# Brilliance

## Phonograph Preamplifier


by

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## 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.


### *Brilliance has safeguards*

We have engineered Brilliance with utmost care to prevent these events. The outputs are muted (disconnected) for five seconds when it comes out of standby mode into active audio playback, when input, gain or load is changed. Even so, before turning on power we strongly recommend connecting everything, especially inputs, outputs and the turntable ground wire.

Brilliance 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 Brilliance, 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: Rear panel connectors and switches)

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

1 Turntable
2 Brilliance
3 Preamplifier (if you use one)
4 Power amplifier, receiver, integrated amp or powered speakers

## Quick Start


Figure 1: Rear panel connectors and switches

### *Rear Panel*

- **120V/240V**
  Set to wall voltage, usually 120V for USA, 240V for most anywhere else
- **AC Input**
  Power cord connection
- **Main Power**

Switches main power on/off

- **Wifi Antenna**
  Screw the included antenna on until finger tight
- **XLR outputs**
  Balanced output connectors to preamplifier or integrated amplifier
  *DO NOT USE BOTH XLR and RCA OUTPUTS AT THE SAME TIME*
- **RCA outputs**
  Single ended output connectors to preamplifier or integrated amplifier
- **BAL/SE switches**
  Push in to ground the shield side of inputs ONE and/or TWO, usually *in* for MM and *out* for MC cartridges. Use the wide end of a broken tooth pick to actuate.
- **RCA inputs**
  Connectors for RCA cables from turntable
- **XLR inputs**
  Connectors for XLR cables from turntable
- **Ground lug**
  Attach ground wire from turntable

## *Connections*

1. Connect the power cord
2. Connect phono cables to inputs ONE or TWO or both (for two turntables or tone arms)
3. Connect phono ground to ground lug
4. Screw the antenna onto the rear connector
5. Turn it on from the MAIN POWER switch, so the LED on the front button is pale blue
6. Brilliance is now in stand-by mode and the internal Wifi Hifi server is active. Get the included tablet to access the control panel.
   Tablet is set up initially connected to the Brilliance internal network.

## Using Brilliance

1. Start the tablet by holding down the power button on top or right side of tablet
2. Open the browser and navigate to URL http://belleson.int
3. You will see the Wifi Hifi user screen.
4. Press the blue power button, wait 5 seconds until the controls are active (you will see a count down and hear some relays click)
5. Open **Settings** panel  , set both inputs to desired **MM** or **MC** gain range
6. return  to main control panel
7. choose input (One or Two)
8. set **Gain**, **R Load** and **C Load** based on recommendation of cartridge manufacturer
9. 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.
10. When you are happy with adjustments, return to **Settings** panel and click the lock to freeze controls.
    See the section **Wifi Hifi™** below to connect Brilliance to your local network (LAN)


Figure 4: Stand-by mode


Figure 2: Active mode

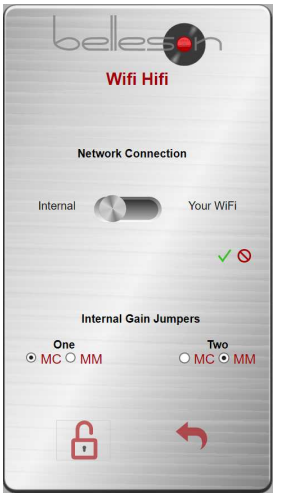


Figure 3: Settings panel

# Controls and Buttons

## *Audio Controls*

| | | |
|---|---|---|
|  | Front panel<br>Stand-by/Active | When power is on, this is pale blue in stand-by mode and pale green in active mode. Same as the Stand-by/Active button in Wifi Hifi remote. |
|  | Remote control<br>Stand-by/Active | When power is on, this is pale blue in stand-by mode and pale green in active mode. Same as the Stand-by/Active button on front panel. |
|  | Input selector | Choose from input pair ONE or input pair TWO. Gain range for each is configured in Settings screen. |
|  | Gain | Sets gain for the selected input pair:<br>MC gain settings are 50, 56, 64, 70 dB<br>MM gain settings are 30, 36, 44, 50 dB |
|  | Capacitive loading | Choose input load capacitance from 0pF to 750pF in increments of 50dB. Setting does not include input (turntable) cable capacitance. |
|  | Resistive loading | Choose input load resistance values of<br>20, 65, 110, 150, 260, 300, 350, 400 Ohms for MC<br>47k for MM |
|  | Wifi reconnect | If controls are not working, click here to reconnect to network. Controls should refresh. |
|  | Mute | Silences output from Brilliance. |

## Settings Controls

| | | |
|---|---|---|
|  | Settings | Opens Settings to allow changes to network or MC/MM configuration. |
|  | Network selector | In Settings, connect to Brilliance internal network or your local area network (LAN) |
|  | Moving coil<br>moving magnet selector | In Settings, choose low gain range for moving magnet cartridge, or high gain range for moving coil cartridge. Inputs ONE and TWO are set independently and remembered for each input pair. |
|  | Control lock/unlock | Allows Gain, C Load and R Load controls to be locked to prevent accidental changes. |
|  | Back to Audio Controls | Return from Settings to main control panel |

## Description

Brilliance 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."[1] So making a state of the art phono preamp like Brilliance was no trivial undertaking and the journey made the final result all the more satisfying.

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 3000), low noise is very important and Brilliance 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.
- Two independent inputs are available, and either can be set for MM or MC. Each input pair has its own load settings that are saved and updated when input selection changes.
- There is a mute (via remote control), in case you need to take a call or converse with someone.
- Brilliance uses 80 optically isolated analog switches (we named them Octal Opto) to control capacitive and resistive cartridge loading, gain and cartridge type (MC/MM) switching. High gain also can amplify switching noise to a point where it is annoying or even dangerous for

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

amplifiers and speakers. Some of the Octal Optos disconnect the outputs whenever anything is switched, to mute any switching transients. You may hear a very faint "click", nothing more.

- Brilliance 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; Brilliance 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 Brilliance remote control (called **Wifi Hifi**) 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 Brilliance from your own tablet, from your phone or from your music server where your other music services are running.
- Brilliance has two modes, stand-by and active. In stand-by mode, only the control system is functional and power consumption is very low. In active mode the audio circuitry is energized and music plays.

## Wifi Hifi™

### *Connecting to your local network (LAN)*

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

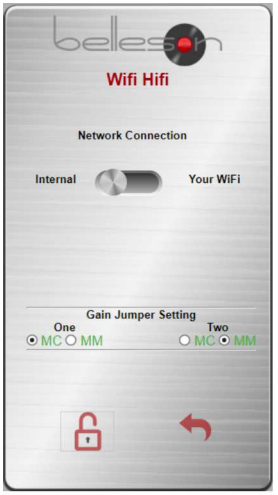


Figure 5: Internal connection

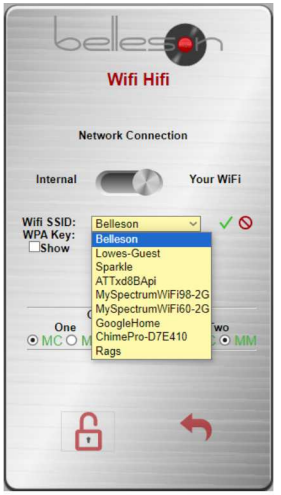


Figure 6: LAN Wifi list

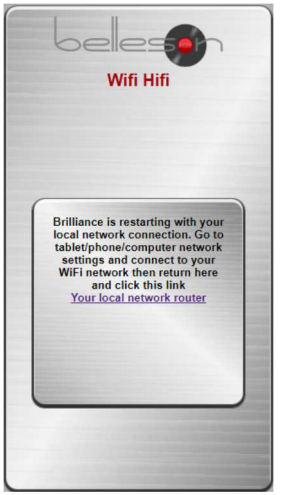


Figure 7: Message with link to LAN

You may already have an audio system on a local network and you want to access Brilliance from there. No problem! Just connect Wifi Hifi to your local area network (LAN):Using the Wifi Hifi controller, click the Settings button to open the settings configuration page:

1. Move the **Network Connection** switch to **Your Wifi**
2. A drop-down list of available networks will appear
3. Choose your network
4. Enter your network **WPA Key** (network password)
5. Click the green check mark to save the network setting. This will restart Brilliance and show a message with a link
6. Go to the tablet *network settings* app and connect the tablet to the same network
7. Return to Wifi Hifi and click the link in the message to reopen the control panel.

You should see the remote control in the browser. Click the blue power button. Wait for the 5 second timer, and when the controls appear you are ready to play music. Now you can open any browser on your network and enter http://belleson.lan to control Brilliance. When a setting is changed, 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 "Brilliance" network. After it connects, return to Wifi Hifi and click the link, or on a browser page enter URL http://belleson.int.

## Network password

The serial number on the rear of your Brilliance is the password for the internal network. Enter this number when you connect to http://belleson.int.

Your Wifi Hifi internal network password_____

## Security

The Brilliance Wifi Hifi has its own internal network server, accessed via http://belleson.int. This 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.

## Network Recovery

If you can't find a network named Brilliance and you can't connect to Brilliance through your LAN, press and hold the front panel active/stand-by button for 5 or more seconds. Let go of the button and wait another 5 to 10 seconds for the controller to restart. This resets Brilliance to its internal network, so you should be able to find "Brilliance" in the tablet network list, connect to it and navigate the browser to http://belleson.int to reconnect.

Wifi Hifi passes messages back and forth between the browser and server. It does not respond instantly and sometimes takes a couple of seconds. If there is no response after 5 or 10 seconds, refresh the connection with  button.

## Specifications

| Parameter | Conditions | Value |
|---|---|---|
| Frequency Response | Chirp, 192k sample rate, RIAA numerically compensated | Overall: >100kHz<br>Individual op amps: >4MHz |
| RIAA Response | 20Hz to 20kHz | ±0.2 dB |
| Distortion (THD) | 3$mV_{rms}$input@1kHz | 0.005% |
| Maximum Output | | 27Vpk-pk |
| Input capacitance | Remotely selectable | 0pF to 750pF in 50pF steps on either input pair |
| Input resistance | Remotely selectable | 20Ω, 65Ω, 110Ω, 260Ω, 350Ω, 400Ω, 47KΩ on any input pair |
| Unweighted Noise | Referred to input | 200$nV_{rms}$, -88dB ref. 5mV, -132 dBu |
| Equivalent Input Noise | Density @ 1kHz<br>RMS, 20Hz->20kHz | 3nV/√Hz<br>460$nV_{rms}$ |
| Dynamic Range | Gain set to 30dB | >100dB at <1% THD |
| Signal to Noise Ratio | IHF A-weighted<br>unweighted | 75 dB<br>65 dB |
| Overload Margin | Referred to 1mV input, gain setting=30dB | 20Hz: 12dB<br>1kHz: 15dB<br>10kHz: 30dB |

Figure 8: Frequency Response, RIAA compliance and channel matching

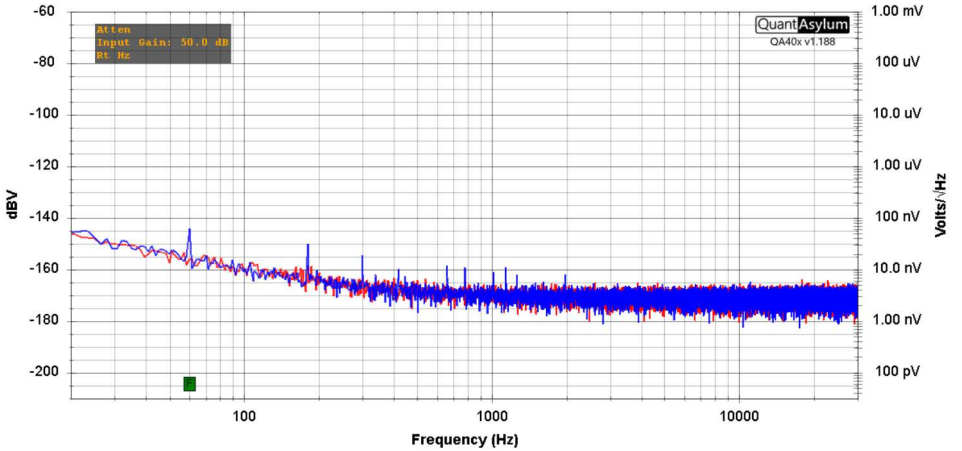


Figure 9: Equivalent Input Noise Density

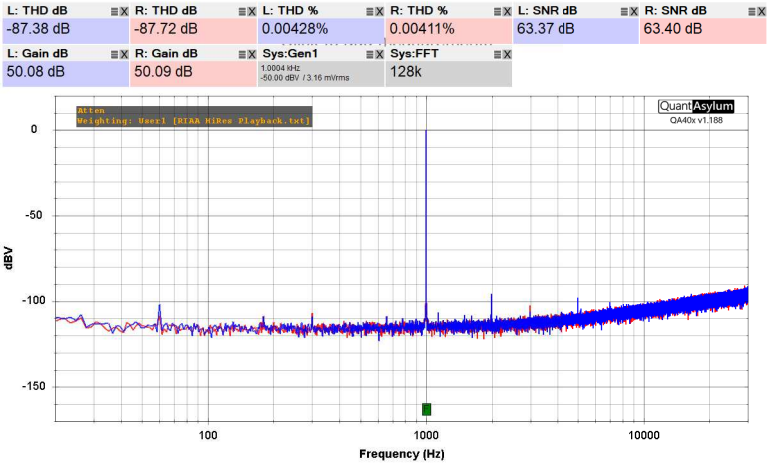


Figure 10: Harmonic Distortion, 1kHz input at -50dBV (3.5mV), gain set to 50dB

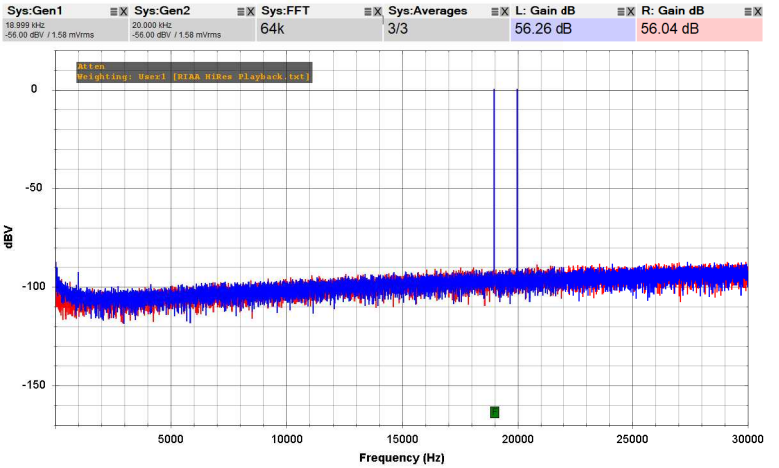


Figure 11: Intermodulation Distortion, 19+20kHz input at -56dBV, gain set to 56dB

## How we do what we do

We...

- design, build, package and ship our products in South Carolina, USA
- build our own two sided Top 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 5 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.