

GTE422

22/11 BAND CONFIGURABLE EQUALIZER

OWNER'S MANUAL

JBL

GTE422



## Introduction

Thank you for selecting a JBL equalizer for your car audio system.

The GTE422 is a sophisticated electronic product. Its advanced circuit design gives you exceptional flexibility for creating superior sound in your car. Rugged mechanical and electrical design guarantee years of reliable operation. However, the GTE422 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 equalizer. 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 equalizer. 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 equalizer should be completely planned before beginning the installation. Work carefully and check each step as it is performed. Before operating the equalizer, recheck the installation, especially the wiring, to ensure that each connection is correct and secure.

## Specifications

Number of bands	4-Channel 11-Band equalizer or 2-Channel 22-Band Equalizer
Front Equalizer Center frequencies:	45 Hz, 90 Hz, 180 Hz, 360 Hz, 720 Hz, 1.5 kHz, 3 kHz, 6 kHz, 10 kHz, 16 kHz, 20 kHz.
Rear Equalizer Center Frequencies:	30 Hz, 60 Hz, 120 Hz, 240 Hz, 480 Hz, 1 kHz, 2 kHz, 4 kHz, 8 kHz, 12 kHz, 18 kHz.
Boost and Cut range	± 12 dB
Subsonic Filter	5 Hz, 12 dB/octave
Signal-to-Noise Ratio:	100 dBA
Frequency Response (all controls flat):	10 Hz - 80,000 Hz (0+, -1 dB )
THD:	0.04%
Maximum Line Level Input & Output:	5 vrms
Maximum Speaker Level Input:	7 vrms
Input impedance:	15k ohm
Fuse:	3 Amp ATO Type
Output impedance:	100 ohm
Dimensions:	7-1/8" x 11-7/8" x 1-5/8" (180mm x 300 mm x 41 mm)
Weight:	3.5 lbs. (1.59 Kg)

Design and specifications are subject to change without notice.

## Features:

Capable of equalizing a full system with front and rear channels.

Continuously variable, Convertible 11-band / 22-band equalizer operation:

3 Mode operation

4-channel input and output:  
11 bands on the front and  
11 bands on the rear.

2-channel input / 4 channel  
output: 11 bands on front and  
11 bands on the rear.

2-channel input / 2-channel output:  
22 bands on two channels.

**Gold plated RCA input/output connectors**

**Gold plated power connectors.**

**Quick replacement fuse setup.**

**High performance, low noise, audiophile quality active and passive circuitry.**

**Independent front and rear equalization circuitry**

**Staggered band center frequencies for greater flexibility convertible operation as one 22 band equalizer.**

**Trunk mountable, low profile chassis.**

**Recessed adjustments to prevent accidental changes in equalizer setups.**

**Power on Indicator**

**12 dB/ Octave,  
5 Hz Subsonic Filter**

## Theory of Operation

Equalization, a form of signal processing, is used to alter the frequency response of a system in order to:

- **Compensate for the effects of the sound system's enclosure** (the vehicle's interior, in this case): The shape and material of an enclosure can absorb (attenuate) some frequencies and boost others. Typical examples are absorption of high frequencies by the cloth interiors and magnification of 100-250 Hz due to resonance of the vehicle's interior. These factors can alter the actual frequency response of an excellent sound system and introduce a variety of non-linearities in its acoustical response.

- **Compensate for the effects of the environment surrounding the sound system:** Sources external to the vehicle such as road noise in a moving car can mask out lower frequencies and reduce their audibility.

- **Compensate for non-linearities of the sound system:** some signal sources (head units) and speakers have non-ideal frequency response characteristics. This problem becomes even more prevalent when passive crossovers are used; reactance of the passive components creates many peaks and dips in the response characteristics.

- **Compensate for deficiencies in source material:** a marginal CD or cassette recording can be immensely improved by equalization. Furthermore, the listener's personal tastes can also be addressed (such as emphasized high and low frequencies).

- The first three items; Compensation for system enclosure, system environment and the system itself are completely objective.

- User tastes and preferences do not play a part in these categories. Therefore, it is best to leave these adjustments and compensations to the professional installation technician or systems engineer at the time of installation. For this purpose, a very precise trunk-mounted equalizer such as the GTE422 is the best solution. It allows very accurate adjustment of all equalization parameters and minimizes the chance of accidental tampering.

- For source material frequency compensation, an in-dash, user-adjustable equalizer should be used, as different source software will require different frequency adjustment. The GTE422 is intended for use in setting up a desired frequency response curve and then leaving it.

## Control and Switches

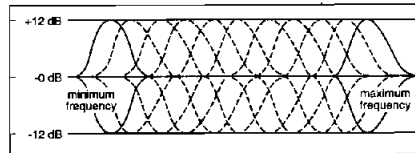
### Notes on the Input Mode and Configuration switches:

**A. 4 input, 4 output operation:**  
 Input mode: Front & Rear, Configuration: 11-Band – Allows connection of separate front and rear outputs of a signal source to front and rear inputs of the GTE422. In this mode, the GTE422 acts as two completely independent front and rear equalizers. This system combination allows fading between front and rear channels from the head unit.

**B. 2-Channel Input – 11-Band, 4-channel output operation:**  
 Input Mode: Front only, Configuration: 11-Band – Allows connection of a head unit with a single pre-amp output to the front input of the GTE422. This signal is then routed to front and rear equalizers of the unit, independently equalized and sent to the separate front and rear output terminals of the GTE422. In this setup, the rear input is disabled, and there will be no fading capability. This, however, allows for different equalization curves to be selected for front and rear channels.

**C. 2-Channel – 22-Band operation:**  
 Input Mode: Front only, Configuration: 22-Band. Configures the GTE422 into a 2-channel, 22-band equalizer, providing tremendous system adjustment capability utilizing a total of twenty-two fully adjustable bands devoted to two channels. If this mode of operation is desired, a second GTE422 will be necessary for a front/rear system.

**1. FRONT AND REAR CHANNEL EQUALIZER CONTROLS:**  
 These controls boost or attenuate the frequency as marked. Note that the front and Rear Channel center frequencies are staggered for use as a 22-band equalizer when the unit is in the 22-band mode.



**2. POWER LED INDICATOR:**  
 This indicator lights when the unit is powered up and operational.

**3. SUBSONIC FILTER CONTROL:**  
 These controls engage a subsonic filter that eliminates frequencies below 5 Hz.

**4. CONFIGURATION SWITCH**  
 The configuration switch connects the front and rear equalizer sections to create either a 4-channel 11-band equalizer or a 2-channel 22-band equalizer.

**5. INPUT MODE SWITCH:**  
 In Front only mode – the equalizer will accept 2-channel input (on the front channel) and will deliver 4-channel or 2 channel output depending on the configuration switch setting. In Front and Rear mode – the equalizer will accept 4-channel input and will produce 4-channel output.

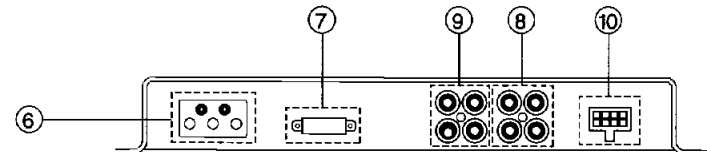
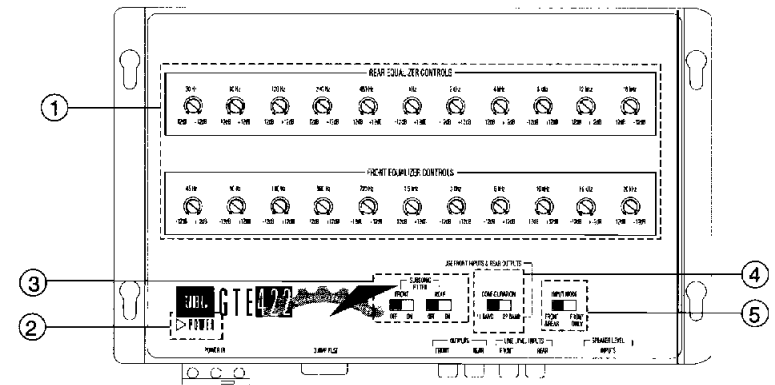
**6. POWER CONNECTOR:**  
 Connect the Battery +, Ground and CD/Cassette Remote on/off line to this connector.

**7. FUSE:**  
 3 amp ATO type fuse.

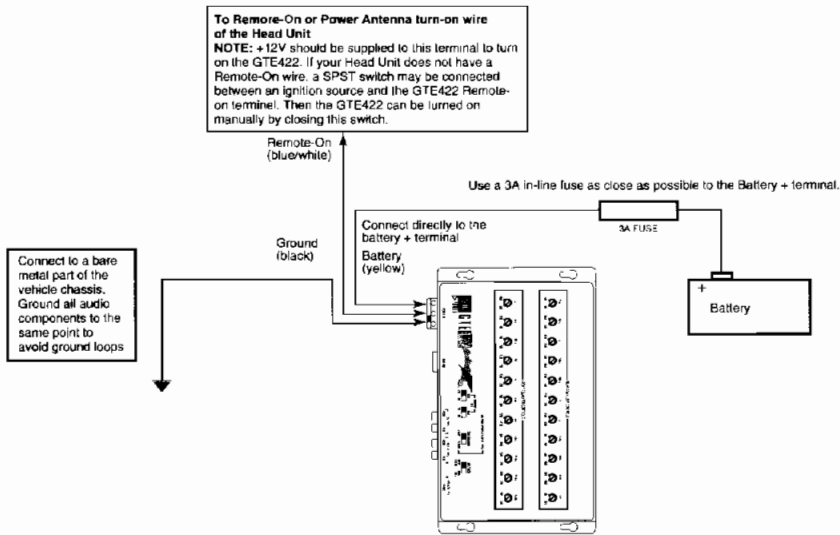
**8. INPUT RCA CONNECTORS:**

**9. OUTPUT RCA CONNECTORS**

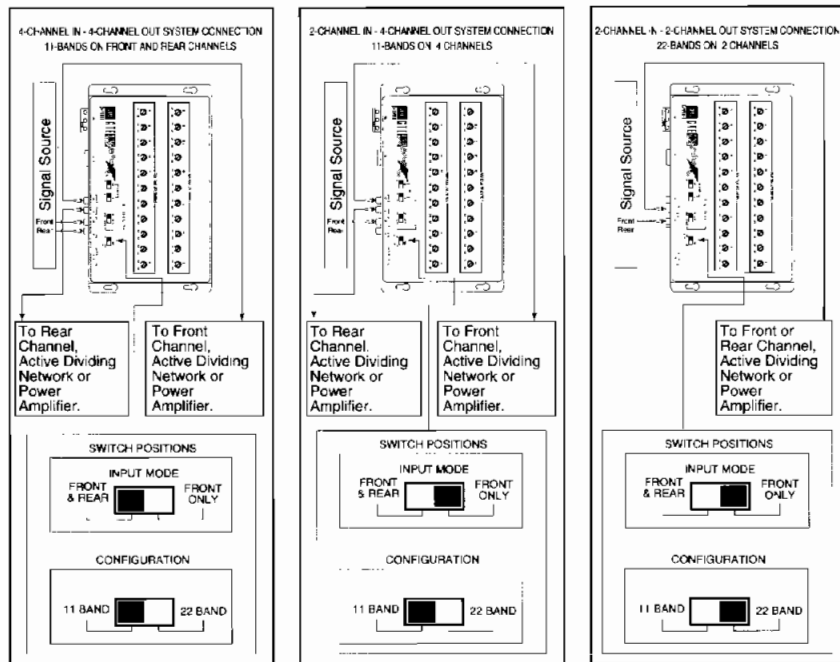
**10. SPEAKER INPUT CONNECTOR:**  
 Input which can accept speaker level connections from CD/cassette players which do not have line level outputs.



## Connection Diagram



## System Chart



## Installation Instructions

### Power Wiring Connections:

Please refer to the diagram on page 8 for wiring connections.

The power supply wires for the GTE422 are to be connected to the power supply terminal that extends from the front of the chassis.

Keep the power wires as short as possible. If they must be run outside the passenger and trunk compartments, use heat and chemical resistant automotive wire. Be sure the wire connections are strong and well insulated.

**Battery (+)12 volt power input —** Connect a wire from this terminal directly to the battery's positive (+) terminal. Be sure to use an additional in-line fuse holder (not included), with a 3 A fast blow fuse, as close as possible to the battery's positive (+) terminal. Use 12-gauge wire for the power wire.

### Audio Connections

The signal voltage levels and impedances of the inputs of the GTE422 are compatible with virtually all signal sources that feature preamp. (line) and speaker level outputs.

**Preamp Level Connections —** Connect the audio input and output RCA connectors as shown in the diagram. The connections to and from the GTE422 should be made with high quality shielded cables terminated with standard RCA connectors. These cables should be kept as short as possible and should not be run next to power or other vehicle wiring in order to minimize the chance of noise being picked up. Never attempt to splice together shielded wires.

**Battery ground —** Proper grounding is extremely important. It has a significant effect on the overall performance and noise level of the system. This wire should be connected to a solid electrical ground point on the frame of the vehicle or somewhere in the electrical system. If the ground wire is connected to a part of the vehicle frame that is painted, scrape off the paint and primer to ensure a good ground connection. For best results, all audio components should be connected to a common point on the chassis.

**Remote Turn-on —** Connect this wire to a +12 volt source that is turned on and off with the system. Most head units have a "remote on" or "power antenna" wire that can be used for this connection. Alternatively, the Remote on wire can be connected to a +12 volt source that is turned on and off with the accessory system of the vehicle.

**Speaker Level Inputs —** When the high level (speaker level) outputs of a cassette/CD are used to drive the GTE422, the signal goes into the GTE422 through a special 8 wire harness and connector (included). If extension wires must be used to connect the speaker output from the cassette/CD player to the GTE422 high (speaker) level inputs use 18 gauge speaker wire. Keep such extension wires as short as is practical and do not run them outside the passenger and trunk compartments Use the color code of the input wire harness and the cassette/CD player output wires to be sure the left/right channel orientation and the positive/negative orientation, of each

connection is correct. For example, the left positive output of the cassette/CD player must be connected to the left positive input of the GTE422. The color code for the high level input wire harness is:

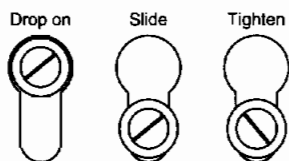
Left Front +	White
Left Front -	White/Black
Right Front +	Grey
Right Front -	Grey/Black
Left Rear +	Green
Left Rear -	Green/Black
Right Rear +	Purple
Right Rear -	Purple/Black

### Mounting:

The GTE422 should be adjusted by the installer at the time of installation. Therefore, it can be mounted at any location that will allow reasonable access for future adjustment changes, should they become necessary due to system expansion or modification.

This unit can be placed inside the trunk, under the seat, or under the dash.

If the permanent mounting location will not allow changes in the adjustment of the controls, the rest of the sound system must be completely installed, and all the adjustments to the GTE422 should be made before it is permanently mounted in its location. Input and output wires may be temporarily extended in order to have the unit in a more accessible position for adjustment. Choosing a readily accessible location will save having to remove the unit in order to revise any of its adjustments.



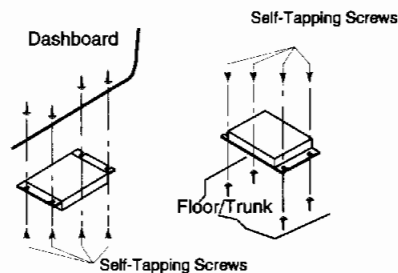
### DO NOT MOUNT THE UNIT IN LOCATIONS THAT WILL BE IN THE VICINITY OF MOISTURE OR EXTREME HEAT (such as the engine compartment).

The GTE422 can be mounted by using the self-tapping screws included. Make sure you have all the necessary parts and tools, then begin mounting according to one of the following procedures:

**NOTE:** Before mounting, record the serial number (located on the bottom of the unit) in the space provided on the front page of this manual for future reference.

### Screw-down Mounting:

1. Hold the GTE422 at its mounting location and mark screw holes. If there is carpet in the screw hole location use a knife to cut a small "X" in the hole location to minimize carpet twisting from the drill. Make sure that there are no objects (such as gas tanks or lines, wiring or brake lines) behind the surface where drilling is to be made that may become damaged.
2. Drill holes and secure the unit with self-tapping screws supplied.



## Adjustments

### General Requirements:

- The JBL GTE422 is a very precise and versatile piece of equipment. Its accurate adjustment requires access to a Real Time Analyzer (RTA). It is possible to adjust the GTE422 by ear, but it is not recommended due to the complexity of the different adjustments necessary.

- It is imperative to have easy access to the GTE422 while it is being adjusted. If it is to be mounted permanently in a location which will not allow easy access, it will be necessary to temporarily relocate the unit by using long audio and power extension wires.

- Before any adjustments can be made, all stereo system components (except for the GTE422) must be permanently mounted in their locations, and the passenger compartment should be completely reassembled as removed door panels or seats will affect the frequency response of the vehicle's interior.

- The vehicle's doors should be closed and windows rolled up. This also requires temporary relocation of the GTE422 outside the vehicle's passenger compartment (if it is to be permanently mounted here) using long extension wires.

- The trunk can be left open if the passenger compartment, including all the speakers and speaker enclosures, are sealed off from the trunk.

- It will be most convenient to have the GTE422 as close as possible to the RTA during adjustments as it is easier to monitor the changes made by each control
- This RTA should cover at least 20 Hz to 20 kHz in at least one-octave increments. It should also possess a dynamic range of more than 100 dB.

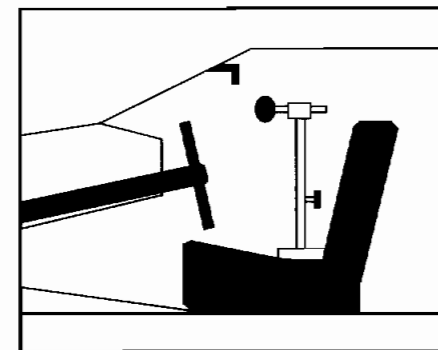
- As there are many different makes and models of Real Time Analyzers, it would be impractical to define set-up procedures for a specific unit. Therefore, you will need to familiarize yourself with the particular model of RTA you will be using to adjust the GTE422. The RTA's owner's manual can provide all the necessary information.

- A high quality, calibrated microphone should be used with the RTA. The RTA manufacturer can recommend a suitable model. This microphone should have a very flat response throughout the audio bandwidth (20 Hz to 20 kHz).

### Initial RTA Set-up:

After all the general requirements are met, proceed as follows:

1. Position the microphone on a microphone stand placed on the driver's seat, in the same position and height as the right ear of the driver.
2. Connect the microphone to the RTA. Set the controls for non-weighting and greater than 100 dB range.



**Perform the following steps with all doors closed, windows rolled up, and the vehicle interior completely intact:**

3. Turn the sound system on, verify that all components are functional, and place all controls such as Bass, Treble, Fader, Balance and in-dash equalizer controls (if any) in the center detente (neutral) position.

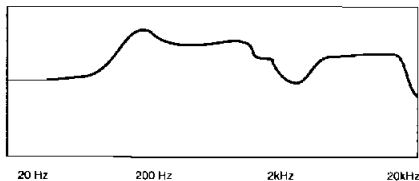
4. Using a Test CD or tape such as the IASCA test disc, select the "Pink Noise" track and set the volume control of the system for a nominal 100 dB average sound pressure level.

5. This sound level will give you a display on the RTA screen. This display is the frequency response of the total system (the sound system and the vehicle's interior together). It may look somewhat similar to the one shown below:

This display shows how many decibels of sound pressure exist at each frequency. A pleasant sounding system should have a smooth frequency response transition, in other words, the level difference between two adjacent frequencies must be as small as possible.

Due to vehicle interior resonances, speaker and speaker enclosure non-linearities or inferior audio section frequency response, a non-equalized system will have many peaks and dips in its frequency response.

Properly adjusted, the GTE422 will virtually eliminate these non-linearities.



After these deficiencies are removed, certain frequencies can also be boosted or cut to overcome road noise or to accommodate user preferences.

### Adjustments:

Keep in mind that frequency peaks are more objectionable to the listener than dips. Therefore, the first priority would be to eliminate all excessive frequency peaks before attacking the dips. Always try cutting a peak instead of boosting the frequencies surrounding it. Unnecessary boosting will degrade the audio system's signal-to-noise ratio.

The following procedure is applicable to all three operation modes of the GTE422, with the only difference being the absence of separate front and rear channels in the 2-channel input and output configuration. In the 2-channel in/out setup, all 22-bands affect the same 2 channels.

1. Place boost/cut controls of all the bands of the GTE422 in the center detente position.
2. Observe the RTA display and visually identify the major peaks in the response.
3. Start with the lowest frequency major peak.
4. Find out at which frequency this problem occurs.
5. Adjust the appropriate equalizer control to flatten out the peak while striving for minimal effect on adjacent frequencies. Keep in mind that equalizers are best used sparingly. Use the minimal amount of cut that is necessary to correct the problem peak.

6. If no effect is noticed, try a one of the adjacent band controls.

7. Move on to the next major problem area.

8. Once you have made one pass through the audio spectrum and covered most major areas, the unused bands can be used to eliminate the dips. Follow the same basic procedure as above; the only change would be boosting instead of cutting to remove dips. Use of boost should be kept to a minimum as many deep dips are actually caused by phase cancellations in the car and are only made worse by adding large amounts of gain.

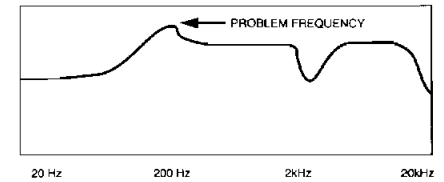
**Always observe the RTA to verify your improvements. It will also help you get a "feel" of how the controls operate and how versatile the GTE422 is.**

9. Set the subsonic filters for front and rear to the desired position.

### Adjustment without an RTA:

**Adjustment without an RTA is not recommended, as improper adjustments can degrade a sound system rather than improve it.**

It can, however, be accomplished if close attention is paid and the adjuster has very good ears.



1. The unit should be temporarily moved to the drivers' seat vicinity using long extension cables, and the adjustment should be done with the installer in the driver's seat.

2. A high quality source material (music or pink noise) with excellent sound quality and frequency response must be used.

3. The peaks or dips should be detected in the same manner explained in the previous section. Boost or cut the appropriate bands until an improvement in the response is heard.

4. The Boost/Cut control should be adjusted for an audibly smooth frequency response.

**This adjustment will not be as accurate as one using a real time analyzer.**

## In Case of Difficulty

Power light does not come on.

- Head unit is not on; turn the head unit on.
- Ground wire is disconnected or defective; check for continuity with an ohmmeter between GTE422's ground terminal and a known chassis ground point.
- Battery wire is disconnected or defective; check for approximately + 12 volts between GTE422's Battery and Ground terminals.
- Blown Fuse; check GTE422's 3 amp Fuse, located near the Battery terminal. If it is blown, replace it with an identical one. If the new fuse blows immediately, then check all the wiring connections. If no fault is found, consult your JBL dealer.
- Remote-on wire between the head unit and the GTE422 is disconnected or defective; check for 12 volts between GTE422 Remote-on connector and ground connector with the head unit on.

Power light is on, but no sound is heard from front, rear or both front and rear channels.

- Make sure the GTE422's Configuration and Input Mode switches are in the correct position for your system configuration. Make sure that the input and output wiring is correct for the system configuration being used. (See page 8)
- Defective or disconnected audio cables; check for continuity and replace if necessary.
- Bypass the GTE422 by connecting its input and output cables together (with a female-to-female RCA adapter). If the system becomes functional, the GTE422 may be defective, consult your JBL dealer.
- Defective Head Unit, or other audio component. Check each component for wiring and operation.

Alternator whine through the audio system with the engine running.

- Ground loops; connect grounds of all audio components to the same point on the vehicle chassis, verify that this point is a true ground by checking for continuity with an ohmmeter between the ground point and the battery's (-) terminal.
- The other audio components may need noise suppressors on their battery or ignition connections.
- Check the vehicle's battery and voltage regulator.