The Magnificent Humbucker Coil-tap/split
by Kevin Smith

For as long as I can remember the coil-tap or split has been a mystery to most guitar players. I am writing this to dispel that mystery and uncover one of the most useful tools guitarists have at their disposal. All the split really does is give you access to the intersection between the 2 coils of any humbucker or 2 coil pickup and can be switched to the ground or the hot for numerous sound combinations. Now don't get me wrong, for any vintage purist that isn't interested in coil taps and wants to slap the toggle of their Les Paul to get the full on humbucker tone you have my blessing, rock on.

Being a club musician playing original and cover tunes, I am the last guy to carry 4-5 guitars to a gig to get 4-5 sounds for different songs. Now I am not going to try to convince you that I can get my Stratocaster to sound like a Les Paul, or vice versa. BUT, I can use a variable coil-tap with any humbucker'd (?) guitar to dial in sounds from full output to slicing single coil tones and all points in between. You would be amazed at how killer my Les Paul sounds with a single-coil output going through a light overdrive. In my opinion more like a Ric or Telecaster. Again, purists may want to turn away. I am not trying to convince anyone that they shouldn't use a variety of guitars. Just know that a tap on any humbucker with open up a world of sweet tonal possibilities.

"Picking" the right humbucker

For so long players have had to carefully pick and choose the output and tone of the humbuckers they used, going through dozens until they find the holy grail, or what they think to be the perfect or closest thing to perfect available (many times compromising one sound to get the other just right). Usually if a humbucker sounds nice and fat with some gain, it is too dark on the clean settings. Or the opposite, it sounds nice and glassy while your amp is set to the clean channel, but when applying light or heavy distortion the thing gets tonally thinned out.

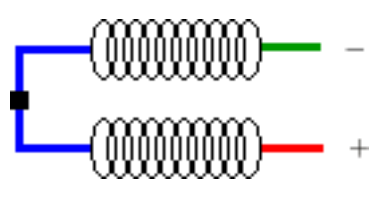
Enter the coil-tap or coil-split

Most of us know what a single-coil Stratocaster or Telecaster style pickup sounds like. They are normally crystal clear, glassy, and great for most amp settings. Well basically all humbuckers are 2 single coils run together in a series circuit with a 180 degrees opposite phase to cancel hum. When you double up on coils like the ones contained in a humbucker, you get higher output which normally yields a louder, darker tone. What we are going to discuss is how to access both single coil and full output from the same humbucker using switches and potentiometers giving you a wide spectrum of tones from a seemingly "one sound" pickup. For the most part you will not need to alter or add to your guitars original circuitry.

So now I don't have to reject the higher output humbucker I love because it's always too dark. I can make it dark when I need that sound, or dial it back for a full, sparkling tone that even gets some jangle, or an even thinner Tele twang that will make your otherwise useless compressor ready for action.

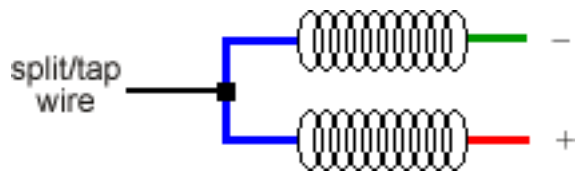
Keep in mind that the humbucker does need to be 3 or 4-conductor to use the coil-tap/coil-split. With a 3 conductor pickup the extra tap/split wire is connected to the intersection between the 2 coils. With a 4-conductor pickup the intersection wires (blue wires in the diagram seen to the right) are not connected so each end of the coil is free to be placed in any combination. With standard series/split operation you will end up connecting the blue wires anyway to form that intersection. These options cannot be achieved with a 2 conductor vintage style lead unless you want to send it to Smit's Handwound Guitar Pickups to be modified to do so. We can do that!

To keep it simple, I will not go into the complete inner workings of the humbucker which is 2 coils of wire within a magnetic field. All we need to know is the beginning of one coil connects to negative (ground -), the end of that coil connects to the end of second coil (■), and the beginning of the second coil connects to positive (hot +). This is standard humbucker operation and is called "series operation" because the coils run in a "series" from negative to positive



The hot (+) connection is usually a 3 or 5 way switch or toggle, or the left lug of the volume pot, which in turn finally makes its way to the tip of the output jack. The negative (-) is a common ground that connects all casings of the volume/tone pots and finally ends up at the sleeve of the output jack. The tip of your guitar cable is the hot (+) signal and the sleeve is the negative (-) ground which also shields it from noise.

A humbucker wired with a split or coil tap wire intersects the 2 coils at this point (■). When the split/tap wire is connected to hot (+) the signal flows only through the top coil. So now the top coil is fully functioning (no signal flows from the positive intersection to the positive of the lower coil making it inactive) resulting in lower output and a signal with less lows and mids. Basically a single-coil. The only way to completely isolate each coil is to use a 4 conductor lead. This lead wire is usually an option with most manufacturers, and the intersection is formed by connecting the green and white (Smit's, Gibson), red and white (S. Duncan). The 4 conductor lead allow us access to both ends of each coil, whereas the 2 conductor connects the intersection between coils internally and allows access to only hot and negative. A single split tap wire can also be installed between the coils for tapping capabilities, leaving the original 2 conductor intact. This wiring mod can be used with all diagrams below.



The opposite happens when a negative (- or ground) is connected to the split/tap wire, only this time the bottom coil is activated(top coil inactive). 100% of the current flows from the split/tap wire to the hot (+).

Since we are dealing with 1 pickup, why would it matter which coil is cancelled from a sound perspective? Believe it or not there is a tonal difference between the 2 coils. If you are interested in a wide range of sounds then the option to isolate each coil differently would be a welcome tonal tool.

Of course connecting the split/tap wire directly to hot or ground would not make sense because then you have disabled the option to use both coils in humbucking mode, which is why you bought the pickup in the first place. Ok, then we can connect the split/tap to a switch, then to hot or ground (or both, hmmmm?) making the single coil a switchable option. Wow, 3 sounds from 1 pickup. This is just the tip of the iceberg.

Toggles and pots

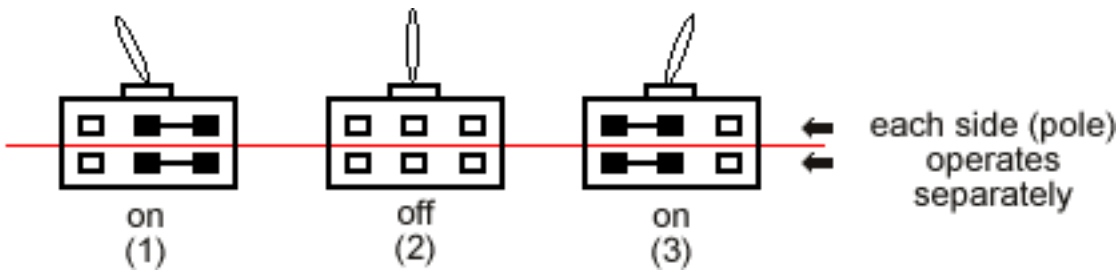
There are 2 methods of connecting the split/tap wire to hot or ground. You can use toggle switches or variable resistors, otherwise known as potentiometers. Yes your everyday garden variety guitar pot, 250k, 500k, 1 Meg ohm pots. I have done this for years. Disconnect the bottom tone pot on my Strat, make the middle pot a master tone and the bottom becomes my humbucker variable coil tap. No holes drilled for toggles and the guitar retains its original look.

"The Toggle"

Lets start with the toggle switch. There are many types of mini toggle switches and most will get you on/off operation, but limit other options. What you need is a DP/DT mini-toggle, on/off/on. That is double pole/double throw. Double pole means 2 sides (poles) isolated from one another that the switch will affect separately.
Each pole has 3 connections. Double throw means the switch has 2 movements (throws) that result in 3 positions (left on (1), middle off (2), right on (3). Why 2 isolated poles? It allows for 2 separate electrical actions to occur when the switch is moved that don't affect one another.

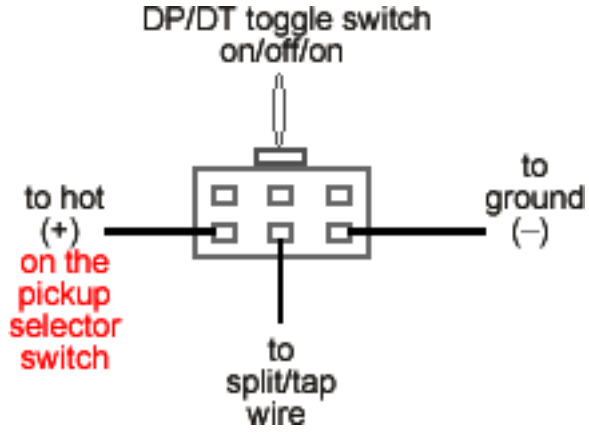
The type of DP/DT toggle you need is an on/off/on. This diagram illustrates the internal

electronic connections between lugs depending on switch position. The first(1) "on" position connects the right and middle lugs on each pole. The second(2) position is "off". This position yields no connections within the switch. The third(3) "on" position connects the middle and left lugs.



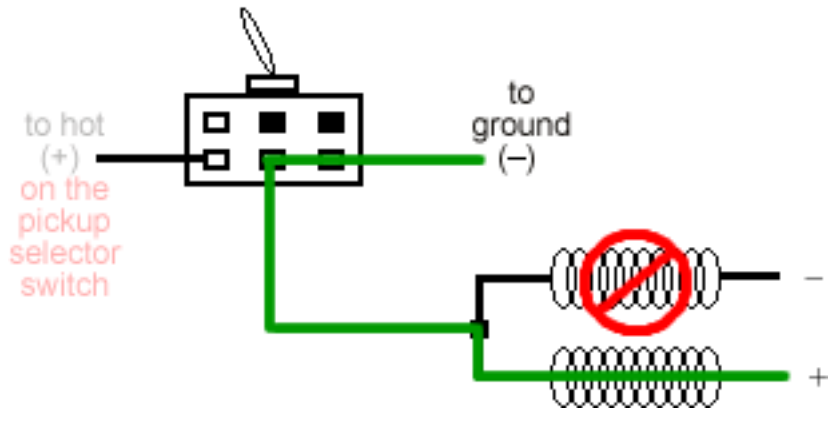
The Toggle Connections

Ok, remember when we connected the split/tap wire to ground to cancel one coil or to hot (+) to cancel to other coil. Lets connect the split/tap wire to the middle lug on one side of the toggle switch. On the same side (bottom pole) attach left lug to hot (+), and the right lug to ground (-). It is important to note the the hot (+) connection from this toggle must go to whatever lug switches the pickup on and off in the circuit. If the connection goes to a hot that is always on, then this pickup will always be on even when you switch to a completely different pickup.

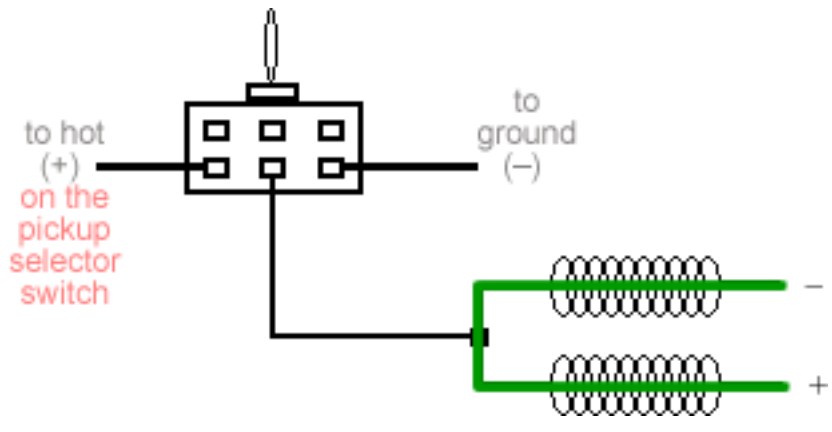


Position 1

The green paths indicate signal flow

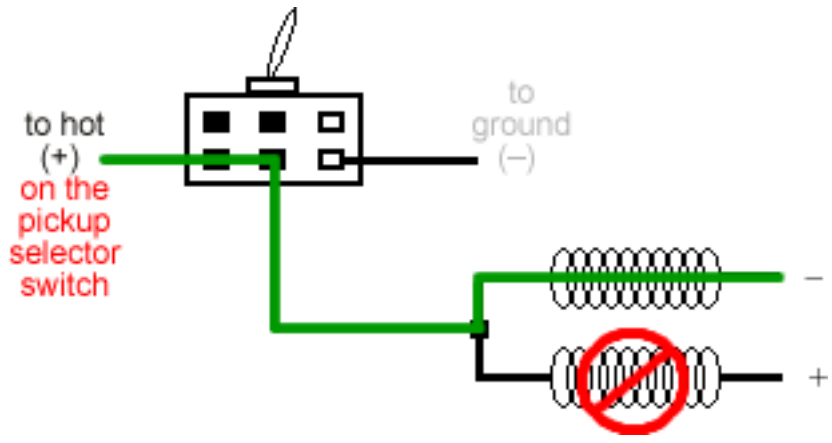


Position 2 (full series humbucker)



Position 3

To help visualize what happens when we use this switch I used the red "no" symbol (circle w/line through it). When in fact if the switch is used a small amount of signal still flows through the cancelled coil. The only way to truly isolate each coil is when a 4 conductor lead is being used. Down sides....none really. The small amount of signal that sneaks through is inaudible. In fact the tapped sound will very "single coil" sounding. In some cases very thin. That brings us to my next section- The Variable coil-tap/split.



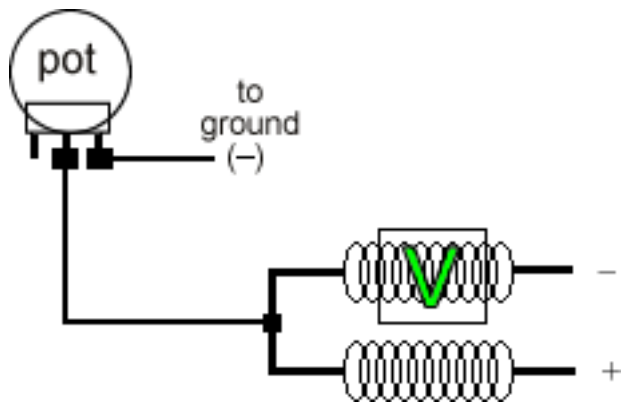
The "Potentiometer"

Ok, switching 1 coil on and off is a great thing, but what if you could use a variable resistor (potentiometer or "pot") to turn that coil up and down instead. Wow, a volume control for half of the pickup. Now we can dial in sounds from full blown humbucker down to single coil and all points in between. This is a great tool when your humbucker is too fat, or too thin (when split with a toggle switch), so you tweak the pot for a bit for more or less. Believe me, turning your regular volume control up or down will not have the same effect.

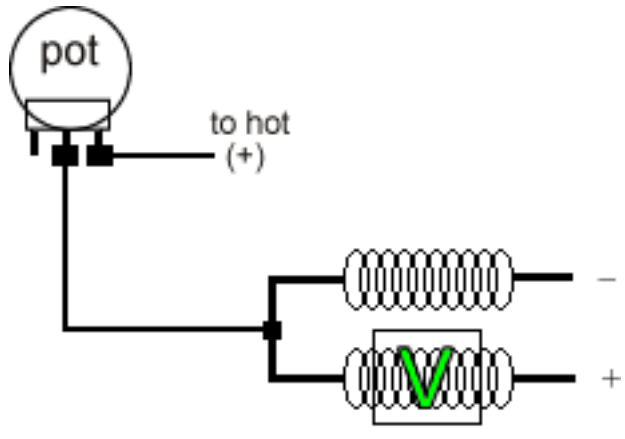
The Variable coil-tap/split

You can use any type of pot for this mod, as each will have varying degrees of resistance changing the amount of signal that gets through. If you are using a Strat, an existing 250k will work fine. Or 500k on a Les Paul. The left lug on the pot is left unconnected. The middle and right lugs are wired according to these diagrams.

Previously a toggle switch provided a hot (+) or negative (-) signal to the split/tap intersection. The only difference here is that we are slowly bleeding that signal in at a varying amount, which in turn cancels one of the coils according to the amount of signal at the intersection. The large V denotes the "variable" coil. Although working on a different principal than a guitar volume pot, the same effect occurs with the variable coil. Like a volume control for that coil. The opposite coil is not affected by this and stays at full output.



Depending on what the right lug of the pot is connected to, hot or negative ground will determine which coil is affected by the signal at the intersection. Please note again that when connected to hot, it must run to the switchable hot (the guitars pickup selector switch) so there is NO hot signal going to this pickup when it is not selected.

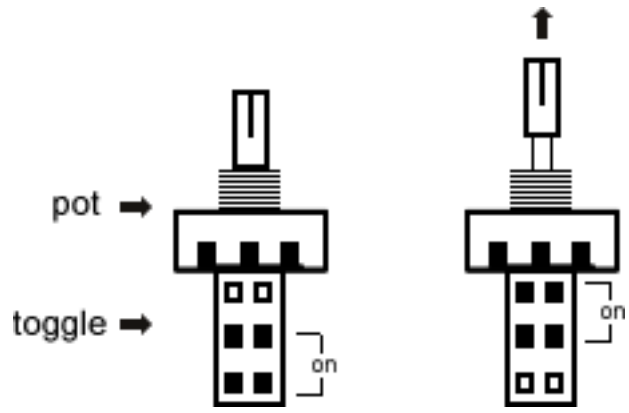


Like I said before, there is quite a difference in the sounds of each coil even though they are very close together (coil location affects the sound you hear). When the pickup is in the bridge position the coil closest to the bridge has a thin biting sound that cuts through like a Tele with plenty of spank. The coil away from the bridge has more juicy midrange honk and is a pleasing, very useable tone. When utilizing this mod for a neck pickup, the coil nearest the fretboard is stringy and cuts through nicely, yet will have enhanced low-end. The coil away from the fretboard gets you back into that middle position honk and a yet undiscovered "cool" tone.

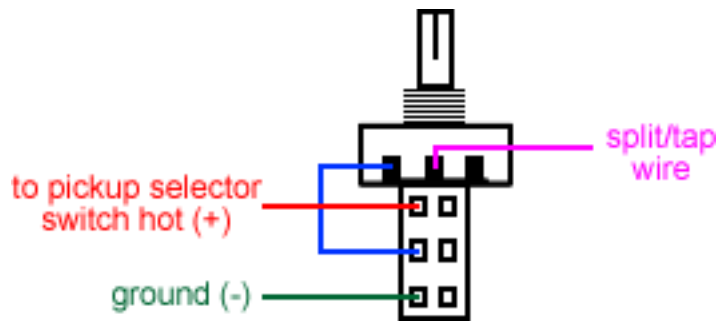
Dual coil variable coil-tap/split

What this mod does is allows you to choose which coil is variable, so rather than being stuck only varying one coil, you can vary either coil for a wider choice of tones.

Part required- a 250k or 500k push-pull pot, which is a potentiometer with a DP/DT on/on toggle piggybacked to the case. When you pull the pot shaft up it switches the toggle to it's alternate position.



Hooking this mod up is quite simple. Solder the split/tap wire(s) from the pickup to the center lug on the push-pull pot. The left lug of the pot (left side when pot is turned right side up as shown) is connected to the middle lug on the toggle switch, either pole (side). Now from the same pole connect the bottom lug to ground(-) anywhere in the circuit. Connect the top lug to hot(+) of the same pickup on the pickup selector switch (If you connect the hot(+) to anywhere else in the circuit, the pickup would always be on. This way hot(+) signal only flows when the pickup is selected). Now you can select where the split/tap junction connects to, the hot(+) or the ground(-), which in turn determines which coil is variable.

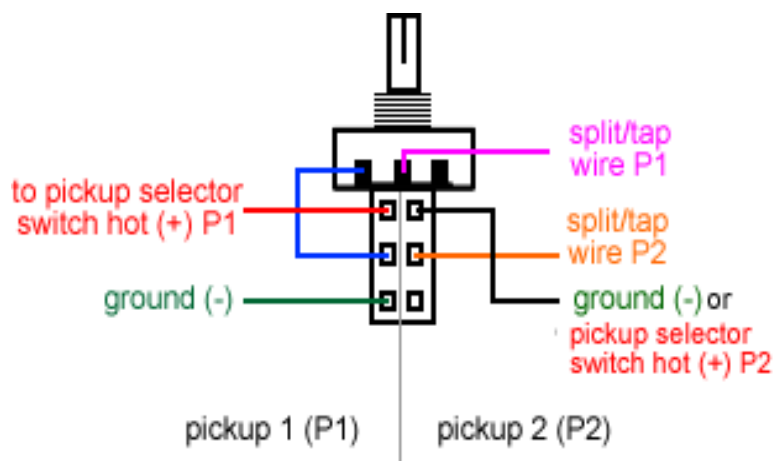


That's it, you're done. Go ahead and try it out.

Note- you can reverse the hot (+) and ground (-) wires and send the blue jumper to the right side of the pot if want this push-pull pot mod to work the opposite way, or for left handed guitars. Either way is your preference.

2 pickups, 1 push-pull pot

At this point you have only used one pole (side) of the on/on toggle. Since the poles are separate circuits you could still utilize the other side to switch another pickup with the split/tap wire, but would be limited to simply splitting the 2nd pickup with no variable choices. I find that with the variable connections used for the bridge pickup, the neck pickup isn't quite as fussy and sounds good with this simple tap. So now you have a push-pull pot that fully varies either coil on the bridge pickup, and functions as a simple tap for the neck pickup. For "variable" split/tap choices for each pickup, you would need to install a separate push-pull pot for the neck pickup.
NOTE- while using the configuration to the right, when connecting more than one lug to ground, you can have a jumper between them so only 1 wire needs to be run from the switch to the ground.



To summarize-
In my opinion using a full-on, full output humbucker by itself is definitely glorious. In saying that, I will

add that anyone who wants more that one sound from a pickup can find many sweet variations using a variable coil split/tap and to be honest, I wouldn't be without that option. Backing off one coil with the volume half way up is a very pleasing rhythm tone, then when it comes time for a solo or lead break just roll up the volume or variable tap and let'er rip. Even more glorious!!!

Kevin Smith