

Radiance
Phonograph Preamplifier



by

belleson

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What's in the Box

- Radiance
- User manual
- RCA cable
- Wifi antenna
- AC line cord (IEC)
- Bamboo stick to change rear ground switch

Rear Panel



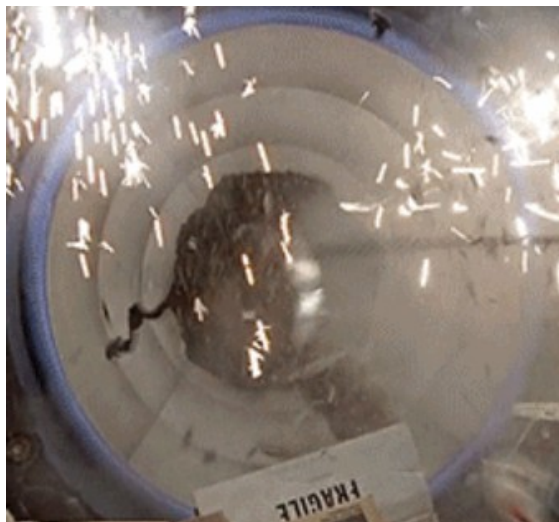
Figure 1: Rear panel connectors and switches

- **AC 115V/220V**
Power cord connection, accepts 115V or 230V AC
- **Off/On**
Switches main power on/off
- **Wifi Ant**
Screw the included antenna on until finger tight
- **TT Gnd**
Connect turntable ground wire here, tighten under knob
- **BAL/SE switch (set this before connecting RCA cables)**
Push *in* to ground the shield side of inputs, usually *in* for MM and *out* for MC cartridges. Use the wide end of a broken tooth pick to actuate.
- **Output**
RCA cable to preamplifier or integrated amplifier
- **Input**
RCA cable from turntable

Quick Start

A Cautionary Note 🎵

All phono stage preamplifiers have, by necessity, a lot of gain. The tiny input signal from a phono cartridge is multiplied by as much as 3000 at the output. For example, if you touch the input connectors of an active phonograph preamplifier, you inject a few millivolts of hum that will propagate through your audio system to become a *very* loud sound in your speakers.



Radiance has safeguards

We have engineered Radiance with utmost care to prevent these events. To prevent turn-on “thumps” in your system, Radiance has a software controlled power-on sequence to prevent any transients until everything is stable. First, the control system is activated, then outputs are muted (disconnected), then power is applied to the analog electronics, and finally after everything is stable and quiet, outputs are activated. This sequence takes about 10 seconds.

Radiance is shipped with gain set to minimum. We recommend turning any other volume/gain controls to minimum before applying power. And any time you change connections to Radiance, turn your system off or set all volume controls to minimum. Increase volume gradually and listen for hum or other undesired sounds. For a magnetic cartridge, set the rear panel BAL/SE switch to be “pushed in” for single-ended (SE) connection. (See figure 1)

After everything is connected, power up your system in this order:

- 1 turntable
- 2 Radiance
- 3 preamplifier (if you use one)
- 4 power amplifier, receiver, integrated amp or powered speakers

Connections

- 1 turn off the audio system
- 2 turn off Radiance **Off/On** switch where button extends 1/8” (~3mm) from rear panel
- 3 connect Radiance power cord and plug into wall
- 4 screw the Wifi antenna onto the rear connector
- 5 use a blunt toothpick to set MC/MM recessed button to match your cartridge
(*not pressed* = MC for low output <5mV, *pressed in* = MM for high output cartridge)
- 6 connect phono ground wire to **GND** screw lug (some turntables do not have one)

- 7 connect phono cable from turntable to **Input** RCA connectors, paying attention to **Left** and **Right** ***BE CAREFUL HERE—if you connect your cartridge to OUT and apply power, it may damage the cartridge!***
- 8 connect RCA cable to **Output**, then to preamplifier or integrated amplifier high level input (typically **AUX**)
- 9 turn power on from the rear panel button and allow 10 seconds for Radiance to stabilize and outputs to activate
- 10 Radiance is now ready for setup from the remote Wifi controller

Wifi Hifi operation

- 11 With a computer, a cellular phone or a wifi enabled tablet, go to *Settings* > *Connections*
- 12 Choose *Radiance* network. It will request the network password. The serial number on the rear of your Radiance is the password for the internal network, which is _____. When it asks if you want to stay connected, choose "Don't ask again" and select "Yes"¹



Figure 3: Main controls

- 13 Open a browser (Firefox, Safari, Edge, Chrome, Opera, Vivaldi, etc.) and navigate to URL <http://belleson.int>
- 14 You will see the Wifi Hifi user screen.
 - 14.1 Click the gear icon to open **Settings** panel, select **MM** or **MC** gain range for your cartridge
 - 14.2 return to main control panel
 - 14.3 set **Gain**, **R Load** and **C Load** based on recommendation of cartridge manufacturer
- 15 Put a record on the turntable, have a seat in your listening chair, adjust **Gain**, **C Load** and **R Load** to your taste, relax and enjoy your music.
- 16 When you are happy with adjustments, return to **Settings** panel and click the lock to freeze controls (optional)
- 17 See the section Wifi Hifi below to connect Radiance to your local network (LAN)

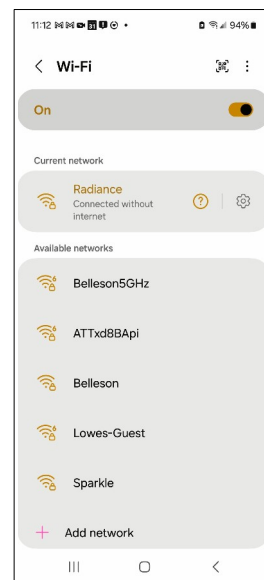


Figure 2: Connecting to Radiance internal network

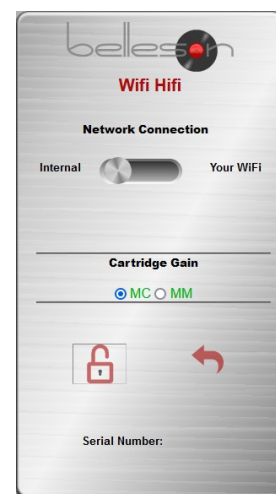


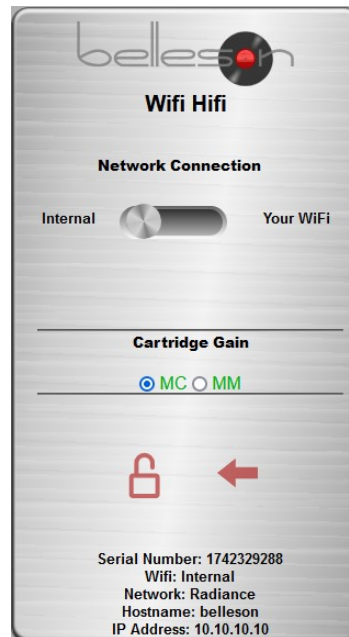
Figure 4: Settings

¹ **Security:** The Radiance internal network is secure because it does not connect to the internet. If you connect to this network from a tablet or phone, you may get a warning like "cannot connect to the Internet, do you wish to stay connected?" Check the box that says "Don't ask again" and select "Yes." There is no possible mischief because no one can connect to this network except you, using the unit serial number as your network password key.

Description

Radiance was designed from day one as a no-compromise phonograph amplifier. Audio electronics design expert Stewart Yaniger has said "good phono stage design is one of the hardest problems in audio electronics."² So making a state of the art phono preamp like Radiance was no trivial undertaking and the multi-year journey made the final result all the more satisfying.

Wifi Hifi makes listening easier



The main control screen has up/down buttons to make turning the knobs easier. The settings screen shows network information.

You can find technical details in our web site or white paper(s) so we'll skip that. Suffice it to say that we consider the end result a masterpiece of electronic design with no compromises. Instead we mention some of the benefits you hear (or don't hear)...

- All inputs are balanced, with high input impedance and very low noise. At the highest gain setting (an amplification factor of over 30 000 at 20Hz), low noise is very important and Radiance noise is lower than the noise contributed by the vinyl itself.
- Capacitive and resistive loading are remotely switchable so you can sit in your listening chair to evaluate the proper load for your cartridge. There is no need to shut off the phono preamp, get out of your chair and fiddle with little rear panel switches, no adding components via screw terminal or worse, opening the case to change loading. The remote control also allows setting gain and even changing from moving magnet (MM) to moving coil (MC) gain ranges. Once everything is set, you can lock the settings to prevent accidentally changing them.
- Input gain can be set for MM or MC, and its load settings saved and updated when power is shut off.
- There is a mute (via remote control), in case you need to take a call or converse with someone.
- Radiance uses 40 optically isolated analog switches (we named them Octal Opto) to control capacitive and resistive cartridge loading, gain and cartridge type (MC/MM) switching. Some of the

2. <https://audiosciencereview.com/forum/index.php?threads/headroom-in-phono-preamps.6760/post-154583>

Octal Optos disconnect the outputs whenever anything is switched, to mute any switching transients. You may hear a very faint “click”, nothing more.

- Radiance is direct coupled from input to output because a direct coupled signal path (with no coupling capacitors) delivers the deepest, tightest, most chest thumping bass reproduction. Direct coupling also amplifies any DC offset; Radiance uses a servo correction loop to null DC offset and make direct coupling possible.
- Servos, because they operate at very low frequency, have long stabilization times at power on. Belleson solved that by adding a unique hardware servo accelerator that keeps the start-up transient small and allows fast settling. You get the best of both worlds—bone-rattling bass with no turn-on thumps.
- The Radiance remote control is a browser based app, so it runs on any device with a web browser. A tablet is included and already connected, so you can open the box, plug it in and listen to your vinyl.
- Wifi Hifi also can be connected into your local wifi network, so you can control Radiance from your own tablet, from your phone or from your music server where your other music services are running (e.g. a music server).

Wifi Hifi

Connecting to your local network (LAN)

Radiance is controlled via **Wifi Hifi**, a web browser app, which can be accessed from any device—a tablet, a cell phone, a computer. *The only requirement is that the device and Radiance are on the same network.* When you first power up Radiance, it starts its own network. The **Quick Start** section above describes how to use the remote control when connected via the internal network.

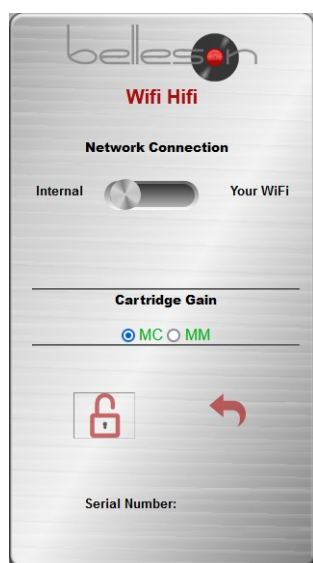


Figure 5: Internal connection

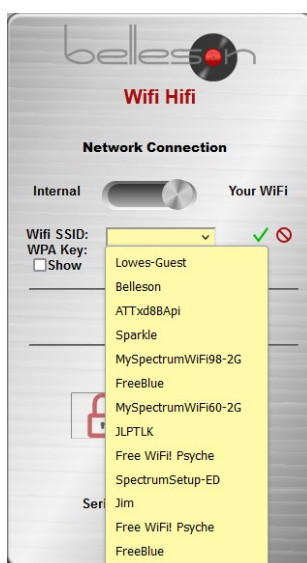


Figure 6: Your Wifi selection

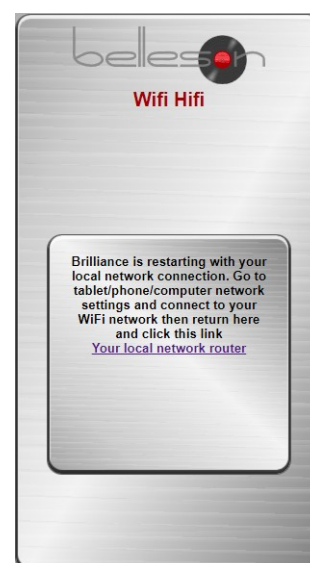


Figure 7: Message with link to LAN

You may already have an audio system on a local network and you want to access Radiance from there. No problem! Just connect Wifi Hifi to your local area network (LAN):

1. Using the Wifi Hifi controller, click the Settings button  to open the settings configuration page
2. Move the Network Connection switch to **Your WiFi**

3. A drop-down list of available networks will appear
4. Choose your network
5. Enter your network WPA key (network password)
6. Click the green check mark  to save the network setting. This will restart Radiance and show a message with a link
7. Go to the tablet/computer/phone *network settings* and connect to the same network
8. Return to Wifi Hifi in the browser and click the link in the message to reopen the control panel.

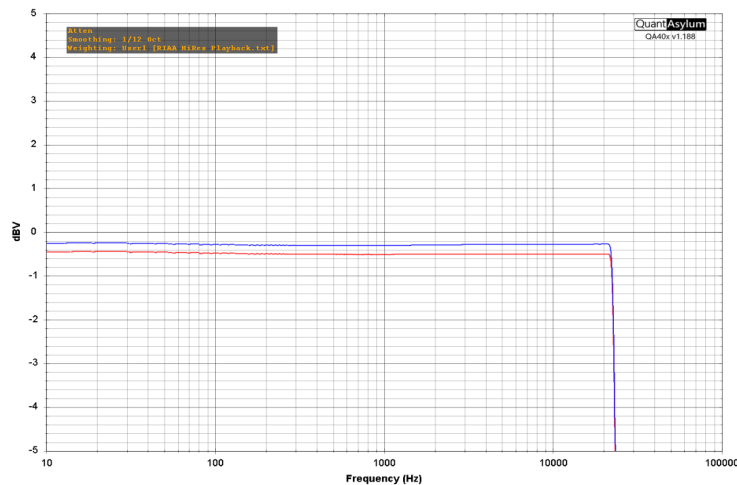
You should see the remote control in the browser, and when the controls appear you are ready to play music. Now open any browser on your network and enter <http://belleson.lan> to control Radiance. When a setting changes, it updates on all connected browsers.

Reconnecting to the internal network

To clear the connection to your LAN and return to the internal network, go to the Settings page and click the red international "NO" symbol . This reverts Wifi Hifi to the internal network and reboots the software. Go to Network Settings on your browser device, connect to "Radiance" network. After it connects, return to Wifi Hifi and click the link, or on a browser page enter URL <http://belleson.int>.

Specifications

Frequency Response	>100kHz, as high accuracy RIAA in two active stages. See graph below
RIAA Response	± 0.2 dB from 20Hz to 20kHz
Distortion (THD)	0.005% THD @ 5mV input, 50dB gain
Maximum Output	27Vpk-pk
Input Impedance (software selectable)	0pF to 750pF in 50pF steps
Input Impedance (software selectable)	20 Ω , 65 Ω , 110 Ω , 260 Ω , 350 Ω , 400 Ω , 47K Ω
Unweighted Noise (Equivalent input noise)	200nV rms, -88dB ref. 5mV, -132 dBu
Unweighted Input Noise Density	3nV/ $\sqrt{\text{Hz}}$ @ 20Hz, 1.4nV/ $\sqrt{\text{Hz}}$ @ 1kHz
Dynamic Range	>100dB at <1% THD
Signal to Noise Ratio (MC)	>87 dB (IHF A-weighted), >67 dB (unweighted)



All graphs are RIAA compensated mathematically post-measurement

Figure 8: Radiance frequency response and RIAA compliance

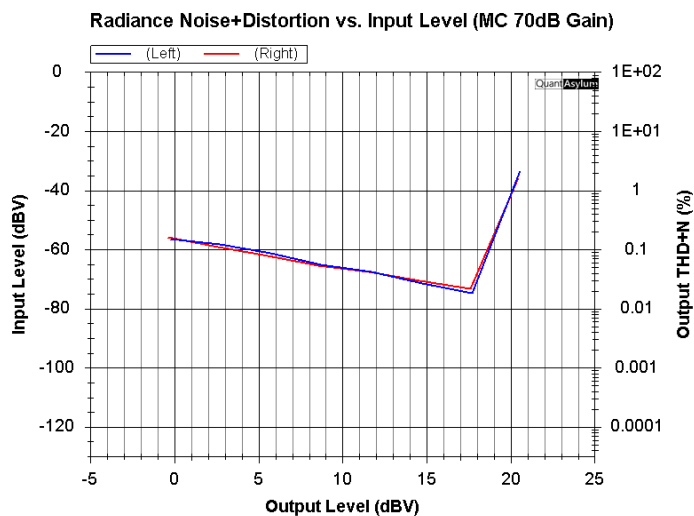


Figure 9: Radiance THD vs input level

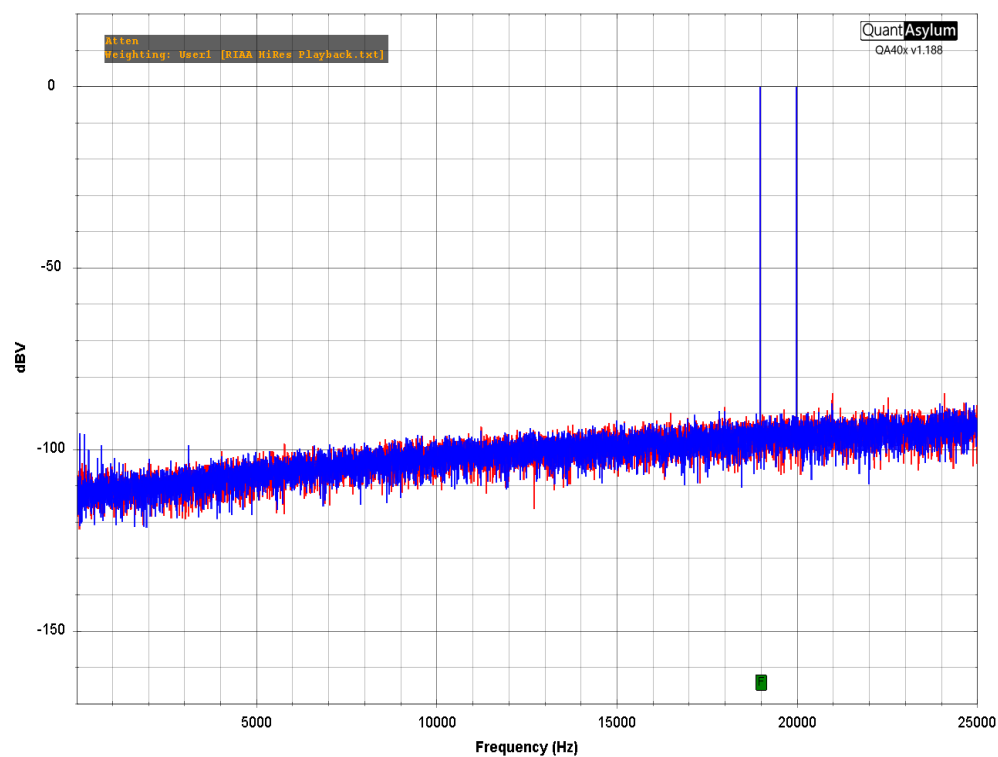


Figure 10: Radiance 19kHz+20kHz IM distortion @ 50dB MM

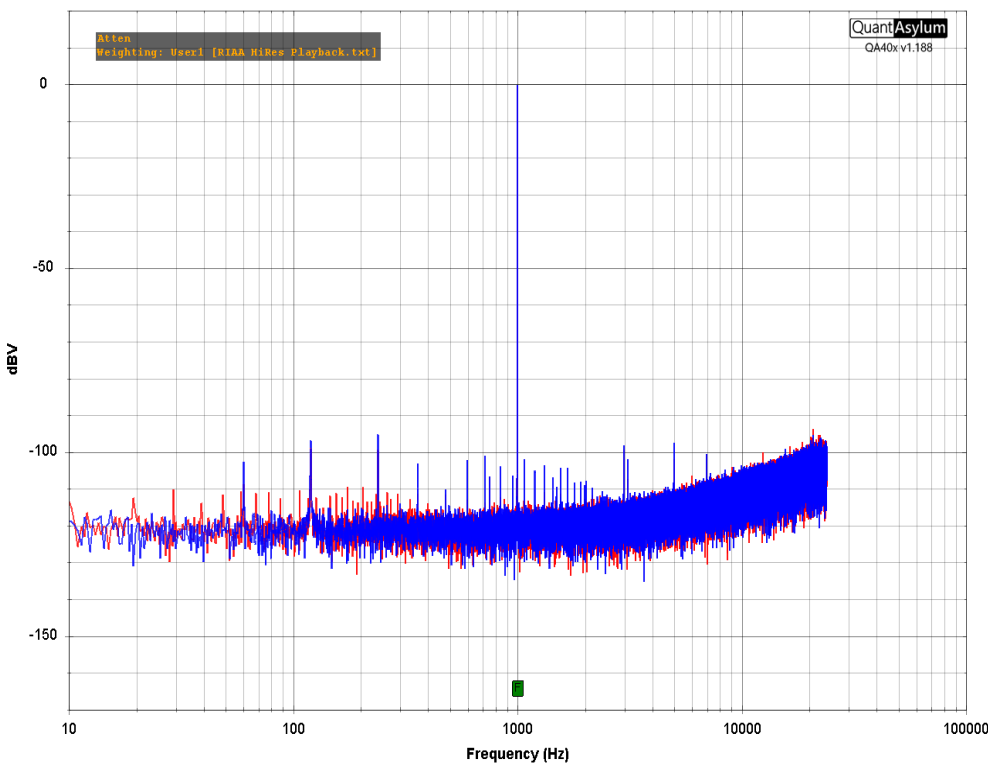


Figure 11: Radiance 1kHz distortion @ 50dB gain MM

How we do what we do

We...

- design, build, package and ship our products in South Carolina, USA
- build our custom designed two sided Bel amp and Octal Opto circuits
- write our Wifi Hifi user interface software
- use our patented Superpower voltage regulators
- use silver plated OFC wire and silver alloy solder
- use silver plated connectors and RCA cable
- design our web site in-house
- process our orders in-house
- don't wrap everything in plastic
- use RoHS qualified components and solder
- reuse packing material

Warranty

Belleson audiophile products are backed by a 3 year warranty. This includes parts and labor for repair or replacement of internal components or of the full product, as determined by Belleson after evaluation of the product. Customers are responsible for shipping to and from Belleson factory, and for adequate packing and insurance.

Products that are non-functional due to modification or physical damage are not covered by this warranty and can be repaired after a discussion with customer.