How to Test Guitar Pickups with a Multimeter

Let's talk about one of the most important subjects every guitarist needs to know in order to troubleshoot their electronics: testing pickups with a multimeter. These affordable hand-held devices are vital and helpful to have around. Whether diagnosing unwanted noises or verifying your pickups' performance, a multimeter helps you get the most from your guitar and rig.

Here, we'll look at a couple of popular ways guitarists can use a multimeter to test their electronics. We'll also dig into pickup resistance, measuring potentiometers (pots), and how to check your instrument's ground. By the end of this article, you'll know exactly how to test guitar pickups with a multimeter.

First stop, pickup resistance!

What is pickup resistance, and should you care?

**Pickup manufacturers like Seymour Duncan generally list the resistance of a pickup in their documentation (see the Pickup Tone Chart for a detailed list of all Seymour Duncan's pickups).*

What is guitar pickup resistance?

Many believe that a pickup's resistance directly correlates to its output. The higher the number, the hotter the pickup, right? Not necessarily. A pickup's resistance is actually a measure of how hard the current has to work to get through the wire coils. But more windings (which usually means higher output) also means higher resistance. Therefore, people often equate the two.

In reality, it's not that simple. A host of variables determines a pickup's output. These include magnet material, gauss (magnet strength), wire material, and the number of coil winds. So, a pickup with a strong magnet can still have lower resistance and plenty of output. Likewise, another will deliver low output, yet yield a higher resistance.

A pickup's resistance is only important when considering all these other factors. Therefore, measuring a pickup's resistance is a diagnostic tool to help confirm your pickup's health. It does not solely determine its performance characteristics and output.

So if your pickups' tone seems off, grab your multimeter and let's get to work.

How to test guitar pickup resistance

The first step in learning how to test guitar pickups with a multimeter is asking if you're already happy with your tone. If you are, there's no reason to dig into your instrument. But if not, there are two primary methods for measuring pickup resistance; from your guitar's output jack and from the pickup lead wires. We'll outline both processes here.

From the guitar's output jack

[TRY THIS FIRST]

1. Turn on your multimeter and set it to the "Ohm" or "Ω" setting (Ohms "Ω" is the unit of measurement for resistance)
2. Plug a cable (or lead for our European friends) into your guitar but leave the other end free
3. Set your pickup selector switch to the position of the pickup you want to check and turn the volume all the way up
4. Touch one multimeter probe to the tip of your cable's free end
5. Touch one multimeter probe to the sleeve (part of the cable end below the tip section) of your cable's free end

After a moment, your multimeter should settle on a number. This number is the pickup's resistance. Keep in mind; resistance is never exact. Therefore,

the number will be *around* the pickup's rating, give or take. If it's not, it's time to dig a bit deeper.

From the lead wires

This method is perfect for checking the resistance of pickups not already installed in an instrument. It's important to note that an installed pickup will need to be desoldered and removed from your instrument in order to test is using this method.

Testing single-conductor pickups (all single-coils and non-splittable humbuckers)

1. Turn on your multimeter and set it to the “Ohm” or “Ω” setting
2. Touch one multimeter probe to either wire (Excluding the ground wire. More on that in a minute)
3. Touch the other multimeter probe to the remaining wire

As before, your multimeter should read out your pickup’s resistance. It may still vary a touch. But this method removes the rest of your guitar’s electronics from the equation and offers a more accurate reading.

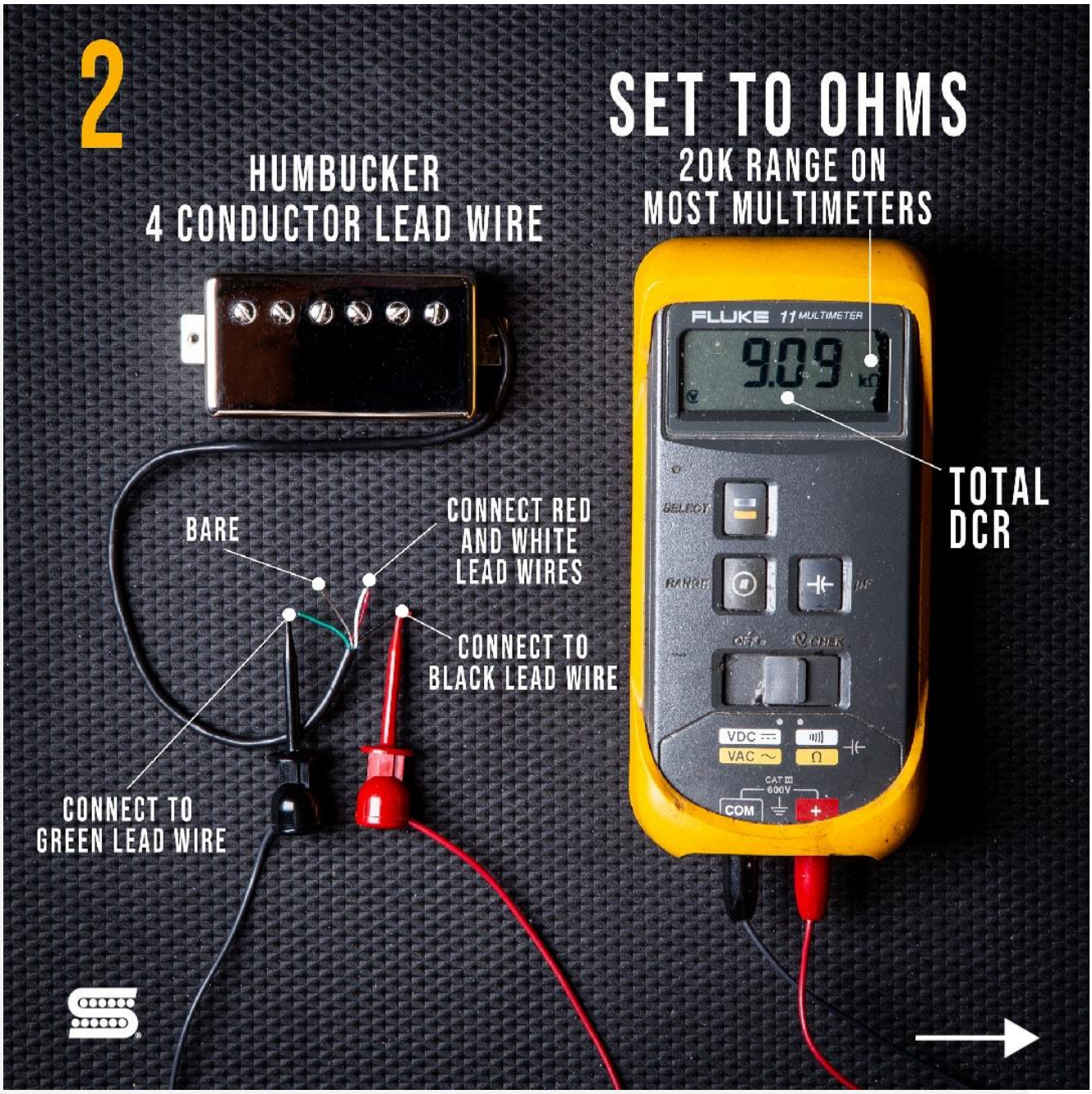
Testing 4-conductor guitar pickups

Any humbucker that boasts five attached wires is a 4-conductor humbucker. The pickups get their name from the two wires extending from each coil. There is also one common ground wire. This wiring allows for selectable split-coil performance options to achieve single-coil-like sounds. 4-conductor humbuckers are extremely common, especially from Seymour Duncan.

Testing the whole 4-conductor pickup

1. Turn on your multimeter and set it to the “Ohm” or “Ω” setting
2. Connect the pickup’s red and white wires
3. Connect the pickup’s green and bare wires
4. Attach your multimeter probe to the black wire
5. Attach multimeter probe to the bare/green combo

The number on your multimeter is the pickup’s total resistance. If the figure is correct, the pickup is fine. But if it doesn’t, it’s time for the next step.



Testing each coil separately

1. Turn on your multimeter and set it to the “Ohm” or “Ω” setting
2. *Testing the fixed-lug north coil:* Touch your multimeter probes to the coil’s white and black wires
3. *Testing the adjustable south coil:* Touch your multimeter probes to the coil’s red and green wires

The resistance of each coil should be roughly half of the full pickup’s listed rating. If one or both are off the mark, then you have a broken pickup.

But don’t worry. Seymour Duncan has plenty of replacement pickups for you. And we also re-wind and repair broken pickups.
If both are on the money, but a problem persists, it’s time to check the pots.

How to test guitar potentiometers

When it comes to guitar electronics, pickups are only part of the equation. Everything between them and your guitar cable plays a pivotal role in your

tone. It can also introduce its own set of issues, especially volume and tone pots.

At their core, potentiometers are variable resistors. And because different pickups work best with different resistance, these pots are available in a few different ratings.

Most common guitar potentiometer ratings

- 250K: Single-coil pickups
- 500K: Humbucking pickups
- 1MOhm Jazzmaster, Some vintage Teles, Fenders with vintage Wide Range humbuckers
- 25K: Active humbucker

Finding a pot's rating

Like on all Seymour Duncan pots, finding your pots' resistance is often as easy as looking at what's written on them. But not all pots are as telling. If the pot doesn't have a printed rating, you can solve the mystery with a glance at your guitar's technical specs. Still can't find the info? Then whip out your multimeter, and we'll take a look for ourselves.

1. Turn on your multimeter and set it to the "Ohm" or "Ω" setting
2. Attach each probe of your multimeter to the outer lugs on the pot

This method gives you the pot's maximum value. You might notice that the value is rarely precisely the same as the pot's rating. Again, resistance is never an exact science. But it is typically within 10% on either side of the expected value.

Linear vs. Logarithmic Potentiometers

And for the geekier among us – which totally includes us – you can also check if your pots are linear or logarithmic. (For more info on this subject, check out this article on potentiometer types.)

Determining if your pots are linear or logarithmic

1. Turn on your multimeter and set it to the “Ohm” or “Ω” setting
2. Turn the potentiometer to half-way through its range
3. Attach one multimeter probe to the left-most lug
4. Attach the other multimeter probe to the center lug

A linear pot's resistance reading will be around half of its maximum value. Logarithmic pots will read substantially less.

Testing your guitar's grounding

What if your pickups and pots check out, but there's still excess noise? Then more than likely, you're experiencing bad grounding. Luckily, it's incredibly easy to diagnose. So, don't accept defeat. Instead, give this multimeter test a try.

How to test your guitar's grounding

1. Switch your multimeter to its Continuity setting
2. Touch your red probe to one of your guitar's strings
3. Touch your black (ground) probe to your guitar's output jack

A good ground will result in a clear beep from your multimeter. But if you don't hear anything, you've found your problem. There's a break in your wiring somewhere. Open up your guitar and check all of your solder-joints, ensuring they are all nice and solid. Once you find and fix the problem joint(s)…problem solved.

Multimeters are invaluable for all electric guitarists and bassists. They're inexpensive and tell you a lot about your gear's health. And though they can look a bit intimidating, they're easy to use. So easy, it's amazing what you'll fix with just that and a good soldering iron. We hope that "How to Test Guitar Pickups with a Multimeter," is a big help down that road.

Let's talk tone!

If you have any other questions about how to test guitar pickups with a multimeter, don't hesitate to reach out at (805) 716-6764. You can also email us here. And don't forget to dig into the Seymour Duncan blog! There's a ton of in-depth information on all of our different designs, how-tos, tone demonstrations, and a lot more.