Installer's Guide

BOSE ®

FreeSpace®
BUSINESS MUSIC SYSTEMS

WARNING
To reduce the risk of fire or electrical shock, do not expose this system to water or moisture.

⚡	**CAUTION** RISK OF ELECTRICAL SHOCK DO NOT OPEN	!
	CAUTION: TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT REMOVE COVER (OR BACK). NO USER-SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED PERSONNEL.	
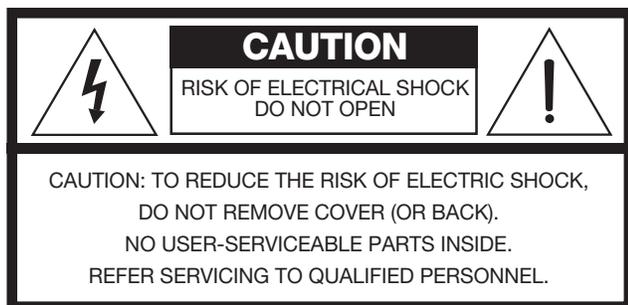
CAUTION
Check local regulations before installing or wiring the Bose® FreeSpace® 6 business music system. The building code may require professional installation by a skilled technician or licensed contractor. Regional or electrical codes may require similar qualifications for wiring the system.

CAUTION
The Bose FreeSpace business music system is an electrical appliance. To reduce the risk of electrical shock, do not disassemble any of its parts. They are not user-serviceable. Dangerous electrical shock may result if unqualified personnel attempt repair. Refer to Bose authorized service personnel for servicing.

The **CAUTION** marks shown here also appear on the FreeSpace 6 system electronics.

The lightning flash with arrowhead symbol, within an equilateral triangle, warns users that uninsulated dangerous voltage is within the enclosure. The voltage may be sufficient to cause electrical shock.

The exclamation point, within an equilateral triangle, tells users there are important operating instructions in this guide.

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Safety Information

Please read this safety information before connecting or operating the Bose® FreeSpace® 6 business music system.

Installation and adjustments should be performed by a competent technician.

1.1 **Read the Instructions –** Read and keep all safety and operating instructions for future reference.

1.2 **Follow Cautions –** Follow the warnings in this guide and on the system.

1.3 **Avoid Moisture –** Never expose the system to water or excessive humidity. Do not install near swimming pools, spas, dish washing or laundry equipment, in cooking areas, or in other excessively humid environments. Avoid installing outdoors.

1.4 **Avoid Heat –** Do not use the system near sources of excessive heat such as radiators, heat registers, flood lamps, spotlights, kitchen equipment, or other appliances.

1.5 **Protect Cables –** Always put system cables where heavy or sharp objects cannot pinch or cut them.

1.6 **Cover the System Electronics –** Make sure the cover is on the system electronics before you use this system.

1.7 **Connect the Ground Wire –** Connect the ground pin (if there is one) on the power cord properly to the ground on the power outlet.

1.8 **Follow the Mounting Guidelines –** Mount the system parts to walls or ceilings only as described in this guide. Failure to do so may cause permanent damage to the system or physical injury to anyone near it.

1.9 **Ventilate the System Electronics –** Do not install the system electronics in a built-in rack or bookshelf without proper ventilation.

1.10 **If Damage Occurs –** Service by qualified service personnel when:

    A. Liquid spills or objects fall into any part of the system;

    B. Any part of the system does not operate normally after following instructions in this guide;

    C. Any part of the system is damaged; or

    D. Any part of the system exhibits a distinct change in performance.

1.11 **Safety Check –** After service or repairs, ask the service technician to perform safety checks to determine that the system is still in proper operating condition. This includes confirming that the AC mains ground wire is operating properly.

Contents

Please read this guide

Installing and operating the Bose® FreeSpace® 6 business music system is significantly different from conventional systems. Please read this guide thoroughly.

Intended Audience

This guide has been written for the professional installer of music systems or a licensed electrician.

English

This FreeSpace® 6 business music system installer's guide consists of the following sections:

System Placement   This section aids you in determining where to place the loud-
                                     speakers, the remote control unit, and the system electronics.

System Installation   This section explains how to assemble and install the flush-
                                     mount loudspeakers, the surface-mount loudspeakers,
                                     the system electronics, and the remote control unit.

System Setup   This section explains how to set the different zones on the
                                     FreeSpace 6 system. A troubleshooting table and the product
                                     specifications are included at the end of this section.

The following additional information is available free upon request. Bose® can either fax it or mail it to you. Just call 1-800-996-2673 (in the United States and Canada) or your local Bose distributor and request the information by name and part number.

Balanced and Unbalanced   This five-sheet packet offers guidelines for wiring to and from
Source Terminals (PN183072)   the system electronics and has many illustrations showing the
                                     correct wiring configurations for balanced and unbalanced
                                     setups.

Loudspeaker Painting (PN183073) This two-sheet packet contains a recipe for mixing paint and
                                     instructions for applying that paint to the grille and rim of the
                                     flush-mount loudspeakers.

Radio Frequency Interference   This sheet suggests ways to determine the source of the
and Hum (PN183074)   interference and ways to correct it.

**System Components** (PN183076)   This four-sheet packet explains the 13 zones in the FreeSpace 6
                                     business music system. It also offers information on how to
                                     choose a microphone.

Wire Considerations (PN183078)   This sheet discusses the recommended class of wire to use per
                                     UL and CSA standards.

If any part appears damaged, do not install or operate the system. Repack and immediately contact Bose® Service or your authorized Bose Professional Products dealer.

Note: Save the cartons and packing materials for use in the event the system must be moved.

(1) Documentation

(1) Power cord

(8) Quick connectors factory installed

(1) System electronics

(1) Remote control

OR

(4) Loudspeakers

(4) Loudspeaker grilles

(4) Mounting brackets

(8) Knobs

(8) Springs

(4) Loudspeakers

(4) Ceiling pans
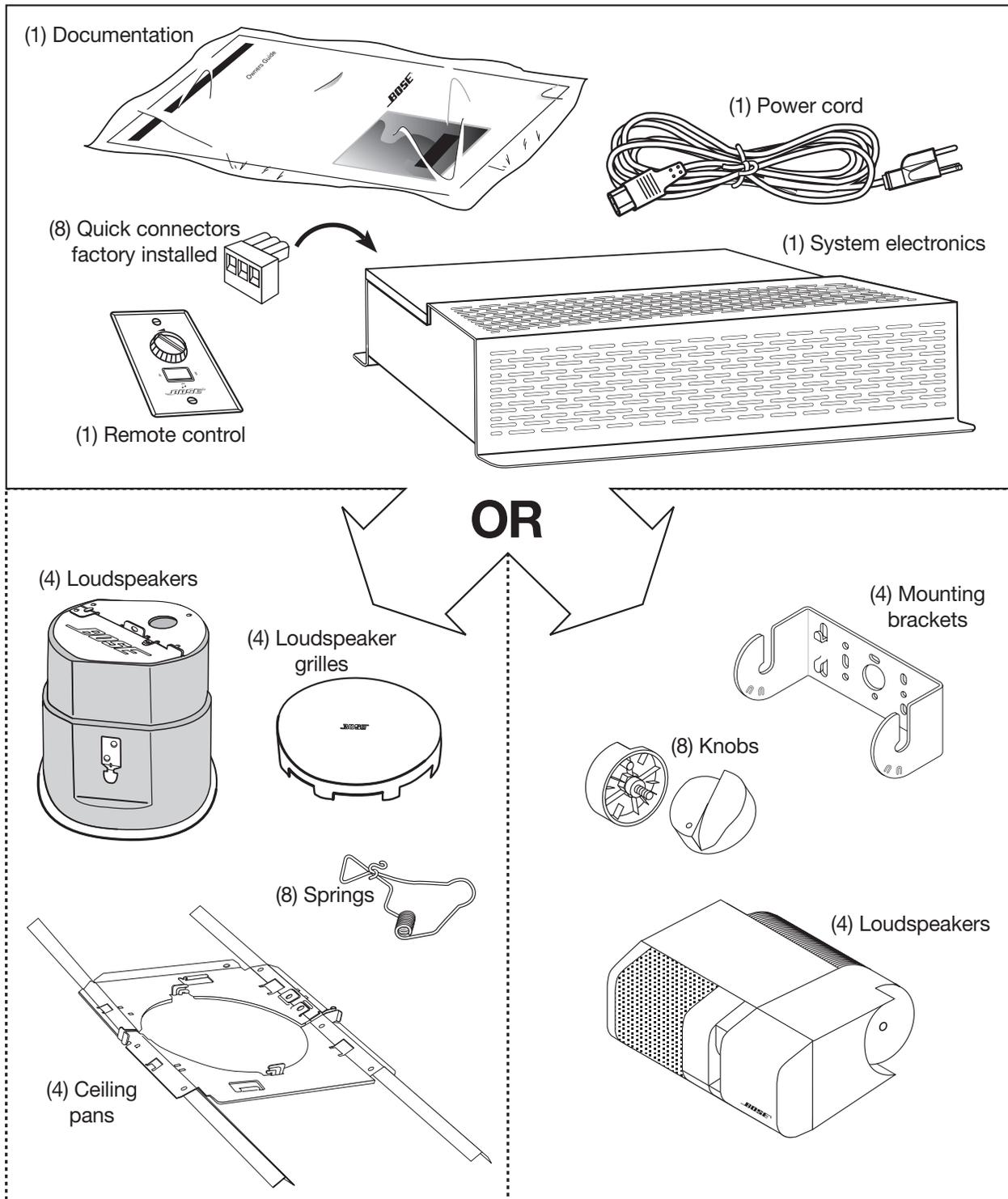
1.1   System electronics

Note: Do not mount the system electronics within a plenum space or any place it cannot be seen during operation.

Be sure the electrical system the FreeSpace® 6 system will be connected to has the correct voltage, frequency, power cord, and agency approvals for the area. In North America, the system should have UL listing or CSA certification labeling.

The system electronics can be mounted on a wall or placed on a shelf.

• Wall construction and material must be sturdy enough to support the system electronics weight of 11 lb (5 kg). Bose® is not responsible for system electronics mounted in or on unsuitable surfaces.

• Be sure the selected spot is safe for drilling. Avoid surfaces that could conceal hazards like electrical conduits or plumbing.

• Do not put the system electronics directly above intense heat sources such as radiators, space heaters, or other amplification equipment.

• Do not put the system electronics in environments with temperatures exceeding 100°F (40°C).

If the system electronics is in an enclosed space, allow at least 2 inches (5 cm) clearance on the top and the sides. If the system electronics is on an open surface, keep the cooling slots unobstructed.

Discuss the placement of the system electronics and the remote control with the business owner. It should be placed where it is easily accessible by business personnel, but not accessible by patrons.
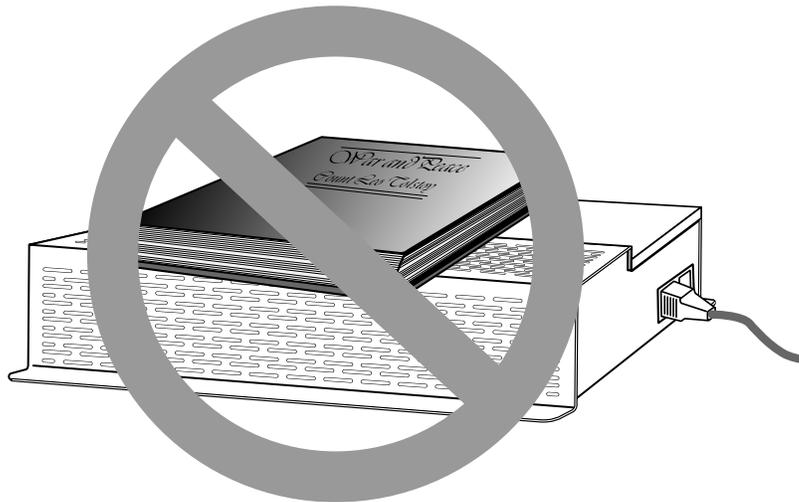

Warranty

Bose® warrants the FreeSpace® 6 business music system with a 5-year, transferable, limited warranty. For more information, please read the warranty card.

Service

If you have problems with your Bose FreeSpace 6 business music system, 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.

≥2 inch
(50.8 mm)
all sides

≤1 inch
(25.4 mm)

≥2 inch
(50.8 mm)
all sides
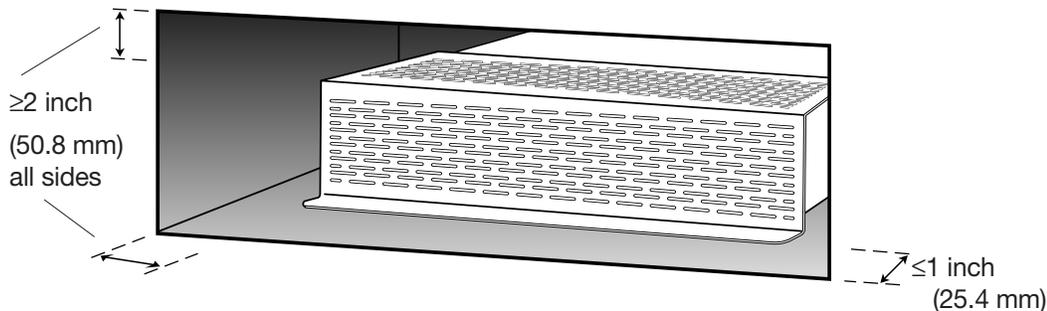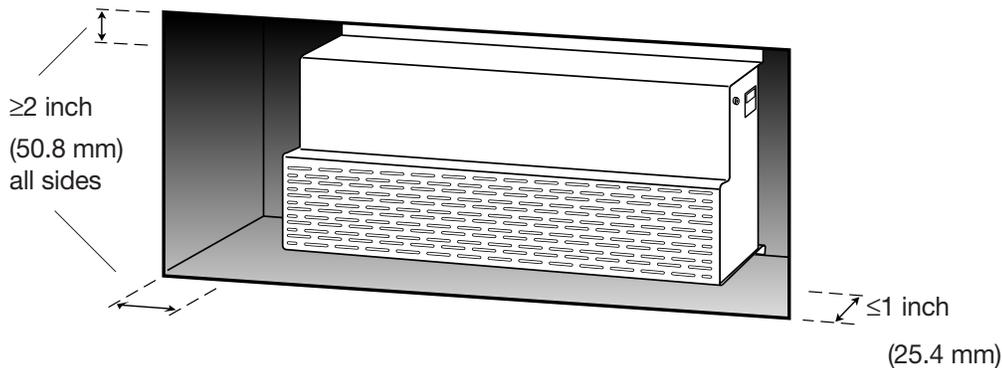
≤1 inch
(25.4 mm)

The front edge should be no more than 1 inch (25.4 mm) from the opening. Leave the opening uncovered.

Note: Do not place anything in the space that blocks the ventilation slots or adds heat.

1.2 Remote control

The remote control should be wall mounted in an electrical box (not included) similar to a light-switch electrical box. Install the control where day-to-day adjustments will be easy to make.

1.3 Loudspeakers

The loudspeakers can be mounted to most fixed or suspended ceilings or walls strong enough to support the combined weight of the hardware and loudspeakers. Bose® will not be responsible for brackets or loudspeakers mounted in unsuitable places.

Permanent ceilings (gypsum board or plaster) may conceal electrical conduits or other hazards. Check for these hazards before cutting mounting holes, especially if using power equipment.

⚠ These loudspeakers are UL listed as vandal resistant and will resist malicious damage from a sharp object. However, they can be removed, or damaged with blows from a heavy object. If vandalism is a concern, consider mounting the loudspeakers out of reach.

1.3.1 Clearance

Allow enough clearance for both the depth of the ceiling loudspeaker and the wire from the electrical fitting. To decrease this distance, an angled electrical fitting may have to be used if flexible metallic conduit or flexible metallic tubing is used.

1.3.2 Flush-mount loudspeaker placement

It is important to take a few minutes before installing the system to determine loudspeaker placement. The placement of these loudspeakers is dependent upon the following factors:

• Ceiling height

• Listener ear height

• Desired smoothness of coverage

• Ceiling type (see Section 1.4)

Proper loudspeaker placement provides enjoyable sound no matter where you are in the area. Follow these steps to determine the proper loudspeaker placement locations.

1. Begin by estimating the maximum ear height of the listener. For example, in a retail environment, patrons will most likely be standing. Maximum ear height in this case will probably be about 6 feet. In a restaurant, patrons will be seated and ear height may be 4 feet.

Note: The shorter the ear height, the broader the sound beam area. This means that the loudspeakers are placed farther apart. Conversely, the higher the ear height, the narrower the sound beam area. The loudspeakers are placed closer together.
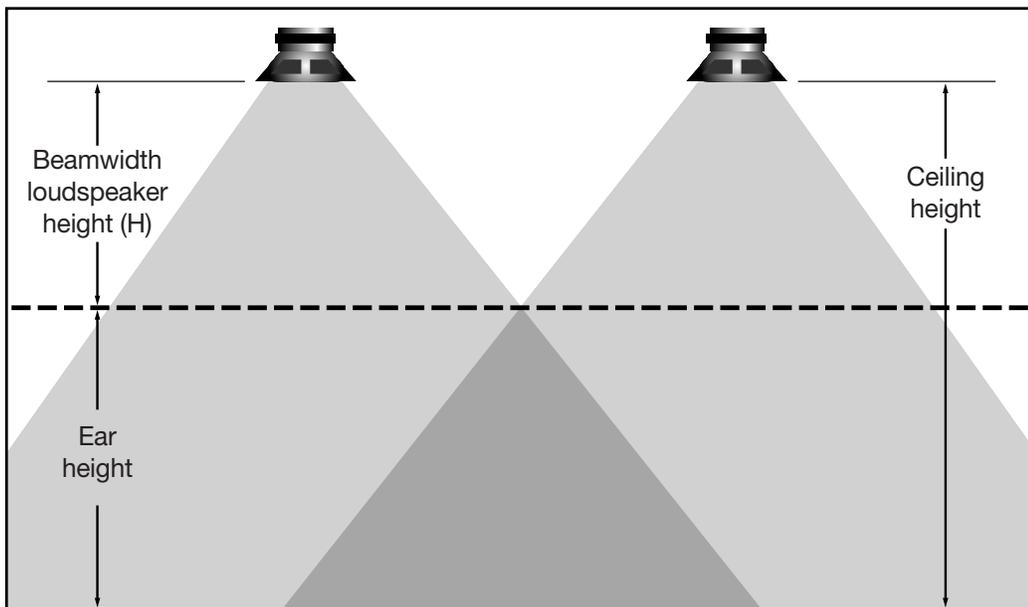
2. Create a floor plan sketch of the installation site. Use the following formulas and table to determine loudspeaker placement.

Use this formula to determine loudspeaker beamwidth height (H).

ceiling height - ear height = loudspeaker beamwidth height (H)

In this example, the room is 36 feet (11 m) x 36 feet (11 m) with a 10 foot (3 m) ceiling.

10 feet (3 m) - 4 feet (1.2 m) = 6 feet (1.8 m)

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Use the following table to help calculate the ideal starting distance from adjacent walls and the distance between each adjacent loudspeaker. Multiplier A is for vertical and horizontal spacing. In order to cover a large area, wider variances in coverage may be acceptable. For our example, a direct field variance of ±6.0dB is desired. That corresponds to a multiplier of 3.0.

Multipliers for FreeSpace®6 loudspeaker spacings are shown up to ±6dB direct field coverage. This spacing yields no more than ±3dB of reverberant field coverage, the industry standard.

| Direct Field Variance	±1.5dB	±3.0dB	±6.0dB
Multiplier A	2.0	2.3	3.0

Calculate the loudspeaker placement for this installation.

For placement of loudspeakers from a wall, multiply $\frac{1}{2}$A x H. In our example, 1.5 x 6 feet = 9 feet.

For placement of loudspeakers from each other, multiply A x H. In our example, 3 x 6 feet = 18 feet.

So in our example, the loudspeakers will be placed at the 9 foot mark from each wall. This gives an 18 foot distance between each loudspeaker. Be aware that not all installations will lend themselves easily to the formulas but the formulas can be a great aid in determining loudspeaker placement. Your experience and judgement will be an invaluable asset in determining loudspeaker placement.

Note: The loudspeaker layout should be centered in the room so the distance between the loudspeakers at the edge of the layout and the perimeter walls is fairly uniform. If necessary, shift the entire loudspeaker layout to ensure a consistent border. DO NOT install loudspeakers less than $3\frac{1}{2}$ feet (1 meter) from any wall. Doing so causes a reduction in bass due to the proximity of the wall.


S = loudspeaker
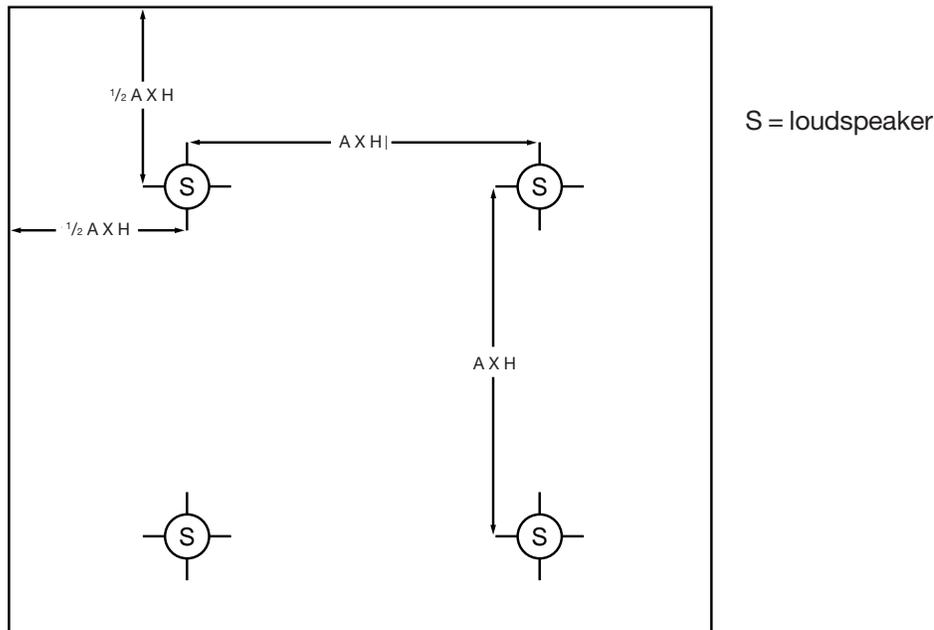
1.0 System Placement

The following chart and illustrations are examples of room sizes and shapes where the FreeSpace® 6 business music system works effectively.

If your room is this long… (feet/meters)	And this wide… (feet/meters)	And this high… (feet/meters)	And has this volume… (feet³/meters³)	Will FreeSpace 6 be effective?
30/9	30/9	9/2.5	8,100/200	Yes
36/11	36/11	10/3	12,960/363	Yes
40/12	40/12	12/4	19,200/576	Yes
30/9	60/18	20/6	36,000/972	No* †
70/22	100/30	12/4	84,000/2310	No*

* This room is too large for the FreeSpace 6 system to be effective. The maximum room size for the FreeSpace 6 system is 20,000 ft³ (570 m³). If the room is larger than 20,000 ft³ (570 m³), we suggest talking to a Bose® representative to determine the best Bose system for the requirements.

† Even coverage can be achieved with this room size. However, sound pressure will be lower.
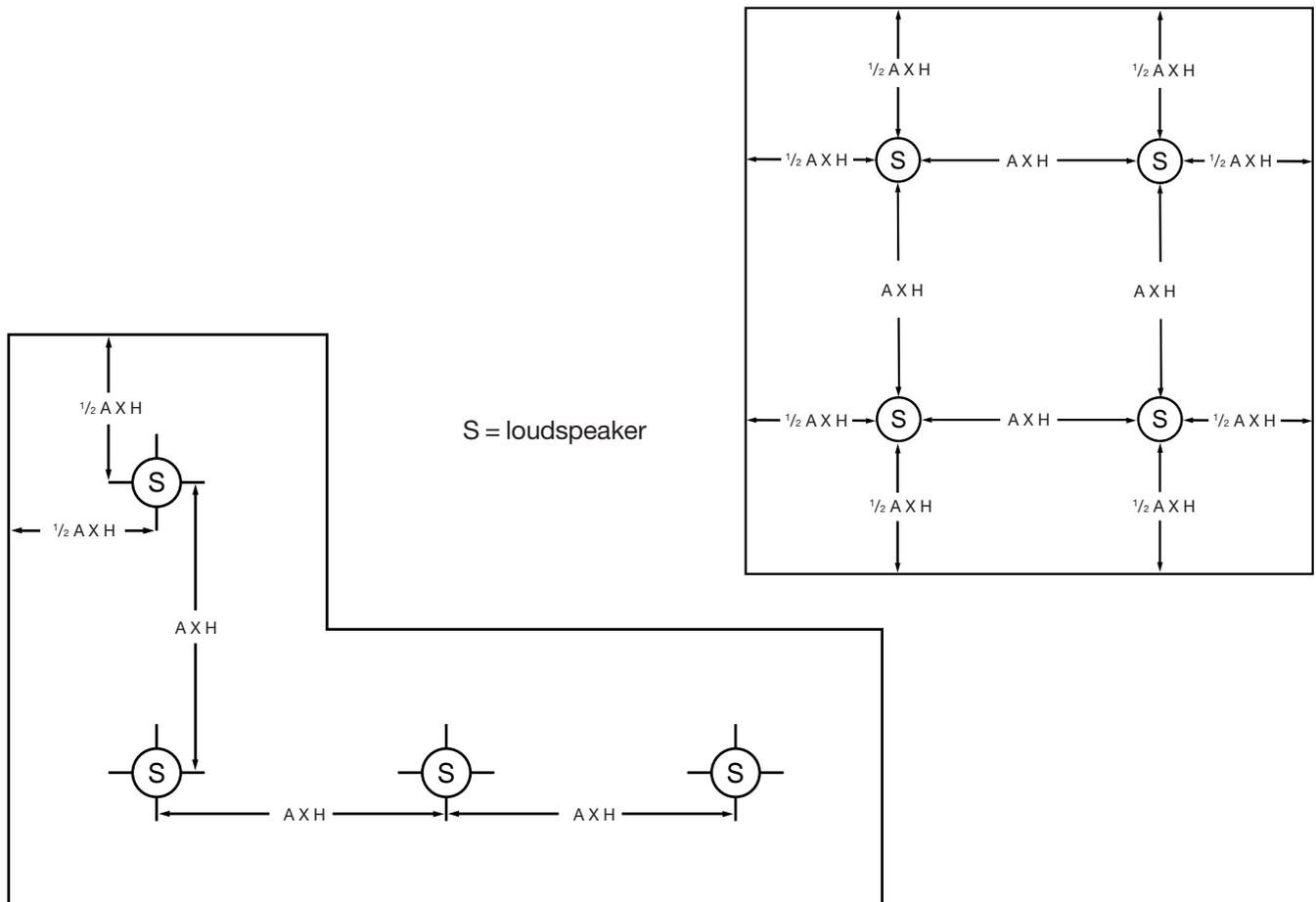
S = loudspeaker

Note: *It is illegal to mount the system electronics within a plenum space or any place you cannot see the system during operation.*

1.3.3 Surface-mount loudspeaker placement

Determining where to place surface-mount loudspeakers is easy. Using your floor plan (which is drawn to scale), draw 25 foot (7.5 m) spacing circles to determine loudspeaker placement.

If your floor plan scale dimension is...	Then your spacing circle diameter size is...
$\frac{1}{16}$ inch (.16 cm)	$1\frac{9}{16}$ inch (4 cm)
$\frac{1}{8}$ inch (.31 cm)	$3\frac{1}{8}$ inch (8 cm)
$\frac{1}{4}$ inch (.63 cm)	$6\frac{1}{4}$ inch (16 cm)

Note: The surface-mount loudspeakers have a throw distance of 25 feet (8 m). For effective coverage only 80% of the area need be covered. The spacing circles should just touch each other or overlap slightly.

Follow these simple rules when laying out the loudspeakers.

• The spacing circles can be drawn with a compass.

• Place a symbol on your floor plan identifying the location of the loudspeaker.

• Start in the corners, if possible, for maximum coverage and bass response.

• Because additions and/or cancellations occur from walls, do not space the loudspeaker equidistant from a side wall and the ceiling. In other words, do not place the loudspeaker 3.5 feet (1 m) from the side wall and 3.5 feet (1 m) from the ceiling.

• In a square room, place each loudspeaker slightly off center.

• The maximum height for the loudspeakers should be 12 feet (4 m) from the floor.

For technical assistance, call 1-800-994-2673 in the USA or your local Bose® distributor.
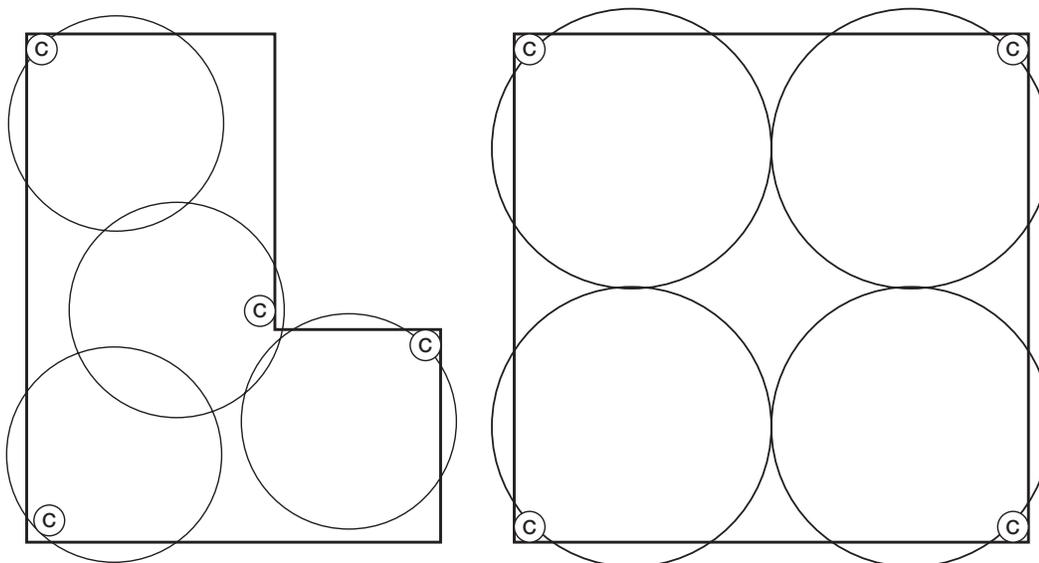
C = surface-mount loudspeaker

1.4 Ceiling types

Check the ceiling construction before beginning installation. Ceiling type, thickness, and strength determine the installation and connection methods for the loudspeakers. Ceiling type also dictates whether to use support rails. If in doubt about these choices, consult a building trade professional, architect, or licensed professional engineer.

| Ceiling Type	Description
Rigid ceiling tiles	If the tiles are particle board, plywood, gypsum board, or plaster, follow the instructions for either tile ceilings or structural ceilings. They do not require support rails. However, support rails may be needed if moisture or other environmental conditions could weaken the ceiling.
	However, if the support rails are not used, the tiles must be strong enough to support the loudspeaker by themselves. See "Support rails" below for more information.
Soft ceiling tiles	If the tiles are a "soft" material (like mineral wool or glass fiber), follow the instructions for ceiling tiles. Use the support rails with this type of ceiling tile. These tiles can bow or absorb moisture and may not continue to support the loudspeaker's weight.
Structural ceilings	Follow the instructions for structural ceilings. Remove the support rails from the ceiling pans before using the "structural ceiling" installation method.

Support rails

Not all ceilings require support rails. Only the installer can determine if a ceiling is strong enough to support the loudspeakers by itself. If in doubt, consult a building trade professional, architect, or licensed professional engineer.

The support rails are $23^3/_4$ inches (60 cm) long, and will support a loudspeaker on a 2 foot x 4 foot (0.6 m x 1.2 m) 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 60 cm tiles, place the ceiling pans and support rails at a 10° – 15° angle

10°–15°
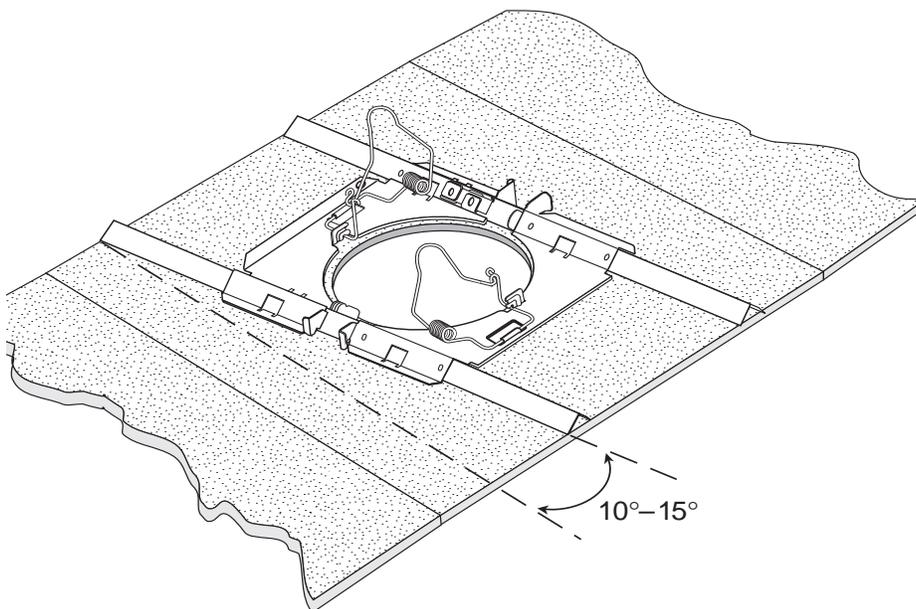
• For 62 cm tiles, extend the rails in opposite directions until each rail reaches the ceiling grid on one side of the tile

2.1   Ceiling pans

WARNING

The springs are ready to use. Unhooking them, except as described in this guide, may cause personal injury. Always wear safety glasses when installing loudspeakers.

CAUTION

If in doubt about the proper wire or connecting to the source or system electronics, have an audio profesional complete the electrical connections.

CAUTION

Unplug all system components from electrical outlets before making connections.

2.1.1 Loudspeaker installation in a ceiling tile

- Do not unhook the springs.
- Cut a $5^3/_4$ inch (145 mm) hole for the loudspeaker. Use the loudspeaker box as a template to cut the correct hole size.

  Bose® offers an optional hole saw (part number 179085) for use with a power drill.
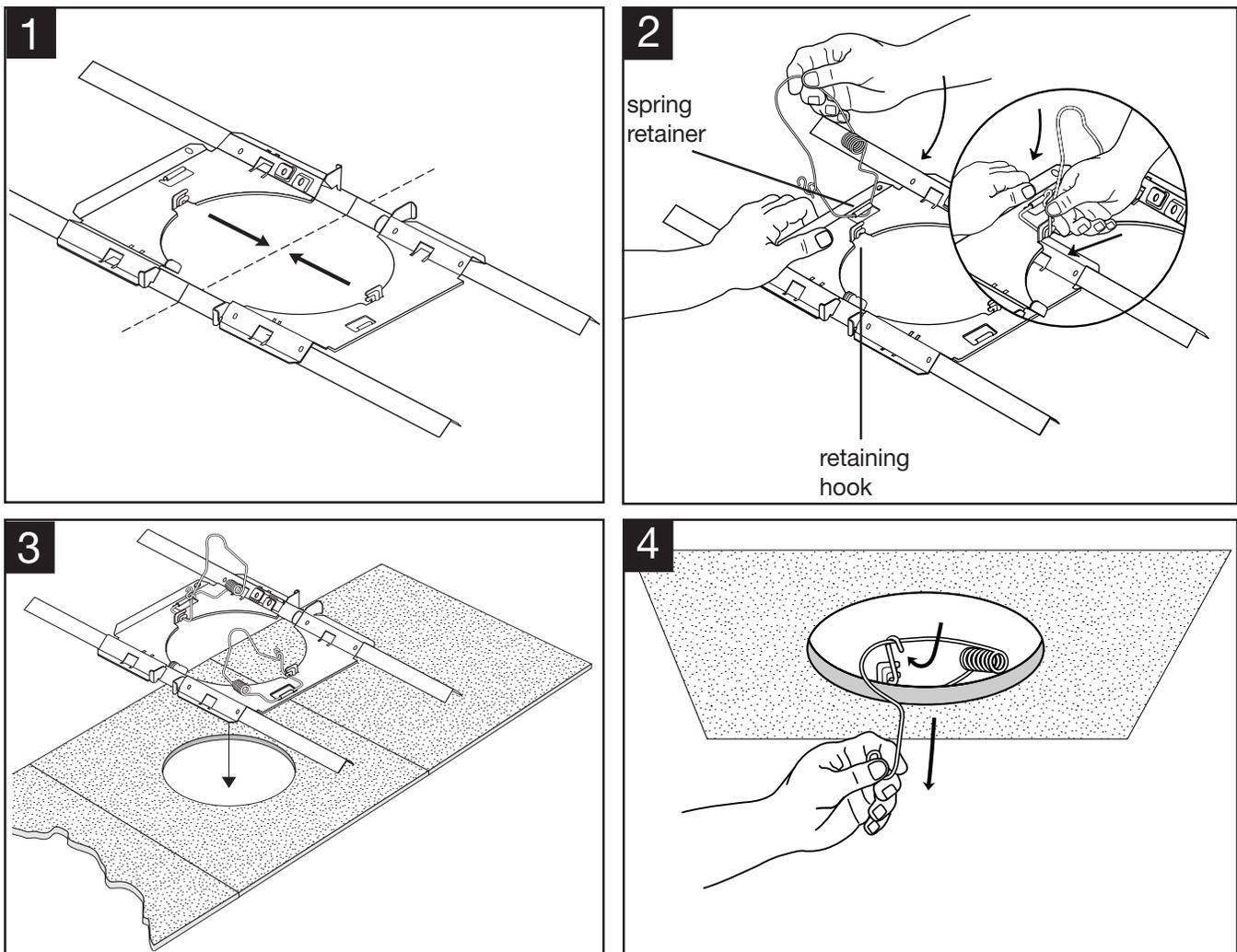
Note: Electrical connections may be completed now or the rotation feature may be used after the loudspeakers are installed.

2.1.2 Loudspeaker installation in a structural ceiling


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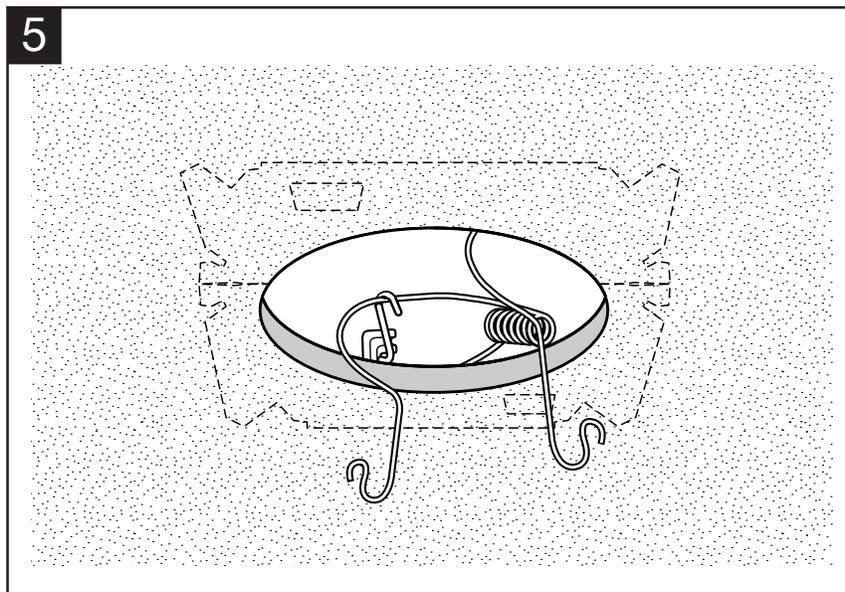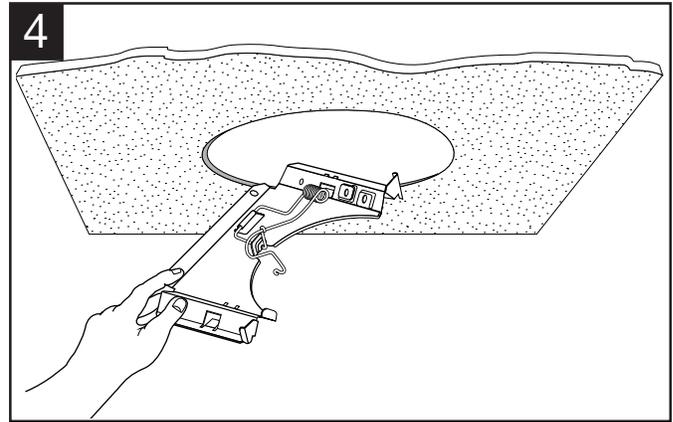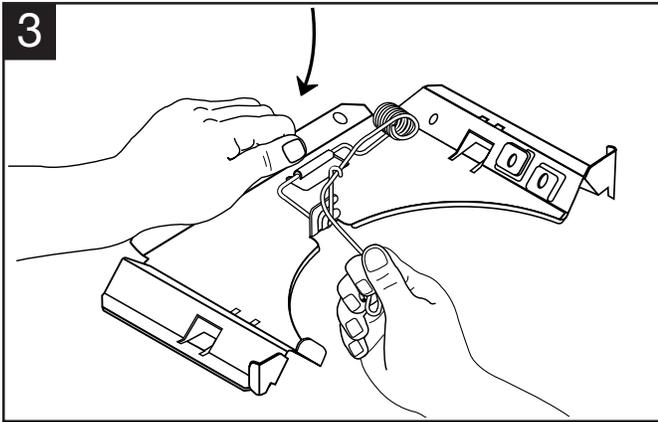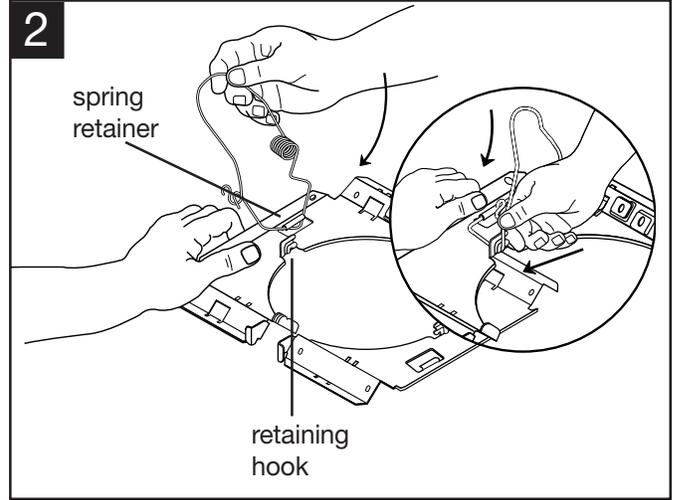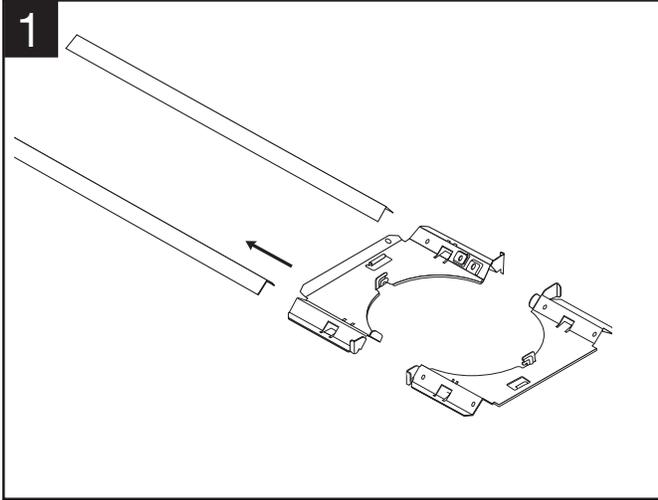
2.2   Flush-mount loudspeaker enclosures

Note: *If the electrical connections have not yet been made, 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 or damage the mounting hole or the loudspeaker rim.

If the springs are to support the loudspeaker while making the electrical connections, complete Steps 1 and 2 only in Section 2.1.2. Once the loudspeaker is hooked on the springs, continue with Section 2.3.4, "Rotation feature" and Section 2.3, "Electrical connections," then return to Step 3 of this section.

Note: *Do not remove the protective shield from the loudspeaker until it is time to install the loudspeaker grille. The loudspeaker grille may be installed when it is felt that subsequent installation steps or construction activities are not likely to result in grille damage.*

English
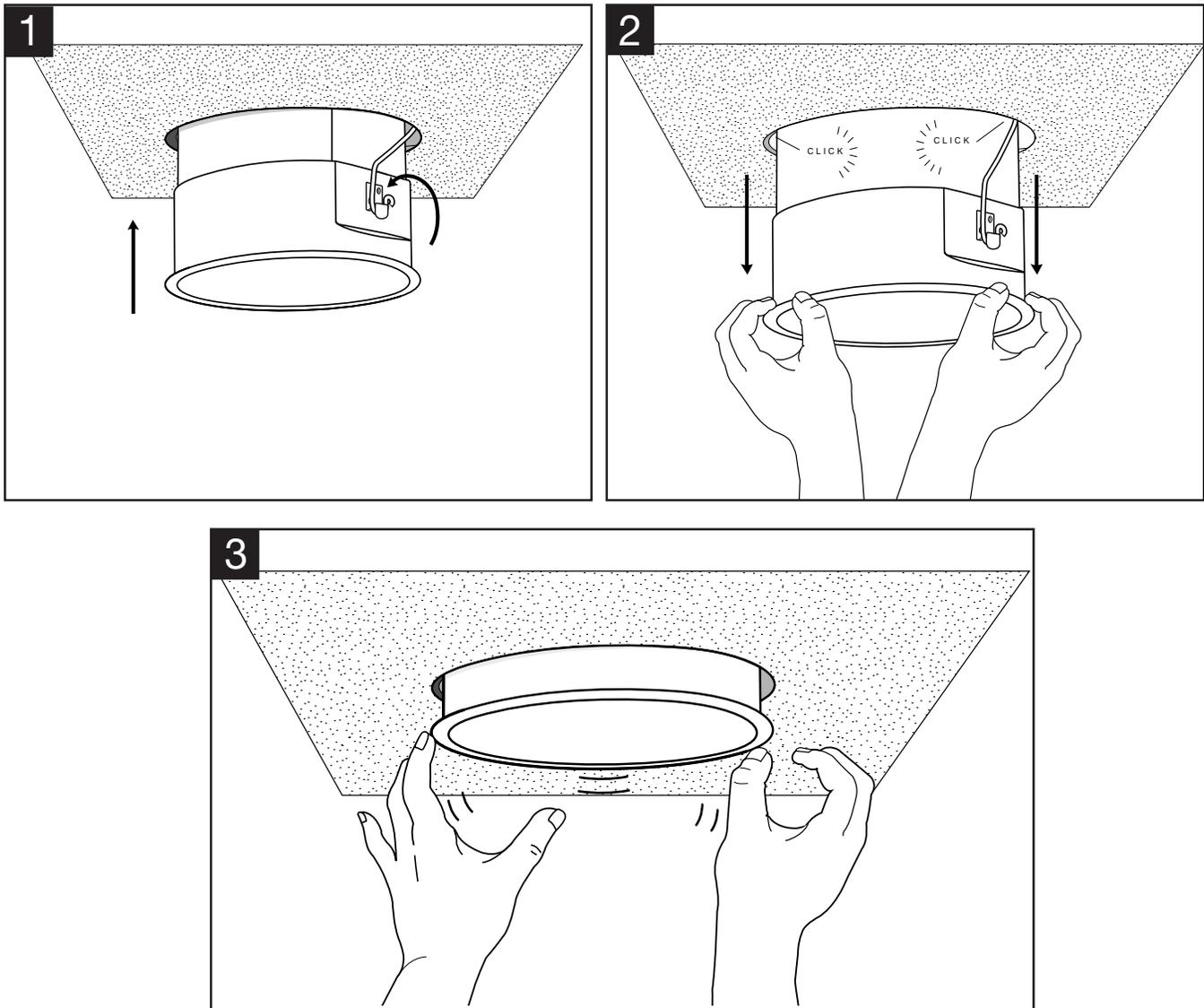
2.3 Electrical connections

2.3.1 Wire protection

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

2.3.2 Wire preparation

Strip the wires to $^5/_{16}$ inch (8 mm).

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

2.3.3 Wire connections

Note: *Keep the following rule in mind when making the wire connections.*
Red on the loudspeaker is connected to the + on the amplifier.
Black on the loudspeaker is connected to the - on the amplifier.

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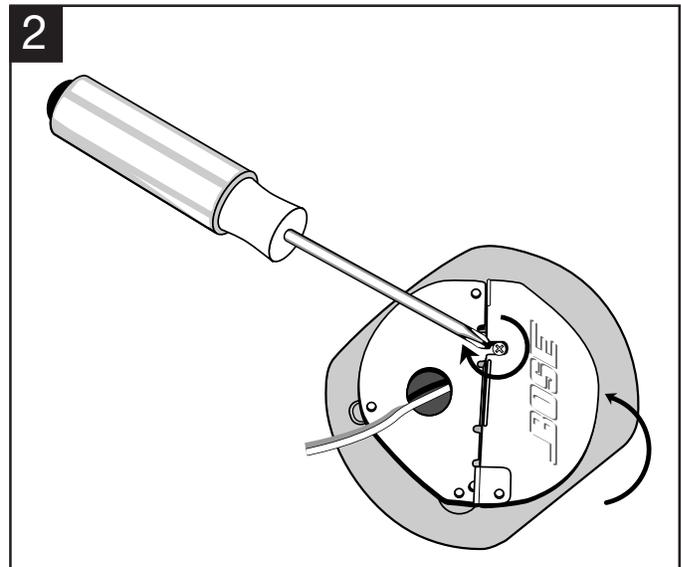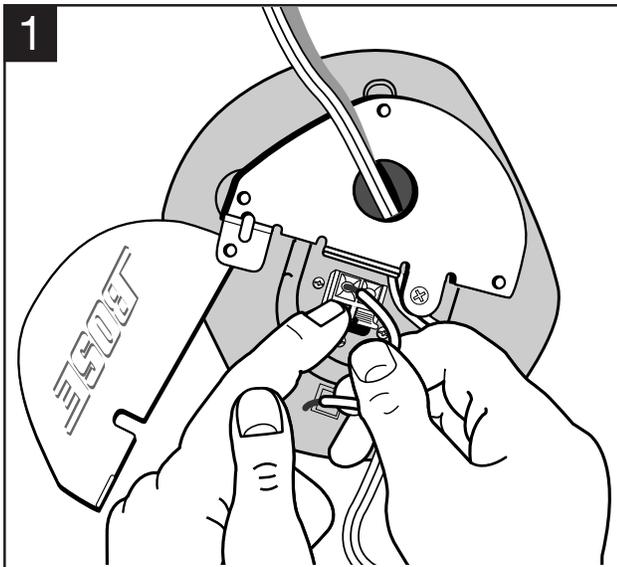
2.3.4 Rotation feature

The rotation feature provides access to the loudspeaker terminals during and after installation. Use this feature for extra support while completing electrical connections. The rotation feature is not an option if the ceiling is thick or the tiles are soft.
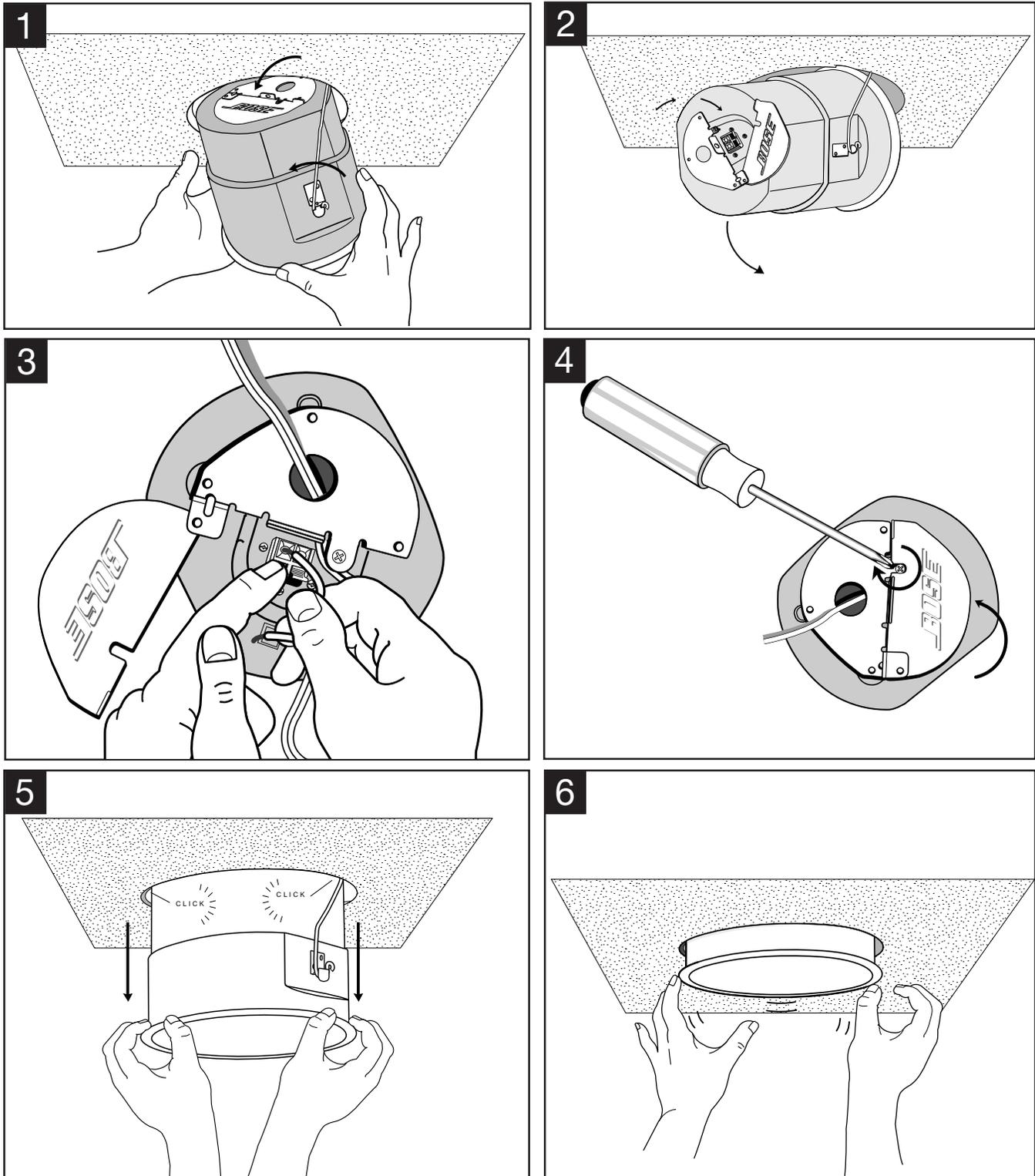
2.4   Installing the flush-mount loudspeaker grille
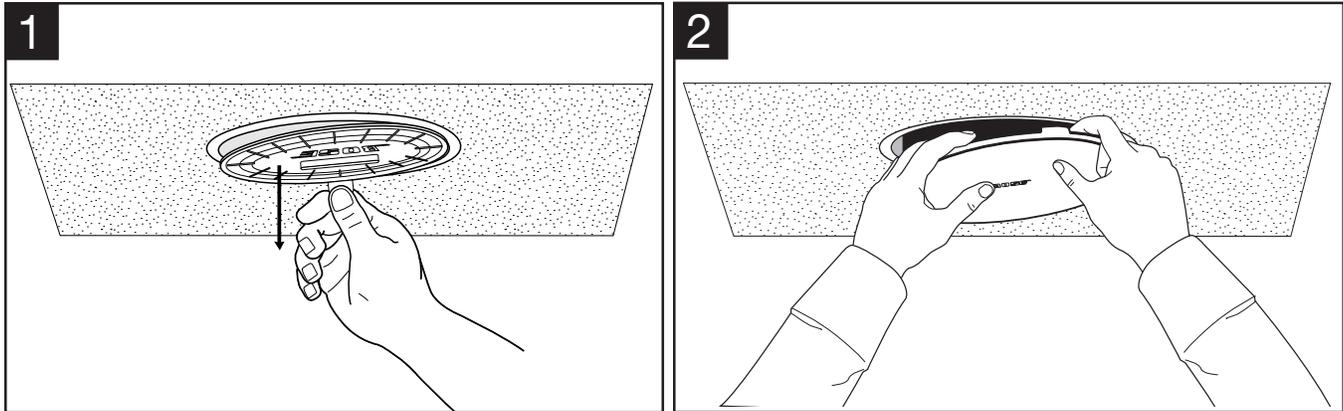
2.5   Removing installed flush-mount loudspeakers

WARNING

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

1. Return the springs to their locked position. If possible, pull the loudspeaker down and rehook the springs in their locked position.

2. Lift the loudspeaker off the springs and remove it.

Note: If the springs cannot be rehooked, release them completely. Hold a spring by its hook and carefully release as much tension as possible. Then release the spring. Repeat for the second spring.

2.6   Installing a surface-mount loudspeaker

Wall construction and material must be sturdy enough to support the loudspeaker weight of 2$\frac{1}{2}$ lb (1.2 kg). Bose® is not responsible for loudspeakers mounted in or on unsuitable surfaces.

The type and length of fastener depends upon the mounting surface selected. To mount to hollow gypsum board or plaster wall, use wall anchors with a load rating in shear of at least 25 pounds PER FASTENER. Direct attachment to more substantial material also should meet this criteria.

English
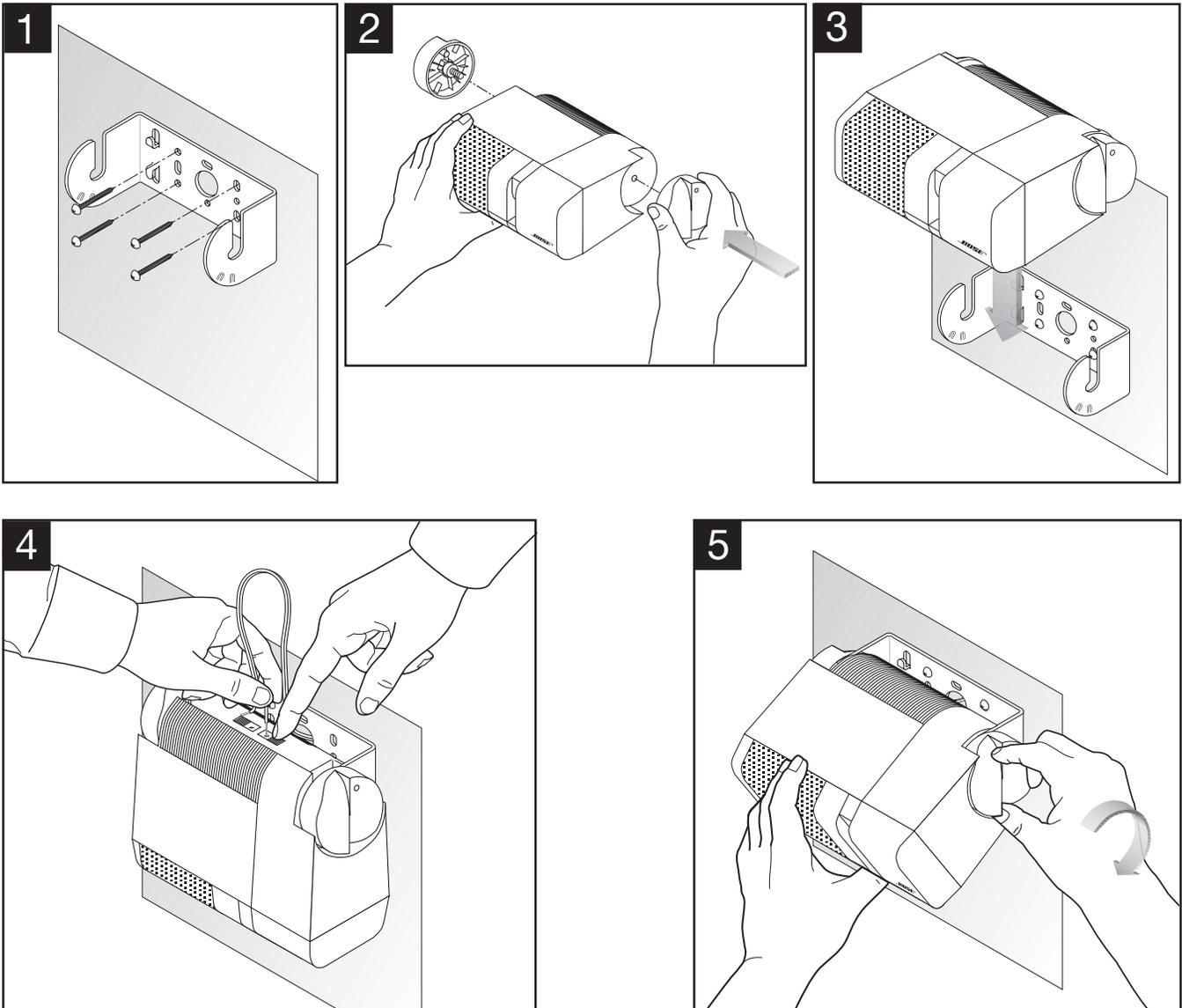
2.7   Removing a surface-mount loudspeaker
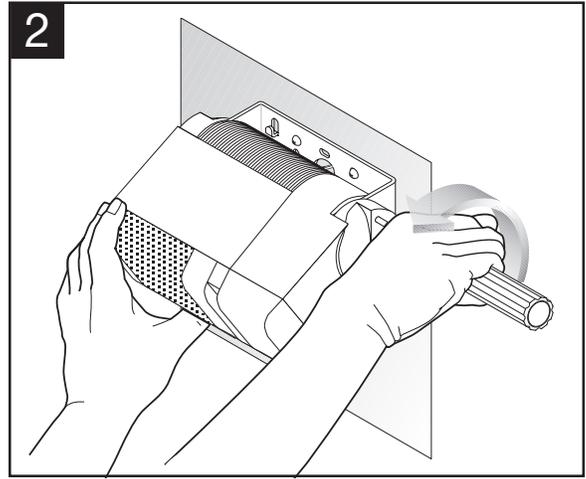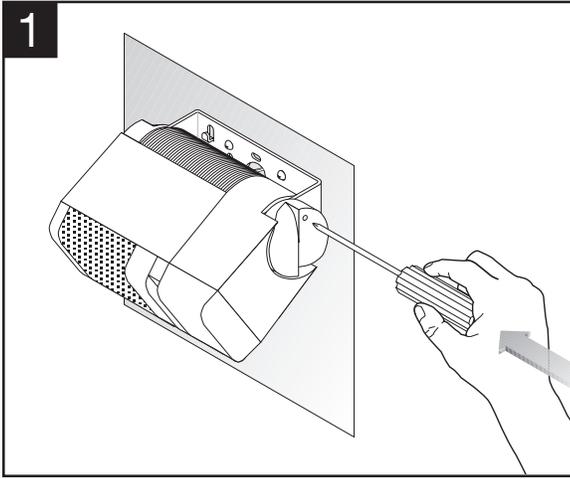
2.8   Electronic system card
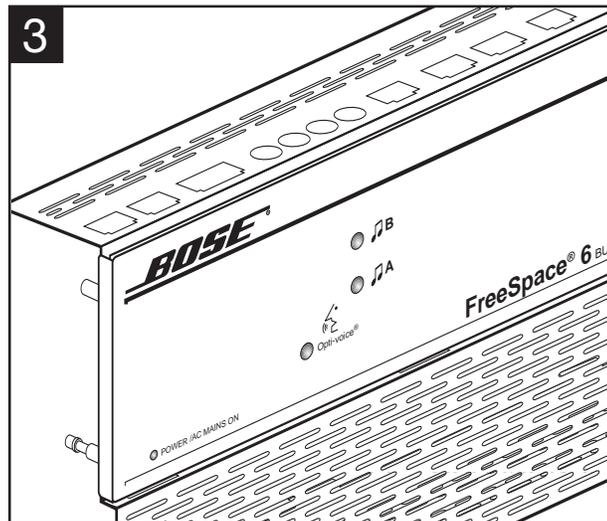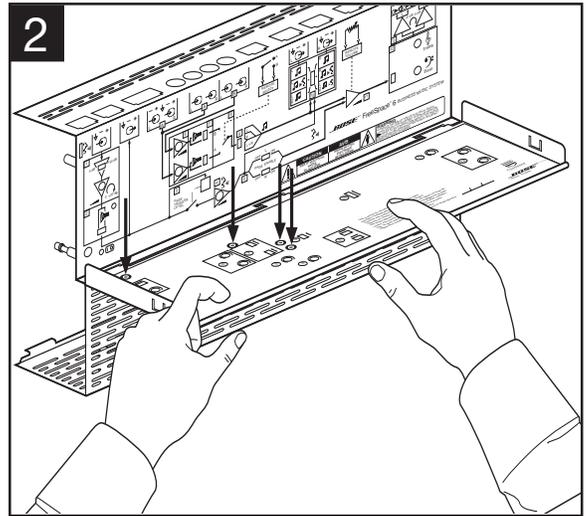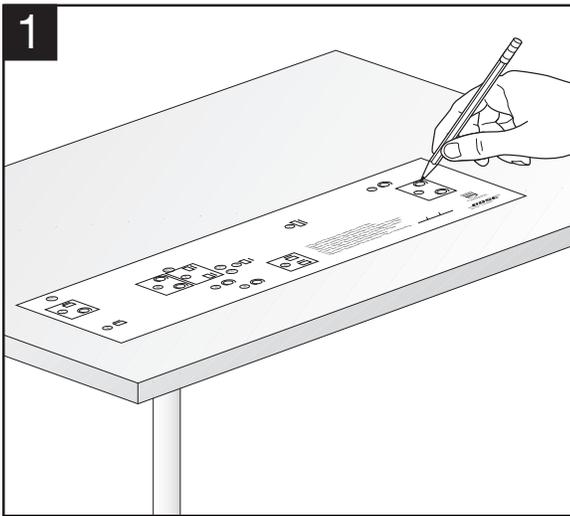
2.9   Mounting system electronics

The system electronics can be shelf or wall mounted. If wall mounted, use proper attachment techniques for your wall construction type.
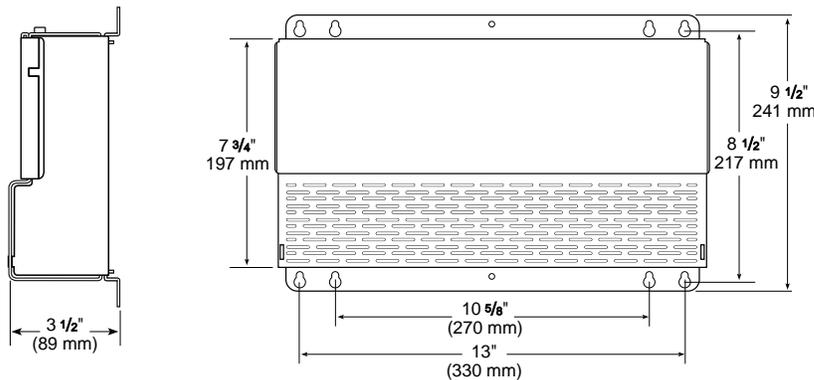
2.9.1 Wall mounting

WARNING

Do not use the system electronics as a drill guide; personal injury could result. Be sure to observe all other safety precautions while drilling or installing the mounting hardware.

Attach the system electronics to a vertical surface using at least four of the ten mounting holes. In the U.S., #10 sheet metal or machine screws, or $3/16$ inch diameter wood screws (or 4 mm diameter metric screws) will work with the "keyhole" mounting holes.

The type and length of fastener depends upon the mounting surface selected. To mount to hollow gypsum board or plaster wall, use wall anchors with a load rating in shear of at least 25 pounds PER FASTENER. Direct attachment to more substantial material also should meet this criteria. The keyholes make it easy to pre-install the fasteners before mounting. For security from accidental or rapid removal of the system electronics, use washers under the screw heads. This prevents using the keyhole feature. The two additional round holes may be used for the same purpose.

Recommendation: Bose® recommends using at least one fastener at each of the four corners of the product. The additional holes allow you to mount the system electronics securely.

2.9.2 Shelf mounting

1. If mounting in an audio equipment rack, use a shelf designed for rack systems. If the shelf is above other sources of heat such as amplifiers, use a solid material shelf not a perforated material shelf.

    Note: *DO NOT attach a rack panel to the front of the system box to mount it in a rack.*

2. Maintain the 2 inch (50 mm) clearance recommendations when stacking electronic equipment above or below the system electronics.

3. To prevent accidental dislodging of the system box, use at least two mounting screws to attach the system to the shelf surface.

4. Use cable ties or other forms of strain relief on the signal and loudspeaker cables to prevent excessive mechanical stress on the wire connections.

5. Allow enough cable slack to move the system electronics forward if adjusting the controls is needed.

6. Dress the wiring so that no one can accidentally trip over it.

2.9.3 Connections

Note: To prevent excessive mechanical stress on the wire connections, use cable ties or other strain relief for the signal and loudspeaker cables.

If using a push-to-talk microphone, be sure the push-to-talk switch is properly wired so that it places a short circuit across the microphone output except when the user presses the switch.

CAUTION

Improper connection can damage both the source equipment and the FreeSpace® 6 system. Be sure to review this guide for information on nominal output voltage, output impedance, and balanced and unbalanced outputs.

Note: Sources are either balanced or unbalanced. Call 1-800-288-2673 (in the U.S. and Canada) or your local Bose® office and request the "Balanced and Unbalanced Source Terminals" information packet (PN183072).

Input connections	Instructions
Paging microphone	**1.** Connect the signal wires of the paging microphone to the quick connect terminal block. **2.** Insert the quick connect terminal block into the paging microphone input.
Telephone systems (PBX) and a central paging signal (such as in malls)	Follow the connection diagram for a balanced or an unbalanced source found in the "Balanced and Unbalanced Source Terminals" information packet available from Bose. Call your local Bose office and request it.
Music source	The following two audio sources are available: • Music Input A accommodates either balanced or unbalanced configurations. – For balanced sources, use the quick connect terminal block. – For unbalanced sources, use the RCA (phono) connectors. • Music Input B accepts unbalanced RCA plugs only.
Remote control	The cable should consist of two wire pairs (22-24 gauge or heavier), with an overall jacket. Select the wire according to safety agency requirements for the installation. No hazardous voltage is present on these wires. One twisted pair might be two white wires, the other pair two black wires.

The remote volume control wires carry small DC voltages (less than 15V) derived from high impedance circuits and do not constitute a safety hazard. Two of the conductors are at the chassis ground potential of the amplifier.

• Use the black pair to connect the potentiometer to the Remote Volume connector on the amplifier

• Use the white pair to connect the switch to the Remote Select switch on the amplifier

The bare wires connecting the remote control to the amplifier are not a hazard. Shorting any or all of them will not damage the system. However, if the wires are not properly terminated, there may be unwanted source selection or muting of the system.

Note: For convenience during setup, connect the remote control temporarily using a short cable.

Output connections	Instructions
Page	The Page Output provides a line-level signal consisting of the paging announcements only. This can be fed to power amplifiers and loudspeakers (or a powered loudspeaker) for a zone such as a valet parking station. The Page Output is muted until a paging signal triggers it. It puts out about 2V. The Remote Control unit DOES NOT control this output.
Line Out L and R	Complex, extended systems can be created originating with the FreeSpace® 6 system electronics. The two Line Outputs provide a pair of signals useful for system expansion. The signals available depend upon the setting of the Line Output Selector switch in block 10. • Top position: stereo music without paging • Center position: stereo music with paging • Lower position: only mono music at left; mono music + paging at right
Loudspeaker outputs	Connect a dedicated loudspeaker cable from each of the four loudspeakers to each amplifier terminal pair. Each output channel on the amplifier connects directly to one loudspeaker. The red terminal (+) of the loudspeaker connects to the positive (+) terminal on the amplifier. If one or more loudspeaker is not connected properly, a loss in bass output can result.

English

Figure 1
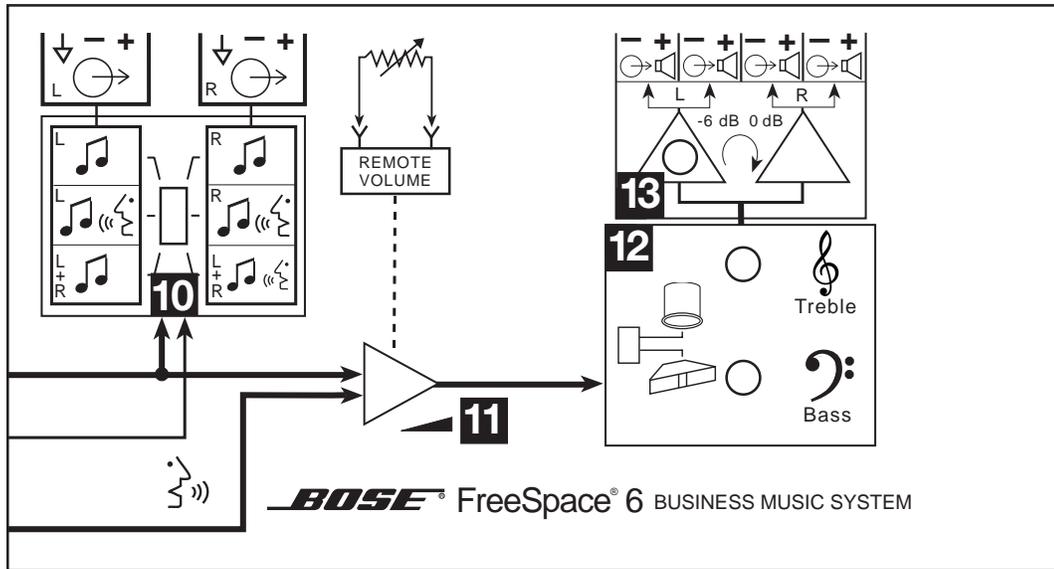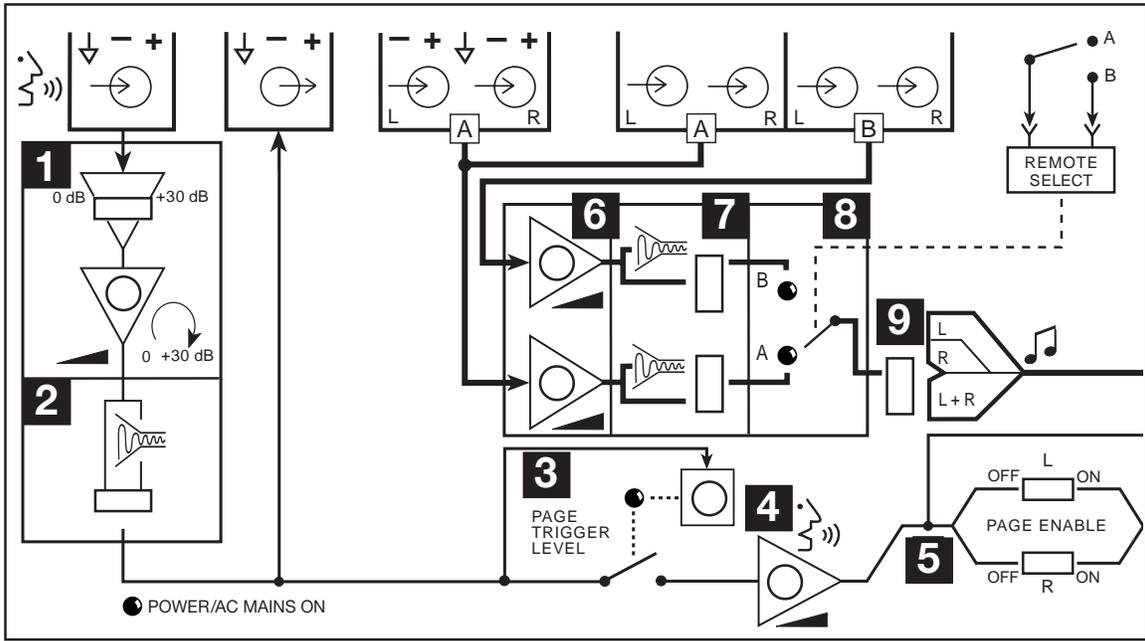
Use the electronic system card (found in the documentation kit) to mark the settings of the zones used in this installation. See page 20. This card is to be stored inside the electronic system cover as an aid in troubleshooting problems.

3.1 Power on/off

The on/off switch is on the right side of the system electronics. If desired, the switch can stay in the ON position. Power consumption without a signal input is typically less than 10 Watts.

3.2 Opti-voice® compressor

The Opti-voice compressor maintains a constant output level for inputs varying over a 30dB range. A LED in block 2 glows green when the compressor is active, but flashes red if the paging circuit is close to being overloaded. Use the compressor when the microphone is used in one or more of the following ways:

• More than one person is using it

• Users vary in how loud they talk into it

• Users vary in how close they hold it to their mouth

Do not use the compressor in cases where:

• There is a tendency for feedback (howling sound, due to loudspeakers being picked up by the microphone)

• The source is a line level signal from a mixer or amplifier with similar signal processing

3.3 Music compressor

The music compressor solves the problem created as the audio industry improves the dynamic range of program material. The music compressor takes about 25dB out of the 90dB or so dynamic range of modern digital program material and is quiet and unobtrusive in operation. It boosts the quiet passages and leaves the loud passages alone. It can even be used on highly compressed material, such as broadcast FM popular music, since it will not do much additional compression on this already compressed material.

3.4 Setting levels

Make the gain adjustments after completing the connection of all source, loudspeakers, and auxiliary expansion components. Refer to **Figure 1** to locate the blocks referred to in this document.

3.4.1 Music sources

Before beginning adjustments, set the music controls as follows:

Control Name	Block	Set to...
Music Input Source A (or B) Trim potentiometer	6	Minimum gain (ccw)
Music Compressor Enable A (or B) switches	7	Enable, unless you choose not to use the Music Compressor
Remote control volume	none	3:00 (about 5dB attenuation)
Remote control source selection switch	none	Source A (the A LED in block 8 should light)

3.4.1 Music sources (cont'd)

Play a test CD or tape. Choose a passage representing the loudest music to be played regularly.

If the...	Then...
Music Input Source A has a fixed level output	Use it. If not, set the variable level output to maximum.
Music compressor is ON for Music Input Source A	Adjust the Music Input Source A Trim so the music compressor LED glows green during the loudest passages. If the LED changes to red, the level is too high. Lower the trim control until the LED stays green.
Music compressor is OFF for Music Input Source A	Adjust the Music Input Source A Trim until the music compressor LED flashes red. Then lower the trim control until the LED stays off.

Repeat for Music Input Source B using the Music Input Source B Trim.

3.4.2 Paging source

Before beginning adjustments, set the paging controls as follows:

Control Name	Block	Set to...
Remote control volume	none	3:00 (about 5dB attenuation)
Page Enable L & R	5	Both L & R ON
Opti-voice® compressor switch	2	The right, if the compressor will be used (compressor enabled)
Page Source Gain Switch	1	30dB, if the page source is a microphone 0dB, if the page source is line level
Page Source Gain Trim	1	0dB
Page Trigger Level	3	Center
Page Mix Trim	4	Center

1. Have someone continuously speak into the microphone while adjusting the controls. If the microphone has a push-to-talk switch, hold it ON during the adjustments. A music source should also be playing. For optimum results, follow these tips:
   - Keep the microphone about 6 inches (15 cm) from the mouth
   - Speak at a normal vocal level

If the...	Then...
Opti-voice compressor is ON	Adjust the Page Source Trim until the Opti-voice compressor LED glows green during the loudest passages.
LED switches to red	The level is too high. Lower the Page Source Gain Trim control (block 1) until the LED stays green.
Opti-voice compressor is OFF	Adjust the Page Source Gain Trim until the Opti-voice compressor LED flashes red. Lower the trim control until the LED stays OFF.

3.4.2 Paging source (cont'd)

2. While speaking into the microphone, slowly turn down (to the left) the Page Trigger Level control (block 3) until the amplifier disables paging and the LED in block 3 goes out.

    Turn the control back to the right until the paging comes ON again.

3. Have the person stop speaking, but keep the push-to-talk button ON. The LED in block 3 should go out and the music source should fade in.

4. Have the person resume speaking with the push-to-talk button ON. The paging source returns and the music source fades out.

3.4.3 Page/music balance

Follow these steps to set the music and the paging levels.

1. Turn on Music Sources A and B.

2. Use the Remote Volume control to adjust the overall level.

3. Use the remote control to select Source A.

4. Have the person speak into the microphone. Adjust the Page Mix Trim (block 4) until the announcement is just loud enough to be heard clearly. Be sure to set the paging level loud enough to be heard in noisy environments, such as when a room is filled with loud patrons.

5. Have the person speak again, louder and closer to the microphone. If the Opti-voice® compressor is used, it should reduce the gain, maintaining a reasonable level, and preventing audible distortion.

6. Switch to Music Input Source B. If Music Input Sources A and B levels are imbalanced, readjusting the settings following the instructions in Section 3.4.1, "Music sources" may be necessary. If readjusting the Music Source trims in block 6, watch the Music Compressor LED in block 7 to be sure it is not flashing red.

3.5   Monaural installations

If the music source is...	Then...
Monaural	Use a "Y" connector cable to connect the source to both the L and R inputs. Then set this switch to stereo (up).
	Another option is to connect the source to the L input only. Then set the mono/stereo switch to mono (down). The mono source will play at both L and R loudspeaker outputs. However, system sensitivity will be reduced by 6dB. In this case, use a 400mV source level to reach full power. Most sources will deliver 400mV at full modulation without a problem.
Mixed (1 mono and 1 stereo)	Use a "Y" connector to feed the mono source into both the L and R inputs. The stereo source is connected to the other source input. Set the mono/stereo switch to stereo.

3.6 Dual zone, single source system

The FreeSpace®6 business music system can be used to create a two-zone single source installation using the same monaural music source. Each zone can have different loudness levels and a choice of page overrides. There is no provision for independent page sources for the two zones—there is only one page input on the system electronics.

3.6.1 L zone trim (block 13)

This trim adjusts the level of the "left" zone relative to the "right" zone in mono installations, where one group of loudspeakers on the left amplifier output must be adjusted in level relative to a second group of loudspeakers on the right amplifier output. The control has a range of 0dB to –6dB. Use the R loudspeaker outputs to drive the zone that is supposed to be the louder of the two, and use the L loudspeaker outputs for the quieter zone.

3.7 Page enable (block 5)

Page Enable switches can be used to determine which, if either, zone receives paging.

One special issue attaches to the use of the Page Enable switches in this two-zone case. The phase of the loudspeaker output is inverted when paging is enabled (180° phase reversal). If one zone has paging enabled and the other zone has paging disabled, the loudspeakers in the L zone will be out of phase with the loudspeakers in the R zone. Since the whole point of using the two zones is to provide a differentiated set of zone signals, there will usually be enough separation between zones so that there is no overlap region where acoustic energy from both zones is present. If, however, there is an overlap zone, sensitive listeners may sense "something funny" from the sound, especially as they move around in the overlap region. There could also be a perception that the bass is diminished in this region.

Avoid an overlap zone if using a FreeSpace business music system in this way.

3.8 Loudspeaker equalization switch and the bass and treble controls (block 12)

The loudspeaker equalization switch is used to select the proper equalization for the loudspeaker type you have installed. Selecting the incorrect equalization will produce undesireable results.

The bass and treble controls may be used to make a final "touch-up" of the frequency response in the installation. These controls have a range of about ±6dB maximum, and will generally be left flat (turned to their center position). Bose® engineers have carefully adjusted fixed and dynamic equalization in the system electronics amplifier to yield an acoustically correct frequency response. However, some environments with many cloth wall hangings might benefit from a slight treble boost.

Symptom	Possible Cause	Remedy
System electronics power LED does not light	The power switch is off	Turn on power switch.
	The power cord is loose, not installed, or defective	Correct the power cord problem.
	The circuit breaker handling this AC outlet has tripped	Turn off the power switch and reset the circuit breaker. If the breaker trips again, there is a problem in the building wiring, or other loads plugged into the same circuit. Call an electrician. If the breaker does not trip, turn on the system electronics. If the circuit breaker trips again, the total load on this circuit may be excessive. Or, the system electronics may be defective. Test the system electronics on another circuit known to not be fully loaded.
	One of the internal fuses has blown	Refer the problem to an authorized service agent. It is not user-serviceable.
No output from loudspeaker Out L and/or R	The power amplifier "no load" protection has been activated	If the system electronics are powered up with no loudspeakers connected, the no load protection will shut down the amplifiers and keep them down even if the loudspeakers are later connected. Make sure that the loudspeakers are properly connected to the system electronics. Turn the AC mains off and back on again.
	The potentiometer wires going to the remote control have been shorted	Confirm this by disconnecting the remote volume control wire at the system. The system should operate at full volume. Check for wire whiskers at the connector or in the remote control or for a defective wire. Repair the short.
Paging is not audible in the loudspeakers	The Page Enable switches (block 5) are set to off	Set the switches to enable paging.
	The Page Trigger Level (block 3) is turned too far down	Turn the Page Trigger Level to the right to increase the sensitivity.
	The Page Mix Trim (block 4) is turned too far down	Turn it to the right and adjust for the correct paging level.
The volume is at full and does not respond to the Remote Volume control	The wiring to the Remote Volume control has been cut or has fallen out of place at one end, or the potentiometer in the remote control has broken	Locate and correct the problem.

Symptom	Possible Cause	Remedy
The loudspeakers go silent after a half hour or so of operation	The amplifiers are shutting down from thermal overload	Check that the installation permits adequate air flow around the system electronics and correct if it does not.
Feed back during paging from a microphone	There is too much gain for the paging signal	Reduce the gain with the Page Source Gain Trim or the Page Source Gain Switch (block 1). If using the Opti-voice® compressor, try disabling it (block 2).
	Page mic is too near one of the loudspeakers	Relocate the loudspeaker nearest to the page mic or relocate the page mic. Change the page microphone to a type with a more directional (cardioid) pickup pattern and orient it away from the direction of the nearest loudspeaker.
The Opti-voice compressor LED (block 2) flashes red sometimes	The gain in block 1 has been set too high	Reduce the gain in block 1 until the LED no longer flashes red even with the loudest paging signal.
Quiet passages of music hard to hear	The Music Compressor has not been enabled	Enable the Music Compressor (block 7).
	The Music A or B Source Trim has been set too low	Turn the appropriate Music Source Trim control (block 6) to the right until the Music Compressor LED glows green. Back off the adjustment if the LED turns red.
The Music Compressor LED flashes red sometimes	The gain in block 6 has been set too high	Reduce the gain in block 6 until the LED no longer flashes red even with the loudest musical source.
There is not enough bass or "something funny" about the sound in one listening region	One or more loudspeakers are out of phase	Check that all loudspeakers are in phase.
	The installation is a dual mono one, where paging is enabled in one zone but not in the other. At least one loudspeaker in each zone is covering the same listening area and there is bass cancellation and/or comb filtering effects	The phase of the loudspeaker output is inverted when paging is enabled (180° phase reversal). Relocate one or both loud-speakers to avoid an overlap zone.
	Loudspeakers are placed within $3^1/_2$ feet (1 m) of a wall or walls, causing bass cancellation	See Section 3.2.1 of the *Bose® FreeSpace® 6 Business Music System Installer's Guide.*
	The Bass Control (block 12) has been turned down	Turn the Bass Control up.

Electrical specifications

System electronics

- Input sensitivity: 200mV (music input), 200µV (page input)
- Power output: 16W into 2Ω load
- Power requirements: 120V or 220-240V ~ 50/60Hz
- Maximum power consumption: 140W
- Remote volume control value: 10kΩ, Audio taper
- Music input impedance, channel A: Balanced: 32kΩ, Unbalanced: 11kΩ
- Music input impedance, channel B: Unbalanced: 10kΩ
- Page input impedance: Balanced: 9kΩ, Unbalanced: 1kΩ
- Page and line output impedance: 400Ω
- Page gain: 0dB to 80dB adjustable
- Frequency range: 80Hz – 16kHz
- Noise (line in to loudspeaker outputs): 20Hz – 20kHz bandwidth; -50dBV at 20dB gain into a 2Ω load
- Noise (line in to line outputs): 20Hz – 20kHz bandwidth; -65dBV at 20dB gain into a 10kΩ load
- Frequency response: 20Hz – 20kHz, ±1dB, referenced to 1kHz at line outputs
- Opti-voice® paging circuitry: voice band equalization for maximum speech intelligibility, AGC circuit for automatic compensation of varying input levels, gradual return of music to original level after page

Mechanical specifications

System electronics

- Dimensions: 4 inch (H) x 7.5 inch (W) x 15 inch (D)
          (10.16 cm x 19.05 cm x 38.10 cm)
- Weight: 11.3 lb (5.14 kg)

Flush-mount loudspeakers

- Dimensions: 10.42 inch (H) x 10.87 inch (W) x 6.5 inch (D)
          (26.47 cm x 27.61 cm x 16.51 cm)
- Weight: 4.2 lb (1.9 kg) installed with mounting hardware
- Finish: *Front baffle* – Arctic white polymer

  Rear enclosure – aluminum

  Grille – vandal resistant, expandable metal mesh

Surface-mount loudspeakers

- Dimensions: 3.3 inch (H) x 7.6 inch (W) x 6.4 inch (D)
          (8.38 cm x 19.30 cm x 16.33 cm)
- Weight: 2.5 lb (1.2 kg) installed with mounting hardware
- Finish: *Front baffle* – Arctic white or Pro grey polymer

  Rear enclosure – Arctic white or Pro grey polymer

  Grille – vandal resistant, expandable metal mesh

Acoustic specifications

Flush-mount loudspeakers

• Sensitivity: 85dB-SPL 1W @ 1m, maximum 94dB-SPL 8W @ 1m
• Impedance: 4Ω nominal
• Power handling: 8W
• Bandwidth: 80Hz-15kHz
• Beamwidth (average over 1-4kHz): 150° @ -6dB

Surface-mount loudspeakers

• Sensitivity: 85dB-SPL 1W @ 1m, maximum 94dB-SPL 8W @ 1m
• Impedance: 4Ω nominal
• Power handling: 8W
• Bandwidth: 80Hz-15kHz
• Beamwidth (average over 1-4kHz): 150° @ -6dB

Flush-mount loudspeaker dimensions

10.87"
276.1 mm

10.42"
264.7 mm

5.60"
142.2 mm

.77"
19.6 mm

6.02"
152.9 mm
Minus "T"

T

6.28"
159.5 mm

English

Surface-mount loudspeaker dimensions

3.30
83.90

6.43
163.34

7.60
193.04

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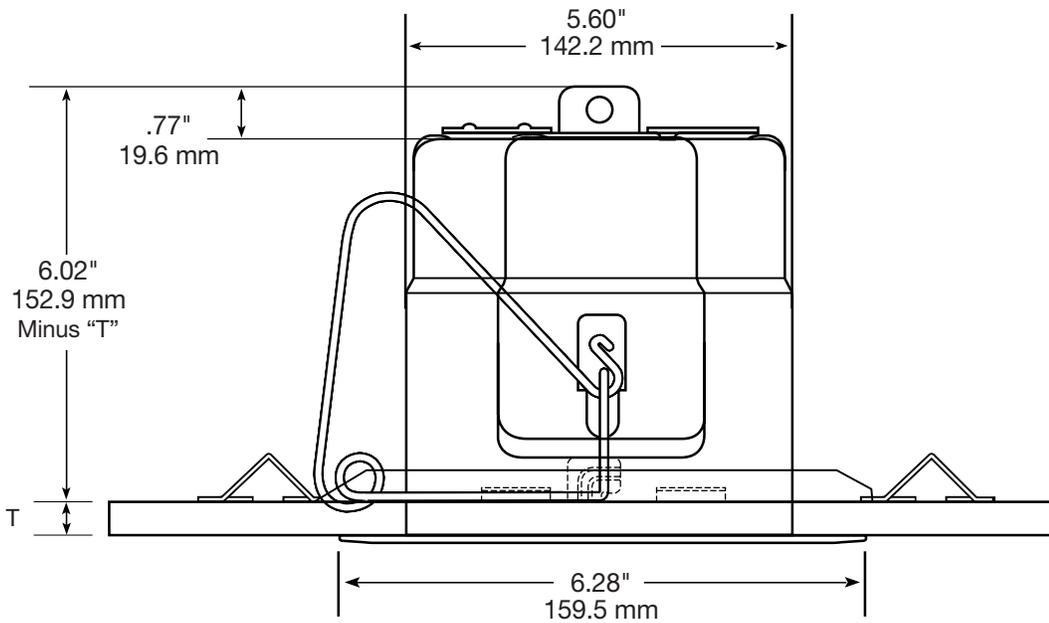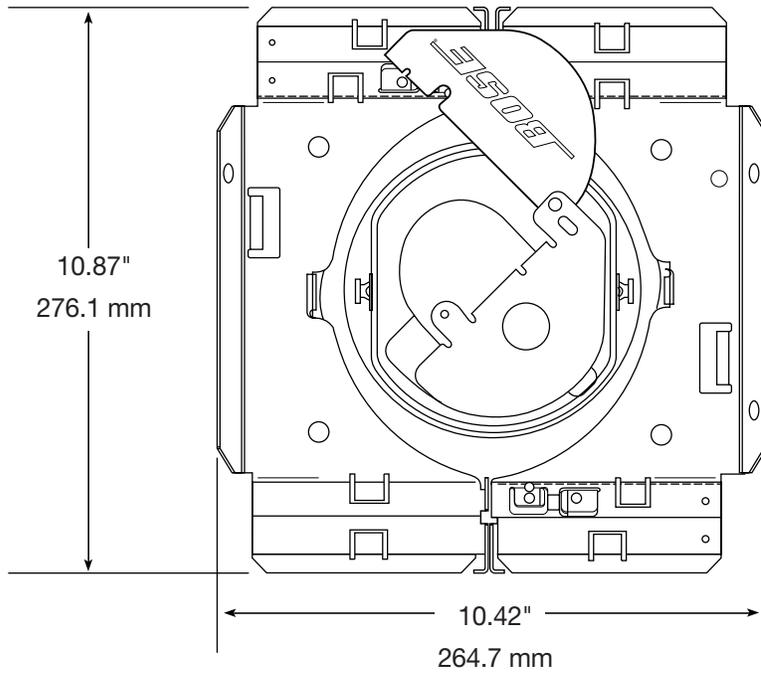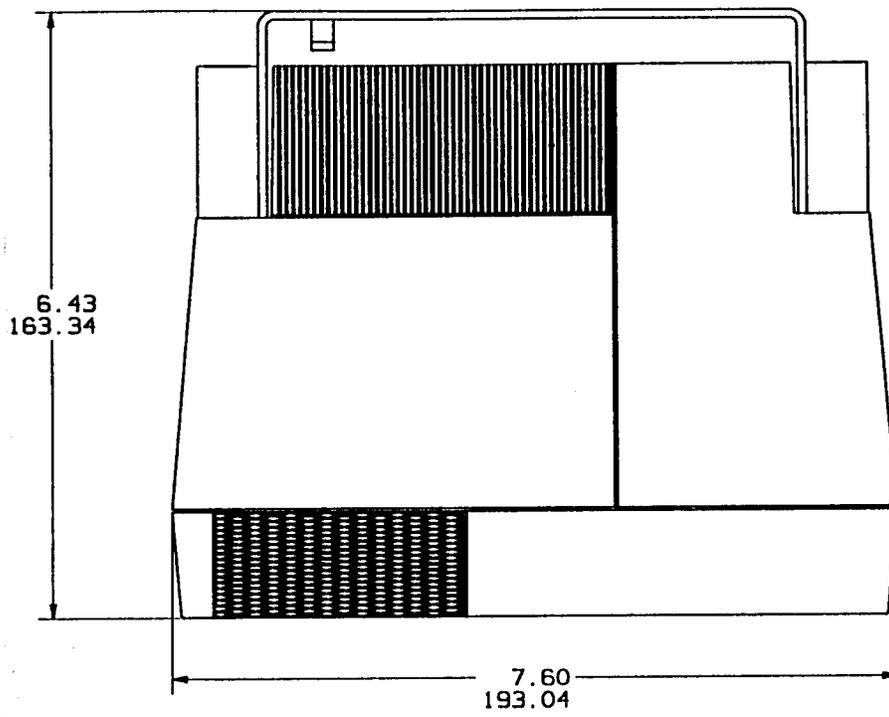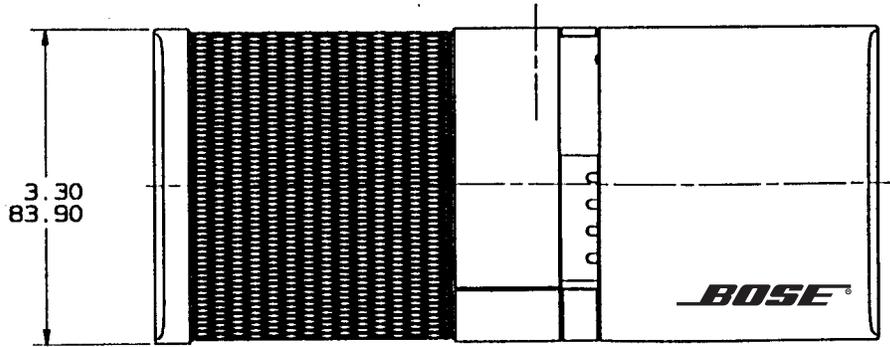
Notes

USA
Bose Corporation, The Mountain
Framingham, MA 01701-9168
1-800-288-BOSE (288-2673)
Weekdays 9 a.m. to 8 p.m.
Saturdays 9 a.m. to 3 p.m. ET (eastern time)

Canada
Bose Ltd., 8-35 East Beaver Creek Road
Richmond Hill, Ontario L4B 1B3
1-800-444-BOSE (444-2673)
Weekdays 9 a.m. to 5 p.m. ET (eastern time)

European headquarters
Bose B.V., Nijverheidstraat 8
1135 GE Edam, Nederland
TEL 0299-371055   FAX 0299-368163

Australia
Bose Australia, Inc.,1 Sorrell Street
Parramatta, N.S.W. 2150
TEL 02 204-6111   FAX 02 204-6122

Belgique/België
Bose N.V., Essenestraat 16, 1740 Ternat
TEL 02-5826200   FAX 02-5823717

Danmark
Bose A/S, Industrivej 7, 2605 Brøndby
TEL 043437777   FAX 043437818

Deutschland
Bose GmbH, Max-Planck-Straße 36d
D-61381 Friedrichsdorf
TEL 06172-71040   FAX 06172-710419

France
Bose S.A., 6, rue Saint Vincent
78100 Saint Germain en Laye
TEL 01-30616363   FAX 01- 30614105

Ireland
Bose Corporation
Carrickmacross, Co Monaghan
TEL 042-61988   FAX 042-61998

Italia
Bose S.p.A., Via Luigi Capucci 12
00147 Roma
TEL 06-5127641   FAX 06-5115438

Japan
Bose K.K., Shibuya YT Building, 28-3
Maruyamacho, Shibuya-ku, Tokyo
TEL 03-5489-1054   FAX 03-5489-0591

Nederland
Bose B.V., Nijverheidstraat 8, 1135 GE Edam
TEL 0299-366661   FAX 0299-368166

Norge
Bose A/S, Solheimsgt. 11
N-2001, Lillestrøm
TEL 063-817380   FAX 063-810819

Österreich
Bose Ges.m.b.H.
Vienna Business Park
Wienerbergstrasse 7 (10.OG)
A-1100 Vienna
TEL 01-6040434   FAX 01-604043423

SchweizNorge
Bose A/S, Solheimsgt. 11
N-2001, Lillestrøm
TEL 063-817380   FAX 063-810819

Schweiz
Bose AG, Rünenbergerstrasse 13
4460-Gelterkinden
TEL 061-9815544   FAX 061-9815502

Sverige
Bose A/S, Blandsädsgatan 2D
S-43146 Mölndal
TEL 031-878850   FAX 031-274891

United Kingdom
Bose Limited, Unit G2
Trinity Trading Estate
Sittingbourne, Kent ME10 2PD
TEL 01795-475341   FAX 01795-427227

Other locations
Bose Service, 1 New York Avenue
Framingham, MA 01701-9168 USA
TEL (508) 229-8484   FAX (508) 229-3891

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