A pickup winder is a great way to make money in your shop. If you can fix a stock pickup there is no better way to maintain an instrument’s vintage value. Use the pickup winder for these repair and customizing jobs:

**Rewinding dead pickups**
- Rewind an entire pickup to original specs.
- Peel a pickup to find the problem, then rewind from the problem out.
- Rewind a pickup to custom specs (overwound, underwound, tapped output, etc.).

**Modifying pickups**
- Make higher output pickups out of standard pickups.
- Make a “tapped” single-coil.
- Add wire to an existing coil.
- Reduce the output of overwound pickups by peeling, tapping the coil and rewinding. This gives the customer more tone options from one pickup.
- Add wire to one coil of a humbucker to get slightly mismatched coils (credited for some players’ unique tone).

**Make pickups for custom/specialty instruments**
- Make replacement components to replace damaged pieces of an existing pickup.
- Design and build your own pickups.

Pickup rewinding requires patience and study. Don’t dive into rewinding vintage pickups until you’ve repaired and wound some el *Cheapo* pickups. Most repair shops have collected a pile of dead pickups over the years—they’re perfect for practicing. (Remember the luthier’s golden rule: Practice On Scrap!)

**Recommended tools and supplies**
Stewart-MacDonald has many of the parts, tools, and supplies you need for building and repairing pickups. Where applicable, item numbers for ordering from StewMac are included.
- Volt-Ohm meter (VOM) #3618
- Soldering iron #0501 and solder #0505 (60/40 rosin core)
- Polarity tester #5127
- Gauss meter/Magnetometer
- Glue pot #0668—for wax potting pickups
- Paraffin and beeswax—available at many grocery stores
- Cooking thermometer—for monitoring the wax’s temperature
- C-clamp and Magnets #4638 — for remagnetizing a single-coil pickup

Additional information on pickup building and specifications at stewmac.com/freeinfo.

**Troubleshooting**
Here are some common pickup ailments. To isolate a problem, unsolder the pickup from the guitar so that other electronic components don’t affect your tests.

**Output is weak**
What is the DC resistance of the pickup?
- Normal DC resistance for a single-coil pickup is 6-8K Ohms; humbuckers are normally around 8-13K. If the pickup’s DC resistance seems normal but the output is low, the magnets could be weak. See “Remagnetizing a pickup” later in these instructions.
- A low DC resistance could indicate shorts within the coil windings. A typical cause is corrosion of the coating on the magnet wire, causing the coil wraps to short out against each other. This can drastically reduce output, making the pickup a candidate for rewinding.
- If there is a reading for DC resistance, and it appears to be normal or close to normal, the magnets may be dead, or there could be a poor solder joint, which has oxidized where the ends of the coil wire connect to the output wires.
- If there is a dead short, then inner coil corrosion could be shorting out to ground, or there is a break in the coil wire. Before you do anything drastic like completely peeling or cutting the coil wire off of the pickup, make sure that the output wire solder connections to the coil wire are not corroded or broken.
Peeling
How a pickup has been manufactured and potted (coated with wax, lacquer, or epoxy) will effect how easily a coil can be peeled. Often, no matter how careful you are, a coil cannot be removed wind-by-wind. Age also can make the wire difficult to remove in one continuous piece. If you’re not trying to retain the original wire or determine the number of winds on a specific coil, the quickest and easiest way to remove the coil windings is to cut through them with a sharp hobby knife.

Winding
Here are some tips and a general outline for winding a pickup.

• When you disassemble and peel a pickup, be sure to make notes on how the coil attaches to the lead wires.

• Quick sketches or a photo are very helpful in recording how a pickup comes apart, and more importantly, how it will go back together!

• File or sand any dings or nicks in the coil’s flatwork. They should be smooth so they can’t catch the coil wire.

• Make sure that there are no nicks in the edge of the wire spool or the traverse bar to snag the coil wire, so it comes off the spool cleanly.

• Pickup wire isn’t meant to feed off a rotating spool. It’s too thin to take the strain of turning the spool. Instead, let the wire feed off the end of the spool vertically, about 3 or 4 feet below the winder.

• Be sure the pickup coil is well attached to the winding arm and that it runs true. Before attaching the coil wire, start the winder and see if there is a wobble or if the flatwork isn’t spinning true and straight.

• Start the first 6-10 wraps by hand. This ensures that coil wire won’t be pulled off of the bobbin when you start the motor.

• Set the traverse end-stops so they’re just inside the inner faces of the flats.

• Set the counter to zero. Determine the number of turns you would like to put on the coil and log that as the “end” counter number on your log sheet (see last page of these instructions).

• Start the winder slowly, then increase the speed. Use your fingers or a doubled-over piece of felt to pinch and guide the wire along the traverse.

Variations in tension, and how the wraps align with each other are just two of the ways to affect a pickup’s tone and response, so be sure to experiment to see what works for your needs.

The term “scatterwound” refers to pickups wound by hand rather than by a machine. Machine wound pickups have a very even winding pattern, and a “distributed capacitance” (the capacitance between each successive turn and layer of a coil). Scatterwinding lets you control the space between your winds and layers, therefore changing the distributed capacitance. Many feel the reason hand-wound pickups sound better and have more harmonic content than their machine-wound counterparts is because there is less capacitance within the coil.

You can also tweak the number of windings for a custom sound. For example, winding a coil 5% under spec can give you a sound that is brighter while overwinding by the same amount can give you a warmer sound with less top end.

Don’t wind a pickup too loose, but don’t wind it too tight either!

• If a coil is too loose it will be microphonic and sloppy.

• If a coil is too tight you can actually deform the bobbin and it’s even possible to cause the pickup to implode.

Wind until you reach the desired number of turns, the mass of wire you want on the coil, or until you reach the desired DC resistance.

You can check the DC resistance during the winding process by gently scraping off some of the protective coating on the coil wire with a hobby knife. Touch the “start” of the coil with one probe from your volt-ohm meter and touch the other probe to a portion of scraped coil wire just off of the coil (don’t cut the coil wire!). When holding the VOM’s probes on the wire, don’t let your body’s resistance affect the readings—there are VOM probes that have delicate little clips for clamping onto thin wire, and they are ideal for guitar electronics. If you need more wraps, put a drop of lacquer or nail polish on a paper towel and wipe a thin coating onto the bare portion of coil wire, let it cure for a few minutes, and continue winding.

Carefully cut the wire and solder it to either the solder lugs (single-coil) or lead wires (humbucker).
Potting a pickup is a technique used to help eliminate unwanted microphonics. Some pickups are not potted from the factory. While it’s not necessary, potting is generally a good idea. Here are the common pickup potting materials.

**Potting with wax**
*Pros:* Works for most pickups, it’s non-toxic, easy to deal with, cheap, and you can undo it if something goes wrong. Wax has a traditional appearance, and it works great for humbuckers with metal covers.

*Cons:* If the wax is too hot you can warp or melt plastic bobbins. If the wax is way too hot you have a potential fire on your hands! Make sure that the wax never smokes—that’s an indicator that it’s getting too hot. Never try heating your wax on the kitchen stove or in a microwave oven because hot paraffin, and especially paraffin vapors, can ignite. It’s best to wax pot outdoors until you have your methods refined and have eliminated any fire hazards.

*Application:* After a pickup has been wound, and the output wires are attached and assembled, suspend the pickup in canning paraffin mixed with 20% beeswax, heated to 145-150° Fahrenheit. After ten or fifteen minutes all of the bubbles should have risen out of the pickup, and all of the voids within the pickup should be filled with a coating of wax. Pull the pickup out of the wax and suspend it over the wax pot letting the excess wax drip back into the pot. Then lay the pickup on a paper towel and allow it to cool to touch. Carefully remove any excess with a paper towel before the pickup completely cools to room temperature.

Stewart-MacDonald’s Hot Glue Pot (#0668) has a thermostat designed to heat hide glue to about 145°. Keep the pot at least 2/3 or 3/4 full. It can operate with less liquid, but the wax may get too hot.

**Potting with lacquer**
*Pros:* Good for plastic bobbins that may melt during wax potting.

*Cons:* Can react with some plastic bobbin materials. Doesn’t stop microphonics caused by metal covers on humbuckers. It’s difficult to peel a lacquer potted pickup. Lacquer has to be applied while winding, which slows down the process.

*Application:* Use a small brush and add a thin coating of lacquer every minute or so. You must wait a few minutes before you start the winder, or you’ll fling lacquer all over the place.

Remagnetizing a single-coil pickup
If a pickup has a good DC resistance, but is still weak, the magnet(s) may have lost their strength. If you don’t have a Gauss meter or magnetometer it’s difficult to know how strong a magnet is. However, if you have similar pickups in your shop, and one seems to pull on the tip of a screwdriver harder than the other, you can guess that the magnet is weak. A polarity tester (Stewart-MacDonald #5127) is a must for deciphering polarities.

Another reason for remagnetizing a pickup is to swap the magnetic polarity of a single-coil, so it will act as a humbucker when combined with another single-coil. Note: the coil must also be “reverse-wound” for this pickup to have the proper phase relationship and noise canceling humbucking properties.

You can make a simple fixture using a basic C-clamp. Remove the foot with a screwdriver and attach two of our 1” diameter Guitar Repair Magnets with #20 Super Glue. Orient the magnets so that they pull toward each other, and adjust the magnets so the pickup fits just between them. Identify and mark the north/south polarity for reference. You can then clamp the fixture into a bench vise as a nice holder while charging.

To swap a pickup’s polarity, simply run the pickup between the two magnets a few times with the top aligned with the new desired polarity.

Our Nut and Saddle Vise (#1816) makes for a sturdy charging station. Since the jaws are steel, the Guitar Repair Magnets hold themselves in place without glue. This lets you adjust for different pickups and different proximity by simply opening and closing the vise.
## Pickup specifications

<table>
<thead>
<tr>
<th>Gibson</th>
<th>PAF Humbucker</th>
<th>P-90</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Turns</strong></td>
<td>5,000-5,050 per coil</td>
<td>10,000</td>
</tr>
<tr>
<td><strong>Wire gauge</strong></td>
<td>42 AWG plain enamel</td>
<td>42 AWG plain enamel</td>
</tr>
<tr>
<td><strong>Bobbin orientation</strong></td>
<td>Bottom out</td>
<td>Bottom out</td>
</tr>
<tr>
<td><strong>Winder direction</strong></td>
<td>Counterclockwise</td>
<td>Counterclockwise</td>
</tr>
<tr>
<td><strong>Coil direction</strong></td>
<td>Clockwise</td>
<td>Clockwise</td>
</tr>
<tr>
<td><strong>Magnet / polarity</strong></td>
<td>Alnico 2 / South on adjustable coil</td>
<td>Alnico 5 / North</td>
</tr>
<tr>
<td><strong>Adjustable coil</strong></td>
<td><strong>Start</strong> Black</td>
<td>Black ground</td>
</tr>
<tr>
<td></td>
<td><strong>Finish</strong> White</td>
<td>White hot</td>
</tr>
<tr>
<td><strong>‘Slug’ coil</strong></td>
<td><strong>Start</strong> Black</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td><strong>Finish</strong> White</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Notes</strong></td>
<td>Magnets varied between Alnico 2,3 &amp; 5.</td>
<td>Two bar magnets are used per pickup. Both North polarity edges are towards the adjustable polepieces. Both north polarity edges are towards the adjustable polepieces.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fender Guitar</th>
<th><strong>50s &amp; early 60s Strat</strong></th>
<th><strong>Late 60s &amp; 70s Strat</strong></th>
<th><strong>50s Tele Bridge</strong></th>
<th><strong>50s Tele Neck</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Turns</strong></td>
<td>7,900 - 8,350</td>
<td>7,600 - 7,700</td>
<td>8,000 - 9,200</td>
<td>7,800 - 8,000</td>
</tr>
<tr>
<td><strong>Wire gauge</strong></td>
<td>42 AWG Formvar or plain enamel</td>
<td>42 AWG plain enamel or poly-nylon</td>
<td>42 AWG plain enamel</td>
<td>43 AWG plain enamel</td>
</tr>
<tr>
<td><strong>Bobbin orientation</strong></td>
<td>Top out</td>
<td>Top out</td>
<td>Top out</td>
<td>Top out</td>
</tr>
<tr>
<td><strong>Winder direction</strong></td>
<td>Clockwise</td>
<td>Counterclockwise</td>
<td>Counterclockwise</td>
<td>Counterclockwise</td>
</tr>
<tr>
<td><strong>Coil direction</strong></td>
<td>Clockwise</td>
<td>Clockwise</td>
<td>Counterclockwise</td>
<td>Counterclockwise</td>
</tr>
<tr>
<td><strong>Magnet / polarity</strong></td>
<td>Alnico 5 / South</td>
<td>Alnico 5 / South</td>
<td>Alnico 5 / South</td>
<td>Alnico 5 / South</td>
</tr>
<tr>
<td><strong>Start</strong></td>
<td>Black ground</td>
<td>Black ground</td>
<td>Black ground</td>
<td>Black ground</td>
</tr>
<tr>
<td><strong>Finish</strong></td>
<td>White hot</td>
<td>White hot</td>
<td>White (or yellow) hot</td>
<td>White hot</td>
</tr>
<tr>
<td><strong>Notes</strong></td>
<td>Hand wound with staggered polepieces, wax potted. 1954-1957 were typically North polarity.</td>
<td>Machine wound with staggered polepieces. Eventually went to flat polepieces sometime in the 70s. Wax or lacquer potted, and some may not be potted at all.</td>
<td>Hand wound, early 50s had flush polepieces, late 50s had raised D and A poles, and 60s have staggered polepieces, wax potted. Copper plated steel baseplate. 1950-1951 were typically North polarity</td>
<td>Machine wound with staggered polepieces. Eventually went to flat pole-pieces sometime in the 70s. Wax or lacquer potted, and some may not be potted at all.</td>
</tr>
<tr>
<td>Fender Bass</td>
<td>50s &amp; 60s Jazz Bass Bridge</td>
<td>50s &amp; 60s Jazz Bass Neck</td>
<td>50s to 60s Precision E &amp; A Coil</td>
<td>50s to 60s Precision D &amp; G Coil</td>
</tr>
<tr>
<td>---------------------------</td>
<td>----------------------------</td>
<td>--------------------------</td>
<td>---------------------------------</td>
<td>---------------------------------</td>
</tr>
<tr>
<td>Turns</td>
<td>9,500</td>
<td>9,500</td>
<td>10,000</td>
<td>10,000</td>
</tr>
<tr>
<td>Wire gauge</td>
<td>42 AWG plain enamel</td>
<td>42 AWG plain enamel</td>
<td>42 AWG plain enamel</td>
<td>42 AWG plain enamel</td>
</tr>
<tr>
<td>Bobbin orientation</td>
<td>Top out</td>
<td>Top out</td>
<td>Top out</td>
<td>Top out</td>
</tr>
<tr>
<td>Winder direction</td>
<td>Counterclockwise</td>
<td>Clockwise</td>
<td>Counterclockwise</td>
<td>Clockwise</td>
</tr>
<tr>
<td>Coil direction</td>
<td>Clockwise</td>
<td>Counterclockwise</td>
<td>Clockwise</td>
<td>Counterclockwise</td>
</tr>
<tr>
<td>Start</td>
<td>Black ground</td>
<td>Black ground</td>
<td>Black ground</td>
<td>Black ground</td>
</tr>
<tr>
<td>Finish</td>
<td>White Hot</td>
<td>White hot</td>
<td>White hot</td>
<td>White hot</td>
</tr>
<tr>
<td>Notes</td>
<td>Jazz Bass coils are reverse wound with reverse polarity, to allow for hum canceling when both pickups are combined.</td>
<td>Jazz Bass coils are reverse wound with reverse polarity, to allow for hum canceling when both pickups are combined.</td>
<td>Precision Bass coils are reverse wound with reverse polarity, to allow for hum canceling.</td>
<td>Precision Bass coils are reverse wound with reverse polarity, to allow for hum canceling.</td>
</tr>
</tbody>
</table>
Customer __________________________  Date __________________________
Address __________________________  Notes __________________________
__________________________________
__________________________________
__________________________________
Phone ____________________________  Notes __________________________
e-mail ____________________________

Pickup type
☐ Single coil
   ☐ Clockwise
   ☐ Counterclockwise
   ☐ RW/RP (Reverse Wind/Reverse Polarity)
☐ Humbucker
   ☐ Clockwise
   ☐ Counterclockwise
☐ Custom/other ______________________

Coil
Wire type ____________ gauge ____________
Polarity  ☐ North  ☐ South
Total turns __________________________
Notes ____________________________

Notes
__________________________________
__________________________________
__________________________________
__________________________________
__________________________________