

Howdy!

Recently I have had a few requests for "Dummy Coils" and it seemed natural to write a note on this topic.

### **What are dummy coils and what are they used for?**

Dummy coils are similar to single coil magnetic pickups, but have no magnets and therefore cannot generate sound from the vibrating strings as guitar pickups do. Dummy coils are used to eliminate a significant amount of the 60 cycle AC noise that single coil pickups are susceptible to. Because dummy coils do not generate a signal from the vibrating strings they are often used to eliminate noise with minimal affect on the single coil tone of the guitar pickup.

My colleague, Christopher Tatoyian recently installed a dummy coil made by Vintage Vibe Guitars in his Gibson Melody Maker and recorded sound clips with and without the dummy coil active in the circuit. To hear the noise cancellation which can be achieved with a dummy coil please listen to the two dummy coil sound clips posted at the top of the following webpage:

<http://www.vintagevibeguitars.com/sound.html>

### **Tech stuff:**

1. Noise signals from external sources (AC transformers, 120 VAC dimmer switches, florescent lights, etc.) can be intercepted by guitar pickups and enter the signal which ultimately is delivered to an amplifier. There are generally four ways one can eliminate this noise:
  - a. Eliminate the noise at the source
  - b. Shield the pickups and guitar controls circuit from the noise
  - c. "cancel" the noise as is done in a humbucking pickup
  - d. Use a noise gate between the guitar and the amplifier

In this article I will focus on option c: noise cancellation. Before we discuss interaction of signals it is best to review how a single coil magnetic pickup works. The electrical signal generated by a single coil passive magnetic pickup in an electric guitar, bass guitar or other similar stringed instrument is an alternating current (AC) waveform. If you could see this AC signal it would look like a repeating wave with peaks and valleys. This AC signal is generated in a pickup when the guitar strings vibrate within the magnetic field of the permanent magnets in a pickup. Magnetic material (iron and nickel) in the vibrating guitar strings cause the magnetic field of the permanent magnets in the pickup to fluctuate at the same frequency as the vibrating strings. This fluctuating magnetic field causes electrons in the copper coil windings of the pickup to oscillate which generates the AC electrical signal in the pickup. AC noise signals from things such as electrical dimmer switches and florescent lights are broadcast just like radio waves and these signals can be intercepted by the pickups or the controls circuit in a guitar. Humbucking pickups utilize two coils to simultaneously boost the strength of the signal from the vibrating strings and reduce or eliminate noise from external AC sources. Usually the two coils of a humbucking pickup are electrically connected to each other in series and the coils are made such that one coil is wound clockwise and the other coil is wound counter clockwise. In addition to this, the magnetic field orientations of the two coils are opposite from each other (one coil has a magnetic field oriented north up, the other coil is south up). The signal from the vibrating strings in one coil adds constructively to the signal generated in the other coil from the strings because these two signals are in phase. The reverse winding direction of the two coils shifts the AC waveform 180 degrees and the opposite magnetic field direction of the two coils reverses the phase orientation another 180 degrees putting the signals generated by the vibrating strings above the two coils back into phase. The noise signal entering the two coils of a humbucker is unaffected by the magnetic fields of the two coils; the noise signal in one coil is out of phase with the noise signal in the other coil and cancels. A dummy coil can offer similar noise cancellation as described for a humbucking pickup but will not boost the signal from the vibrating strings.

2. Installing a dummy coil:

- a. For best noise canceling results a dummy coil should be as similar as possible to the guitar pickup it is paired with and exposed to the same noise environment as the guitar pickup. The dummy coil should have a similar coil design (number of turns on the coil, coil wire gauge and coil geometry) as the guitar pickup. To make the noise environment of the pickup and dummy coil as similar as possible the dummy coil and pickup should both be located in the instrument as close as feasible to each other and in the same orientation. If the guitar pickup has grounded shielding, the dummy coil should have grounded shielding also. As a practical note a dummy coil should be securely fastened in the instrument controls cavity to prevent it from moving around and becoming damaged or causing electrical shorts in the controls circuit. The dummy coil can be wired to the pickup either in series or in parallel. In either case the dummy coil should be wired such that the winding direction of the dummy coil is opposite of the winding direction of the pickup to cancel the noise signal.

Dummy coils are available from Vintage Vibe Guitars in a variety of designs to match specific pickups; please contact us for more information regarding dummy coils.

My congratulations to all of you who have read all the way through this newsletter!

I hope this information is helpful to you.

Best Wishes.