

**CARR BEL-RAY**

**BEL-RAY**



**OWNER'S MANUAL**

***January 2024***



## **Bel-Ray Instructions**

Thank you for purchasing a Carr Bel-Ray amplifier.

### ***Three British classics in a performance-ready package***

With the big, powerful amplifiers of the golden age of guitar tone ever harder to use on stage and in the studio, the Bel-Ray reconfigures three legendary '60s to early '70s sounds from across the pond into a portable, club-friendly package that dishes out classic British chime, crunch, and *kerrang* in a format today's player can actually use.

Fronting a dual-EL84 output stage that generates 16 watts of power, the Bel-Ray sports a front end of two 12AX7s plus a fat British-voiced EF86\* pentode tube in a triple-threat preamp that delivers Top Boost chime, Plexi grind, and H-Watt punch at the twist of a switch.

Juicy, tactile dynamics and multi-dimensional playing feel are ensured by tube rectification courtesy of an EZ81—an essential part of the power supplies in the smaller '60s AC combos and 18-watters alike—and atmospherics are maximized by a tube-driven, bias-modulated tremolo circuit that oozes a warm, lush, swampy throb.

Atop this versatile foundation, the Bel-Ray carries the kind of feature set that has made Carr Amplifiers famous for their ability to deliver vintage-caliber tones to modern playing situations. The Level (aka Volume) control is coupled with a High/Low volume-taper toggle which selects between a direct signal or one with a partial Master Volume inserted after the following EF86 stage. In High, the volume comes on fast and furious, hitting the output stage harder for increased crunch. Set to Low, the volume rolls up gradually and drives the EL84s less aggressively, perfect for at-home nighttime playing and quieter settings.

The Bel-Ray's decibels are further dialed in with our acclaimed built-in attenuator: a toggle switch flips between the full 16 watts and anywhere from 0 to 2 watts of power. And behind it all is hand-wired, point-to-point circuit construction, acknowledged as among the finest in the business, using military grade power components, signal elements from the golden age of analog amplification, and other high-end parts to optimize clarity, depth, and playing feel.

The Bel-Ray — legendary British tone via top-flight American engineering.

Please take time to familiarize yourself with this manual.

### **Front panel controls**

**Level** – Adjusts the loudness and drive of the amplifier.

**Hi/Low Volume Toggle** -In the **baton up** position the signal passes through the amp unimpeded after the Level control – volume comes on fast and aggressively – great for live applications. With the **baton down** the signal going to the power amp after the EF86 is actively attenuated following the Level setting. This shifts the flavor balance toward the EF86 and gives you much finer control over low level settings. Great for late night home playing!

Both toggle settings will bring the amp to full power. When you are really driving the amp hard with high Level settings the toggle down position yields a tighter more focused sound. Each position has its own feel and voice, - especially apparent using high Level settings.

**Voice Rotary Switch** 3 distinct tonal voices: **1966 V, 1973 H, 1968 M**

*(Or if you prefer English county of origin: Kent, Surrey, London!)*

Changing the position rewires the Tone Stack circuit to mimic the unique designs of these archetypal British amplifiers. The gain increases as you go as well as does overdrive potential. *In classic V style amps, the Midrange is fixed. The Bel-Ray Mid control pointing straight up yields the fixed mid response. You can push the Mids further though for more aggressive sounds or scoop the Mids for a hollow sweet vibe. New tonal ground!*

**Top** – Varies the high treble from dark to bright.

**Mid** – Midrange frequencies are where so much of the feel and vibe of any amp lives. The Bel-Ray Mid has extended range and can give you more midrange push than the classic amps offered. Setting beyond 3 o'clock especially in the **V** and **M** voices are more aggressive than the archetypes. *This is great for cutting punchy drive and crunch.* In the **H** voice with Mid settings below 10 o'clock on the dial you will hear very beautiful deeply scooped sounds – *perfect for atmospheric ambiance or astringent funk lines.*

**Bass** – Varies the low end from lean to full. As you turn up the Level the Bel-Ray becomes much thicker sounding (this is generally true for all amps). At higher Level setting you may prefer to turn the Bass down to keep the amp clear and tight.

**Speed - Tremolo** – Varies the speed of the tremolo pulses from slow swampy swells to twitching hypnotic jabs!

**Depth - Tremolo** – Controls the amount of the tremolo effect which varies the gain of the EL84 tubes. The Bel-Ray Tremolo is inspired by designs from the US Mid 50s amps. This Tremolo circuit works by modulating the bias on the output tubes – increasing and decreasing the output sections gain and sensitivity. *At Depth setting above 3 o'clock you will start to hear the tremolo oscillator pulse when not playing - this is normal, we decided to include these higher settings of Depth as they are so fun and wild! While you are playing you hear very little of the oscillator pulse separately.*

**Tremolo Toggle and foot switch Jack** – When the foot switch is plugged in, it controls the Tremolo on and off, – if the foot switch is unplugged the panel toggle with control the tremolo on and off.

*-There may be a small pop turning the tremolo on or off – this is normal for this style circuit.*

**Attenuator** – Set the Wattage toggle up for full 16 watts with the speaker bypassing the attenuator. Toggle down to vary the speaker output from ~ 2 Watts to a whisper continuously.

**Hold – Off – Play** – The Power Toggle switch in the middle position is Power Off. To play set the amp to Hold (*same as Standby* - switch baton *down*). After 1 minute of warm up, switch the Power baton *up* to Play. The amp is ready to be played.

When turning Off the amplifier you can simply switch directly from Play to Off.

Using the Standby setting every time the amp is turned on will prolong tube life.

***Note:** as the voltages inside your amps come up to operating levels (~ 30 seconds) - the Voice switch or toggling the Power from Play directly to Off may produce a pop. This is normal and will not hurt the amp.*

**EF86**-***Note:*** You may hear some pinging sounds as you manipulate the panel controls or tap the chassis, which is **entirely normal**. The EF86 is a very sensitive high-gain tube (which we carefully select for low-noise examples) and these artifacts go hand-in-hand with its thick, lush sound, but any such mechanical noises won't be heard once you start playing!

*There is a removable tape over the cabinet front pilot light to protect the lens during shipping. Please peel away the tape once you have the amp home.*

## **Bottom Panel**

**Fuse** – In the unlikely event that a tube fails, the Bel-Ray is protected by a 1.5 Amp slow blow fuse for 120v and 100v (North America and Japan) models or a 0.75 Amp slow blow fuse for 220v and 240v (Europe and Asia) models. **Please consult us or a qualified tech for assistance in the event of a fuse blowing.** The fuse is located on the bottom of the chassis by the IEC connector and power cord.

**Speaker output jack** – The speaker output jack is located between the power tubes and the Pre amp tubes on the chassis (see *Chassis Diagram*). The Bel-Ray is designed to drive an 8 ohm load. Maximum tone will be realized when connected to an 8 ohm speaker or cabinet. The internal speaker in Bel-Ray combos is an 8 ohm load.

To run an external cabinet, turn the Bel-Ray OFF, unplug the internal speaker (combo amps) and plug in the external cabinet's speaker cord. Alternatively, a "Y" speaker cord can be

used to run a 16 ohm external cabinet along with the internal speaker(s) of a combo amp without damage to the amp (the total impedance or speaker load in this case will be 5.3 ohms – see the previous paragraph).

**Warning: Damage will result from operating the Bel-Ray without a speaker load or into any load less than 4 ohms.**

### **Biassing your Carr Bel-Ray**

The Bel-Ray is a partial cathode bias (self bias) amplifier and as such does not require a bias adjustment when changing tubes. Matched pairs of output tubes are required for optimal tone and reliability. The Bel-Ray can only use EL84 power tubes.

*Carr Amplifiers selects and tests the finest current production tubes specifically for each amplifier model. Caution should be used when buying replacement tubes from any dealer who does not have a return policy as all tubes can have problems (NOS tubes are susceptible to microphonics and failure too - they aren't getting any younger!).*

**Recommended Settings** These give you a place to start – the Bel-Ray has a huge range of possible tones – have fun experimenting and remember that guitar pickups vary a lot and you will need to tweak to your guitar and ear! Use the Attenuator for the desired overall loudness.

Sound	Level	Hi/Low	Voice	Top	Mid	Bass
Mid 60s Chime Clean		Low	V66			
Spacy Shimmer		Hi	H73			
Bulldog Bite		Hi	M68			
Vowel Howl		Low	H73			

# Carr Amplifiers Chassis Diagram

Power Connection  
100W Max



Fuse

Rectifier

EZ81/6CA4

P2  
EL84

P1  
EL84

Speaker  
- Jack -  
8 ohms

V3  
12AX7

V2  
EF86

V1  
12AX7



## **Conceptual notes on the V66/H73/M68 Voice switch –**

The Bel-Ray is an imagining of mid 1960s thru early 70s Classic British amp sounds. There were a wide range of circuit approaches from this period and each brand had its own vibe depending on tone stack choices, general output section topology, power tube types, and speaker configurations. The Bel-Ray Voice switch rewires the Tone Stack circuit to mimic the unique designs of these archetypal British amplifiers.

### ***What does the Voice switch change in the Bel-Ray circuit?***

4 physical circuit path and component values change every time the Voice switch is turned. *(that's value!)*

The signals coupling capacitors and how they interact with the tone pots change.

The frequency voicing of the Top, Mid, and Bass changes.

The amplitude of the signal going into the Level control changes.

The 'Feel' and Vibe changes.

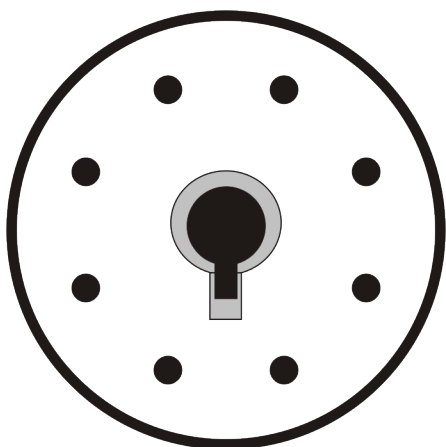
### ***What do the numbers (V66, H73, M68) on the Voice switch refer to?***

These conceptual center years point to the different classic amplifier tone circuits the Bel-Ray design took inspiration from. At these points in history the various circuit designs had stabilized creating the iconic amp sounds we love!

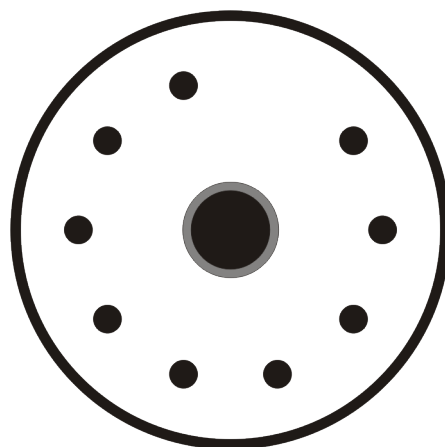
*(Naturally there are other amazing years and classic inspirations out there, but those are for another day!)*

# IMPORTANT REMINDERS

- Please keep the original packing materials in case your amp needs to be shipped for service.
- When inserting power tubes, the power tube key must line up with the tube socket keyway.
- When inserting preamp tubes, the tube pins must line up with the tube socket holes.



*Do not insert power tubes with missing or damaged keys or pins.*



*Do not insert preamp tubes with missing or damaged pins.*

- To reduce the risk of electric shock, keep the unit away from excess moisture.
- No user serviceable parts inside.
- Potentially lethal voltage present.

# CARR AMPLIFIERS WARRANTY

**All Carr amplifiers are warranted to be free from defects in workmanship (solder joints, hardware assembly etc.) for the lifetime of the original owner, and free from defects in materials (including cabinet) for three years from the date of purchase by the original owner, provided that:**

- The owner mails the signed warranty registration card (next page) and a copy of the original sales receipt to Carr Amplifiers within thirty days of purchase.
- Problems are not the result of misuse, abuse, tampering, circuit modification, improper tube installation (incorrect orientation of tubes can damage the amp), or spilled beverages, as these will void the warranty.
- The amplifier is shipped to Carr Amplifiers in the original packing materials with freight paid by the purchaser. We pay the return shipping after the warranty work is complete.

**Tubes, speaker(s), and reverb tanks carry a ninety-day warranty, and are subject to the same terms and conditions as above.**

Please call us at 919-545-0747 if you have a warranty claim. Be prepared to provide the model and serial number of your amp. We will issue a Return Merchandise Authorization number (RMA#) before the amplifier is shipped for service.

*For customers outside of North America, warranty and repair service is provided through the dealer where the amp was purchased.*

**Shipping address:**

Carr Amplifiers  
23 Rectory St., Suite E  
Pittsboro, NC 27312

**Mailing address:**

Carr Amplifiers  
433 W. Salisbury St.  
Pittsboro, NC 27312

**Tel:** 919-545-0747

**Fax:** 919-545-0739

[www.carramps.com](http://www.carramps.com)

[info@carramps.com](mailto:info@carramps.com)

# Carr Amplifiers Owner's Registration

*Note: For export models your local dealer is your Carr Warranty source.*

To validate your warranty, please mail the **completed form** and a **copy of your original sales receipt** within 30 days of purchase to:

Carr Amplifiers  
433 W. Salisbury St.  
Pittsboro, NC 27312

*We do not sell, give away, or otherwise share customer information with third-parties.*

**MODEL:** \_\_\_\_\_

**SERIAL NUMBER** (located on the tube chart sticker and the bottom or back panel of the chassis): \_\_\_\_\_

**PURCHASED FROM:** \_\_\_\_\_

**DATE OF PURCHASE:** \_\_\_\_\_

**OWNER'S NAME:** \_\_\_\_\_

**OWNER'S ADDRESS:** \_\_\_\_\_

**OWNER'S E-MAIL:** \_\_\_\_\_

**TYPE OF MUSIC YOU USUALLY PLAY:** \_\_\_\_\_

**HOW YOU FIRST HEARD ABOUT CARR AMPLIFIERS:** \_\_\_\_\_

**YOUR ADDITIONAL COMMENTS ARE INVITED:** \_\_\_\_\_

**I have read and understand the terms and conditions of the warranty agreement as set forth above.**

**Signed:** \_\_\_\_\_ **Date:** \_\_\_\_\_

**The above must be signed and dated to validate the warranty.**

**With your completed registration form you are eligible for a complimentary Carr Amplifiers t-shirt**

**For amps purchased outside the United States: Please contact your dealer for your Carr Amps t-shirt**

**We do not currently ship t-shirts outside the U.S.**

**Please specify your size:**

\_\_\_\_\_ **Small**  
\_\_\_\_\_ **Medium**  
\_\_\_\_\_ **Large**  
\_\_\_\_\_ **X-Large**  
\_\_\_\_\_ **XX-Large**