controls, you can fine tune filter frequencies and slopes and attenuate each channel section to achieve proper balance.

Bi-Amplified System with one MHD900/5 driving two main speakers plus subwoofer (3-Channel Mode)

In this configuration, the **"Front"** channels of the MHD900/5 will be bridged to drive the left front component speaker system (150W x 1 @ 4Ω) with high-pass filtering. The **"Rear"** channels will be bridged to drive the right front component speaker system (150W x 1 @ 4Ω), also with high-pass filtering. The **"Subwoofer"** channel will drive the subwoofer system (500W x 1 @ 1.5-4Ω) with low-pass filtering.

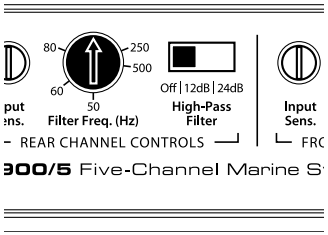
For information on proper bridging techniques refer to the section titled **"Bridging Considerations"** in this manual (page 14).

Once the input sections have been configured appropriately, go to the **"Front Channel Controls"** Section. Select **"12dB"** or **"24dB"** on the **"High-Pass Filter"** and an appropriate **"Filter Freq."** (80-90 Hz is a good starting point).

Next, turn your attention to the **"Rear Channel Controls"** section and set it exactly the same as you set the **"Front Channel Controls"**.

Finally, in the **"Subwoofer Channel Controls"** section, select **"12dB"** or **"24dB"** on the **"Low-Pass Filter"** switch and a **"Filter Freq."** of 80-90 Hz.

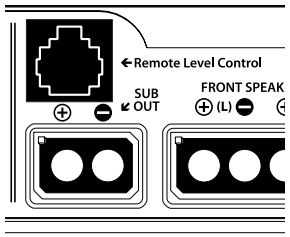
After proper adjustment of the MHD900/5's **"Input Range"** and **"Input Sens."** controls, you can fine tune filter frequencies and slopes and attenuate each channel section to achieve proper balance. Keep in mind that the left and right front speakers will have independent **"Input Sens."** controls in this configuration, and these need to be carefully matched for proper stereo performance.



REMOTE LEVEL CONTROL (OPTIONAL)

With the addition of the optional Remote Level Control (HD-RLC), you can control the level of the Subwoofer Channel of the MHD900/5 from the front of the vessel. The HD-RLC connects to the jack labeled **"Remote Level Control"** on the Connection Panel of the amplifier using a standard telephone cable (supplied with the HD-RLC).

If desired, multiple MHD amplifiers can be controlled from a single HD-RLC controller using a simple phone line "splitter" and multiple phone cables.



When connected to the amplifier, the HD-RLC operates as follows. At full counter-clockwise rotation, the audio will mute completely. At full clockwise rotation the level will be the same as if the HD-RLC was not connected at all. In other words, it operates strictly as a level attenuator.

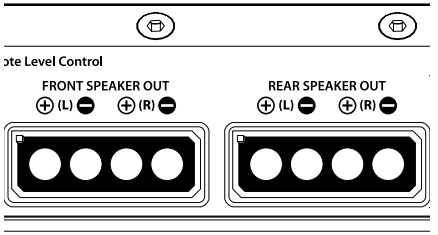
When no HD-RLC is connected, the Level Control circuit is defeated.

! IMPORTANT

The RBC-1 Remote Bass Control used with JL Audio Slash, Slash v2, e-Series, A-Series and G-Series amplifiers is NOT compatible with the HD/MHD Series amplifiers. If you attempt to connect an RBC-1 to an HD amplifer, the control will not work. You must use the HD-RLC controller.

SPEAKER OUTPUTS

The MHD900/5 employs JL Audio's exclusive Regulated, Intelligent Power Supply (R.I.P.S.) design. The operation of the R.I.P.S. system is independent for each channel section. This sophisticated power supply allows the amplifier to produce its optimum power into higher impedances as well as low impedances.



The R.I.P.S.-equipped MHD900/5 gives you the freedom to use a variety of speaker configurations that achieve final nominal impedances between 1.5 – 4Ω per channel in stereo while maintaining 75 - 100W x 4 of clean power output. When bridged, each main channel pair will optimize output at 150-200 watts between 3 – 8Ω. The mono subwoofer channel will deliver its full 500W output into any impedance between 1.5-4Ω.

The operation of the R.I.P.S. circuitry is entirely automatic and adjusts itself every time the amplifier is turned on. There are no user controls to configure. The system operates through multiple stages of impedance optimization, choosing the stage most appropriate to the actual impedance of the speakers you connect to it.

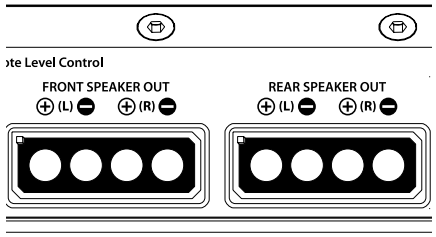
! IMPORTANT

If you connect a load higher than 4Ω nominal per channel in stereo mode (or 8Ω in bridged mode), power will drop by half with every doubling of impedance above 4Ω stereo / 8Ω mono. If you connect a load lower than 1.5Ω nominal per channel in stereo mode (or 3Ω in bridged mode, the amplifier protection circuitry activates a "safe" mode which reduces amplifier power to protect the circuitry from failure (the LED status indicator on the control panel will light up amber to indicate that this has happened). See page 15 for details.

BRIDGING CONSIDERATIONS

Bridging is the practice of combining the output of two amplifier channels to drive a single load. When bridged, each channel produces signals of equal magnitude, but opposite polarity. The combined output of the two channels provides twice the output voltage available from a single channel. The MHD900/5 has been designed for bridging of its two main channel pairs without the need for input inversion adaptors.

The mono subwoofer channel cannot be bridged to another mono channel.



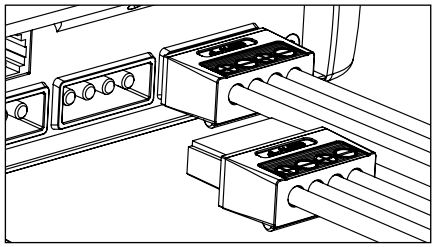
To bridge either pair of main channels, use the **"Left +"** and **"Right –"** speaker connectors only (the **"Left –"** and "**Right +**" remain unused). Then connect a mono signal to ***both left and right RCA inputs*** for that channel pair. This requires an RCA "Y-Adaptor" (sold separately), because a bridged pair of channels requires that both amplifier channels of the bridged pair receive input. **Connection of only one RCA input will result in reduced power output, increased distortion and can cause the amplifier to overheat.**

When bridged, each channel pair will deliver optimum power into a 3-8Ω load. Operating bridged channel pairs into a load lower than 3Ω is not recommended.

Speaker Connector Plugs

There are three speaker connector plugs on the MHD900/5: one for the front channels, one for the rear channels and one for the subwoofer channel.

To connect the speaker wires to the amplifier, unplug the speaker connector plugs from the amplifier chassis (pull back firmly) and back out the set screws on each connector plug, using the supplied 2.5 mm hex wrench. Strip 3/8 inch (10 mm) of insulation from the end of each wire and insert the bare wire into the receptacle on the speaker connector plug, seating it firmly so that no bare wire is exposed. While holding each wire in place, tighten each set screw firmly, taking care not to strip the head of the screw.



! IMPORTANT

Speaker loads below 1.5Ω nominal per channel in stereo or 3Ω nominal in bridged mode are not recommended and may cause the amplifier output to distort excessively.

"STATUS" LED / PROTECTION CIRCUITRY

There is a single multi-color LED on the control panel of the amplifier to indicate the amplifier's operating status. This LED's behavior is as follows:

1) Flashing Green: amplifier is powering up, audio output is muted.

2) Constant Green: amplifier is on and functioning normally, audio output is active.

3) Constant Red: lights to indicate that the amplifier has exceeded its safe operating temperature, putting the amplifier into a self-protection mode, which temporarily reduces the peak power output of the amplifier. The red light will turn green and the amplifier will return to full-power operating mode when its temperature returns to a safe level.

3) Constant Amber (yellow): lights to indicate that at least one channel is in overcurrent protection mode. This could mean that the impedance of the speaker load connected to the amplifier is lower than the optimum load impedance range for the amplifier. When this light is on, a protection circuit engages and reduces the power output of the channel(s) experiencing the problem. This can manifest itself as audible distortion.

The amber indicator will also light when a short-circuit is detected in the speaker wiring (this can be a short between the positive and negative speaker wires or between either speaker wire and the vessel chassis). This can be used to diagnose a short-circuit by only connecting one of the amplifier sections at a time (**"Front"** or **"Rear" or "Sub"** channels). The amber LED will light when you connect the section that is experiencing the problem and turn the volume up. Note that a short in the speaker wiring may show an alternating red/green status light with no signal (volume down).

4) Alternating Red and Green: lights to indicate that the amplifier is experiencing a fault that may require service of the amplifier, its wiring or the vessel's charging system. Audio is muted when this fault occurs. The most likely cause of this fault is a low supply voltage condition. If battery voltage drops below 8.5 volts at any point, the amplifier (except for the "Status" LED) will shut itself off to protect itself and the vessel's charging system. If the Remote Turn-On voltage drops below 6 volts, the "Status" LED will also turn off.

The amplifier will turn back on automatically when voltage climbs back above 9 volts. This shut-down and turn-on behavior may happen in a rapid cycle when bass-heavy program material causes a weak charging system to momentarily dip too low. If this is happening in your system, have your charging system inspected to make sure it is working properly.

If no problem is found with the supply voltage to the amplifier and you are still seeing alternating Red and Green on the "Status" LED, check that there are no short-circuits to chassis ground in any of the speaker wiring in the vessel. Disconnect speaker connectors from the amplifier one-by-one to check.

If no problem is found with the supply or remote voltage, disconnect everything except power/ground/remote. If the amplifier is then turned on and displays an alternating red-green, the amplifier needs service.

For more information on troubleshooting this amplifier, refer to Appendix D (pages 20, 21).

SERVICING YOUR JL AUDIO AMPLIFIER

If your amplifier fails or malfunctions, please return it to your authorized JL Audio dealer so that it may be sent in to JL Audio for service. There are no user serviceable parts or fuses inside the amplifier. The unique nature of the circuitry in the JL Audio amplifiers requires specifically trained service personnel. Do not attempt to service the amplifier yourself or through unauthorized repair facilities. This will not only void the warranty, but may result in the creation of more problems within the amplifier.

If you have any questions about the installation or setup of the amplifier not covered in this manual, please contact your dealer or technical support.

JL Audio Technical Support:
(954) 443-1100
9:00 AM – 5:30 PM (Eastern Time Zone)
Monday - Friday

APPENDIX A:
MHD900/5 Specifications

Amplifier Topology: Class D, switching type with patented Single-Cycle Control™ technology.
Power Supply: Pulse width modulation-regulated switching power supply
Recommended Fuse Value / Type: 60A (AFS, AGU or MaxiFuse™)
Rated Power (Main Channels / Stereo):
100W RMS x 4 @ 4Ω (11V - 14.5V)
75W RMS x 4 @ 1.5-3Ω (11V - 14.5V)
Rated Power (Main Channels / Bridged):
200W RMS x 2 @ 8Ω (11V - 14.5V)
150W RMS x 2 @ 3-6Ω (11V - 14.5V)
Rated Power (Subwoofer Channel):
500W RMS x 1 @ 1.5-4Ω (11V - 14.5V)
THD at Rated Power:
Main Channels: <0.03% @ 4Ω per channel
Subwoofer Channel: <0.05% @ 4Ω
(Average at 1 kHz)
Signal to Noise Ratio (20 kHz Bandwidth):
Referred to Rated Power: 108 dBA
Referred to 1 Watt: 88 dBA
Frequency Response (Main Channels):
12 Hz - 28 kHz (+0, -1dB)
Frequency Response (Subwoofer Channel):
12 Hz - 10 kHz (+0, -1dB)
Damping Factor (Main Channels):
>400 @ 4Ω per ch. / 50 Hz
>200 @ 2Ω per ch. / 50 Hz
Damping Factor (Subwoofer Channel):
>800 @ 4Ω / 50 Hz
>400 @ 2Ω / 50 Hz

Crossover Filters:

High-Pass Filters: Front Channels and Rear Channels
Low-Pass Filter: Subwoofer Channel
Filter Type (all channels): 12 dB/octave Butterworth or 24 dB/octave Linkwitz-Riley
Cutoff Freq. Range: Continuously variable, 50 - 500 Hz

Input Sections:

No. of Inputs: Three Stereo Pairs (Front, Rear and Sub)
Input Type: Differential-balanced with RCA jack inputs
Input Range: Switchable from 200mV - 2V RMS (Low) to 800mV - 8V RMS (High)

Chassis Dimensions (LxWxH):

10.74 in. x 7.85 in. x 1.93 in. (273 mm x 199.5 mm x 49 mm)
Dimensions do not include connectors.

Due to ongoing product development, all specifications are subject to change without notice.

APPENDIX B:
Precise Frequency Selection Chart

"FILTER FREQ" Detent Number	Panel Marking	Actual Freq. (Hz)
Full counter-clockwise: 53		
01	"50"	53
02		53
03		53
04		53
05		54
06		55
07		57
08		58
09	"60"	60
10		62
11		64
12		66
13		69
14		71
15		74
16		77
17	"80"	80
18		85
19		86
20		90
21		95
22		100
23		104
24		110
25	"12 o'clock"	116
26		123
27		131
28		141
29		151
30		165
31		180
32		200
33		224
34	"250"	248
35		293
36		347
37		422
38		459
39	"500"	504
40		508
41		508
Full-clockwise: 508		

APPENDIX C:
Input Sensitivity Level Setting

JL Audio amplifiers utilizing the Regulated Intelligent Power Supply (R.I.P.S.) allow delivery of their rated power when connected to any load impedance from 1.5 - 4Ω per channel and when connected to a charging system with any voltage from 11 - 14.5V. This design is beneficial for many reasons. One of these reasons is ease of setup.

Because each JL Audio amplifier will always deliver the same amount of power within its operational range of supply voltages, the maximum, unclipped output is very predictable.

This makes setting the gain structure via the input sensitivity controls very simple. Following the directions below will allow the user to adjust the input sensitivity of the amplifier(s) simply and easily in just a few minutes using equipment which is commonly available in installation bays.

Necessary Equipment

- Digital AC Voltmeter
- CD with a sine-wave test tone recorded at 0 dB reference level in the frequency range to be amplified for that set of channels (50 Hz for subwoofer channels, 1 kHz for a midrange application). The CleanSweep® Calibration Disc contains the appropriate test tones and is available for sale at http://store.jlaudio.com Do not use attenuated test tones (-10 dB, -20 dB, etc.).

! IMPORTANT

Do not increase any "Input Sens." setting in the system beyond the maximum level established during this procedure. Doing so will result in audible distortion and possible speaker damage.

It will be necessary to re-adjust the "**Input Sens.**" for the affected channels if any equalizer boost is activated after setting the "**Input Sens.**" with this procedure. This applies to any EQ boost circuit, source unit tone controls or EQ circuits. EQ cuts will not require re-adjustment.

The Nine-Step Procedure

(follow this procedure for each pair of channels)

1) Disconnect the Speaker Connector Plugs.

2) Turn off all processing on the source unit (bass/treble, loudness, EQ, etc.). Set fader control to center position and subwoofer level control to 3/4 of maximum (if used to drive the MHD900/5). Disconnect the HD-RLC Remote Level Control temporarily (if one is being used).

3) Switch the "**Input Voltage**" to "**Low**" and turn the "**Input Sens.**" control on both sets of channels all the way down.

4) Set the source unit volume to 3/4 of full volume. If the subwoofer channel is being driven by a source unit's dedicated subwoofer output, also adjust the source unit's subwoofer level control to 3/4 of maximum output. This will allow for reasonable gain overlap with moderate clipping at full volume.

5) Using the chart below, determine the target voltage for input sensitivity adjustment according to the nominal impedance of the speaker system connected to each set of outputs.

6) Verify that you have disconnected the Speaker Connector Plugs before proceeding. Play a track with an appropriate sine wave (within the frequency range to be amplified by each set of channels) at 3/4 source unit volume.

7) Connect the AC voltmeter to the "**Front Speaker Outputs**" or "**Rear Speaker Outputs**" connectors of the amplifier. If the channel pair is operating in stereo, it is only necessary to measure one channel in the pair. If bridged, make sure you test the voltage at the correct connectors (L+ and R–).

8) Increase the "**Input Sens**." control until the target voltage is delivered for that set of channels. If excessive voltage is read with the control at minimum (full counterclockwise), switch the "**Input Voltage**" switch to "**High**" and re-adjust.

9) Once you have adjusted each set of channels to its maximum unclipped output level, reconnect the speaker(s). The "**Input Sens.**" controls can now be adjusted downward any set of channels requires attenuation to achieve the desired system balance.

Nom. Impedance	FRONT OR REAR CHANNELS		SUBWOOFER CHANNEL
	Stereo	Bridged	Mono
8Ω	20.0 V	40.0 V	44.7 V
6Ω	20.0 V	32.0 V	44.7 V
4Ω	20.0 V	24.6 V	44.7 V
3Ω	16.0 V	21.2 V	38.7 V
2Ω	12.3 V	**not recommended**	31.6 V
1.5Ω	10.6 V	**not recommended**	27.4 V

APPENDIX D: TROUBLESHOOTING

"How do I properly set the input sensitivity on my amplifier"

Please refer to Appendix C (pages 18, 19) to set the input sensitivity for maximum, low-distortion output.

"My amplifier doesn't turn on"

Check the fuse(s), not just visually, but with a continuity meter. It is possible for a fuse to have poor internal connections that cannot be found by visual inspection. It is best to take the fuse out of the holder for testing. If no problem is found with the fuse, inspect the fuse-holder.

Check the integrity of the connections made to each of the "**+12VDC**", "**Ground**", and "**Remote**" terminals. Ensure that no wire insulation is pinched by the terminal set screw and that each connection is tight.

Check to make sure there is +12V at the **"Remote"** connection of the amplifier. In some cases, the turn-on lead from the source unit is insufficient to turn on multiple devices and the use of a relay is required. To test for this problem, jump the "**+12VDC**" wire to the "**Remote**" terminal to see if the amplifier turns on.

"I get a distorted / attenuated sound coming out of the speaker(s)"

Check the speaker wires for a possible short, either between the positive and negative leads or between either speaker lead and the vessel's chassis ground. If a short is present, you will experience distorted and/or attenuated output. The "Status" LED will turn amber (yellow) in this situation. It may be helpful to disconnect the speaker wires from the amplifier and use a different set of wires connected to a test speaker.

Check the nominal load impedance to verify that each channel of the amplifier is driving a load equal to or greater than 1.5 ohms in stereo mode (3 ohms bridged).

Check the input signal and input signal cables to make sure signal is present at the **"Amplifier Inputs"** and the cables are not pinched or loose. It may be helpful to try a different set of cables and/or a different signal source to be sure.

Reset the amplifier by removing the power plug, then wait ten seconds and reconnect the power plug.

"My amplifier's output fluctuates when I tap on it or hit a bump"

Check the connections to the amplifier. Make sure that the insulation for all wires has been stripped back far enough to allow a good contact area inside the connector plugs.

Check the input connectors to ensure that they all are making good contact with the input jacks on the amplifier.

"My amplifier shuts off once in a while, usually at higher volumes"

Check your voltage source and grounding point. The power supply of the MHD900/5 will operate with charging system voltages down to 9V. Shutdown problems at higher volume levels can occur when the charging system voltage drops below 9V. These dips can be of very short duration making them extremely difficult to detect with a common DC voltmeter. To ensure proper voltage, inspect all wiring and termination points. It may also be necessary to upgrade the ground wire connecting the battery to the vessel's chassis and the power wire connecting the alternator to the battery. Many vessels employ small (10 AWG - 6 AWG) wire to ground the battery to the vessel's chassis and to connect the alternator to the battery. To prevent voltage drops, these wires should be upgraded to 4 AWG when installing amplifier systems with main fuse ratings above 60A. **Grounding problems are the leading cause of misdiagnosed amplifier "failures."**

"My amplifier turns on, but there is no output"

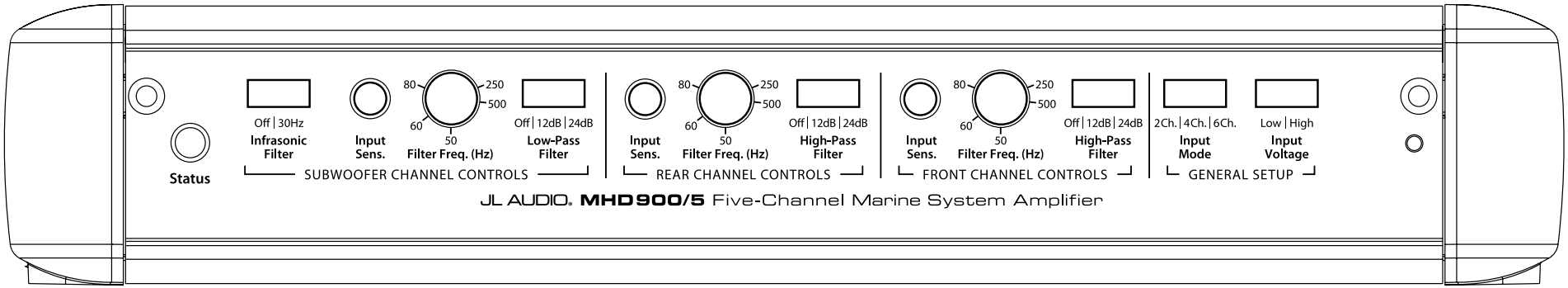
Check the input signal using an AC voltmeter to measure the voltage from the source unit while an appropriate test tone is played through the source unit (disconnect the input cables from the amplifier prior to this test). The frequency used should be in the range that is to be amplified by the amplifier (example: 50 Hz for a sub bass application or 1 kHz for a full range / high-pass application). A steady, sufficient voltage (between 200mV and 8.0-volts) should be present at the output of the signal cables.

Check the output of the amplifier. Using the procedure explained in the previous check item (after plugging the input cables back into the amplifier) test for output at the speaker outputs of the amplifier. Unless you enjoy test tones at high levels, it is a good idea to remove the Speaker Connector Plugs from the amplifier while doing this. Turn the volume up approximately half way. 5V or more should be measured at the speaker outputs. This output level can vary greatly between amplifiers but it should not be in the millivolt range with the source unit at half volume. If you are reading sufficient voltage, check your speaker connections as explained below.

Check to ensure that the speaker wires are making a good connection with the metal inside the Speaker Connector Plugs. The speaker wire connectors are designed to accept up to 12 AWG wire. Make sure to strip the wire to allow for a sufficient connection with the metal inside each terminal.

INSTALLATION NOTES:

Use this diagram to document your amplifier's switch and control positions.



LIMITED WARRANTY - MARINE PRODUCTS (USA)

JL AUDIO warrants this product to be free of defects in materials and workmanship for a period of two (2) years from the original date of purchase.

This warranty is not transferable and applies only to the original purchaser from an authorized JL AUDIO dealer. Should service be necessary under this warranty for any reason due to manufacturing defect or malfunction, JL AUDIO will (at its discretion), repair or replace the defective product with new or remanufactured product at no charge. Damage caused by the following is not covered under warranty: accident, misuse, abuse, product modification or neglect, failure to follow installation instructions, unauthorized repair attempts, misrepresentations by the seller. This warranty does not cover incidental or consequential damages and does not cover the cost of removing or reinstalling the unit(s). Cosmetic damage due to accident or normal wear and tear is not covered under warranty.

Warranty is void if the product's serial number has been removed or defaced.

Any applicable implied warranties are limited in duration to the period of the express warranty as provided herein beginning with the date of the original purchase at retail, and no warranties, whether express or implied, shall apply to this product thereafter. Some states do not allow limitations on implied warranties, therefore these exclusions may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

If you need service on your JL AUDIO product:

All warranty returns should be sent to JL AUDIO 's Amplifier Service Facility freight-prepaid through an authorized JL AUDIO dealer and must be accompanied by proof of purchase (a copy of the original sales receipt). Direct returns from consumers or non-authorized dealers will be refused unless specifically authorized by JL AUDIO with a valid return authorization number.

Warranty expiration on products returned without proof of purchase will be determined from the manufacturing date code. Coverage may be invalidated as this date is previous to purchase date. Non-defective items received will be returned freight-collect. Customer is responsible for shipping charges and insurance in sending the product to JL AUDIO. Freight damage on returns is not covered under warranty.

For Service Information in the U.S.A. please call
JL Audio Customer Service: (954) 443-1100
9:00 AM – 5:30 PM (Eastern Time Zone)
JL Audio, Inc
10369 North Commerce Pkwy.
Miramar, FL 33025
(do not send product for repair to this address)

International Warranties:
Products purchased outside the United States of America are covered only by that country's distributor and not by JL Audio, Inc.

Single-Cycle Control™ (U.S. Patent #6,084,450) is used under exclusive license for mobile audio from Power Physics, Inc. - Newport Beach, CA