

# ***The Blue Guitar***

## **Brawley A-122 Threat LTD: Pickup Wiring Mods**

### **Introduction**

These guitars are an incredible bargain with a retail price of \$400 and while the stock pickups are definitely unique, my own personal preference is vintage-style pickups (like from Lindy Fralin). The Brawley bridge humbucker has an interesting distorted tone... even when plugged into a low gain amp! It's a bit like plugging your guitar into a Tube Screamer ahead of your amp. But the middle and neck single coil pickups were too aggressive for my own tastes so I wanted to see if I could add some different tones to this guitar—which has a fantastic neck and great acoustic tones from its swamp ash body. I have a hunch that the Brawley single coil pickups are voiced as they are so that the guitar sound will cut through if you are plugged into one of the muddier sounding modern amps, but what I prefer is a guitar that will sound sweet and nasty when plugged into one of my vintage amps (like a tweed deluxe clone and a 1965 Princeton Reverb).

My first thought was to put in Lindy Fralin Vintage Hot pickups for the neck and middle positions, and a PAF-style humbucker for the bridge. However the Brawley “Custom Alnico” single coil pickups are narrower than a typical strat pickup so the Lindy Fralins would not fit. While a tele neck pickup might fit the pickup cavities I decided to see what I could accomplish with the stock pickups first.

At least on my own A-122 the notched position with the middle pickup and inner coil of the humbucker was not hum-cancelling (although the neck/middle linkage was). So my first step was to switch the neck and middle pickups so that three of the five positions were humcancelling. While doing that I also replaced the foam insulation on the back of the two single coil pickups with a thinner foam so that I could screw them down lower into the body to smooth out the sound a bit. But I still wasn't happy with the stock sounds from the single coil pickups so I decided to experiment with alternate linkages between the two single coil pickups and the two coils of the bridge humbucker and came up with a custom wiring harness that uses a generic “mega-switch” and a push-pull pot for the volume control.

### **Details: Swapping the neck and middle pickups**

Before switching the neck and middle pickups check to see if both of the “notched” positions are already hum-cancelling. If they are then you can skip the first section here. (I will plug my guitar in a few feet away from a TV or computer monitor to check whether a linkage is hum-cancelling or not.)

It is easiest to reverse the neck and middle pickups by first unsoldering the leads at the selector switch and volume pot case. With the strings removed (and something under the bridge to protect the top) remove the two screws holding each of the single coil pickups and the four screws holding the humbucker mounting ring. Loose pickups can scratch up the finish of your guitar so you might want to use masking tape to hold them in place temporarily. On my guitar it was the middle pickup that used the yellow and black leads while the neck pickup used the white and black leads. Once you have pulled the leads out from the control cavity you can switch the pickups around and then resolder the wires, reversing the yellow and white leads as they were connected to the selector switch.

If you like your pickups closer to the body then you will want to replace the foam insulation of the back with something thinner. (I'm not sure how springs or latex tubing would work with these pickups mounted directly to the body.)

More obsessive/compulsive tweaks: I noticed that the pole pieces would cause a loud hum if I touched a screwdriver to them. Because of this, I suspect that the single coil pickups on my guitar were hooked up backwards, with the hot lead going to the inside of the coil next to the pole pieces and the grounded lead going to the outside of the coil. Whether that was intentional or a mistake, I decided to ground the pole pieces by using conductive epoxy (sold under the Circuit Works name at local parts houses for about \$16 for two small tubes). Before doing this I first checked to see if there was any leakage between the coil and the pole pieces (if there is continuity to one of the pole pieces be sure not to ground it!) I then scraped off some of the excess wax on the back of the pickup and put two coats of the conductive epoxy over the back of the pickup making sure that it made a good contact with all of the pole pieces.

When I first started this project I hadn't planned on creating a custom wiring harness so I just ran the conductive epoxy to the tab from the black lead on each pickup. When I decided to implement series linkages, I scraped off the epoxy going to the black leads and wrapped the neck and middle pickups with an overlapping wrap of copper foil tape, running a short length of the tape to the back where I soldered it to a ground wire, allowing some of the solder to flow onto the conductive epoxy. I then put another layer of conductive epoxy over the copper tape and ground wire to make sure that everything would stay in place. With most guitars you need to run that ground wire back to the control compartment but on the Brawley there are ground wires screwed to the shielded cavities under the neck and middle pickup so I put small crimp terminals on the pickup ground wires and secured them under those screws.

I was also getting a loud hum if I touched the pole pieces on the inner coil of the bridge humbucker. I used the Circuit Works CW2200 – STP conductive pen to ground the six slugs to the metal backing plate (you need to scrape off the excess wax first). If you are not getting this hum there would be no need to do this step.

I did all of this work one small step at a time rather than analyzing everything and following a master plan. It probably would have been better to have reversed the leads of the single coil pickups so that the normally grounded return wires were on the inside of the coil next to the pole pieces. However with my guitar that would have put both of the single coil pickups out of phase with the humbucker, so I would have had to either flip the magnet in the bridge pickup 180° or rewire it so that I could reverse the wiring. Rewiring the humbucker using 4+ shielded cable would be a good idea since it would allow for maximum flexibility in wiring options as well as reducing the noise a bit (see the next section for details on that).

## Details: Custom Wiring Harness

The Brawley A-122 has a neck perfect for playing blues or jazz, but the stock pickup sounds don't do it justice. I already mentioned the humbucker which is basically a one-trick pony; to paraphrase the real estate saying: "it's distortion, distortion, distortion!" I may decide to replace it later with a PAF-style humbucker but for now I figured I'd see what I can do with it.

The neck and middle single coil pickups both have a DC resistance of ~5.5k so I suspect that they are essentially identical but RWRP with respect to each other. Neither of them have the bass response for a full sound from chords or riffs; their tonality is a very aggressive "in-your-face" sound which might be appropriate for certain specific musical styles.

All in all, the stock pickup sounds are a bit limited in their scope and it would be like a fine arts painter using a palette with just half of the colors (like red, orange and purple). My goal was to fill in this palette with some optional linkages while retaining the stock sounds so that the guitar would not completely lose its rather unique character.

To experiment with the various parallel and series linkages I desoldered all of the pickup leads and used small jumper clips to make the connections so I could hear what they sounded like. Even after doing that I wasn't completely satisfied with the results so I wired up a second megaswitch with the following choices:

- Position #1 (knob towards neck): Neck & Bridge(outer) in series [Alt: neck alone]
- Position #2: Middle & Bridge(inner) in series [Alt: mid alone]
- Position #3: Neck & Bridge(outer) in parallel
- Position #4: Middle & Bridge(inner) in parallel
- Position #5: Bridge pickup alone(both coils)

Here are the actual connections spelled out:

- Position #1: [Hot] =>N<sub>W</sub> || N<sub>Bk</sub> => B<sub>R</sub> || [B<sub>Gnd</sub> => Gnd]
- Position #2: [Hot] =>M<sub>Y</sub> || M<sub>Bk</sub> => B<sub>W</sub> || B<sub>R</sub> => Gnd

Position #3: [Hot] =>N<sub>W</sub> & B<sub>R</sub> || N<sub>Bk</sub> => Gnd|| [B<sub>Gnd</sub> => Gnd]  
Position #4: [Hot] =>M<sub>Y</sub> & B<sub>W</sub> || M<sub>Bk</sub> & B<sub>R</sub> => Gnd  
Position #5: [Hot] => B<sub>W</sub> || [B<sub>Gnd</sub> => Gnd]

Note: the connection from B<sub>Gnd</sub> to Gnd is hardwired so I have left that connection within square brackets since it is not wired through the selector switch.

In order to access the stock neck and middle sounds I used a 500k push-pull pot wired up so when you pull the knob out, the black wires from those pickups are connected to ground rather than the megaswitch. So for Positions #1 and #2 you get the stock neck and middle pickups, respectively.

After wiring up the first custom harness for this guitar I thought that Positions #1 and #2 sounded too muddy so I used a trick I discovered by accident a few years back: for a series linkage if you partially bypass the coil closest to ground with a resistor and capacitor in series it will brighten up the sound considerably. After trying a few different caps and several resistors I ended up using a 12k resistor and a 0.022uF for Position #1, with the RC network going from N<sub>Bk</sub> to ground. For the middle/bridge series linkage of Position #2 I used an 8k2 resistor and a 0.022uF cap from M<sub>Bk</sub> to ground.

I suspect that the inductance of the humbucker coil in conjunction with the resistor and capacitor creates a tuned LCR filter so you need to experiment with different values to make sure that the sound is even throughout the range of your guitar. However another way of looking at it is that the RC network offers a shortcut for the high frequencies of the single coil pickup to complete a circuit to ground bypassing the coil from the humbucker (which swallows up a lot of the highs). If the RC network was connected to the “hot” side of the single coil pickup it would bleed off some of the highs but since it is connected to the “return” side of the pickup (which is then routed to the “hot” side of the appropriate humbucker coil) it actually allows more of the highs to reach the volume pot and from there to the output jack.

In any case, you can A/B the neck pickup alone and in series with the bridge outer coil to see how the series link adds a lot of bottom end and fullness to the sound. With the added resistor and cap most of the humcancelling features were lost, but I believe it was worth it. The sound is more like a low output neck humbucker than a strat neck pickup with its distinctive “woodiness”.

Position #2 has a “notched” sound to it, but with an added fullness from the series linkage to the inner coil of the bridge pickup. I used a smaller resistor, mainly to differentiate the sound from Position #1; you can go up to 15k here for more bass and less highs but I was trying to get a nice mix of tones in this wiring harness. The alternate linkage of the middle pickup alone gets away from the notched sound and delivers a fairly decent strat lead tone.

The output from Positions #3 and #4 is lower than the other linkages since they use parallel linkages but they deliver some classic tones. Position #3 has a very clear and sweet sound, somewhat like both pickups together on a tele. I get the same sound on my LP 25-50 with both pickups selected and the coil split switch activated (I rewired the LP to make that combination hum-cancelling). It also reminds me of the blend position on my old Silvertone guitar with the “cheese shredder” pickup covers. Position #4 is pure “quack” and is the same linkage used on the stock A-122. My first choice for that position was the neck/middle notched position but I ran out of poles on my generic megaswitch to accomplish that. I had also considered using the split coil mode of the bridge humbucker for Position #4 but I didn’t feel that it added as much to the tonal palette as the traditional notched sound.

Which brings us to Position #5, the bridge humbucker. You’ll either love it or hate it. For now I’m giving it a chance to prove its usefulness. It has a pretty cool distorted sound, even when plugged into a low gain preamp (like my Princeton Reverb). By the way the stock volume control came with two bright caps wired in series between the ungrounded terminals of the pot; both of the caps were 1000pF ceramic disk so the resulting net value was 500pF. I’m not sure if they just ran out of 500pF caps and had to make do, or perhaps Keith Brawley felt that using two of them produced a better tone. At this time I have a 180pF ceramic cap there but I think that I’ll try the stock caps there just to see how well the humbucker cleans up as you turn back the control.

I almost forgot to mention that I used some of the tricks from the John Atcheley “Guitar Nuts” site to further reduce the noise level of the guitar. His original idea was to separate the ground shields from the signal return leads in a guitar, just as you would do inside a guitar amp. So I have the shielded wire from the guitar jack wired up to the grounded tab of the volume pot, and all of the signal return leads are run to this point. The various ground wires going to the bridge and the shielded cavities go to the back of the tone control pot which is isolated from the signal return ground by using a 1.0uF/250v poly cap. I haven’t done comprehensive A/B testing of this grounding method, but I’m happy with the noise levels of my guitars which use an isolating capacitor for the shields. I had mentioned that I did not rewire the stock humbucker with separate shield and signal return leads; the assembled humbucker was evidently dipped in wax so I didn’t feel like taking it apart to upgrade the wiring. But a more adventurous soul would be encouraged to do that to further reduce the noise level of the guitar by running the humbucker cable shield to the back of the tone pot rather than to the signal return lug on the volume pot.

## **Final notes**

I had originally planned on using this guitar with the whammy bar but decided that it sounds and plays too good for that so I blocked the Wilkenson trem block with a piece

of wood glued in to the trem cavity. Unlike a vintage strat bridge if you tighten down all of the trem springs until the block rests against the cavity the bridge will not be level.

It should be noted that the custom wiring harness presented here was specifically designed for the Brawley A-122 although the same principles could be used with any guitar with the S/S/H configuration (without having to use the two RC networks I added to the push-pull switch). If you like the stock pickup sounds and have no need for the more vintage sounds offered by the custom wiring harness then skip the last sections of this article and just check to see if both notched positions are hum-cancelling.

Let me repeat that this Brawley is one heckuva guitar for \$400; looking at the workmanship on the neck and on the body, this guitar is more like what usually retails for \$1000 to \$1500, especially with all of the custom upgrades throughout (Gotoh locking tuners, roller trees, graphite nut, Wilkenson trem, recessed strap locks, shielded control and pickup cavities, etc.) While the stock sounds are definitely unique in a world with thousands of "sound alike" guitars, the added sounds from my custom wiring harness make this guitar a lot more versatile.

Enjoy!

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<http://www.blueguitar.org/>

## **Links:**

**Brawley A-122: Revisited (June 2003)**

[http://www.blueguitar.org/new/articles/blue\\_gtr/gtr/brawley\\_revisited.pdf](http://www.blueguitar.org/new/articles/blue_gtr/gtr/brawley_revisited.pdf)

**Brawley Guitars website**

<http://www.brawleyguitars.com/>

**Harmony Central user reviews**

<http://www.harmony-central.com/Guitar/Data4/Brawley/A-122-01.html>

**Brawley A-122 sound samples**

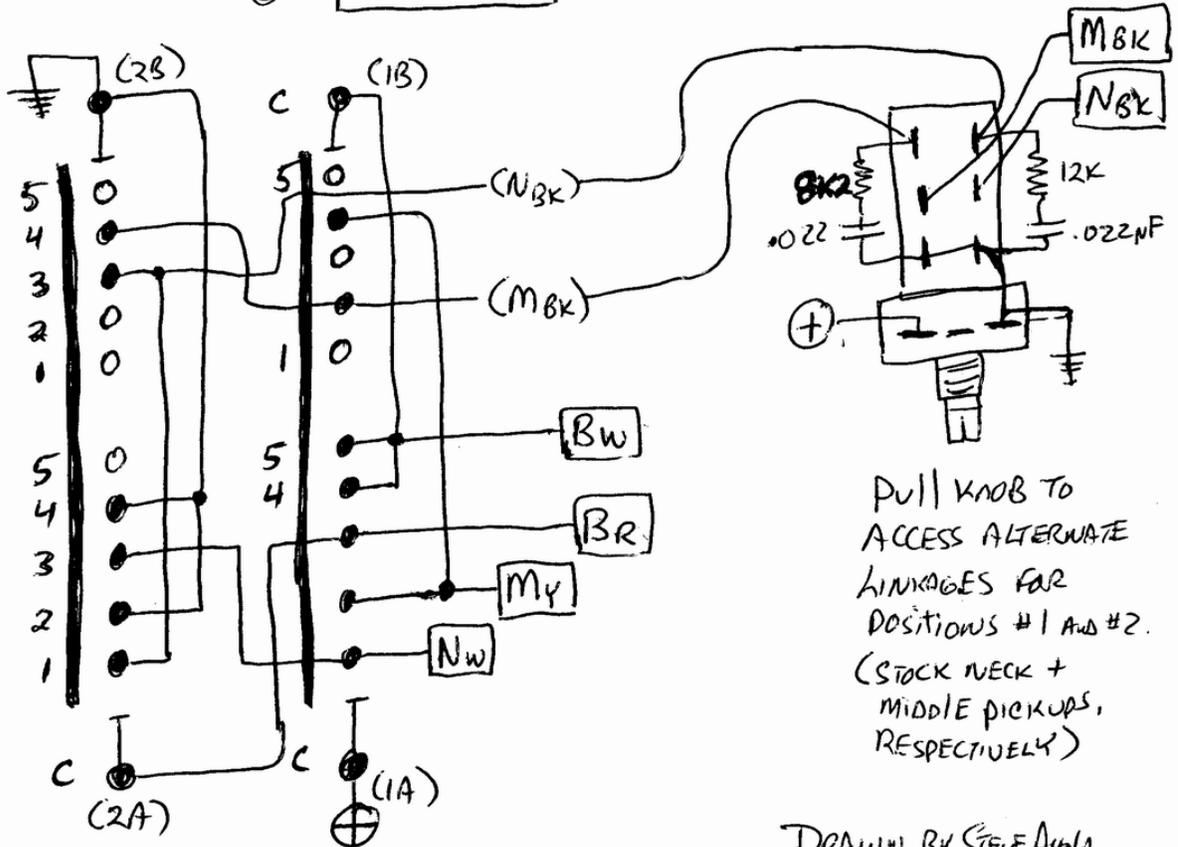
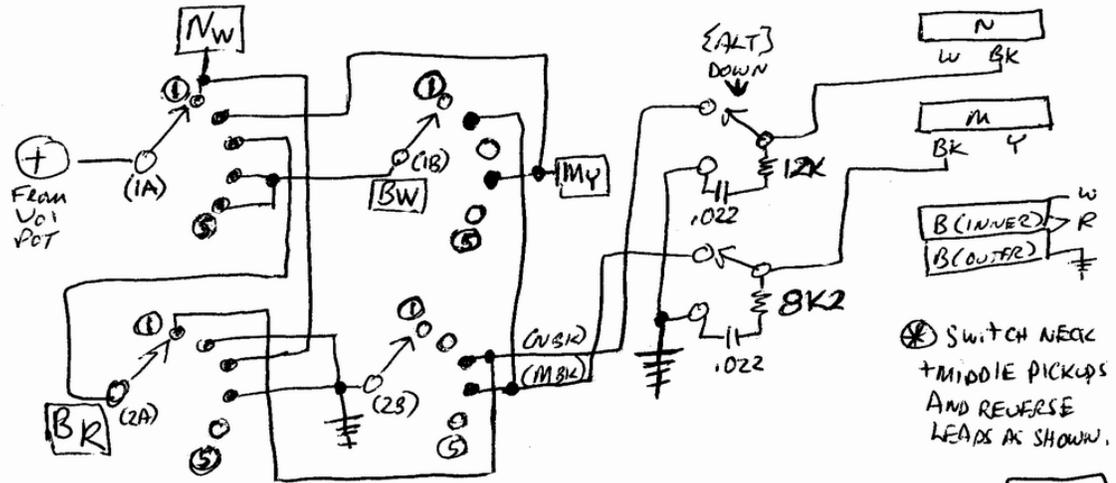
[http://www.blueguitar.org/new/mp3/blue\\_gtr/0c1alt1\\_shuckin1.mp3](http://www.blueguitar.org/new/mp3/blue_gtr/0c1alt1_shuckin1.mp3)

[http://www.blueguitar.org/new/mp3/blue\\_gtr/0c1alt2\\_shuckin.mp3](http://www.blueguitar.org/new/mp3/blue_gtr/0c1alt2_shuckin.mp3)

[http://www.blueguitar.org/new/mp3/blue\\_gtr/0c5alt1\\_lastcall.mp3](http://www.blueguitar.org/new/mp3/blue_gtr/0c5alt1_lastcall.mp3)

# CUSTOM WIRE HARNESS FOR BRAWLEY A-12Z

- Position #1 (up) - NECK + BRIDGE (OUTER) in SERIES {ALT: NECK PICKUP ALONE}
- #2 - MIDDLE + BRIDGE (INNER) in SERIES {ALT: MIDDLE PICKUP ALONE}
- #3 - NECK + BRIDGE (OUTER) in PARALLEL (VERY CLEAR)
- #4 - MIDDLE + BRIDGE (INNER) in PARALLEL ("QUACK")
- #5 - BRIDGE HUMBUCKER (BOTH COILS) ("RIPS")



4 POLE "MEGASWITCH" AS VIEWED FROM REAR OF CONTROL COMPARTMENT

DRAWN BY STEVE ANGLA  
3/3/02