

G&L L2K Wiring Mods Rev 4.1
27-Dec-2017
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1 Introduction

1.1 2017 Forward (**Added 12/17/2017**)

This is what I believe to be the fourth addition of this document. I say “believe” as I did not keep the cleanest of archiving records when I started doing this. I started posting my “experiments” in the Dude Pit G&L forum shortly after I bought my first G&L in May of 2003 (first ever L2500 quilted top from Dave McLaren). There were a few other intermediate stops for this info which included Talkbass and Bad Ass Bass Players. I just came across the Basses By Leo forum that appears to have a really organized forum dedicated to these wonderful G&L basses. Thanks Ken for putting it all together.

To me, the G&L L2000 bass is like a “Heath Kit” or crystal radio kit for bass players. It exemplifies the creativity, technical prowess, and entrepreneurial spirit of the man who has contributed more to the electric bass than anyone else. It seems impossible to think anyone could contribute more to the electric bass guitar than Leo Fender. And after already providing the world with the most played, most recorded, most copied, and most revered bass designs in history, Leo founded G&L. He kept innovating and seeking the next big thing. And here we all are admiring and analyzing his final bass contributions with that same innovating spirit. And his lifelong passion of innovating provides us a stellar example of a man who “never rested on his laurels”.

I find it ironic that the vintage Fender crowd generally never wants to change a thing on their original Fender bass, whereas the G&L crowd seems to have as much fun modifying the bass as they do playing it. I would say that the G&L crowd is probably more of the mind set of Leo Fender than most in the music community. It’s great to hear all the G&L folks talking about how to do things a little different, a little better, and in ways that provide individual customization and real pragmatism.

I have been making money as an electrical engineer since 1992. I have designed many analog, power, and magnetic circuits for harsh environment industrial control systems. In that world, I am proud to say I have a lot of stuff in the field that has been mass produced and functioned for many years with good reliability. When I first started tinkering with the guts inside my L2500, I started applying my electrical analysis skills to what I was seeing under the hood. I stumbled into this world first as a bass player and then soon after as an engineer.

After playing my G&L for a bit, I started to miss my 1961 Jazz bass single coil clarity that I had grown up on. This got me looking at the G&L coil arrangements and coil switching. It would have been possible to achieve single coil operation and live with two coil arrangement options with the stock 4PDT on-on switch. But I did not want to give anything up. I was pleasantly surprised to find that there were commercially available 4PDT on-on-on switches that could drop into the L2000 cavity. This allowed adding the single coil option and retaining the Parallel and Series options.

As I was determining how to wire up the 3-way switch to add single coil options, hum cancelling coils became a focus of how exactly I should approach the single coil modifications. This led to exploring the Series mode OMG capacitor hum. It was well known in 2003 that disconnecting the OMG caps could eliminate the Series mode hum. But it severely changed the Series mode sound. And the worst part of the original Series OMG mode was that two pickups together where hum adding. As I was looking at the hum bucking nature of the single coils, it became obvious that the two single coils not being filtered in the Series OMG mode were of the same winding polarity (both white-black coils were full spectrum). I was a little surprised that G&L had not realized and/or fixed this. So my earliest mods changed the OMG filter cap on the bridge pickup to filter the white-black coil instead of the yellow-green coil. This created a humbucking pull spectrum pair of coils with the white-black neck and yellow-green bridge coils. This allowed humbucking operation in Series OMG mode with both pickups selected.

This version of the document adds wiring Mod #10 that allows for Parallel, Series, Single Coil Inside, and Single Coil Outside without drilling any more holes. After not owning a G&L for the last 8 years, I am drawing this up with a new-to-me L2000 Tribute as my newest G&L "Heath Kit". I am also modifying the preamp treble response to go along with these modifications. That is another document.

Also, if you have made modifications to your G&L using this document or earlier versions, please send me an email at daveplaysbass@hotmail.com and let me know what you did and what your favorite settings are. There are enough people out there doing these modifications that I would like to do some statistical analysis of what people like. In my opinion the only way to sort thru the 100s of variables in electric basses, is to look at things statistically with large data sets. Now I am talking like Dave the engineer rather than Dave the bass player☺. Peace.

1.2 Some Technical Stuff Before You Get Started

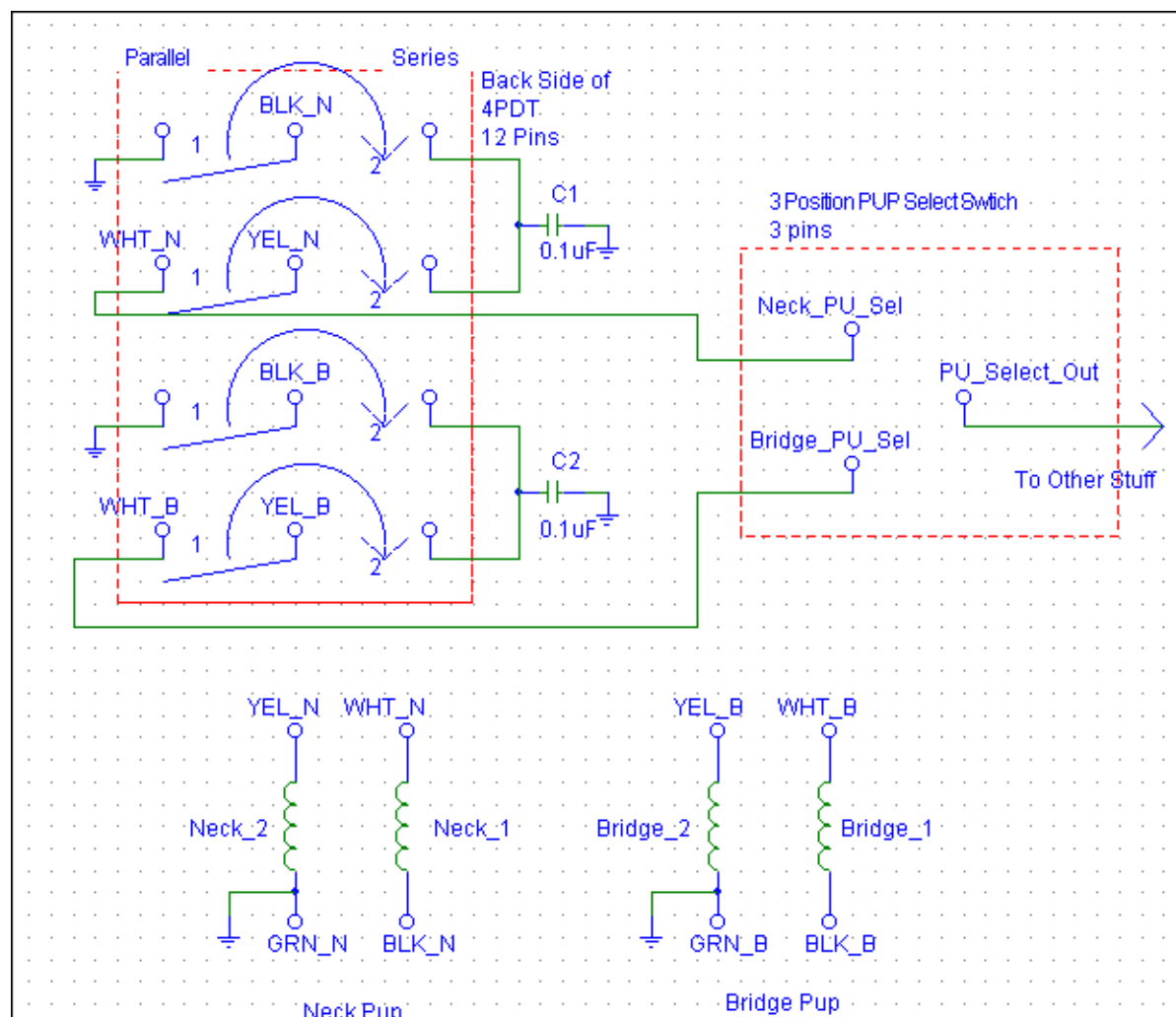
There are a number of different wiring mods provided in this document. All of these wiring mods are based on modification of the wiring of the Parallel / Series switch. This is a 4-pole double-throw (4PDT) switch. This means the 4PDT assembly has four electrical switches (4 poles) on it that switch from one point to a second point (double throw). With the purchase and installation of a 3-position 4PDT on-on-on switch, it is possible to add a single coil option along with the stock Parallel and Series options. The 3-position 4PDT switch is a drop-in replacement for the stock 2-position 4PDT switch (it looks exactly the same). The only difference is that there are three unique switch positions rather than two.

I have made some changes to the wiring approach relative to earlier versions of this document. The Tribute L2Ks are nicely shielded with conductive paint and the green wire from the pickup gets tied to both the cavity shield ground and the pickup assembly case. This improves the G&L noise rejection. In order to preserve this noble grounding improvement, I will not unground either of the green pickup wires as was shown in earlier versions of this document.

2 Stock Wiring

L2K stock wiring should look like this. This details the pup connections leading up to the pup select switch. The G&L website provide a complete schematic of the pup wiring thru the bass / treble cuts thru the preamp. I have not included all this extra stuff because the mods in this document do not change anything down stream of the pup select switch.

Tributes' stock wiring is done differently. First off, Tributes do not have the capacitors C1 and C2. This means the Series setting on the Tributes is different that USA models made before 2006. The latest US models also do not contain C1 and C2. Also in the Tributes they connect up the pickups to the switch a little differently. They have a variation that results in fewer solder joints. This along with the removal of C1 and C2 results in an easier to manufacture product. However, the end result is still the same regarding Series and Parallel connections.



The yellow-green coils are located closest to the neck and the white-black coils are located closest to the bridge.

Note that there is a 4-pole double throw switch that connects the center posts (poles) either to the left side contacts in position 1 or the right side contacts in position 2. Position 1 is Parallel. Position 2 is Series.

In the Parallel setting each pup has it's two coils tied in Parallel (yellow connected to white, green connect to black). When connected in this manner the magnetic signals add (musical stuff) and the noise signals cancel (noise). This is humbucking.

In Series the grounded coil (yellow-green) is on the bottom and the ungrounded coil (white-black) is on the top. The yellow wire connects to the black wire with a 0.1uF to ground at that point of connection. Because of the capacitor the two coils for a given pup are not humbucking. The four coils working together are HUM ADDING because the same polarity of coil is in the bottom of each series string and the capacitors unbalance the humbucking nature. If the caps were not there, all of the Series configurations (1 pup or 2 pups) would be humbucking. Tributes and US G&Ls made after 2006ish do not have capacitors C1 and C2.

3 Series Humbucking Modification #1 (Stock Hardware)

One other thing to note is that a well shielded bass does not hum much if at all. My Tribute came shielded. And it is quieter than two US G&Ls I have had.

The stock G&L Series setting is not humbucking for two reasons. The first reason is that capacitors C1 and C2 create an unbalancing of the two coil windings. The yellow-green windings get all their highs shunted to ground thru these caps and the white-black winding do not. If the capacitors are removed, then the yellow-green and white-black windings will form a balanced humbucking situation. The first mod is simply removing these two caps.

This will change the Series setting a bit. The capacitors take away a lot of highs which result in an overall response that is very bottom heavy. When the caps are taken out, there will be a lot more highs in the Series setting and it will not have the "bass boost" function as much as it will just give a 6 dB boost relative to the Parallel setting and will roll off at a lower frequency.

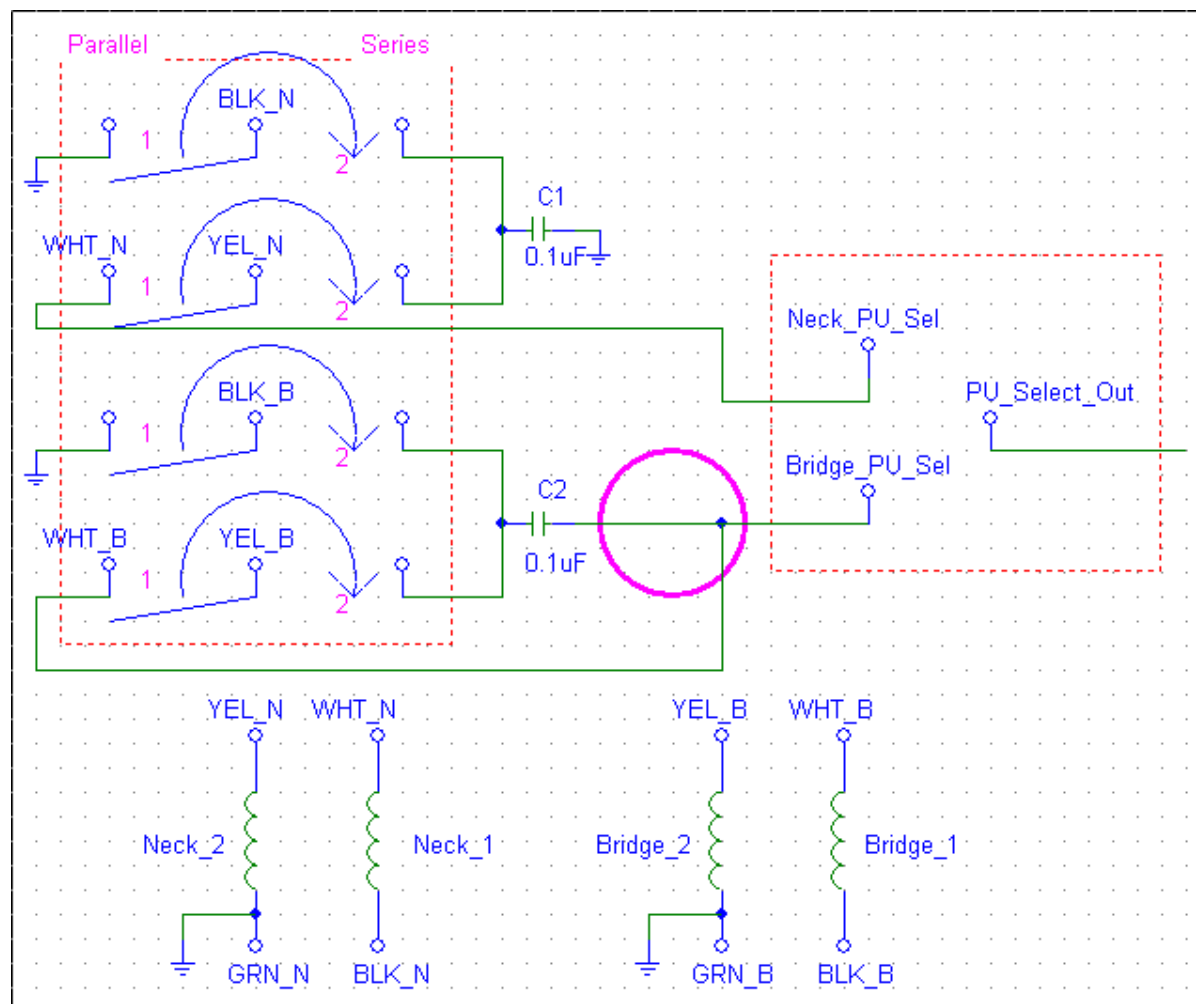
I personally did not like this setting very much on my Climax or my Tribute. I think the bass boost capacitors add a character that can be bottom heavy but with some bass cut there are some nice sounds to be had. But I include this for completeness and the fact that many have removed these caps and are happy with the results.

4 Series Mode Humbucking Modification #2 (Stock Hardware)

The second way to address the hum associated with Series is to create a balanced humbucker with all four coils and C1 and C2. This is done by connecting C2 as shown below. When C2 connects as shown, the highs get sucked out of the top neck coil which is the white-black coil for the bridge. So from a humbucking perspective the neck white-black and the bridge yellow-green are full frequency and buck hum together with both pups on. And the neck yellow-green and the bridge white-black have their highs sucked out and also form a balanced pair with both pups on.

The limitation is that you only get humbucking operation with both pups. Solo a pup, and it will be just like the stock hum. However, with stock wiring, the two pickups in Series mode are hum adding. So you get twice the hum with both pickups on with stock wiring. And this can be quite noticeable in an UNSHIELDED bass. Shielding makes a HUGE difference.

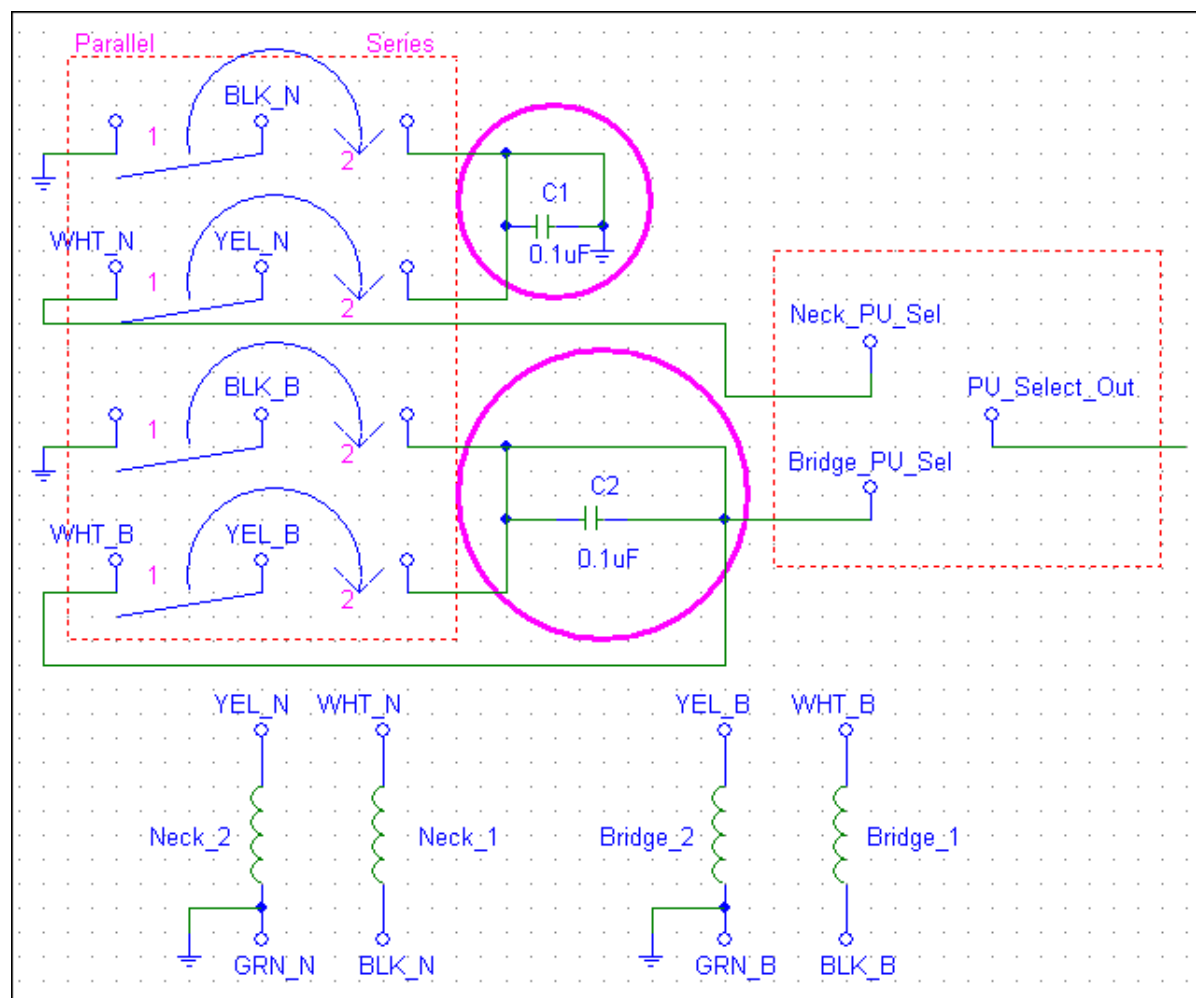
As for change in tone, there may be some difference on the bridge Series setting. In the stock configuration the white-black bridge coil is the full spectrum coil and with the mod this is switched over to the yellow-green coil. On paper you have traded some treble bite for some midrange fatness on the bridge Series setting. But it should be pretty negligible. I really like the soloed bridge pup in the Series "SC with bass boost" setting wired as below. A very useful setting if a room is boomy.



5 Parallel – SC Inside Mod (Stock Hardware)

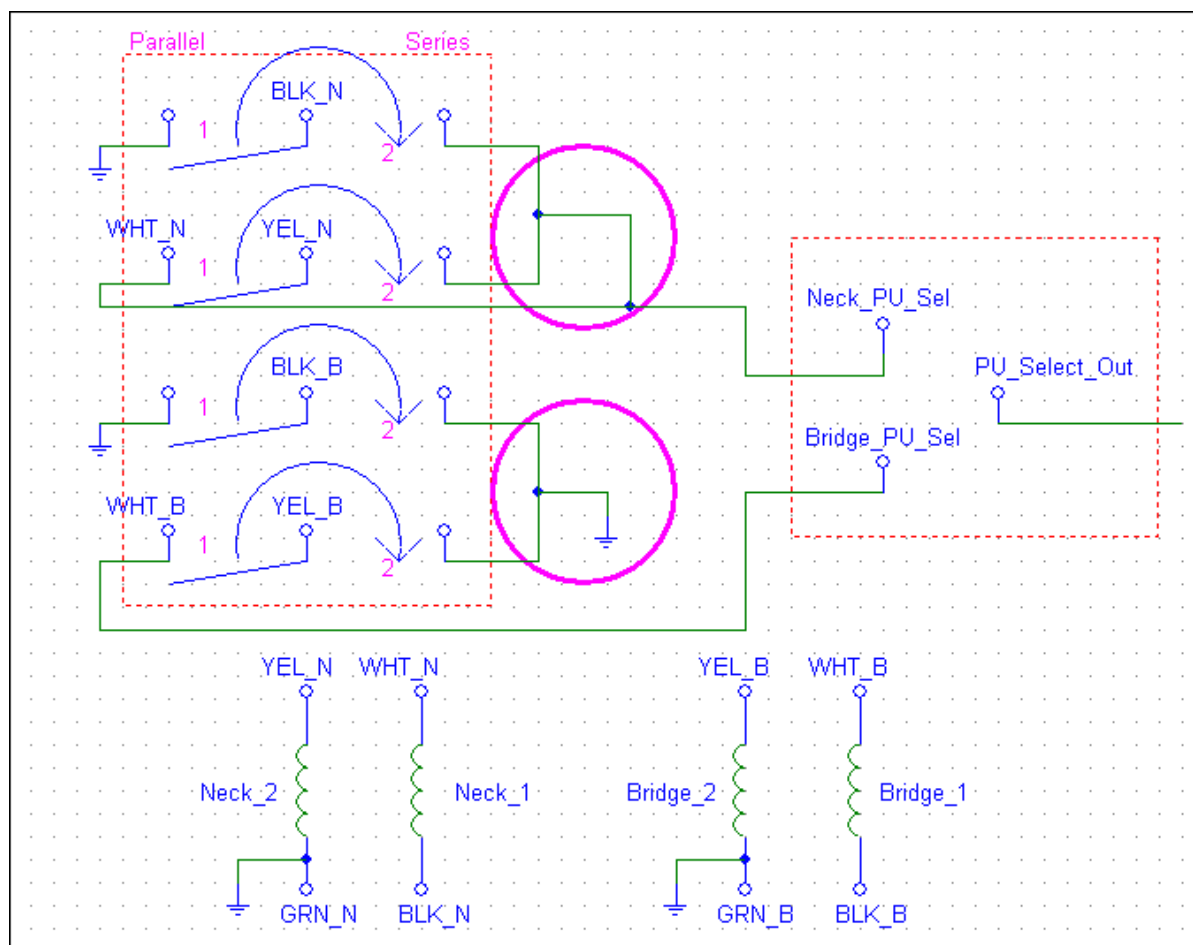
This mod eliminates Series mode and replaces it with a single coil mode. The single coils selected are the Inside coils (i.e. the neck pup coil closest to the bridge and the bridge pup coil closest to the neck). This uses all the stock hardware provided with an L2K and is very easy to undo. NOTE THAT the C2 capacitor has been rewired per section 3 first. THIS IS ESSENTIAL to making this work correctly.

If you do not have capacitors C1 and C2 in your bass, just add the shorts and ignore the capacitors.



6 Parallel – Single Coil Outside Mod (Stock Hardware)

This mod eliminates Series mode and replaces it with a single coil mode. The single coils selected are the Outside coils. This uses all the stock hardware provided with an L2K and is very easy to undo. NOTE that C1 and C2 have been pulled from the circuit. THIS IS ESSENTIAL. You could have a capacitor in parallel with the short and it would not affect things.



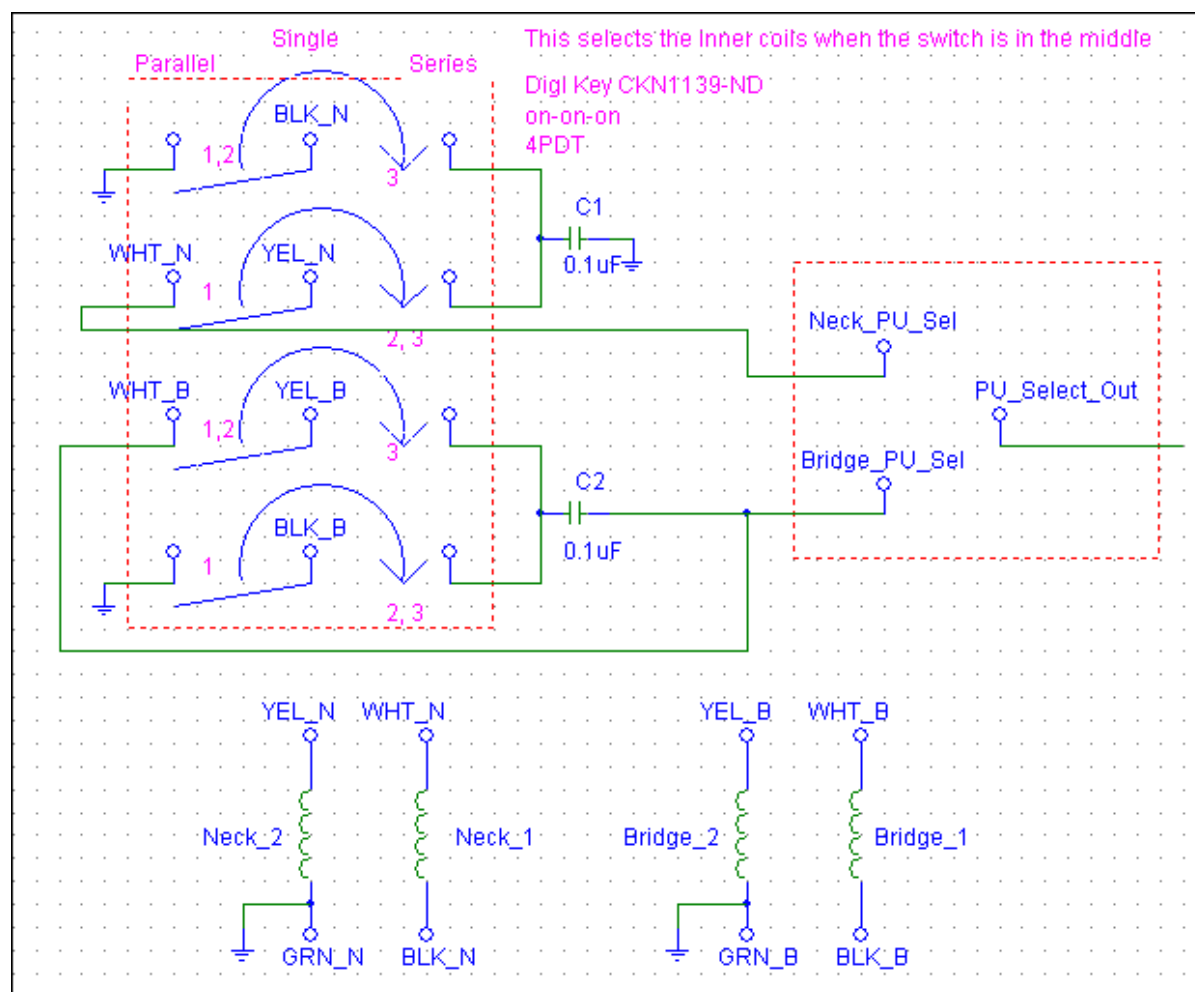
7 Parallel – Single Coil Inside – Series Mod (3-Position 4PDT)

This modification replaces the two position on-on 4PDT with a three position on-on-on 4PDT. The middle position provides an Inside single coil (SC) setting.

Today, this is my preferred single coil setting. With both pups on, it is punchy and thick but clearer than Parallel. Think of it as a wide Stingray or Climax humbucker with a little more bottom end. Solo the neck, and you get the L1K SC setting (coil closest to bridge). I have my Tribute L2K wire like this. I like it a lot. My go to setting is the SC – both pups – active or passive depending on how much sizzle is desired.

IT IS ESSENTIAL to verify that the switch behaves exactly as indicated below. This can be wired with or without capacitors C1 and C2. They are only active in the circuit in the Series setting and provide the “single coil with bass boost” Series setting.

BE SURE TO VERIFY THAT THE SWITCH USED performs as specified below (the Digi Key CKN1139-ND does). In other words in position one (Parallel) all of the poles (center posts) should be connected to the left side, in position two (single coil), two of the four poles change position to the right side, and in position three (Series) all of the poles are connected to the right. MAKE SURE THAT IN SINGLE COIL MODE (middle position or position two), that everything matches the drawing below. The numbers 1,2, and 3 are used to indicate where each of the four poles are connected at the respective switch position. If this does not make sense, find someone that can help you figure it out. If things are done backwards, the single coil mode will not work as intended.



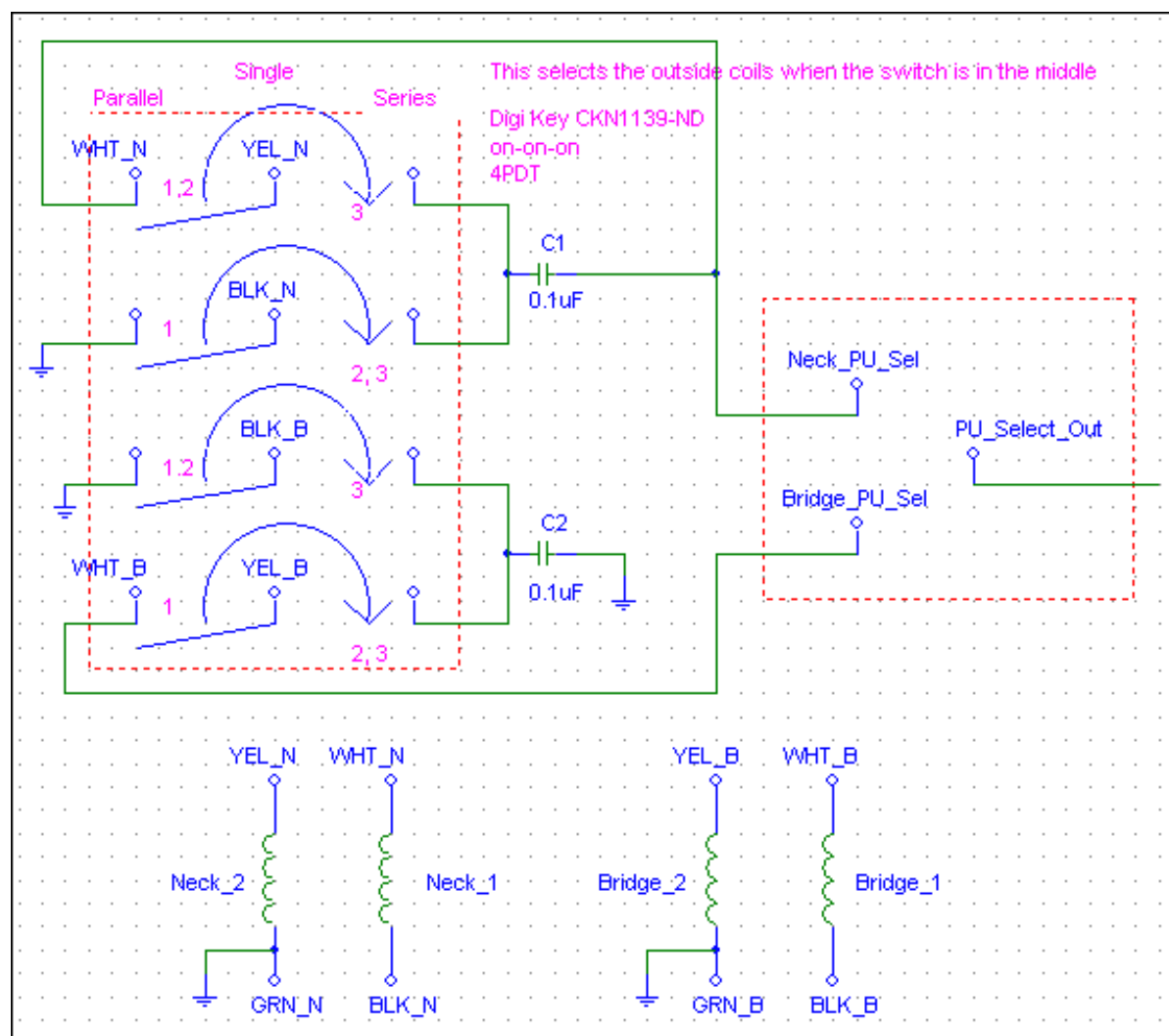
8 Parallel – Single Coil Outside – Series Mod (3-Position 4PDT)

This modification replaces the two position on-on 4PDT with a three position on-on-on 4PDT. The middle position provides an Outside single coil (SC) setting.

With both pups on, this provides a scooped sound that is great for slap. Think 70's Jazz Bass.

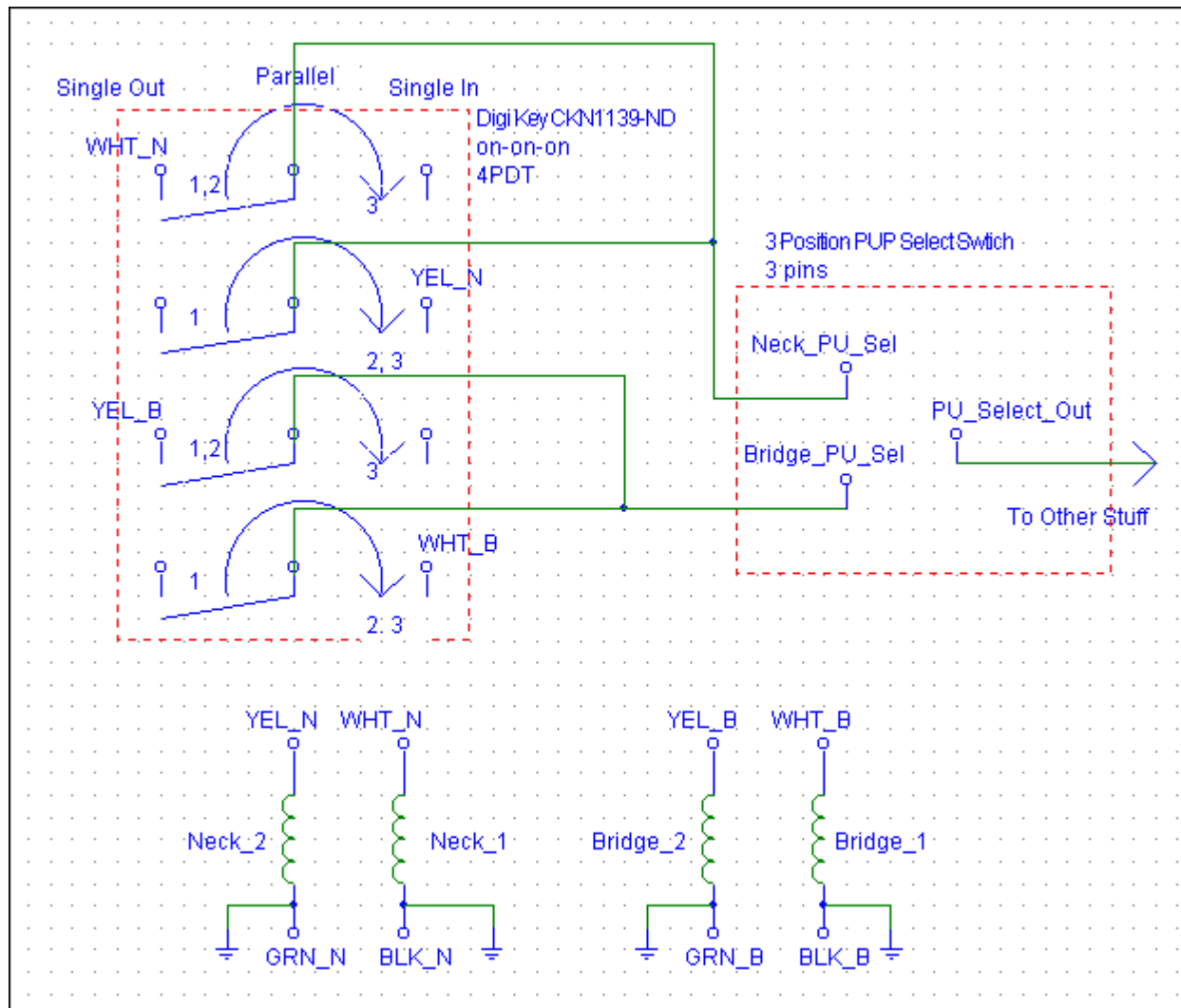
NOTE that C1 and C2 are wired reverse of sections 4 and 6. This emphasizes the outside coils in the "single coil with bass boost" Series setting.

BE SURE TO VERIFY THAT THE SWITCH USED performs as specified below. In other words in position one (Parallel) all of the poles (center posts) should be connected to the left side, in position two (single coil), two of the four poles change position to the right side, and in position three (Series) all of the poles are connected to the right. MAKE SURE THAT IN SINGLE COIL MODE (middle position or position two), that everything matches the drawing below. The numbers 1,2, and 3 are used to indicate where each of the four poles are connected at the respective switch position. If this does not make sense, find someone that can help you figure it out. If things are done backwards, the single coil mode will not work as intended.



9 SC Outside – Parallel – SC Inside Mod (3-Position 4PDT)

This modification eliminates Series mode and has a three position switch that goes single coil Outside => Parallel => SC Inside.



10 Parallel – SC Inside – Series + SC Outside (**Added 12/17/2017**)

This modification is a variation of Mod #7 (Parallel – SC Inside – Series). This simply replaces the Volume 250kΩ pot with a push/pull pot. The Volume pot is wired exactly the same way for the volume function. And the DPDT on-on switch on the bottom of the push/pull pot provides the ability to get a SC Outside model option. This is not the cleanest of mods in that there are some undefined states. When the main 4PDT is in Parallel mode, you can just pull up on the Volume pot and it will drop the Inside coils, leaving you with the Outside single coils. If you switch the 4PDT coil switch to its other two positions (SC Inside, Series), the push pull pot must be in the down position or there will be nothing connected to the output jack. In other words the push/pull pot becomes a kill switch in SC Inside and Series mode settings when the push/pull pot is pulled up.

Also note that I call out a different 4PDT switch than the earlier mods. It is the same function as the other switch but is almost half the price at the time of writing. I also am noticing that what I refer to as a 4PDT on-on-on is being referred to as a DP3T switch by the industry. I believe that my term is more “correct” but it does not search very well.

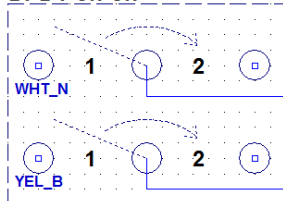
Volume Push Pull Position	3-Way Coil Switch Setting	Results
Down	Parallel	Parallel
Down	SC Inside	SC Inside
Down	Series	Series
Up (New State over #7)	Parallel	SC Outside
Up (New State over #7)	SC Inside	Off / Kill Switch
Up (New State over #7)	Series	Off / Kill Switch

SC Outside available when the 4PDT is in Parallel mode.

Pull Volume Pot for Outer SC

Down Pull
Par/SCIn/Ser SCOut/off/off

DPDT on-on



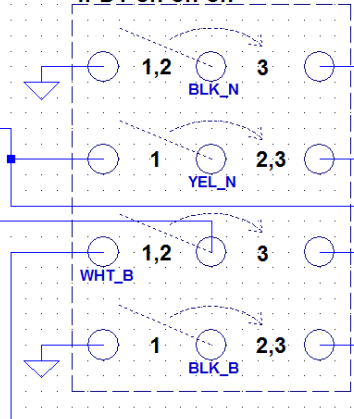
Middle Position Selects Inner SC

Digi Key Part # 563-1656-ND

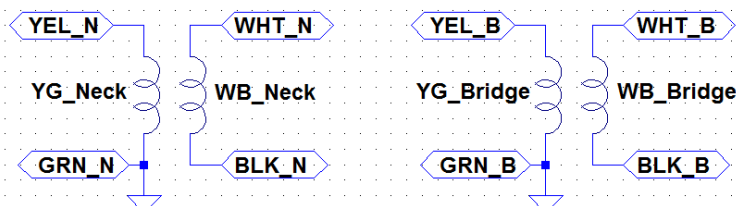
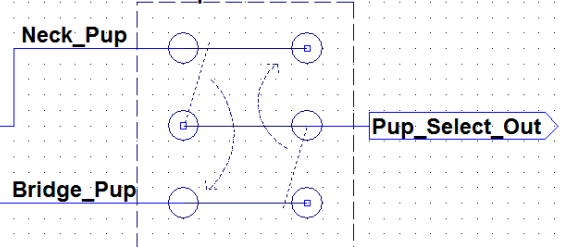
Copal Electronics Part # 8A4101-Z (DP3T)

Parallel SC Inside Series

4PDT on-on-on



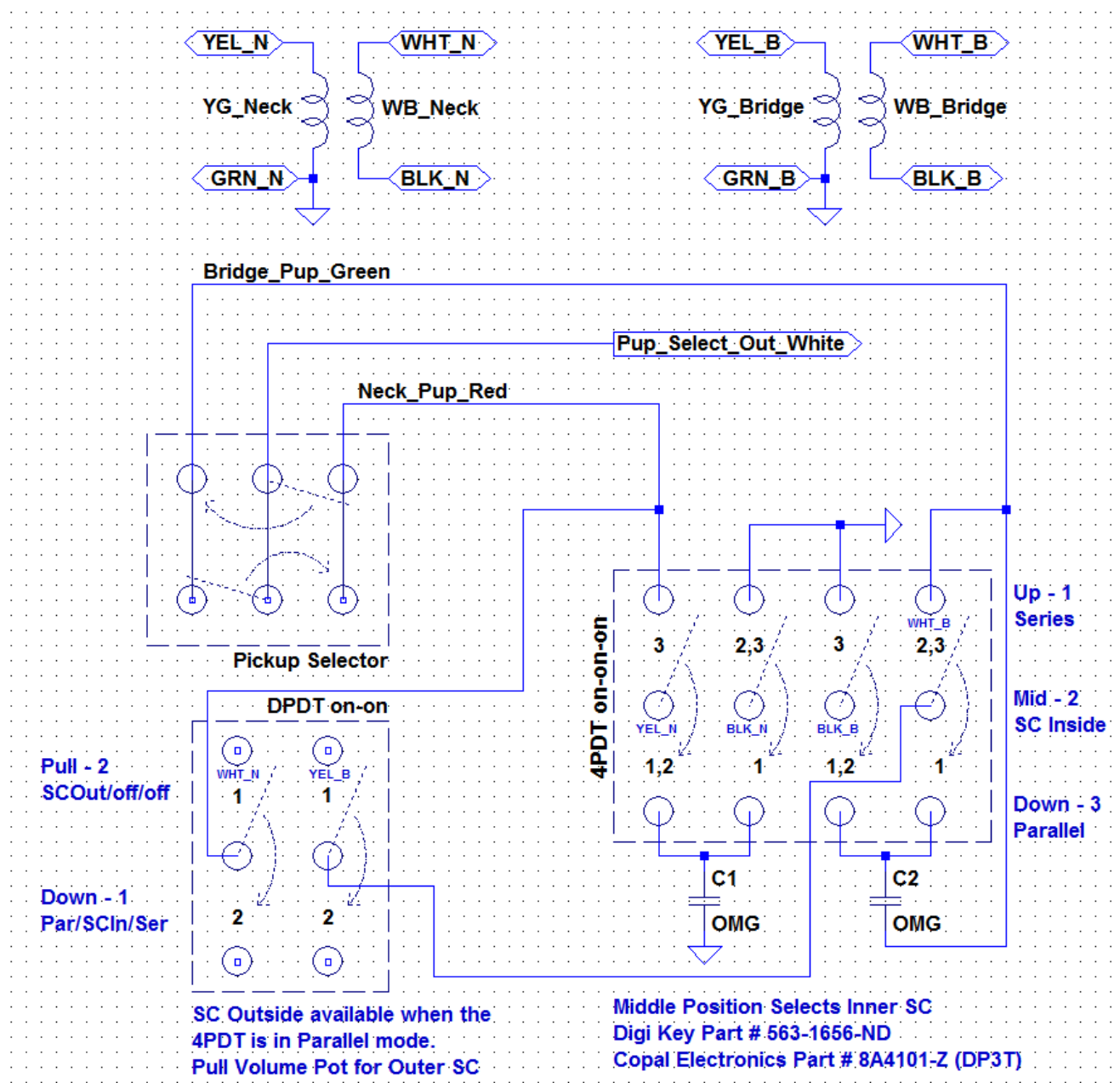
Pickup Selector



10.1 Alternative Wiring (Added 12/25/2017)

This is marginally easier if you are starting from scratch. If already did Mod #7, you may want to use the drawing above.

In order to make the wiring simpler, I changed Parallel to being in the “3” switch position. This wires the 4PDT in a mirror image of the diagram above based on Mod #7. This is drawn looking from the bottom of the switch from inside the control cavity. The neck is to the left and the bridge is to the right. The push-pull for SC-Outside is on the bottom of the volume pot.



11 Further Mods

There are many more wiring variations possible to the creative mind. Leo Fender created a highly flexible platform with a plethora of useful sounds to those willing to explore. The amazing thing is that nearly everything I have modded results in a useful tone. Leo has left us hidden tones in the L2K. I don't know of any other bass that can be produce so many different useful tones just by simple coil rearrangement and the clever use of a couple capacitors.

I have corresponded with people who have taken the basic ideas in this document and expanded them further. One individual (Benj) drilled for a second 4PDT switch and gets Parallel – Series from the stock switch but in Parallel mode he can use a 3 position switch like described above to go SC Inside – Parallel – SC Outside (this will not work with the bass boost capacitors in place).

Another individual (Sunbeast) has written about using individual DPDT switches for each pup so that he can get each pup in a different state (Parallel, SC, or Series). He did this by pulling the pup select switch and replacing the master volume with concentric volume pots (if I remember correctly). Not only did he get individual control of each pup state, he got the ability to blend them like a Jazz. The only drawback I see is the loss of the master volume which to me is very useful with these rather high output basses. I also think the master volume can be used as a tone control.

I had a bass wired SC Inside – SC Outside using the stock 4PDT switch. I have thought about ditching Parallel and going with a 3-way switch that does both SC settings and the Series setting. Or I could replace the Master Volume pot with a push-pull that could be pulled when in Parallel to get me the Outside SC setting I do not have today.

If you are having a hard time understanding what is going on with these mods. Draw the coils and their associated connections for each switch state. After doing this a few times, it may start to make more sense.

And if you gain anything from this document or find something new that is really cool, please give me some feedback at DavePlaysBass@hotmail.com or look for me on Bases By Leo or Talkbass.

12 Revision History (**Added 12/17/2017**)

Date	Revision	Comments
2004	1	Created original with 3 sections. This was the first 3-way switch mod that introduced the SC Inside option on a L2K style instrument.
2004	2	6 section document addressed Series mode hum and expanded on 2-way and 3-way switch possibilities
02/28/2008	3	10 section document that explores more coil switch options. Also rearranged all wiring configurations to have the green wire grounded on each pickup to address the Tributes' using the green pickup lead as "earth" ground.
12/17/2017	4	Added a new configuration with 3-way 4PDT and push poll pot to get Parallel, Series, SC Inside, SC Outside. Added revision history
12/25/2017	4.1	Added alternative wiring of 4PDT switch in Mod 10 which allows for fewer solder joints