

FreeSpace® 4400 Business Music System

OWNER'S GUIDE





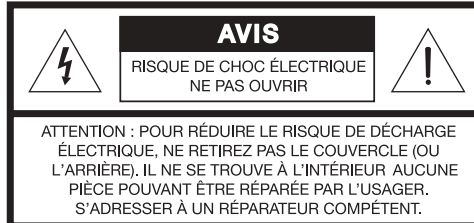
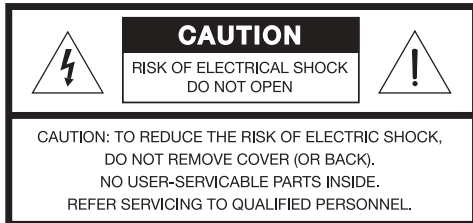
BOSE®

Safety Information

Please read this owner's guide

Please take the time to follow the instructions in this owner's guide carefully. It will help you set up and operate your system properly and enjoy all of its advanced features. Please save this owner's guide for future reference.



-  **WARNING:** To reduce the risk of fire or electrical shock, do not expose the product to rain or moisture.
-  **WARNING:** The apparatus shall not be exposed to dripping or splashing, and objects filled with liquids, such as vases, shall not be placed on the apparatus. As with any electronic products, use care not to spill liquids into any part of the system. Liquids can cause a failure and/or a fire hazard.






The lightning flash with arrowhead symbol within an equilateral triangle alerts the user to the presence of uninsulated, dangerous voltage within the system enclosure that may be of sufficient magnitude to constitute a risk of electrical shock.



The exclamation point within an equilateral triangle, as marked on the system, is intended to alert the user to the presence of important operating and maintenance instructions in this owner's guide.

-  **CAUTION:** Make no modification to the system or accessories. Unauthorized alterations may compromise safety, regulatory compliance, and system performance.
-  **CAUTION:** This product shall be connected to a mains socket outlet with a protective earthing connection.

 This product conforms to the EMC Directive 89/336/EEC and to the Low Voltage Directive 73/23/EEC. The complete Declaration of Conformity can be found on www.Bose.com/static/compliance/index.html.

-  **Note:** Where the mains plug or appliance coupler is used as the disconnect device, such disconnect device shall remain readily operable.
-  **Note:** The product must be used indoors. It is neither designed nor tested for use outdoors, in recreation vehicles, or on boats.
-  **Note:** Provide an earth connection before the main plug is connected to the mains.

Important Safety Information

Caution marks on the product

These CAUTION marks are located on the back of the product.



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The exclamation point within an equilateral triangle, as marked on the system, is intended to alert the user to the presence of important operating and maintenance instructions in this owner's guide.

Important safety instructions

1. Read these instructions.
2. Keep these instructions
3. Heed all warnings.
4. Follow all instructions.
5. Do not use this apparatus near water.
6. Clean only with a dry cloth.
7. Do not block any ventilation openings. Install in accordance with the manufacturer's instructions – To ensure reliable operation of the product and to protect it from overheating, put the product in a position and location that will not interfere with its proper ventilation.
8. Do not install near any heat sources, such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
9. Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding-type plug has two blades and a third grounding prong. The wider blade or third prong are provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
10. Protect the power cord from being walked on or pinched, particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.
11. Only use attachments/accessories specified by the manufacturer.
12. Use only with the cart, stand, tripod, bracket, or table specified by the manufacturer or sold with the apparatus. When a cart is used, use caution when moving the cart/apparatus combination to avoid injury from tip-over.
13. Unplug this apparatus during lightning storms or when unused for long periods of time.
14. Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way such as power-supply cord or plug is damaged; liquid has been spilled or objects have fallen into the apparatus; the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.



15. To prevent risk of fire or electric shock, avoid overloading wall outlets, extension cords, or integral convenience receptacles.
16. Do not let objects or liquids enter the product – as they may touch dangerous voltage points or short-out parts that could result in a fire or electric shock.
17. See product enclosure for safety related markings.
18. No naked flame sources, such as lighted candles, should be placed on the apparatus.



WARNING: To reduce the risk of fire or electric shock, do not expose the amplifier to rain or moisture.

Information about products that generate electrical noise

If applicable, this equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, this is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, you are encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment to an outlet on a different circuit than the one to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Note: Unauthorized modification of the receiver or radio remote control could void the user's authority to operate this equipment.

This product complies with the Canadian ICES-003 Class B specifications.

The information furnished in this user's guide does not include all of the details of design, production, or variations of the equipment. Nor does it cover every possible situation which may arise during installation, operation, or maintenance. If you need assistance beyond the scope of this user's guide, please contact our Customer Service department. See "Customer support" on page 60.

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1.1 The Bose® FreeSpace® 4400 Business Music System



The FreeSpace® 4400 system is an integrated four-channel digital signal processor and 400-watt power amplifier for 70/100V business music applications.

The FreeSpace 4400 system has a total of four source inputs, including two Line In, one Mic/Line and one Page/Mic/Line, to provide the inputs needed for most business music installations. The system also has a direct input which can override the sources playing on all four output channels.

The FreeSpace 4400 system has four amplifier output channels which can be configured for different zones. A Music on Hold output is also provided for simple integration into a phone system.

In a single chassis, it provides all of the processing and control features required for one-to-four zone business music applications. These features include:

- **Auto Volume:** When used with the optional FreeSpace system Auto Volume Sense Mic, FreeSpace 4400 system electronics dynamically control the program level in each zone so your customers can always hear it, regardless of the background noise.
- **Scheduling:** Allows you to program the FreeSpace 4400 system electronics for automated on/off control, source changes, and volume changes according to time of day or day of week.
- **Multi-Zone Paging:** Allows you to initiate a page from a single keypad to one or more of the zones being powered by the same FreeSpace 4400 system.
- **Opti-voice® Paging:** Provides a smooth transition between music and page signals.
- **Opti-source® Input Leveling:** Monitors the input level of up to four sources and continually makes adjustments to maintain a consistent volume level between different sources.
- **Dynamic Equalization:** Maintains tonal balance at all listening levels.
- **Room Equalization:** Provides easy adjustment of tonal balance in each zone.
- **Signal Routing:** Meets the demands of most four-zone systems, allowing for an input source to be routed to any of the four amplifier outputs.

- **Serial Data Interface:** RS-232 serial port for easy interfacing to your PC
- **Remote On/Off Input:** Accepts a remote STANDBY switch

The integrated 400-watt power amplifier features a patented power-sharing technology which dynamically allocates power to each output.

For example, if you have a two-zone system that requires 5 watts in Zone 1 and 395 watts in Zone 2, the FreeSpace 4400 system electronics distributes the power based on those needs.

The FreeSpace 4400 system also includes an easy-to-replace memory module, which holds the system configuration settings and design file uploaded by the FreeSpace 4400 *Installer™* software (see page 3).

1.2 FreeSpace 4400 system accessories

Optional Bose accessories for the FreeSpace 4400 system are available.

- **FreeSpace 4400 System AVM 1-Zone User Interface (PC042351)** A wall-mountable keypad that fits into a standard double-gang junction box. It provides buttons for volume up/down control, 1-3 source selection, and mute or Auto Volume on/off controls for a single zone.
- **FreeSpace 4400 System AVM 2-Zone User Interface (PC042352)** A wall-mountable keypad that fits into a standard double-gang junction box. It provides buttons for volume up/down control, 1-3 source selection, and mute or Auto Volume on/off controls for two zones.
- **FreeSpace 4400 System Auto Volume Mic Kit (U.S.) (PC042354)** One sensing microphone that can be mounted as is or in a standard U.S. single-gang junction box.
- **FreeSpace 4400 System Auto Volume Mic Kit (Euro) (PC042355)** One sensing microphone that can be mounted as is or in a standard Euro single-gang junction box.
- **FreeSpace 4400 System Page User Interface (PC042353)** A wall-mountable keypad that fits into a standard double-gang junction box. It provides buttons for 1-4 page zone selection, all page zones selection and initiate page.

1.3 FreeSpace 4400 *Installer*™ software



FreeSpace® 4400 *Installer*™ software is included with every FreeSpace 4400 system. The FreeSpace 4400 *Installer* software allows you to configure hardware devices such as the FreeSpace 4400 system. The FreeSpace 4400 *Installer* software is designed for use on a PC that is connected to the FreeSpace 4400 system through a serial data interface.

The FreeSpace 4400 *Installer* software requires a computer system with the following minimum requirements:

- 400 MHz Pentium®-based PC
- 256 MB of RAM
- 60 MB of available hard-drive space
- RS-232 serial port
- 800 x 600 display
- 4x CD-ROM drive
- Microsoft Windows® 98, Windows® 98SE, Windows® NT, Windows® 2000, Windows® XP

2.1 Introduction

This section describes the basic steps for designing a FreeSpace 4400 system and includes an example. It is assumed that a complete loudspeaker design and layout has already been created.

2.2 Basic design steps

There are five basic steps in designing a FreeSpace 4400 system.

2.2.1 Step 1 – Determine source routing

Decide which sources will be played in each area. Create a “source map” such as the following one that shows which sources will be played in each major area of the facility.

	Source 1	Source 2	Source 3	Source 4
Area 1	●		●	
Area 2	●	●		●
Area 3	●		●	
Area 4	●			
Area 5	●			

2.2.2 Step 2 – Determine Auto Volume requirements

Identify which areas will use Auto Volume. Each Auto Volume zone must use one AVM (Auto Volume) user interface and one Bose® sensing microphone to control the volume.

When using Auto Volume, remember that you will be adjusting the volume of an overall area. Imagine that you have a dining area and a bar adjacent to one another. If the sensing microphone is placed above the bar, the music may become too loud in the dining area. Likewise, if you place the sensing microphone above the dining area, the music may never be heard in the bar.

Guidelines for establishing Auto Volume zones

Loudspeaker height is...	Background noise is uniform	Background noise is non-uniform
>25 ft (7.6 m)	Not recommended	
12-25 ft (3.7-7.6 m)	One Auto Volume zone for every 3600 ft ² (324 m ²)	One Auto Volume zone for every 1800 ft ² (162 m ²)
<12 ft (3.7 m)	One Auto Volume zone for every 1800 ft ² (162 m ²)	One Auto Volume zone for every 900 ft ² (81 m ²)

Loudspeaker mounting height and the overall quality of the background noise is used to determine the Auto Volume zoning requirements. Uniform background noise is found in an area where no part of the area is louder or quieter than any other. A room with non-uniform background noise would seem louder in some areas (people talking, machinery running, etc.) and quieter in others.

Mounting guidelines for sensing microphones

- The sensing microphone must be mounted at the same height as the loudspeakers or higher. A sensing microphone must never be mounted lower than the loudspeaker height.
- In all cases, there must be 6 ft (1.8 m), minimum, between the loudspeaker and the sensing microphone. This is so that the microphone does not receive signals only from a loudspeaker.
- There must be 35 ft (10.7 m), minimum, between the sensing microphones of two adjacent Auto Volume zones.
- Avoid placing the microphone near unique noise sources like HVAC equipment, dishwashers, motors, etc.

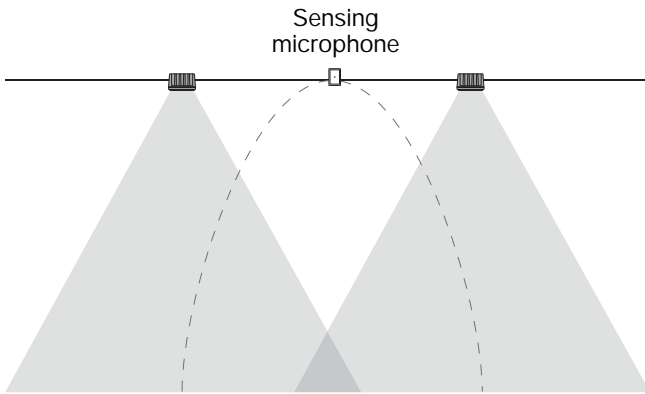
Separating the microphones as much as possible for two zones is the best practice. Consider the previous example of the dining area and a bar adjacent to one another. If each of these areas uses Auto Volume, it is possible to create a situation in the dining area where the music is too loud simply because the microphone is too close to the bar.

2.0 Designing with the FreeSpace® 4400 System

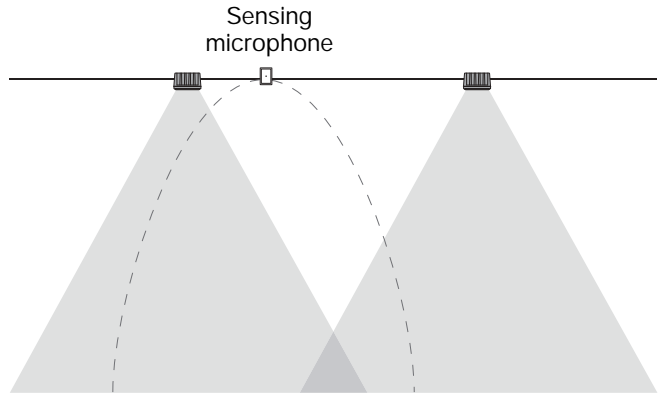
The following are examples of correct and incorrect sensing microphone placements:

Ceiling Flush

Correct placement

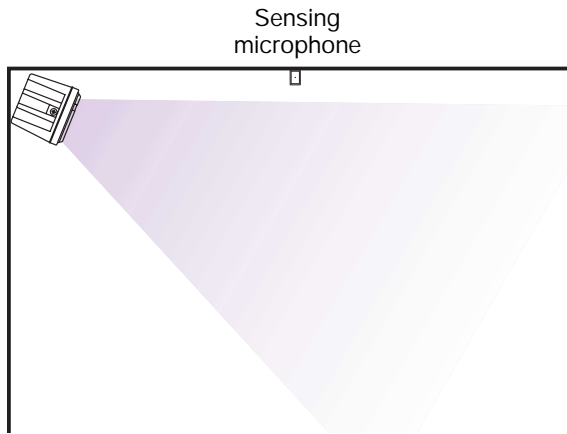


Incorrect placement

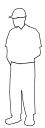
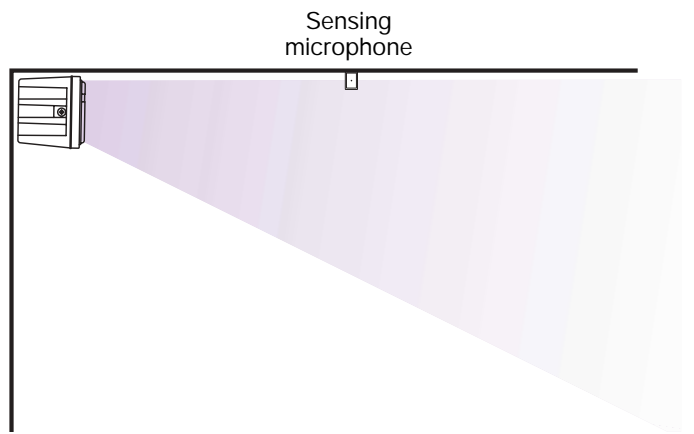


Wall Surface

Correct placement



Incorrect placement

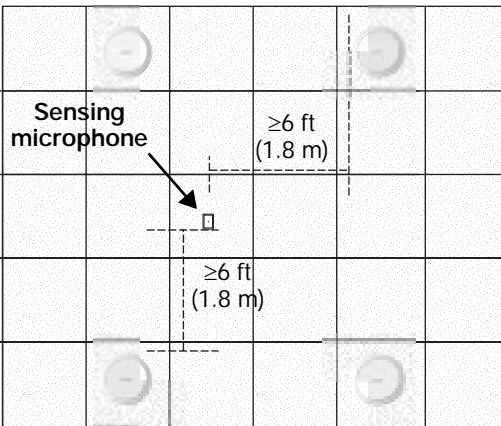


Installer's Note: In applications where ceiling height is less than 12 ft (3.6 m), the microphone should be wall mounted.

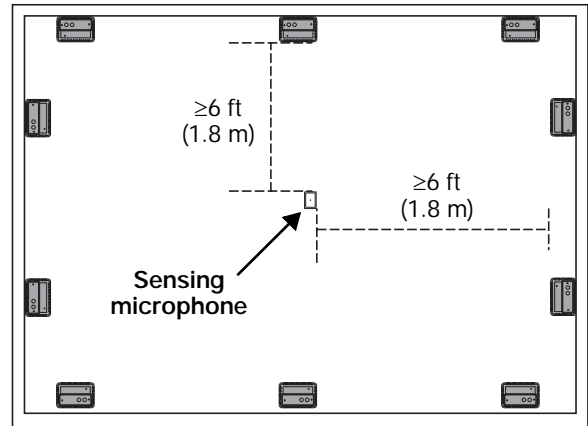
2.0 Designing with the FreeSpace® 4400 System

When mounting sensing microphones, always maintain a distance of 6 ft (1.8 m) minimum between the microphone and the loudspeaker.

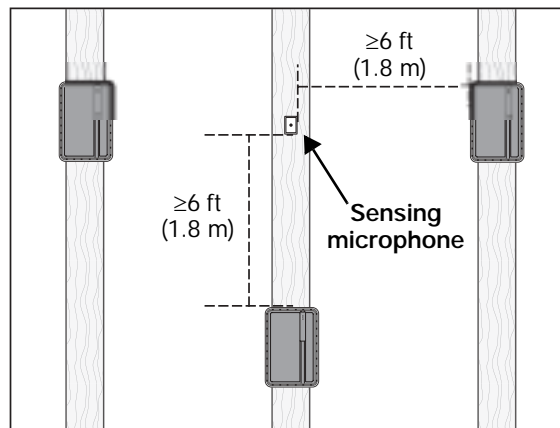
Ceiling Flush



Wall Surface



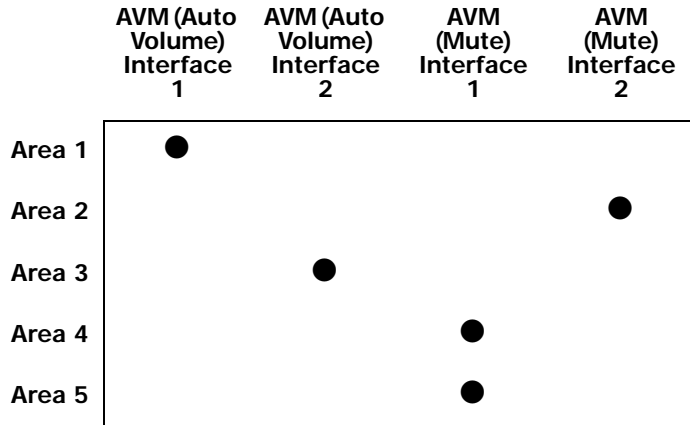
Ceiling Surface



2.0 Designing with the FreeSpace® 4400 System

2.2.3 Step 3 – Determine volume control requirements

Decide which areas will have volume controls. Create a control map, such as the following, showing the types of controls that will be used, and the areas in which they will be installed.



AVM (Auto Volume/Mute) user interfaces are available for use with the FreeSpace® 4400 system. They offers control over source selection and volume. The interface can be configured as an AVM (Mute) interface or as an AVM (Auto Volume) interface. If you have identified an area that uses auto volume, you must configure the interface as an AVM (Auto Volume) interface to control this zone.

It is also possible to use a 70/100V in-line volume control between the amplifier output and the loudspeaker. If you plan to use a 70/100V in-line volume control, be aware that they cannot be used in zones where either Auto Volume or Dynamic EQ is used. Auto Volume and Dynamic EQ monitor the amplifier output and make adjustments accordingly. Using an in-line volume control would cause these functions to operate improperly.

When determining the placement or physical location of the controls, first think about how the control is used. If the control is very rarely used or it requires a secure location, it should be placed with the equipment. If the control is for an area that requires frequent adjustments, then it is best to place the control in the area being controlled.

2.2.4 Step 4 – Determine the loud-speaker requirements

Determine the loudspeaker coverage required for the design. Consider the following points as you do this:

- Each Auto Volume function requires a separate zone. Each Auto Volume zone requires the dedicated use of one FreeSpace 4400 output channel.
- Each type of specifically equalized Bose loudspeaker requires the dedicated use of one FreeSpace 4400 output channel. If you are designing a system that uses specific Bose loudspeaker equalization, such as the 102°F loudspeaker, Model 32, Model 32SE, or Model 8, you must dedicate one FreeSpace 4400 output channel for each loudspeaker type.

Create a loudspeaker map, such as the following, and match the loudspeaker models to areas (Loudspeaker Qty x Tap = Zone Power required):

	Model 32SE	FreeSpace 3-1	Loud-speaker Qty	Tap	Area Power
Area 1		●	2	50	100
Area 2	●		5	8	40
Area 3		●	1	50	50
Area 4	●		3	4	12
Area 5	●		6	8	48

2.0 Designing with the FreeSpace® 4400 System

2.2.5 Step 5 – Determine the FreeSpace® 4400 requirements

Once you have identified the areas that use Auto Volume and specifically equalized Bose loudspeakers, you can combine different areas based on the types of sources and controls they are using.

Now we can take a look at how the maps we created can help us determine the quantity of FreeSpace 4400s we will need.

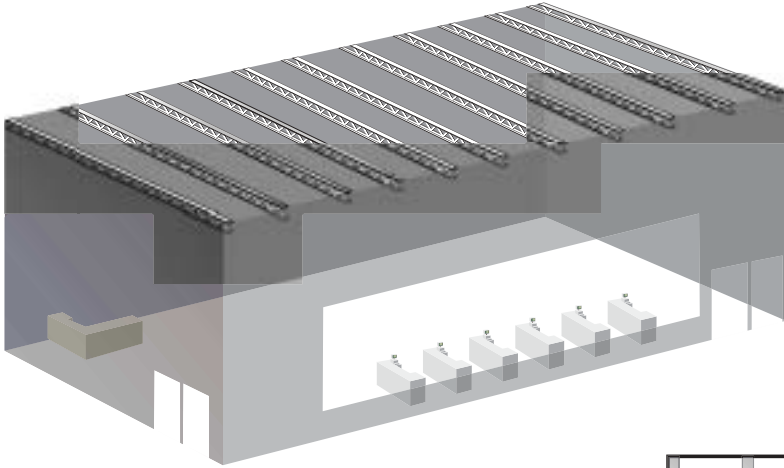
	Sources				Controls				Loudspeakers			4400 Ch.
	1	2	3	4	AV1	AV2	VC1	VC2	M32SE	FS3	Total W	
Area 1	●		●		●					●	100	1
Area 2	●	●		●				●	●		40	2
Area 3	●		●			●				●	50	3
Area 4	●						●		●		12	4
Area 5	●						●		●		48	4

Total System Power = 250W

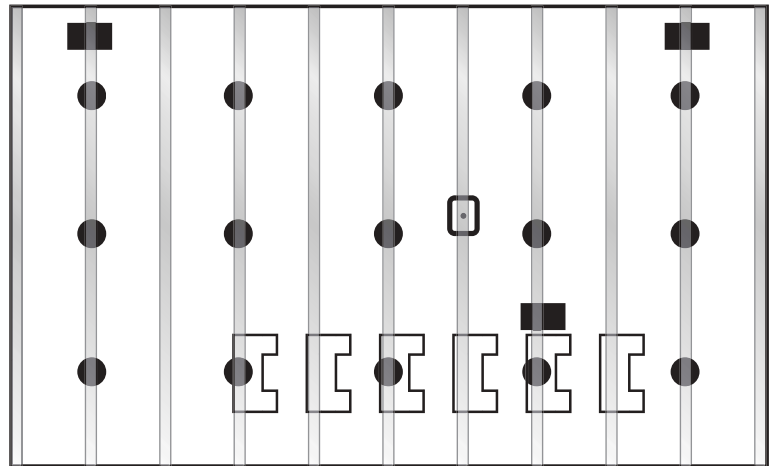
By combining the maps you can easily combine sources, loudspeaker types, and control types. The information placed in this table suggests that Area 1 and Area 3 need to be grouped separately because they are Auto Volume zones requiring separate FreeSpace 4400 system outputs. Area 2 uses one AVM (Mute) interface requiring one FreeSpace 4400 output channel. Areas 4 and 5 share a common volume control and can be combined on a third FreeSpace 4400 output channel. Since only four outputs are required and the total combined power requirement is less than 400W, only one FreeSpace 4400 unit would be needed for this system.

2.3 Auto Volume layout examples

Large, open retail space with single music source

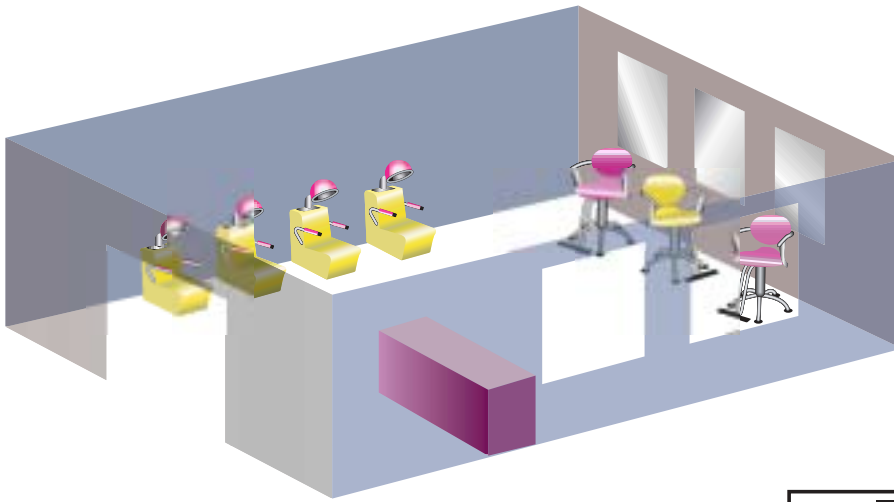


- FreeSpace® Acoustimass module
- Model 16 (pendant mounted)
- Sensing microphone

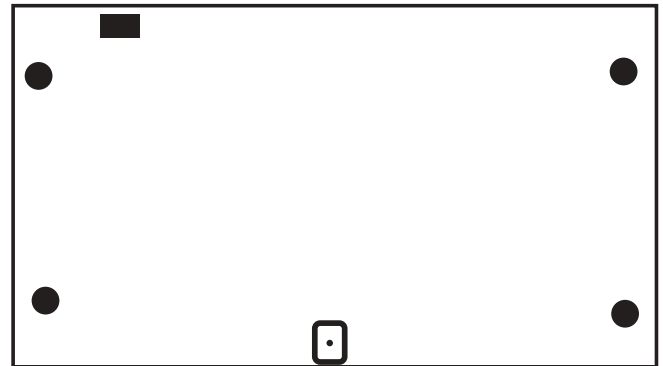


2.0 Designing with the FreeSpace® 4400 System

Hair salon (Small space with specific noise)

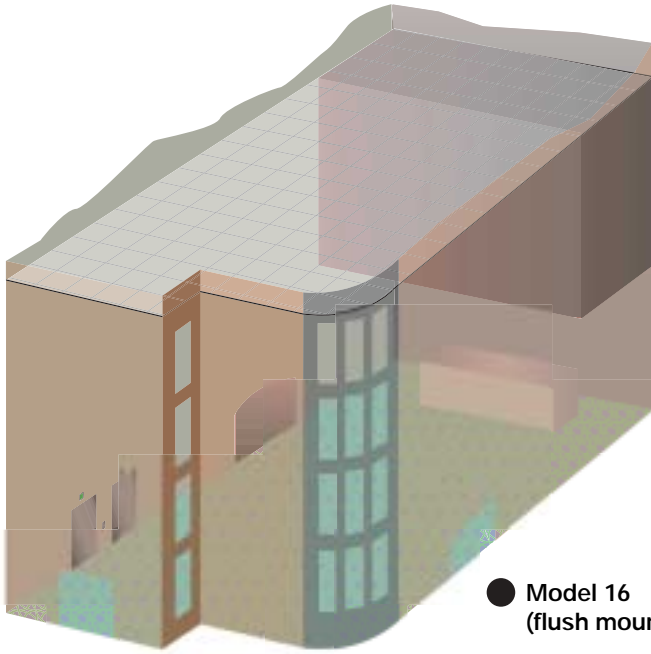


- ■ FreeSpace® 3 system
- Sensing microphone

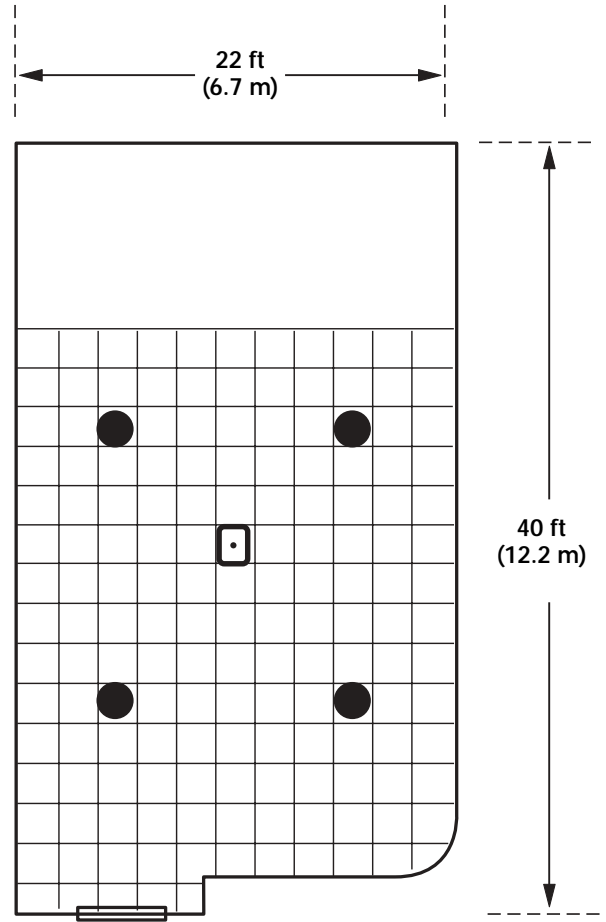


2.0 Designing with the FreeSpace® 4400 System

Hotel lobby

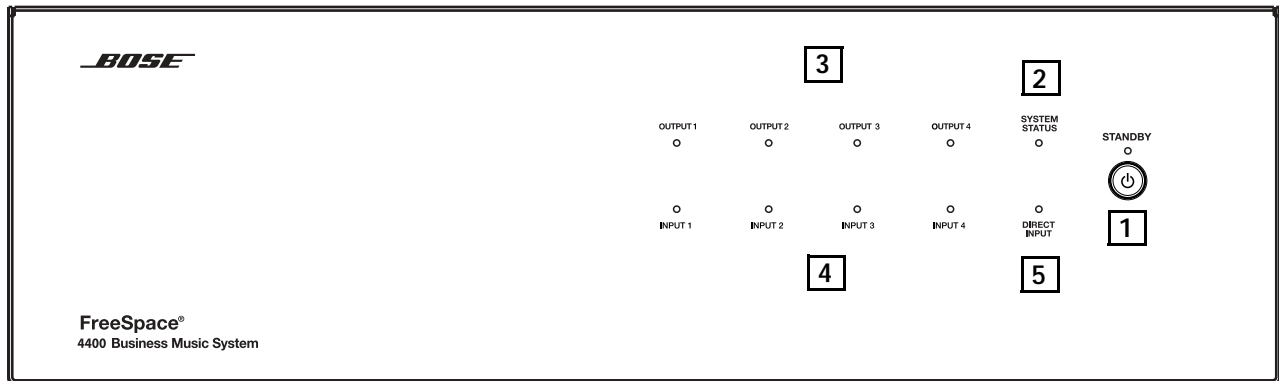


- Model 16 (flush mounted)
- Sensing microphone



3.0 FreeSpace® 4400 Hardware Description

3.1 Front panel



3.1.1 Controls

1 **STANDBY** – The STANDBY button switches the unit between standby and active. The color of the LED above the switch indicates the status:

Amber = Unit is in standby

Unlit = Unit is active

3.1.2 Indicators

2 **SYSTEM STATUS** – The SYSTEM STATUS LED indicates the condition of the unit:

Green = Normal operation

Red = Fault condition

3 **AMP OUTPUTS** – These LEDs work in pairs (1 and 2, 3 and 4) and indicate the operating status of the four amplifier output channels:

Green = Normal operation

Red = Fault condition

Unlit = No signal

4 **AUDIO SOURCES** – These LEDs indicate the operating status of the four input sources:

Green = Good signal

Amber = Low signal

Red = Signal clipping

Unlit = No signal

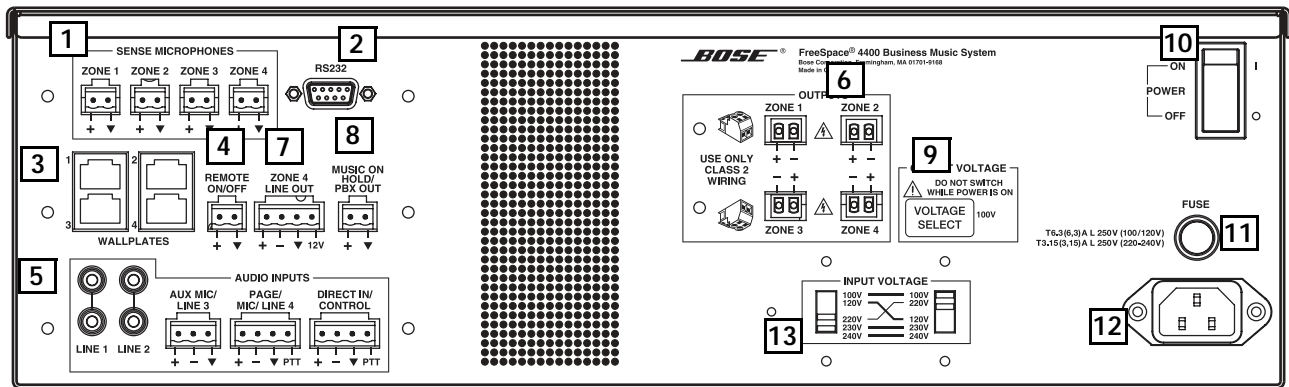
5 **DIRECT INPUT** – The color of this LED indicates the condition of the source connected to the DIRECT IN/CONTROL connector on the rear panel.

Amber = Active bypass

Unlit = Normal operation

3.0 FreeSpace® 4400 Hardware Description

3.2 Rear panel



3.2.1 System controls

- 1 SENSE MICROPHONES** – Input connectors for sensing microphones used with the Auto Volume feature.
- 2 RS-232** – Standard RS-232 communications port. Provides a communications interface for a PC running FreeSpace® 4400 *Installer*™ software. The FreeSpace 4400 *Installer*™ software is used to configure the FreeSpace 4400 system.

Note: The RS-232 port should only be used to connect a FreeSpace 4400 system to a PC.

- 3 WALL PLATE CONNECTIONS** – Input connectors for AVM 1-Zone, AVM 2-Zone User Interface, or Page user interfaces.
- 4 REMOTE ON/OFF** – An input connector for a remote STANDBY switch.

3.2.2 Audio source inputs

- 5 LINE 1/LINE 2** – Unbalanced audio inputs
- AUX MIC/LINE 3** – Balanced audio input with phantom power
- PAGE/MIC/LINE 4** – Balanced audio input with phantom power
- DIRECT IN/CONTROL** – Balanced (DSP bypassed, full amplifier gain) audio input which can override the sources playing on all four output channels

3.2.3 Amplifier outputs

- 6 ZONE OUTPUTS 1/2/3/4** – Loudspeaker connections for four zones
- Installer's Note:** Please notice the polarity markings when wiring loudspeaker cables to the ZONE OUTPUT connectors.
- CAUTION:** DO NOT ground the minus (-) terminals.
- 7 ZONE 4 LINE OUT** – A line-level output that duplicates the program material from LINE 4. May be used to feed another amplifier installed for a large zone. The 12V control output is used to connect to Bose® amplifier sequence inputs.
 - 8 MUSIC ON HOLD/PBX OUT** – An audio output used to provide music input to a PBX system

3.2.4 AC power

- 9 OUTPUT VOLTAGE** – Sets the ZONE OUTPUT lines to 70/100V.
- 10 POWER ON/OFF** – Switches AC power on or off
- 11 Fuse** – T6.3(6,3)A L 250V (100/120V) or T3.15(3,15)A L 250V (220-240V).
- 12 AC MAINS LINE CORD JACK** – AC line voltage input
- 13 INPUT VOLTAGE** – switches need to be configured for proper input voltage.

4.0 Hardware Installation

4.1 Introduction

This section provides instructions for installing the FreeSpace® 4400 system hardware on a tabletop or in a rack.

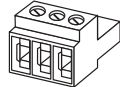
4.2 Included accessories

The following accessories are shipped with the FreeSpace 4400 system.

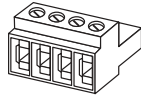
- **2-terminal input connectors (7)** – For wiring Auto Volume mics to the **SENSE MICROPHONES** jacks



- **3-terminal input connectors (2)** – For wiring equipment to the **AUX MIC/LINE 3** jacks



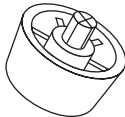
- **4-terminal input connectors (4)** – For wiring equipment to the **ZONE 4 LINE OUT**, **PAGE/MIC/LINE 4**, and **DIRECT IN/CONTROL** jacks



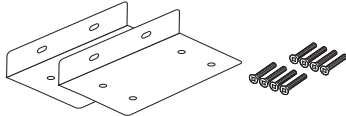
- **2-terminal output connectors (5)** – For wiring loudspeaker cables to the **ZONE OUTPUT** jacks



- **Rubber feet (4)** – For installing the FreeSpace 4400 system on a level surface



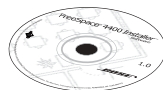
- **Rack ears (2)** – for rack mounting the unit. Includes (8) M4 x 12mm screws.



- **Replacement voltage label (2)** – Used on the **OUTPUT VOLTAGE** selection switch



- **FreeSpace 4400 Installer™ software CD** – Contains application software for programming the FreeSpace 4400 system



4.3 Placement guidelines

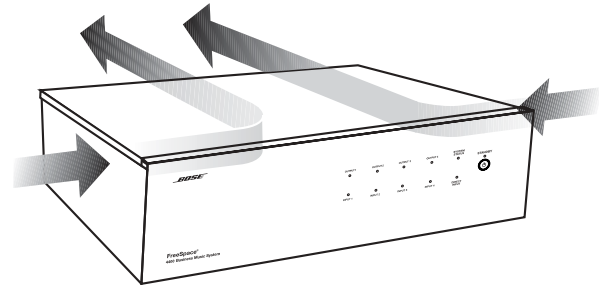
- Place the FreeSpace 4400 system where it is protected from heat and allowed adequate ventilation.
- Place the FreeSpace 4400 system away from direct heat sources, such as heating vents and radiators.
- Make sure that air can circulate freely behind, beside, and above the chassis for adequate ventilation. There are intake vents on the sides and an exhaust vent on the back of the unit. Do not cover or block the vents.



Installer's Note: Do not allow the chassis to exceed the maximum operating temperature of 50° C (122° F). Be aware of conditions in an enclosed rack that may increase the temperature above room-ambient conditions.

4.4 Shelf mounting the FreeSpace 4400 system

The FreeSpace 4400 system is ideal for shelf mounting. The included accessory kit contains four rubber feet for the bottom of the FreeSpace 4400 chassis. The rubber feet will protect the surface on which the FreeSpace 4400 system is installed and help prevent movement of the FreeSpace 4400 system. Be sure to follow the "Placement Guidelines" previously described when choosing a location for the FreeSpace 4400 system.



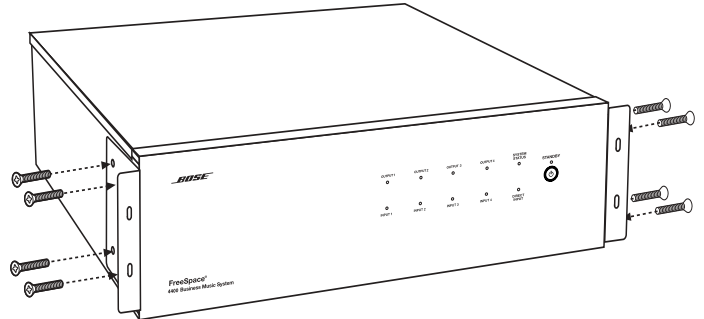
4.0 Hardware Installation

4.5 Rack mounting the FreeSpace 4400 system

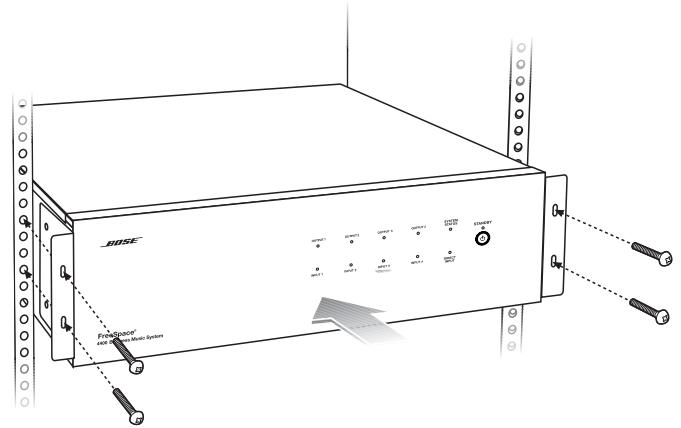
The FreeSpace 4400 system requires three 1.75" (44 mm) rack space units with a 16" (406 mm) inside depth (including the rear supports). When mounting, use four screws with washers to prevent marring the front panel. Neoprene rubber washers are a good choice because they grip the screw head and prevent the screws from backing out from vibration or during transportation.



Installer's Note: If the FreeSpace 4400 system is to be transported while mounted in a rack, be advised that the rear of the FreeSpace 4400 system must be mechanically supported. Install a shelf under the unit or use brackets in such a way as to support the rear of the unit. Failure to use proper mounting hardware may result in damage to the FreeSpace 4400 system during transport.



Attaching rack ears to the FreeSpace 4400 chassis



Attaching the FreeSpace 4400 chassis to the rack (mounting screws not provided)

4.0 Hardware Installation

4.6 Installing accessories

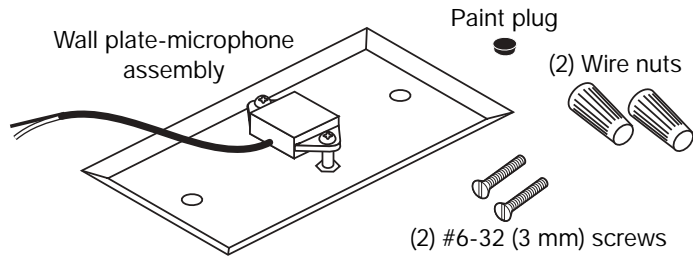


Installer's Note: Disconnect the FreeSpace 4400 system from the AC (mains) power before making any input/output connections.

4.6.1 Sensing microphones

Required accessory:

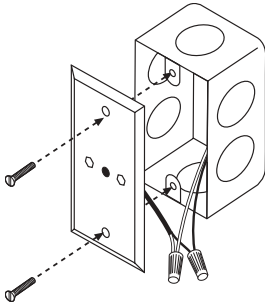
FreeSpace® 4400 System Auto Volume Mic Kit [PC042354 (U.S.), PC042355 (Euro)]



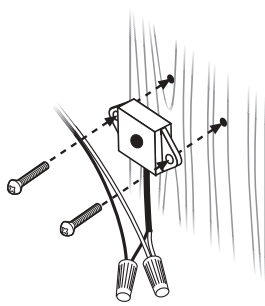
Microphone installation:

The wall plate-microphone assembly can be installed using a single-gang junction box, or the microphone can be removed from the wall plate and mounted directly on a flat surface.

Junction box installation



Surface-mounted mic

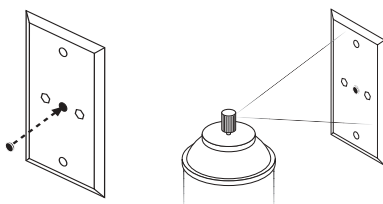


Recommended wire length:

Up to 2000 ft (610 m) max., 24 AWG (0.2 mm²) shielded twisted pair (shield tied to minus at FreeSpace 4400, floated at sense mic).

Painting:

Before painting the wall plate, install the supplied temporary plug over the microphone opening. Remove the plug when finished.

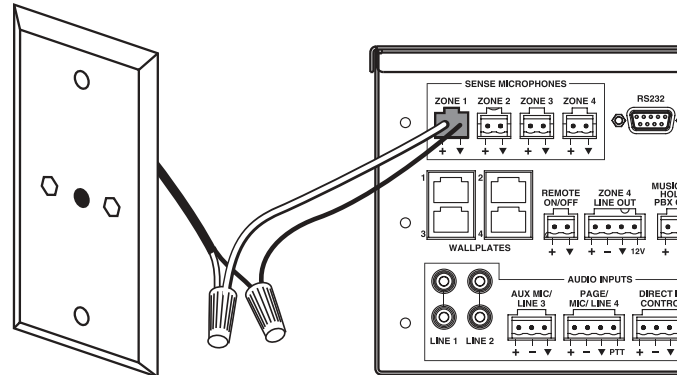


Mounting locations:

For mounting instructions, see "Mounting guidelines for sensing microphones" on page 4.

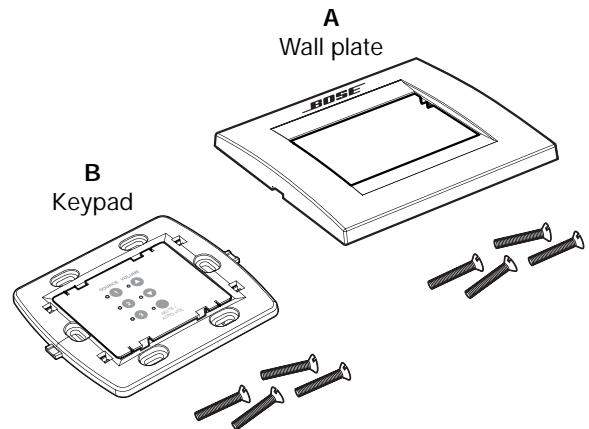
4.6.2 Auto volume microphone inputs

Connect each sensing microphone to the SENSE MICROPHONES jacks on the FreeSpace 4400 rear panel.

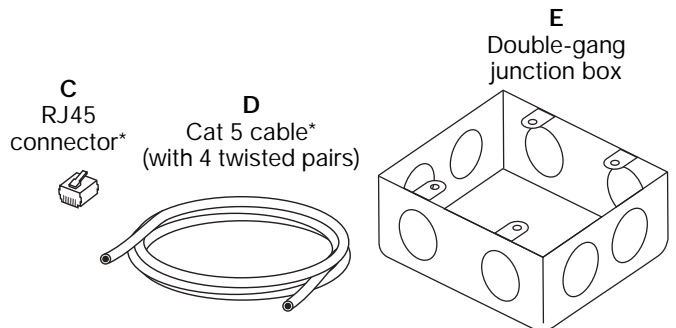


4.6.3 User interfaces

Required accessory: FreeSpace® 4400 System AVM 1-Zone User Interface [PC042351] or FreeSpace® 4400 System AVM 2-Zone User Interface [PC042352] or FreeSpace® 4400 System Page User Interface [PC042353]



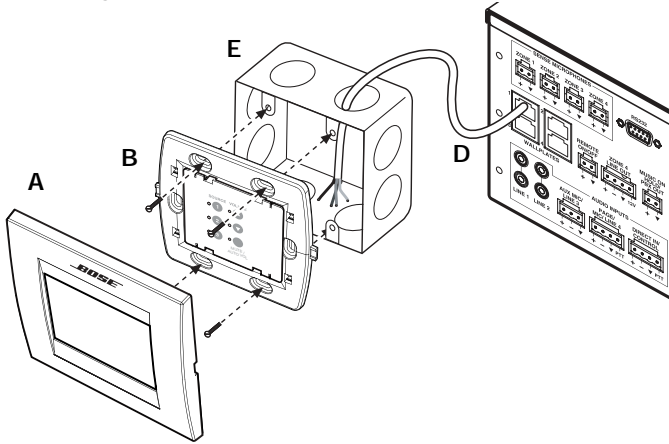
Required additional equipment (not supplied):



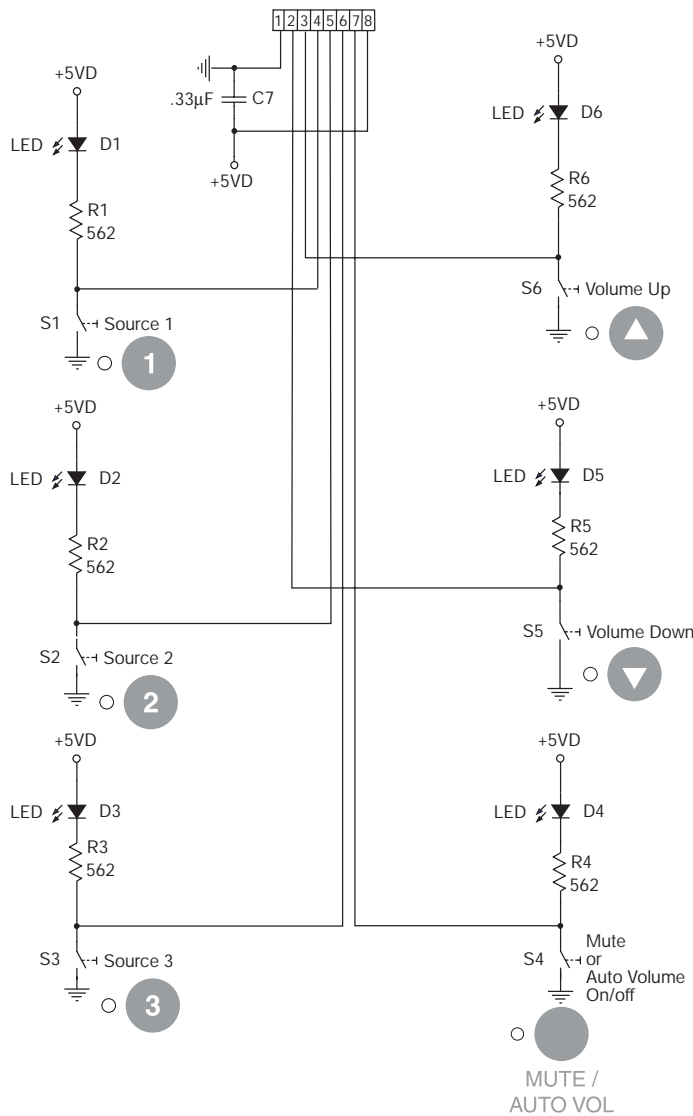
*FreeSpace® 4400 System AVM 2-Zone User Interface requires the use of two (2) RJ45 connectors and two (2) Cat 5 cables.

4.0 Hardware Installation

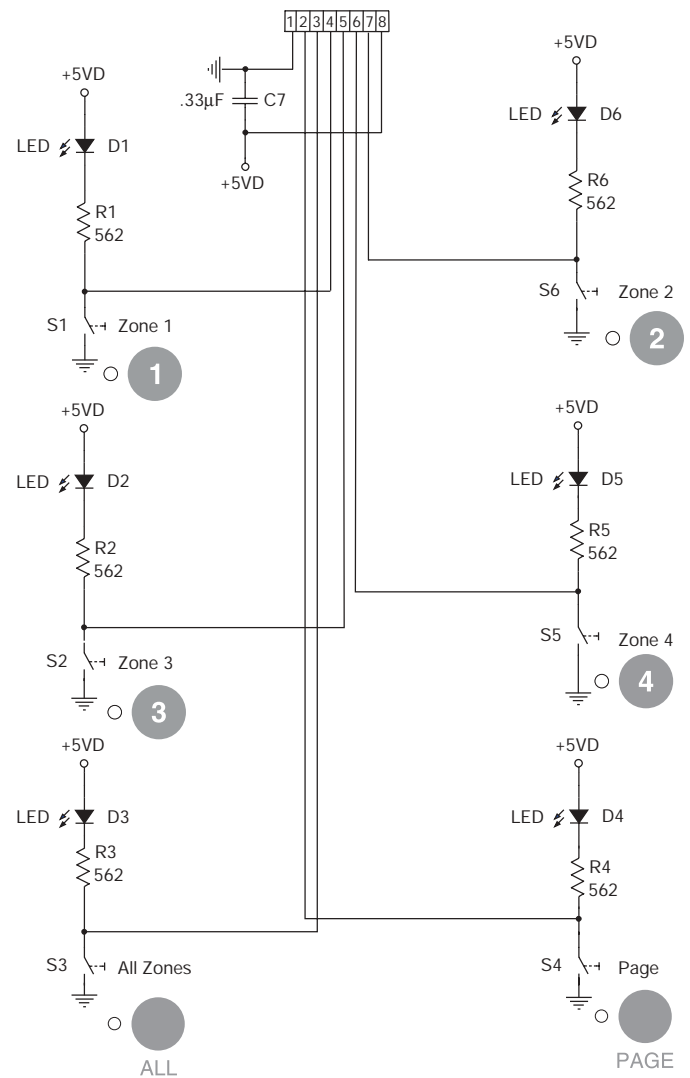
Assembly:



User interface schematic - AVM (Auto Volume/Mute)user interface*:

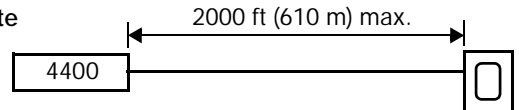


User interface schematic - Page user interface:

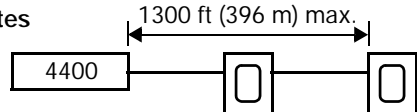


Recommended cable lengths:

One wall plate using CAT 5



Two wall plates using CAT 5



Installer's Note: Only two (2) user interfaces can be connected in series.

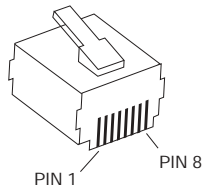
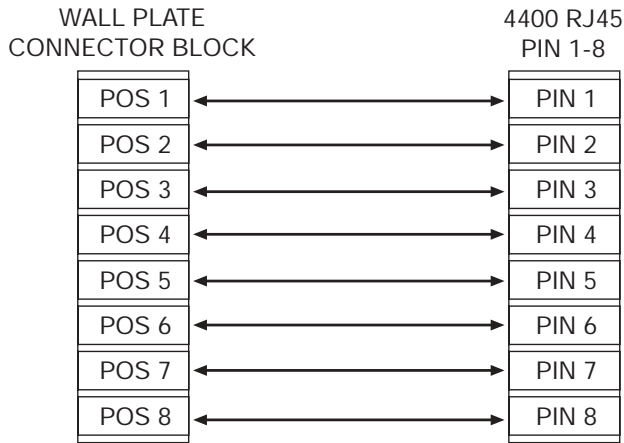
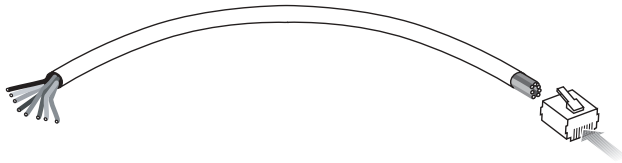
*FreeSpace® 4400 System AVM 2-Zone User Interface has two separate 8-terminal connectors. Each connector uses the same wiring schematic represented above.

4.0 Hardware Installation

User interface wiring:



Installer's Note: Use only standard ethernet (Cat 5) cable to connect the user interface to the FreeSpace 4400 system. DO NOT use crossover (XOV) cables.



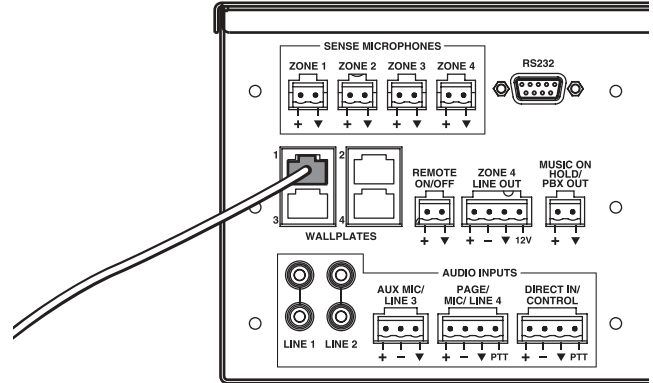
For operating information, see "User Interface Operation" on page 49.

4.6.4 User interface connections

Connect the user interface from each zone to the appropriate WALL PLATE CONNECTION jack.



Installer's Note: Only use standard ethernet (Cat 5) cable to connect the user interface to the FreeSpace 4400 system. DO NOT use crossover (XOV) cables.



4.0 Hardware Installation

4.7 System wiring

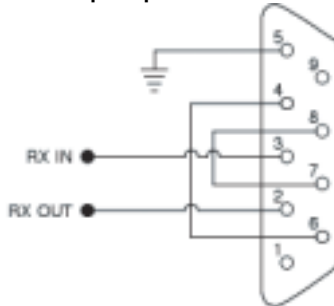


Installer's Note: Disconnect the FreeSpace 4400 system from the AC (mains) power before making any input/output connections.

4.7.1 Serial data communications

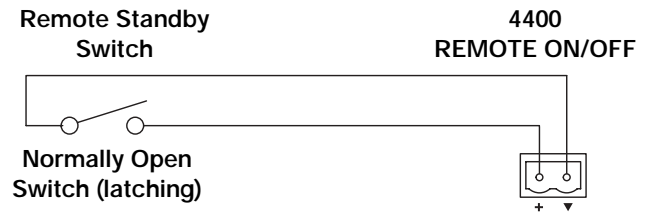
Connect your PC to the FreeSpace 4400 system using a straight-wired serial data cable (DB9 male to DB9 female).

RS232 port pinout



4.7.2 Remote standby switch

If you are installing a remote standby switch, connect it to the REMOTE ON/OFF input.

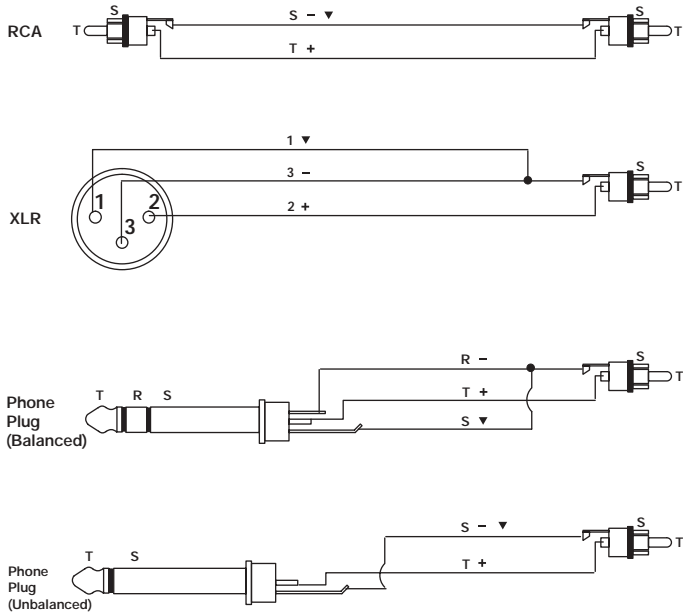


4.0 Hardware Installation

4.7.3 LINE 1/LINE 2 source input

Audio sources can be connected to the LINE 1 and LINE 2 inputs using one of the following cable types.

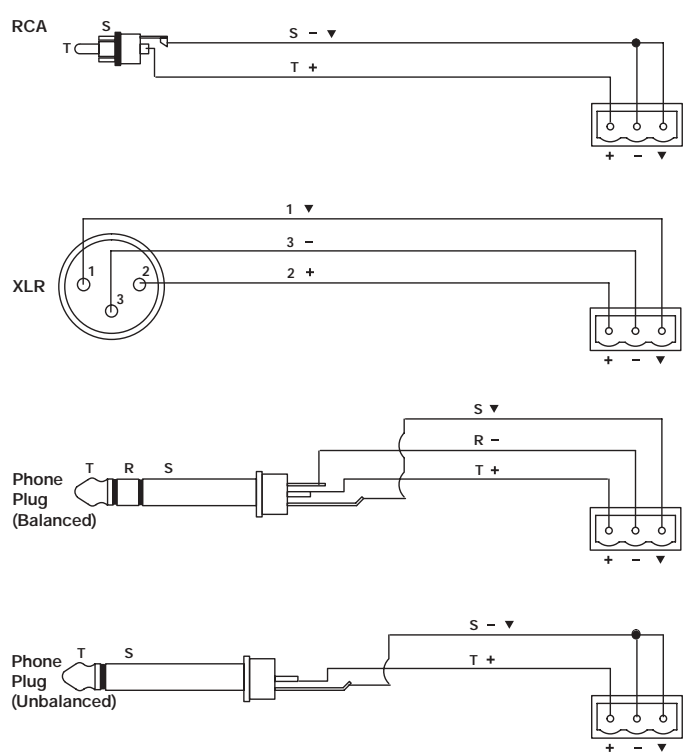
Source Connector 4400 LINE 1/LINE 2



4.7.4 AUX MIC/LINE 3 source input

A microphone or an audio source can be connected to the MIC/LINE 3 input using one of the following cable types.

Source Connector 4400 AUX MIC/LINE 3

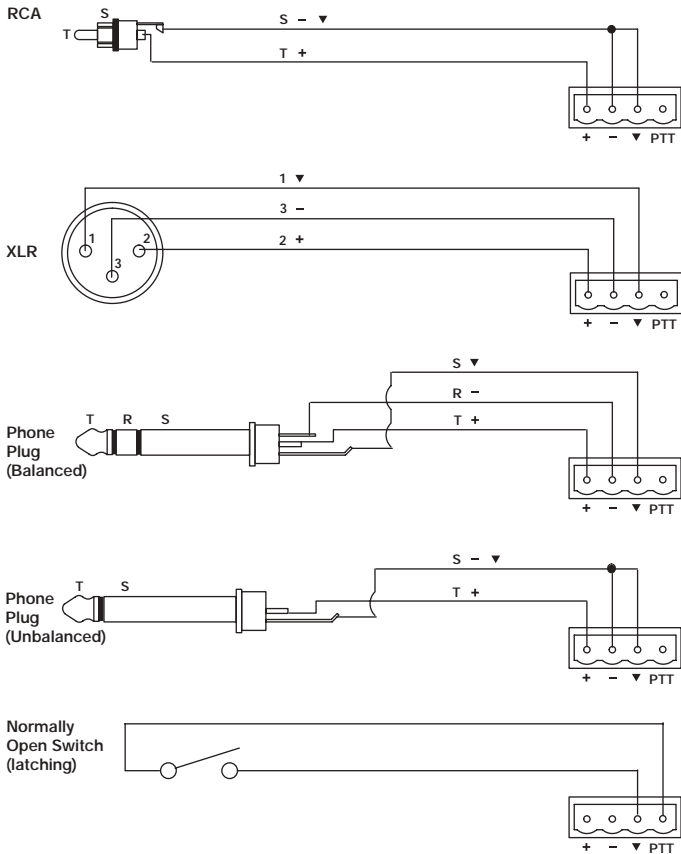


4.0 Hardware Installation

4.7.5 PAGE/MIC/LINE 4 source input

A microphone or an audio source can be connected to the PAGE/MIC/LINE 4 input using one of the following cable types.

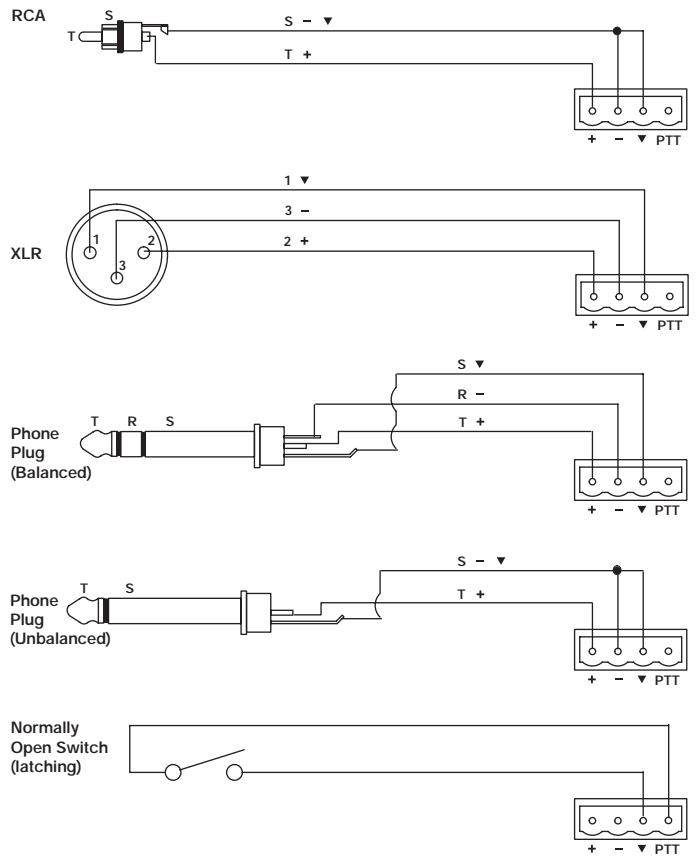
Source Connector 4400 PAGE/MIC/LINE 4



4.7.6 DIRECT IN/CONTROL source input

A microphone or an audio source can be connected to the DIRECT IN input using one of the following cable types. The control (PTT) input requires a normally open switch.

Source Connector 4400 DIRECT IN/CONTROL



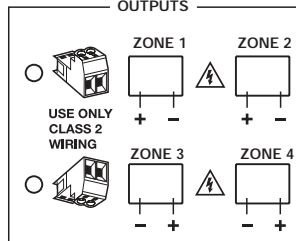
4.0 Hardware Installation

4.7.7 Amplifier ZONE OUTPUT outputs

Loudspeaker systems in up to four zones can be connected to the ZONE OUTPUT amplifier outputs.

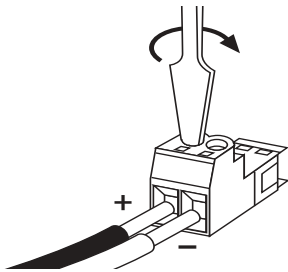


Installer's Note: Please notice the polarity markings on the ZONE OUTPUT 1-4 connectors. Wire each connection as shown, using the 2-terminal output connector from the accessory kit.



Installer's Note: DO NOT ground the minus (-) side of the line.

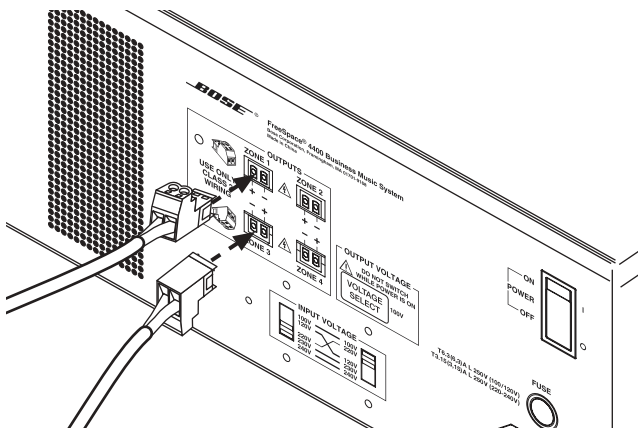
1. Install a two-terminal output connector (supplied) on the loudspeaker cable from each zone.



2. Plug the loudspeaker cable connectors into the appropriate ZONE OUTPUT jack.

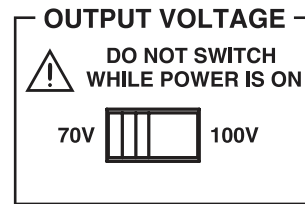


Installer's Note: Be sure to position the cable connector in the correct orientation for the ZONE OUTPUT jacks: Screw heads face upward for ZONE OUTPUT 1 and 2 jacks, screw heads face downward for ZONE OUTPUT 3 and 4 jacks.



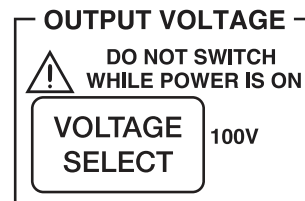
4.7.8 Output voltage setting (70/100V)

Check the OUTPUT VOLTAGE switch setting and change if needed.



Installer's Note: Disconnect power from the FreeSpace 4400 system before changing the OUTPUT VOLTAGE setting.

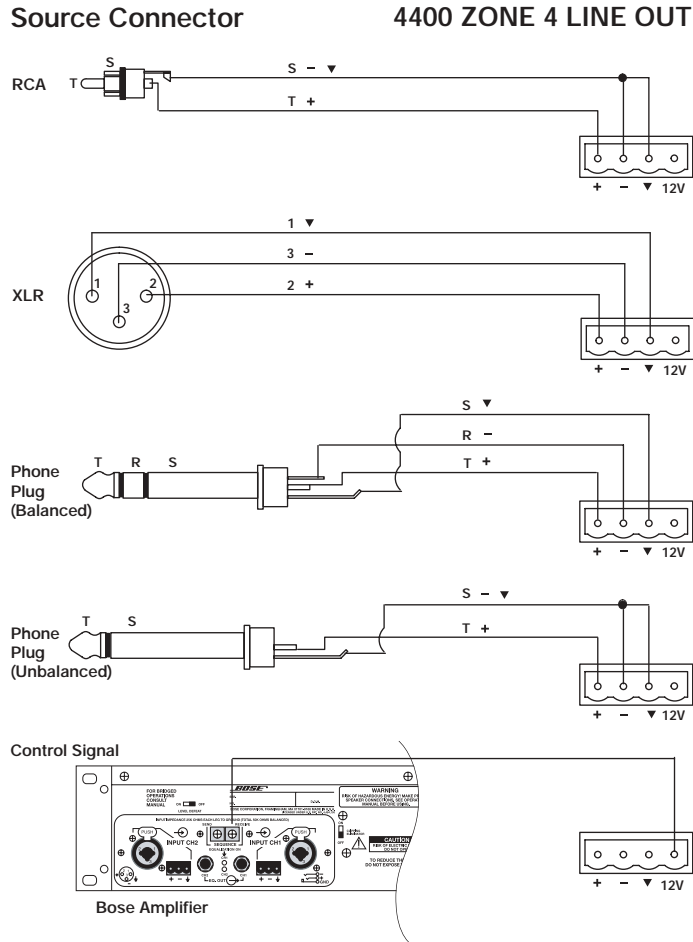
To change the setting to 70V or 100V, remove the label, change the switch setting and replace the label. Additional labels are supplied in the accessory kit.



4.0 Hardware Installation

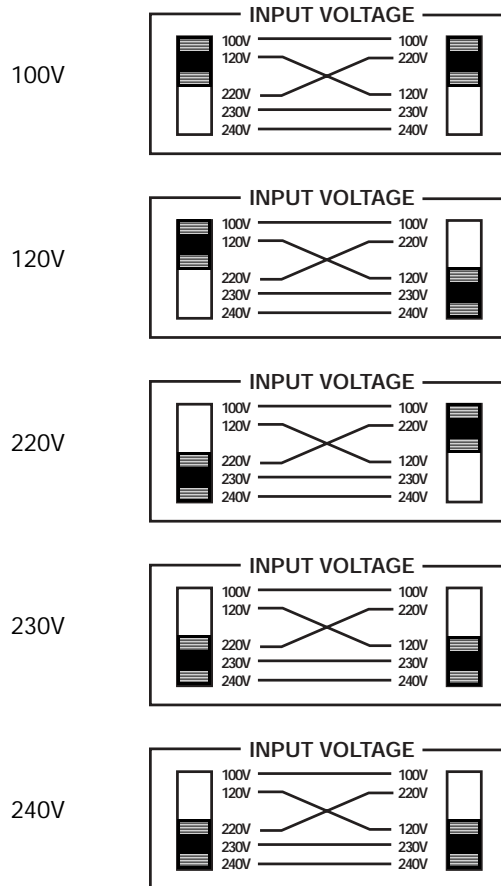
4.7.9 ZONE 4 LINE OUT output

The **ZONE 4 LINE OUT** jack provides a line-level output that duplicates the program material on LINE 4. This may be used to feed another Bose® amplifier installed for a large zone. The 12V control output is used to connect to Bose amplifier sequence inputs.



4.8 AC power connections

The rear connection panel of the chassis provides an input voltage switch for 100V, 120V, 220V, 230V, or 240V use. Check the switch settings to be sure it is appropriate for the local power standard.



WARNING: Be sure to disconnect the unit from AC power before changing the input voltage settings on the rear connection panel.

4.8.1 Fuse type

Be sure the proper supplied fuse is inserted in the fuse holder. Replace the fuse as needed with the proper type. 100V and 120V units require a T6.3(6,3)A L 250V fuse. 220V, 230V, and 240V units require a T3.15(3,15)A L 250V fuse.

4.8.2 AC POWER connection

Insert the proper power cord for the voltage used in your region.

5.1 Installing the software

Insert the FreeSpace® 4400 Installer™ software CD into the CD tray of your laptop PC.

If the install program does not start automatically, open "My computer" from the desktop, double-click on the CD-ROM drive icon, and double-click on the "Setup.exe" icon.

Follow the instructions on the screen to complete the installation.



Programmer's Note: For the FreeSpace 4400 Installer™ software to operate properly, your PC must be connected to the FreeSpace 4400 system. See the following section, "Connecting to the FreeSpace 4400 system".

5.2 Connecting to the FreeSpace 4400 system

To create a design file in FreeSpace 4400 Installer™ software, your PC must have an active connection with the FreeSpace 4400 system hardware. This means that your PC must first be physically connected to the hardware device with a serial cable and then that connection must be activated using the software.

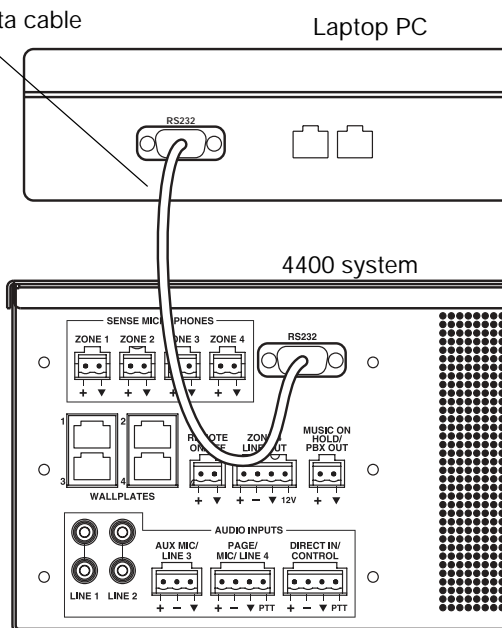
1. Connect your PC to the FreeSpace 4400 system.

Using a serial cable (not supplied), connect the RS-232 serial port of your laptop PC to the RS-232 serial port on the rear panel of the FreeSpace 4400 system.



Programmer's Note: If your computer does not have an RS-232 port you will need to use an RS-232 to USB adapter.

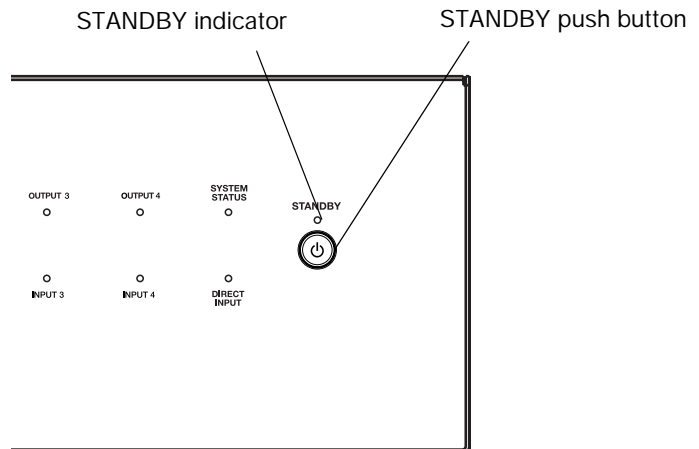
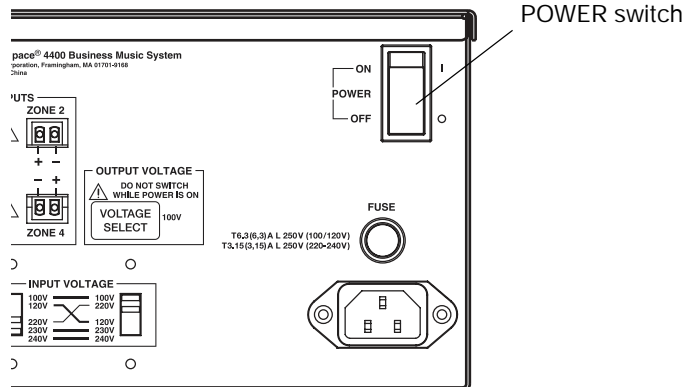
RS-232 serial data cable
(not provided)



Programmer's Note: The RS-232 port should only be used to connect a FreeSpace 4400 system to a PC.

2. Set the FreeSpace 4400 rear panel POWER switch to ON.

Verify that the **STANDBY** indicator is lit on the FreeSpace 4400 front panel. Then press the **STANDBY** push button to switch the FreeSpace 4400 hardware to the operating mode.



5.0 Using FreeSpace® 4400 Installer™ Software

3. Launch the FreeSpace 4400 Installer™ software.

The FreeSpace 4400 *Installer* software splash screen will appear on your screen.



After the splash screen, a status dialog will appear and report the status of each installation stage.



Programmer's Note: Clicking the **Close** button on the hardware connection status dialog will cause a communications failure, locking the serial port. If the port locks, you must restart your computer.

At this point in the installation, the software looks for a connected FreeSpace 4400 system, and if found, then checks to see what version firmware is running in the FreeSpace 4400 system.

If you get a "No hardware detected" dialog, see "No hardware detected" on page 26.

If you get an Incompatible Microcontroller code dialog, see "Incompatible microcontroller code" on page 26.

4. If prompted, select the correct COM port for the FreeSpace 4400 system.

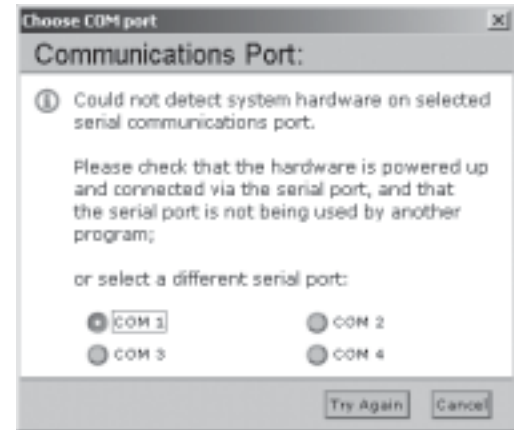
By default, the FreeSpace 4400 *Installer* software tries to locate a hardware device on the COM 1 serial port. If the FreeSpace 4400 system is not detected on COM 1, the software displays a "Choose COM port" dialog box asking you to select the correct serial port.



Programmer's Note: If you encounter the "Choose COM port" dialog box, immediately follow the displayed recommendations for correcting the problem. DO NOT click the **Cancel** button until after trying each of the given recommendations.



Programmer's Note: Before dismissing the "Choose COM port" dialog, select the COM 2 port and click **Try Again**. Not doing this will cause the COM 1 port to be locked.



After your PC successfully connects to the FreeSpace 4400 hardware, the Choose COM port dialog should automatically close. If not, close the window manually.

5. If you have connected to a new FreeSpace 4400 system, use the FreeSpace 4400 front panel window to set up the hardware.

Refer to the "FreeSpace® 4400 System Setup" on page 34.



5.0 Using FreeSpace® 4400 *Installer*™ Software

5.2.1 No hardware detected

If after launching the FreeSpace 4400 *Installer*™ software a hardware device is not found, the status window reports a failure to detect connected hardware:



In this case, clicking the **Close** button results in a blank hardware setup window.



Programmer's Note: If you are not connected to the FreeSpace 4400 system, you can see an example of the FreeSpace 4400 front panel by opening the sample design file provided on the FreeSpace 4400 Installer CD. See "Sample design files" on page 26.



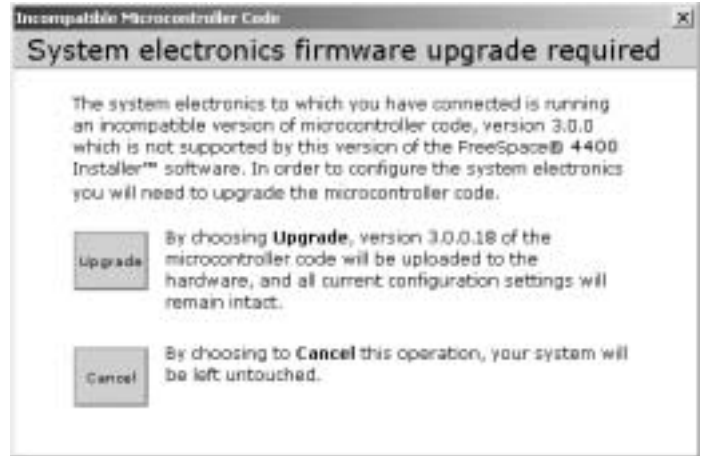
Programmer's Note: To configure a FreeSpace 4400 system, the FreeSpace 4400 system must be powered up. DO NOT switch the FreeSpace 4400 system to STANDBY mode while the FreeSpace 4400 Installer software is running.



Programmer's Note: The FreeSpace 4400 Installer software does not notify you if there is a loss of communication between the FreeSpace 4400 system and your PC.

5.2.2 Incompatible microcontroller code

If the FreeSpace® 4400 *Installer*™ software finds that your system is running an older version of firmware (microcontroller code), the following window appears, giving you the opportunity to upgrade the code.



- Click **Upgrade** to upload the latest version of microcontroller code to the device. When the "Upload Complete" window appears, click **Close**. Then, finish the installation and configure your hardware device.



Programmer's Note: Upgrading new software does not change any of your current configuration settings. When the upgrade is finished, your current configuration will be restored.

- Click **Cancel** to exit the software and leave the device untouched.



Programmer's Note: The FreeSpace 4400 Business Music System is only compatible with the FreeSpace 4400 Installer software. The FreeSpace 4400 system is incompatible with the FreeSpace E4 system's FreeSpace Installer software. Additionally, the FreeSpace E4 system is incompatible with the FreeSpace 4400 Installer software.

5.2.3 Sample design files

Two sample design files are included with your FreeSpace® 4400 *Installer*™ software:

- sample70V.fsi – for 70V FreeSpace 4400 systems
- sample100V.fsi – for 100V FreeSpace 4400 systems

They can be used to display a FreeSpace 4400 front panel when your PC is not connected to a system hardware device.

To open the sample design file:

1. Click the **Open** file tool in the FreeSpace 4400 *Installer* software window.
2. Select the name of the sample design file in your FreeSpace 4400 *Installer* software directory:
C:\Program Files\FreeSpace 4400 Installer 1.0.0.
3. Click the **Open** button in the dialog box.
4. Click on the "Bose FreeSpace 4400" system name in the System Overview pane. The FreeSpace 4400 front panel will appear in the application window.



Programmer's Note: If you are not connected to the FreeSpace 4400 system when you open a design file, all controls within the software are grayed out and not accessible.

5.3 The FreeSpace 4400 *Installer™* software user interface

The following describes the software user interface.



Tool box



Open File – Displays the file open dialog.



Save File – Saves the design file and the current settings of the connected hardware device to your PC's hard drive.



Flash Hardware Configuration – Sends the design file and current settings from your PC to the memory of the connected hardware device. This determines the default startup state of the device.



Detect Hardware – Uploads the design file and configuration settings from the system hardware to your PC.



Help – Launches the online help system.

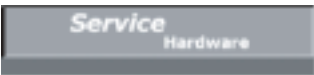
Mode buttons



Set Up System – Selects the Set Up System mode enabling you to set up the system hardware or create a schedule to automate system operation.

Hardware – Selects the Set Up Hardware mode.

Schedule – Selects the Set Up Schedule mode.



Service Hardware – Selects the Service Hardware mode.

Window sizing tools



Minimize Window – Collapses the application window into the Windows Task bar.



Maximize Window – Function not available.



Close Application – Closes the application program.

System overview pane – After connecting your PC to a system, this pane will list the hardware device. After you select the device to establish a connection, the name of the hardware device is highlighted.

Name of system to which your PC is connected

Currently-connected device



Work area – The functions available for each mode are displayed in the work area.

Control pane – The control pane is used to display the controls for the function selected in the work area.

5.0 Using FreeSpace® 4400 Installer™ Software

5.4 Set Up Hardware mode

Using the Set Up Hardware mode, you can create new system configurations. The following example displays the software front panel for the FreeSpace® 4400 system.

The hardware setup window consists of three panes:

System overview pane – This pane displays the selected hardware device that you are currently configuring. For more information on the system overview pane, see “The FreeSpace 4400 Installer™ software user interface” on page 27.

Hardware pane – The hardware pane displays a software front panel of the hardware device that you selected in the system overview pane. Reading from left to right, this diagram shows you the functions and signal paths from input sources to output zones. All functions internal to the connected hardware device appear on a gray background.

Functions are selected by clicking on a button. When you select a function, all controls for that function appear in the control pane.

Control pane – When you select a function in the hardware pane, the controls that affect operation, configuration, or setup of the selected function or device appear in the control pane. On some control panes, you can view additional functions by clicking on **More**.

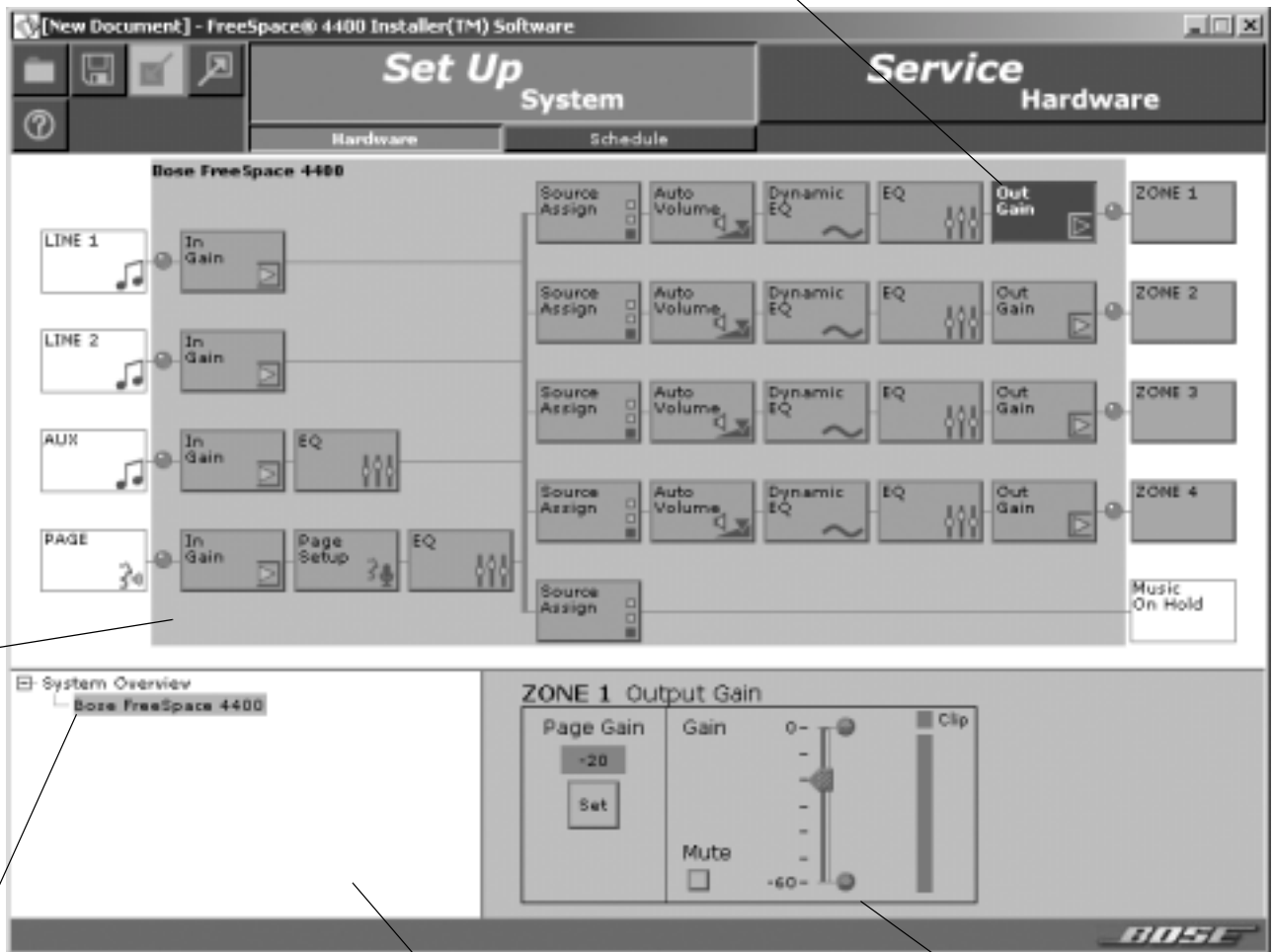
Selected function

Hardware pane

Connected hardware

System overview pane

Control pane for selected function



5.5 Set Up Schedule mode

The Set Up Schedule mode allows you to automate a system by creating up to 64 events. To select the Set Up Schedule mode, click the **Schedule** button under Set Up System. The features and controls of the Set Up Schedule window are as follows:

Event list selection tabs – These tabs determine which list of events is displayed. Click the top tab to display the system event list. Click any one of the ZONE tabs to display the event list for a selected zone.

Event list – This list contains all scheduled events for the selected system or zone. Each event entry includes the time of the event, a description of the event, and the days of the week on which the event will occur.

Add event buttons – The Add Event buttons include **On/Off**, **Mute**, **Volume**, **Source**, and **Auto Volume**. The **On/Off** button is a system event only. **Mute**, **Volume**, **Source**, and **Auto Volume** are zone events. When you click one of these buttons, the event is added to the list and the controls for the selected event are displayed in the Event control panel. As events occur, the number of remaining events are displayed in parentheses above the **On/Off** button.

Control pane – When you select an event in the event list, this pane displays the settings for that event. Any changes made to these settings are reflected in the event listing.

Remove Event button – This button will remove a selected event from the event list.

Hardware clock display – The clock display shows the current date and time of the hardware clock. The **Set Clock** button is used to set or change the clock.

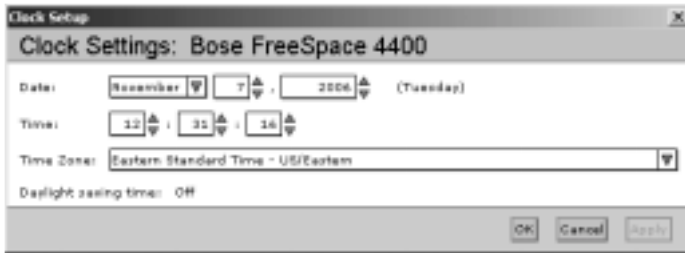
System overview pane – This pane displays the selected hardware device that you are automating. For more information on the system overview pane, see "The FreeSpace 4400 Installer™ software user interface" on page 27.



5.5.1 Setting the clock

The date and time of the hardware clock is initially set in Eastern Standard Time. After your PC is connected to the hardware, check the clock and set it as necessary for the time zone and region of your installation.

To adjust the clock settings manually, click the **Set Clock** button in the clock panel. The Clock Settings window opens, allowing you to make adjustments to the date and time. Click **Apply** or **OK** to set the clock in the hardware, or click **Cancel** to close the window and leave the clock settings unchanged.



5.5.2 Adding events

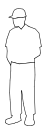
When you click the **On/Off**, **Volume**, **Source**, or **Auto Volume** event button, an event of that type is added to the event list. At this point you can change the event settings. When the event list exceeds the length of the pane, the software will add a scroll bar on the right side.

A maximum of 64 events may be added to a system. This means that the total number of events from all event lists must not exceed 64. An On-Off event consumes two events, while source change, volume change, and Auto Volume events consume one apiece. A counter is provided in the Schedule mode window to keep track of the number of remaining events.

Remaining events counter



Zone events programmed to occur at the same time as a "System ON" event will not occur. To ensure that zone events will happen, they must be programmed to occur 15 minutes after the "System ON" event. For example, if a "System ON" event is programmed to occur at 8:00 AM, the first zone event should be programmed to occur at 8:15 AM.



Installer's Note: Flashing the FreeSpace 4400 Installer software configuration file to the FreeSpace 4400 system sets the default state of the system when it is turned on. Whenever possible the default state of the system should be set to meet the requirements most likely to occur after a scheduled "System ON" event.

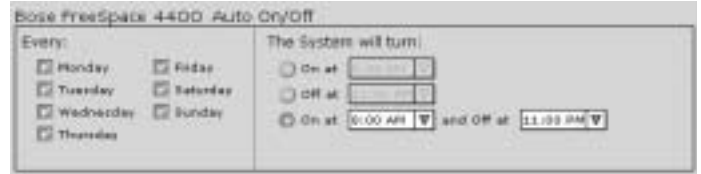


Adds a system Auto On/Off event

This event applies only to the whole system. You can select individual on or off times for the day(s) you choose. Or, you can select on and off times in a single statement.



Programmer's Note: One Auto On/Off event specifies both an "On" time and an "Off" time and is counted as two events.



Adds a zone Mute event

This event allows you to mute/unmute the zone output at a specified time on selected days of the week.



Adds a zone Volume Change event

This event allows you to change the volume level at a specified time on selected days of the week.



Programmer's Note: The maximum/minimum volume stops cannot be adjusted in this pane. To adjust these limit stops, select the Output Gain function in the Set Up Hardware mode.



5.0 Using FreeSpace® 4400 *Installer*™ Software



Adds a zone Source Change event

This event allows you to change the source at a specified time on selected days of the week.

ZONE 1: Source Change		
Every:	Time:	Selected Source:
<input checked="" type="checkbox"/> Monday <input checked="" type="checkbox"/> Tuesday <input checked="" type="checkbox"/> Wednesday <input checked="" type="checkbox"/> Thursday	<input checked="" type="checkbox"/> Friday <input checked="" type="checkbox"/> Saturday <input checked="" type="checkbox"/> Sunday	<input checked="" type="radio"/> LINE 1 <input type="radio"/> LINE 2 <input type="radio"/> AUX <input type="radio"/> PAGE
	12:00 PM ▼	



Adds a zone Auto Volume event


This event allows you to turn Auto Volume on or off at a specified time on selected days of the week.

ZONE 1: AutoVolume Tracking		
Every:	Time:	AutoVolume:
<input checked="" type="checkbox"/> Monday <input checked="" type="checkbox"/> Tuesday <input checked="" type="checkbox"/> Wednesday <input checked="" type="checkbox"/> Thursday	<input checked="" type="checkbox"/> Friday <input checked="" type="checkbox"/> Saturday <input checked="" type="checkbox"/> Sunday	<input checked="" type="checkbox"/> On <input type="checkbox"/> Off
	12:00 PM ▼	



Programmer's Note: Do not schedule an Auto Volume event on a zone that is not set up for Auto Volume.



Programmer's Note: Events are only saved to the FreeSpace 4400 system when you click the  (Flash Hardware Configuration) button.

5.5.3 Viewing and changing event settings

To view any event and change the settings, first click the system or one of the zone tabs. Then select an event in the list to display the event settings in the control pane. Now, you can edit the settings just as when an event is added.

5.5.4 Removing events from the list

To remove an event from the list, select the event by clicking on it



and then click the  (Remove Event) button.



Programmer's Note: After changing any event settings or removing an event from the list, you must flash the hardware in order for the change to take effect.

5.6 Service Hardware mode




The Service Hardware mode provides a list of any system errors that have occurred.

To view the Error Log, click the **Service Hardware** button. If you are already connected to hardware, the Error Log is retrieved from the hardware and displayed in the window. If not yet connected, select the hardware in the System Overview pane and after establishing the connection, click  (Detect Hardware) and then click .

When the FreeSpace 4400 system is powered on, it performs a self-test. Any errors detected during a power-on cycle are appended to the Error Log. Likewise, any errors detected during normal operation are appended to the Error Log. The Error Log provides diagnostic information for repair technicians to help them repair the system.

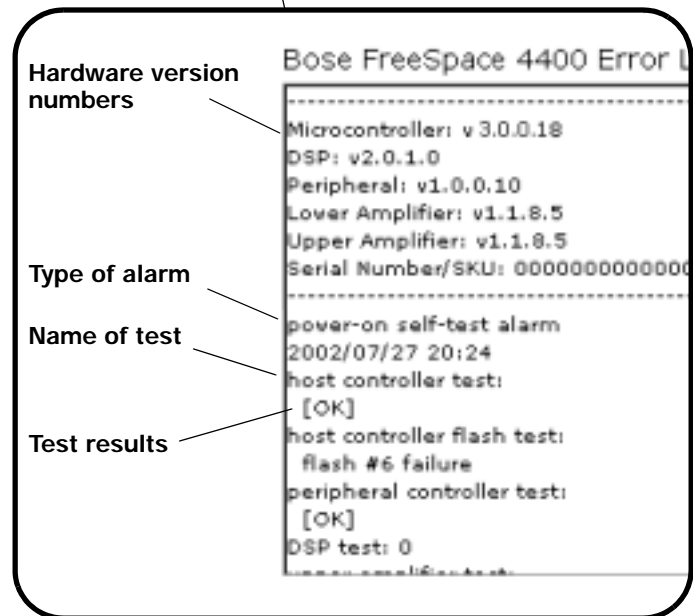
For more information on reported errors, see “FreeSpace® 4400 system Error Log” on page 55.

The buttons below the Error Log display allow you to manage the Error Log information:

	Uploads the current Error Log listing from the hardware. If you recently cleared the log, the Error Log will contain information reported only since the time you cleared it.
	Exports the Error Log to your hard drive as a text file.
	Clears the Error Log from the window and the FreeSpace 4400 system.



Error Log



6.0 FreeSpace® 4400 System Setup

6.1 Introduction

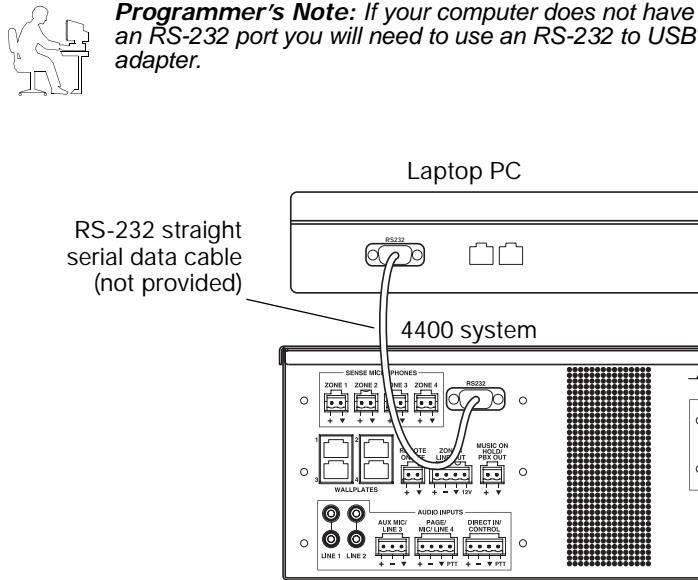
This section provides instructions on setting up an installed FreeSpace 4400 system. To set up a FreeSpace 4400 system you need a PC running the FreeSpace® 4400 *Installer™* software.

6.2 Connecting your PC to a FreeSpace 4400 system

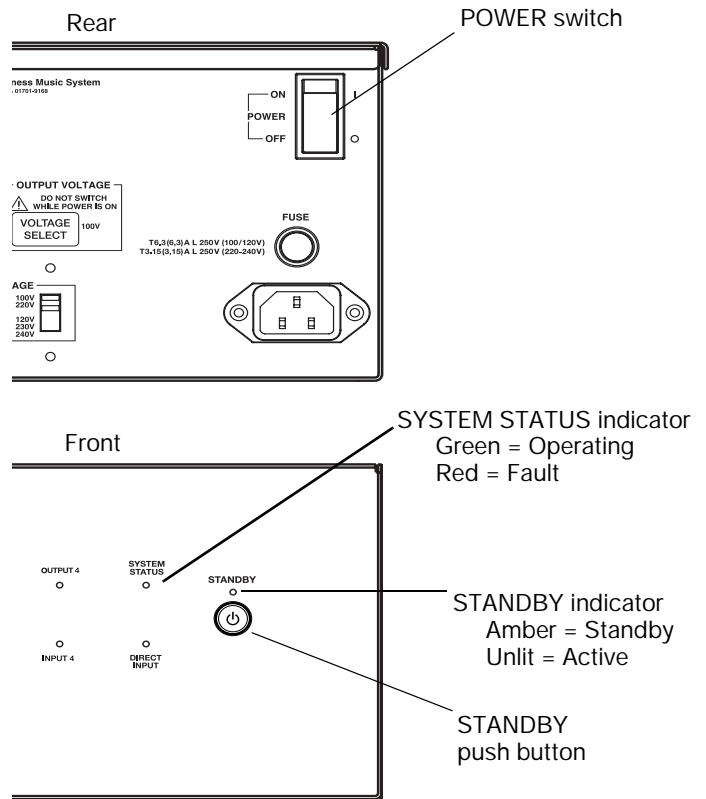
Before you can set up the FreeSpace 4400 system, your PC must first be physically connected to the FreeSpace 4400 system with a serial cable and then that connection must be activated using the FreeSpace 4400 *Installer™* software.

1. Connect the RS-232 serial port of your PC to the RS-232 serial port on the rear panel of the FreeSpace 4400 system using a straight serial data cable.

Programmer's Note: If your computer does not have an RS-232 port you will need to use an RS-232 to USB adapter.



2. Set the FreeSpace 4400 rear panel **POWER** switch to **ON**. When the FreeSpace 4400 system is powered up and ready, the **SYSTEM STATUS** indicator is dark (unlit) and the **STANDBY** indicator is amber.



3. Press the **STANDBY** push button to switch the FreeSpace 4400 system to the operating mode. The **STANDBY** indicator will turn off and the **SYSTEM STATUS** indicator will be green. (If a system fault condition exists, the indicator will be red.)

Programmer's Note: If the FreeSpace 4400 system experiences a brownout or power loss, the FreeSpace 4400 system will return to power in the **STANDBY** mode. To return to operation, press the **STANDBY** button, or press any key on any user Interface.

4. Launch the FreeSpace 4400 *Installer™* software. See "Launch the FreeSpace 4400 *Installer™* software." on page 25 for the software launching sequence.

6.3 System setup procedure

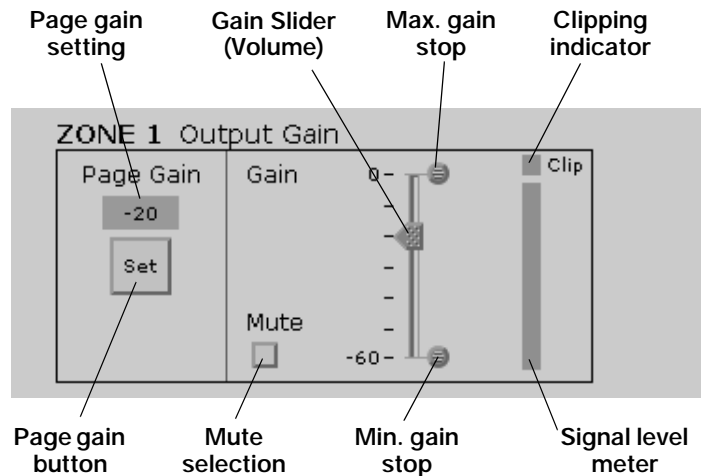
The first time you turn on a FreeSpace 4400 system it loads its factory (default) configuration settings. These settings were stored in the FreeSpace 4400 when it was manufactured. Once your PC is fully connected to the FreeSpace 4400 system, you can use the FreeSpace 4400 *Installer™* software to make changes to the factory configuration settings.

The configuration contains the “start-up” settings for the FreeSpace 4400 system. Once your work is completed and flashed to the FreeSpace 4400 hardware, the new settings become the startup configuration.

1. Select **Output Gain** for each zone and mute the output. This prevents any damage to loudspeakers during this procedure. This also allows you to work without disturbing any other people in your work area. See “Output gain” on this page.
2. Set up the **ZONE** for each output channel. Choose a Speaker EQ (default is No EQ) for the speakers you are using. You can use the Subzones table to document your subzones. See “Zone setup” on page 36.
3. Set up the **Input Gain** controls for each source. Choose settings for input type, gain, and source leveling. If the input type is set for microphone use, you can turn phantom power (+12V) on or off. See “Input gain” on page 37.
4. Set up the **Output Gain** controls for each zone. Set the minimum/maximum gain (volume) limits and the initial gain level. See “Output gain” on this page.
5. Select **Source Assign** for each zone and assign sources for each. See “Source assign” on page 39.
6. Set up the source **EQ** for AUX MIC/LINE 3 and PAGE/MIC/LINE 4 inputs. See “Source EQ” on page 40.
7. Select **Page Set Up**. See “Page setup” on page 40.
8. Select **EQ** for each zone. See “Zone EQ” on page 42.
9. Select the **Dynamic EQ** state for each zone. See “Dynamic EQ” on page 43.
10. Set up **Auto Volume**. See “Auto Volume” on page 43.
11. Create a **System Schedule**. See the “Set Up Schedule mode” on page 30.
12. Click the flash configuration button in the upper toolbox. You will be asked to confirm that you want to save the configuration to the FreeSpace 4400 hardware. Once you confirm, the configuration and scheduling settings are sent to the FreeSpace 4400 system.
A copy of the FreeSpace 4400 *Installer™* software design file is also sent to the hardware.

6.3.1 Output gain

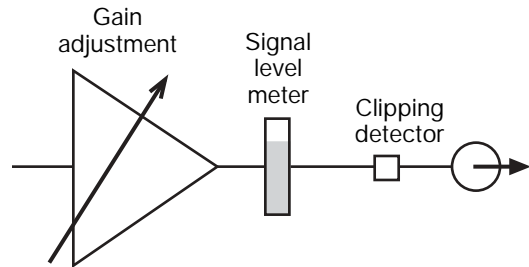
The controls in the Output Gain control panel allow you to control the amplifier output of the FreeSpace 4400 system.



Factory default settings

Gain	Max. Gain	Min. Gain	Page Gain	Mute
-20 dB	0 dB	-60 dB	-20 dB	Off

Output gain circuit block diagram



Output gain setup sequence

1. Set the maximum output gain.

This sets the maximum allowed volume within a zone. Play a source that will be used in that zone and raise the volume slider to the zero level. If it is too loud, lower the maximum gain stop.



Programmer's Note: If the source still plays too loud at the -30 dB setting, you should lower the tap setting on your loudspeakers for optimal system performance.

6.0 FreeSpace® 4400 System Setup

2. Set the minimum output gain.

This sets the desired minimum volume within a zone. Play a source that will be used in the zone and adjust the volume slider to the desired minimum level. Raise the minimum gain stop up to the volume slider level.

3. Set the initial output gain.

When the FreeSpace 4400 system is switched from standby to operating mode, it loads its configuration (initial settings). Wherever the volume slider is set when you save the configuration becomes the initial gain setting.

Page Gain Setup

The Page Gain function allows you to independently define a page level for each of the four output zones of the FreeSpace® 4400 system.

1. Select the Out Gain function for the zone with paging.
2. Using the output gain slider, set the gain to the paging level you want for the output zone.
3. Click the Set button. The new Page Gain level is displayed above the Set button.



Programmer's Note: When working with the Page Gain function, please note the following behaviors:

- Moving the maximum gain stop to a point below the current Page Gain setting will set the Page Gain to the level of the new maximum output gain.
- Moving the minimum gain stop to a point above the current Page Gain setting will set the Page Gain to the level of the new minimum output gain.
- If Auto Volume was calibrated for a zone with paging, you will be able to adjust the Output Gain and set the Page Gain when Auto Volume is off.

Output gain controls

Page Gain – Displays the Page Gain setting for the output zone.

Page Gain Set Button – Sets the Page Gain to the level defined by the gain slider position.

Gain slider – This slide control adjusts the output gain. As you click and drag the slider, you will hear the level change. Release the mouse when you hear the level you want. The output gain is adjusted in an installed system by the Volume up/down buttons on the AVM (Mute) or AVM (Auto Volume) user interface.



Programmer's Note: In zones using Auto Volume, the volume may only be adjusted using the Auto Volume interface.

Maximum and minimum gain stops – The maximum and minimum gain stops determine the maximum and minimum volume levels. Click and drag each stop to the values you want. If the stop meets the volume slider, the volume slider will move with the stop until the new setting is reached.

When a AVM user interface is used in a zone, the volume control cannot set the gain outside these limits.



Programmer's Note: In an Auto Volume zone, the maximum and minimum level stops are disabled once an Auto Volume calibration is run.

Mute selection – When checked, the Mute selection quiets the output audio.

Signal level meter – The signal level meter displays the output level of the FreeSpace 4400 system.

Clipping indicator – The clipping indicator tells you when clipping is occurring in the amplifier. When indicated, clipping is caused by a low/reduced AC line voltage.

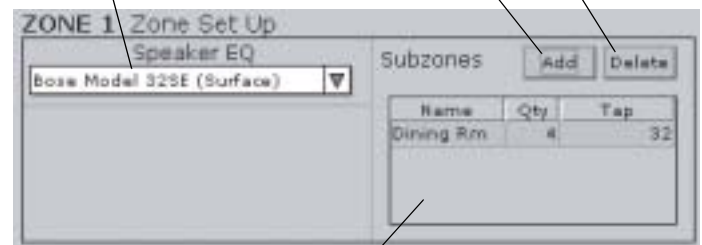
6.3.2 Zone setup

The Zone Setup control panel allows you to select the EQ for the loudspeakers used in a zone and to document (optional) the number of loudspeakers in a subzone and their tap settings.

Loudspeaker model drop list

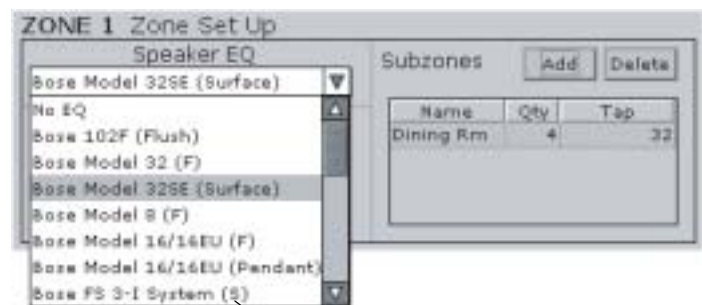
Add subzone

Delete subzone



Subzone table

Speaker EQ – The Speaker EQ drop-down list contains a list of loudspeakers by model name. The selected loudspeaker equalization settings are sent to the FreeSpace 4400 system.



Mount code

Each item in the list indicates a type of mounting: (F) for flush, (S) for surface, and (P) for pendant. Some items are listed more than once because they may be mounted in more than one way. For example, the Model 16 has two entries: one with an (F) for flush, and one with a (P) for pendant.

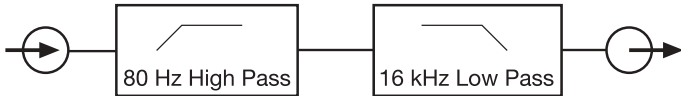
The list also includes commonly used groupings, such as combinations of FreeSpace® 3 bass and mid/high devices. Use these settings when you are using the FreeSpace 3 bass on the same loudspeaker line with other loudspeakers.

6.0 FreeSpace® 4400 System Setup



Programmer's Note: If you are using the FreeSpace 4400 system to drive loudspeakers that are not Bose® products, choose the **No EQ** setting or one of the four high-pass filter settings at the end of the list.

The No EQ setting helps protect the FreeSpace 4400 against loudspeaker transformer saturation when non-Bose loudspeakers are connected to the FreeSpace 4400 hardware. This setting acts as a band pass filter and allows energy between 80 Hz and 16 kHz to be sent to the amplifier section of the FreeSpace 4400 electronics.



If you change the loudspeaker EQ type, any subzones will be automatically changed to the new Speaker EQ setting, and be given the default loudspeaker tap. Depending on the quantity and tap of loudspeakers, you could receive an error message notifying you that the system exceeds the 400 W limitation of the FreeSpace 4400 system. If this problem occurs, delete the subzones from the subzone list. This will allow you to change the loudspeaker EQ type.

Subzones table – The Subzones table allows you to document the loudspeakers used in a zone.

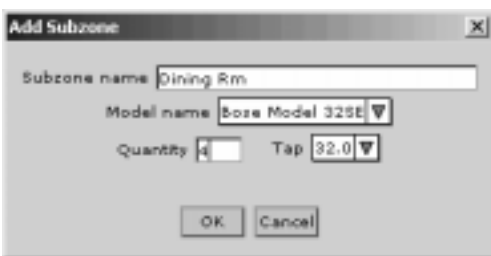
A zone is a group of loudspeakers that are driven by the same amplifier output channel. A subzone is a group of loudspeakers within a zone that use a common tap or are of a common type.

For example, you may have installed ten Model 16 loudspeakers in a dining room and set it up as a zone to be driven by channel 1. In this zone you may have established two subzones, one with five Model 16 loudspeakers tapped at 8W and the other with five Model 16 loudspeakers tapped at 16W.

To add a subzone

Click the **Add** button. When the Add Subzone window appears, enter a name for the new subzone, select the loudspeaker model installed, enter the quantity, and select a tap setting. The Model Name list will include only loudspeakers that are compatible with the Speaker EQ you selected.

Click **OK** to add the selections to the subzone table.

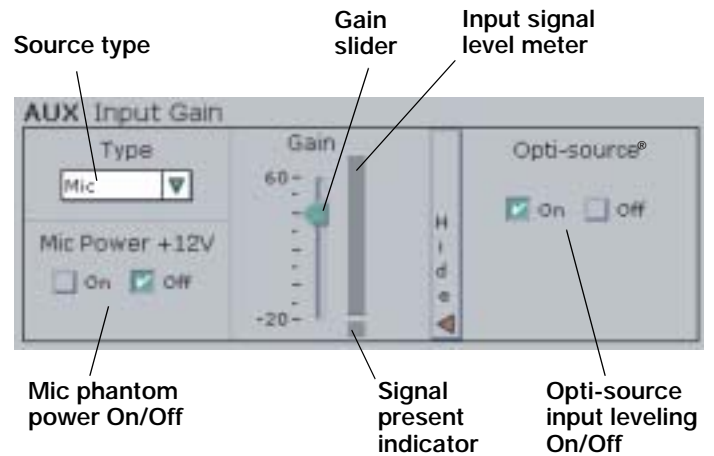


To delete a subzone

In the subzones table, select the subzone to be removed and click the **Delete** button.

6.3.3 Input gain

The Input Gain controls allow you to adjust functions related to the input source signal.



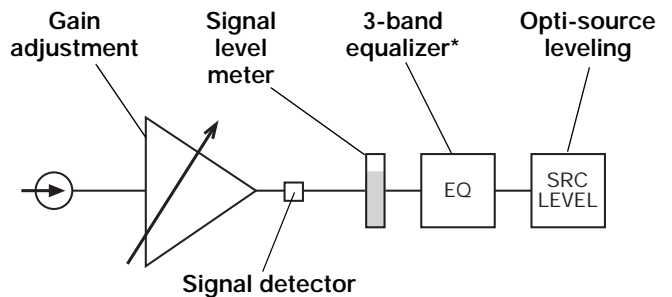
Factory default settings

Input Type	Initial Gain	Gain Range	Opti-source
Mic	40 dB	80 dB	Off
Line	0 dB	70 dB	Off
Mic Page	40 dB	80 dB	On
Line Page	0 dB	60 dB	On



Programmer's Note: Input gain controls are disabled if the input channel is routed to a zone in which Auto Volume is enabled (on). You will only be able to change/adjust the input gain by resetting the Auto Volume for the affected zone.

Input gain circuit block diagram



* Only available for AUX MIC/LINE 3 and PAGE/MIC/LINE 4 inputs. See "Source EQ" on page 40.

6.0 FreeSpace® 4400 System Setup

Input gain setup sequence

1. Set **Opti-source® Control** to **Off**. This allows you make the initial gain setting.
2. Select the source **Type** and determine if Mic Power +12V is needed. Set **Mic Power** to **On** if required. Leave it in the **Off** setting if you are using line inputs.
3. Start your input source and monitor its signal on the gain signal level meter. If the level is green, go to step 4. If the level is yellow, increase the input gain until the level is green. Likewise, if the level is red, reduce the input gain until the level is green.



Programmer's Note: You may have to repeat step 3 a few times if the input source is a CD player. The output level of a CD player varies based on the program material.

4. Set **Opti-source** to **On**. If you are using a source that produces a varying output level due to program material, such as a CD player, Opti-source leveling will compensate for these variances. If your system will be switching among multiple sources, Opti-source leveling will compensate for variances among the different sources.

5. Repeat steps 1 to 4 for the remaining system inputs.

When you turn Opti-source on, you should only hear a small change in volume. If you hear a large increase, raise the input gain. Likewise, if you hear a large decrease, lower the input gain.

Input gain controls

Type – This setting determines the initial gain and amount of gain available for the input signal. The following table lists the choices for each input line.

Input Line	Input Type(s) Selection	Initial Gain
LINE 1	Line	0
LINE 2	Line	0
AUX MIC/ LINE 3	Line (default) Mic	0 40
PAGE/MIC/ LINE 4	Line Mic Line Page Mic Page (default)	0 40 0 40

Mic power +12V – This setting enables/disables +12V phantom power only for inputs 3 and 4, which are capable of accepting microphone signals. This power source is used for condenser type microphones.

Gain slider – Click and drag the gain slider up/down to set the input gain. Changes in the slider's position are continuously sent to the FreeSpace 4400 system so you will hear the change in gain as it is applied and see the change in the signal level on the meter. The gain range is dependent on the **Type** setting: 80 dB for Mic; 70 dB for Line.



Programmer's Note: When setting up the system, adjust the input gain slider until the meter is green. Occasional flashes of red are acceptable.

Input gain meter – The input gain meter indicates the average input signal level of the hardware. The meter is divided into three color segments:

Amber = Low signal level

Green = Good signal level

Red = High signal level

Signal present indicator – The signal present indicator tells you if a signal is being received by the hardware:

Inactive = No signal

Green = Good signal

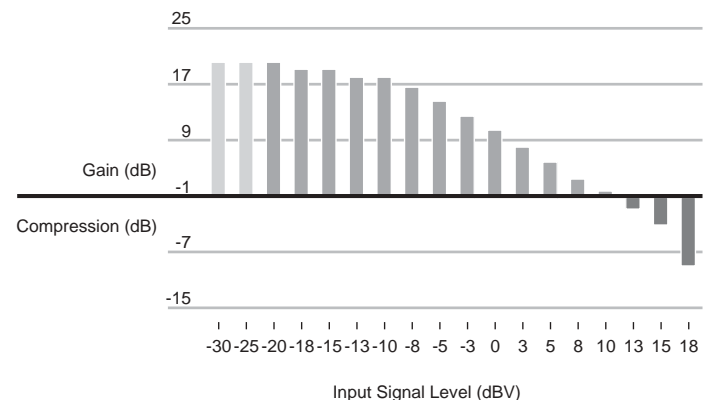
Red = Signal clipping

Opti-source® – This is the on/off control for this function. When on, Opti-source leveling automatically manages the input gain level so that the full output of the amplifier can be achieved. It does this by adjusting the input signal level to obtain the desired amplifier input signal level (+11 dBV). When setting the initial input gain level, check to make sure that Opti-source control is **Off**. If you do not see this setting in the control pane, click on **More** to display the Opti-source On/Off boxes.



Programmer's Note: The Opti-source® control state cannot be changed when the Opti-voice® paging system is on.

The following chart shows how Opti-source® system leveling operates. For sources whose average input signal level is less than -20 dBV, Opti-source leveling will add 20 dB of gain. For sources whose average signal level is between -20 and 0 dBV, Opti-source leveling will add the necessary gain so that the average output of the Opti-source function is +11 dBV. Sources whose average level is greater than 0 dBV will have gain reduction applied so that they maintain an average of +11 dBV at the Opti-source leveling output.

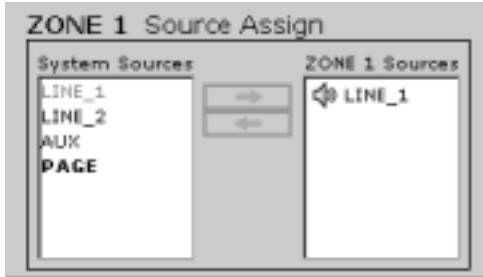


Input signals from -20 to 0 dBV fall within the ideal operating range for the Opti-source leveling function. This is reflected in the color scale used for the input gain signal level meter. If your input signal level is within the green area of -20 to 0 dBV, Opti-source leveling will effectively manage the input source level.

6.0 FreeSpace® 4400 System Setup

6.3.4 Source assign

In the Source Assign control, you can choose which system sources will be available in each zone. The Source Assign control panel lists all system sources on the left and zone sources on the right. Sources are assigned by moving them from the System Sources list to the ZONE Sources list.



Factory default settings

LINE 1 input source is assigned and routed to all four zones.

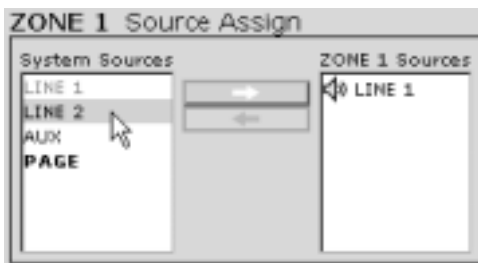


Programmer's Notes:

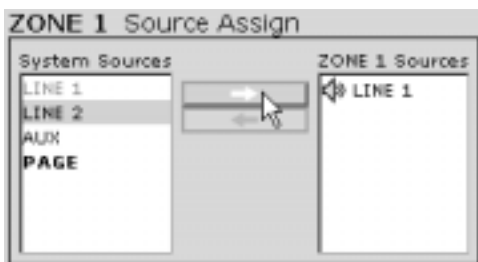
- Because the FreeSpace 4400 system is a router, at least one source must always be assigned to a zone.
- If you try to remove all sources from a zone, the last active source will always remain assigned to the zone.
- This function is disabled for zones in which Auto Volume is enabled (On). If you turn Auto Volume off and change source assignments, you will need to recalibrate Auto Volume.
- Any source assigned to ZONE 4 will also be sent to the ZONE 4/LINE OUT output.

To assign a source to a zone

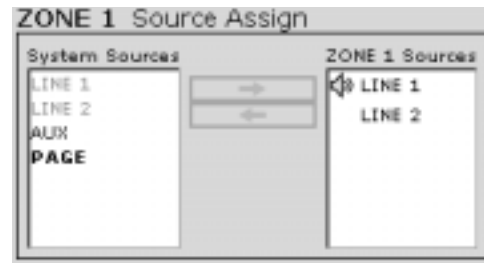
1. Select a source in the System Sources list.



2. Click the right arrow (⇒) button to move the highlighted selection to the ZONE Sources list.



When the source appears in the ZONE Sources list, it is assigned to the current zone. Once a source is assigned to a zone, that source is no longer available in the System Sources list and appears grayed out.

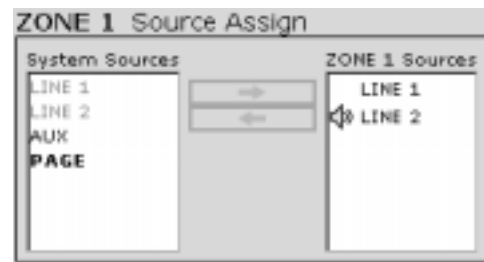
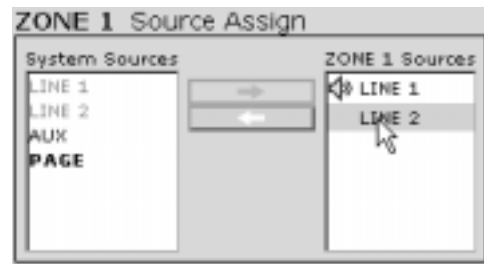


To unassign a source

1. Select the source in the ZONE Sources list.
2. Click the left arrow (⇐) button to move the highlighted selection to the System Sources list.

To route a source to a zone

Double-click on the source in the ZONE Sources list. When the source is routed, a sounding-loudspeaker icon appears next to the source.

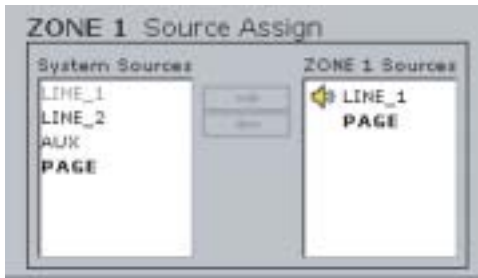


Programmer's Note: The FreeSpace® 4400 Installer™ software automatically disables keys of unassigned sources when a Flash Hardware Configuration command is performed.

6.0 FreeSpace® 4400 System Setup

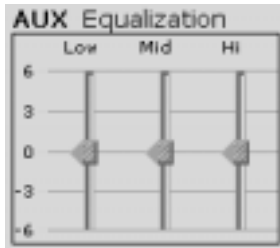
To set up paging in a zone

In order to use paging in a zone, first you must assign the **PAGE** source to the zone. Then select the appropriate settings in the Page Setup (page 40) control pane.



6.3.5 Source EQ

An input source EQ control panel is available for inputs 3 and 4. This three-band equalizer is used primarily to compensate for microphone response or for handling noise.



Click and drag each slider to the level you want. The scale on the left side of the panel is expressed in dB.

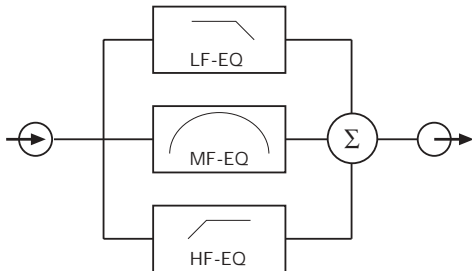
Factory default settings

Low	Mid	Hi
0 dB	0 dB	0 dB

Source EQ operation

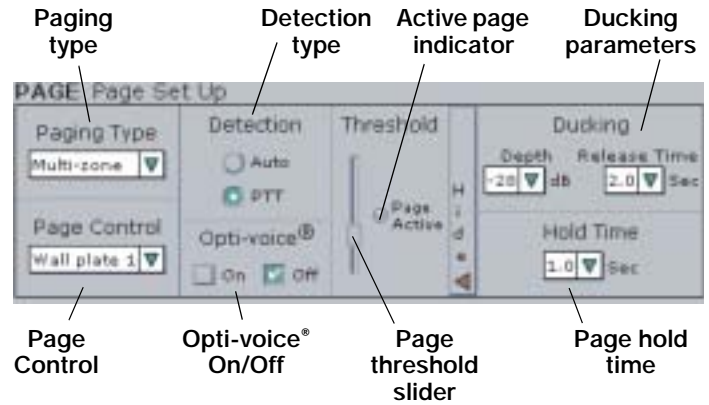
The center frequency and shape of each EQ band is fixed and can be adjusted by ± 6 dB.

- The low-frequency EQ (LF-EQ) is a low-pass shelf EQ with a corner frequency of 125 Hz and a roll-off of 6 dB per octave.
- The mid-frequency EQ (MF-EQ) has a center frequency of 1.6 kHz and a Q of 1.
- The high-frequency EQ (HF-EQ) is a high-pass shelf EQ with a corner frequency of 8 kHz and a roll-off of 6 dB per octave below this point.



6.3.6 Page setup

The Page Setup control panel is used to set up the PAGE/MIC/LINE 4 input for paging. The page setup is available when "Mic/Page" or "Line/Page" is selected for "Type" in the Input Gain control panel.



Fixed-zone paging default settings

Paging Type	Detection	Opti-voice®
Fixed-zone	PTT	On

Page setup with Opti-voice system on (default)

Since the Opti-voice paging system implements predetermined settings for ducking depth and release time and source EQ, this is the most efficient setup method. After the Opti-voice paging system is turned on, the rest of the setup depends on the chosen detection method.

1. Set **Opti-voice control** to **On** in the Page Setup control panel.
2. Select a detection method. If you select **PTT**, there is no further setup required. If you select **Auto**, continue.
3. Ask another person to talk into the paging microphone at the lowest volume that will normally be used.
4. Lower the Page **Threshold** slider to the level where the page active light is constantly on.
5. Check your page threshold setting to make sure that no environmental noise, such as a music source or background noise, triggers the page.

If you hear the music source continually ramping up and down, the environmental noise is triggering a page. If this occurs, try one of the following:

- Increase the page threshold level.
- Lower the taps on the loudspeakers near the page mic.
- Change the page mic location.

Page setup with Opti-voice® control off

1. Set **Opti-voice** to **Off** in the Page Setup control panel. This enables the **Ducking Depth** and **Release Time** controls.
2. Set the **Ducking Depth** to the amount in dB that the music will be reduced to once a page is triggered.
3. Set the **Release Time** to the length of time (secs.) it will take for the music to return to its original level. The Release Time can determine the overall quality of a page.
 - If you pause frequently while paging or release the push-to-talk (PTT) button during a page, use a long Release Time.
 - If the Release Time is too short, the music will quickly return and the level will be reduced once the page continues.

Page setup controls

Paging Type – Identifies whether you are using fixed-zone or multi-zone paging.

- **Fixed-zone** – Enables paging in all zones that have the PAGE source assigned to them.
- **Multi-zone** – Enables paging in all zones that have the PAGE source assigned to them and allows the user to select each zone independently using a Page user interface. See “Source assign” on page 39, “Setting up Multi-zone paging” on page 41, and “Page user interface operation” on page 51.

Page control – Selects which page keypad is used for paging. Active only when Paging Type is set to Multi-zone.

Detection type – Determines the page trigger method:

- **Auto** – Automatically senses input signal level. Requires that the Page Threshold level be set.
- **PTT** – Detects contact closure from push-to-talk (PTT) microphones. This disables the Page Threshold slider control.

Opti-voice selection – The Bose® proprietary Opti-voice paging system provides the appropriate sound level regardless of variations in speech projection. When on, this feature implements pre-determined settings for Ducking Depth and Release Time, and source EQ.



Programmer's Note: When the Opti-voice paging system is on, the Ducking, Source Leveling, and Input EQ controls are unavailable. Only when the Opti-voice paging system is off can these values be changed individually.

Page Threshold slider – The Page Threshold slider setting determines the signal level required to trigger a page when Auto Detection is used.

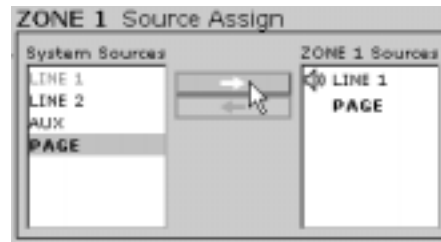
Page Active indicator – The Page Active indicator will be green when a page is being sent.

Ducking parameters – There are three settings for ducking:

- **Depth** – Determines how much to reduce the level of program material when a page starts.
- **Release Time** – Determines the amount of time to keep program material reduced after a page ends.
- **Hold Time** – Determines the amount of time that the page remains active after the page signal has stopped. Page length and Hold Time determine the point at which the Release Time starts. See “Paging operation” on page 42.

Setting up Multi-zone paging

1. Assign the **PAGE** source to all zones that will be paged. See “To set up paging in a zone” on page 40.



2. Select **Multi-zone** in the Paging Type drop list.



3. Select the wall plate connection for the page control keypad in the Page Control drop list.



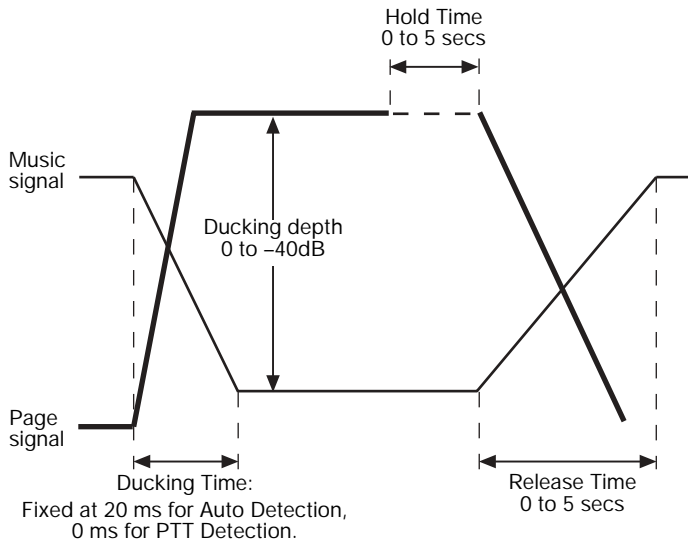
4. Set the Page Gain for each page zone. See “Page Gain Setup” on page 36.
5. Click the Flash Hardware Configuration button.



6.0 FreeSpace® 4400 System Setup

Paging operation

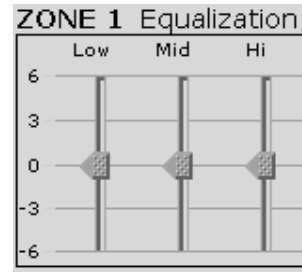
When a page signal is triggered, the music signal is ramped down according to the ducking time. The ducking time is preset at 20 ms for Auto detection and 0 ms for PTT triggering. The music level is reduced by the ducking depth which can be adjusted using the ducking depth control. Ducking depth is adjustable from 0 to -40 dB. Once a page is completed and the Hold Time has elapsed, the music volume is ramped up according to the ducking release time, which is adjustable from 0 to 5 seconds in 0.5-second increments.



Programmer's Note: The attack time for a page is approximately 1 millisecond for a PTT input and 20 milliseconds for a voice-activated input.

6.3.7 Zone EQ

The Zone EQ control panel provides a three-band equalizer for adjusting the sound quality of the zone.



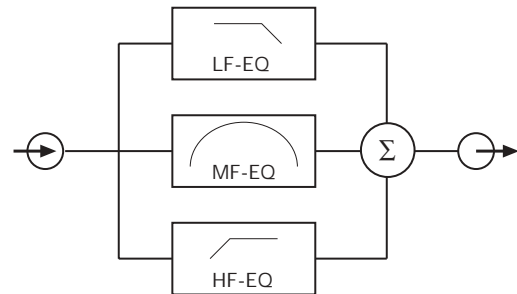
Click and drag each slider to the level you want. The scale on the left side of the panel is expressed in dB.

Factory default settings

Low	Mid	Hi
0 dB	0 dB	0 dB

ZONE EQ operation

The center frequency and shape of each EQ band is fixed and can be adjusted by ± 6 dB.

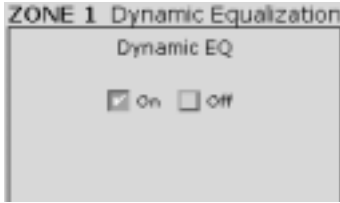


- The low-frequency EQ (LF-EQ) is a low-pass shelf EQ with a corner frequency of 125 Hz and a roll-off of 6 dB per octave.
- The mid-frequency EQ (MF-EQ) has a center frequency of 1.6 kHz and a Q of 1.
- The high-frequency EQ (HF-EQ) is a high-pass shelf EQ with a corner frequency of 8 kHz and a roll-off of 6 dB per octave below this point.

6.0 FreeSpace® 4400 System Setup

6.3.8 Dynamic EQ

The Dynamic EQ control panel provides an on/off control to enable/disable Dynamic Equalization in the current zone.



Dynamic EQ should only be used in either of the following conditions:

- The system contains extended bass or a FreeSpace® 3 loudspeaker system.
- A user interface is being used to control the volume and no autotransformers are being used on the loudspeaker line. When autotransformers are used, the system cannot accurately monitor the output level of the system, and as a result, cannot provide the appropriate response for the current listening level.

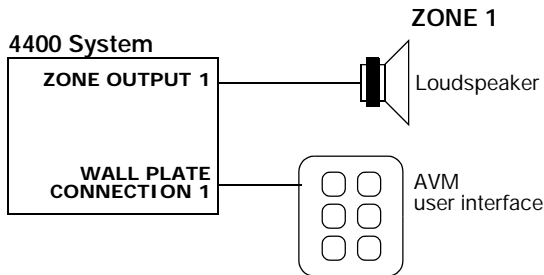
Factory default settings

Dynamic EQ is set to Off.

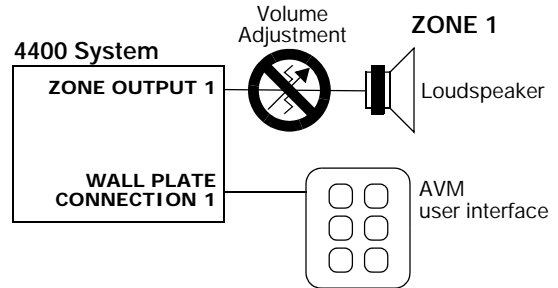
Dynamic EQ compensates for a perceived loss of bass response at low listening levels. Based on the current output level of the FreeSpace 4400 system, additional bass and high frequency will be added.

For Dynamic EQ to operate correctly, make sure the hardware is connected properly:

- An AVM user interface must be connected to the WALL PLATE CONNECTION 1.
- The loudspeaker(s) must be directly wired to the ZONE OUTPUT connector.



- **DO NOT USE AUTOTRANSFORMERS:** DO NOT use an autotransformer on the loudspeaker line to adjust the loudspeaker volume. Dynamic EQ will not operate properly with this added component.

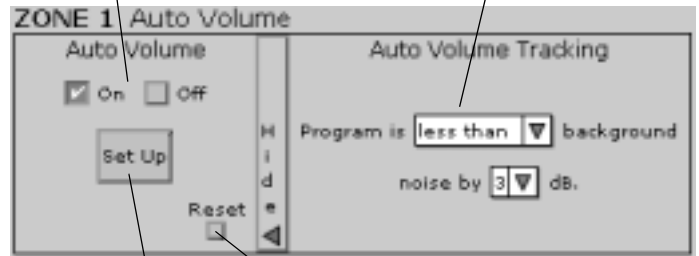


6.3.9 Auto Volume

The Auto Volume function controls the volume level in a zone in relation to its environmental noise. Using the Auto Volume control pane, you can configure and calibrate this function for each zone.

Auto Volume On/Off states

Auto Volume Tracking settings



Auto Volume calibration button

Auto Volume calibration reset button

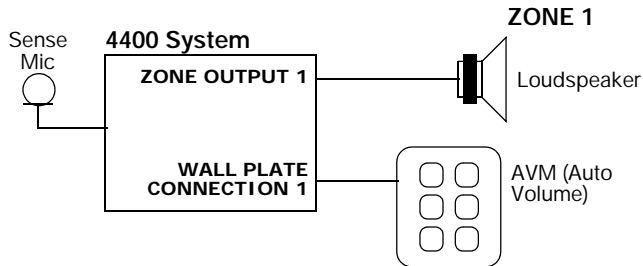
Factory default settings

Auto Volume	Auto Volume Tracking
Off	Equal to background noise

6.0 FreeSpace® 4400 System Setup

IMPORTANT: Before you calibrate Auto Volume

- Make sure that the system hardware installation is complete and that all components (sense microphones, loudspeakers, and AVM (Auto Volume) user interfaces) are properly connected. Remember that loudspeakers must be directly wired to the ZONE OUTPUT connectors on the FreeSpace 4400 rear panel.

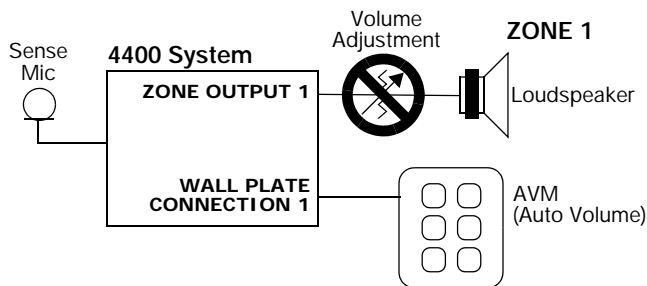


- Make sure that you have selected the correct loudspeaker model in the ZONE setup pane.
- Make sure that the output gain is set so that the source can be heard without dropping out.
- Check that sources have been assigned to zones.



Programmer's Note: If a source is routed to multiple zones, you need to perform Auto Volume calibration on that source only once. After calibration, the source is "locked" (no adjustments to the source will be allowed) until all zones using that source have been reset.

- Check the EQ pane and make any final adjustments.
- **DO NOT USE AUTOTRANSFORMERS:** Loudspeakers must be directly wired to the ZONE OUTPUT connector of the FreeSpace 4400 hardware. DO NOT use an autotransformer on the loudspeaker line to adjust the loudspeaker volume. If you lower the volume using an autotransformer, the FreeSpace 4400 system will raise the volume. Likewise, if you raise the volume using an autotransformer, the FreeSpace 4400 system will lower the volume.




Auto Volume setup procedure



Programmer's Note: While the Auto Volume calibration is running,

- DO NOT use the paging microphone.
- Wait for the Auto Volume calibration to finish before adjusting other system functions.
- DO NOT disconnect the RS-232 cable from the FreeSpace 4400 system.

1. Click  button for the zone you want to calibrate.
2. Click **More** to display the Auto Volume Tracking settings.
3. Select Auto Volume Tracking settings for the type of system used in this zone. See "Auto Volume Tracking settings" on page 48.
4. Click **Set Up** to start the Auto Volume Setup process. The initial Auto Volume Setup dialog appears in the window.



6.0 FreeSpace® 4400 System Setup

- Click **Continue**. Your Auto Volume Tracking settings are confirmed. If the tracking settings are not correct, click the **Cancel** button, change the settings, and start the setup process again.



- Click **Continue**. All sources assigned to the zone are listed in the window. You are asked to confirm that a source is connected and operating. If the source list is wrong, click the **Cancel** button, use the Source Assign control panel to correct the problem and start the process again.

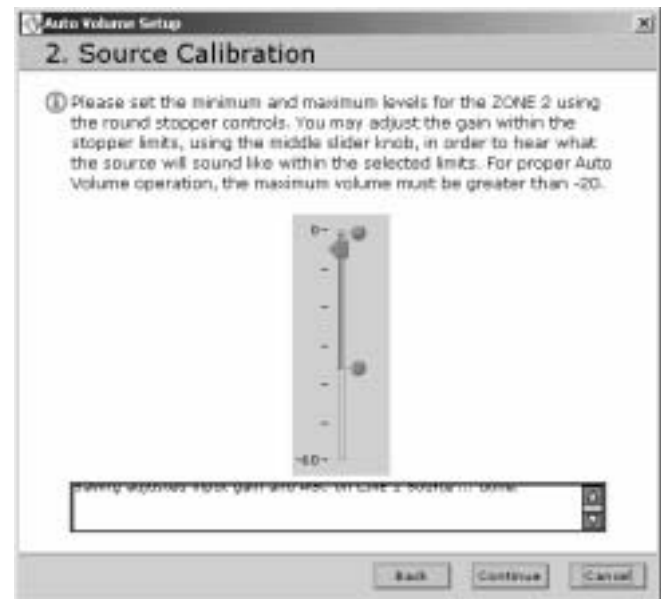


- Click **Continue** to begin the source calibration setup steps. Wait for the setup steps to be completed.



Programmer's Note: If you attempt to calibrate a source that is already calibrated, the dialog box will tell you that source calibration is being skipped.

When the setup steps are done, you are asked to make volume adjustments. The maximum output gain should always be greater than -20 dB for proper Auto Volume operation. If the maximum output is less than -20, the source calibration procedure might fail. If your system is too loud in this range, change the loudspeaker taps to a lower setting.



6.0 FreeSpace® 4400 System Setup

8. Click **Continue** to begin the source calibration process.



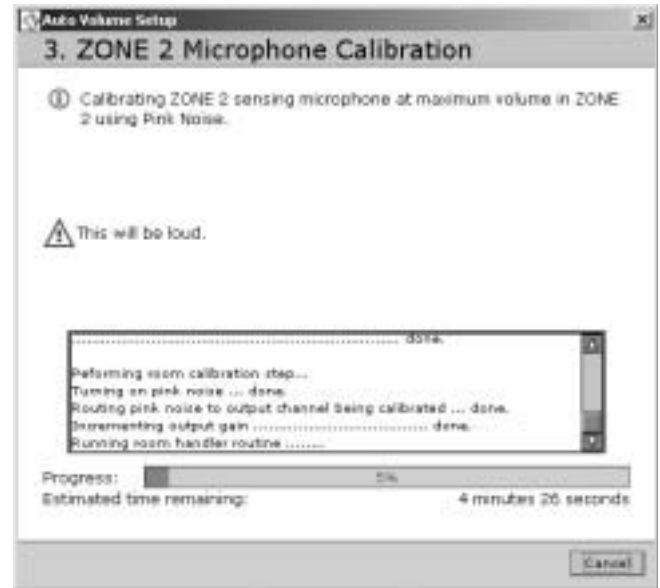
The source calibration process takes about three minutes per source. For each source, the input gain is measured and optimized, and the source level is activated. When this is done, the software displays the following confirmation.



9. Click **Continue** to begin the Zone Microphone Calibration.



This calibration is performed using a test signal at the maximum zone volume and takes about 5 minutes.



6.0 FreeSpace® 4400 System Setup



Programmer's Note: If this process fails, a dialog similar to the following will appear. Check the sensing microphone installation and make sure all sources are operating.



Following a successful microphone calibration, the software automatically flashes the hardware to save the configuration.



10. At the end of a successful Auto Volume calibration, the software displays a list of controls that are disabled when Auto Volume is on. Click **Finish** to exit Auto Volume Setup. The Auto Volume function is now **On**.



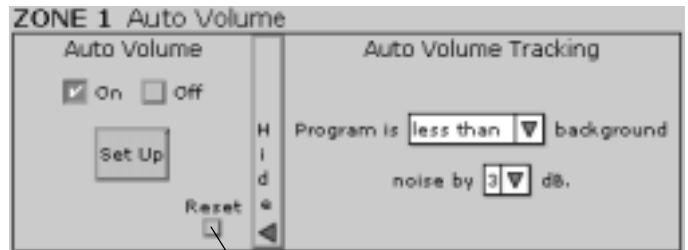
Resetting a calibrated Auto Volume zone

To cancel the calibration in an Auto Volume zone, click the **Reset** button. The Reset button is available only after a zone is successfully calibrated.

When you reset a calibrated Auto Volume zone, the keypad control programming is restored to that of an AVM (Mute) user interface the next time you perform a hardware flash.



Programmer's Note: Be sure you want to reset the zone before you click the Reset button. If you reset the zone, you will need to run the Auto Volume setup process again before you can use Auto Volume.



Click to reset Auto Volume calibration

When to repeat the Auto Volume calibration

You will need to repeat the Auto Volume process if:

- You reset a calibrated zone.
- You physically replaced source hardware.
- You moved a sensing microphone.
- You changed a loudspeaker tap.
- The source hardware has an output control and you changed its setting after you calibrated Auto Volume.
- You have flashed an existing file into a new hardware device in a new installation. The calibration specific to the new installation needs to be performed.
- You upgraded the FreeSpace 4400 microcontroller code.

Auto Volume controls

Auto Volume On/Off states – These selections appear grayed if the Auto Volume function is not calibrated. After a successful calibration, these controls are accessible and you can turn Auto Volume on and off.

Auto Volume Tracking settings – These settings determine the ratio between the background noise and the program material. Once calibrated, the Auto Volume function maintains this ratio. These settings can be changed with some restrictions after calibration. See “Changing Auto Volume Tracking after calibrating a zone” on page 48.

For this type of system	Set “Program is ...” to	Set “noise by ...” to
Background system (music level is less than room noise level)	less than	1, 3, or 6 dB
Foreground system (music level equals room noise level)	equal to	NA
Performance system (music level is greater than room noise level)	more than	1 or 3 dB

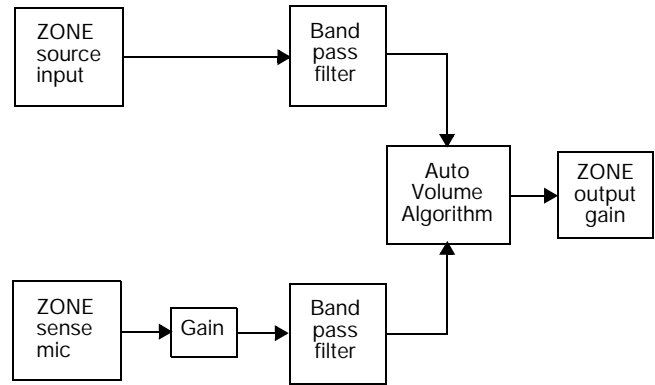
Set Up (Auto Volume calibration) button – Clicking this button starts the calibration process. Once calibration is complete, the following functions are disabled for the applicable zone:

- Input Gain controls for all sources routed to the zone
- Source Type for all sources routed to the zone
- Source Assign
- Auto Volume Tracking
- Output Gain controls

Auto Volume reset button – Clears the Auto Volume calibration within the selected zone and enables the functions that were previously disabled. This button is enabled only when the zone is in a calibrated state. See “Resetting a calibrated Auto Volume zone” on page 47.

Auto Volume operation

The Auto Volume function monitors the zone source input relative to the zone sensing microphone input. Based on these two inputs, the Auto Volume function determines if the output gain for the zone must be raised or lowered to maintain the predetermined program-to-noise ratio.



- When the Auto Volume function is on, pressing **Volume ▲** or **Volume ▼** on the AVM (Auto Volume) user interface will turn Auto Volume off. To turn Auto Volume on again, press the Auto Volume key.
- When you turn the Auto Volume off with a user interface, the volume is reset to the lowest level set by the Min. gain stop. “Set the minimum output gain.” on page 36 for details on setting the minimum output gain.
- When Auto Volume is on in two adjacent rooms and they are acoustically coupled, the same source must be played in each room. If this is not the case, each zone with Auto Volume will sense the other source as noise and try to overcome that noise. The result would be a very loud system.

Changing Auto Volume Tracking after calibrating a zone

After a zone is calibrated for Auto Volume, the Auto Volume Tracking settings can be changed according to the following table.

If Auto Volume Tracking is	It can be changed to
more than 3	more than 1
more than 1	more than 3
equal to	less than 1, less than 3, or less than 6
less than 1	equal to, less than 3 or less than 6
less than 3	equal to, less than 1 or less than 6
less than 6	equal to, less than 1 or less than 3

7.0 User Interface Operation

7.1 Enabling keypad operation

User interface keys for assigned sources are enabled only after flashing the hardware. Keys for any unassigned sources are automatically disabled after flashing the hardware.

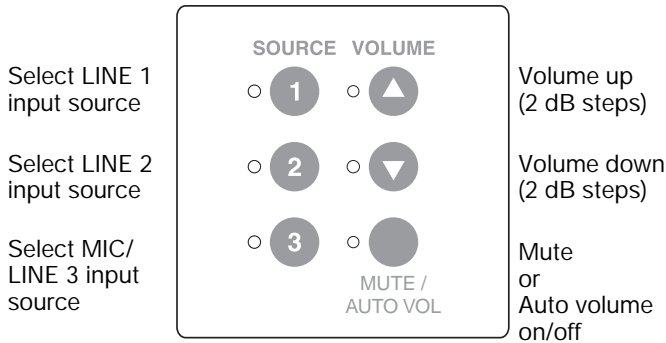
7.2 Turning the system on

When the FreeSpace 4400 system is in STANDBY, you can turn the system on by pressing any key on any keypad except keys for unassigned sources on the AVM user interfaces, and the PAGE key on the Page user interface.

7.3 AVM user interface operation

The FreeSpace® AVM 1-Zone User Interface and FreeSpace® AVM 2-Zone User Interface provide source selection, volume up/down, and Mute or Auto Volume on/off controls.

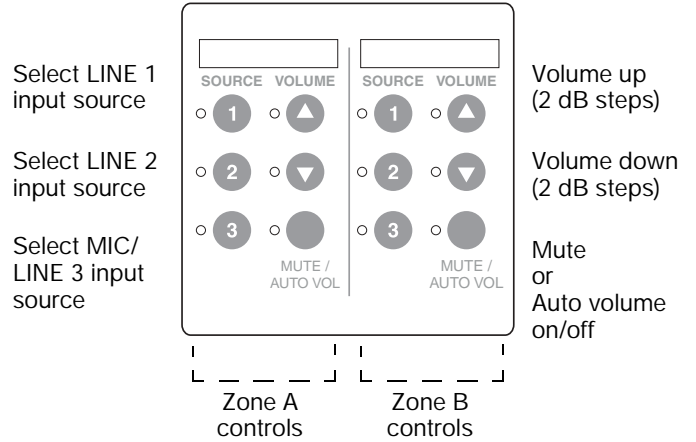
FreeSpace® AVM 1-Zone User Interface



The FreeSpace® AVM 2-Zone User Interface provides two sets of source selection, volume up/down, and Mute or Auto Volume on/off


controls for use with two zones.

FreeSpace® AVM 2-Zone User Interface




- Press **1**, **2**, or **3** to select the audio source connected to the LINE 1, LINE 2, or LINE 3 input, respectively. A green LED indicates the active source.
- Press **▲** (Volume up) or **▼** (Volume down) to increase or decrease the volume in 2 dB steps. Press and hold for continuous increase/decrease. The red LED lights when either button is pressed.
- The maximum/minimum volume setting is determined by the min./max. level stop settings in the Output Gain control pane.

When configured for Standard operation:

- Press  (MUTE/AUTO VOL) to silence the listening area. When muted, a yellow LED flashes. Press again to restore the volume.

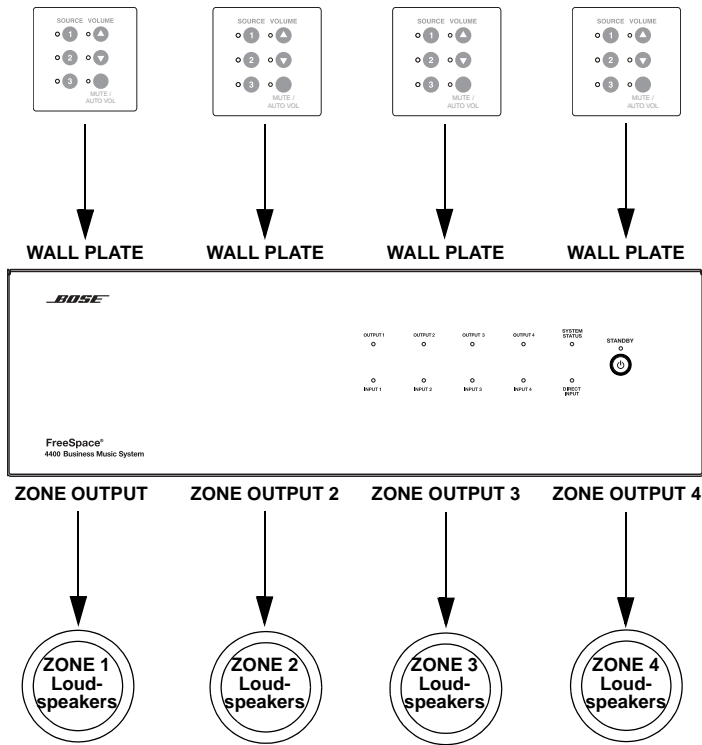
When configured for Auto Volume operation:

- Press  (MUTE/AUTO VOL) to turn the Auto Volume function on or off. The yellow LED lights when Auto Volume is on.
- When the Auto Volume function is on, pressing **▲** (Volume up)

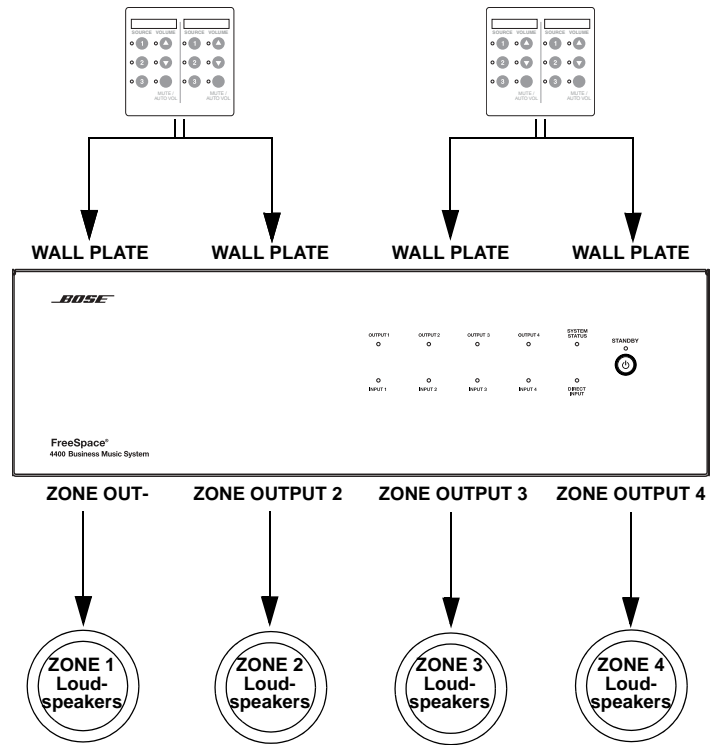


7.0 User Interface Operation

AVM 1-Zone User Interface Example



AVM 2-Zone User Interface Example



7.0 User Interface Operation

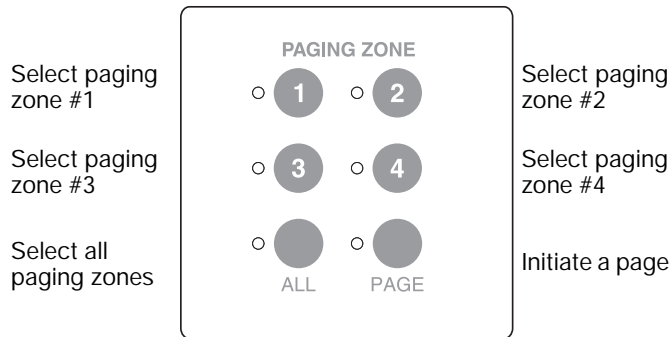
7.4 Page user interface operation

The Page user interface provides keys to select single paging zones, all paging zones and initiate a page.

Paging zones are not the same as output zones. After assigning the PAGE source to the output zones and choosing the appropriate settings in the Page Setup control pane, flashing the hardware maps the paging zone buttons accordingly.

When mapped, the paging zone **1** button will select the lowest numbered output ZONE to which the PAGE source is assigned. The paging zone **2** button will select the next lowest numbered output ZONE to which the PAGE source is assigned, and so forth.

Page User Interface



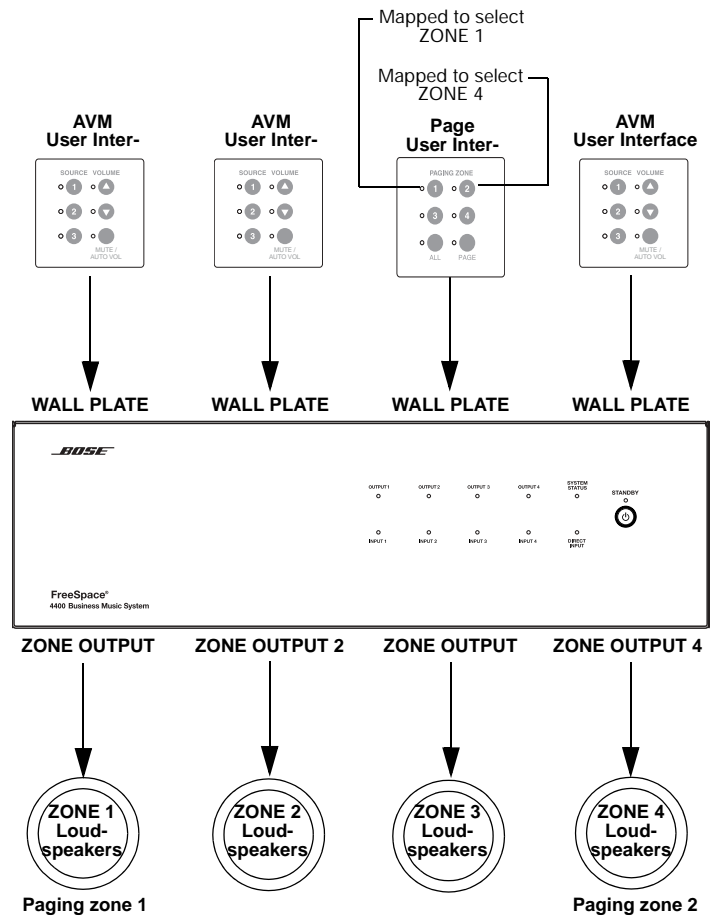
- Press **1**, **2**, **3** or **4** to select a paging zone. A green LED flashes to indicate that the zone is selected for paging. After ending a page the LED turns off.
- Press **ALL** to select all paging zones.
- Press **PAGE** to initiate a page in systems that do not use a PTT (push-to-talk) microphone.

Page User Interface Example:

- The **PAGE** source is assigned to ZONE OUTPUT 1 and ZONE OUTPUT 4.
- In the Page Setup control pane for ZONE 1 and ZONE 4:

Paging Type = Multi-zone
PAGE Control = Wall plate 3

- After flashing the hardware, the paging zone **1** button selects ZONE OUTPUT 1 for paging, and the paging zone **2** button selects ZONE OUTPUT 4 for paging.



8.0 FreeSpace® 4400 System Troubleshooting

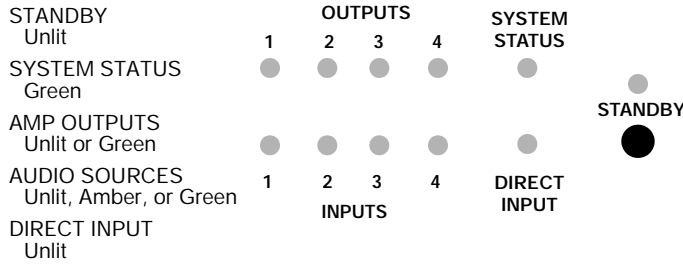
8.1 Introduction

This section provides troubleshooting guidelines to use for solving any problems you may encounter while installing and servicing FreeSpace 4400 systems.

8.2 FreeSpace 4400 hardware indicators

8.2.1 Normal operation

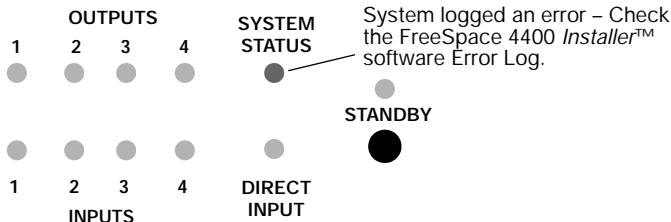
These are the indications of normal operation.



8.2.2 System fault

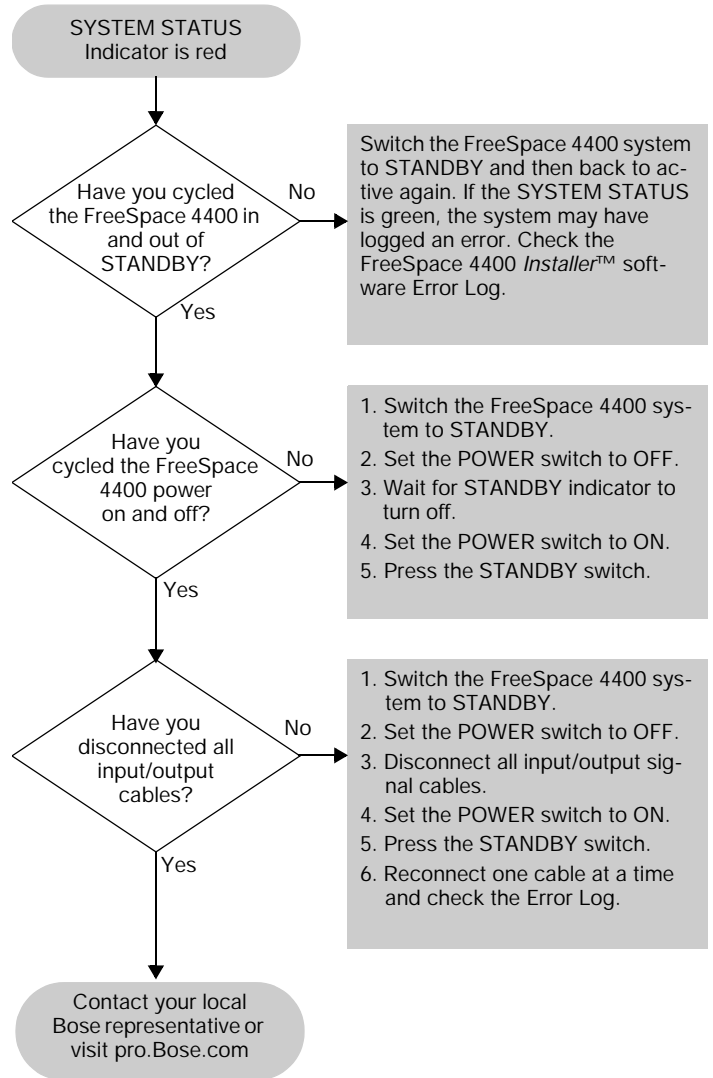
A red SYSTEM STATUS LED indicates that the FreeSpace 4400 received an error from one of its many internal components. A red SYSTEM STATUS LED after AC power is switched on may be caused by:

- A Power-On Self-Test failure
- A DSP error
- The DSP is offline



To determine the severity of the error, cycle the FreeSpace 4400 system power off and back on again. If the SYSTEM STATUS indicator is now off, the FreeSpace 4400 system has logged an error, but is still operational.

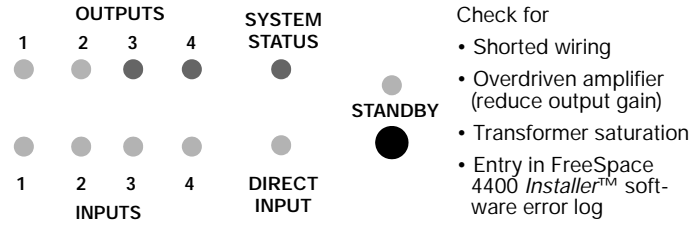
When you check the error log using the FreeSpace® 4400 *Installer*™ software you can identify the cause of the error, and determine an appropriate solution.



8.0 FreeSpace® 4400 System Troubleshooting

8.2.3 Amplifier fault

The AMP OUTPUT LEDs work in pairs (1 and 2, 3 and 4) and indicate the operating status of the four amplifier output channels.

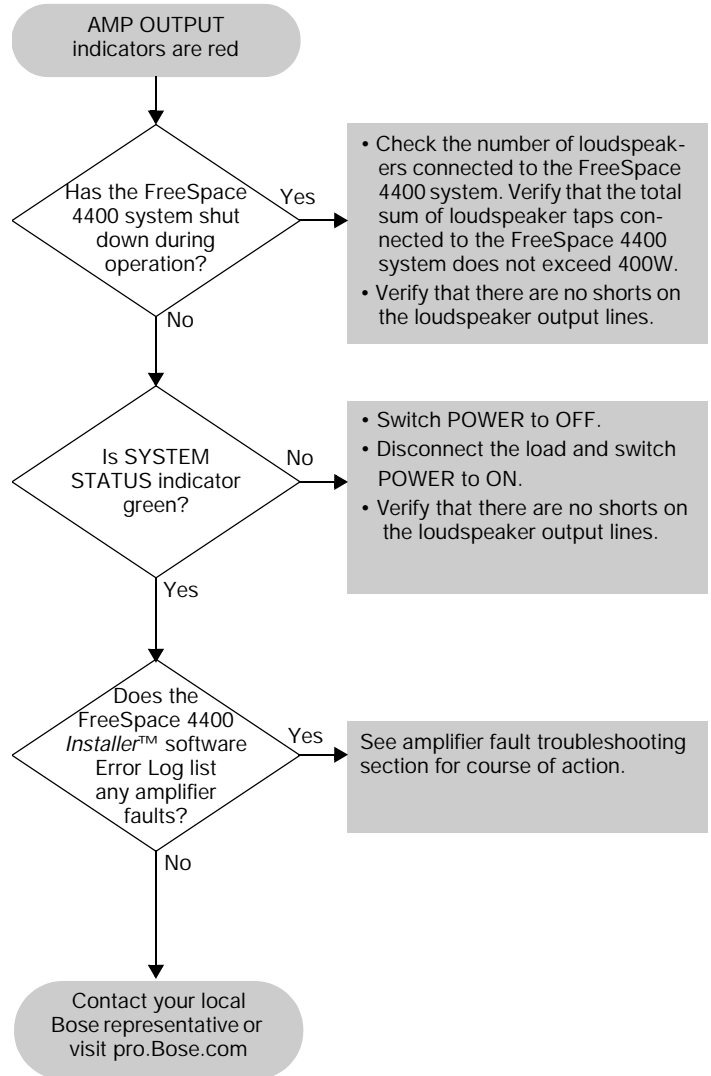


When an amplifier fault occurs, the amplifier mutes its outputs and indicates an error. After a short period of time the amplifier will try to operate again. If the fault condition persists, the amplifier will attempt to restart six times, after which it will remain muted.

Amplifier faults are typically caused by a shorted loudspeaker line, an overdriven amplifier, or a saturated output transformer.

- To check for a shorted loudspeaker line, remove the loudspeaker connection from the amplifier channel. If this resolves the problem, locate and correct the shorted loudspeaker line.
- To make sure that you are not overdriving the FreeSpace 4400 output, change to a different source. If the problem no longer exists, use the FreeSpace 4400 *Installer*™ software to reduce the input level of the original source that was overdriving the output.
- To make sure an output transformer is not being saturated, check to see if the correct loudspeaker EQ setting is selected.

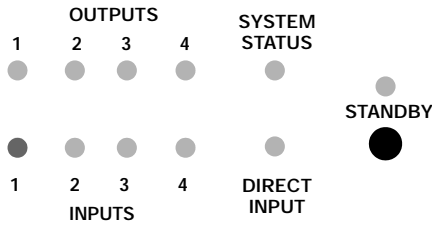
If none of these actions solve the problem, read the instructions in the following flow chart or check the error log using the FreeSpace 4400 *Installer*™ software.



8.0 FreeSpace® 4400 System Troubleshooting

8.2.4 Input clipping

If clipping is occurring at the input of an amplifier channel, the source LED will blink red.



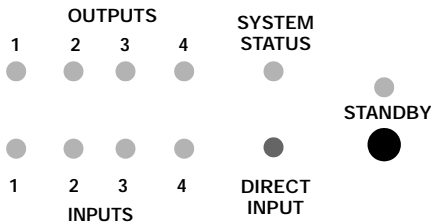
If this fault occurs:

- Reduce the output gain of the source, or
- Using the FreeSpace 4400 *Installer*™ software, reduce the input gain for the channel that is clipping.

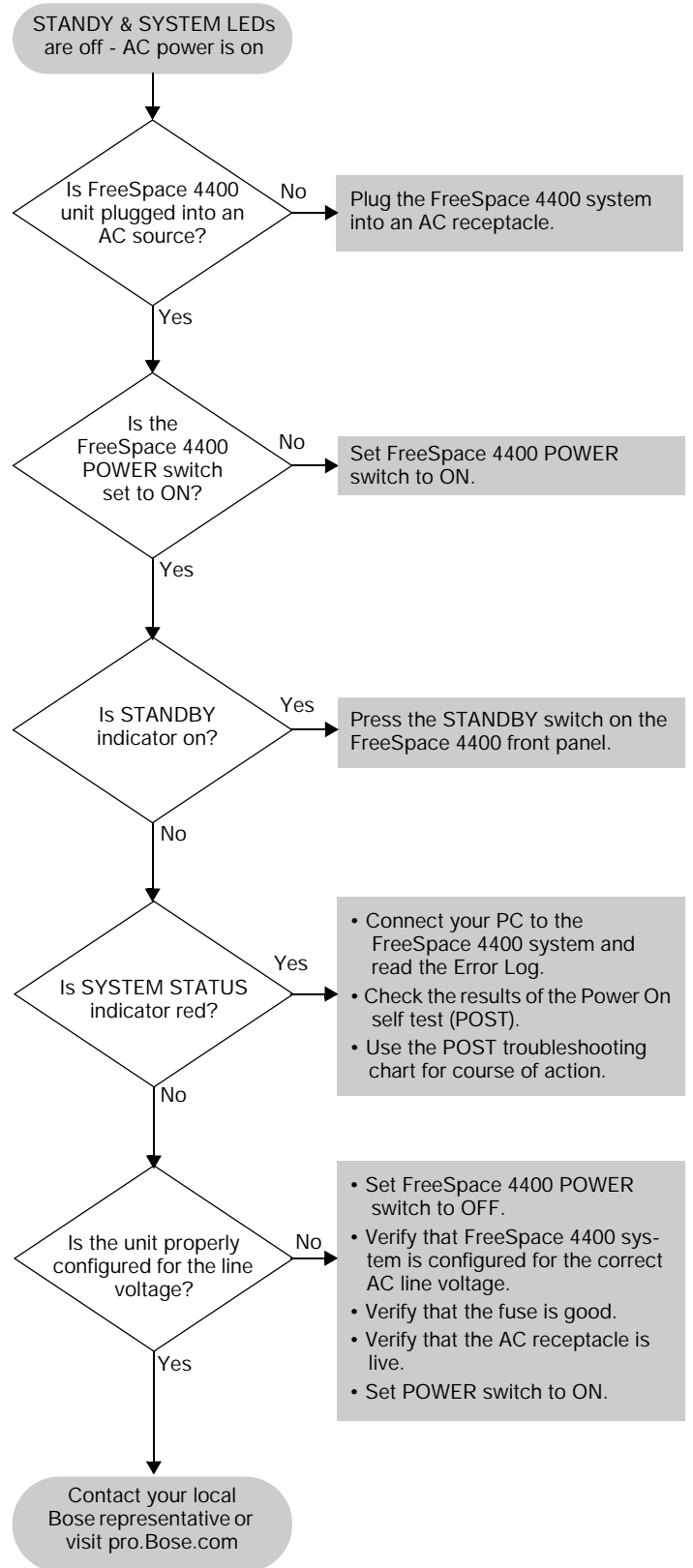
8.2.5 Direct input is active

If the DIRECT INPUT LED is red:

- Check that the DIRECT INPUT/CONTROL contact closure is in the closed position.
- Check the device to which this input is connected.



8.2.6 No STANDBY and SYSTEM indicators



8.3 FreeSpace® 4400 system Error Log

The FreeSpace 4400 system Error Log is displayed when the FreeSpace 4400 *Installer*™ software is in the Service Hardware mode.

8.3.1 Contents of the Error Log

The Error Log displays FreeSpace 4400 system hardware version numbers and records all alarms and their causes as shown in the following example.

Bose® FreeSpace 4400 Error Log	
Hardware version numbers	Microcontroller: v3.0.0.18 DSP: v2.0.1.0 Peripheral: v1.0.0.10 Lower Amplifier: v1.1.8.5 Upper Amplifier: v1.1.8.5
Type of alarm	power-on self-test alarm (ok)
Name of test	2002/12/31 23:59 host controller test:
Test results	[OK] host controller flash test: [OK] peripheral controller test: DSP test: 1 upper amplifier test: [OK]

8.3.2 Hardware configuration

The FreeSpace 4400 system hardware version numbers appear at the top of the Error Log listing. These are the version numbers of the software installed in the FreeSpace 4400 hardware at the time of manufacture. These version numbers do not pertain to the FreeSpace 4400 *Installer*™ software installed on your PC.

8.3.3 Power-on self-test results

The power-on-self test (POST) results are only displayed when an error has occurred. The POST test checks the basic operation of the FreeSpace 4400 hardware to determine if it is capable of properly performing audio processing and amplification. During the POST test, five major components of the hardware are tested.

- **Host controller** – The host controller monitors and controls the operation of the FreeSpace 4400 hardware. A host controller failure will cause the message, “Power-on self-test incomplete” to appear in the host controller test section. The failure type for a host controller is an SRAM address failure. If this occurs, contact your local Bose representative or visit pro.Bose.com.
- **Flash memory test** – The flash memory contains the configuration, design file, and system event schedule. A flash failure will cause the message, “Power-on self-test incomplete” to appear in the host controller flash test section. If this occurs, contact your local Bose representative or visit pro.Bose.com.
- **Peripheral controller** – The peripheral controller monitors contact closures, front panel connections and user interface connections for incoming event messages. Any failures in these areas will cause the message, “Power-on self-test incomplete” to appear in the peripheral controller flash test section. If a 12C, or code failure occurs, contact your local Bose representative or visit pro.Bose.com. If a user interface failure occurs, check the user interface wiring for shorts.
- **DSP test** – The DSP performs all signal processing and routing functions. If a DSP error occurs, contact your local Bose representative or visit pro.Bose.com.
- **Upper and lower amplifier test** – The upper and lower amplifier test determines if the amplifiers are operating properly. An amplifier failure will cause the message, “Power-on self-test incomplete” to appear in the upper or lower amplifier section of the POST test results. If a 12C, or code failure occurs, contact your local Bose representative or visit pro.Bose.com. Additional details on the exact cause of an amplifier failure can be found in the amplifier section of the Error Log.

8.3.4 Amplifier alarms

Each amplifier section monitors its own operation and performance. If a fault condition occurs, it is reported in the Amplifier Alarm section of the Error Log. Upper amplifier alarms affect channels 1 and 2, and Lower amplifier alarms affect channels 3 and 4.

The amplifier section of the alarm log indicates the following:

- **Alarm type** – The generated alarm type is the first item.
- **Amplifier status** – When an alarm is generated, the amplifier reports its current operating status for diagnostic purposes. The following items are reported in the status:

Date & Time: Date and time when alarm condition occurred.

Rail Voltage: The amplifier positive and negative rail voltages. Normally, the amplifier rail voltage should be between 100V and 190V. Voltages outside this range will cause the amplifier to shut down. In the 70V mode, a normal rail voltage is approximately 125V. In the 100V mode, a normal rail voltage is approximately 165V.

Temperature: The internal operating temperature of the amplifier. Normally, this will be between 0° and 160° Fahrenheit (-18° - 71° Celsius).

Output Voltage: The actual output voltage of the amplifier at the time of the alarm.

Output Current: The actual output current of the amplifier at the time of the alarm.

Input Status: The status of the input signal to the amplifier. Possible status messages are DC sense fault, amplifier module fault, AC power fault, sleep mode, high-frequency sense fault, and retry fault.

Output Status: The status of the amplifier output at the time of the alarm. Possible status messages are “amplifier module muted,” and “speaker relay off.”

Fan Speed: The fan speed at the time of the alarm.

Operating Mode: The current setting of the output voltage select switch, 70V or 100V.

Amplifier alarms – using output voltage and current

Reviewing the output voltage and current can help to diagnose a problem. Compare the output voltage and current for each of the two amplifier outputs to determine the nature of the problem.

	High Voltage (>20V)	Low Voltage (<20V)
High Current (>2A)	Driving an impedance <12Ω <ul style="list-style-type: none"> • Reduce total loudspeaker load • Check for partial short of loudspeaker line 	
High Current (<1A)	Loudspeaker transformer saturation at low frequency <ul style="list-style-type: none"> • Check for proper Speaker EQ setting • Set Speaker EQ to high-pass filter 	Short on loud-speaker line

Amplifier alarms – using rail voltage

Normally, the amplifier rail voltage should be between 100V and 190V. In the 70V mode a normal rail voltage is approximately 125V. In the 100V mode a normal rail voltage is approximately 165V.

By comparing the + and – rail voltages, you can determine if you are driving an impedance which is too low (<12Ω). In this case the difference between the two rails will probably be greater than 20%.

If one of the rails shows a voltage, and the other does not, the amplifier should be replaced.

As you review all alarm records you can compare the plus rail voltage in each of the status sections. For example, a drop of 50% in one status could indicate a brownout condition occurred.

Amplifier alarms – input and output status

The Input and Output Status sections display the fault condition which caused the alarm and the current status of the amplifier output.

8.0 FreeSpace® 4400 System Troubleshooting

A number of fault conditions can be displayed in the Input Status section:

DC Sense Fault: A power supply fuse, output FET, amplifier module, or some combination of the above has blown. The unit should be replaced.

Amplifier Module Fault: When the Amplifier Module fault occurs by itself it can be caused by any of the following:

- Shorted loudspeaker line – Check the loudspeaker line for shorts.
- System power exceeds 400W – Check that system power does not exceed 400W.
- Loudspeaker transformer saturation – Check that proper loudspeaker EQ is being used or use a high-pass filter for loudspeaker EQ.
- Line voltage too high (surge) – Check Error Log for a rail voltage that exceeds 150V, in 70V mode, or 190V, in 100V mode.
- Line voltage too low (brownout) – Check Error Log for a rail voltage which is lower than normal by at least 20%.
- 70/100V mode switched with unit operating – Check that output voltage and AC input voltage selector are correct.
- Blown power supply fuse (as opposed to AC line fuse) – Replace the FreeSpace 4400 system.

AC Power Fault: Might be an AC line dropout or severe brownout, or simply AC power turned off without first placing the FreeSpace 4400 in standby mode. You can check that the power has been removed from the FreeSpace 4400, or that you experienced a power dropout.

Sleep Mode: The host microcontroller has told the amplifier and power supply to turn off. This only occurs in conjunction with another alarm (usually AC power fault), because it in itself is not an alarm condition. When an AC power dropout occurs, the amplifier immediately shuts the amplifier and loudspeaker relay off, then the other processing is shut down. This all happens fast enough to prevent data loss or corruption, and to prevent loud pops in the loudspeakers. When this occurs you should check the alarm history to determine what other faults occurred at this time.

High-Frequency Sense Fault: This protection mode is designed to prevent damage to the amplifier or loudspeakers from excessive high-frequency audio or ultrasonic energy. The amplifier is not capable of sustained operation at full power in the 10kHz to 20kHz (+) range.

Generally, this fault results in a one-time 3-second dropout. If, when the amplifier tries to restart after 3 seconds, the excess HF is still present, the amp (and loudspeaker relay) will remain off for another 3 seconds and the loop repeats. Six of these in a row will cause the amp to shut down, and will trigger a Retry Fault.

When this fault occurs you can check your program material for excessive high-frequency content, or for a potential ground loop which has created an oscillation internal to the FreeSpace 4400 system. You can also reduce the output gain for this amplifier zone in an attempt to reduce the high-frequency energy going to the amplifier.

Retry Fault: The amplifier has tried to start up or recover from a fault condition at least six times. When this occurs, you will need to place the FreeSpace 4400 system in standby and then press the STANDBY button again to clear the fault, at which time the FreeSpace 4400 system will again try to start up.

When this occurs you should check the alarm history section of the Amplifier Alarm to determine the exact fault type that triggered the Retry Fault.

Input and output alarm history

This part of the Error Log displays the sequence of fault conditions where “0” is the initial fault reported followed by “1-6”. These occur over a very short period of time.

8.3.5 Solving faults reported in the Error Log

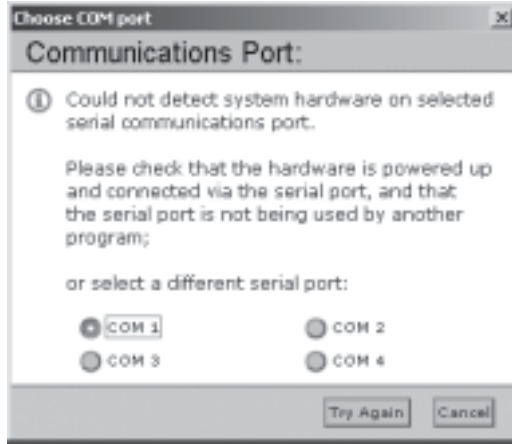
When errors are reported in the Error Log, you can try to solve the problem by performing one of the following actions:

- On the FreeSpace 4400 rear panel, turn the POWER switch to OFF. Wait a few seconds and turn the POWER switch to ON. Then press STANDBY on the front panel.
- On the FreeSpace 4400 rear panel, turn the POWER switch to OFF. Disconnect all input/output signal cables. Wait a few seconds and turn the POWER switch to ON. Then press STANDBY on the front panel. Reconnect one cable at a time and check the Error Log.

8.4 Common problems

8.4.1 Communications port error

When you receive the communications port error dialog, the FreeSpace® 4400 *Installer™* software was not able to locate a FreeSpace 4400 system on the COM 1 port.



This normally occurs due to one of three reasons:

- The PC and FreeSpace 4400 are not connected via a “straight-wired” serial cable.
- Another software application has control of the serial port. Applications such as the Palm OS, or other audio applications control the serial port while they are open. Close these applications and click the **Try Again** button.
- The FreeSpace 4400 is connected to another communications port. If this is the case you should select the appropriate COM port and click the **Try Again** button.

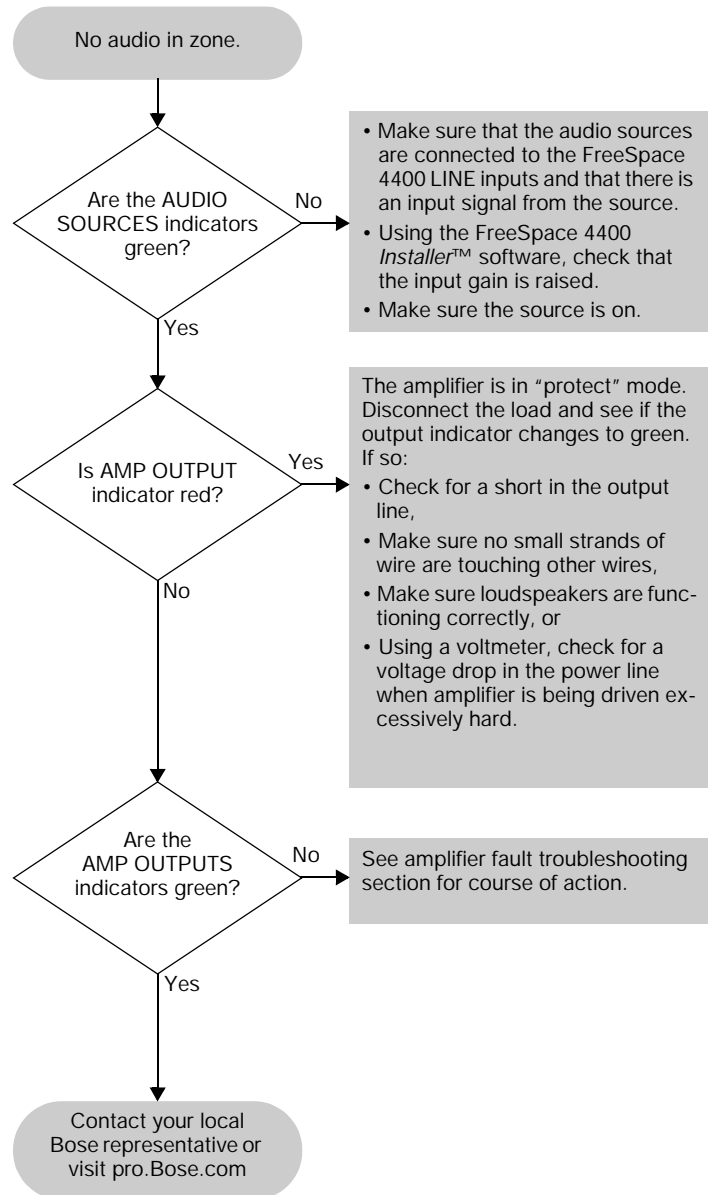


Programmer's Note: Before dismissing the “Choose COM port” dialog, select the COM 2 port and click **Try Again**. Not doing this will cause the COM 1 port to be locked. If the port locks, you must restart your computer.

8.4.2 No audio in zone

If the system is powered on and operational, but there is no sound, check the following:

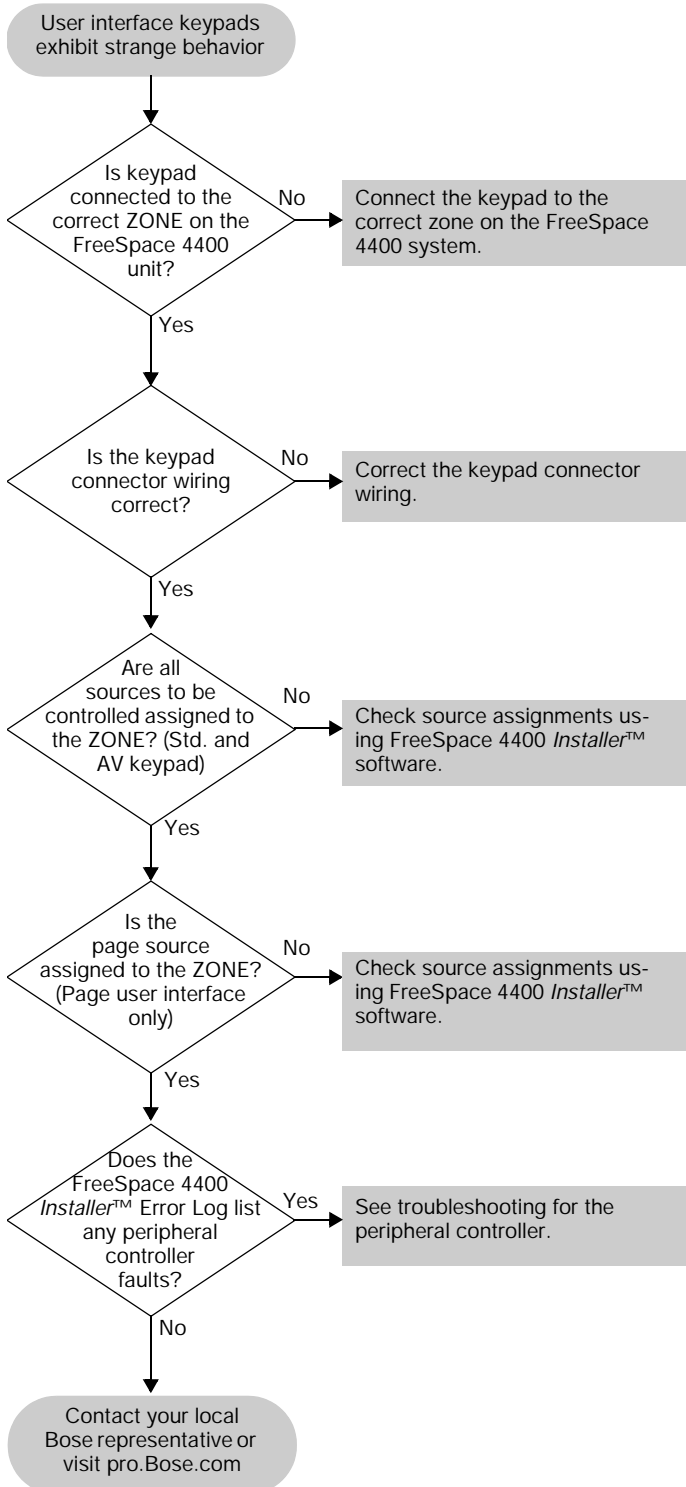
- Do the front panel LEDs indicate normal operation?
- Is the source operating?
- Is routing correct?
- Is output gain correct?
- Is the output gain muted?
- Is cabling correct?



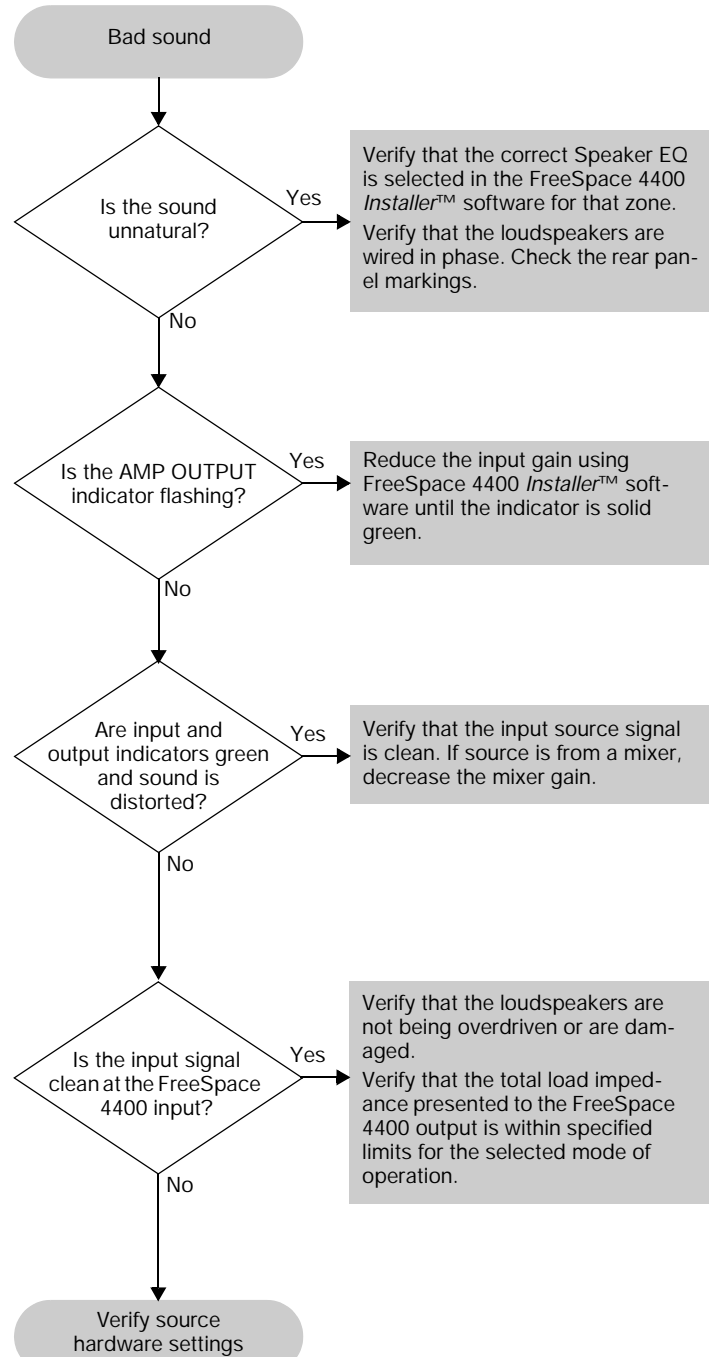
8.0 FreeSpace® 4400 System Troubleshooting

8.4.3 User interface keypads do not operate correctly

- Check wiring of RJ-45 connectors.
- Check for breaks/shorts in cable.
- Using the FreeSpace 4400 *Installer*™ software, check the Error Log for a peripheral controller error.



8.4.4 Bad sound in a zone



8.4.5 Auto Volume does not calibrate

Auto Volume calibration may fail if the process cannot obtain an adequate source level. This may be due to:

- Loudspeakers are tapped too high
- Maximum output gain is less than -20 dB
- Source is not operating
- Source level is too low

Calibration could also fail if the calculated loop gain is not within required limits. This may be due to:

- Broken microphone cable
- Loudspeakers are not connected
- Sensing microphone is not connected, or is connected to the wrong zone

8.5 Customer support

8.5.1 Technical assistance

If you need further technical assistance, contact your local Bose representative, or visit pro.Bose.com.

8.5.2 Reporting software bugs and issues

Please email any problems, issues, or software bugs to your local Bose representative. Please include the following information:

- Software version
- FreeSpace 4400 Error Log file
- Computer make, model, and configuration (hard drive storage capacity, processor speed, and amount of installed RAM)
- Description of the problem – Can it be reproduced? If so, what steps can be taken within the application to make the problem manifest itself?

If possible, attach the FreeSpace 4400 *Installer*™ software diagnostic files. The FreeSpace 4400 *Installer* software creates three important diagnostic files (output, error, and log) each time the software runs. These files are distinct from the FreeSpace 4400 Error Log file which refers to the hardware errors and can be accessed using the **Service** tab within the FreeSpace 4400 *Installer*™ software.

The name of each FreeSpace 4400 *Installer* diagnostic file includes the date and time that FreeSpace 4400 *Installer* software was run. For example:

FreeSpaceInstallerOutput-Oct 8, 2002 12_53_05 PM.txt

FreeSpaceInstallerErrors-Oct 8, 2002 12_53_05 PM.txt

FreeSpaceInstallerLog-Oct 8, 2002 12_53_05 PM.txt

These files are automatically written in the "temporary file" directory of your computer's operating system. Use the standard Windows "Search" or "Find" feature to look for files named

FreeSpaceInstallerOutput,
FreeSpaceInstallerErrors, and
FreeSpaceInstallerLog

on all local hard drives. This feature can be found in the **Start** menu of Windows 98, NT, 2000, or XP. Once the search is complete, sort the listing by date to show the diagnostic files most recently created by the FreeSpace 4400 *Installer*™ software.

To find the temporary file directory...

For Windows 2000, or Windows XP:

1. Right-click **My Computer** on the Windows desktop.
2. Select the **Properties** menu item.
3. Click the **Advanced** tab.
4. Click the **Environment Variables...** button.
5. Scroll down to the value of variable **TEMP** under "User variables". If, and only if, it is not found there, look under System variables instead.

For Windows NT:

1. Right-click **My Computer** on the Windows desktop.
2. Select the **Properties** menu item.
3. Click the **Environment Variables** tab.
4. Scroll down to the value of variable **TEMP** under **User variables**. If, and only if, it is not found there, look under **System variables** instead.

For Windows 98

1. Click on the **Start** menu.
2. Select **Run...**
3. Type command and hit **Enter**.
4. Type **echo %TEMP%** and hit **Enter**.
5. Write down the displayed value of variable **TEMP**.
6. Type **exit** and hit **Enter**.

Typical values for TEMP are C:\WINNT\TEMP, C:\windows\TEMP, C:\TMP, etc.



Programmer's Note: You may not see these files if the contents of the "tmp" file are not visible. Use the **Show all files** option in the Windows **Tools/Folder Options** menu.

9.0 Restoring FreeSpace® 4400 Microcontroller Code


IMPORTANT!


DO NOT use this procedure to upgrade the firmware in your FreeSpace® 4400 system to any version other than the version running at the time that the design file was created.

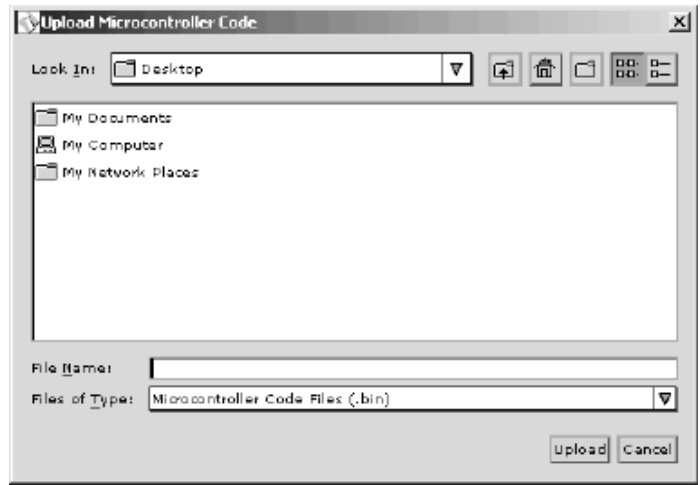
The microcontroller code residing in the FreeSpace 4400 system hardware can be restored using the FreeSpace 4400 *Installer*™ software.

1. Using the FreeSpace 4400 front panel **STANDBY** button, place the unit in standby mode (the STANDBY indicator should be amber).
2. Press the **STANDBY** button again to place the unit in operating mode (the SYSTEM STATUS indicator should be green).
3. If not already done, connect your PC to the FreeSpace 4400 system using a serial data cable.
4. Launch the version of FreeSpace 4400 *Installer* software that was last used to configure the system. As the software activates the connection with the FreeSpace 4400 system, a status dialog window appears. Once the connection is made, the FreeSpace 4400 front panel (block diagram) appears on your screen.



5. Click the  (Save File) button and save the design file to your PC. This ensures that all of your settings and events will be available later.

6. Press and hold the **Ctrl** and **Alt** keys on your PC keyboard and click the  (Flash Configuration) button. The Upload Microcontroller Code dialog appears:



7. Locate the appropriate microcontroller code file in the installation directory on your computer. Typically, this file is located in,
C:\Program Files\FreeSpace 4400 Installer 1.0\Firmware select,
`BoseE4Uctlr-#.#.#.#`
(#.#.#.# represents the code version number.)
8. When you are asked to confirm that you are about to upload new firmware, click **Yes**.



9.0 Restoring FreeSpace® 4400 Microcontroller Code

The firmware upgrade runs automatically and will notify you when it is complete.

Once the upgrade is completed, select the Service Hardware mode and verify that the microcontroller version number is correct. For example:

Microcontroller: v3.0.0.18




DSP: v2.0.1.0

Peripheral: v1.0.0.10

Lower Amplifier: v1.1.8.5

Upper Amplifier: v1.1.8.5

If you do not see the correct microcontroller version number, or if any of the other firmware version numbers are less than the values shown in this example, please contact your local Bose representative or visit pro.bose.com.

9. Open the design file you saved in Step 6. Click the  (Flash Hardware Configuration) button to restore your hardware configuration.
10. Perform an Auto Volume calibration for those zones in which Auto Volume is used. Click the  (Flash Configuration) button to send your final settings to the FreeSpace 4400 hardware.
11. Click the  (Save File) button and save the design file to your PC.

10.0 Technical Specifications

10.1 Power amplifier

Power output

Total shared power available for all channels: 400W
Maximum power per channel: 400W

Output configurations

70.7V or 100V nominal

Frequency response (@ 1 Watt)

20Hz to 20 kHz ± 3 dB

Crosstalk

>70 dB @ 1 kHz
(Tested with AES 17 low-pass filter.)

THD

<1.0% (@ full rated power)
(Tested with AES 17 low-pass filter.)

Signal-to-noise ratio¹

>97 dB (below rated power, A-weighted)

10.2 Digital signal processing

Sample rate

44.1 kHz

A to D conversion

24-bit, 128x oversampling

D to A conversion

24-bit, 128x oversampling

10.3 Front panel indicators and control connections

Amp output signal indicators

Green = Normal operation; Red = Fault condition;
Unlit = No signal

Source input signal indicators

Green = Good signal; Amber = Low signal;
Red = Signal clipping; Unlit = No signal

Other indicators

System Status: Green = Normal operation; Red = Fault condition
Direct Input: Amber = Active bypass; Unlit = Normal operation
Standby: Amber = Unit is in standby; Unlit = Unit is active

10.4 Rear panel inputs, outputs, and controls

Line level inputs

Type: Unbalanced dual RCA connectors internally summed to mono
Sensitivity: -30 dBV to +17 dBV
Impedance: 25K ohms
Input Clip Level: +17 dBV

Mic level inputs

Type: Balanced Euroblock connectors
Sensitivity: -60 dBV to +17 dBV
Impedance: 1.36K ohms
Input Clip Level: +17 dBV

Direct input

Type: Balanced Euroblock connectors
Sensitivity: 0 dBV
Impedance: 10K ohms
Input Clip Level: +6 dBV

Sensing microphone inputs

Sensing Mic 1 - 4: Euroblock connector

Control connectors

Wall Plate Zone 1 - 4: RJ45 connector
Remote On/Off Input: 2-terminal Euroblock connector
PC Input: RS-232 connector

Creston® compatibility

RS-232 control

Power amplifier outputs (70V or 100V only)

Amp Out Zone 1 - 4: Inverted 2-pin Euroblock connector

Audio outputs

Music on Hold/PBX Output: Euroblock connector
Aux Out/Control: Euroblock connector

Output configuration

70V or 100V: Switch

AC power consumption

60W or less at idle
200W with musical program
600W at maximum continuous rated power (1 kHz, sine wave input) 70V or 100V mode

AC power requirements ($\pm 10\%$)

120 VAC/50-60 Hz; 220 VAC/50-60 Hz;
240 VAC/50-60 Hz; 100 VAC/50-60 Hz

Peak Inrush current

80A @ 120V/60Hz; 60A @ 230V/50Hz

Fusing/protection

100/120V: T6.30A, L250V; 220-240V: T3.15A, L250V

Size (H x W x D)

Product: 5.1" x 16.5" x 16" (130mm x 420mm x 406mm)
Shipping: 11.8" x 23.2" x 22.8"
(300 mm x 590mm x 580mm)

Weight

Product: 31 lb (14.1 kg)
Shipping: 41 lb (18.6 kg)

Enclosure construction

Steel chassis designed for rack or shelf mounting

10.5 FreeSpace 4400 system serial data commands

The table on the following page provides serial data commands for controlling the FreeSpace 4400 system through the serial data port.

The serial port of your computer must be configured as follows:

Port speed . . . 57600
Parity None
Data bits 8
Stop bits 1
Flow None

Note: All specifications subject to change without notice.

10.0 Technical Specifications

Serial command table

Command	System	Zone 1	Zone 2	Zone 3	Zone 4
Off	0x84x000x030x000x000x 020x000x010x000x8a0x8 40x000x030x010x000x02 0x000x010x000x8b				
On	0x840x000x030x000x000 x020x010x010x000x8b0x 840x000x030x010x000x0 20x010x010x000x8c				
Volume up		0x840x000x030x000x020 x910x020x030x010x20	0x840x000x030x010x020 x910x020x030x010x21	0x840x000x030x020x020 x910x020x030x010x22	0x840x000x030x030x020 x910x020x030x010x23
Volume down		0x840x000x030x000x020 x910x020x040x010x21	0x840x000x030x010x020 x910x020x040x010x22	0x840x000x030x020x020 x910x020x040x010x23	0x840x000x030x030x020 x910x020x040x010x24
Select source 1		0x840x000x030x000x000 x510x000x010x000x8d	0x840x000x030x010x000 x510x000x010x000xda	0x840x000x030x020x000 x510x000x010x000xdb	0x840x000x030x030x000 x510x000x010x000xdc
Select source 2		0x840x000x030x000x000 x510x010x010x000xda	0x840x000x030x010x000 x510x010x010x000xdb	0x840x000x030x020x000 x510x010x010x000xdc	0x840x000x030x030x000 x510x010x010x000xdd
Select source 3		0x840x000x030x000x000 x510x020x010x000xdb	0x840x000x030x010x000 x510x020x010x000xdc	0x840x000x030x020x000 x510x020x010x000xdd	0x840x000x030x030x000 x510x020x010x000xde
Select source 4		0x840x000x030x000x000 x510x030x010x000xdc	0x840x000x030x010x000 x510x030x010x000xdd	0x840x000x030x020x000 x510x030x010x000xde	0x840x000x030x030x000 x510x030x010x000xdf
Mute Alternating		0x840x000x030x000x040 x910x010x050x010x23	0x840x000x030x010x040 x910x010x050x010x24	0x840x000x030x020x040 x910x010x050x010x25	0x840x000x030x030x040 x910x010x050x010x26
Mute on		0x840x000x030x000x040 x910x010x010x010x1f	0x840x000x030x010x040 x910x010x010x010x20	0x840x000x030x020x040 x910x010x010x010x21	0x840x000x030x030x040 x910x010x010x010x22
Mute off		0x840x000x030x000x040 x910x000x010x010x1e	0x840x000x030x010x040 x910x000x010x010x1f	0x840x000x030x020x040 x910x000x010x010x20	0x840x000x030x030x040 x910x000x010x010x21
Auto Volume on		0x800x000x010x000x000 x340x010xb6	0x800x000x010x010x000 x340x010xb7	0x800x000x010x020x000 x340x010xb8	0x800x000x010x030x000 x340x010xb9
Auto Volume off		0x800x000x010x000x000 x340x000xb5	0x800x000x010x010x000 x340x000xb6	0x800x000x010x020x000 x340x000xb7	0x800x000x010x030x000 x340x000xb8
Select Zone Page		0x840x000x030x000x010 x1D0x010x010x000xa7	0x840x000x030x010x010 x1D0x010x010x000xa8	0x840x000x030x020x010 x1D0x010x010x000xa9	0x840x000x030x030x010 x1D0x010x010x000xaa
Page Trigger	0x840x000x030x000x000 x0D0x010x050x010x9B				

Bose® Product Sales Conditions

Limited Warranty Policy and Conditions of Sale

Bose Corporation
The Mountain
Framingham, MA 01701

What is covered:

All parts defective in material and workmanship. The Limited Warranty for the Bose® FreeSpace® 4400 Business Music System covers the functionality of the product for its normal, intended use as specified in the Owner's Guide and does not cover a malfunction that has resulted from improper or unreasonable use or maintenance, accident, excess moisture, vermin or other animal damage, improper packing, lightning, power surges or unauthorized tampering, alteration or modification while not under the control of Bose or products purchased for an unauthorized reseller. Bose® systems are not designed to be used in every environment, so please review your Owner's Guide.

WHERE PERMITTED, THE PROVISIONS OF THIS LIMITED WARRANTY ARE IN LIEU OF ANY OTHER WRITTEN WARRANTY, WHETHER EXPRESS OR IMPLIED, WRITTEN OR ORAL, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

For how long:

In countries where the duration of a warranty is not determined by statute, the Bose Limited Warranty lasts two years from the purchase date. For countries where minimum Warranty terms are determined by statute, the Limited Warranty term is the longer of the statutory period or two years. In the United States, if you qualify as a "consumer" under the Magnuson-Moss Warranty Act, then you may be entitled to any implied warranties allowed by law as set forth below for the period of the express Limited Warranty. Some places do not allow time limitations on an implied Limited Warranty, so the above limitation may not apply to you.

What we will do:

We will repair or replace in our sole discretion defective parts within a reasonable period of time and free of charge (excludes shipping, costs, duties and taxes).

How you can obtain Limited Warranty service:

You can ship the system to either a Bose Service Agency or to Bose directly with a proof of purchase from an authorized dealer.

Please:

- A. Properly and carefully pack the product for shipping. If you need a carton for shipping, contact Bose for a new carton.
- B. Label and ship the product to the appropriate Bose location.
- C. Contact Bose to get a return reference number. Place this number prominently on the outside of the carton.

Proof of purchase is not required where it is excluded by statute.

THIS LIMITED WARRANTY IS FULLY TRANSFERABLE PROVIDED THAT THE CURRENT OWNER FURNISHES THE ORIGINAL PROOF OF PURCHASE FROM AN AUTHORIZED BOSE DEALER. WHERE PERMITTED, THE MAXIMUM LIABILITY OF BOSE SHALL NOT EXCEED THE ACTUAL PURCHASE PRICE PAID BY YOU FOR THE PRODUCT.

FOR YOUR BENEFIT, WE RECOMMEND THAT YOU RECORD YOUR SERIAL NUMBER(S), FOUND ON THE PRODUCT(S), AND OTHER PURCHASE INFORMATION, AND KEEP IT WITH YOUR PERSONAL RECORDS ALONG WITH PROOF OF PURCHASE. THIS INFORMATION WILL ALLOW US TO BETTER SERVE YOUR NEEDS.

THIS LIMITED WARRANTY GIVES YOU SPECIFIC RIGHTS SUBJECT TO SPECIFIC CONDITIONS. YOU MAY ALSO HAVE OTHER LEGAL RIGHTS WHICH APPLY TO THE PRODUCT YOU HAVE ACQUIRED WHICH VARY FROM PLACE TO PLACE. THIS LIMITED WARRANTY WILL ONLY APPLY TO THE EXTENT THAT THE APPLICABLE LAW ALLOWS.

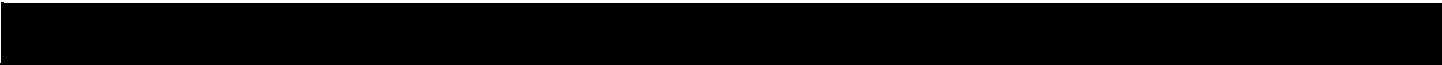
The laws of your state or country may provide you with legal claims against the seller or manufacturer of this product. The Limited Warranty does not affect those rights.

Remedies:

The provisions of this Limited Warranty are in lieu of any other warranties or conditions, except those provided by law.

This Limited Warranty does not affect any legal rights provided to you by law and does not preclude any legal remedy you may have under law.

This Limited Warranty is void if the label bearing the serial number has been removed or defaced or if the purchase is made from an unauthorized reseller.



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