FreeSpace® E4 Series II Business Music System

OWNER'S GUIDE

BOSE®

CE

DECLARATION OF CONFORMITY

We, the offerer: **Bose Corporation**
The Mountain
Framingham, MA 01701-9168 USA

acknowledge our sole responsibility, that the product,

Kind of equipment: Amplifier

Type designation: FreeSpace® E4 Series II business music system

in accordance with EMC Directive 89/336/EEC and Article 10(1) of the Directive, is in compliance with the following norm(s) or document(s):

Technical Regulations: EN 55103-1(E2)/EN 55103-2(E2)

Report Number: EMC.N9C.02.170.1

Test laboratory: Bose Corporation
1 New York Avenue
Framingham, MA 01701 USA

and in accordance with the Low Voltage Directive 73/23/EEC, is in compliance with the following norm(s) or document(s):

Technical Regulations: EN 60065/IEC 60065

Certificate/Report Number: S2171542/E2171622

Accredited test laboratory: TÜV Rheinland
Sicherheit und Umweltschutz GmbH
Am Grauen Stein, D-51101 Köln, Germany

07/10/2004

Bose B.V.
Nijverheidstraat 8, 1135
The Netherlands

Nic Merks
Vice President, Europe
Manufacturer's authorized EU representative

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8.0 E4 System Troubleshooting

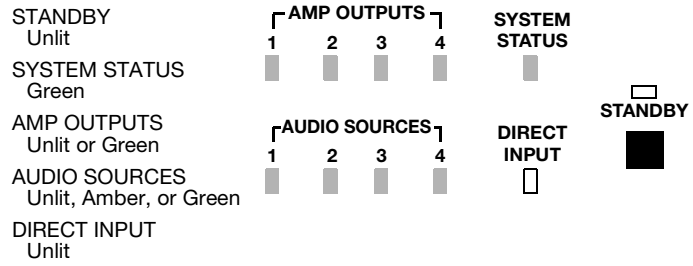
8.1 Introduction

This section provides troubleshooting guidelines to use for solving any problems you may encounter while installing and servicing E4 systems.

8.2 E4 hardware indicators

8.2.1 Normal operation

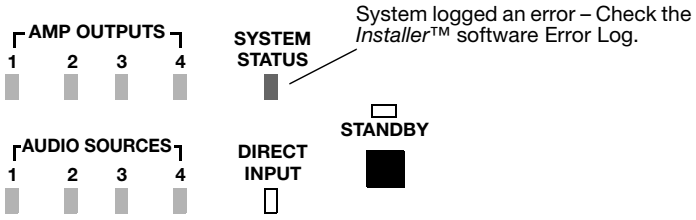
These are the indications of normal operation.



8.2.2 System fault

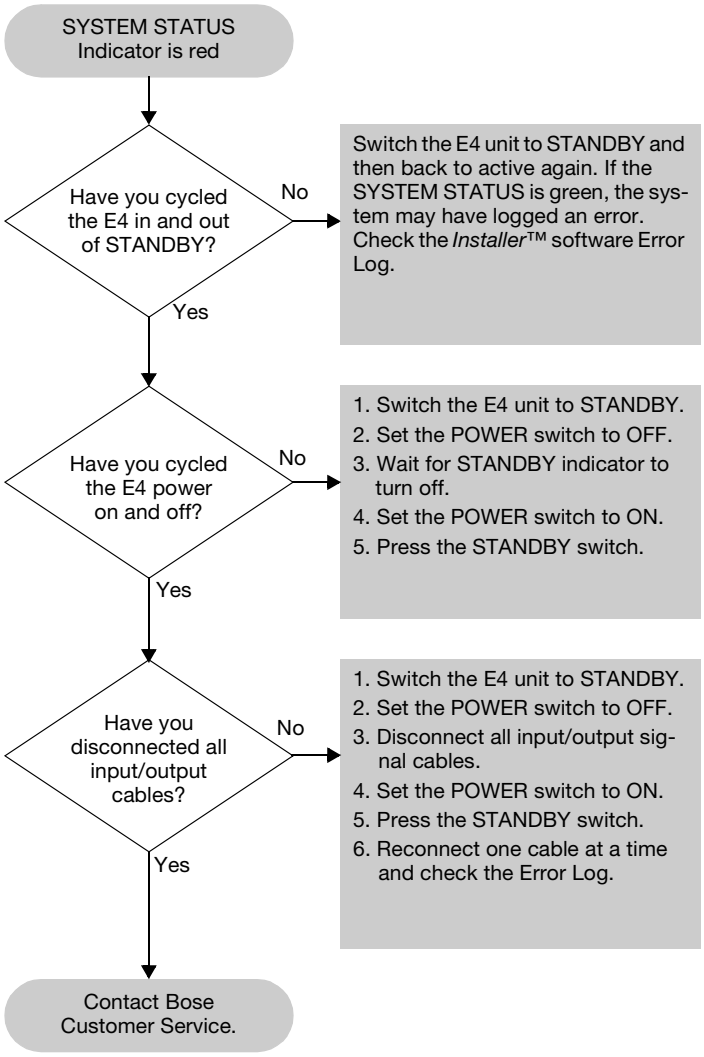
A red SYSTEM STATUS LED indicates that the E4 received an error from one of its many internal components. A red SYSTEM STATUS LED after AC power is switched on may be caused by:

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



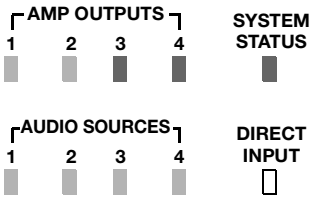
To determine the severity of the error, cycle the E4 unit power off and back on again. If the SYSTEM STATUS indicator is now off, the E4 system has logged an error, but is still operational.

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



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.



Check for

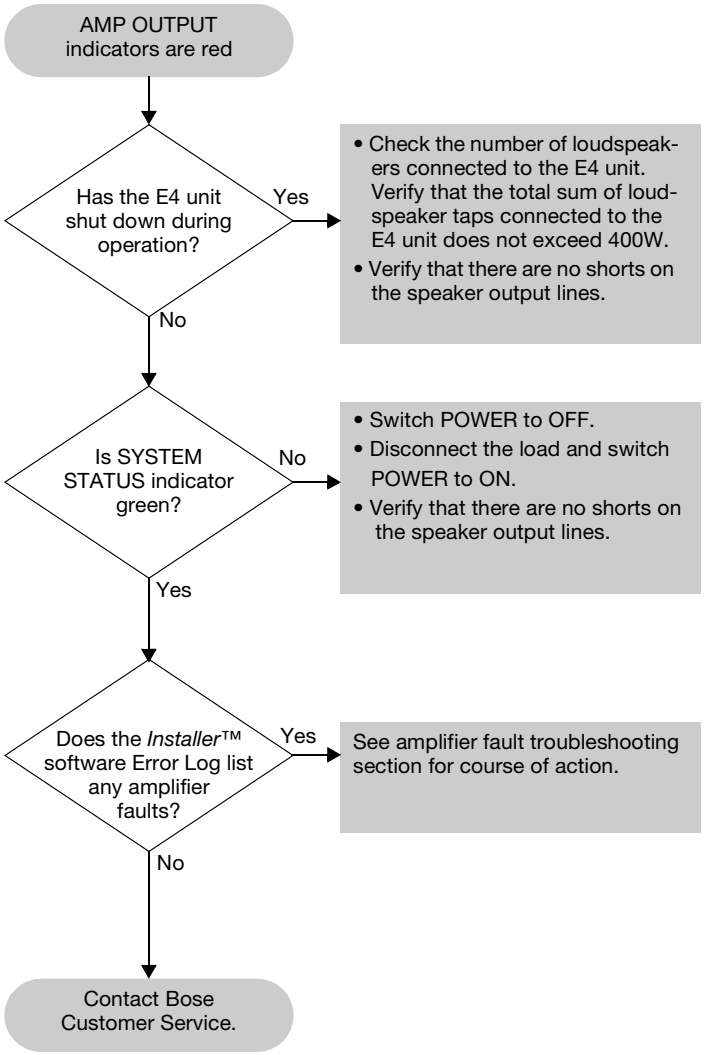
- Shorted wiring
- Overdriven amplifier (reduce output gain)
- Transformer saturation
- Entry in *Installer*™ software error log

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 speaker line, an overdriven amplifier, or a saturated output transformer.

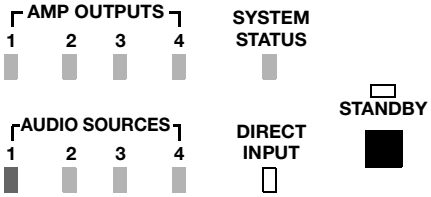
- To check for a shorted speaker line, remove the speaker connection from the amplifier channel. If this resolves the problem, locate and correct the shorted loudspeaker line.
- To make sure that you are not overdriving the E4 output, change to a different source. If the problem no longer exists, use the *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 speaker 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 *Installer*™ software.



8.2.4 Input clipping

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



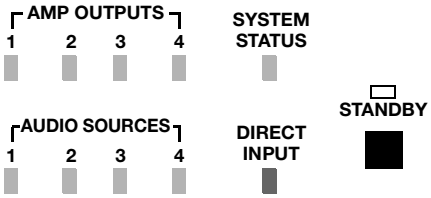
If this fault occurs:

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

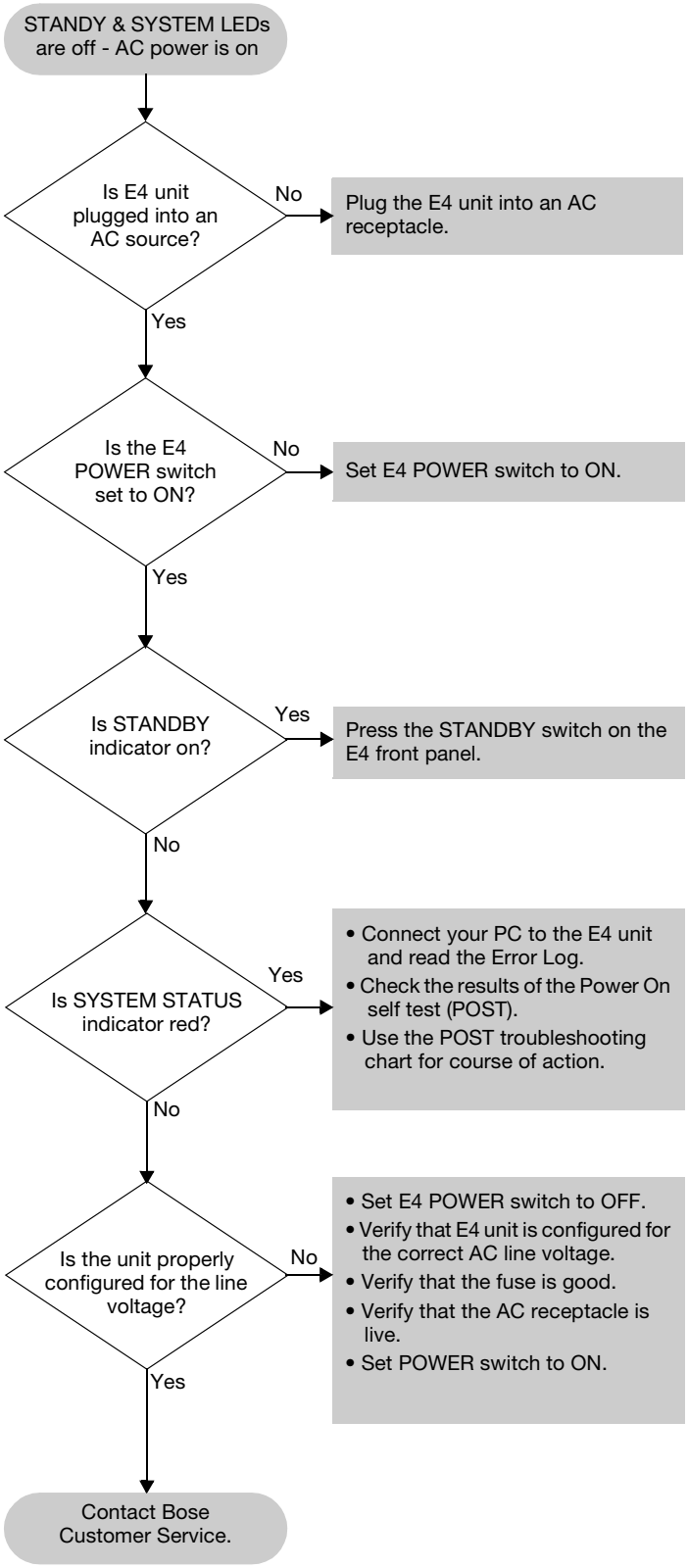
8.2.5 Direct input is active

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

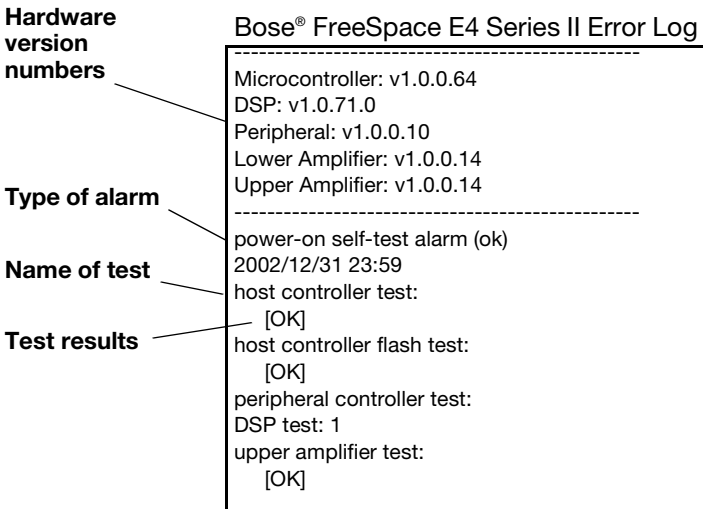


8.3 FreeSpace® E4 system Error Log

The FreeSpace E4 system Error Log is displayed when the *Installer*™ software is in the Service Hardware mode.

8.3.1 Contents of the Error Log

The Error Log displays E4 system hardware version numbers and records all alarms and their causes as shown in the following example.



8.3.2 Hardware configuration

The E4 system hardware version numbers appear at the top of the Error Log listing. These are the version numbers of the software installed in the E4 hardware at the time of manufacture. These version numbers do not pertain to the FreeSpace *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 E4 hardware to determine if it is capable of properly performing audio processing and amplification. During the POST test, six major components of the hardware are tested.

- **Host controller** – The host controller monitors and controls the operation of the E4 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 Bose Customer Service. See “Customer support” on page 70.
- **Flash memory test** – The flash memory contains the configuration, design file, and system event schedule. A flash failure will cause the message, “Power-on sel-test incomplete” to appear in the host controller flash test section. If this occurs, contact Bose Customer Service. See “Customer support” on page 70.
- **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 Bose Customer Service. See “Customer support” on page 70. 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 Bose Customer Service. See “Customer support” on page 70.
- **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 Bose Customer Service. See “Customer support” on page 70. Additional details on the exact cause of an amplifier failure can be found in the amplifier section of the Error Log.
- **Front panel board test** – The front panel board test determines if the USB port is working properly. A USB failure will cause the message, “Power-on self-test incomplete” to appear in this section of the POST results. If a USB failure occurs, contact Bose Customer Service. See “Customer support” on page 70.

Programmer’s Note: *The USB port is not currently used for communication with the E4. If a USB failure occurs, the E4 will still function normally for audio processing and amplification.*

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 degrees Fahrenheit.

  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 • Reduce total speaker load • Check for partial short of speaker line	
High Current (<1A)	Loudspeaker transformer saturation at low frequency • Check for proper Speaker EQ setting • Set Speaker EQ to high-pass filter	Short on 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.

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 speaker line – Check the loudspeaker line for shorts.
- System power exceeds 400W – Check that system power does not exceed 400W.
- Speaker transformer saturation – Check that proper speaker EQ is being used or use a high-pass filter for speaker 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 E4 unit.

AC Power Fault: Might be an AC line dropout or severe brownout, or simply AC power turned off without first placing the E4 in standby mode. You can check that the power has been removed from the E4, 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 speaker 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 speakers. 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 speakers 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 speaker 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 E4 unit. 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 E4 unit in standby and then press the STANDBY button again to clear the fault, at which time the E4 unit 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

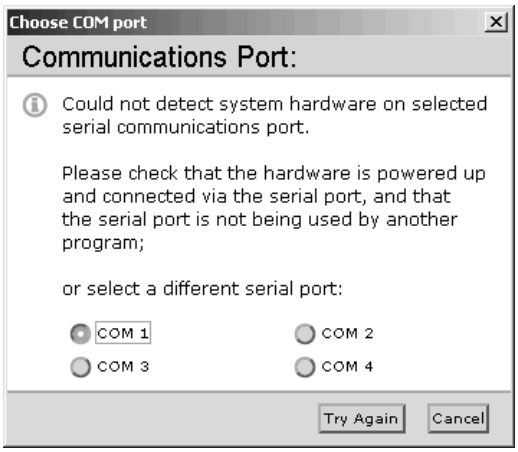
When errors are reported in the Error Log, you can try to solve the problem by performing one of the following actions:

- On the E4 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 E4 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® *Installer*™ software was not able to locate an E4 system on the COM 1 port.



This normally occurs due to one of three reasons:

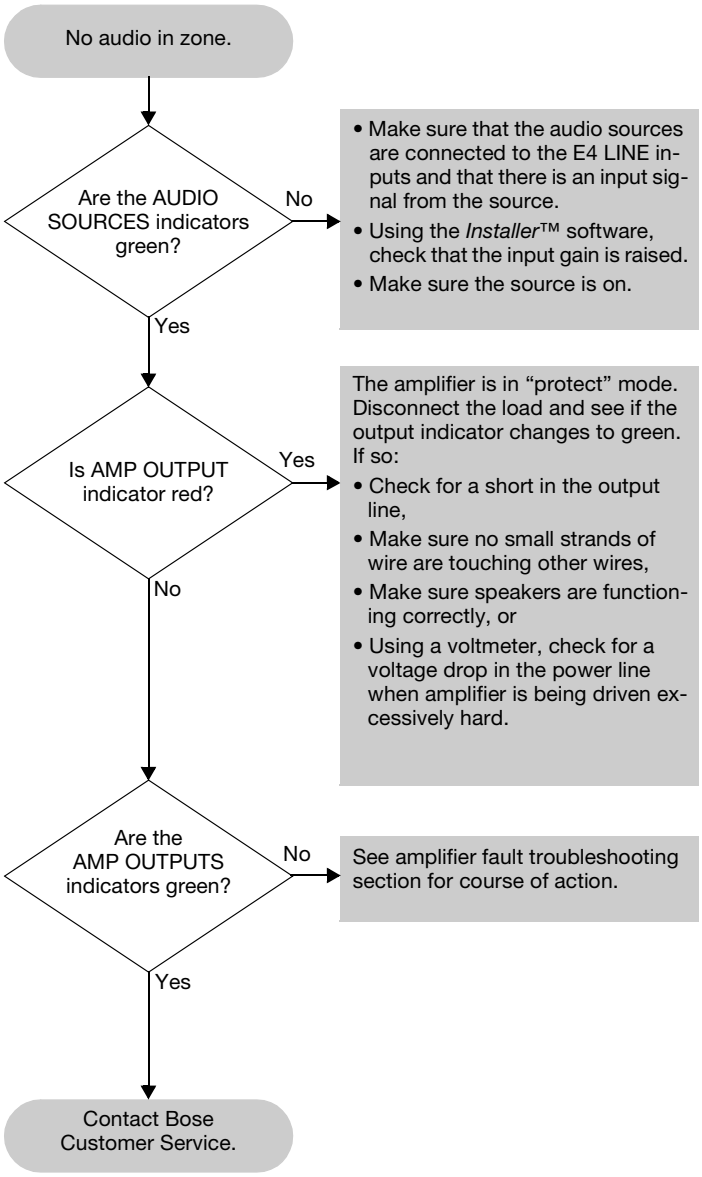
- The PC and E4 are not connected via a “straight-wired” serial cable.
- Another software application has control of the serial port. Applications such as the Palm OS, or other audio applications control the serial port while they are open. Close these applications and click the **Try Again** button.
- The E4 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.*

8.4.2 No audio in zone

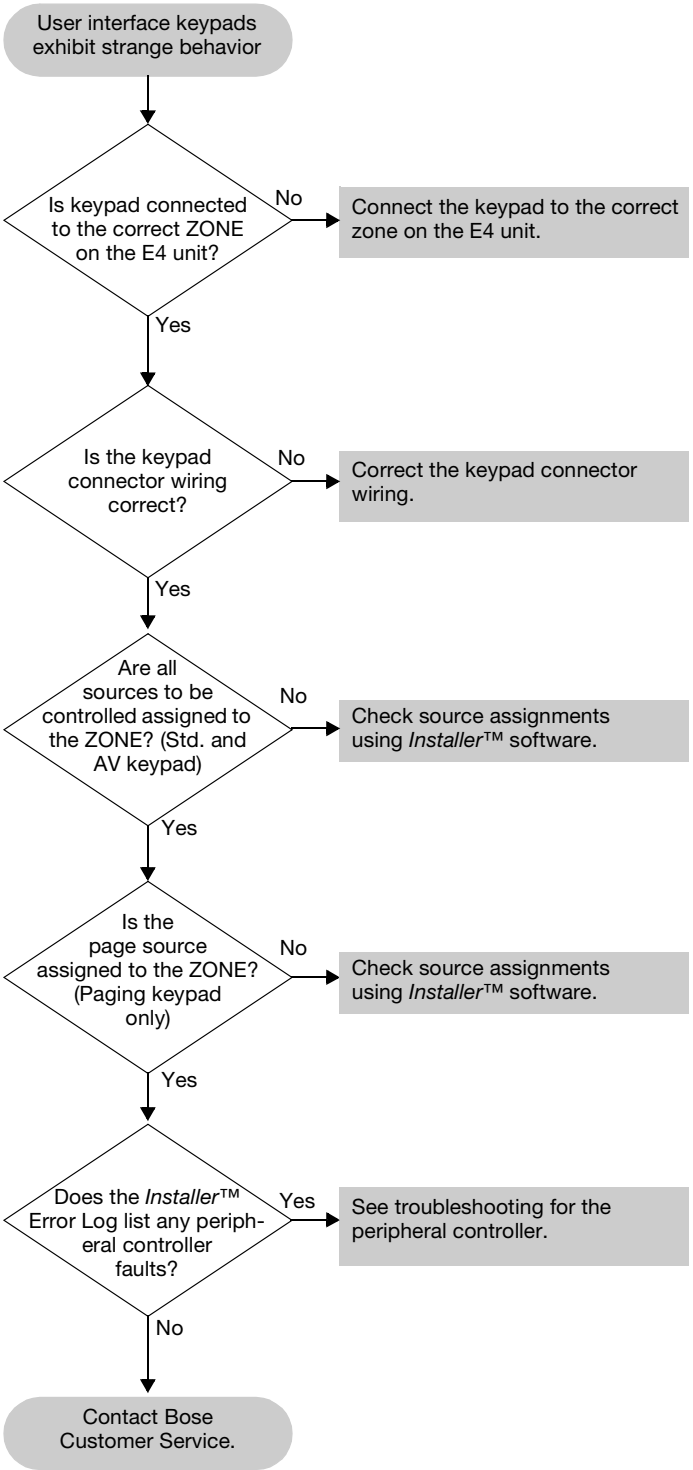
If the system is powered on and operational, but there is no sound, check the following:

- 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?

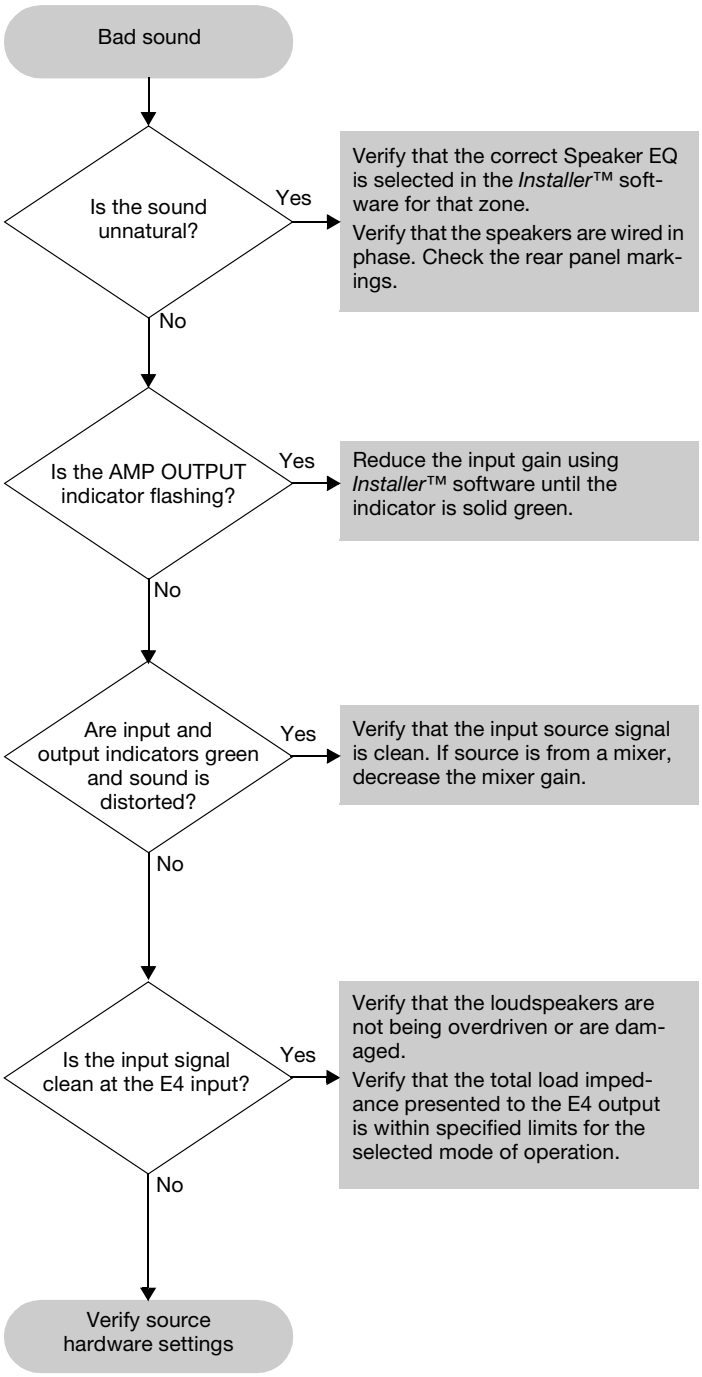


8.4.3 User interface keypads do not operate correctly

- Check wiring of RJ-45 connectors.
- Check for breaks/shorts in cable.
- Using the *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:

- Speakers 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
- Speakers 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 send an email to the address for your area:

North America

InstallerSupportNA@bose.com

Europe

InstallerSupportEUR@bose.com

Asia, Australia, India and Middle East

InstallerSupportABDG@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
- E4 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 *Installer*™ software diagnostic files. The *Installer* software creates three important diagnostic files (output, error, and log) each time the software runs. These files are distinct from the E4 Error Log file which refers to the hardware errors and can be accessed using the **Service** tab within the *Installer*™ software.

The name of each *Installer* diagnostic file includes the date and time that *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” of “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 *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.

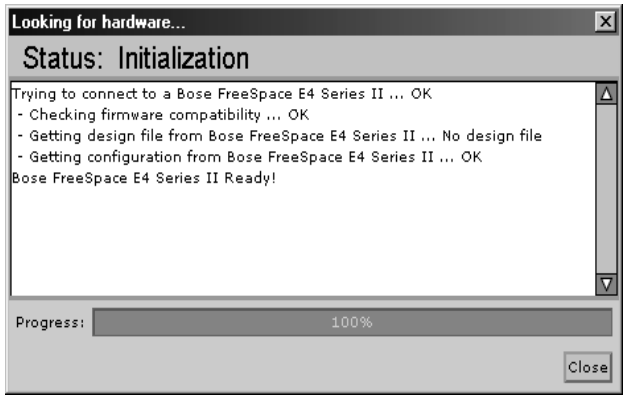
Programmer's Note: *You may not see these files if the contents of the "tmp" file are not visible. Use the* ***Show all files*** *option in the Windows* ***Tools/Folder Options*** *menu.*

9.0 Restoring E4 Microcontroller Code

IMPORTANT!
DO NOT use this procedure to upgrade the firmware in your FreeSpace® E4 Series II system to any version other than the version running at the time that the design file was created.

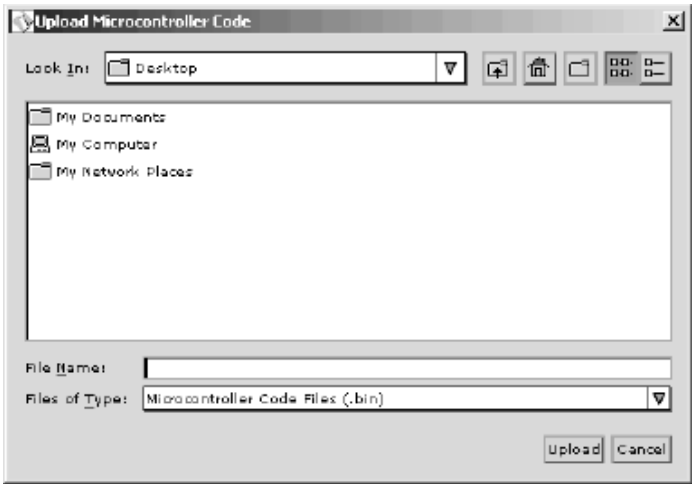
The microcontroller code residing in the E4 system hardware can be restored using the *Installer*™ software.

1. Using the E4 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 E4 unit using a serial data cable.
4. Launch the version of *Installer* software that was last used to configure the system. As the software activates the connection with the E4 unit, a status dialog window appears. Once the connection is made, the E4 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 Installer 2.0\Firmware

   If the OUTPUT VOLTAGE of your E4 system is set to 70V, select,

   BoseE4Uctlr70V-#.#.#.#

   If the OUTPUT VOLTAGE of your E4 system is set to 100V, select,

   BoseE4Uctlr100V-#.#.#.#

   (#.#.#.# represents the code version number.)

8. When you are asked to confirm that you are about to upload new firmware, click **Yes**.

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: v1.0.0.64

DSP: v1.0.71.0

Peripheral: v1.0.0.10

Lower Amplifier: v1.0.0.14

Upper Amplifier: v1.0.0.14

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 Customer Support representative.

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 E4 hardware.
11. Click the  (Save File) button and save the design file to your PC.

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. This limited warranty for the Bose Freespace® E4 system ("system") covers the functionality of the system 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, improper packing, lightning, power surges, or unauthorized tampering, alteration or modification while not under the control of Bose. 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 the warranty is not determined by statute, the Bose Limited Warranty lasts five years from the purchase date. For countries where minimum warranty terms are determined by statute, the warranty term is the longer of the statutory period or the term listed above.

What we will do:

We will repair or replace any defective parts within a reasonable period of time and free of charge.

How you can obtain warranty service:

1. 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. Please contact Bose to get a return reference number. Place this number prominently on the outside of the carton.

2. You can return the system with proof of purchase from an authorized dealer to a Bose Service Agency or directly to Bose. Proof of purchase is not required where it is excluded by statute.

Other Rights:

EXCLUSIVE REMEDY:

THIS LIMITED WARRANTY IS FULLY TRANSFERABLE PROVIDED THAT THE CURRENT OWNER FURNISHES THE ORIGINAL PROOF OF PURCHASE FROM AN AUTHORIZED BOSE DEALER. THE MAXIMUM LIABILITY OF BOSE SHALL NOT EXCEED THE ACTUAL PURCHASE PRICE PAID BY YOU FOR THE PRODUCT. IN NO EVENT SHALL BOSE BE LIABLE FOR SPECIAL, INCIDENTAL, CONSEQUENTIAL OR INDIRECT DAMAGES. SOME PLACES DO NOT ALLOW LIMITATIONS ON THE EXCLUSION OR LIMITATION OF RELIEF, SPECIAL, INCIDENTAL, CONSEQUENTIAL OR INDIRECT DAMAGES OF THE LIMITATION OF LIABILITY TO SPECIFIED AMOUNTS, SO THE ABOVE LIMITATIONS OR EXCLUSIONS MAY NOT APPLY TO YOU.

OTHER CONDITIONS:

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

THIS LIMITED WARRANTY GIVES YOU SPECIFIC RIGHTS SUBJECT TO SPECIFIED CONDITIONS. YOU MAY ALSO HAVE OTHER LEGAL RIGHTS WHICH APPLY TO THE PRODUCT YOU HAVE ACQUIRED. THESE LEGAL RIGHTS VARY FROM STATE TO STATE OR COUNTRY TO COUNTRY. SOME PLACES DO NOT ALLOW THE EXCLUSION, RESTRICTION OR MODIFICATION OF CERTAIN IMPLIED RIGHTS OR THEIR EFFECT. IN THOSE SITUATIONS THIS LIMITED WARRANTY WILL ONLY APPLY TO THE EXTENT THAT THE APPLICABLE LAW ALLOWS. OTHER LAWS PROVIDE YOU WITH A STATUTORY CLAIM AGAINST THE SELLER.

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 the law.

This Limited Warranty is fully transferable provided that the current owner furnishes the original proof of purchase from an authorized Bose dealer.

This Limited Warranty is void if the label bearing the serial number has been removed or defaced.