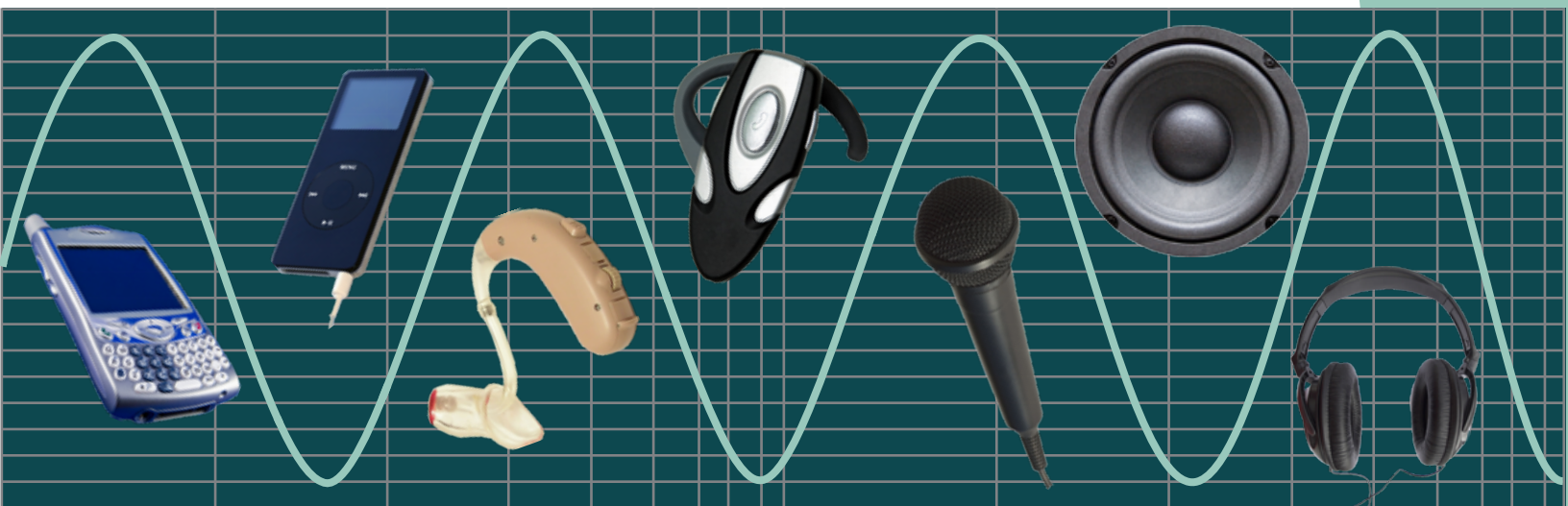




LISTENINC

SoundCheck ONE™ (version 9.0) Instruction Manual



Rev Date 012110

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Introduction to SoundCheck ONE

SoundCheck ONE™: The low cost production line loudspeaker test system.

ONE minute to set up...

ONE second to test...

ONE low price

SoundCheck ONE is a simple to use and cost-effective complete test system for production line measurement of loudspeakers. It consists of a simplified version of the popular SoundCheck® software package, integrated with Listen's AmpConnect hardware, a sound card, cables and an optional microphone.

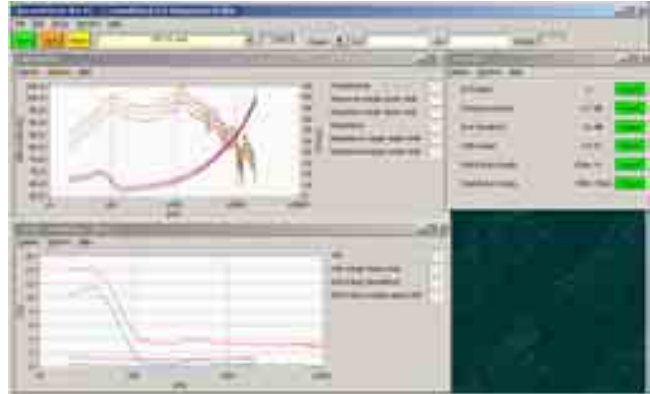


Figure 1-1: Display of results

ONE minute to set up – Simple, out of the box operation

Simplicity is the core of SoundCheck ONE's design. The software and hardware are designed to work together and the AmpConnect USB-controlled hardware box contains all the additional equipment you need for a complete audio test (microphone power supply, impedance box, amplifier, etc.)

Set up is easy and takes less than a minute. Once the soundcard is installed in your computer and SoundCheck loaded, you simply need to connect your loudspeaker under test, the AmpConnect box, and your measurement microphone and customize your test using the sequence generator. This simple checkbox interface allows you to select individual tests, determine the start and stop frequency, and set the level and sweep time. Finally, measure the reference speaker by clicking the button in the sequence generator, and adjust your limits (if necessary).

For simplicity, the version of SoundCheck supplied with this package runs only the test sequences included with it, and will only operate with the supplied hardware. Custom tests cannot be developed. To simplify testing for your overseas manufacturers, a Chinese language version is also available.

Benefits

- Simple
- Fast
- Cost Effective
- Accurate
- Chinese language option
- Upgradable



Figure 1-2: Sequence Generator

One second to test – Fast, accurate measurements

It's not just set up that is fast – testing is too. SoundCheck ONE carries out a full loudspeaker test in just one second. This is because SoundCheck ONE uses the same engine as SoundCheck – a product with a 15 year history that is used on thousands of production lines around the world. SoundCheck's measurement algorithms are designed to meet the needs of high throughput production lines with special attention to speed, reliability and repeatability even in noisy environments.

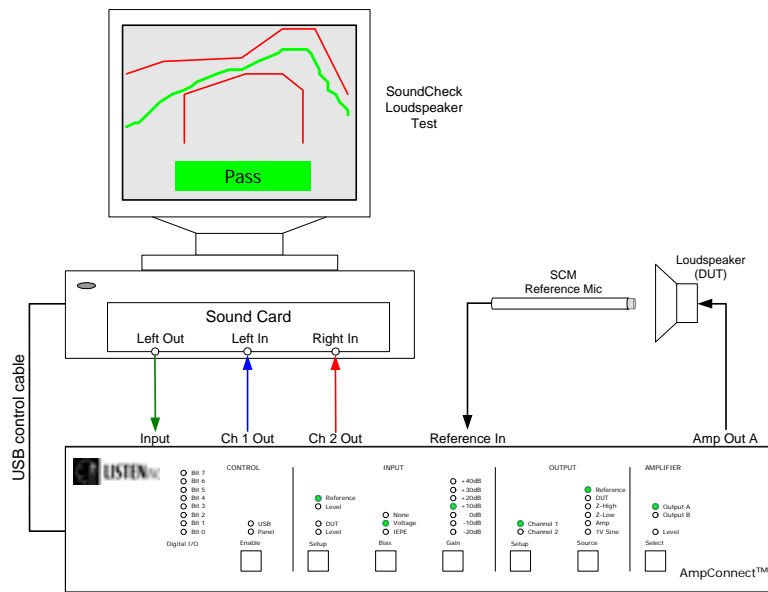


Figure 1-3: SoundCheck ONE Loudspeaker test set-up

One low price – cost effective

At less than \$6000 for a complete system including hardware, SoundCheck ONE is similarly priced to systems with far less sophisticated measurement methods. Although the interface is simple and the cost is low, it offers the same test speed, repeatability and reliability as the more expensive full version of SoundCheck.

Compatibility and Flexibility

Unlike other comparably priced systems, should you need more flexibility in the future, the software supplied in the SoundCheck ONE package can be upgraded to a full version of SoundCheck – all the hardware supplied is fully compatible. This guarantees that even if your testing needs expand, your initial investment is not wasted.

Important! Sequences written in the full version of SoundCheck x.x are not compatible with SoundCheck ONE. For companies who own copies of SoundCheck ONE as well as the full version of SoundCheck, SoundCheck can be enabled to also operate in SoundCheck ONE at no extra cost for test development purposes. SoundCheck ONE sequences and results may be opened and analyzed in SoundCheck 9.0, but may not subsequently be opened in SoundCheck ONE.

Note: SoundCheck ONE sequences can be imported into SoundCheck 9.x.

Installation

Computer Setup

Please follow the procedures outlined in the **SoundCheck Instruction Manual Appendix: [Appendix 15: Computer Setup Recommendations](#)**. This shows our recommended setup for Windows XP Pro and optimization tips.

Software Installation

1. Place the SoundCheck installation CD in the CD-ROM drive of your computer.

If your computer is setup to Auto Run, you will be prompted to install the software. You can also begin the software installation by double-clicking on the file *Setup.exe* in the root of the Listen CD-ROM, or by using the **Run** command from the **Windows Start** menu and typing the letter of your CD-Rom drive followed by *setup.exe* (e.g., f:\setup.exe).
2. Select **SoundCheck ONE** from the options menu.
3. Follow the instructions on the screen. Click **Next** to proceed.
4. Always use the sound card drivers provided on the SoundCheck CD or from our website.

Sound Card Installation

Install SoundCheck before installing the CardDeluxe sound card. The SoundCheck installation also installs the CardDeluxe driver.

Before installing the audio card in the computer check the Input and Output level jumpers, the Input level jumpers should be set on +4 dBu and the Output level jumpers should be set on: -10 dBv.

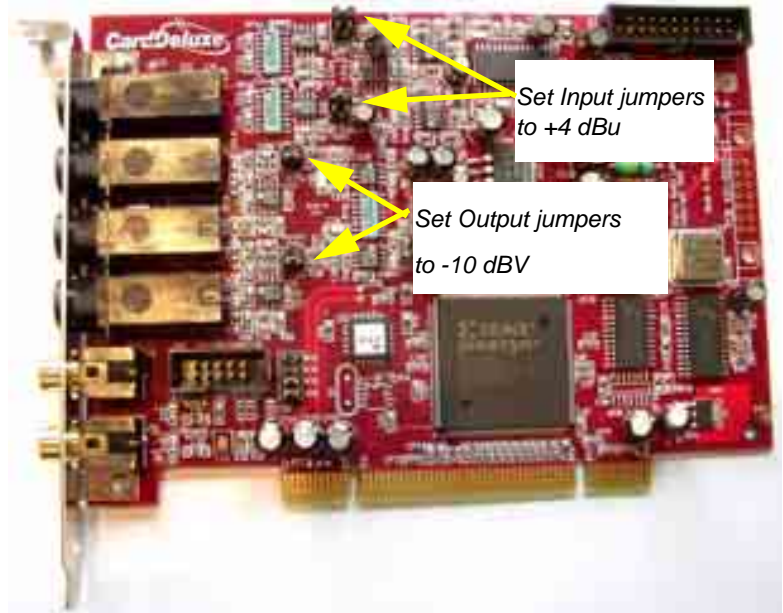


Figure 2-1: CardDeluxe jumper settings

After installing the card in the computer, Windows will automatically detect the hardware and prompt for the driver install. When prompted to connect to Windows Update, select "No, not at this time" and click Next. At the next prompt, select "Install software automatically" and click Next to finish the driver installation.

Hardware Key

In order to make real measurements the hardware key must be installed. Without the hardware key, SoundCheck will run in demo mode. You can save, print and recall data, and create and modify test sequences. However, you cannot save any sequence settings. Also, while in demo mode, all other functionality of SoundCheck is available, but all data is randomized. SoundCheck executes the test sequence and adds random values to the data displayed or saved. All data generated in demo mode is randomly adjusted in level and is therefore not valid.

Hardware Key Installation

1. Insert the included hardware key into the USB port of your computer *AFTER* SoundCheck is installed. The computer will recognize the new hardware.

The hardware key should have a solid green light. (A flashing hardware key indicates that the driver has not yet been installed.)

2. During installation, you will be prompted for the location of the *status.dat* file, which is unique to your hardware key. Your new *status.dat* file will be copied to your *SoundCheck 9.0\System* folder. The *status.dat* file is normally sent by email.

If you lose your unique *status.dat*, a new one can be sent by email.

Note: The hardware key file, *status.dat*, must be copied to the *SoundCheck 9.0\System* folder in order for the SoundCheck software to work.

Important! As of SC8.1, the file path for the Status file is now part of the **Edit - Folder Paths** setup. The Status.dat file can be any name; e.g. "**status SC 1111.dat**". This allows for use of multiple hardware keys on one system. This selection is immediately effective. SoundCheck does not have to restart for it to take effect.

Important! Do not remove the hardware key while SoundCheck is running. The hardware key can be damaged. If damaged, it will need to be returned to Listen, Inc. for replacement.

Warning! Do not lose the hardware key!

Do not lose the hardware key for the SoundCheck system. It unlocks the functionality of your SoundCheck software. For insurance purposes, this key represents the full value of your system and should be noted in your company's list of assets. We recommend that it be securely attached to the computer to avoid loss or theft.



Figure 2-2: Hardware Key

Backup

It is highly recommended that you make a backup of your SoundCheck critical folders on a regular basis. A backup should always be made prior to installing a new version or update to SoundCheck. We recommend that the following folders be included in any backup:

- Sequences
- Steps
- Data (If the default Data folder in SoundCheck is the location for your data files.)
- Results (If the default Results folder in SoundCheck is the location for your result files.)
- WAV files
- Last session.txt (Stores the preferences that were last used in SoundCheck.)

Installing SoundCheck ONE on a SoundCheck 9.x system

If you wish to run SoundCheck ONE on a system that already has SoundCheck 9.0, you do not need to reinstall the software. SoundCheck ONE is based on the SoundCheck 9.0 platform. Simply select the SoundCheck ONE Status.dat file from the **Folders Menu**:

- **SoundCheck Main Screen > Edit > Folder Paths > Folders Menu > Status File Path**

If you are upgrading from an earlier version of SoundCheck 9.0 (or Beta version) you should copy the old installation folder and name it "SoundCheck 9.0 OLD" before installing the new version. This is a precautionary measure to keep you from overwriting sequence steps that you have customized.

Important! Installing SoundCheck ONE overwrites the contents of the SoundCheck 9.0 folder.

If installing on a SoundCheck system prior to 9.0, the folder name does not need to be changed.

During installation, if the SoundCheck 9.0/ONE installer finds a current SoundCheck 8.x installation, it will copy all the SoundCheck 8.x Steps and Sequence folders into the SoundCheck 9.0 directory. These folders will be named SoundCheck 8.x Steps and SoundCheck 8.x Sequences. **These sequences are not compatible with SoundCheck ONE and cannot be used.**

Important! SoundCheck ONE sequences cannot be run on SoundCheck systems prior to 8.2. Only sequences created with SoundCheck ONE can be used. SoundCheck ONE sequences can be used in a SoundCheck 8.2 system or later, which makes upgrading to the full version of the software a simple task.

Important! DAT files created with SoundCheck 8.1, 8.2 & SC ONE are not viewable in versions of SoundCheck prior to and including SoundCheck 6.0x. The DAT file format was updated in SoundCheck 6.1.

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System Setup

Hardware Connections

The setup of the SoundCheck ONE system is easy. Simply connect the AmpConnect test interface to the CardDeluxe sound card as shown in [Figure 3-1](#). The color coded cables are included with the system.

- AmpConnect Channel 1 Output to sound card Left Input - Blue XLR female to 1/4" TRS
- AmpConnect Channel 2 Output to sound card Right Input - Red XLR female to 1/4" TRS
- Sound card Left Output to AmpConnect Input - Green XLR male to 1/4" TRS
- Connect the Device Under Test (Loudspeaker) to Output Terminal A - Red & Black test leads
- Connect the Reference Microphone to the AmpConnect Reference Input - BNC to microdot adapter

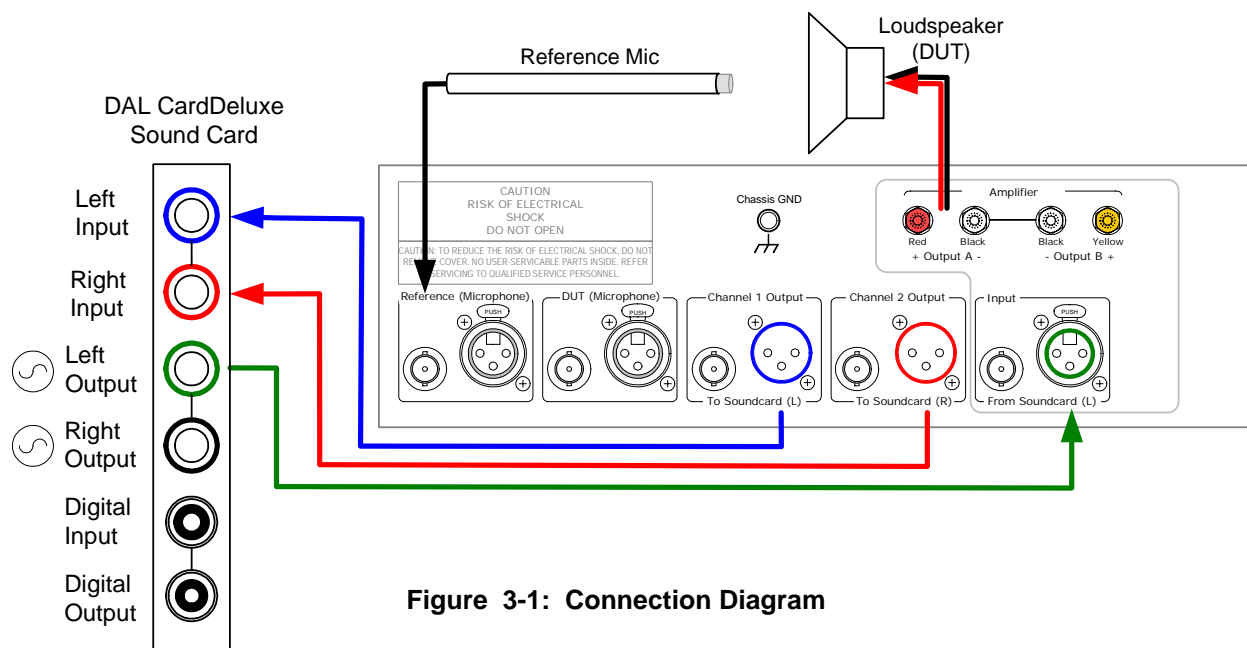


Figure 3-1: Connection Diagram

Once the system components have been connected, open SoundCheck ONE.

After the Login Screen closes, the Quick Launch Menu will open. See [Login on page 9](#) for details on this screen.

Important! All AmpConnect front panel functions are controlled from the SoundCheck ONE sequence. Changing the front panel settings is not recommended. Any changes to the front panel settings are reset when the test sequence is run.

Quick Launch Menu

The Quick Launch Menu runs automatically when SoundCheck ONE is started.

Three options are available:

- Self Test
- Calibrate Microphone
- Setup Test

(Autostart of the Quick Launch Menu can be turned off by checking “Do not show this dialog again“.)



Figure 3-2: Quick Launch Menu

Self Test

This runs the AmpConnect self test sequence. The test sequence automatically sets the AmpConnect input and output connections, runs the sequence and displays the results as shown in [Figure 3-3](#). This allows the user to verify that the system has been connected correctly and that it is operating with specifications.

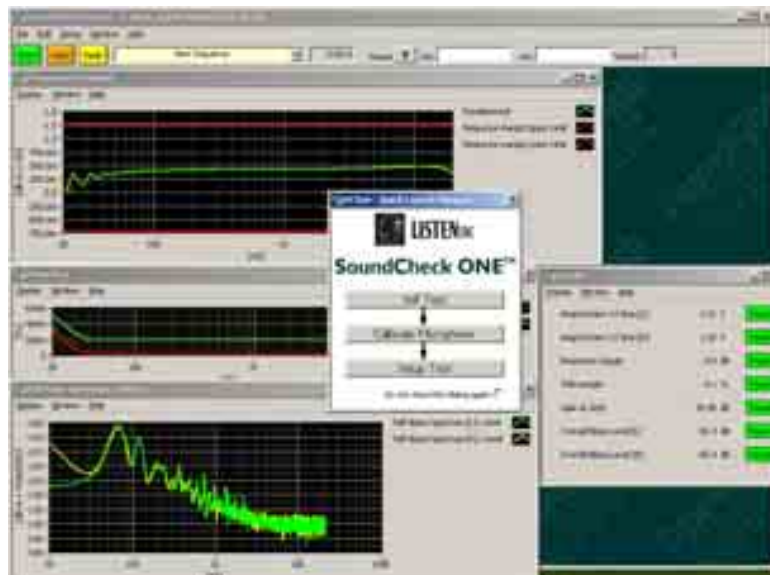


Figure 3-3: Self Test Results

Calibrate Microphone

The Microphone Calibration window allows the user to select the type of measurement microphone as well as calibrator type and settings for that calibrator.

The AmpConnect settings for microphone calibration are switched automatically by the Microphone Calibration editor.

The SoundCheck ONE Microphone Calibration step is preset to use the SCM 2 microphone. The Mic Calibration defaults to a sensitivity of 200mV/Pa (20mV + 20dB of gain) for the SCM 2 so that you do not need to calibrate when using the SCM 2 microphone.

If a different microphone is used, please refer to [Microphone Calibration on page 11](#) for instructions on calibrating the microphone.

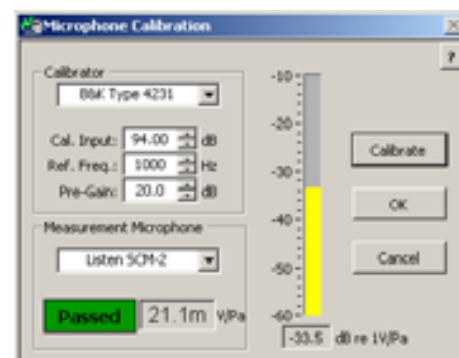


Figure 3-4: Microphone Calibration

Setup Test

This runs the Sequence Generator.

The Sequence Generator in [Figure 3-5](#) allows you to set the parameters of the test before running the measurement of the reference loudspeaker.

For details on these settings see [Sequence Generator on page 13](#).



Figure 3-5: Sequence Generator

Login

When opening SoundCheck ONE, the Login screen prompts for User Name and Password. The Access Level of a User Name helps to control what functions that user has access to.

Access Level

There are three access levels: Engineer, Technician, and Operator.

Engineer

The Engineer level is the highest access level, and therefore all functionality is accessible.

Technician

The Technician level allows access to Microphone Calibration procedures, and allows the user to measure, print and save data.

Operator

The Operator level can only measure and print.



Figure 3-6: Login Screen

To view and change the system's login settings, select **Login** from the **Edit** pull-down menu on the main SoundCheck® menu bar. The *Login* screen also appears when first starting the SoundCheck program. *Login* allows the SoundCheck administrator to prevent use of certain test system functions by other users. For instance, Calibration, Sequence, and Step Setups can be password protected from unauthorized users.

User Name

The user name can be stored with data, results, and included with printouts. It is useful for keeping track of who performed the measurement. The user name is typed in at the login prompt or can be scanned in with a barcode reader. Once the user name has been entered SoundCheck will remember the name and use it for all future sessions. The name is remembered when SoundCheck is exited and re-opened. If a new user name needs to be entered, simply open the *Login* screen from the **Edit** menu in SoundCheck and enter a new operator name, or enter a new name in the *Login* screen upon opening SoundCheck.

Password

The default passwords are not specified (blank or empty) when SoundCheck is shipped. You must click **Setup** (See [Figure 3-6: Login Screen](#)) to create passwords.

Passwords are case sensitive, so be careful with capital letters. Click **Setup** to open the *Login Setup* dialog in order to create new passwords. (Always keep a written copy of your passwords and keep them in a secure place.)

You have up to three (3) seconds to click **Setup**, while the *Login* screen is open, to change and/or create passwords. This can also be edited by selecting **Login** from the **Edit** drop down menu on the SoundCheck main screen.

(For more information regarding Login, refer to the SoundCheck 9.0 Instruction Manual.)

Microphone Calibration

The SoundCheck ONE Microphone Calibration step is preset to use the SCM 2 microphone. If you are using the SCM 2 microphone, the microphone calibration does not necessarily need to be run. The step defaults to a mic sensitivity of 200mV/Pa (20mV + 20dB of gain). Of course, even with the SCM 2 in use, you can run the calibration step to verify the mic sensitivity.

The AmpConnect settings for microphone calibration are switched automatically by the Microphone Calibration editor.

Calibration Procedure

This procedure will allow you to check your measured microphone's sensitivity against the microphone manufacturer's specifications.

1. On the SoundCheck main screen click on **Setup** and open the *Calibration Editor*.
2. Click **Calibrate**.
3. Select your calibrator model # from the pull-down menu or select **Other Calibrator** and enter the acoustic calibrator's reference level and frequency.
 - The microphone calibrator's reference level should be indicated in its specifications as a given dB SPL value (relative to 20 μ Pa) at a reference frequency.
 - e.g., for the Brüel & Kjær Type 4231 Acoustic Calibrator:
 - Sound Pressure Level: 94.00 dB \pm 0.20 dB
 - Frequency: 1000 Hz \pm 0.1%

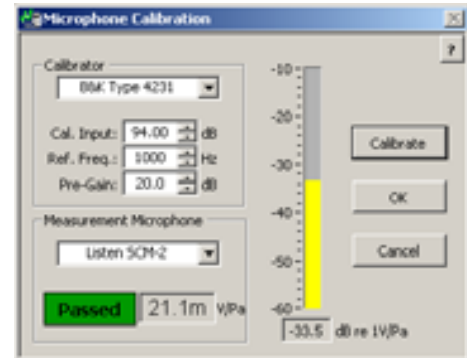


Figure 3-7: Mic Calibration

Note: When choosing **Other Mic** under Measurement Microphone, the sensitivity check will always indicate PASS, as long as the sensitivity is above 1mV/Pa. Since SoundCheck does not have the sensitivity listed in the look-up table, the final Pass/Fail verdict must be left up to the operator. Please refer to the manufacturer's specifications to confirm that the measured sensitivity is within appropriate limits.

4. Enter the gain or attenuation in dB that corresponds to the settings on the AmpConnect.
5. Select your measurement microphone model number from the pull-down menu. If your microphone is not listed in the pull-down menu, choose **Other Mic**.
6. Place your acoustic calibrator on your reference microphone and click **Calibrate** to measure its sensitivity.
 - The measured sensitivity of your reference microphone is displayed under **Measured Sensitivity** in mV/Pa after clicking **Calibrate**. If the measured sensitivity is outside the manufacturer's specifications, a flashing FAILED message will appear. Check first to see if your connections are correct or if the calibrator is turned on before assuming something is wrong with the microphone.

- The FAILED message can also appear if the Calibrator's frequency is not correct. If a Reference Frequency of 1000Hz is entered, but the Calibrator's actual frequency is 1008Hz, the Calibration may Fail. To verify the Calibrator's frequency, use the *Spectrum Analyzer* under the **Operate** menu.
- The meter on the right side indicates the corresponding dB level relative to 1 Volt per Pascal. If it varies by a few tenths of a dB from your last calibration measurement, do not be alarmed, this is normal. If it varies by more than 1 dB or failed the sensitivity test, you may want to have your microphone checked by a qualified calibration lab.

Important! We recommend that the user check the microphone calibration before testing a run of loudspeakers and before creating a new sequence.

Making Measurements

Once the Reference Microphone has been calibrated, measurements can be made.

Setting up a new sequence for a loudspeaker is simple in SoundCheck ONE.

1. Run Sequence Generator to create a new test sequence
2. Setup limits for each result; e.g. Set limits on fundamental response to +/- 3dB from reference standard
3. Measure the response of the reference standard loudspeaker ("Golden" Unit)
4. Save the sequence
5. Run the sequence and measure the response on production loudspeakers (DUT) and/or adjust Limits

Creating a New Sequence

From the SoundCheck main screen, click on **File** and select **New** to run the Sequence Generator.

Sequence Generator

The first step in creating a new sequence is to measure the reference loudspeaker. The Sequence Generator in [Figure 4-2](#) allows you to set the parameters of the test before running the measurement of the reference loudspeaker.

Test Setup

Stimulus parameters that can be adjusted are:

- Start and Stop Frequency ([See Step-Specific on page 14](#))
- Test Level (in Volts)
- Sweep Time (effects resolution)

Results

Select the Limits that are to be applied to the Device Under Test. Set the tolerance to the right of each Limit.

- Fundamental: +/- \underline{x} dB
- Sensitivity: +/- \underline{x} dB
- THD: +/- \underline{x} %
- Rub & Buzz: +/- \underline{x} %
- Loose Particle: relative threshold, no level adjustment
- Polarity: + or - relative to Golden Unit
- Impedance: +/- \underline{x} Ohms



Figure 4-1: File - New



Figure 4-2: Sequence Generator

Autosave

Click on Save Data and/or Save Results to automatically save information when the sequence is run. The folder icon allows the user to select the location for storing Data and Results.

Note that some of the parameters are marked in Blue Fields and others marked in black fields, using the following definition:

Sequence-specific

Step attributes can be **Sequence-specific** (local). These attributes are marked with a blue colored font (blue field). Changes to these attributes only appear in the sequence they are saved in. (See **Sequence Editor** in the main SoundCheck Instruction Manual for more information.)

Step-Specific

Steps can have attributes that are Step-specific (global). If one of these attributes is changed, that change appears in ALL sequences that use that step.

Important! Because they are Step-specific, the only way the Stimulus Range and Resolution can be different between sequences is to manually select Stimulus from the Setup menu, edit the Range and Resolution as required, select "Save as", give it a new name and then save the sequence. This sequence will be the only sequence using this unique Stimulus Step.

Measure Reference Standard

Click **Measure Reference Standard** to measure the golden unit.

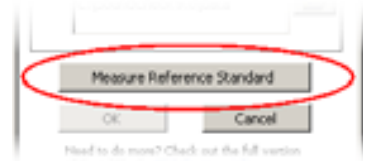


Figure 4-3: Measure Reference Standard

The sequence runs and the display shows the Limits and Results applied to the Golden Unit.

After the Reference Standard is measured, the final sequence limits and results are applied to the Golden Unit and displayed. The Sequence Generator will remain open during the measurement of the reference standard as shown in [Figure 4-4](#).

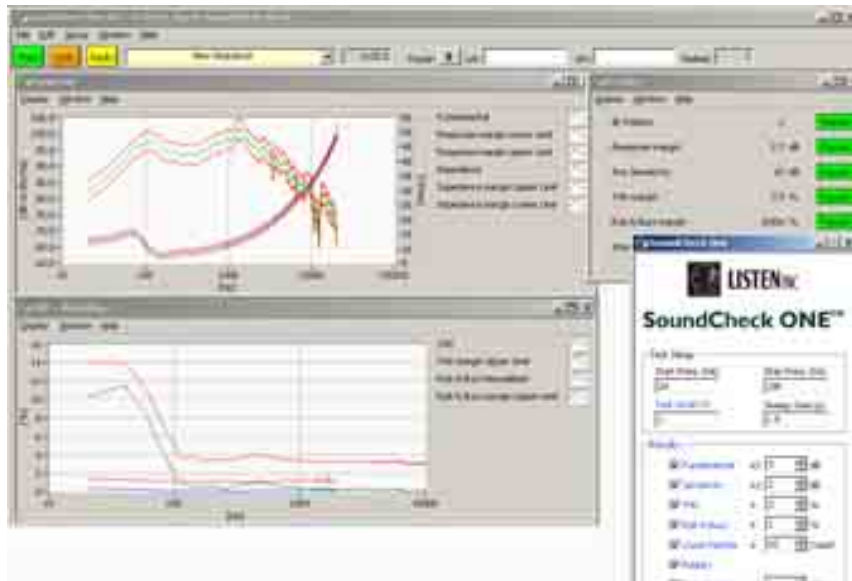


Figure 4-4: Reference Standard Results

Click **OK** on the Sequence Generator if the results are satisfactory or re-measure the Golden Unit. This will also allow the user another opportunity to update the limits and desired results (or Click **Cancel** to exit the Sequence Generator without saving the sequence). After clicking **OK** the user is prompted to enter a name for the new sequence.

Enter a sequence name and click **OK** to save to disk.

Replace the Reference Loudspeaker with a production loudspeaker and click **Start** on the SoundCheck main screen to run the sequence. The sequence limits and results are displayed after the sequence runs.

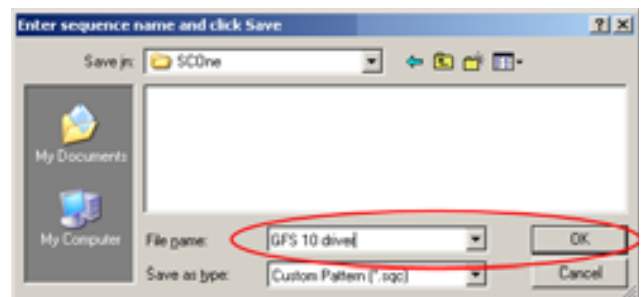


Figure 4-5: Name Sequence

Setting Limits

Limits on each of the selected results can be edited after the sequence has been created. The data for the limit curves and data come from the measurement of the Golden Unit, when the sequence is created or when the Golden Unit is re-measured. The offset for each of the limits is determined in the Sequence Generator as shown in [Figure 4-2 on page 13](#).

From the SoundCheck main screen, click on **Setup** and then select **Limits**.

The options on each of the Limit Editors are as follows:

Response Margin

The limit curves are the response of the Golden Unit. The upper and lower limits can be easily offset on the Y axis by entering a value in the Y Limit Offset field and then clicking the “Offset” button.

In this example, the limits have been offset by + or - 3dB in the Sequence Generator. To make the limits + or - 4dB:

- Enter 1 in the Upper Limit Offset “Y field” and click **Offset**.
- Enter -1 in the Lower Limit Offset “Y field” and click **Offset**.

The limits are then shifted up and down so that they are +/- 4dB.



Figure 4-6: Response Limits Editor

Individual points can also be adjusted. For more information on editing limits, refer to the **Limits Editor chapter** of the SoundCheck Instruction Manual.

Ave Sensitivity

The upper and lower limits for Average Sensitivity can be offset by the same method used in the [Response Margin](#) example.

Since it is a single value, it is also easily entered manually, by entering a value in the Upper Limit and Lower Limit fields as shown in [Figure 4-7](#).

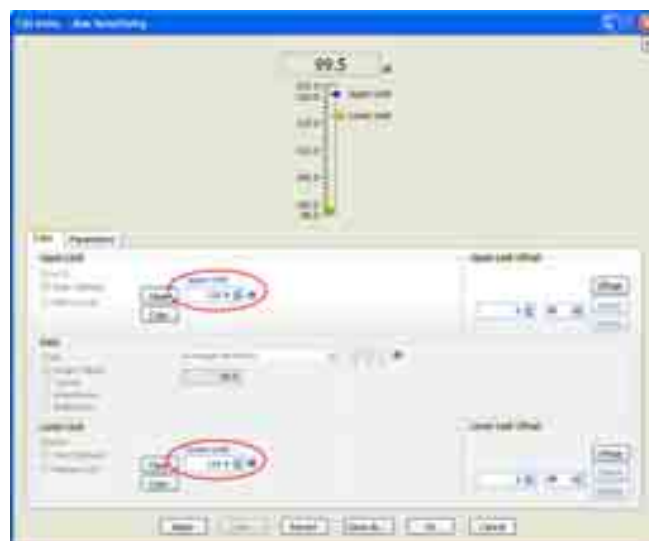


Figure 4-7: Sensitivity Limits Editor

THD margin

Distortion limits are offset by a percentage. This limit uses only the Upper Limit to determine Pass/Fail.

The limit curve is offset by entering a value in the Upper Limit Offset "Y field" and then clicking **Offset**.



Figure 4-8: THD Limits Editor

Rub & Buzz margin

Distortion limits are offset by a percentage. This limit uses only the Upper Limit to determine Pass/Fail.

The limit curve is offset by entering a value in the Upper Limit Offset "Y field" and then clicking **Offset**.

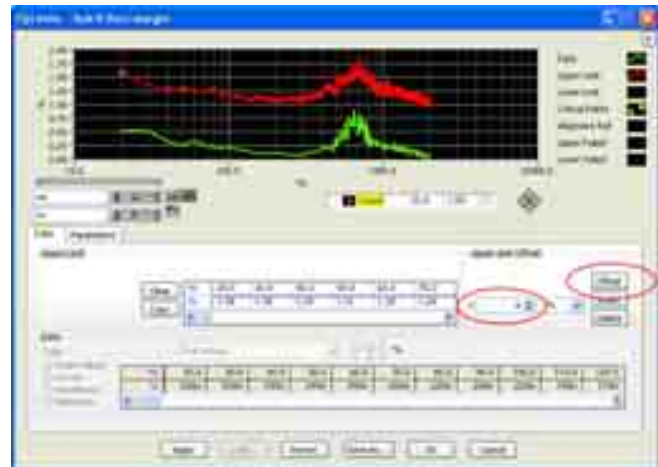


Figure 4-9: Rub & Buzz Limits Editor

Loose Particle margin

Loose Particle limits are set by a count of detections. This limit uses only the Upper Limit to determine Pass/Fail.

In this example, if more than 10 Loose Particle transients are detected, the limit will indicate a failure.

For more information on the improved Loose Particle Algorithm, please refer to the main SoundCheck Instruction Manual - Analysis chapter.



Figure 4-10: Loose Particle Limits Editor

Polarity

This compares the polarity of the Golden Unit to the polarity of the Device Under Test. In this example, the Golden Unit polarity value is 1.

If the polarity of the DUT is opposite that of the Golden Unit, the data value will be -1 and the limit will indicate a failure.

The upper and lower limits are set to 1 and 0.9, so that any value other than 1, created a failure.



Figure 4-11: Polarity Limits Editor

Impedance margin

The upper and lower limits for Impedance can be offset by the same method used in the [Response Margin](#) example.



Figure 4-12: Impedance Limits Editor

For more technical information on how to adjust Limits, please refer to the *Limits Editor* chapter of the main SoundCheck Instruction Manual.

Display Data and Results

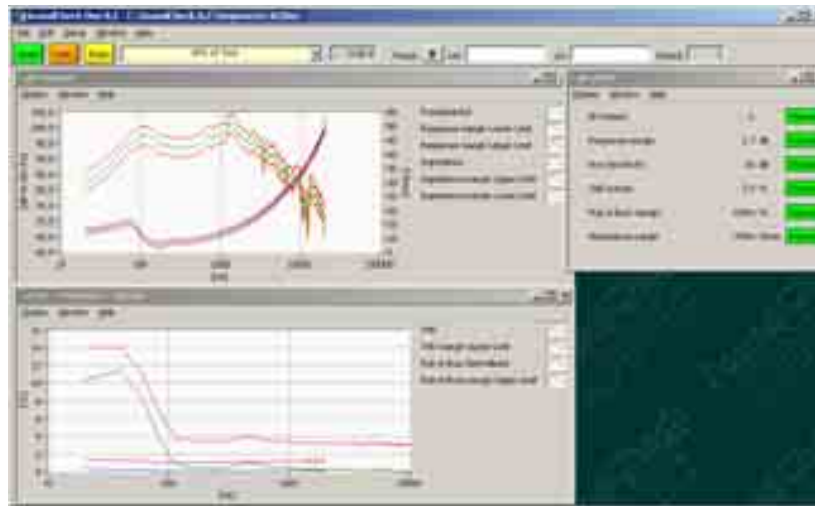


Figure 4-13: Final Display

The Display Step shows the final data and results that are selected in the Sequence Generator. Display windows can be added or modified by opening the **Memory List** from the front panel **Setup Menu**.

Memory List

The Memory List is the control center for display windows. The Lock Button in the upper right corner of the Memory List keeps the setup of the display locked so that any changes made to the windows are ignored the next time the sequence is run.

For more information on adding or changing display windows, please refer to the [Display Editor chapter of the main SoundCheck Instruction Manual](#).

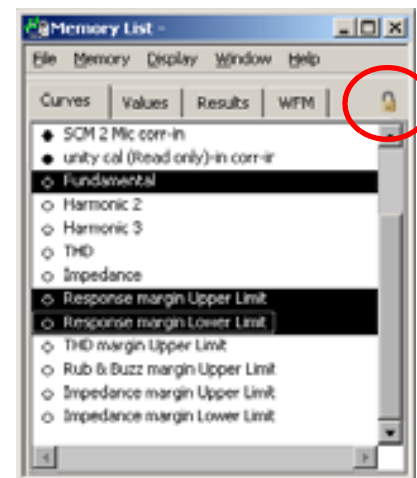


Figure 4-14: Memory List

Important! Any changes made to a Display Step will change that display in all sequences that use that step. In order to make a “unique display” for a specific sequence, select **File** in the **Memory List** and then select **Save as** to give the display a new name.

Analysis Editor

The sequence generated by SoundCheck One has two Analysis steps: one for TSR (Simulated Free Field) and another for Impedance. These steps should not be altered unless advised by Listen, Inc.



Figure 4-15: Select Analysis Step

Analysis TSR

- Curve Resolution (Frequency Tab): Automatically sets the resolution of the curves that are output by the sequence, and performs smoothing.

SoundCheck One analysis resolution is fixed at 1/12th octave.

Setting the resolution to 1/12th octave reduces the number of points in the resulting curve, making the sequence operate faster.

- Max Valid Harmonic (Time Tab): The maximum valid harmonic is the maximum harmonic order that can be time separated from its immediate harmonic neighbors. This is a function of the start/stop time and sweep rate.

(This is the Maximum Harmonic that can be selected while still having a valid result.)



Figure 4-16: Analysis TSR

For more information, please refer to the Analysis chapter of the main SoundCheck Instruction Manual.

Analysis Impedance

- Impedance Measurement Method (Electrical Tab): SoundCheck One requires that AmpConnect is selected. The Rref (Reference Resistor) Z-High selection is set automatically by the generated sequence in SoundCheck One.

If the Z-Low Rref resistor is needed for a test, this can be selected after the sequence has been generated. Click **OK** after changing the selection, and then save the sequence so that it is saved on the hard drive.

If a Custom Reference Resistor is installed in AmpConnect, Custom should be selected manually. The Reference Resistor field will be available to enter the value of the Custom Reference Resistor.

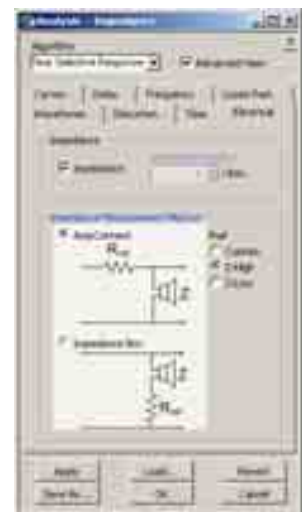


Figure 4-17: Analysis Impedance

Front Panel Menus

Note that many of the functions in the drop down menus have “short-cut keys“ associated with them. More information on the items in the drop down menus can be found in the main SoundCheck manual.

File

- New: Create new sequence - Opens the Sequence Generator
- Open: Select sequence to open
- Save: Save changes to current sequence
- Save As: Save changes and give sequence a new name
- Revert: Loads the last saved version of the current sequence and discards changes
- Rename: Change the name of the current sequence in memory and hard disk
- Delete: Erases the current sequence from memory and hard disk
- Import Seq: Allows the user to import a *sequence and all its steps* from a folder, from another system
- Export Seq: Allows the user to export a *sequence and all its steps* to a folder so that it can be sent to another system
- Exit: Closes SoundCheck ONE

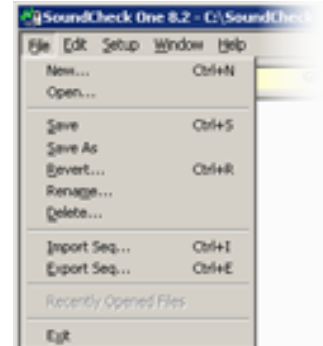


Figure 5-1: File - New

Edit

Login: Set the properties for the Login Screen



Figure 5-2: Edit - Login

Folder Paths: Set the various folder path options including the status.dat file selection

- Demo Mode: Forces SoundCheck One to run in demo mode. The SoundCheck One splash screen will indicate that it is running in Demo Mode and that the “Data Is Randomized”.
- Wrong Status.dat Warning: If the wrong Status.dat file is selected, a warning message will be displayed indicating that “Data Is Randomized”.



Figure 5-3: Folder Paths

Setup

Step editors are opened from this drop down menu, allowing the user to adjust each step after the sequence is created.

The following editors are available:

- Calibration
- Stimulus
- Analysis
- Post-Processing
- Limits
- Memory List: Opens the Memory List for adjusting the Display step

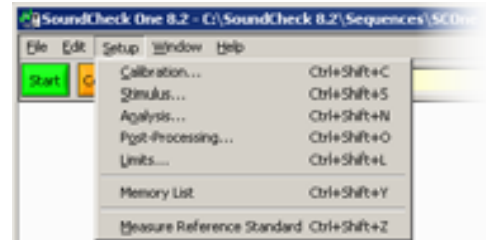


Figure 5-4: Setup - Select Editor

Measure Reference Standard:

Runs the measurement of the Reference Standard transducer, and updates the data and results used for comparative measurement. This can be done at any point during the testing of devices to insure the accuracy of results.

Window

- Full Size: Promotes SoundCheck ONE to a fixed window that fills the computer desktop. Resizing of this window is disabled until **Full Size** is turned off.

The lower section of the menu allows the user to select Display or Editor Windows to bring them to the front of the computer display.

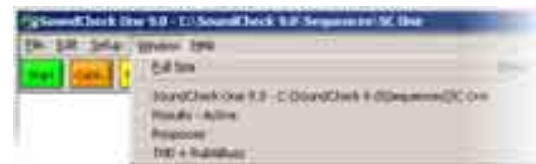


Figure 5-5: Window

Help

- Show Context Help: Turns on a help window that shows information on items as the user hovers over an item with the cursor
 - User Manual: Opens a PDF of the SoundCheck ONE manual (requires PDF reader)
 - New Features: Opens a PDF document
 - Check for Updates Now*: Opens the online, automatic update service
 - Optional Modules: shows the modules installed on the system as well as modules that are available
 - Listen, Inc. Website*: Opens www.listeninc.com
 - Listen, Inc. User Community*: Opens the online users group
 - Report a Bug*: Opens the online bug report form
 - Request a New Feature*: Opens the online request form
 - About SoundCheck: Shows information on the installed version of SoundCheck ONE
- * requires an internet connection



Figure 5-6: Help

Introduction: AmpConnect™

AmpConnect™ makes loudspeaker and microphone testing simpler AND more cost-effective. It replaces an impedance box, amplifier, microphone power supply and digital I/O card with one simple USB controlled piece of hardware. AmpConnect provides all the necessary calibration, voltage, & current signals to perform acoustic and electronic tests such as frequency response, sensitivity, distortion, and impedance. It can also drive sound sources (e.g. mouth simulators) for testing microphones. This reduces operator error as multiple hardware items are replaced by a single rugged, rack mountable unit with fully labelled connections. AmpConnect is fully controllable via SoundCheck which means that adjustments of parameters such as gain can be included in test sequences. AmpConnect will self-calibrate with SoundCheck and has both XLR and BNC connection options to achieve low noise operation. AmpConnect can route/select all test signals, and contains an integral power amplifier to drive the device under test (or mouth simulator). Two selectable internal reference resistances to measure device impedance offer much simpler impedance measurements than conventional methods. No additional external equipment is required to realize a complete acoustic test platform for a wide range of devices – simply connect your device to AmpConnect and SoundCheck, and start testing.



Control

AmpConnect can be controlled either using the switches on the front-panel, or remotely via a USB connected PC. This makes it equally suitable for use as a standalone device (e.g., in a lab or during production line setup), or with a PC on a production line. An eight-bit digital I/O port provides digital control and/or status monitoring of external devices for operator feedback, test fixture control, etc.

Connection

Connection to SoundCheck (or any other test system) is simple via balanced (XLR) or single-ended (BNC) connections. Two simultaneous user-selectable inputs enable 2 measurements to be made simultaneously. In the case of a loudspeaker test, this may be an acoustic signal and an electrical signal such as impedance, and in the case of a microphone test a reference microphone may be measured at the same time as the microphone under test for comparison purposes. Two sets of output connections for the devices under test, either of which can be selected as the active output, permit one test to be performed while simultaneously setting up a test on the other output, thereby increasing production line testing throughput. A reference input connection allows the output from an external electrical test signal (typically the output of a measurement microphone) to be routed through and selected by AmpConnect and communicated to SoundCheck, freeing the operator from having to handle any external signal switching during testing. This reference input also provides voltage and IEPE bias, supporting transducers requiring either type of powering. The bias can be removed to allow direct connection to a microphone power supply or preamplifier. The amplitude of signals can be adjusted for optimal levels without the need for external amplifiers or attenuators. Both the reference input signal and the signal from the device under test, can be attenuated by 10 or 20 dB, or amplified by 0, 10, 20, 30, or 40 dB before being output to SoundCheck. Simplicity and ease of use has been carried through to the user display, with three-color indicators on the front panel (as well as a signal to the computer via the USB) to provide a clear visual signal to the user that the reference, device-under-test, and power amplifier levels are operating within range.

Key Features

Combines the functionality of:

- Microphone power supply
- Impedance Sense Resistor Interface
- Power Amplifier
- Signal Router
- Digital I/O

All in a 2 rack space package.

Simplicity

- Consolidates test equipment and eliminates excess cabling, greatly simplifying setup and reducing connectivity errors
- Much simpler calibration without having to change any cables

Integration

- Can be controlled directly from SoundCheck® via USB or through front panel controls

Protection & Durability

- Protects sound card from overload and damage
- Built to stand up to demanding production environments

Speed

- Dual amplifier outputs allows the operator to test one speaker while loading another

Test Setup Comparison

Conventional Test Setup

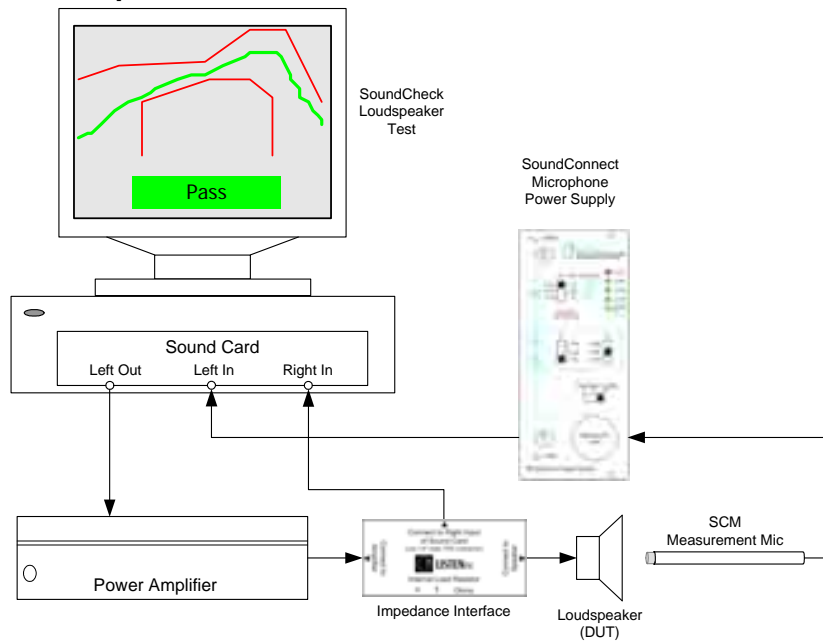


Figure 6-1: Conventional loudspeaker test setup

AmpConnect Test Setup

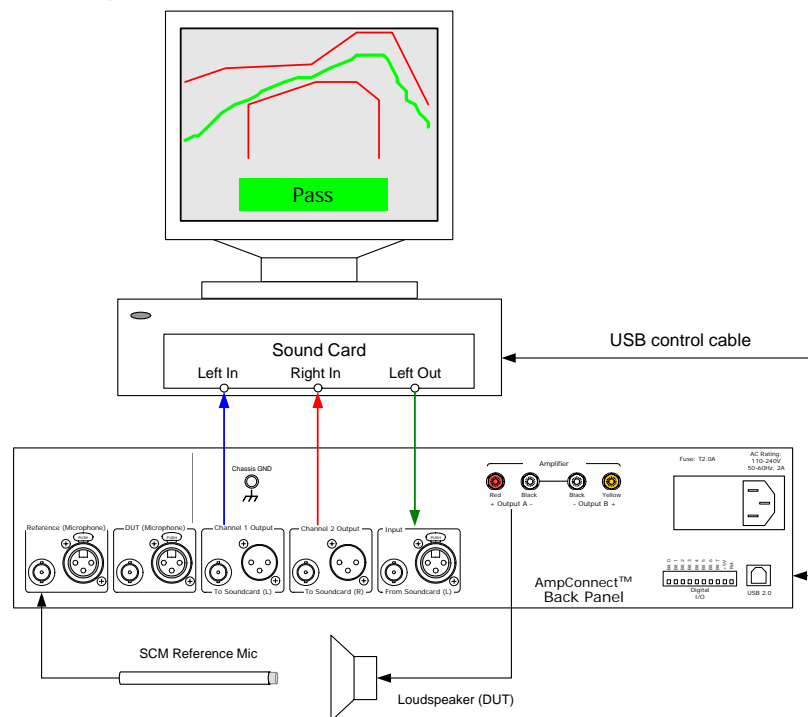


Figure 6-2: AmpConnect simplifies the setup

Two Speaker Test Setup

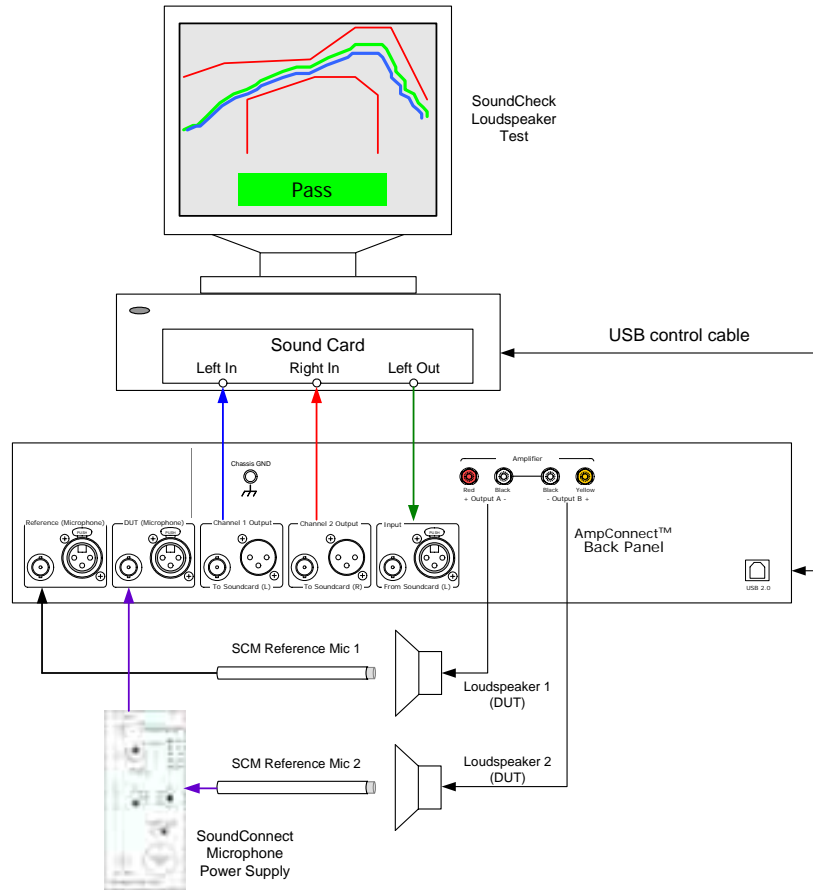


Figure 6-3: Example of two speaker test setup

Installation

Requirements

- SoundCheck 8.11 minimum (or SoundCheck ONE) is required in order to control AmpConnect via USB
- The SoundCheck computer must have an available USB 2.0 connection
- The following Custom VI files must be copied to the C:\SoundCheck x.x\System\Custom VIs folder:
 - AmpConnect.vi
 - AmpConnect Editor.vi
 - AmpConnect.llb

Software Installation

Before connecting AmpConnect to a USB port of your SoundCheck System, you must run the AmpConnect software installation.

AmpConnect requires Microsoft .NET Framework 2.0 sp1 (or later). The installation process will check to see if .NET Framework is installed. If not, the following screen will appear prompting you to install the required application.

Note: An internet connect is required in order to download the Microsoft application. If the SoundCheck system does not have internet access, the NET framework installer can be download on a different PC and then copied to the system manually.



Once the installation has finished, you can connect AmpConnect to your SoundCheck system using the USB cable provided.

Windows will indicate that new hardware has been found, which shows that the driver has been successfully installed. This may be displayed as "AmpConnect" or as "New HID Device".



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Front Panel Functions

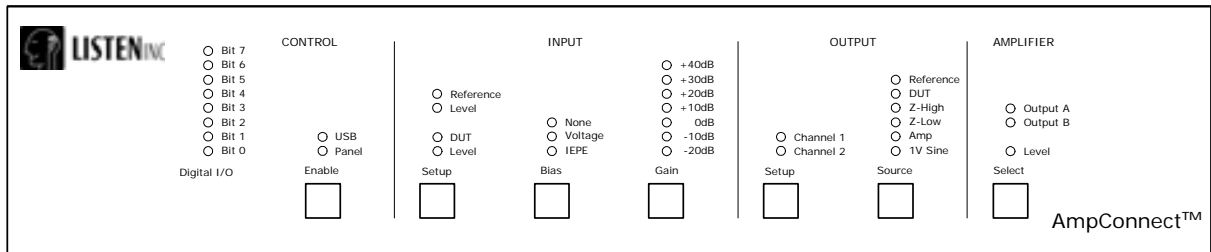


Figure 8-1: Front Panel

AmpConnect can be used as a stand-alone test and measurement interface. It can also be controlled by SoundCheck using Custom Steps in a test sequence. The front panel LEDs show the settings for input and output channels as well as signal level and signal state.

Control

Enable

The Enable button toggles between USB and Front Panel control. The USB and Panel LEDs indicate which is selected.

- **USB** allows SoundCheck to control the operation of AmpConnect
 - AmpConnect will automatically enable **USB** control as soon as it is connected to the SoundCheck computer via USB
 - AmpConnect will return to Panel control if the SoundCheck computer shuts down
- **Panel** allows AmpConnect to function as a standalone interface (This is disabled when USB is selected in a SoundCheck sequence step.)
 - When **Panel** is disabled, the front panel is locked out, protecting the unit from accidental changes during testing. This feature may be activated from a step, however, it is not a requirement.
- **USB** and **Panel** control can be simultaneously enabled if desired

Panel Control

Important! The default power up state is user defined. Thirty seconds after the front panel settings have been changed, the new settings are stored and will be used as the **new default state** the next time the unit is powered on.

The initial power up default settings from Listen, Inc., are those most commonly used for loudspeaker testing:

- **Digital I/O:** all Bits are Low (LEDs off). (Digital I/O is not available when used as a stand-alone interface)
- **Input Reference:** Mic Bias set to Voltage with +20dB of gain
- **Input DUT:** Not selected since it is not used in for loudspeaker testing [DUT default settings]
- **Output Channel 1:** Reference Mic
- **Output Channel 2:** Z-Low
- **Amplifier:** Output routed to Output A

USB Control

- USB control of front panel functions through a SoundCheck sequence step
- When USB is selected in a SoundCheck sequence step, the Front Panel controls are disabled to prevent accidental changes

Digital I/O

- 8 bits of digital I/O that can be written and read directly in SoundCheck
- Used to control relay boards and switches, e.g. footswitch for Start and Stop
- Communicate with PLCs in automated production lines
- Receive TTL signals from other test equipment

Digital I/O States

- Bits can be used as either input or output. The state of the Bit is indicated by the LEDs:
 - LED off - Bit is low
 - LED on - Bit is high

Note: The Digital I/O function can only be used when AmpConnect controlled by SoundCheck through USB.

Input

The Setup button toggles between Reference input and DUT input. Separate settings and signal routing can be made for each. The settings for Reference and DUT are independent of each other.

When the Reference or DUT inputs are routed to Output 1 or 2, the level indicators show the signal state of the OUTPUTS that these inputs are assigned to. This is to insure that the input of the SoundCheck sound card is not overloaded or underloaded (low signal level that is too close to the noise floor of the system). Refer to your sound card manual to see what overload level is appropriate.

Reference

Level - Monitors the signal level and state of the **Output Channel** that the **Reference Input** has been routed to, after applying gain. (All values are nominal)

- Green indicates level is > -40dBV
- Yellow indicates level is > +4dBu
- Red indicates level is > +13dBu
- If an input channel is not assigned to an output channel, the LED is off

DUT (Device under test)

Level - Monitors the signal level and state of the **Output Channel** that the **DUT Input** has been routed to, after applying gain. (All values are nominal)

- Green indicates level is > -40dBV
- Yellow indicates level is > +4dBu
- Red indicates level is > +13dBu
- If an input channel is not assigned to an output channel, the LED is off

Bias

Bias can be set ONLY for the Reference (Microphone) Input.

- **None:** for microphones or electronics that do not require power
- **Voltage:** provides bias to SCM microphones and electret condensers
- **IEPE:** provides constant current bias for pre-polarized reference microphones

Note: Testing microphones that need 48V phantom power requires an external phantom power supply.

Gain

- Gain is variable in steps from -20dB to +40 dB
- Input gains are independently variable

Output

AmpConnect™ features two configurable outputs to the sound card. You can choose which signals are routed to each from the Front Panel or via USB control. Settings for Channels 1 and 2 are independent of each other.

Any of the following source signals can be routed to Output Channel 1 or 2:

- **Z-High:** The voltage across a 1 Ohm current sense resistor (for loudspeaker impedance test)
 - output signal is 1 Volt/Amp
 - An alternate resistor value is available as a factory installed option from Listen, Inc.
- **Z-Low:** The voltage across a 0.1 Ohm current sense resistor (for loudspeaker impedance test)
 - output signal is 100 mVolt/Amp
 - fixed value - cannot be changed
- **Amp:** the output voltage of the power amplifier, attenuated by 20 dB (x 0.1)
 - The output of the power amp can be routed to a signal out when calibrating the amp
 - Only one output at a time may use this source. If it is already selected, it will be skipped.
- **Reference (microphone) Input:** signal from the Reference microphone input
- **DUT (microphone) Input:** signal from the DUT microphone input
- **1V Sine:** a reference 1 Volt, 1 kHz sine
 - constant signal generated by AmpConnect
 - can be sent to either output in order to test sound card connections and settings
 - cannot be routed to amplifier output
- **Quiet:** Output channel is defeated (All source LEDs are set to **Off**)
 - If AmpConnect is accidentally disconnected from USB or if the computer is shut off, AmpConnect will automatically switch to **Quiet**. The power amplifier outputs are also set to **Off**. This is to minimize transients. Re-enable the channel outputs and power amp outputs by re-selecting them.

Amplifier

- Single input amplifier with a fixed gain of 26 dB
- Amplifier output can be routed to Output A, Output B or both simultaneously
- Output impedance is always actively minimized to nearly 0 Ohms, even as sense resistors are selected. The damping factor of the amplifier/speaker combination remains unchanged regardless of the sense resistor setting.
- Should the power amp output current exceed 5.7A peak, the outputs will be disabled until reset by the user. The power amp level indicator will flash red.

Level

- Monitors the peak signal level and state of the amplifier output (All values are nominal)
 - Green indicates level is > -14dBVout (corresponds to -40dBVin)
 - Yellow indicates level is > 12Vpeak (about 6dB before clipping)
 - Red indicates level is > 17Vpeak (about 3dB before clipping)

Rear Panel Connections

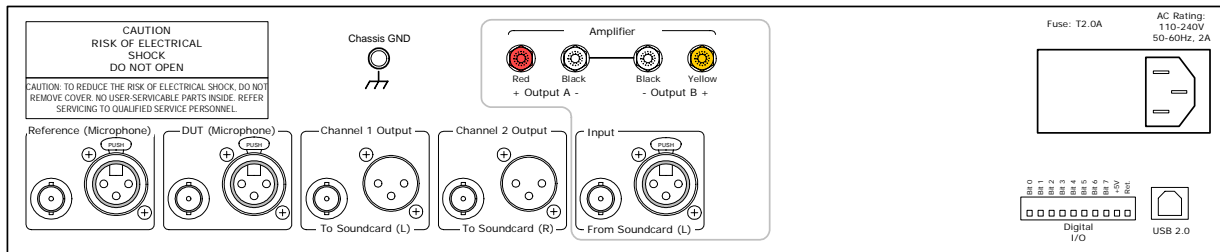


Figure 9-1: Rear Panel

Important! XLR and BNC connections on an **input** should not be used simultaneously. However, the XLR and BNC outputs can be used to simultaneously drive two different loads, within specification, since their output drivers are decoupled from one another.

Reference (Microphone) Input

This is typically used for connecting a Reference Microphone.

- Balanced XLR female and Single Ended BNC connectors, wired in parallel
- -3dB low frequency roll off point is 7 Hz (nominal)
- Bias voltage is across Pin 2 & 3 of XLR connector, and the center pin & shell of the BNC connector
 - When Voltage or IEPE Bias is selected, the BNC shell and XLR Pin 3 are internally connected to signal ground. This makes the input Single Ended.
- Voltage = 10 V (nominal)
- IEPE = 10mA (nominal)
- Input impedance - 100k ohm (nominal)

BNC vs. XLR internal wiring

- XLR & BNC inputs are differential
- XLR pin 1 is chassis ground
- XLR pin 2 is signal high (+), BNC center is signal high (+)
- XLR pin 3 is signal low (-), BNC case is signal low (-)

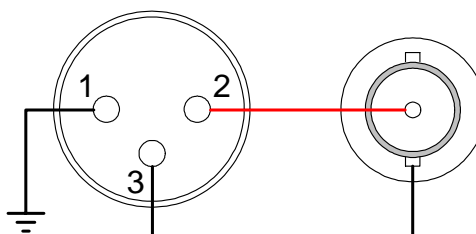


Figure 9-2: XLR / BNC Inputs

DUT (Microphone) Input

This connection can be used for connecting a “Device Under Test” Microphone. This connection is used typically for microphone testing.

- Balanced XLR female and Single Ended BNC connectors
- -3dB low frequency roll off point is 7 Hz (nominal)
- Bias is not available for DUT microphone

Channel 1 Output

This is connected to Input 1 of the SoundCheck system sound card, e.g., CardDeluxe Left Input.

- Balanced XLR male and single ended BNC connectors

Channel 2 Output

This is connected to Input 2 of the SoundCheck system sound card, e.g., CardDeluxe Right Input.

- Balanced XLR male and single ended BNC connectors

Amplifier Input

This is connected to Output 1 of the SoundCheck system sound card, e.g., CardDeluxe Left Output.

- Balanced XLR female and single ended BNC connectors
- Direct input to Amplifier. Amplifier output can be routed to two outputs

Amplifier Output A

Connects to a transducer via the binding post connectors.

Note: There is only one power amp channel in AmpConnect. This amp channel can be switched to either Output A, Output B or A + B.

Amplifier Output B

Connects to a second transducer via the binding post connectors.

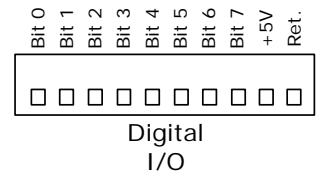
Digital I/O

Phoenix style connector

- Requires a Phoenix plug, part number: 1803659, in order to wire to external devices. (optional part, available from Listen, Inc.)

Pin out:

- Bit 0 thru 7 - Lines can be used as outputs to control external devices, or as inputs to receive switching signals from external devices.
 - Input Bit max voltage is 5.5V DC
- +5V - Provides a +5V DC voltage as reference or power for Bits
 - Self resetting fuse set at 80 mA
- Ret. - Digital I/O signal ground (at same potential as chassis ground)



See [Digital I/O Connections on page 45](#) for wiring suggestions.

USB

Connect to SoundCheck computer for USB control.

The settings in AmpConnect can be changed through a Custom Step in a SoundCheck test sequence.

See [Custom Step on page 37](#) for more information.

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USB Control Via SoundCheck

Custom Step

Open the SoundCheck sequence editor and select the Custom Step category on the left hand menu.

Under **Step** select **New**.

Enter "**AmpConnect**" for the custom step name and click **OK**.

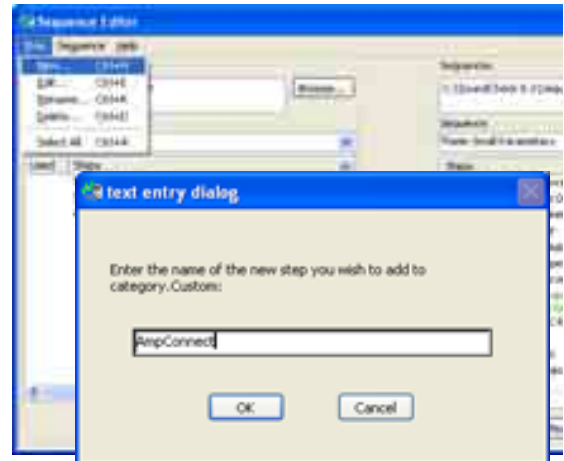


Figure 10-1: Create Custom Step

Note: In SoundCheck ONE, the user does not have access to creating a new custom step. Only the settings in the existing step can be changed.

Insert the new AmpConnect step at the top of the sequence. When the sequence runs, this step will set the AmpConnect options for its first use in the sequence.

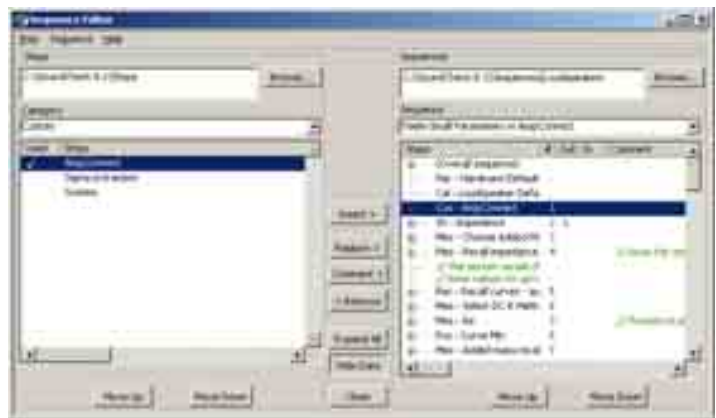


Figure 10-2: Custom Step in Sequence

Important! AmpConnect settings can be changed during the run of a test sequence, to perform different functions. This will require individual AmpConnect steps at various points in the SoundCheck sequence. All settings in the AmpConnect Custom Step are Blue Fields (Sequence Specific), so that multiple instances of a step can be used in a sequence. Each step can have different settings. Please refer to the SoundCheck Manual for more information on sequence operation.

AmpConnect Software Control

Open the AmpConnect Custom Step from the Active Sequence in the right hand section of the editor, as shown in [Figure 10-2](#).

The Custom Step allows the user to control the front panel settings of AmpConnect by clicking on the LEDs. Click **Apply** and AmpConnect is switched to the new settings. The user can also update the settings of the Custom Step by clicking **Read Settings**.

In addition to the standard front panel controls, the Custom Step also includes the following:

Control - Digital I/O (must be set to USB)

- Bit 0 thru 7: Shows the state that the Bit expects to see when set to Read. If the actual state of the input agrees with the setting, the step result will be “Pass”. If it does not agree, the result will be “Fail”. When set to write, this is the state that the Bit will change to when the Custom Step runs in the sequence.

Toggle Inputs/Toggle Outputs

The Toggle control can be used to switch the Microphone Input and Amplifier Output as a test sequence runs in **Continuous** or Loop operation. This can be used to test a loudspeaker on one test fixture while setting up a different speaker on another fixture. (The fixtures and test microphones should be identical.)

- Toggle Inputs (Ch.1): Switches so that the first pass of the sequence uses the Reference Microphone Input and the second pass uses the DUT Microphone Input. (On **Channel 1 only**.)
- Toggle Outputs: Switches so that the first pass of the sequence uses Amplifier Output A and the second pass uses Amplifier Output B.

Sequence Example



Figure 10-3: Channel 1 Settings



Figure 10-4: Channel 2 Settings

The Loudspeaker Impedance Test Sequence will require the settings as shown in [Figure 10-3](#). (Refer to [Single Loudspeaker Test on page 41](#) for wiring suggestions.)

- Control is set to USB. This disables the front panel controls.
- Input Section - Reference Mic is set to use Voltage and a Gain of +20dB.
- Output Section - The Reference Mic is routed to Output Channel 1.
- Amplifier output is set to Output A

In addition, [Figure 10-4](#) shows the settings for Output Channel 2:

- The signal from the Z-Low sense resistor is set to Output Channel 2. This is used for the Impedance measurement input in the SoundCheck sequence.

Click **Apply** in the editor to test that the AmpConnect settings change on its front panel.

When the sequence runs, AmpConnect will automatically change to these settings.

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Connection Procedures

Single Loudspeaker Test

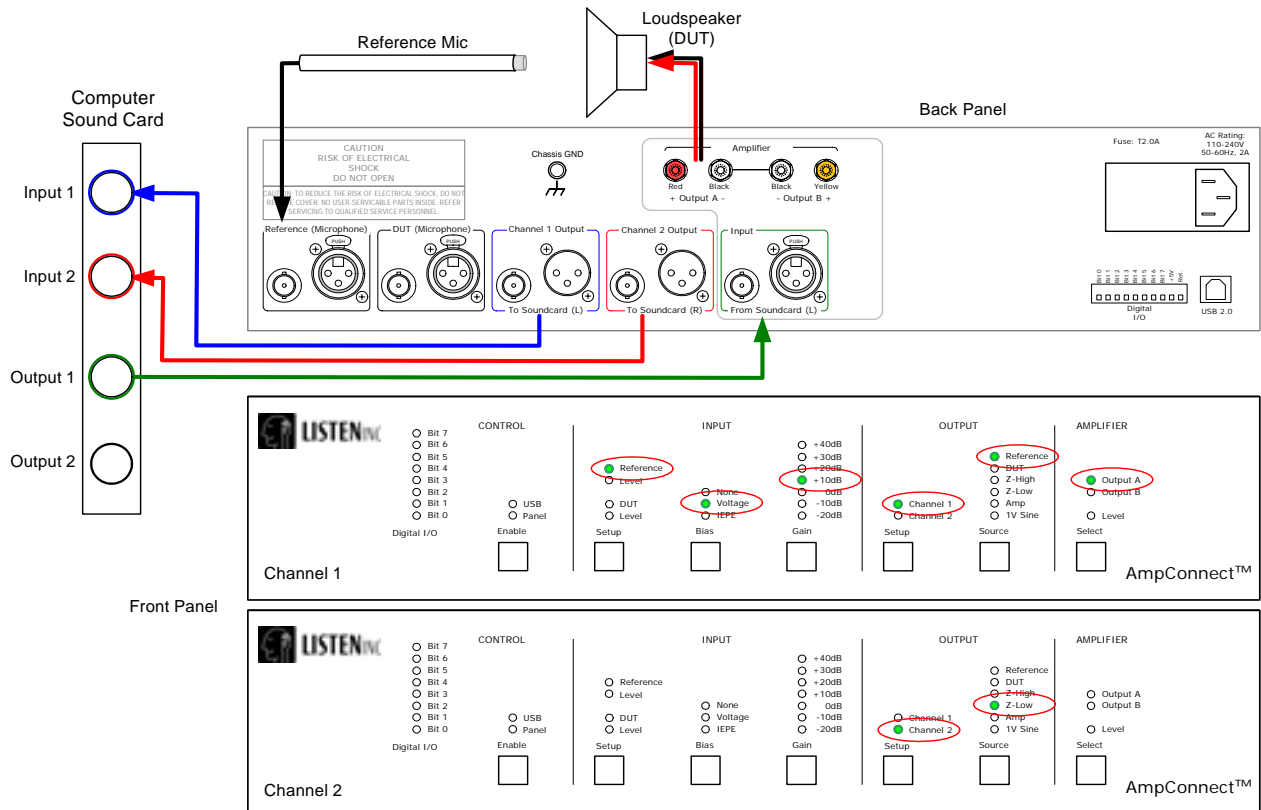


Figure 11-1: Single Loudspeaker Test Layout

The Single Loudspeaker test as shown in [Figure 11-1](#) shows AmpConnect with the following settings:

- Reference Mic output set to Channel 1
- Bias set to Voltage
- Reference gain set to +10 dB (DUT input not used)
- Amplifier output set to Output A
- Z-Low sense resistor output set to Channel 2

Two Loudspeaker Test

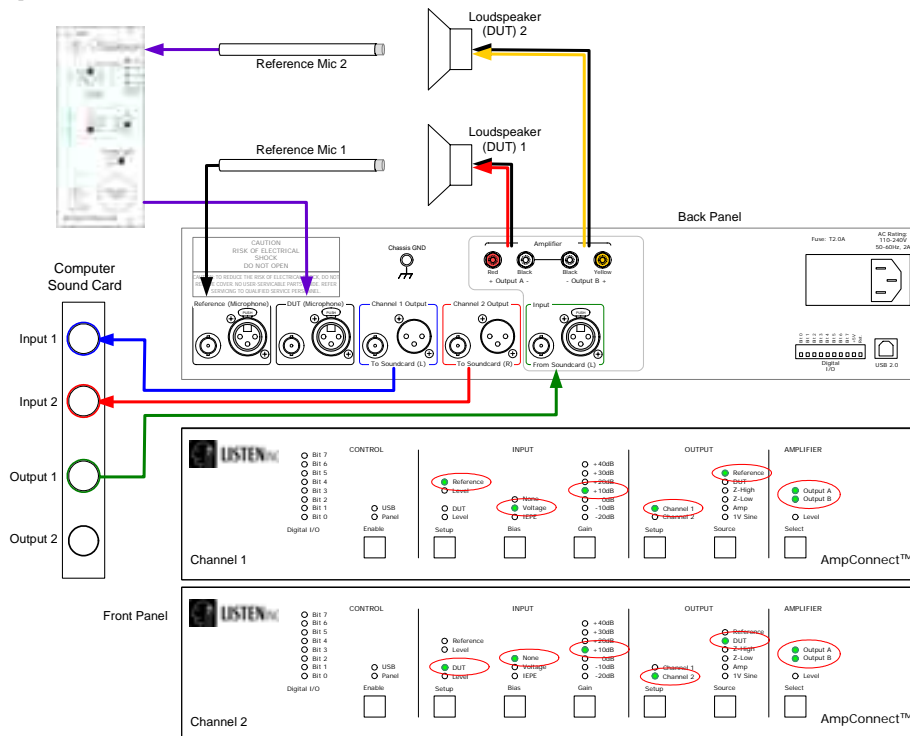


Figure 11-2: Two Loudspeaker Test Layout

Figure 11-2 shows AmpConnect setup to test two loudspeakers simultaneously. (This does not include impedance measurement.)

- Reference Mic 1 output set to Channel 1
- Bias set to Voltage
- Reference gain set to +10 dB
- Reference Mic 2 is connected to an external microphone power supply. In this case, a SoundConnect.
 - SoundConnect set to 0dB of gain and connected to the DUT Microphone input
- DUT Mic (Reference Mic 2) output set to Channel 2
- DUT gain set to +10 dB (Bias not available on DUT Mic input)
- Amplifier output set to Output A and B

Important! Connecting two loudspeakers in parallel to one amplifier output reduces the impedance of the load, e.g., 8 Ohms in parallel with 8 Ohms equals 4 Ohms. For speakers with impedances less than 4 Ohms, use the 1 Ohm sense resistor (or a custom reference resistor available from Listen, Inc.) to increase the load as seen by AmpConnect. This will reduce AmpConnect's output power proportionately by the ratio of the reference resistor divided by the "**loudspeaker plus reference resistor**" impedance, (e.g.: a 3 Ohm loudspeaker with a 1 Ohm reference resistor will reduce the power output by $\frac{1}{4} \times 60$ watts = 15 Watts, leaving 45 Watts available to drive the load). Also, because of AmpConnect's extra dissipated power internally, its upper temperature limit may be lowered.

Microphone Test

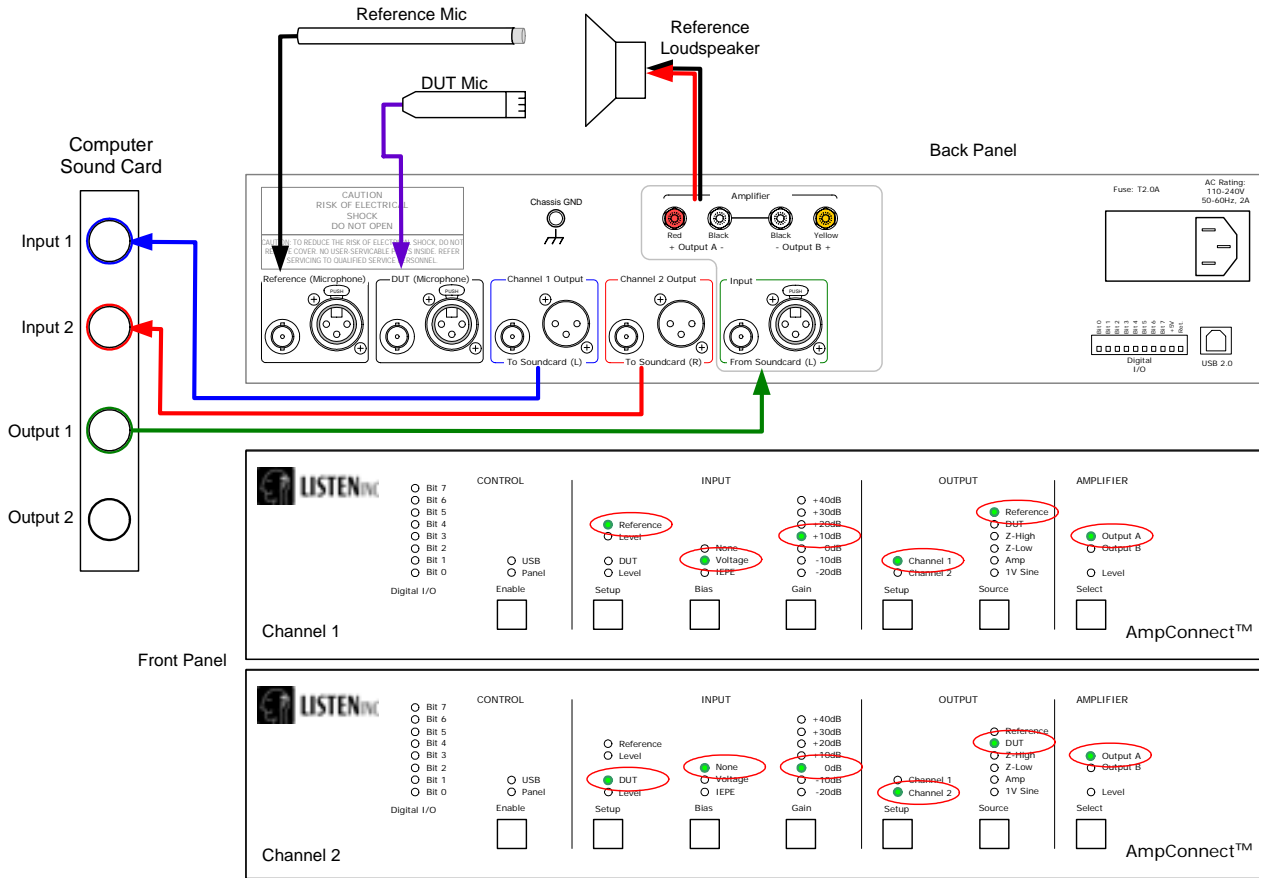


Figure 11-3: Microphone Test Layout

The Microphone test setup in [Figure 11-3](#) shows how AmpConnect is setup with a DUT Mic that does not require an external power supply.

- Reference Mic output set to Channel 1
 - Bias set to Voltage
 - Gain set to +10dB
- DUT Mic output set to Channel 2
 - Bias is not available on the DUT Mic input (see notes below)
 - Gain set to 0dB
- Amplifier output set to Output A

Note: To test microphones that require Bias (Voltage or Current), an external supply such as the SoundConnect can be used.

Note: To test microphones that require 48 Volts, an external Phantom Power Supply can be used.

Digital I/O Connections

Digital I/O settings are made in an AmpConnect Custom Step used in a SoundCheck test sequence. When the Bit Light is **On**, the Bit is set **High**. When **Off**, the Bit is set **Low**. The Read/Write state of the Bit determines if it is an Output or an Input. (See General Rules below.)

Important! Individual AmpConnect Custom Steps are required in a SoundCheck sequence to perform various Digital I/O operations. All settings in the AmpConnect Custom Step are Blue Fields (Sequence Specific), so that multiple instances of a step can be used in a sequence. Each step can have different settings including different Bit configurations.

Sequence-specific Definition

Step attributes can be **Sequence-specific** (local). These attributes are marked with a blue colored font (blue field). Changes to these attributes only appear in the sequence they are saved in. (See **Sequence Editor** in the main SoundCheck Manual for more information.)

Note: Access to Digital I/O control is not available in SoundCheck ONE.

General rules

- Bits are at ground when set Low (LED Off)
- Bits are at +5V when set High (LED On)
- This corresponds to the Front Panel LEDs and software control settings
- Bits set to **Read** will act as Inputs
 - The setting of the Bit indicates the state that you expect to read. That state is then used in a comparison with what is actually read to produce the Pass/Fail result for the step.
 - If the Bit is selected in the custom step (LED On), the step expects that Bit of AmpConnect to be pulled High at the time the sequence runs in order to produce a Pass result. If the Bit is Low, the step result will be Fail.
- Bits set to **Write** will act as Outputs
- The Pass/Fail state of a step with a Bit set to **Read** is determined at the time the step is executed in the sequence.
 - If any Bit set to Read disagrees with the actual status of the Input, the step will issue a FAIL verdict. This is then used by the Step Configuration for sequence logic. See **Step Configuration** in the main SoundCheck Manual for more information.
 - If all Bits set to Read Agree with the actual status of the Input, the step will issue a PASS verdict.
- Lines for Bits 0 thru 7 have an internal 470 Ohm resistor in series with each
- When set to Read (configured as an input), the Bit is pulled high through an internal 100K resistor

Output: Bit set to Write

When using the Digital I/O Bits as outputs the example in [Figure 11-4](#) shows two possible wiring configurations.

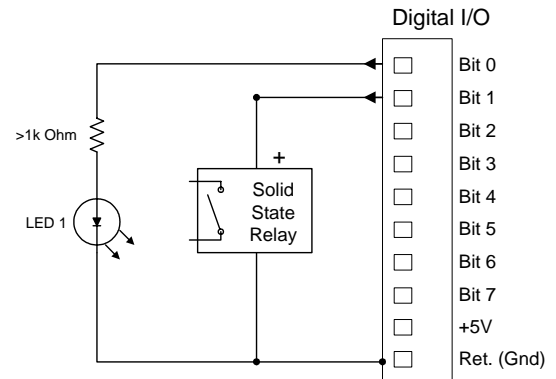


Figure 11-4: Bits 0 & 1 used as outputs

Bit 0 Example

When the step is executed in a sequence, an external LED (or other device) is turned on according to the settings in the software control panel:

- Bit 0 is set to Write (Output)
- Bit 0 is set to High (LED On)

A resistor of at least 1k Ohm should be put in series with the LED, wired as indicated in [Figure 11-4](#). When the step is executed in the sequence, Bit 0 is set High and 5VDC is applied to the LED.



Bit 1 Example

- Bit 1 is set to Write (Output)
- Bit 1 is set to High (LED On)

This activates an external Solid State Relay as shown in [Figure 11-4](#). When Bit 1 is set High by the AmpConnect Custom Step, 5VDC is applied to the relay input.



Two different AmpConnect steps can be run in the sequence to perform the operations shown in the two previous examples independently.

A single AmpConnect step can also be created to perform both operations simultaneously.

- Both Bit 0 and 1 set to Write (Output)
- Bit 0 and 1 set to High (LEDs On)



Input: Bit set to Read

When set to **Read** (configured as an input), the Bit is pulled high through an internal 100K resistor. Users may want to use external pull-up resistors to increase noise immunity or pull-down resistors to force the input low, as shown in [Figure 11-6](#).

External Switch Examples

The DIO input of AmpConnect can read external switch closures into a SoundCheck test sequence.

Normally Closed Switch

Bit 4 Example - High when switch is depressed

[Figure 11-5](#) shows a Normally Closed switch wired across Bit 4 and Ret.

In this configuration, when the switch is open (footswitch depressed), the AmpConnect Input will be pulled **High**.

When the switch is closed (footswitch not depressed), the Input will return to **Low**.

The AmpConnect Custom Step will compare the actual status of the Input to the setting for Bit 4 and issue a verdict.

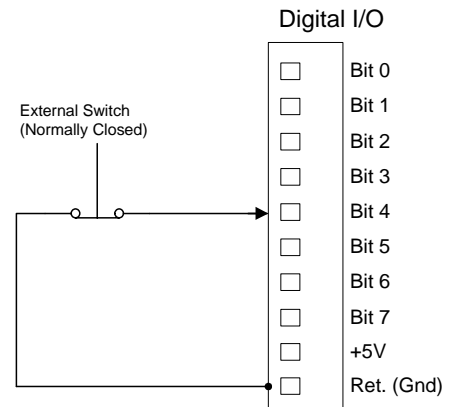


Figure 11-5: Bit 4 - Normally High

Normally Open Switch

Bit 4 Example - High when switch is depressed

In [Figure 11-6](#) a Normally Open switch is wired across Bit 4 and +5V.

A 2.2k Ohm resistor is also wired across Bit 4 and Ret.

In this configuration, when the switch is open, the AmpConnect Input will be pulled **Low**. When the switch is closed, the Input will return to **High**.

The AmpConnect Custom Step will compare the actual status of the Input to the setting for Bit 4 and issue a verdict.

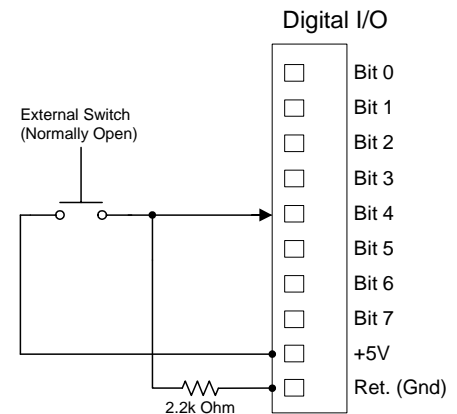


Figure 11-6: Bit 4 forced Low

When the AmpConnect Custom Step is executed in the sequence, it will Read the actual status of the Input and compare it to the setting of Bit 4.

- Bit 4 is set to Read (Input)
- Bit 4 is set to High (LED On)

If the setting disagrees with the actual status of the Input, the step will issue a FAIL verdict. This is then used by the Step Configuration for sequence logic. See [Step Configuration](#) in the main SoundCheck Manual for more information.

If the setting agrees with the actual status of the Input, the step will issue a PASS verdict.



Bit 5 Example - TTL Input

SoundCheck may also need to receive a TTL signal from an external device such as a Production Line Controller.

Figure 11-7 shows the output of such a device connected across Bit 5 and Ret.

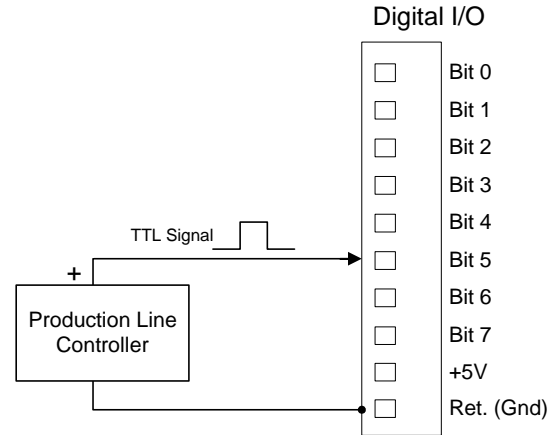


Figure 11-7: Bit 5 - Normal Logic Input

When the AmpConnect Custom Step is executed in the sequence, it will Read the actual status of the Input and compare it to the setting of Bit 5.

- Bit 5 is set to Read (Input)
- Bit 5 is set to High (LED On)

If the setting disagrees with the actual status of the Input, the step will issue a FAIL verdict. This is then used by the Step Configuration for sequence logic. See **Step Configuration** in the main SoundCheck Manual for more information.

If the setting agrees with the actual status of the Input, the step will issue a PASS verdict.



AmpConnect Block Diagram

Block Diagram

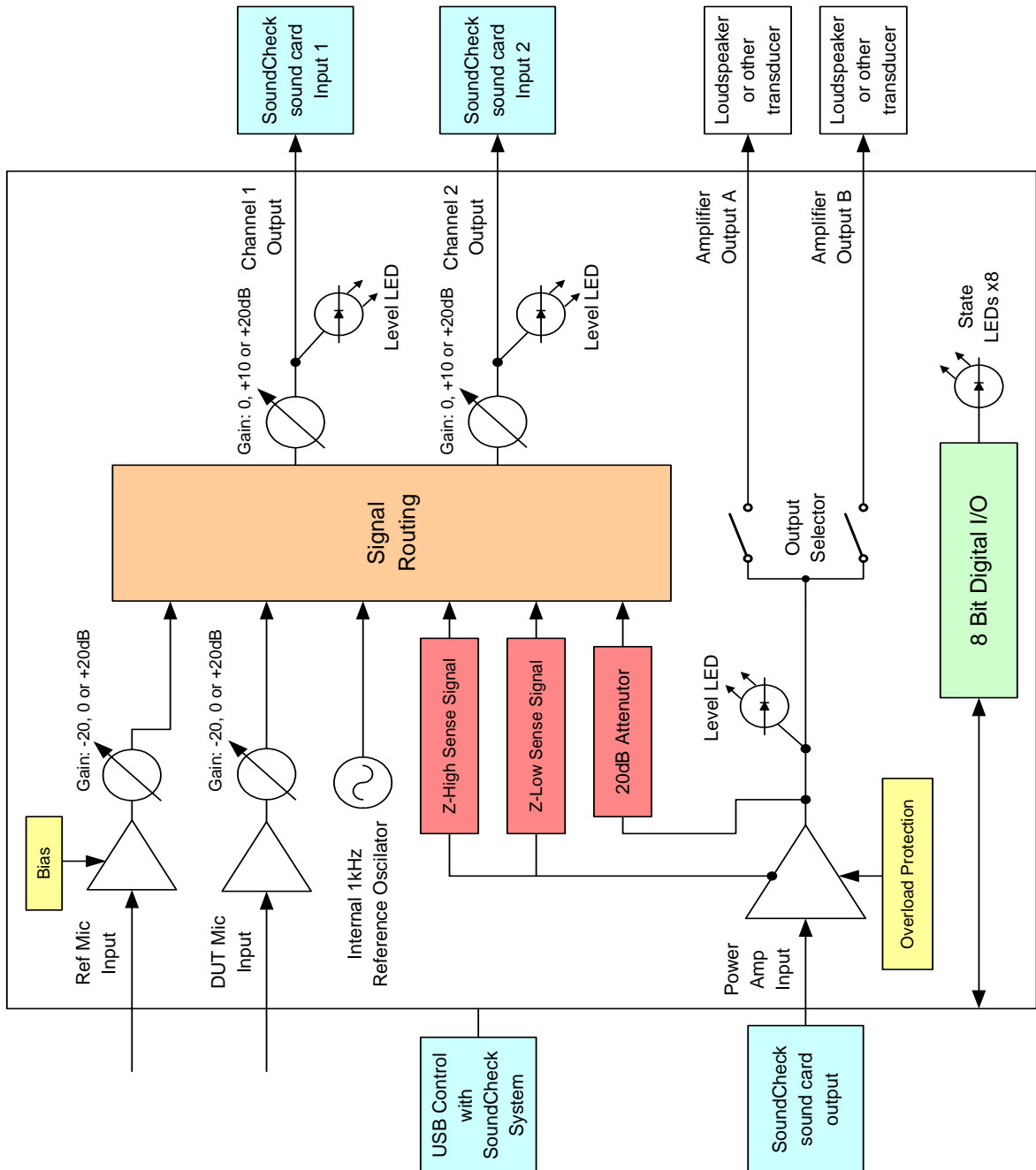


Figure 12-1: AmpConnect Block Diagram

Internal Jumper Settings

Important! The internal jumper settings should not be changed! These are set at the factory and should only be changed with instruction from Listen, Inc.

Specifications

Nominal values

Power Amplifier

- Continuous Output Power: 60W RMS into 4 Ohms, 47W RMS into 8 Ohms
- Frequency Response: -3dB at 4 Hz & 90 kHz
- THD at 60W, 4 Ohms: 0.019% at 1 kHz
- Voltage Gain: +26.4dB, +/-0.1dB at 1 kHz
- Attenuator: -20.0dB +/-0.2dB at 1 kHz
- Gain from Amp In to Ch1/2 with Amp as Source: +6.4dB +/-0.23dB at 1 kHz
- Output Impedance: Actively minimized to nearly 0 Ohms (see [Amplifier on page 32](#))

Loudspeaker Current Measurement

- Z-High = $1V/A$ +/-1%
- Z-Low = $100mV/A$ +/-1%

Reference & DUT Inputs

- Gain: -20dB to +40dB in 10dB steps
- Maximum input at -20dB: 100V RMS
- Maximum input at +40dB: 100mV RMS
- Frequency Response: -3dB at 7 Hz & 100 kHz;
- IEPE Bias: 10mA, 20VDC (max)
- ECM / Electret Bias: 10 VDC through 2.2k Ohms

Channel 1 and 2 Outputs (To Soundcard Inputs)

- Maximum Output: 10V RMS into 600 Ohms (Balanced and Unbalanced)
- Unbalanced Output Impedance: Less than 5 Ohms
- Unbalanced Output Tolerances: +/- 0.1dB for gains -20dB, 0dB, +20dB, +/-0.2dB for gains -10dB, +10dB, +30dB, +40dB (at 1 kHz)
- Balanced Output Impedance: 50 Ohms +/- 10 Ohms
- Balanced Output Gain - $R_L = 100k$ Ohm: 6dB +/- 0.2 dB at 1 kHz
- Balanced Output Gain - $R_L = 600$ Ohm: 6dB +/- 0.3 dB at 1 kHz

Digital I/O

- 8 Bit; any Bit may be configured for input or output
- Outputs: +5V/GND 10mA (max) each
- Note: USB required for Digital I/O operation

Internal Sine Generator

- Output Level: 1V RMS +/-TBD dB
- Output Frequency: 1 kHz +/- TBD Hz

USB 2.0 Interface

- All front panel functions USB controllable
- Front panel can be locked out via USB
- Outputs automatically disabled upon USB disconnect or PC shutdown

Physical

- Without rack mounting flanges: 17 in. wide, 2-Unit (3-1/2 in.) high, 11 in. deep
- Weight: 7 lbs (3.2kgm) approx.
- Power: 85 - 264VAC 50/60 Hz, 150 Watts (max)

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Contact Information

Contact the Listen office at 617-556-4104, Monday thru Friday, between 9 AM and 5 PM EST.
or email:

Sales - sales@listeninc.com

Technical Support - support@listeninc.com

Useful links

Listen Website: www.listeninc.com/

User Forum: www.listeninc.com/community/

FAQ page can be found at: www.listeninc.com/community/

Download the latest versions of manuals, drivers and sequences from the support section of the Listen website.

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