

**JBL**

**PRO POWER™**

**GTi**



**Automotive Subwoofer Owner's Manual**

**W10GTi**

**W12GTi**

**W15GTi**

**Thank you** for choosing a JBL GTi Series subwoofer. GTi Series subwoofers are designed to provide maximum sound output in a variety of enclosure types while maintaining the superb sound quality associated with JBL. To ensure the best subwoofer performance, we strongly recommend that installation be entrusted to a qualified professional. Although these instructions explain how to install a GTi Series subwoofer in a general sense, they don't show the specific installation procedures that may be required for your particular vehicle. If you feel you don't have the necessary tools or experience, don't attempt the installation yourself; rather, ask your authorized JBL dealer about professional-installation options.

**Warning:** Playing loud music in an automobile can hinder your ability to hear traffic, as well as permanently damage your hearing. We recommend listening at low levels while driving. JBL accepts no liability for hearing loss, bodily injury or property damage resulting from use or misuse of this product.

#### **Your Car and Bass Reproduction**

Depending on the size of the vehicle's interior listening space, reproduced frequencies below 80Hz may be boosted by nearly 12dB per octave as frequency decreases. This effect, commonly known as transfer function or cabin gain, plays an important role in defining the in-car frequency response of your subwoofer. It is displayed graphically, along with freespace response, on the enclosed data sheet for your GTi subwoofer.

#### **Power-Handling Limitations**

The power-handling capacity of any subwoofer is related to the excursion limit of its suspension and its ability to dissipate heat. A speaker reaches its excursion-limited power-handling capacity when its suspension is stretched to its limit. The excursion curve shown on the Enclosure Design Sheet (included with your woofer) displays cone excursion at the input power level required to drive the woofer to maximum linear excursion ( $X_{max}$ ). The input power shown may be used as instantaneous input only.

Thermal power handling is determined by the amount of heat that may be dissipated by the driver's voice coil. The power-handling rating assigned to your GTi Series subwoofer is its thermal-power-handling rating. This rating assumes a clean (unclipped) signal. A clipped waveform has much higher average power, due to the longer duty cycle at the top and bottom of the waveform; it will heat the woofer's voice coil faster than a clean signal and may damage the voice coil. A square wave has a 100% duty cycle and is extremely dangerous for any speaker. Audible distortion in the output of your woofer is an indication that your amplifier may be clipping, which could damage your speakers over time.

### **Choosing an Enclosure**

GTi Series subwoofers are optimized to perform best in small sealed, vented and bandpass enclosures. While infinite-baffle mounting of GTi Series subs is possible, power handling will be compromised since there will be no enclosed volume of air to help the speaker's suspension control the motion of the woofer's cone. For this reason, we do not recommend infinite-baffle mounting for high-power applications.

You should choose the enclosure you'll use based on the type of music you listen to, how much amplifier power you'll use to drive the subwoofer, and how much space inside the vehicle you can devote to a subwoofer enclosure. If you'll be using your GTi Series subwoofer for SPL competition, please see the document titled "GTi as SPL Competition Subwoofers" (included with your woofer).

Because a sealed enclosure provides the most control over the woofer's movement, a woofer mounted in a sealed enclosure will handle more power at low frequencies than a woofer mounted in another enclosure type. Sealed enclosures provide more accurate sonic reproduction than other enclosure types, so they are well suited to all types of music. Sealed-enclosure construction is straightforward. An optimum sealed enclosure is always smaller than other types of enclosures that are optimized for a particular speaker, so they require the least space inside the vehicle.

Vented enclosures provide better efficiency in the 40Hz – 60Hz range, but this efficiency comes at the expense of sound output in the lowest octave (below 40Hz) and at the expense of some control and power handling below box tuning. If you are using a small amplifier, a vented box will provide more bass output from less power. Vented enclosures are also well suited to a variety of music types. Because vented enclosures require the volume of the enclosure and the size of the port to have a specific relationship with the characteristics of the woofer, the enclosure must be built exactly to the specifications provided. If you wish to use a vented enclosure, we strongly recommend having your authorized JBL dealer build it; or verify that your design is correct if you wish to build it yourself. An optimum vented enclosure is always larger than the optimum sealed box for the same woofer, and will require more space inside the vehicle.

Bandpass enclosures can provide the greatest output available from any amplifier and subwoofer combination – at the expense of sonic accuracy. If sheer SPL (sound pressure level) is what you desire most, choose a vented or bandpass enclosure. Bandpass enclosure design is very tricky and the aid of a computer and enclosure design software is necessary if you wish to design the enclosure yourself. Like a vented enclosure, a bandpass enclosure must be built exactly to the specifications provided. Bandpass enclosures can be quite large and may require a lot of space inside your vehicle.

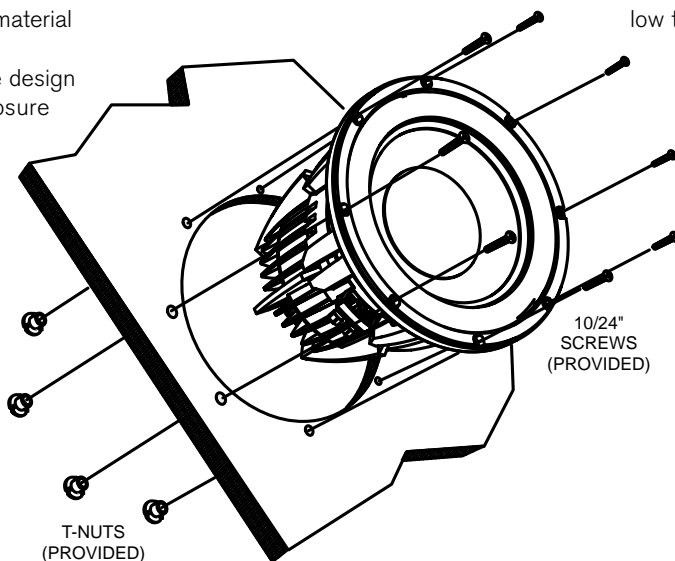
### Enclosure Construction

Please observe the following suggestions when building an enclosure for GTi Series subwoofers.

1. Choose an enclosure design from the Enclosure Design Sheet included with your subwoofer.
2. Use at least 3/4" (19mm) MDF (medium density fiberboard) or marine birch plywood to build the enclosure. Enclosures for 12" and larger subwoofers and smaller woofers driven by high-power amplifiers should be constructed using 1" (25mm) material.
3. Join pieces of wood with glue and screws; do not use nails. Once the box has been tested, seal all joints inside the box with silicone caulk.
4. Fill the enclosure with damping material (dacron, fiberglass insulation or long-fiber wool) according to the design you have chosen from the Enclosure Design Sheet. "0% fill" indicates that no damping material should be used; "50% fill" indicates that all interior walls except the baffle should be lined with 1" thick damping material, and "100% fill" indicates that the box should be loosely stuffed with damping material.

5. Use PVC or ABS plastic pipe for ports. Keep in mind that the openings at either end of the port must be at least one port diameter away from any obstruction.
6. Use the 10/24" machine screws and T-nuts provided to mount the woofer to the baffle. See Figure 1.

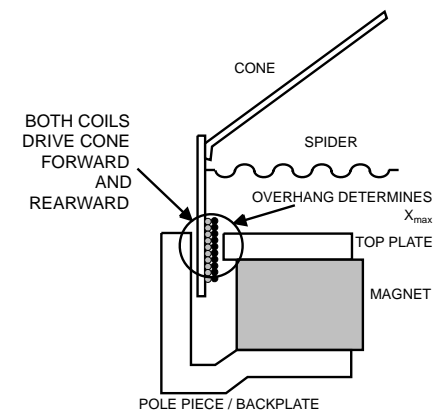
**Figure 1. Mounting the GTi woofer in its enclosure**



### Dual Coil Versus Differential Drive® (patent pending)

Conventional dual-voice-coil woofers use a pair of voice coils "interwound" on the former and centered in the magnetic gap. The two coils may be connected in series or parallel in order to maximize an amplifier's output power. Both coils drive the cone forward and rearward.  $X_{max}$  (one-way-linear) is determined by the amount of voice coil exposed above and below the top plate. A conventional voice coil is made up of several layers of windings, each transferring heat to the winding next to it until the heat is finally dissipated by the outside layer through the top plate, magnet and backplate. This arrangement is inefficient, and results in low thermal power handling. See Figure 2.

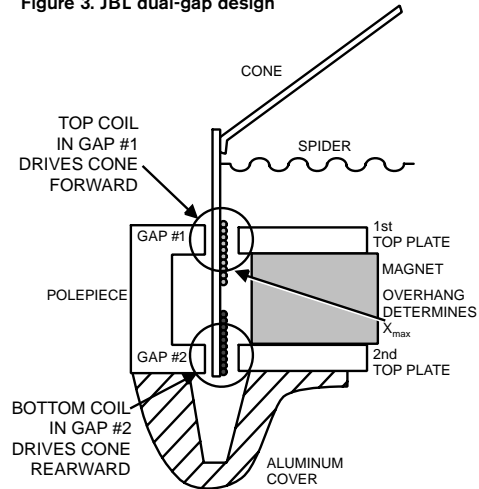
**Figure 2. Conventional dual-voice-coil design**



JBL GTi Series subwoofers employ Differential Drive, a technology developed by JBL Professional. Differential Drive employs two voice coils positioned at opposite ends of the former, each suspended in a separate magnetic gap. These two coils may be connected in series or parallel, like a conventional DVC woofer, to maximize an amplifier's output power. Both coils MUST be connected to the amplifier in correct polarity! At low power, both voice coils drive the woofer's cone, and any motor nonlinearities are cancelled by the out-of-phase coils and gaps. As power input increases so that one coil rides completely out of its gap, force is still applied to the cone by the other coil. At extremely high power, each coil will enter

the other coil's magnetic gap. This will cause magnetic braking, which will slow the cone's motion and prevent damage due to overexcursion. For a GTi Series woofer,  $X_{max}$  is determined by the amount of voice-coil overhang between the first and second top plates. See Figure 3. Thermal power handling is far superior to a conventional DVC woofer using voice coils of a similar diameter and length because Differential Drive provides twice the heat-dissipating surface area and two top plates to transfer heat to the magnet-cover fins.

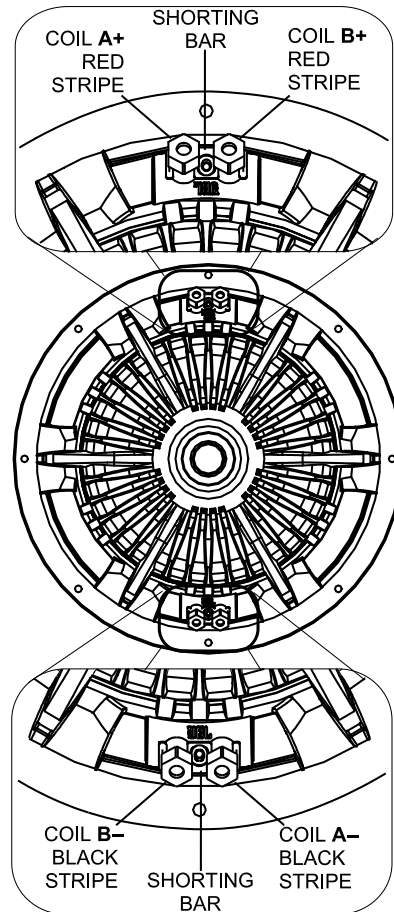
**Figure 3. JBL dual-gap design**



**Connecting Your Subwoofer to an Amplifier:**

**Configuring the voice coils:**

**Figure 4. Terminal locations**

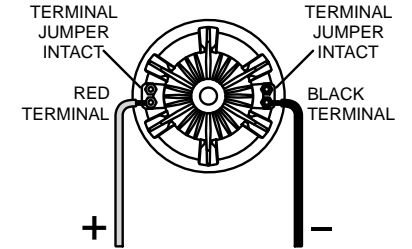


*Note: Unlike conventional DVC subwoofers, the two sets of terminals are configured so that both positive (+) terminals are on one side of the frame and both negative (-) terminals are on the other side. GTi Series subwoofers are shipped with terminal jumpers installed which configure the two 6-ohm voice coils in parallel for a 3-ohm load.*

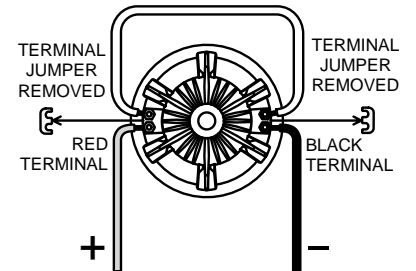
*Note: Both voice coils MUST be connected to the amplifier in series or parallel.*

**Figure 5. Connecting the voice coils in parallel (3 ohms)**

*Note: Connect the coils in parallel if you are connecting a single woofer to an amplifier.*

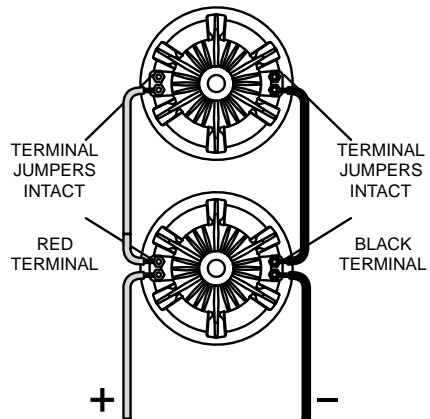


**Figure 6. Connecting the voice coils in series (12 ohms)**

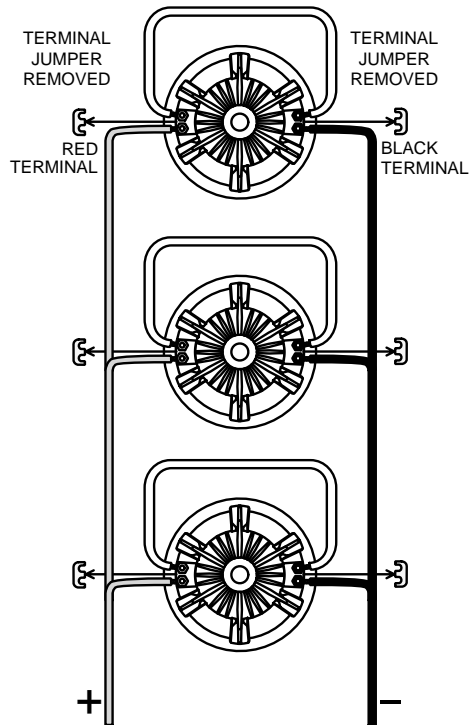


**Configuring multiple woofers for connection to a single amplifier:**

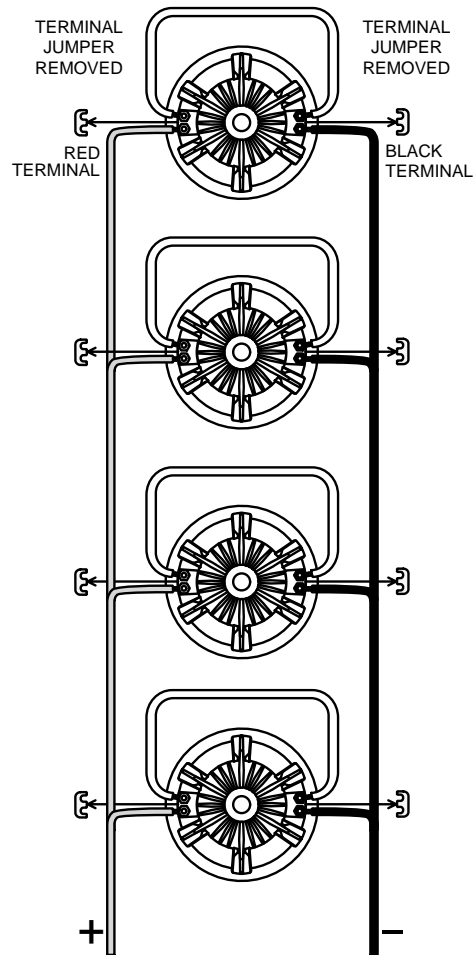
**Figure 7. Connect two woofers in parallel (with coils in parallel) for a 1.5-ohm load**



**Figure 8. Connect three woofers in parallel (with coils in series) for a 4-ohm load**



**Figure 9. Connect four woofers in parallel (with coils in series) for a 3-ohm load**



# Specifications

	<b>W10GTi</b> 10" Automotive subwoofer	<b>W12GTi</b> 12" Automotive subwoofer	<b>W15GTi</b> 15" Automotive subwoofer
<b>Power handling (peak)</b>	3000W	4000W	5000W
<b>Power handling (avg.)</b>	600W	700W	800W
<b>Frequency response (in-car)</b>	20Hz – 1kHz, ±3dB	18Hz – 1kHz, ±3dB	16Hz – 1kHz, ±3dB
<b>Impedance</b>	3 or 12 ohms	3 or 12 ohms	3 or 12 ohms
<b>Sensitivity (2.83V/1m)</b>	90dB	91dB	92dB
<b>Overall diameter</b>	10-1/2" (267mm)	12-1/4" (312mm)	15-1/4" (388mm)
<b>Cut-out diameter</b>	9-3/16" (234mm)	11" (280mm)	13-7/8" (353mm)
<b>Mounting depth</b>	9-1/8" (232mm)	10-1/4" (260mm)	10-1/4" (260mm)
<b>Basket displacement</b>	.108 cu. ft. (3.06 L)	.149 cu. ft. (4.23 L)	.174 cu. ft. (4.93 L)



**JBL**

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