GRACE DESIGN

m903 reference headphone amplifier / DAC / monitor controller

Owner's Manual Rev A

2434 30th Street, Boulder, CO 80301 USA

www.gracedesign.com / 303.443.7454

Welcome

Thanks for purchasing the Grace Design m903 reference headphone amplifier / DAC / monitor controller. The m903 represents a powerful combination of pristine audio performance, robust mechanical construction and steadfast reliability.

While we strive to build all our products to be simple to setup and intuitive to operate, we do suggest that you spend a little time familiarizing yourself with the features and operational functions outlined in this manual. Doing this will make your experience with the m903 more productive and enjoyable.

In the event that you encounter any technical or operational difficulties with this or any Grace Design product, please feel free to contact us at 303-443-7454. Our office hours are from 9 to 5, Monday through Friday, MST. Or you can email questions to: info@gracedesign.com.

Also, please remember to visit our website www.gracedesign.com for the latest Grace Design product information, owner's manuals and technical documents.

Grace Design has been building audiophile quality products since 1995. The technology developed for the m903 has evolved through a process of extensive listening, field testing and careful refinement. Regardless of what type of monitoring you do, your m903 will faithfully serve as an invisible link between your source audio and your headphones or speaker systems. We sincerely hope it helps you achieve a new level of excellence in your work!

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Important Safety Information

GENERAL

- Indoor use only
- Ordinary Protection: This equipment should not be exposed to dripping or splashing.
- Avoid placing objects filled with liquids, such as vases or glasses, on this equipment.
- Class I Equipment (grounded type)
- Electrical rating: 100-120/220-240V~ 50-60Hz 25W
- Mains supply voltage fluctuations are not to exceed ±10% of the nominal supply voltage.
- Pollution Degree 2
- Installation (Over voltage) Category II for transient overvoltages.
- Maximum Relative Humidity: <80%
- Operation temperature range: 10 °C to 40 °C
- Storage and transportation temperature range –40 °C to 70 °C
- Maximum altitude: 3000m (9843 ft)
- Equipment suitable for continuous operation
- Weight: 2.3kg (5lbs)

SAFETY MARKING SYMBOLS

CAUTION: READ ACCOMPANYING DOCUMENTS

This symbol, located on the equipment and in this manual, refers to important instructions. Read this manual thoroughly before operating this equipment.

WARNING: ELECTRICAL SHOCK HAZARD

This symbol, located on the equipment and in this manual, indicates the potential for electrical shock hazard.

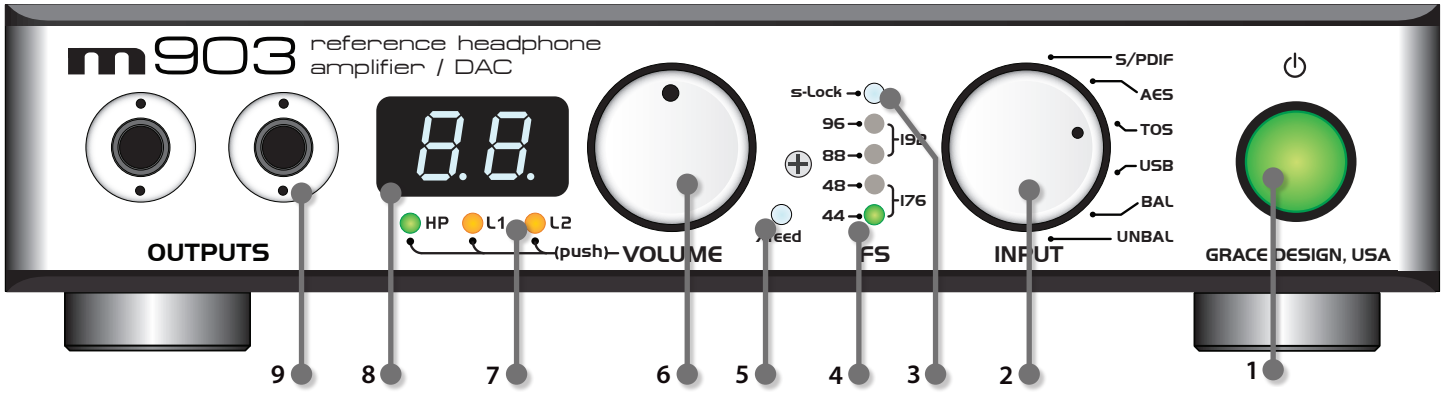
SERVICE INFORMATION

The Grace Design m903 contains no user serviceable components. Contact Grace Design for repair and upgrade information. In the event that your Grace Design m903 needs to be returned to the factory, contact us for a return authorization number.

m903 Key Features

- Stereo analog inputs - balanced (+4dBu) XLR and unbalanced (-10dBv) RCA.
- Ultra low distortion 24-bit /192khz DAC accepts stereo digital input sources in AES3, S/PDIF, TOSLINK (optical) and USB formats with auto sample rate detection and digital de-emphasis filter.
- **s**-lock[tm] dual stage PLL (phase lock loop) circuitry for the ultimate in low jitter clocking and sonic integrity.
- Two sets of line level outputs provided via RCA and ¼ TRS jacks for connection to stereo monitors.
- Front panel rotary encoder provides precision level control of both headphone and the line output levels. Level adjustments are made in 0.5dB steps within a 95dB range.
- 0.05dB channel level matching to ensure true stereo balance at any monitoring level.
- Large, white 7-segment display is used to show headphone and stereo main output levels.
- X-feed (crossfeed) simulates the acoustics of a loudspeaker listening environment which can significantly improve imaging while reducing listening fatigue when using headphones. This feature employs carefully designed signal cross-feed, filtering and delay circuits to simulate hrtf (head related transfer functions).
- High current transimpedance output amplifier design drives 8 ohm loads. The m903 was specifically designed with low impedance headphones in mind.
- Only the highest quality 0.5% metal film resistors are used throughout and there are no electrolytic capacitors in the signal path. Sealed gold contact relays are used for all signal switching.
- Infrared remote control for level control, left/right balance, mute and more when using the optional remote control unit.
- 5 Year transferable warranty on parts and labor.

m903 Frontpanel Controls / Features



1 ILLUMINATED POWER SWITCH - illuminates green when unit is powered on.

2 ROTARY INPUT SELECTOR SWITCH - selects between all available inputs.

3 **s**-lock[tm] INDICATOR LED - illuminates when **s**-lock[tm] is active.

4 SAMPLE RATE INDICATOR LEDS - auto sample rate detection from selected digital input source.

5 CROSSFEED INDICATOR LED - crossfeed circuitry is user activated in setup menu or via the optional remote.

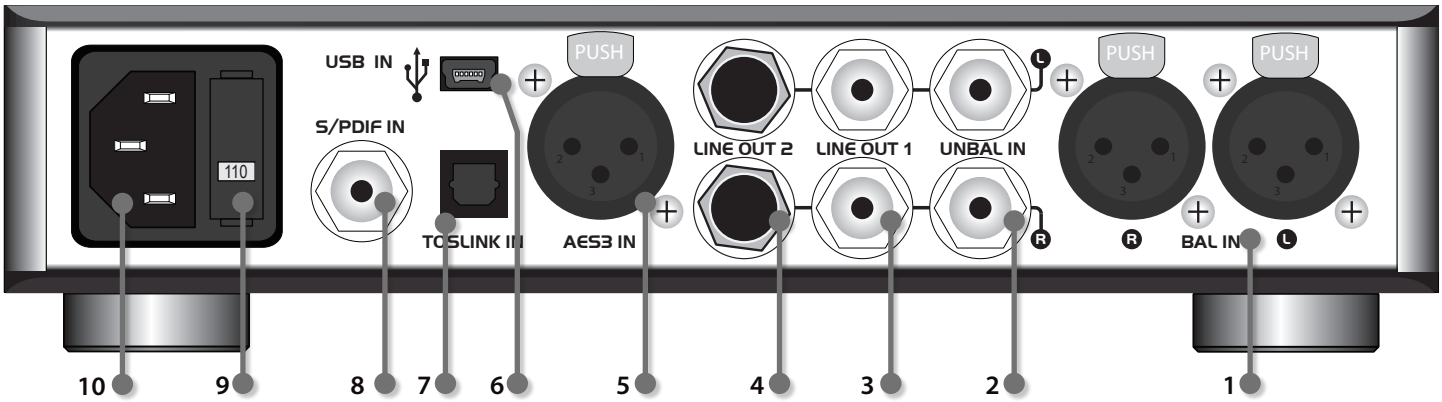
6 OUTPUT LEVEL/EDIT ROTARY ENCODER - This stepped rotary encoder controls the selected output level in .5dB increments. This encoder is also used to adjust other settings found in the setup menu.

7 OUTPUT SELECTION LEDS – These LEDS indicate which output is currently selected by the user and under interface control.

8 OUTPUT LEVEL / SETUP MENU DISPLAY - This blue, 2 digit display shows the current relative output level values based on the position of the main level rotary encoder. The range of this display is 0 to 99. Note the decimal represents a 0.5dB increment. This display is also used to give the user information in the setup menu.

9 HEADPHONE OUTPUTS – Two stereo headphone output jacks wired in parallel.

m903 Rearpanel



1 BALANCED ANALOG INPUT - standard female XLR connectors.

2 UNBALANCED ANALOG INPUT - standard RCA connectors.

3 UNBALANCED LINE OUTPUT - standard RCA connectors.

4 BALANCED LINE OUTPUT - standard 1/4" TRS connectors.

5 AES DIGITAL INPUT - quality 110 Ohm balanced cable recommended.

6 USB DIGITAL INPUT - standard USB type A -to- type B mini cable included.

7 TOSLINK DIGITAL INPUT - standard TOSLINK optical cable.

8 S/PDIF DIGITAL INPUT - quality 75 Ohm cable recommended.

9 VOLTAGE SELECT CAM - selects between 110 VAC and 220 VAC.

10 AC LINE INPUT MODULE - standard 3 prong AC cable included.

Unpacking and Installing your m903

The m903 is shipped in one box which contains the m903 unit, an AC power cord, a USB cable, a small plastic bag containing four hand-threaded machined metal feet and a warranty registration card..

OPEN AND INSPECT THE BOX

Open all shipping boxes, carefully remove the m903 and put it aside. Before you go any further, check to make sure the above listed components are included with your shipment. If you believe something is missing, contact your grace design dealer and they will make sure you're taken care of.

SAVE YOUR BOX!!

We strongly encourage you to save the box and shipping materials supplied with your m903. They are specially designed to properly protect these valuable components, and in the unlikely event that you need to return them for service, only these OEM shipping materials can ensure their safe return to our factory.

REGISTER YOUR UNIT!

We strongly urge you to register your unit with Grace Design. We provide a limited 5 year transferable warranty on all of our products, but if you register your system, it's easier for us to help you if necessary. So please take a few minutes to complete the enclosed warranty registration card and mail it in, or you can simply go to the warranty registration form on our web site. Thank you!

INSTALLING THE FEET AND/ OR RACKMOUNTING

The m903 is designed to either be placed on a flat, stable surface in your studio or listening environment, or be rack mounted. If you don't plan to rack mount your m903, first install the 4 supplied metal/rubber feet. Simply thread theses supplied feet by hand

into the 4 vacant threaded holes in each corner of the underside of the m903.

For rack mount installation, the m903 chassis has a #10-32 threaded insert mounting hole on the bottom towards the back. Two m903's can be mounted side by side in a standard 1U rack tray. Use a #10-32 x 1/2" or a #10-32 x 3/8" machine screw. Do not use a screw longer than 1/2".

Powering up the m903

POWER CONNECTIONS

The disconnect device for the m903 system is the mains plug or the appliance coupler on the power supply cord. The disconnect device must remain accessible and operable. The power supply cord supplied with the m903 must be connected to a mains outlet with a protective earthing connection.

CHECK LINE VOLTAGE SETTINGS

The iec power entry module has been set from the factory to operate at the voltage required for your part of the world. However, it's important to double-check this in order to ensure no damage will come to the unit if power is applied and the setting is incorrect.

LINE VOLTAGE SELECTOR

To change the line voltage, remove the AC power chord from the power inlet then use a small screwdriver to pry the fuse carrier out. Remove both fuses from the fuse carrier and replace with the proper value fuse from the fuse chart below. Carefully remove the grey colored fuse holder and re-insert it into the fuse carrier with the proper line voltage showing through the small window. Note that time delay or "slow blow" fuses are required.

Voltage and Fuse information		
CAM SETTING	LINE VOLTAGE	FUSE VALUE
110V~	100-120V~	250V~ T 250mA L
220V~	220-240V~	250V~ T 125mA L

AC POWER CORD

Connect the supplied AC cord to the iec power entry module on the rear panel of the m903. For safety, it is recommended that the cable be connected to a grounded outlet.

LOW VOLTAGE DETECTION

The m903 will automatically detect a low line voltage condition. In the event that line voltage drops below 85 VAC (for 100 -120 vac) or 170 VAC (200 – 220 vac), the m903 will switch into low voltage detection mode. In this mode both headphone and line outputs are muted, and the 7 segment led will begin to flash. The m903 will automatically store the states of any current output mutes and return to those states when power is restored.

Power-Up Sequence

The m903's headphone outputs are protected from any popping when the unit is turned on or off. However, if you are using the line outputs, observing proper power sequencing is recommended to avoid any potential popping in your speakers. Before powering up your m903, make sure your monitor speakers or power amps connected to your monitors are turned OFF. Once the m903 and the rest of your audio system are powered up, then turn on the power to your speakers or amplifiers. When powering down, first power OFF your speaker system and / or power amps and then power down the m903. *Turn power amps on last, turn them off first!*

Input Connections

The input / output / interface connections highlighted earlier in this manual are detailed below. Please contact us if you have any questions regarding cable terminations or pinout specifications.

BALANCED ANALOG INPUTS - The balanced stereo analog input is provided via female XLRs. Connection is made using standard balanced XLR cables. This input is wired to the pin 1 shield, pin 2 positive pin 3 negative XLR standard.

UNBALANCED ANALOG INPUT - This stereo input is provided for interfacing with consumer level (-10dBv) unbalanced analog sources. Connections are made using standard RCA cables.

AES3 DIGITAL INPUT - The stereo AES3 input is provided via one female XLR connector. This conforms to the AES3 standard. Use of high quality 110 Ohm balanced cable is highly recommended.

S/PDIF COAXIAL INPUT - Standard coaxial stereo digital input. The input impedance is 75 Ohms. Use a quality 75 Ohm cable for connections to this input.

TOSLINK INPUT - Standard stereo optical input connector for use with consumer devices. Use a standard TOSLINK optical cable for connections to this input.

USB INPUT - The stereo USB input for connection to a host computer. Use a standard USB type A -to- type B mini cable (included with your m903). The type A connector is to be plugged in to the HOST PC and the type B mini connector is to be used with the m903 input.

Output Connections

STEREO HEADPHONE OUTPUTS - Headphone outputs are provided via two ¼" TRS (Tip, Ring, Sleeve) jacks. These outputs are wired in parallel. Connection to headphones should be made using standard ¼" TRS stereo connectors.

UNBALANCED LINE OUTPUTS - A stereo pair of unbalanced line level outputs are provided via two RCA jacks. These outputs should be connected to powered speakers or power amplifiers using standard unbalanced RCA cables.

BALANCED LINE OUTPUTS - A stereo pair of balanced line level outputs are provided via two ¼" TRS jacks. These outputs should be connected to powered speakers or power amplifiers using standard balanced cables. Connection to an unbalanced input is also possible. See figure 1 and 2 below for proper termination.

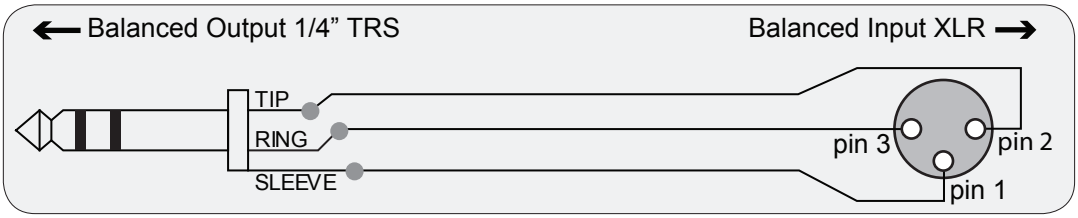


figure 1 balanced 1/4"TRS to XLR

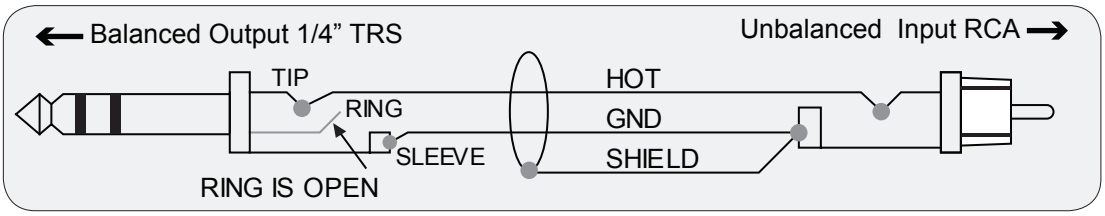


figure 2 balanced 1/4"TRS to unbalanced RCA

Selecting an Input Source

The m903 allows for selection from a variety of analog and digital input sources. The rotary input selector switch is used to choose the input source for both the headphone amplifier and line outputs.

ANALOG INPUTS - The m903 provides both balanced and unbalanced stereo inputs. To select either of these analog inputs, rotate the input selector to the desired input. When an analog input is selected, the m903's internal DAC is turned off.

DIGITAL INPUTS - The m903 provides the following digital input sources: AES3, S/PDIF, TOSLINK and USB. The AES3, S/PDIF and TOSLINK inputs support audio data with sample rates from 32kHz to 192kHz and 24 bits. The USB input supports audio data with sample rates from 44.1kHz to 192kHz with 24bit resolution.

m903 USB Input and Computer Audio Configuration

ASYNCHRONOUS AUDIO

The asynchronous mode USB converter in the m903 represents a significant improvement over any previous type of USB DAC. Previously, a USB DAC worked under standard adaptive mode USB audio, which means the DAC's clock would have to sync to the non-audio related computer USB buss master clock. As you can imagine, the computer has a lot else to do, so the incoming clock signal to which the DAC's clock would have to sync was not ideal and would result in unwanted jitter.

With asynchronous mode USB, the USB DAC becomes the master to which the computer's USB buss gets synced. So the computer is now synced to a crystal-based audio clock signal and the systems works with dramatically lower jitter. No phase-lock loop or sample rate conversion is necessary, which means bit-perfect playback from a computer with zero interface induced jitter. In addition, the USB port is completely ground isolated from the m903 audio ground. This eliminates the possibility of noisy computer grounds inducing any noise or impurity in the m903 audio circuits.

This asynchronous USB DAC code was developed by Gordon Rankin at Wavelength Audio. We, along with a select few other audio companies, have chosen to license this technology because it is simply the best computer audio playback technology available.

COMPUTER AUDIO REQUIREMENTS

Regardless of the type of computer you will use to playback audio from, it must have at least one available USB port. The m903 ships with a standard USB type A to type B mini cable. The type A connector plugs in to the computer and the type B mini connector to the USB m903 input.

The m903's asynchronous mode USB DAC supports standard driverless operation on MAC to 192kHz and on PC to 96kHz. For sampling rates above 96kHz, PC users will need to download and install a free driver on their computer. This driver can be found on our website -

http://www.gracedesign.com/support/support.htm

Driverless operation basically means 'plug and play'. The m903 will automatically show up in your computer's list of supported audio devices as 'Grace Audio Device'. In most cases, simply choose that as your audio playback device and the system will work.

Different operating systems may pose their own set of complications in setting up the m903 as the audio playback device. In the event that 'plug and play' operation does not occur, you will need to look at some specific setup variables for your OS. In this case, we will direct you to a very well written and comprehensive document by our friend and colleague Charles Hanson from Ayre Acoustics. http://www.ayre.com/usb.htm

This is an invaluable resource for computer/USB audio setup information for most current operating systems, and we strongly urge you to familiarize yourself with the information pertaining to your specific OS.

Another excellent resource is Wavelength Audio's website: http://www.usbdacs.com

In the event that you have any setup issues which aren't addressed by these resources, feel from to contact us directly at 303.443.7454 Monday through Friday 9 – 5, MST.

OPERATING THE HEADPHONE AND LINE OUTPUTS

Both the headphone and the line outputs feature precision level control from the front panel rotary encoder. Each output can be completely independent of the other in terms of level and balance control (see the setup menu section for further description of this feature).

The output selection indicator LED's show which output is currently under control by the volume control. To toggle the output control selection, simply press and release the rotary level encoder. You will see the selection indicator change. Note: two different modes can be used for toggling through each output level. The first (L1) has the 2 outputs 'ganged' together and they are controlled in unison, the second (L2) is a 'round robin' type, where the line output are controlled independently of each other. More information on these two modes is found in the set up menu section of this manual.

The volume encoder is used to adjust the level of both the headphone and line level outputs independently. The level of the currently selected output is displayed in the 7-segment display. Turning the encoder clockwise increases the output level and counter-clockwise decreases it.

The m903 features an extremely high precision analog volume control. Step size is 0.5dB and channel matching is within 0.05dB for all settings. Also, embedded within the volume control architecture is a 3 stage acceleration curve. The encoder has 24 posi-

tions. Turning it one revolution slowly will result in a change of 12dB (24 x 0.5dB). As the rotation speed increases, each step goes from 0.5dB to 2.0dB and then to 4.0dB. This allows not only precise control but also convenience when large volume changes are desired.

Any changes made are reflected in the 7-segment display. Level range is from 0.0 to 99.5. NOTE: The least significant digit's decimal point (.) is used to indicate 0.5dB increments

ABOUT S-LOCK™

s-Lock™ is our proprietary PLL (Phase Lock Loop) circuitry that has been specifically developed for the m903 and its big brothers the m904 and multi-channel controller, the m906.

When using the TOSLINK, S/PDIF, or AES2 digital inputs, the digital audio stream contains an embedded clock that can contain various forms of jitter. The s-Lock PLL will lock to this clock source and provide an extremely stable and ultra-low jitter clock to run the DACs.

s-Lock™ is a crystal-based PLL used for regenerating the incoming digital clock. The crystals used have extremely low intrinsic jitter and are capable of locking to sample rates of up to 192kHz. When the digital input selected for the DAC is active, the s-Lock circuitry automatically captures the incoming recovered clock from the AES3, S/PDIF, or TOSLINK connectors. Once phase-lock with the incoming signal has been achieved, the DAC's, which have been running off the original clock, are switched to run off the ultra-low jitter s-Lock system clock. If at any time s-Lock is lost or not achieved, the DAC's are run off the original clock. The s-Lock system can effectively lock to input sample rates of 44.1kHz or 48kHz +/- 5Hz, 88.2kHz or 96kHz +/- 10Hz and 176.4kHz or 192kHz +/- 20Hz.

If the incoming digital audio signal clock frequency is outside of these tolerances the s-Lock circuit will not lock and the s-Lock indicator on the m903 will extinguish. Even if the s-Lock does not achieve lock, the digital audio receiver circuits in the m903 can achieve excellent recovered clock jitter performance. Note that in USB mode, the m903 is the clock master so there is no need to "lock" to an incoming signal.

ABOUT X-FEED (CROSSFEED)

When listening to loudspeakers in a room, your left ear hears sound primarily from the left speaker (and vice versa) but also receives a signal from the right speaker at a lower level and with some time delay compared to the right ear. As well, the right speaker sound that reaches the left ear does not have a flat frequency response as the sound waves have traveled around the shape of your head before reaching your left ear. The brain uses delay, level and frequency response characteristics to process the location of a sound and hence, create an aural image.

When listening through headphones, each ear only hears the sound from one transducer and the mixing of signals between the ears does not exist. In this situation the brain is left without many of the psycho acoustic clues required to generate a properly distributed image and an accurate sound stage. The result is that instruments seem to cluster in the far left, far right or center of your head. Since the vital clues are absent, the brain has a difficult time deciding how to process the sounds coming from the headphone, which can result in listening fatigue when listening for extended periods of time.

The m903 contains circuitry which electronically simulates the signal crossfeed that occurs in a real acoustic space and helps the brain establish instrument locations across the entire sound stage. While it is difficult to perfectly model the very complex level, delay and frequency response characteristics of the head, the crossfeed circuitry in the m903 gives the brain some of the basic clues it needs and the result is a very pleasing simulation of an acoustic space.

After extensive research and listening to many different crossfeed circuits, we chose to license and implement an existing crossfeed circuit design called "The Natural Crossfeed Filter" which was designed by Jan Meier of Meier-Audio (www.meier-audio.de). This is an updated version of the crossfeed in the m902, which has slightly more pronounced effect and also gently compensates for the perceived loss of bass response with some program material.

Accessing And Using The Setup Menu

The m903 features a number of useful functions that can be accessed and adjusted using the setup menu feature.

To access the m903 setup menu, simply press and hold the front panel encoder knob for 3 seconds. Once the m903 has entered the setup menu, you will see the 7-segment display change to reflect the currently activated setup menu mode.

To navigate through the available setup menu items, simply rotate the encoder knob, which will scroll you through the available modes, either clockwise or counter-clockwise. Once the last mode is reached, continuing to rotate will loop you back to the first mode.

To exit the setup menu at any time, press and hold the encoder knob for 3 seconds. The 7-segment display will switch back to the current output level once the setup menu has been exited. *Note: When the setup menu is exited, the last mode you were in will be the first mode activated the next time you enter the setup menu. This allows quick access to the parameter you are currently adjusting.*

The setup menu is also accessible by the optional m903 infrared remote control. Please refer to the 'Remote Control Operation' chapter for a detailed description of how this works.

Following is each available setup menu option, in the sequence they appear.

BALANCE MODE

This provides individual left / right balance control of 6dB in 0.5dB increments for each available output (headphone, Line 1 and Line 2). To program balance settings:

1. Push and hold the rotary encoder to enter the setup menu, then rotate the encoder until you reach the balance settings, which are indicated as: bH for headphones, b1 for line output 1 and b2 for line output 2.
2. When you have reached the output you wish to adjust, push the encoder again to enter the balance setting.
3. When no balance offset has been made, both the left and right speaker symbols are shown in the 7-segment display.
4. Turning the rotary encoder clockwise results in a balance adjust to the right. This will be indicated by the right facing speaker symbol changing to the corresponding balance offset value.
5. Turning the rotary encoder counter-clockwise results in a balance adjust to the left. This will be indicated by the left facing speaker symbol changing to the corresponding balance offset value.
6. With each detent of the volume control the m903 alternates between adding .5dB to one channel and then subtracting 0.5dB from the other. This continues until one channel is 3dB louder and the other is 3dB quieter.
7. To store your balance setting for the selected output, push and hold the encoder. This will then send you out of the setup menu and back to the main level control screen.

The m903 stores all three balance level settings in non-volatile memory and recalls these upon each power up.

POWER UP LEVEL

This feature allows the user to save specific level settings for each output as the default power up level. While default levels are set to 0 at the factory, you may want to have the unit always power up at a specified level other than the default. To program power up level settings:

1. Push and hold the rotary encoder to enter the setup menu. Now rotate the encoder until you reach the power up level settings, which are indicated as: PH for headphones, P1 for line output 1 and P2 for line output 2.
2. When you have reached the output that for which you'd like to enter the power up level, push the encoder again to display the current power up level.
3. From here you can rotate the encoder to adjust the power up level.
4. From here, you can either push and hold to immediately store the level, which will then send you back to the main level control screen. Or, push the encoder once (without holding) to exit back to the first level of the setup menu, from where you can select and adjust another power up level. Note: This option does not store the power up level until you push / hold and exit back to the main level control screen.

OUTPUT TOGGLE LOCK OUT MODE

Situations may exist when you need to lock the output level select toggle function of the encoder to prevent inadvertent switching.

Example: A musician is using the m903 in a live application and the amplifier is on stage for adjustment during the performance. The m903 may down be out of sight, but within reach. If they accidentally hit the encoder button, the output would toggle and they would be left adjusting the wrong output.

1. Once this mode is enabled, pressing and releasing the encoder button no longer toggles the m903 through the 3 available outputs. Pressing and holding the encoder button will still allow the user to enter the setup menu. This mode is reset to OFF whenever the m903 is power cycled. To activate this feature:
2. Push and hold the encoder to enter the setup menu. Now rotate the encoder until you reach the output toggle lock mode, indicated by the OL symbol in the 7-segment display.
3. Pushing the encoder once turns the this mode ON, which is indicated by the decimal points illuminating in the O.L. symbol.

4 Turning the rotary encoder counter-clockwise turns this mode OFF, which is indicated by the OL symbol without the decimal points.

This mode is reset to OFF whenever the m903 is power cycled.

SELECTING USB CLASS 1 OR USB CLASS 2.

This setting determines the whether the m903 acts like a USB class 1 or class 2 audio device. USB class 1 audio mode supports playback of audio files with sample rates up to 96kHz. For playback of files above 96kHz, you will only need to use the setting for USB class 2 Audio. For complete details on how to configure your computer for playback over USB, please refer to the 'computer setup' chapter of this manual.

To change this setting:

5 Push and hold the rotary encoder to enter the setup menu. Now rotate the encoder until you reach the USB class select menu item, indicated by either the U1 or the U2 symbol in the 7-segment display.

6 Push and release the encoder to toggle between and select either mode. U1 indicates class 1 USB operation, while U2 indicates class 2 USB operation.

7 Push and hold the encoder to store the setting and exit the setup menu.

INFRARED REMOTE CONTROL ENABLE

This feature allows the user to disable the infrared remote control operation of the m903. The m903 remote control uses command codes that are quite obscure, but they are not proprietary. Should interference occur from another manufacturer's remote control unit, the remote control operation of the m903 can be turned off to prevent improper operation. The default for this setting is on (remote operation is enabled) and the current status is preserved whenever the m903 is power cycled. To change this setting:

1 Push and hold the rotary encoder to enter the setup menu. Now rotate the encoder until you reach the IR menu item

2 Push and release the encoder to toggle on or off the infrared control, which is indicated by the decimal points in the I.R. symbol illuminating (on) or extinguishing (off) .

3 Rotate the encoder to navigate to other setup menu items or push and hold to exit the setup menu

DISPLAY DIMMER MODE

The m903 features bright user interface designed to give you clear operational information. However, situations may exist when you want to turn off this display while keeping your unit running. This is possible with the display dimmer mode. With the display dimmer enabled, all the light on the front panel will extinguish after 4 seconds of inactivity. Any change made by the user or system change (sample rate or s-Lock status) will turn the displays back on for 4 seconds, then again extinguish. Note: the status of the display dimmer feature mode retained whenever the m903 is power cycled. To change this setting:

1 Push and hold the rotary encoder to enter the setup menu. Now rotate the encoder until you reach the dd menu item.

2 Push and release the encoder to toggle on (indicated by the decimal points in the d.d. symbol turned on) or off.

3 Rotate the encoder to navigate to other setup menu items or push and hold to exit the setup menu.

LEVEL OFFSET ADJUST

With three independently controlled analog outputs (headphones, line 1 and line 2), the m903 is designed to function as a high performance monitor controller for the professional studio or any type of playback scenario. To enhance its flexibility in integrating into any playback setup, each output level can be offset by +/- 9.5 dB in .5 dB steps. To adjust each output level offset setting:

1 Push and hold the rotary encoder to enter the setup menu. Then rotate the encoder until you reach the 3 level offset menu items, labeled oH (headphones), o1 (line 1) and o2 (line 2).

2 Once you are at the outputs who's level offset you wish to change, push and release the encoder to enter the offset level readout.

3 Rotate the encoder clockwise to increase the offset (0 to 9.) or counterclockwise (0 to -9.) to decrease offset. Note: the decimal point indicates the .5 dB stop between numbers.

4 Once you have set your level offset, push and release the encoder to store the setting and return to the setup menu, or push and hold the encoder to exit the setup menu.

MONO MODE

This feature sums the left and right channels on every set of outputs. Quite useful for checking for phase and balance issues in mixing and mastering. Or listening to Beatles records as they were originally mixed. To activate mono mode:

1. Push and hold the rotary encoder to enter the setup menu. Then rotate the encoder until you reach the mono mode screen, as indicated by the [ ] symbol.
2. Push and release the encoder to activate mono, which will be indicated by the illuminated decimal points [.].
3. Once you have activated (or deactivated) mono mode, either rotate the encoder to advance to the next setup menu item, or push and hold the encoder to exit the setup menu.

CROSSFEED MODE (X-FEED)

Please refer to the detailed description of this feature earlier in this manual. Crossfeed is only applied to the headphone outputs. This feature is toggled on and off in the setup menu, and its current status is preserved whenever the m903 is power cycled. To activate:

1. Push and hold the rotary encoder to enter the setup menu. Then rotate the encoder until you reach the crossfeed mode screen, as indicated by the letters CF.
2. Push and release the encoder to activate crossfeed, which will be indicated by the illuminated the decimal points C.F.
3. Once you have activated (or deactivated) crossfeed, either rotate the encoder to advance to the next setup menu item, or push and hold the encoder to exit the setup menu.

LINE OUTPUT MODE

The rotary encoder is used to select and adjust the volume of the three available sets of outputs (headphones, line 1 and line 2). Depending of the output mode selected here, the two line outputs can either be selected and controlled independently of each other, or they can be grouped together and controlled in parallel. These options depend on how your m903 is installed – you may want to send the identical, parallel line outputs to two different input destinations (power amp, powered monitors, headphone distribution etc..). Or you may want independent control of two different sets of monitors (mains and nearfields).

One interesting possibility for having the two line outputs grouped is a simple 2.1 monitoring setup - send one set to your monitors and the other to a subwoofer. Use the level offset feature to trim either set of outputs accordingly.

To select between the two line output modes:

1. Push and hold the rotary encoder to enter the setup menu. Then rotate the encoder until you reach the two line output mode options, as indicated by the letters L1 or L2.
2. Push and release the encoder to toggle between either mode, which again we be indicated by the letters L1 or L2. L1 is what refer to as 'grouped' operation, where both line outputs are selected and adjusted together in unison. L2 is what we call 'round robin, where each line output is selected and adjusted independently of each other.
3. Once you have selected the mode you require, either rotate the encoder to advance to the next setup menu item, or push and hold the encoder to exit the setup menu.

EXCLUSIVE OUTPUT MODE

This mode allows you to toggle between all three outputs and mute the output not selected. The exclusive output mode can be very useful when referencing between the line outputs (controlling your speakers) and your headphones. Instead of having to manually mute or turn down the volume when toggling between outputs, this mode handles it automatically. Once enabled, selecting either line output turns that output on at its set volume and mutes the headphone outputs. Selecting the headphone output turns this output on at the set volume and mutes the line outputs. Note: the exclusive output mode is saved anytime the m903 is power cycled. To activate exclusive output mode:

1. Push and hold the rotary encoder to enter the setup menu. Then rotate the encoder until you reach the exclusive output mode option, as indicated by the letters EO.
2. Push and release the encoder to toggle on, which will be indicated by the illuminated the decimal points E.O. (push and release again to toggle off)
3. Once you have selected the output mode you require, either rotate the encoder to advance to the next setup menu item, or push and hold the encoder to exit the setup menu.

Infrared Wireless Remote Control Operation

A optional high quality wireless remote control is available as a very convenient control for the m903. The following section details all of the features available from the remote control. Several of the buttons on the remote have dual functions, accessed by either a 'push' or a 'push and hold' action, and are described below. To activate an m903 for use with a remote control please refer to the 'infrared remote control enable' procedure in the 'accessing and using the setup menu' chapter of this manual. The factory default setting is active

MUTE (PUSH) - Pushing and releasing this button toggles the mute setting for the currently selected output on the m903. Once engaged, active mute status will be reflected by the 7-segment display flashing on and off in regular intervals.

To disable muting simply press the mute button again. The output will return to the current level setting and the display will return to solid.

In addition to pushing the mute button, mute can be turned off by making any volume change (on remote control or on the m903 itself).

MUTE (PUSH AND HOLD) Pushing and holding the mute button will toggle the exclusive output (EO) setting and will exit you from the submenu mode. The current exclusive output status will be displayed momentarily on the m903 display.

X-FEED (PUSH) - Pushing this button toggles the x-feed status on the m903. The current x-feed status will be displayed momentarily on the m903 7-segment display, as well as by the dedicated x-feed LED to the right of the volume control. Also, pressing the x-feed button while in the setup menu will return the m903 to normal operation.

PHONES/LINE (PUSH) - Pushing and releasing this button during normal operation toggles between the 3 available outputs (phones, line 1 and line2). The newly selected output indicator LED will illuminate and its corresponding level will be displayed on the 7-segment display.

PHONES/LINE (PUSH AND HOLD) – Pushing and holding this button enters the m903 setup menu. From here you can control the setup menu in the same way as from the front panel volume encoder, only with the volume up / volume down buttons used to scroll, and a single push of the PHONES/LINE button serving as the 'enter' switch. Please refer back to the previous chapter 'accessing and using the setup menu' for detailed information on how to navigate the setup menu.

Pushing and holding the PHONES/LINE button again will store all changes made and exit the setup menu.

BALANCE - Pushing this button will directly enter balance mode option. From here, pushing the volume up button will adjust the left (vol down) and right (vol up) balance. Conversely, pushing the volume down button will adjust the right (vol down) and left (vol up) balance. These changes are indicated by the right or left facing speaker symbol changing to the corresponding balance offset value. Please refer back to the previous chapter 'accessing and using the setup menu' for a more detailed description of adjusting the balance setting.

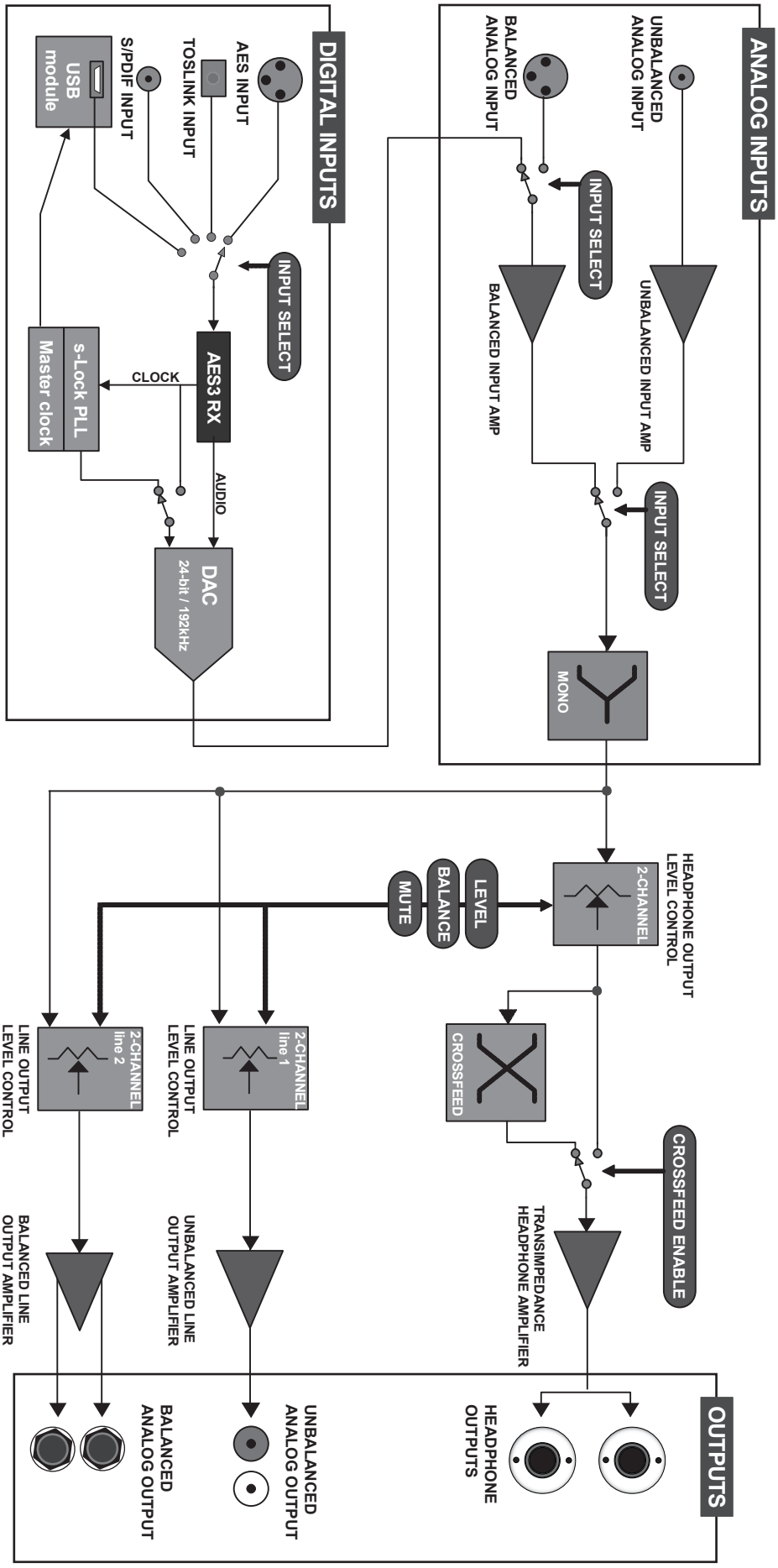
Pressing this button while the m903 is in balance mode will exit the user from the sub-menu and balance mode.

BALANCE (PUSH AND HOLD) – Pushing and holding the balance button during normal operation will toggle the MONO mode feature of the m903. This setting simply sums the left and right channels of all outputs together. When MONO mode is active, the 7-segment display no longer displays the current output level numbers and shows two large facing brackets. Pushing and holding again returns the m903 to normal stereo operation, as indicated by the brackets changing back to the current output level numbers.

VOLUME UP / VOLUME DOWN - In normal operation pressing the volume up or down buttons will change the selected m903 output level respectively in 0.5dB steps. Also, pressing the volume up or down buttons while the selected output is muted will unmute the output. NOTE: Pushing and holding the Volume up / down buttons results in continuous volume changes. The longer a button is held the quicker the volume level changes.

If the setup menu has been entered by pushing and holding the PHONES/LINE button, the volume up and down buttons are used to scroll through the available setup menu items.

Block Diagram



Specs

SPECIFICATIONS ANALOG IN	
Gain – Balanced Input	
Headphone output, volume at maximum	0dB
Balanced Line output, volume at maximum	+4dB
Unbalanced Line output, volume at maximum	-8dB
Frequency Response – Unbalanced In > Unbalanced Out	
@ 0dBu out +/- .25dB	27Hz – 54kHz
@ 0dBu out +/- .5dB	18Hz – 80kHz
@ 0dBu out +/-3dB	6.5Hz – 226kHz
Maximum Input Level	
Balanced Input	+22dBu
Unbalanced Input	+16dBu
Maximum Output Level	
Unbalanced output @1kHz, 100k Ohm load	+21.5dBu
Balanced output @1kHz, 100k Ohm load	+27dBu
Headphone output @1kHz, 50 Ohm load	+20dBu
Impedance	
Balanced Input	106K Ohms
Unbalanced Input	53K Ohms
Balanced Output	95 Ohms
Unbalanced Output	47.5 Ohms
Headphone Output	1.2 Ohm
Dynamic Range	
@ 0dB gain, Balanced In > Balanced Out	117dB
@ 0dB gain, Balanced In > Headphone Out	116dB
THD+N Balanced Input	
Headphone Out @ +10dBu, 50 Ohm load, SMPTE 4:1	<0.020%
Headphone Out @ +10dBu, 50 Ohm load	<0.0060%
Unbalanced Line Out @ +10dBu, 100k Ohm load	<0.00026%
Balanced Line Out @ +20dBu, 100k Ohm load	<0.00036%
Attenuator	
Channel matching	<0.05dB
Attenuator Range	97.5dB
Output Noise Floor, Balanced Input	
Balanced Output, volume at maximum, 22-22kHz	-90dBu
Balanced Output, volume at minimum, 22-22kHz	-103dBu
Unbalanced Output, volume at maximum, 22-22kHz	-101dBu
Unbalanced Output, volume at maximum, 22-22kHz	-105dBu
SPECIFICATIONS D/A CONVERTER	
Input Sample Rate	32, 44.1, 48, 88.2, 96, 176.4, 192kHz
THD+N	
44.1kHz, 24bit, 1kHz, -1dBFS, Unbalanced Out @ +15dBu	<0.0009%
44.1kHz, 24bit, 1kHz, -1dBFS, Balanced Out @ +15dBu	<0.0006%
OUTPUT LEVEL	
Unbalanced Output @ 0dBFS, Volume at maximum, trim at 0	+9dBu
Blanced Output @ 0dBFS, Volume at maximum, trim at 0	+21dBu
POWER REQUIREMENTS	
120VAC	0.16A
230VAC	0.08A
DIMENSIONS AND WEIGHT	
Dimensions	H1.7" x W8.5" x D8.25"
Weight	5 lbs (2.2kg)

Cleaning and Maintenance

Your m903 chassis is constructed out of high quality stainless steel. Under normal circumstances, virtually no maintenance is required to keep the unit looking shiny and new. However, if your unit becomes smudged or dirty, here are some cleaning tips: We recommend using either Pledge furniture polish or Zep brand stainless steel cleaner (available at the hardware store). Apply cleaner to a clean, dry, lint free cloth and gently wipe all stainless surfaces, taking care not to allow the cleaning product to build up around the panel switches or knobs.

Warranty Information

1 Grace Design warrants all of our products to be free of defective parts and workmanship for a period of five years. This warranty period begins at the original date of purchase and is transferable to any person who may subsequently purchase the product during this time.

2 This warranty excludes the following conditions: normal wear and tear, misuse, customer negligence, accidental damage, unauthorized repair or modification, cosmetic damage and damage incurred during shipment.

3 During the time of this warranty, Grace Design will repair or replace, at its option, any defective parts or repair defective workmanship without charge, provided the customer has appropriate proof of purchase and that the product has its original factory serial number.

4 In order for Grace Design to provide efficient and timely warranty service, it is important that you mail the completed warranty registration card enclosed with all of our products within 10 days of the original date of purchase. You may also register your product directly with Grace Design by telephone (303-443-7454 Monday-Friday 9:00am to 5:00pm MST), or you can register your product online at www.gracedesign.com.

5 This warranty is in lieu of all other warranties whether written, expressed, or implied, INCLUDING ANY WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

6 In no event will Grace Design be liable for lost profits or any other incidental, consequential or Exemplary damages, even if Grace Design is aware of the possibility of such damages. In no event will Grace Design's liability exceed the purchase price of the product

7 This warranty gives the customer specific legal rights. The customer may also have other rights, which vary from state to state. Some states do not allow limitations on implied warranties or consequential damages, so some of the limitations of the above may not apply to a particular customer.

Manual Revisions

Revision	Page	Change	Date	Initials
A		Initial release	12/20/2010	edg