

**GALAXY AUDIO**  
**HOT SPOT™**

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**OWNER'S MANUAL** © 1998 Galaxy Audio, Inc.

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## **DO. . .**

- Read this manual
- Use a unidirectional microphone
- Handle with care
- Complete the registration card

## **DON'T. . .**

- Expose the HOT SPOT to rain or moisture
- Plug-in or unplug the HOT SPOT while it is operating (doing so may damage your amplifier)
- Attempt to make any repairs (call your Galaxy Audio dealer for service)

# SOUND REINFORCEMENT BASICS

## AVOIDING FEEDBACK

*Feedback* (the shriek sometimes emitted by PA systems) is caused by a regeneration of sound leaving the speaker and entering the microphone. It occurs when the microphone (or pickup) and speaker are positioned too close together for a given level of volume. Once feedback occurs, it will continue until either the volume is decreased or the microphone or speaker is moved. The amount of gain—or volume before feedback—is determined not only by the size of the power amplifier, but by the relationship between the microphones and speakers and the room in which they are situated. (See *Figures 1.1 and 1.2*)

- In most cases, the (main) speakers should be placed on stands, at a height slightly above the heads of the audience, in front and to each side of the stage.
- They should be rotated inward, but only slightly. More than a few degrees of rotation can reduce the gain. (See *Figure 1.3.*)
- Powering monitor speakers with the same channel of the amplifier used to power main speakers may cause feedback. (See *Figure 1.4.*)
- Ideally, monitor speakers should either have their own volume controls or be routed through a separate channel of the amplifier so the volume of one speaker system can be adjusted without affecting the other.
- Most mixers provide separate controls for the mains and monitors. Separate monitor outputs make it possible to tailor the monitor mix and the levels without affecting the mains. With all the mics at their working volumes, gradually increase the volume of the monitors until they reach the point immediately before feedback. (They should just ring.) Reduce, by 2dB to 3dB, the level of the frequency that is ringing. Periodically speak through the system, while repeating this process, until either several frequencies are ringing at once or sound quality is diminished by overequalization.
- In high volume applications, reduce all the LOW frequencies. Low frequencies are *omnidirectional* and can be heard equally well anywhere on stage. They are not needed in the monitor mix.
- Use a *unidirectional* microphone. Since there are many brands, with wide variance in their amounts of rejection (the ability to *not* pick up peripheral sounds), experimentation provides the best means of choosing the right microphone.

## MONITOR PLACEMENT

- The HOT SPOT should be positioned within arm's reach of the performer. The closer it is, the louder it is.
- The HOT SPOT should be placed to the rear of the microphone being used by the performer.
- If, in a system with multiple monitors, one monitor is substantially nearer a vocal microphone than are the other monitors in the system, its volume may need to be reduced to avoid limiting the gain of the entire monitor system.

## AVOIDING DISTORTION

Distortion in a monitor system usually occurs when the amplifier is being *overdriven*—nearing the limits of its power output capability. *Overdriving* the amplifier may be corrected by reducing the bass frequencies in the monitor mix (low notes use

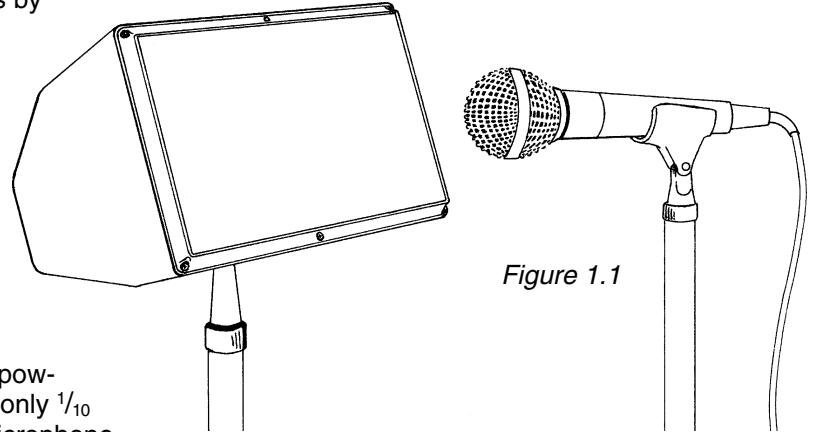
a lot of power). Distortion may also originate with a bad signal source (tape, microphone, etc).

### Low Frequency Distortion

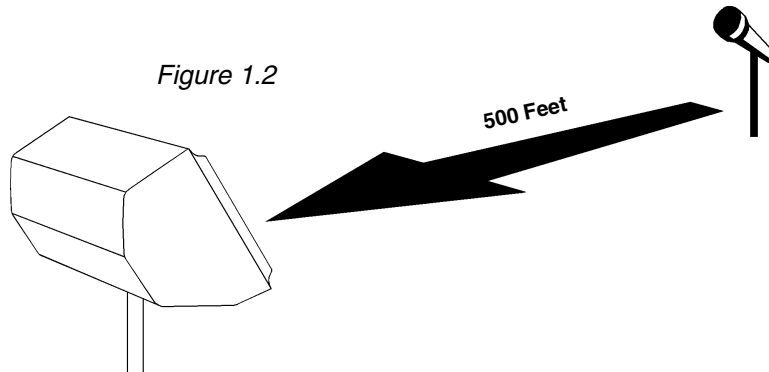
The 5 inch driver will not reproduce tones lower than 200 Hz. If the speaker begins to distort, reduce the low frequencies by adjusting the LOW tone control. As a monitor the HOT SPOT does a great job in conjunction with the house stack where the low frequencies are reproduced.

## MAXIMIZING GAIN

*Figure 1.1* represents the worst possible case of gain limiting; the microphone is pointed directly at the speaker. Any increase in volume will instantly produce feedback. As little as  $1/1000$  of the amplifier's power may be available; with a 100 watt amplifier, that's only  $1/10$  of a watt. In *Figure 1.2*, the distance between the microphone and the speaker has increased to 500 feet, allowing 100 percent gain (all 100 watts of power may be utilized without producing feedback). Of course, these are extremes, but they illustrate the importance of speaker and microphone placement in determining the gain of the system. In most cases it's not possible to locate the microphone 500 feet from the speakers. The challenge is to position the speakers to adequately cover the listening area while positioning the microphone to maximize the gain.



*Figure 1.1*



*Figure 1.2*

Figure 1.3 shows a typical example of how speakers and a microphone may be positioned to adequately cover the listening area while maximizing the gain before feedback.

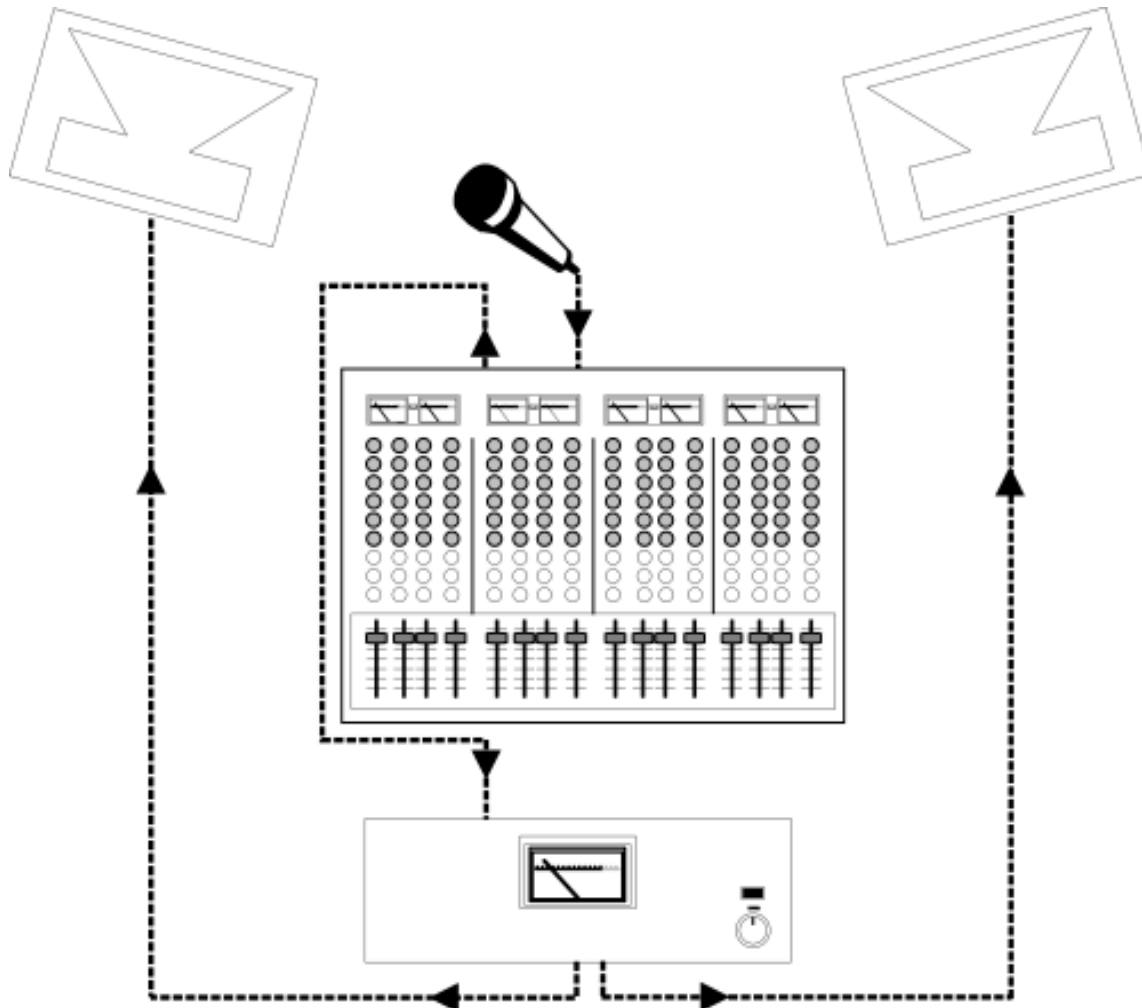


Figure 1.3

Figure 1.4 shows a monitor speaker on-stage in very close proximity to a microphone. If powered by the same channel of the amplifier used to power the main speakers, this monitor may set into motion a “domino effect” of feedback, limiting the gain of the entire system to that of the monitor. Some mixers provide separate *sends* (outputs) for mains and monitors, enabling levels to be tailored to suit each musician.

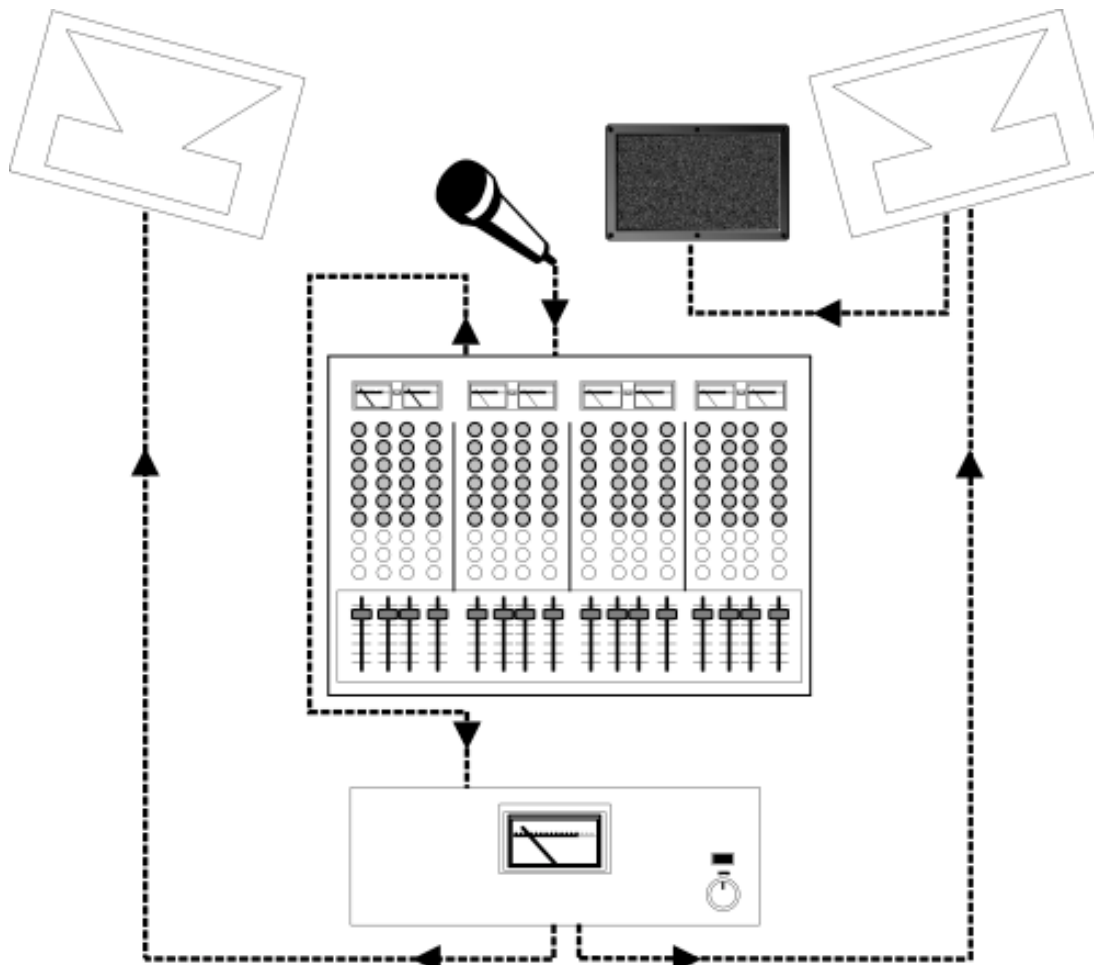


Figure 1.4

## OHM'S LAW AND THE HOT SPOT

Most professional-type speakers (like the HOT SPOT) have two jacks which are wired *in parallel* (meaning the signal can travel into one jack and out of the other). Think of each speaker as a “load” added to the amplifier. The greater the number of speakers, the heavier the load. Adding too many speakers can overload the amplifier, causing it to overheat and distort. If the amplifier begins to distort, or if it becomes hot to the touch, disconnect any extra speakers. One easy way to determine the load on the amplifier is to use Ohm’s law, which states: “The total impedance of  $N$  speakers in parallel is equal to the reciprocal of the sum of the reciprocals. In equation form:

$$Z \text{ (Total)} = \frac{1}{\frac{1}{Z_1} + \frac{1}{Z_2} + \frac{1}{Z_3} + \frac{1}{Z_4} + \frac{1}{Z_N}}$$

Where  $Z_1$  is the impedance (or ohm rating) for the first speaker,  $Z_2$  for the second, and so on, for every speaker in the chain. This equation calculates the total impedance of the speaker system, which should **NOT** be lower than the minimum impedance rating of the amplifier.

### EXAMPLE 1:

For one pair of speakers use the short form of the equation: the product of the two speakers divided by the sum of the two speakers is equal to the total impedance or the equivalent impedance of the speaker system.

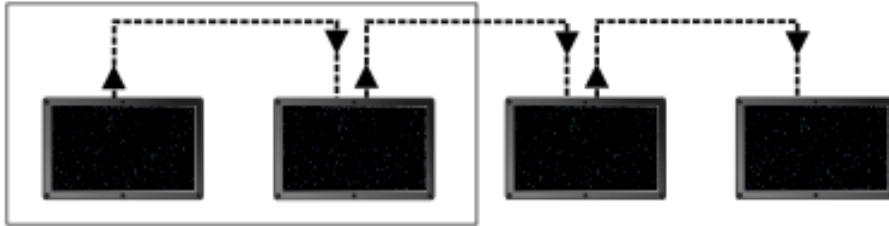
$$Z = \frac{Z_1 \times Z_2}{Z_1 + Z_2}$$

This equation may be used to calculate the equivalent impedance for additional speakers in two-speaker increments. Determine the impedance of the first two speakers, substitute  $Z$  total for  $Z$ , and include the next speaker. Repeat the process until all speakers have been included. The result should be the same as with the first method.

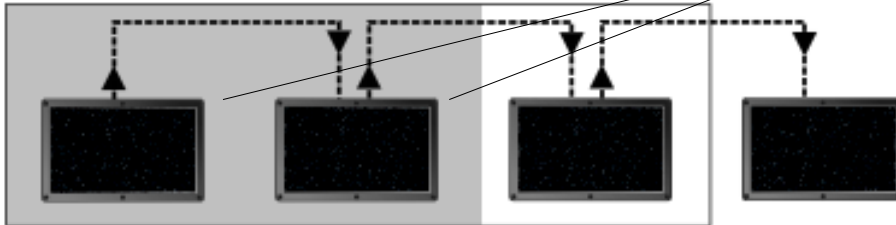
A word of caution: polarity rules must be observed when connecting multiple speakers. Polarity will not affect the  $Z$ , but can affect the quality and volume of the sound. If you are having problems with any of these applications use Galaxy Audio’s CRICKET Polarity and Continuity Test Set to check the polarity of your cables.

**EXAMPLE 2:**

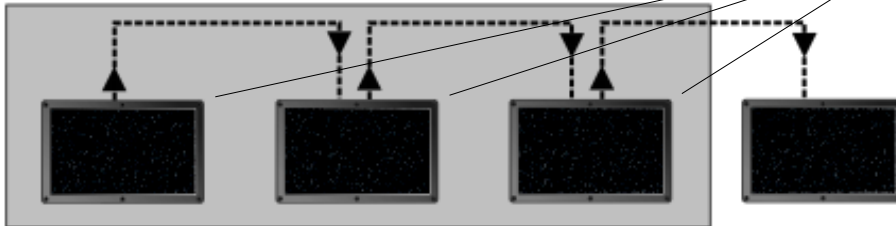
As long as all of the speakers have the same impedance rating, the equivalent impedance of the system is the rated impedance of one speaker divided by the number of equivalent speakers. The HOT SPOT's impedance is 16 ohms.



$$Z = \frac{16 \times 16}{16 + 16} = 8 \text{ Ohms for two HOT SPOTS}$$



$$Z = \frac{8 \times 16}{8 + 16} = 5.33 \text{ Ohms for three HOT SPOTS}$$



$$Z = \frac{5.33 \times 16}{5.33 + 16} = 4 \text{ Ohms (the total load)}$$

The impedance of the HOT SPOT VC is determined by the position of its volume control. Use the table below to determine the actual impedance.

POSITION	IMPEDANCE	dB REDUCTION
Full Clockwise	16 ohms	0
2nd	23 ohm	-3
3rd	33 ohms	-6
4th	46 ohms	-9
5th	64 ohms	-12
6th	90 ohms	-15
7th	130 ohms	-18

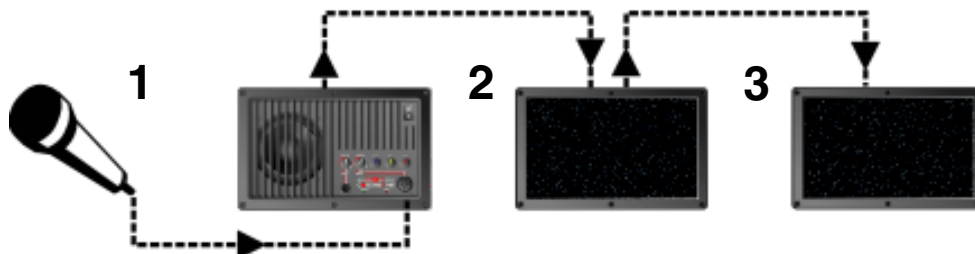
## USING THE HOT SPOT WITH THE CORE PA5X140 POWERED MONITOR

The CORE PA5X140's *SPEAKER OUTPUT* jack is designed to allow two HOT SPOTS to be “daisy-chained.” Its amplifier is rated at 4 ohms. Therefore, the total impedance of the speaker system must be greater than, or equal to, 4 ohms. Anything less will overload the amplifier.

**The CORE PA5X140 produces 146 watts when powering two HOT SPOTS** (*Figure 1.5*).

Route cables:

- 1) From the microphone to Galaxy Audio's CORE PA5X140.
- 2) From the output of the CORE PA5X140 to the first HOT SPOT.
- 3) From the first HOT SPOT to the second HOT SPOT.



*Figure 1.5*

# SPECIFICATIONS

	HOT SPOT	HOT SPOT VC
<b>Speaker Compliment:</b>	Two ferro fluid cooled 5-inch drivers	Two ferro fluid cooled 5-inch drivers
<b>Magnet Structure Weight:</b>	80 oz. (2.2kg) total	80 oz. (2.2kg) total
<b>Power handling capacity:</b>	200 watts continuous above 150 Hz	200 watts continuous above 150 Hz
<b>Sensitivity (1 Watt @ 1 meter):</b>	98 dB (1 kHz octave band)	98 dB (1 kHz octave band)
<b>Frequency response:</b>	150 Hz–15 kHz	150 Hz–15 kHz
<b>Nominal impedance:</b>	16 ohms	16 ohms
<b>Input Connectors:</b>	¼" jack	¼" jack
<b>SPLOWT:</b>	15.37	15.37
<b>Enclosure Materials:</b>	ABS plastic	ABS plastic
<b>Color:</b>	Black	Black
<b>Dimensions:</b>	6.75" x 10.94" x 6" (171 mm x 278 mm x 152 mm)	6.75" x 10.94" x 6" (171 mm x 278 mm x 152 mm)
<b>Net weight:</b>	8 lbs. (3.6 kg)	8 lbs. (3.6 kg)
<b>Shipping weight (pair):</b>	17 lbs. (7.7 kg)	17 lbs. (7.7 kg)
<b>Additional Features</b>		Volume control: range 18 dB, 7 positions at 3 dB each

## ARCHITECT and ENGINEER SPECIFICATIONS

The loudspeaker shall be a full range system offering two ferro fluid cooled 5-inch drivers with 40-ounce magnet structures. The loudspeaker shall be capable of handling 200 watts of continuous program. Nominal impedance shall be 16 ohms. Input connections shall be ¼-inch phone jacks. The enclosure shall be constructed of rugged ABS plastic and feature a foam grille cover. The cabinet shall be available in black with a black bezel. An integrated flange shall be provided to accommodate microphone stand mounting. An optional handle shall be offered. Dimensions shall be 10.94 inches wide (278 mm), 6.75 inches high (171 mm), and 6 inches deep (152 mm). The system's weight shall be 8.25 lbs (3.37 kg). The loudspeaker system shall be the **GALAXY AUDIO HOT SPOT. MADE IN USA.**

## THREE YEAR LIMITED WARRANTY

This warranty gives you specific legal rights, and you may also have other rights which may vary from state to state.

This warranty is extended to the purchaser and to any purchaser from him for value.

GALAXY AUDIO warrants the materials and workmanship of its products for a period of three full years from the date of the original purchase.

The following are not covered by the warranty:

1. Damage to or deterioration of the exterior cabinet which occurs after delivery.
2. Damage after initial delivery resulting from accident, misuse or neglect.
3. Damage resulting from failure to follow instructions contained in the owner's manual.
4. Damage resulting from the performance of repairs by someone other than GALAXY AUDIO or an authorized GALAXY AUDIO service center.
5. Damage occurring during the shipment or delivery of any GALAXY AUDIO product to GALAXY AUDIO or an authorized service center after initial delivery of the product to you.
6. Damage to any GALAXY AUDIO product which has been altered, or on which the serial number has been effaced or removed.

If your unit requires service, it must be returned, shipping charges prepaid to an authorized GALAXY AUDIO service center in the United States. (This warranty is not enforceable outside the U.S.) If you are not able to locate an authorized service center in your area, please call or write GALAXY AUDIO, 601 E. Pawnee, Wichita, Kansas 67211, (316) 263-2852. We will then refer you to an authorized service center to which the unit may be returned, or we may advise you to return your unit to the factory for service. Under no circumstances should you return your unit to the factory without written instruction to do so. If service is required, you must present the original or a copy of the bill of sale as a proof of date of purchase of your unit.

Upon receipt of your unit for service, GALAXY AUDIO or the authorized service center will repair or replace your unit as soon as possible, but in no event later than 30 days after the receipt of the unit. We will return the unit to you, shipping charges prepaid, provided the necessary repairs are covered by this warranty.

IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR PARTICULAR PURPOSE ARE LIMITED IN DURATION TO THE LENGTH OF THIS WARRANTY, UNLESS OTHERWISE PROVIDED FOR BY STATE LAW.

GALAXY AUDIO'S LIABILITY IS LIMITED TO THE REPAIR OR REPLACEMENT, AT OUR OPTION, OF ANY DEFECTIVE PRODUCT, AND SHALL IN NO EVENT INCLUDE INCIDENTAL OR CONSEQUENTIAL DAMAGES OF ANY KIND.

SOME STATES DO NOT ALLOW LIMITATIONS ON HOW LONG AN IMPLIED WARRANTY LASTS AND/OR DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATIONS AND EXCLUSIONS MAY NOT APPLY TO YOU.

GALAXY AUDIO does not authorize any third party, including any dealer or Authorized Service Center, to assume any liability on behalf of GALAXY AUDIO or to make any warranty for GALAXY AUDIO.

**CAUTION:** This product are capable of producing sound pressure levels which may cause permanent hearing damage after prolonged exposure.



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