

GTS50

2 CHANNEL AUTOMOTIVE POWER AMPLIFIER

OWNER'S MANUAL



GTS50

Features

- 2 Channel Operation
- Minimal Negative Feedback
- Quiet Start Circuitry
- Continuously Adjustable Gain Control
- Rated for 2-ohm operation
- Low Noise Input Section
- Gold-plated RCA Connectors
- Balanced Speaker Level Inputs
- JBL Proprietary, Solid Brass Heavy Duty Screw-down Speaker Output Connectors
- Remote Turn On Circuitry with Power On Indicator
- Fully Protected Against All Installation Errors
- Second-order, 12 dB per octave Capacitive / Inductive Power Supply Input Filtering

Owner's Warranty Information Records

Model Number

Serial Number

Dealer Name

City, State, Zip

Sales Receipt Number

Date of Purchase

Specifications

Maximum Power Output (into 2 ohms)	50 Watts
Power Output (20-20k Hz, 14.4V battery voltage)	18 Watts × 2 (4 ohms, 0.5% THD) 25 Watts × 2 (2 ohms, 0.5% THD)
Signal-to-Noise Ratio	95 dBA
Frequency Response	10-35k Hz (± 3 dB)
Input Sensitivity (for rated power output)	Line Level Input: 150 mV to 1.5V Speaker Level Input: 2.5V to 25V
Input Impedance	Line Level Input: 11k ohms Speaker Level Input: 100 ohms
Minimum Speaker Impedance	2 ohms
Power Requirement	11 to 16V DC negative ground
Power Size	7A
Size (inches, L × W × H)	8-1/8 × 4-1/4 × 2-3/8

Introduction

Thank you for selecting a JBL power amplifier for your car audio system.

The GTS50 is a sophisticated electronic product. Its advanced circuit design gives it exceptional sound quality. Its rugged mechanical design and elaborate protection circuitry guarantee years of reliable operation. However the GTS50 must be properly installed to realize its full performance potential. Skill with tools, knowledge of mobile DC electrical systems and some experience with car stereo installation are necessary to install this amplifier. **We strongly recommend the installation be done by an authorized JBL dealer.**

Take the time to read ALL of the information in this manual before attempting to install or operate the amplifier. Pay particular attention to the safety precautions.

Plan the complete installation before you start. The routing of wires, the power supply connection points, and the mechanical installation of the amplifier should be completely planned before beginning the installation. Work carefully and check each step as it is performed. Before operating the amplifier, recheck the installation, especially the wiring, to ensure that each connection is correct and secure.

Associated Equipment

The GTS50 is compatible with most mobile stereo equipment. However, there are a few factors that should be considered when selecting the speakers and electronics that will be used with these amplifiers.

The GTS50 can deliver 25 watts per channel of continuous, low distortion power. Be sure the speakers that will be connected to the amplifier can handle such power levels.

The impedance of the speaker (or speakers) connected to each channel of the GTS50 should be at least 2 ohms. When only one pair of speakers is connected, virtually any speaker can be used. However, when two pairs of speakers are connected in parallel to the GTS50 each speaker must have an impedance of at least 4 ohms so the total impedance load on each channel does not drop below 2 ohms. Impedance loads of less than 2 ohms may cause the amplifier to overheat and/or overload its output stage. Either condition can trigger the amplifier's protection circuits, although permanent damage will probably not occur.

The GTS50 must NOT be connected to speakers that have one of their input terminals wired to the frame of the speaker or to the chassis of the vehicle. Use only speakers that have complete electrical isolation between the speaker signal wiring and the frame of the speaker and/or the chassis of the vehicle.

The line and speaker level inputs and the gain control allow the GTS50 to be used with virtually any radio/tape deck or CD player. Whenever possible, use the line level inputs. (This type of input is also called a preamp level or low level input.) A line level signal does not go through as many stages of amplification as a high level (or speaker level) signal, so it will have less noise and distortion.

The low level outputs of almost any head unit that has them can be used to drive the GTS50. The adjustable gain control can be used to match the sensitivity of the amplifier to the output voltage of the signal source. This matching is important to keep overall system noise levels low. See the "Operation" section of this manual for information on setting the input level control.

When the speaker level inputs of the GTS50 are used, the amplifier is driven by the speaker outputs of the head unit. A 2.5 volt signal (equivalent to less than 1 watt across 4 ohms) will drive the GTS50 to full rated output. The left and right channels of the GTS50 high level inputs have "isolated grounds" instead of "common grounds". Virtually any radio/tape deck, even units with BTL (Balanced Transformerless) or OCL (Output Capacitorless) outputs, can be used to drive the speaker level inputs of the GTS50. See the "Operation" section of this manual for information on setting the input level control.

Installation Precautions

Before beginning the installation of the GTS50, read all the following precautions carefully. Failure to heed these warnings could result in **PERSONAL INJURY** or **DAMAGE TO PROPERTY**.

The GTS50 should be installed only in vehicles that have 12 volt negative ground electrical systems. Connection to other types of systems may damage the amplifier and/or the vehicle's electrical system.

Before drilling holes for the amplifier mounting screws, inspect the mounting area carefully to be sure there are no critical components such as electrical wires, hydraulic brake lines, fuel lines, or fuel tanks that may be damaged when drilling the holes. Damage to any of these components can be extremely hazardous. Such components may be hidden within double-walled panels or structural members of the vehicle, so be extremely cautious.

Wear eye protection whenever cutting, drilling or filing any part of the vehicle.

Do not bypass or modify the fuse in the +12 volt power supply wire. Do not replace the fuse with a fuse rated for higher current levels. Doing so could result in damage to the amplifier and the vehicle's electrical system and could be extremely hazardous.

Repeated blowing of the power supply fuse indicates improper operation or installation of the GTS50.

NOTE — An additional power supply fuse should be located as close as possible to the battery power supply connection point in order to prevent electrical system damage or fire in the event of damage to the power supply wire.

Physical Installation

Several factors should be considered when selecting a mounting location for the GTS50. The amplifier must be solidly mounted in the passenger or trunk compartment where it will not be subject to excessive shock and vibration. Never mount the amplifier where it will be exposed to moisture or extreme heat. Try to mount the GTS50 where the main +12 volt power supply wire, which must be connected directly to the battery, can be kept relatively short.

The GTS50 must be mounted where there is room around the chassis to allow air circulation.

There are three recommended positions for installing the GTS50. The best position is on a vertical surface with the heat sink fins oriented vertically. The other best position is on a horizontal surface that has a fair amount of space above it such as on the floor of the trunk. The third acceptable choice is vertical mounting with the heat sink fins positioned horizontally. Using these installation positions will make the amplifier operate at lower temperatures and reduce the risk of triggering the thermal protection circuit.

Whenever possible, choose a mounting location that allows access to the amplifier's wiring connections and level adjustments. This accessibility allows the GTS50 to be mounted first and the wiring connections and level adjustments to be made later.

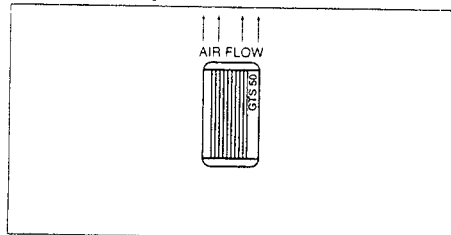
Mounting

Before mounting the GTS50, review the "Installation Precautions" and "Physical Installation" sections of this manual to select the best mounting location.

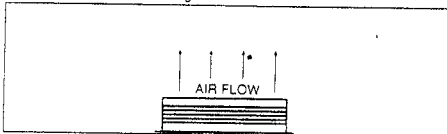
Place the amplifier in the mounting location and use a marking pen to mark the positions of the four mounting screw holes in the amplifier and panel flanges. Set the GTS50 aside and drill the four mounting screw holes with an appropriate size bit. Note: If the holes are drilled in metal panels that may be exposed to moisture, treat them with a rust prevention compound.

Set the GTS50 in the mounting position and align the holes in the end panel flanges with the holes previously drilled. Drive the four self tapping sheet metal screws into the mounting panel. Using lock washers under the screws will ensure a strong, vibration resistant mounting. Tighten the screws evenly until the unit is solidly mounted.

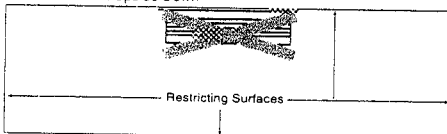
GOOD - Vertical Mounting



GOOD - Horizontal Mounting



NEVER - Mount Upside Down



Wiring

Proper wiring of the GTS50 and associated components is extremely important for both initial performance and long-term reliability. Using the proper type of wire is equally important. If the power supply wires must be run outside the passenger or trunk compartments, use heat and chemical resistant automotive wire. Regular wire will not withstand exposure to heat and chemicals. Audio signal wires should never be run outside the passenger/trunk compartments.

Be sure all wiring is secure and run where it will not be damaged. If wires are run through metal panels or are placed where they might be pulled, they should be protected with grommets and strain reliefs.

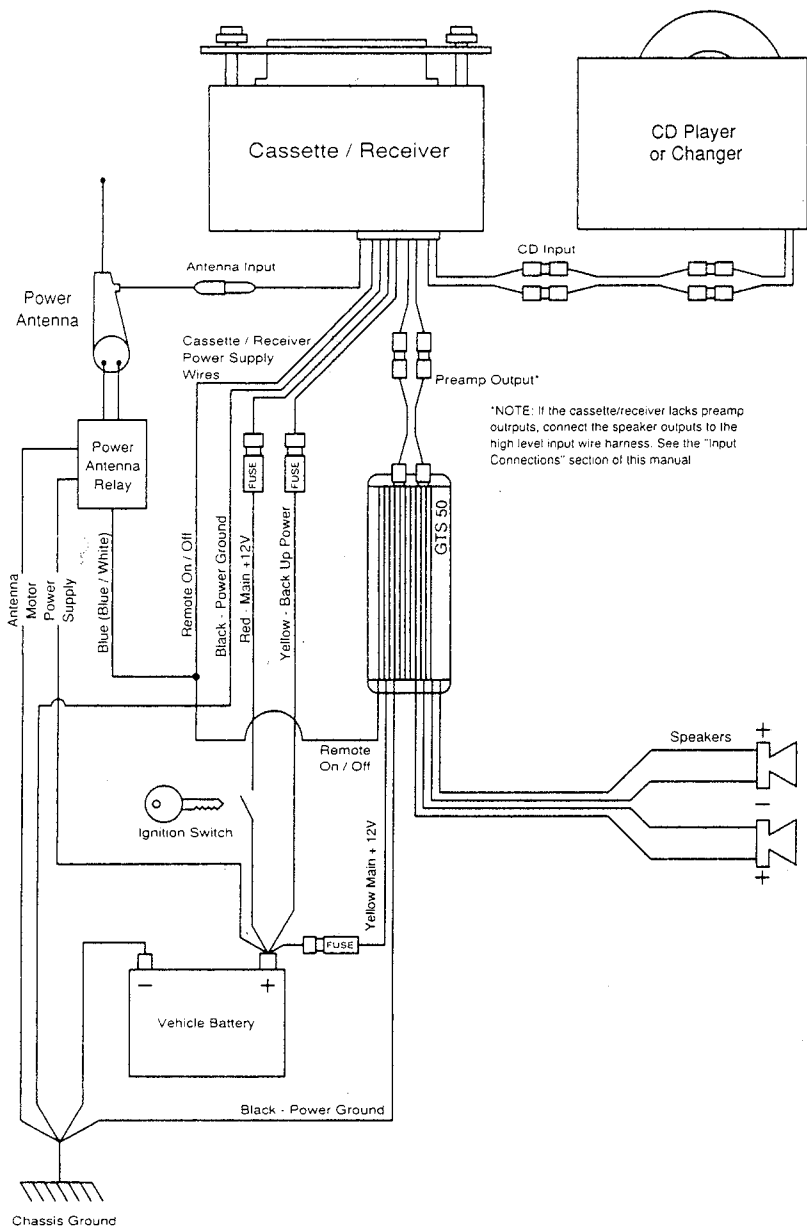
Do not run audio signal wires next to the power supply wires for the audio system or the wiring harnesses of the vehicle.

Keep audio signal wires away from components such as ignition control modules and fan motors. This reduces the chance that noise from the electrical system of the vehicle will be picked up by the audio signal wires.

To ensure long-term reliability, all wire-to-wire connections should be soldered and insulated with electrical tape or heat-shrink tubing. Terminate wires with crimp and solder-on lug terminals wherever appropriate, such as the power supply ground connection to the chassis of the vehicle.

It may be necessary to remove trim panels and sections of carpeting to hide the wiring. Work carefully and the effort will be rewarded with a reliable, attractive installation.

Wiring Diagram



Power Supply Connections

BAT (+) (yellow) — The GTS50 will draw as much as 5 amps from the vehicle's electrical system. The standard power wiring in the vehicle may be overloaded by this current demand. So the +12 volt power supply wire should be connected directly to the positive (+) terminal of the vehicle's battery. The GTS50 has a short +12V power input wire with an in-line fuse holder. Connect a heavy gauge heat and oil resistant extension wire to the power input wire and connect it to the positive (+) battery terminal.

To prevent electrical system damage or fire, an additional fuse holder, with a 7 amp fuse, should be installed in the extension wire as close to the battery as possible.

Ground (Black) — Proper grounding is extremely important. It has a significant effect on the overall performance and noise level of the system. The ground wire must be solidly connected to a major sheet metal structure of the vehicle. Usually the power supply ground wire can be connected to a sheet metal panel near the amp mounting location. Scrape all paint and primer off the sheet metal at the grounding point to ensure a good electrical connection. Attach the wire to the grounding point with a sheet metal screw and lock washer or a bolt/lock washer/nut set.

In some vehicles, such as those that have non-metal bodies, it may be necessary to extend the power supply ground wire and connect it directly to the negative (-) terminal of the battery.

Use heat and oil resistant 12 gauge stranded copper automotive wire and solder and insulate the wire-to-wire connections. Keep the extension wire as short as possible. Solder a terminal on the end of the extension wire and connect it to the battery terminal.

In some installations the noise level will be lower if the GTS50 is grounded to the same point as the head unit.

Remote turn on — The remote power control system turns the GTS50 off when not in use to prevent discharging of the vehicle's battery. When a +12 volt "turn on signal" is applied to the remote turn on wire the amplifier is turned on. A red LED on the end panel of the amplifier lights when the amplifier is on. If the head unit has a +12 volt automatic antenna activation wire, the remote turn on wire may be connected to it. Some head units have no automatic antenna activation wire. Other decks have automatic antenna wires that are "on" only when the radio is used, the +12 volt turn-on signal is cut off when a tape is played. In such cases, the remote turn on wire may be connected to the standard radio or accessory wiring. An unused accessory terminal in the fuse block, or any other +12 volt source that is turned on and off with the vehicle's ignition switch, may be used. The remote on/off system draws only a small amount of current so a relatively small (18 or 20 gauge) extension wire may be used to connect the remote on/off voltage source. Be sure to solder and insulate the wire-to-wire connections.

Input Connection

Proper wiring between the head unit and the GTS50 will help keep noise levels in the system low. Use high-quality wire. Keep the wire as short as possible. Do not splice together wires.

Line Level The line level inputs of the GTS50 accept standard phono plugs (also called "RCA plugs"). The preamp level outputs of most head units have phono plug connectors. Some units have multi-pin DIN connectors and will require the use of adaptors. Proper wire and connectors can be obtained from any electronics parts supplier.

Speaker Level When the high level (speaker level) output of a head unit is used to drive the GTS50, the signal goes into the amp through a special four-wire harness/connector. If extension wires are needed between the head unit output and the amplifier unit, use 18 gauge speaker wire. Keep the wiring inside the passenger and trunk compartments. Keep the extension wires as short as possible.

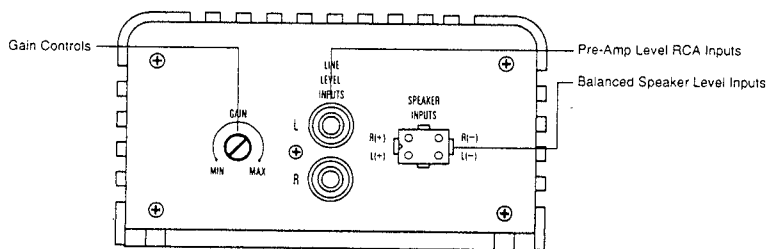
Use the color code of the input harness wires and the identification on the radio/tape deck output wires to be sure the left and right channels are

correctly connected and the positive/negative wiring of each channel is correct. For example the left positive output of the head unit must be connected to the left positive input of the GTS50. The color code for the high level input harness is:

Grey	Right Positive (+)
Grey/Black	Right Negative (-)
White	Left Positive (+)
White/Black	Left Negative (-)

When a head unit that has "floating ground" outputs circuits (also called BTL or OCL circuits) is used to drive the high level inputs of the GTS50, some unusual connection procedure may be necessary in order to minimize noise levels in the system. Seek the advice of a professional car stereo installers. They may be able to recommend steps to help reduce noise in particularly troublesome installations.

To prevent noise pick-up from the power supply wiring, do not route the input signal wiring near the power wiring for the amplifier or the vehicle's accessories and lights. See the "Wiring" section of this manual for more detailed information.



Speaker Connections

IMPORTANT: THE SET-SCREWS ON THE TERMINAL BLOCK MUST BE TIGHTENED ONLY WITH A #0, FLAT BLADE SCREWDRIVER SUCH AS XCELITE R184. DO NOT OVERTIGHTEN THESE SCREWS.

When connecting speaker wires, be sure that no uninsulated wire remains exposed and no loose strands of wire touch an adjoining wire or terminal or metal surface.

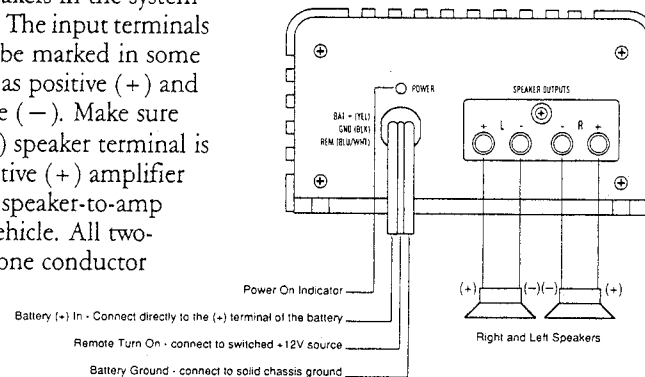
The GTS50 has four set screw type connectors for easy, secure attachment of speaker wires. Two connectors are labeled "R" for the right channel and the other two are labeled "L" for the left. Each pair has a connector for the positive (+) speaker wire and a connector for the negative (-) speaker wire. To attach a speaker wire, strip about 1/4" of insulation from the wire and twist the exposed strands into a neat bundle. Loosen the set screw on the top of the connector block and insert the wire into the hole. Be sure there are no loose strands of wire that could touch an adjoining wire or any metal surface. Then tighten the set screw to secure the wire.

To get proper bass response and stereo imaging, all the speakers in the system must be "in phase". The input terminals of the speakers will be marked in some way to identify one as positive (+) and the other as negative (-). Make sure that the positive (+) speaker terminal is attached to the positive (+) amplifier connection in every speaker-to-amp connection in the vehicle. All two-conductor wire has one conductor

marked in some way so it can be traced. There will be a ridge molded into the insulation of one conductor. Or there will be a stripe on the insulation of one conductor. Or the insulation may be clear with one conductor a natural copper color and the other tinned to give it a "silver" appearance. These marking allow the two conductors to be traced to simplify proper speaker connection and phasing throughout the system.

Use high-quality speaker wire for the speaker to amp connections. At least 16 gauge wire should be used. Larger wire (that has a lower gauge number) or special high performance speaker cables can enhance the performance of the system, especially when long lengths of wire are required.

The insulation of speaker wires will not withstand high temperatures or exposure to chemicals. Do not run speaker wire outside the passenger and truck compartments. Be very careful when speaker wire is routed through a door hinge area to door-mounted speakers. Use grommets and strain reliefs wherever necessary to prevent damage to the wires.



Operation

Before operating the GTS50, recheck all wiring connections to make sure they are correct and secure. Be sure the proper fuse (7 amps) is installed in the +12 volt power supply wire.

Gain Control Adjustment - The proper setting of the input sensitivity control on the GTS50 is important to the performance, noise level, and durability of the system. As a general rule, this control should be set as low as possible while still allowing adequate volume from the system. The signal coming from the head unit should be as high as possible to minimize the noise levels in the system.

To adjust the gain controls in the system, start with the amplifier gain control set to the full counter-clockwise

position. Set the volume control of the head unit to a point between 1/2 and 2/3 of full volume. Some head units have auxiliary output level controls. Generally they should be set to their maximum position. If adequate sound levels cannot be obtained without turning the volume knob of the radio/tape deck beyond the 3/4 point, turn up (clockwise) the gain control of the GTS50. If associated equipment such as equalizers or crossovers are used their output level controls must be at maximum. Always try to keep the gain control on the GTS50 set fairly low. Stop turning up the controls when adequate volume levels are obtained or when the first signs of distortion are heard.

The gain control on the GTS50 can also be used to balance the sound of multi-amplifier, multi-speaker systems. This adjustment is complex and often requires lengthy trial and error settings. We recommend that you consult a professional car audio installer to help with such adjustments.

Turn on Delay — When installed as described in this manual, the GTS50 will turn on and off with the radio/tape deck or the vehicle's ignition switch. When the amplifier is turned on, there is a time delay of several seconds (longer in cold weather) before the speakers are connected. This gives the GTS50 time to stabilize before the speakers are connected. This prevents annoying and possibly damaging turn on noises.

Power Consumption — Operating the GTS50 when the vehicle is not running will discharge the battery. Under normal operating conditions, the GTS50 will draw several amps from the battery. After a few hours, this may discharge the battery to the point that it will not start the vehicle. Power consumption under "no signal" conditions is 1/4 amp. Even this small power usage will discharge a battery after a while. To prevent such battery discharge, the blue Remote On/Off wire must be connected as described in the "Power Supply Connections" section of this manual.

Protection Systems — The GTS50 features protection circuitry to ensure reliable operation and prevent damage from extreme conditions. If the amplifier begins to cycle on and off it indicates a problem in the installation.

Check speaker wiring for short circuits or load impedance below 2 ohms. Check the power supply wiring and the vehicle's power supply system voltage.

If the GTS50 is operated at high power levels in a high ambient temperature situation, the heat sinks may not be able to radiate all the heat generated by the normal operation of the amp. If the temperature of the GTS50 reaches a level that could cause damage, the thermal overload protection circuit will turn the amplifier off. It will turn itself back on again when it cools off. Repeated activation of the protection circuit indicates that the system is being improperly operated, that the amplifier should be relocated to an area that has a lower ambient temperature or to a location that allows more air circulation around the heat sinks.

Fuse Replacement - If the fuse in the yellow +12 volt power supply wire must be replaced, do NOT replace it with a fuse rated for higher current levels. The maximum allowable fuse size is 7 amps. Do not bypass or modify the fuse or fuse holder. Replacing the standard fuse with one rated for higher current levels or bypassing the fuse will void the warranty and may cause serious damage.

Noise Suppression

The electrical system of every vehicle has some electrical "noise" that is generated by the ignition system, the alternator, the accessories, and their wiring. High performance audio equipment is more likely to pick up such noise than conventional equipment because it has wider frequency bandwidth and high gain (amplification) circuits. The GTS50 has a built-in power supply filter to prevent such noise pick-up. If noise is being picked up, it is probably the result of improper installation. Often the noise is being picked up by the head unit and only being amplified by the GTS50. The following suggestions will help eliminate most noise problems.

Grounding — Most noise problems are caused by inadequate grounding. All the components in the system must be grounded to a major metal member of the vehicle's frame. In modern vehicles, the structural supports behind the dashboard may be plastic or they may be insulated from the main chassis structure. Be sure all the electrical ground connections are solidly grounded.

In some cases it may be necessary to ground the GTS50 and the head unit at the same point. Or it may be necessary to use a different grounding point.

External Power Line Filters — The built-in power supply filter of the GTS50 makes external filters unnecessary in most installations. However the DC power of some vehicles is particularly "noisy". Additional filters may help reduce

noise in such instances. If additional filtering is needed, consult a professional car stereo installer regarding what type should be used and how it should be installed. Be sure the filter can handle the current levels the amplifiers require. In some cases, power supply noise can enter the system through the head unit power supply. Putting a filter on the head unit power supply input, or the remote turn-on wire may be necessary.

Suppression of Noise Sources —

Common noise problems will be solved by proper grounding and power supply connections. However, there are vehicles that are particularly prone to noise problems. Noise suppression devices, such as spark plug and coil lead suppressors and rotor and coil bypass capacitors, that are available at auto parts or car stereo stores may be effective in such vehicles. There are also noise suppressors that can be connected directly to the alternator that are effective in some situations. The use of any type of suppressor should be discussed with a professional car audio installer.

Antenna — A common noise problem is generated by a ground loop produced by grounding the antenna shielded cable at both the antenna mounting point and at the radio input. In this instance, insulate the antenna ground from the chassis of the vehicle at the antenna mounting point so the antenna shield is grounded only at the radio's antenna input.

Maintenance

There are no elements within the GTS50 which require maintenance. Periodically checking the grounding points and terminal connections is advisable, especially if the vehicle is subjected to unusual shock and vibration. Loose or corroded connections can cause annoying intermittent noise or unusual operational problems to occur.

Add-On and Upgrade

The JBL GT Series of power amplifiers and electronic crossovers allow the user to start up with one power amplifier, and build up a large, competition-quality system, without having to throw away any of the previously purchased components:

