

Bose® FreeSpace® Model 8 And Model 32 Loudspeakers

Installer's Guide

BOSE®



***May 6, 2002
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Bose Corporation***



FreeSpace™
BUSINESS MUSIC SYSTEMS

Please read this guide

Bose® FreeSpace® Model 8 and Model 32 loudspeakers are significantly different from conventional ceiling loudspeakers, both in operation and installation. We recommend this guide be read carefully.

Safety Information

- 1.1 Read the instructions** – Read and keep all safety and operating instructions.
- 1.2 Follow cautions** – For safety, follow all cautions and warnings in this guide and on the loudspeakers.
- 1.3 Avoid moisture** – Do not install the loudspeakers near water or excessive humidity. This includes installations near spas, swimming pools, dish washing and laundry equipment, and cooking areas. Avoid installing outdoors.
- 1.4 Avoid heat** – Do not install the loudspeakers near excessive heat sources. This includes installations near or above radiators, ranges, grills, fryers, stoves, or other appliances.
- 1.5 Protect cables** – Always route cables so heavy or sharp objects cannot pinch or cut them.
- 1.6 If damage occurs** – Service by a qualified service person if:
 - A.** Water or other liquids leak into the loudspeakers;
 - B.** The loudspeaker cone is dented or punctured before the grille is installed;
 - C.** The loudspeakers do not operate normally even though the instructions in this guide have been followed;
 - D.** The loudspeakers exhibit a distinct change in performance.

WARNING

To reduce the risk of fire or electrical shock, do not expose these loudspeakers to moisture.

WARNING

Bose Model 8 and Model 32 loudspeakers are electrical appliances. There are no user-serviceable parts inside. As with all electrical appliances, dangerous electrical shock may result if unqualified personnel attempt repair. Only qualified personnel should perform service and installation.

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Bose Corporation back cover

2.0 Bose® FreeSpace® Model 8 And Model 32 Loudspeakers

Bose designed the FreeSpace Model 8 and Model 32 loudspeakers to provide high fidelity voice and music reinforcement in commercial settings. These Virtually Invisible® loudspeakers meet the aesthetic demands of most architectural designs. The loudspeaker rim and grille can be painted to match the setting. Bose has an information sheet explaining how to paint the rim and grille. Call 1-800-996-BOSE and ask for a copy of 183073 Loudspeaker Painting.

FreeSpace Model 8 loudspeakers are available in two versions: 100V (Europe and Japan only) and 70V (North America only). FreeSpace Model 32 loudspeakers are available in three versions: 100V (Europe and Japan only), 70V (North America only) and 4Ω (worldwide). All 70V and 100V versions require a Bose approved equalizer, such as the Bose FreeSpace (Model 8/32) system controller. Using the loudspeakers without an approved equalizer causes inferior acoustic performance and may damage the loudspeakers. The 4Ω version of the Model 32 loudspeaker does not require an approved equalizer. It is compatible with the FreeSpace BMA-125 business music amplifier and other amplifiers.

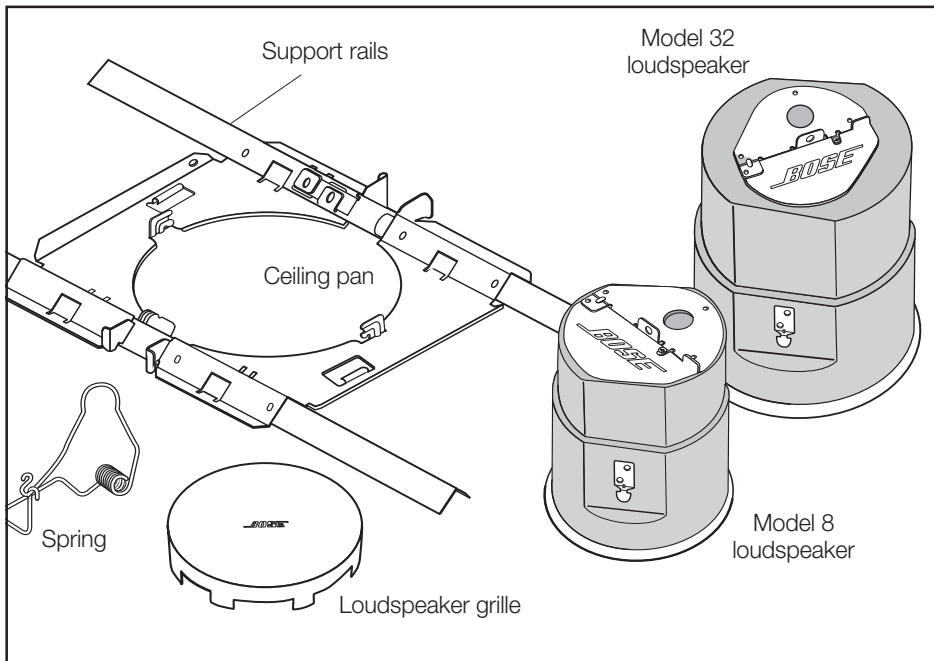


Figure 1

Contents of a 1-pack:

- 1 loudspeaker
- 1 loudspeaker grille
- 1 ceiling pan (support rails pre-installed)
- 2 springs

Contents of a 6-pack:

- 6 loudspeakers
- 6 loudspeaker grilles
- 6 ceiling pans (support rails pre-installed)
- 12 springs

Note: Figure 1 shows both the FreeSpace Model 8 and the Model 32 loudspeakers just to illustrate the differences in the two loudspeakers. These loudspeakers will not be mixed in the same box. The other parts shown in the illustration are common to both loudspeaker models.

All versions meet all regulatory standards for ceiling loudspeakers and are UL listed as vandal resistant. A 70V fire safety version of each model, available only by special order, is also UL listed as a fire protective signaling device. Complete safety agency listings and special requirements for fire protective signaling and warning systems are contained in Appendix C, "Safety Requirements."

For seismic security, the loudspeaker enclosures and mounting pans have holes for attaching security wires. Used with appropriate hardware, these attachment points may qualify the loudspeakers as earthquake resistant. Check local building codes.

In North American loudspeaker installations, both UL and CSA permit the use of Class 2 wire (CL2, CL2P, or CL2R) for loudspeaker wire. If the wire passes through a plenum, only CL2P is acceptable. Since most commercial ceiling spaces are used as plenums, most installations will require CL2P. In risers such as vertical air handling ducts or any through passage from floor to floor, CL2R is classified for this use. To maintain compliance with plenum installations, use metallic electrical connectors.

See Table 725-53 of the National Electric Code (NEC) for a list of acceptable wire substitutes.

It is recommended that the fire marshal or building inspector be consulted before installing these loudspeakers in air handling spaces (plenums) because some areas require the use of metallic conduit or metallic tubing.

2.1 Unpacking the loudspeakers

Unpack the loudspeakers carefully (Figure 1). Save the carton and all packing materials.

If any part appears damaged, do not install the loudspeakers. Repack them and immediately notify Bose Service or your authorized Bose Professional Products dealer.

For the most efficient installation, review this section and plan ahead before wiring and installing Bose FreeSpace Model 8 or Model 32 loudspeakers.

3.1 Ceiling type

Evaluate the ceiling construction BEFORE beginning installation. Ceiling type, thickness, and strength determine the installation and connection methods as well as the necessity of support rails. A qualified person, such as a building trade professional, architect, or licensed professional engineer, should make these determinations.

Bracket installation

This guide covers installation methods for both ceiling tile and structural ceilings.

Structural ceilings – Follow the instructions for structural ceilings.

Soft ceiling tiles – If the tiles are made of a “soft” material (like mineral wool or glass fiber), follow the instructions for ceiling tiles. This will provide extra support.

Rigid ceiling tiles – If the tiles are made of particle board, plywood, gypsum board or plaster, follow the instructions for ceiling tiles. Or, follow the instructions for structural ceilings. However, the tiles must be strong enough to support the loudspeaker without the help of the support rails. See “Support rails” below for more information.

Support rails

Not all ceilings require the use of the support rails. Only a qualified person, such as a building trade professional, architect, or licensed professional engineer, should determine if a ceiling alone is strong enough to support the loudspeakers.

Ceiling tiles – Use the support rails with any ceiling tile made of mineral wool, fiberglass, or other fibrous material. These tiles do not remain flat, may absorb moisture, and may not always support the loudspeaker’s weight.

The support rails are 23 ³/₄" (603 mm) long and will support a loudspeaker in a 2' x 4' or smaller tile. If the ceiling tiles are another size, the support rails will usually provide adequate support if they meet the edge of the tile on at least two sides. Follow these guidelines:

For 600 mm tiles, place the mounting pans and support rails at a 10°–15° angle (Figure 2).

For 625 mm tiles, extend the rails in opposite directions until each rail reaches the ceiling grid on one side of the mounting pan.

Ceiling tiles made of particle board, plywood, gypsum board, or plaster usually do

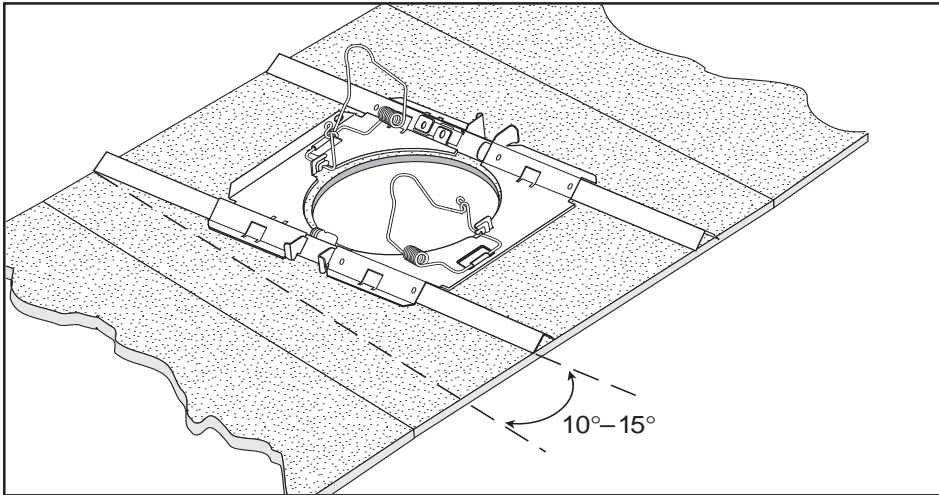


Figure 2

not require support rails. However the support rails may be needed if moisture or other environmental conditions may weaken the ceiling.

Structural ceilings – The support rails and spacers must be removed from the ceiling pans before using the structural ceiling installation method.

Rotation feature

FreeSpace® Model 8 and Model 32 loudspeakers can be rotated on their springs to conveniently access the terminals after installation. The ceiling pan and springs hold the speaker in place while the tap settings are changed or electrical connections are completed (see Figures 21 and 22 on page 15). Be careful not to damage the mounting hole when turning or releasing the loudspeaker.

Do not use the rotation feature if the loudspeakers are installed in a very thick ceiling. In general, the rotation feature works with FreeSpace Model 8 loudspeakers installed in ceilings up to 2" thick, and with FreeSpace Model 32 loudspeakers installed in ceilings up to 1" thick. To be certain, install one loudspeaker and attempt rotation as described in Section 4.3, "Electrical connections."

3.2 Clearance

Allow enough clearance for both the depth of the loudspeaker and the wire from the electrical fitting. To decrease this distance, use an angled electrical fitting with flexible metallic conduit or flexible metallic tubing.

3.0 Before You Begin

3.3 Preparing wires

70V and 100V versions

The loudspeaker terminals will accept either stripped wires or crimp-on forked connectors.

Note: Using forked connectors for multiple wires is not acceptable in fire protective signaling and warning systems due to the lack of electrical supervision capability.

Prepare the wires as shown (Figure 3).

- For bare wire connections, strip the wires to $\frac{3}{8}$ " – $\frac{7}{16}$ " (9 – 10 mm).
- For crimp-on connectors, strip the wires to $\frac{5}{16}$ " (8 mm). Use only insulated barrel connectors. Uninsulated terminals can short circuit to the cover. Before crimping, make sure the wire is fully inserted into the connector with no uninsulated wire exposed.

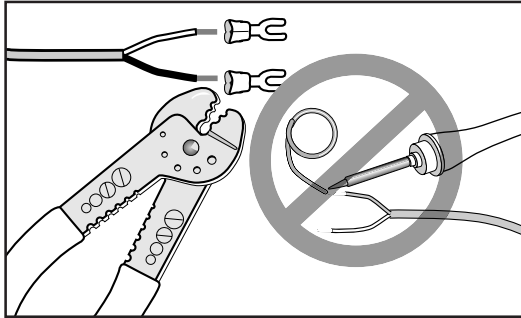


Figure 3

4Ω version

Strip the wires to $\frac{5}{16}$ " (8 mm).

Note: Stranded wire is preferred. DO NOT solder (tin) the wires.

3.4 Junction box fittings

70V version

The junction box has a $\frac{7}{8}$ " diameter hole.

Select and install a UL listed $\frac{1}{2}$ " trade size wire fitting (Figure 4).

Note: To meet local electric codes, fittings for $\frac{3}{8}$ " or $\frac{1}{2}$ " flexible metallic tubing or flexible metallic conduit may have to be used.

100V version

Both a plastic strain relief bushing and a plastic bushing are supplied. Use whichever is appropriate.

4Ω version

A plastic bushing is already installed.

Note: If local code requires flexible metallic tubing or flexible metallic conduit, be sure it is well supported. Too much unsupported tubing or conduit can weigh the loudspeaker down, pushing it away from the ceiling surface.

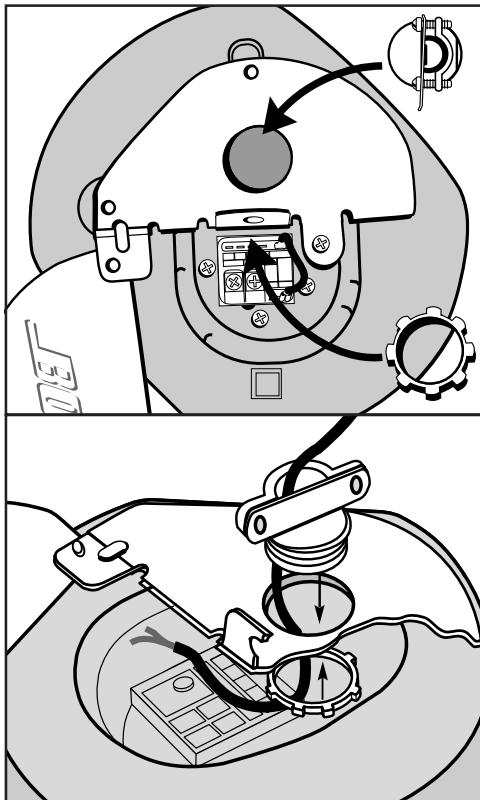


Figure 4

3.5 Setting taps

Set the transformer to the preferred wattage (Figure 5):

1. Locate the blue wire.
2. Disconnect the smaller tab from the shipped setting (8W on Model 8 loudspeakers, 32W on Model 32 loudspeakers).
3. Reconnect to the preferred tap setting.

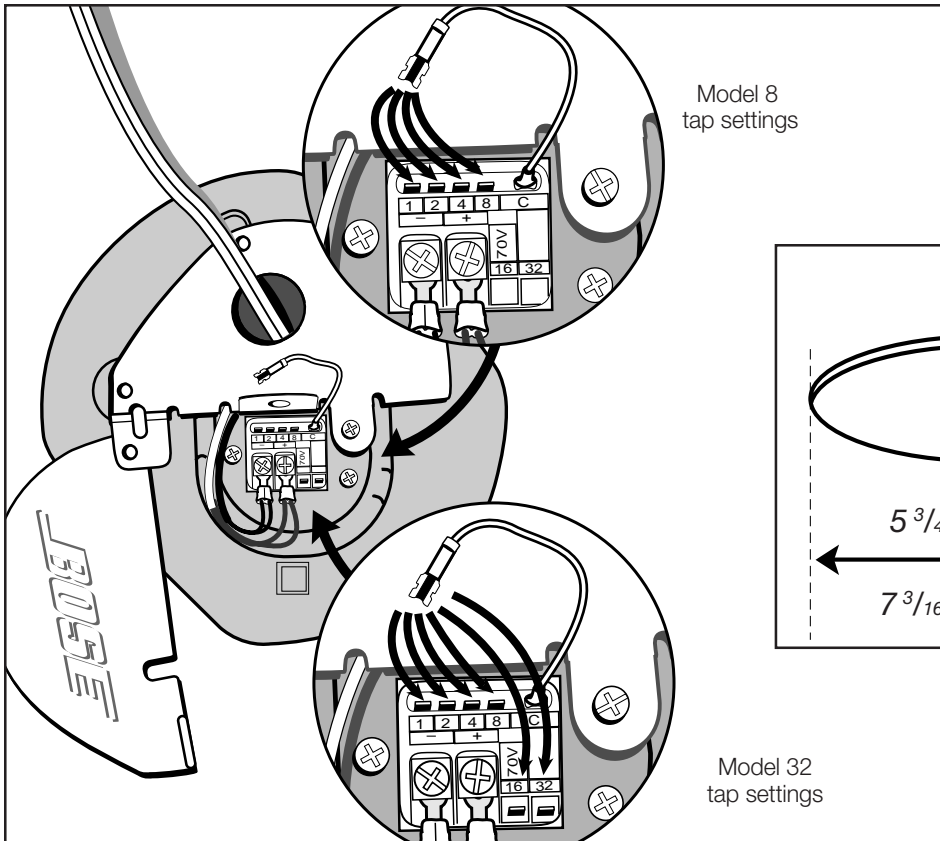


Figure 5

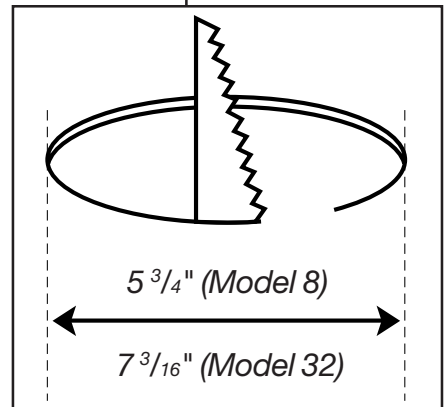


Figure 6

3.6 Cutting mounting holes

Cut the mounting hole (Figure 6).

- The hole for a FreeSpace® Model 8 loudspeaker should be $5 \frac{3}{4}$ " (145 mm).
- The hole for a FreeSpace Model 32 loudspeaker should be $7 \frac{3}{16}$ " (182 mm).

Note: Check for electrical conduits and other hazards before cutting the mounting hole. Also avoid glass fiber insulation. Insulation can interfere with the mounting springs, making installation or changing tap settings difficult. It can also compress and push the loudspeaker out of the mounting hole after installation.

4.0 Installation

Review Section 3.0 “Before You Begin” before installing FreeSpace® Model 8 or Model 32 loudspeakers. It contains important guidelines for choosing the correct installation method and providing proper support for the loudspeakers.

4.1 Ceiling pans

Ceiling tile installation

Note: Do not unhook the springs. Wear safety glasses.

- 1a. For Model 8 loudspeakers, push both halves of the ceiling pan together (Figure 7). Center the support rails by lining up the space between the two halves of the pan with the center marks on the rails.

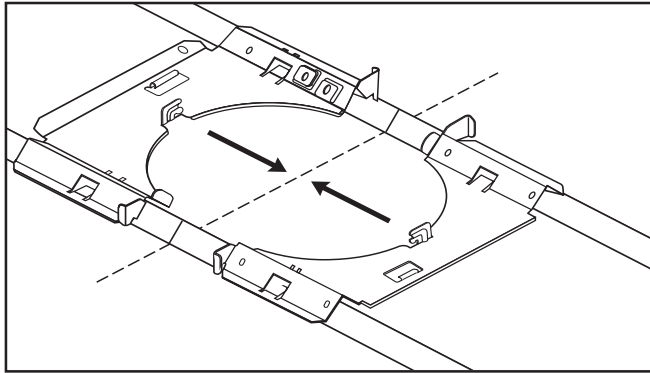


Figure 7

- 1b. For Model 32 loudspeakers, center the ceiling pans approximately $1 \frac{5}{16}$ inch around the center marks on the rails.
2. Place the spring under the spring retainer on the ceiling pan (Figure 8). Position the spring as shown and snap under the retaining hook.
3. Repeat for the second spring.

CAUTION:

The springs are pre-loaded and ready to use. Unhooking them, except as described in this guide, may cause personal injury. Wear safety glasses.

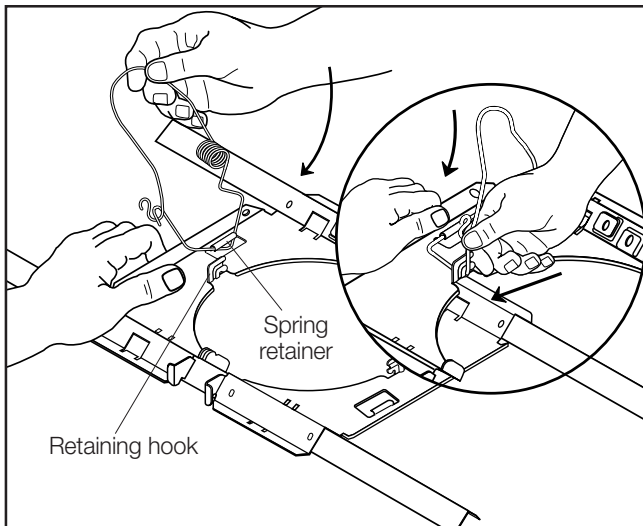
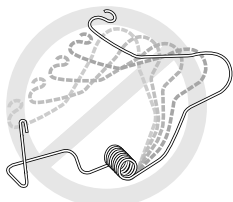
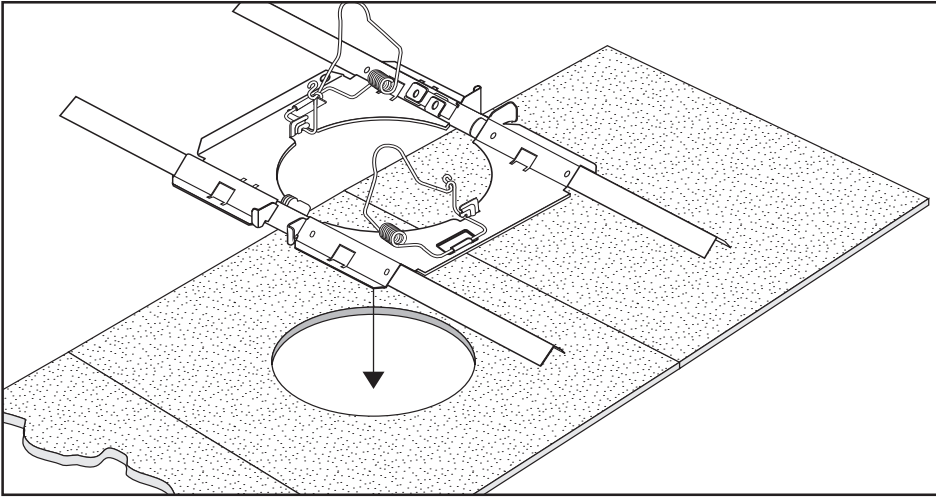


Figure 8



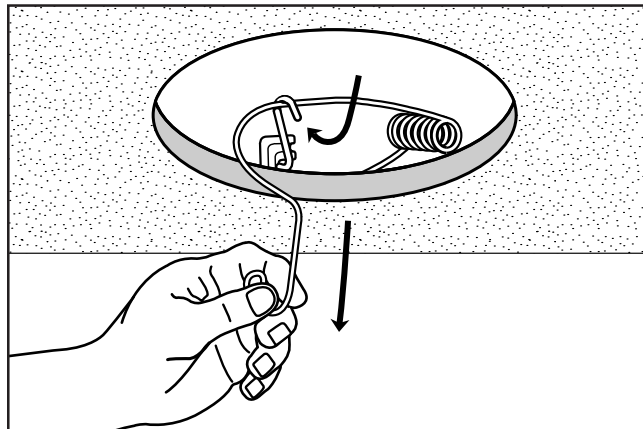
**Figure 9**

4. Place the ceiling pan over the hole in the ceiling tile (Figure 9).

Note: For 2' x 4' ceiling tiles, place the rails parallel with the 2 foot side of the tile.

5. Pull the springs through the mounting hole and hook in the installation position shown (Figure 10).

Note: Complete electrical connections now or use the rotation feature after installing the loudspeakers. See Section 4.3, "Electrical connections."

**Figure 10**

4.0 Installation

Structural ceiling installation

Before beginning this method of installation see Section 3.1, “Ceiling type” to be sure the ceiling qualifies for installation as a structural ceiling.

Note: Do not unhook the springs. Wear safety glasses.

1. For both FreeSpace® 6 Model 8 and Model 32 loudspeakers, remove the rails from the ceiling pans (Figure 11). The ceiling pan will not fit through the mounting hole with the rails installed.



WARNING:

An accidentally released spring can cause personal injury. Wear safety glasses. Keep hands and fingers clear of the spring.

2. Place the spring under the spring retainer on the ceiling pan (see Figure 8, page 10). Position the spring as shown and snap under the retaining hook.
3. Repeat for the second spring.

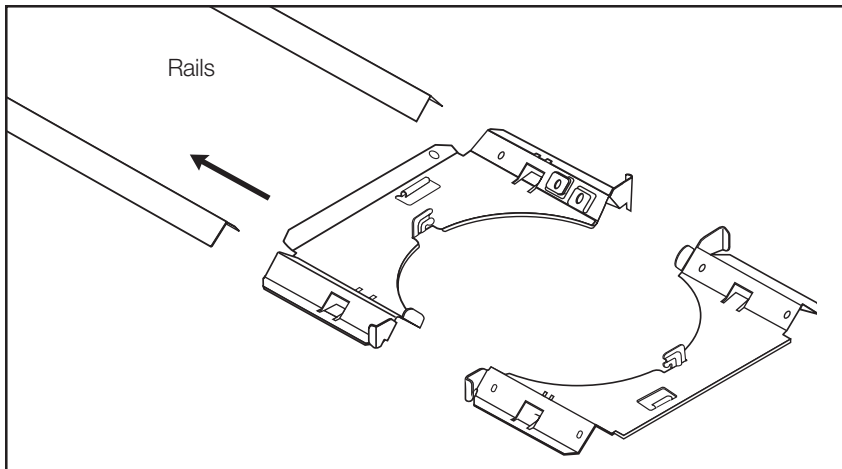


Figure 11

4. Move the springs to the installation position shown (Figure 12).
5. Slide the ceiling pan halves through the mounting hole (Figure 13). Place one half on each side of the mounting hole and push to the outer edge of the hole (Figure 14).

Note: If installing Model 8 loudspeakers, be sure the halves do not overlap.

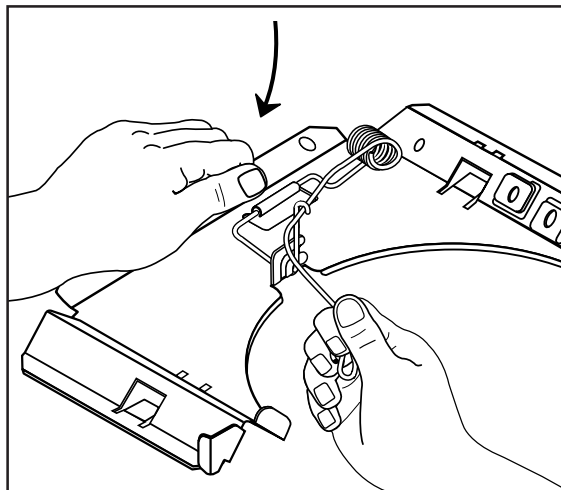
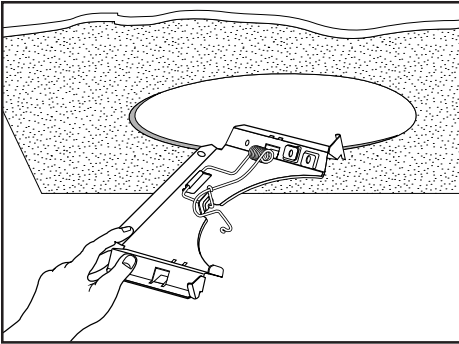


Figure 12

**Figure 13**

4.2 Loudspeaker enclosures



Note: If the electrical connections have not been made yet, pull all wires through the mounting hole and clear of the springs.

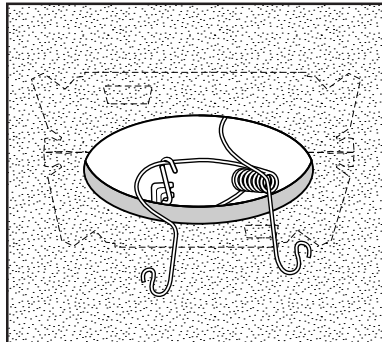
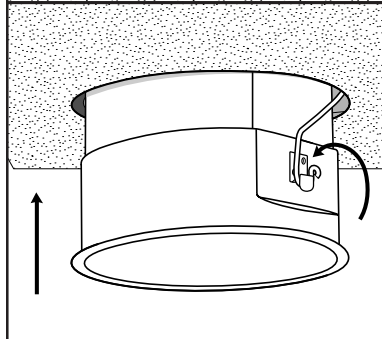
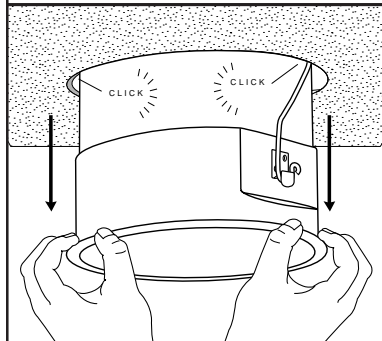
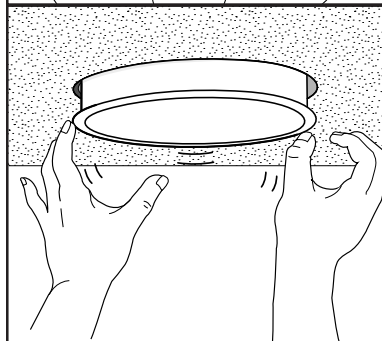
Complete electrical connections before releasing the loudspeaker into the ceiling. Releasing the loudspeaker with wires unconnected could cause the loudspeaker to jam on the dangling wires and could damage the mounting hole or the loudspeaker rim.

If using the mounting springs to support the loudspeaker while making electrical connections, only complete Step 1 now. Once the loudspeaker is hooked on the springs, continue with Section 4.3 “Electrical connections.” Then return to Step 2 of this section.

If electrical connections have been completed, install the loudspeaker as follows:

1. Push the loudspeaker past the springs and wires into the hole in the ceiling tile. Hook the springs to the sides of the loudspeaker (Figure 15).
2. Pull down on the loudspeaker until you feel the springs release (Figure 16).
- 3a. If making electrical connections now, rotate the loudspeaker to the wiring position. See Section 4.3, “Electrical connections.”
- 3b. If the electrical connections have been completed, gently release the loudspeaker (Figure 17).

Go to Section 4.4, “Loudspeaker grilles.”

**Figure 14****Figure 15****Figure 16****Figure 17**

4.0 Installation

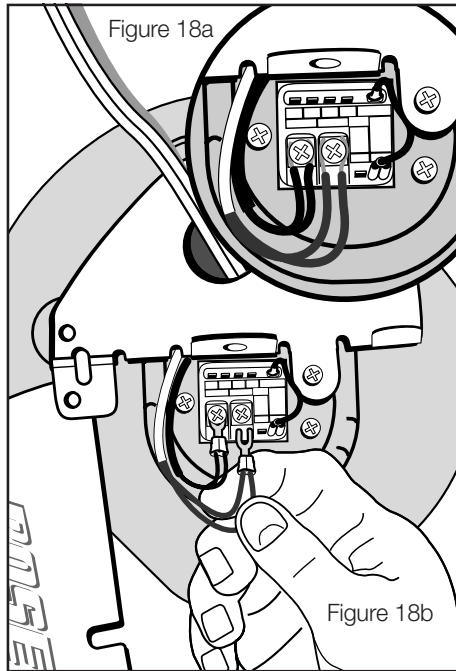
4.3 Electrical connections

70V and 100V versions

- 1a. For stripped wire connections, place one straight wire on each side of the screw beneath the screw plate. Tighten the screw (Figure 18a).
- 1b. For crimp-on forked connectors, slide the connector under the screw plate. Tighten the screw (Figure 18b).

CAUTION

Using forked connectors for multiple wires (as shown in Figure 18b) is not allowed in fire protective signaling and warning systems due to the lack of electrical supervision capability.



Figures 18a and 18b

2. Close the cover and tighten the screw (Figure 19).

Note: If the screw is loose the cover will make a vibrating noise.

4Ω version

1. Depress the terminal tab.
2. Insert the stripped end of wires (Figure 20).
3. Close the loudspeaker cover and tighten the screw (see Figure 19).

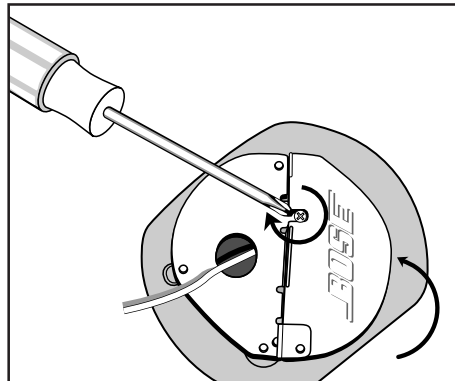


Figure 19

CAUTION

For 70V loudspeakers, be sure the appropriate UL listed 1/2" trade size wire fitting is installed. (See Section 3.4 "Junction box fittings")

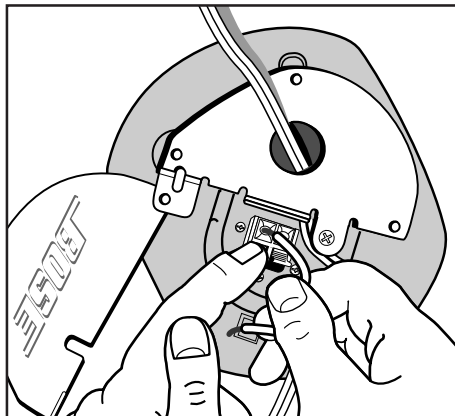


Figure 20

Rotation feature

The rotation feature provides access to the loudspeaker terminals during or after installation. This feature can be used for extra support while completing electrical connections or changing tap settings. The rotation feature is not an option if the ceiling is very thick or the tiles are very soft. See the guidelines in Section 3.1, "Ceiling type." If the rotation feature is used, be careful not to damage the edge of the mounting hole or the loudspeaker rim.

1. Pull the loudspeaker down until the top clears the mounting hole (Figure 21).

Turn the loudspeaker until the terminal cover is facing down and can be opened.

Note: If the top of the loudspeaker cannot easily clear the mounting hole, the ceiling is too thick. Remove the loudspeaker as described in Section 4.5 "Removing installed loudspeakers." Complete electrical connections and reinstall.

2. Gently rest the loudspeaker against the mounting hole (Figure 22).
3. Connect wires or change tap setting as described earlier.
4. Pull the loudspeaker down and turn until the terminal cover faces up.
5. Gently release the loudspeaker back into the mounting hole.



Figure 21

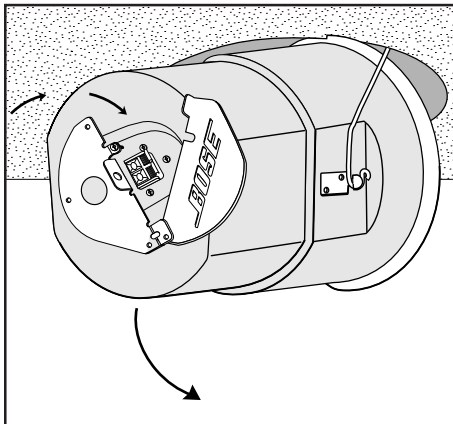


Figure 22

4.0 Installation

4.4 Loudspeaker grilles

1. Pull down on the tab to remove the paint shield (Figure 23).
2. Push up on the grille until it is flush with the loudspeaker rim (Figure 24).

Note: If the ceiling tile lifts up as the grille is installed, pull the loudspeaker down slightly. Hold the loudspeaker rim firmly with your fingers while pushing up on the grille with your thumbs.

Note: It is not necessary to orient the Bose® logo before installing the grille. The logo can be turned in any direction after installation.

4.5 Removing installed loudspeakers

If the loudspeaker needs to be removed after installation, first return the springs to their locked position. If possible, pull the loudspeaker down and rehook the springs in the locked position. Then lift the loudspeaker off the springs and remove.

If the springs cannot be rehooked, release them completely. Holding a spring by its hook, carefully release as much tension as possible. Then release the spring.

Repeat for the second spring.

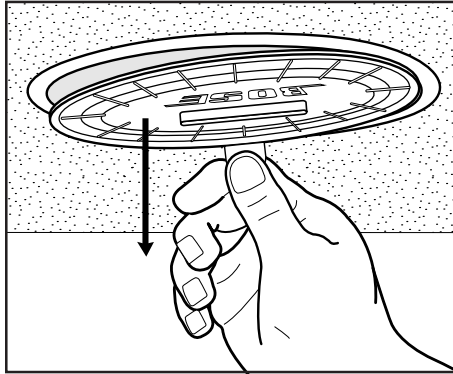


Figure 23

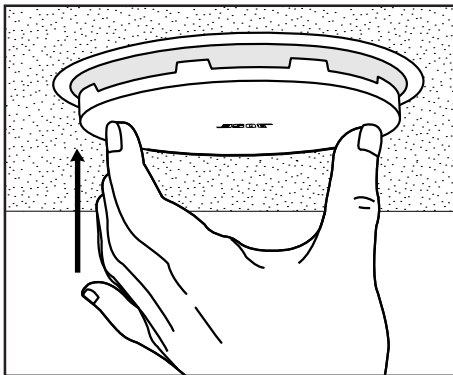


Figure 24

A.1 Acoustic specifications

Sensitivity: 70V & 100V – 81dB 1W 1m, maximum 90dB 8W 1m

Sound pressure level (SPL) sensitivity is measured in an anechoic chamber as follows:

- Full bandwidth pink noise is applied through a Model 8 equalizer and fed into a power amplifier.

FreeSpace Model 8

Wattage tap	1 Watt	2 Watt	4 Watt	8 Watt
SPL at 1 meter at wattage input indicated	81dBA	84dBA	87dBA	90dBA

When the operational bandwidth is limited to speech (paging) applications, sensitivity is increased by 1dB at each tap setting.

Impedance: 625Ω (70.7V),
1250Ω (100V) @ 8W

Power handling: 8W maximum

Bandwidth: 80Hz – 16kHz

Beamwidth: 121° at -3dB,
150° at -6dB

A.2 Mechanical specifications

Dimensions: 10.42" x 10.87" x 6.02"

Weight: 70V & 100V – 4.2 lb (1.9 kg)
installed

Finish:

Front baffle – Arctic white polymer

Rear enclosure – aluminum,
painted black

Grille – vandal resistant,
expanded metal mesh

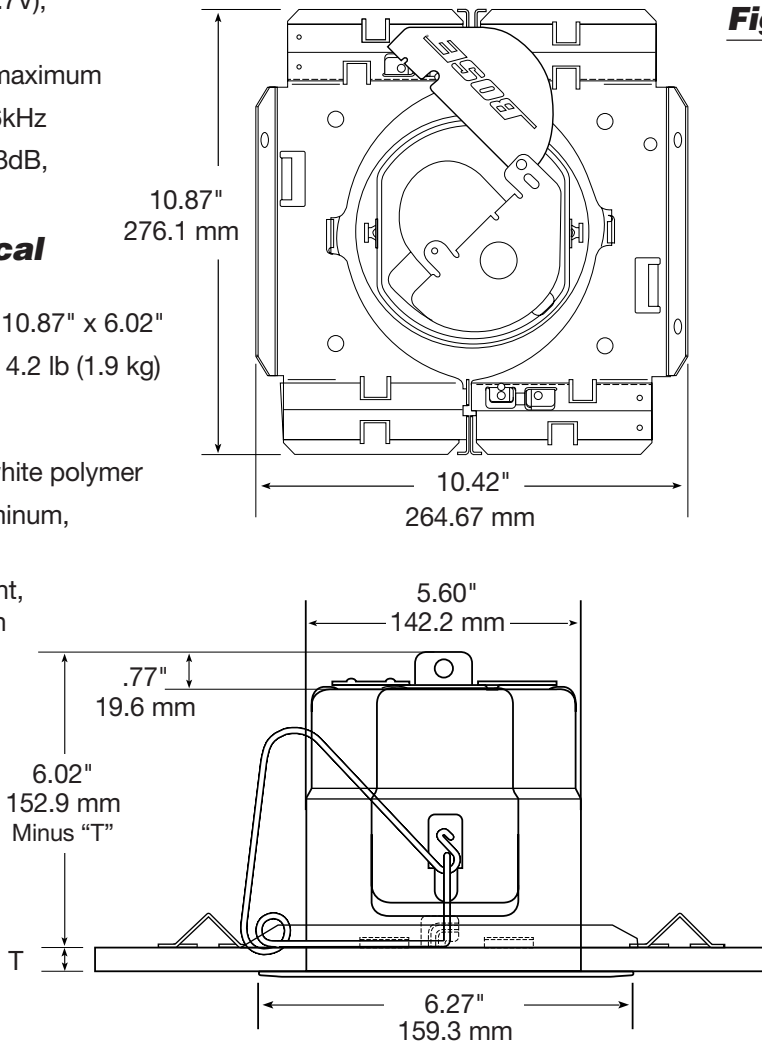


Figure 25

B.1 Acoustic specifications

Sensitivity: 4 ohm – 87dB 1W 1m, maximum 102dB 32W 1m

Sound pressure level (SPL) sensitivity is measured as follows:

- Full bandwidth pink noise is applied directly to a low output impedance amplifier with the output limited to the wattage specified.

Sensitivity: 70/100 Volt – 88dB 1W 1m, maximum 102dB 32W 1m

Sound pressure level (SPL) sensitivity is measured in an anechoic chamber as follows:

- Full bandwidth pink noise is applied through a Model 32 equalizer and fed into a power amplifier.

FreeSpace Model 32 Loudspeaker

Wattage tap	1 Watt	2 Watt	4 Watt	8 Watt	16 Watt	32 Watt
SPL at 1 meter at wattage input indicated	87dBA	90dBA	93dBA	96dBA	99dBA	102dBA

When the operational bandwidth is limited to speech (paging) applications, sensitivity is increased by 1dB at each tap setting.

Impedance: 156Ω (70.7V), 31Ω (100V) @ 32W

Power handling: 32W maximum

Bandwidth: 80Hz – 16kHz

Beamwidth: 104° at -3dB, 132° at -6dB

B.2 Mechanical specifications

Dimensions: 10.87" x 11.75" x 7.45"

Weight: 4Ω – 5.13 lb (2.33 kg) installed

70V & 100V – 5.77 lb (2.62 kg) installed

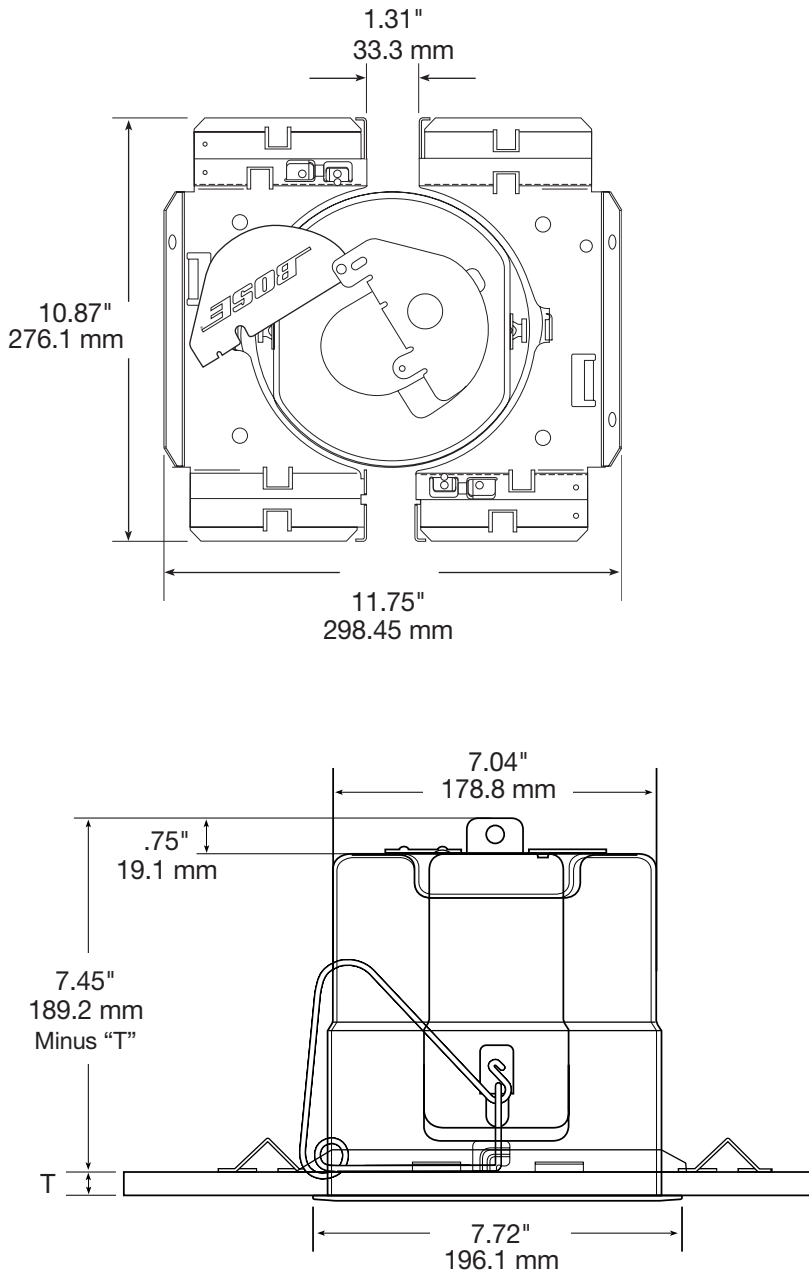
Finish:

Front baffle – Arctic white polymer

Rear enclosure – aluminum, painted black

Grilles – vandal resistant, expanded metal mesh

Figure 26



C.1 Safety agency listings

FreeSpace® Model 8 and Model 32 (70V, 100V and 4Ω versions)

All models are UL 1480 listed:

- Vandal resistant (with grilles in place);
- General use - UL Category UEAY, Control number 3N89, File number S5591;
- Air handling spaces (ceiling plenums) - NFPA 70 NEC 1993 Article 300-22 (C) and UL 2043; NFPA 90A-1993 Installation of air conditioning and ventilation systems, section 2-3.10.1 (a) exception 3.

FreeSpace Model 8 and Model 32 (70V fire safety models)

In addition to the above listings, fire safety models are UL listed for fire protective signaling.

- Fire protective signaling use - UL Category UUMW, Control number 42S9, File number S 3241).

C.2 Fire protective signaling

Bose® offers 70V fire safety models of both FreeSpace Model 8 and Model 32 loudspeakers listed with UL as fire protective signaling devices. These loudspeakers are available only by special order.

Signal processing equipment

The Bose FreeSpace® (Model 8/32) system controller is the only equalizer listed for use with FreeSpace Model 8 and Model 32 loudspeakers in fire protective signaling and warning systems. The FreeSpace system controller installer's guide describes the proper set up of fire protective signaling and warning systems using FreeSpace Model 8 or Model 32 loudspeakers.

Wire preparation

Although the loudspeaker terminals will accept either stripped wires or crimp-on forked connectors, using forked connectors as shown in Figure 18b for multiple wires is not acceptable in fire protective signaling and warning systems due to the lack of electrical supervision capability. Electrical supervision capability is maintained by connecting each wire individually to the terminals.

Sound Pressure Level (SPL) specifications

Loudspeaker sound pressure level is measured per UL-1480/ANSI-S1.12/ANSI-S1.2 in the specified reverberant chamber. These SPLs will differ from the specification given in the tables contained in Appendix A and Appendix B.

FreeSpace Model 8 Fire safety model

Wattage tap	1 Watt	2 Watt	4 Watt	8 Watt
dB at 10 feet	75dBA	78dBA	81dBA	84dBA

FreeSpace Model 32 Fire safety model

Wattage tap	1 Watt	2 Watt	4 Watt	8 Watt	16 Watt	32 Watt
dB at 10 feet	81dBA	84dBA	87dBA	*90dBA	*90dBA	93dBA

* UL requires a step of 3dB (with a +/- .2dB variable) with each doubling of input power. Because our transformer gives slightly less than the required 3dB step between 8 watts and 16 watts, we must show the last dB rating. In this case, there are two 90dB ratings. For these values, the actual UL measured level for the 8W tap is 89.9dBA, for the 16W tap is 92.5dBA, and for the 32W tap is 94.6dBA.

D.1 Warranty

Bose® covers FreeSpace® Model 8 and Model 32 loudspeakers with a 5 year, transferable, limited warranty.

D.2 Service

If you have problems with your Bose FreeSpace Model 8 or Model 32 loudspeakers, contact your authorized Bose Professional Products Dealer. The dealer will verify any defects and arrange for service by a factory authorized Bose service agency, or by Bose Corporation.

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