



## Series/Parallel Wiring and Switching Options

The concept of Series/Parallel can be confusing because it can be applied in two seemingly unrelated ways. However, the same fundamental concept can be used in two different applications, each producing a different tonal effects:

1. combining *two pickups* in series
2. allowing the coils of one *dual-coil* pickup to perform independently in parallel.

In the first application we will fuse two pickups together in series, e.g. the neck and bridge, to produce a fatter tone than is achievable by simply selecting both pickups at the pickups selector switch.

In the second application we will show how you can separate and wire the coils of one dual-coil pickup to get a jangly and quackier tone using a parallel wiring scheme. A Double Pole/Double Throw (DPDT) switch is used to allow you to switch back and forth between the series and parallel tones of each application.

The first application of pickups in series is fairly straightforward. This feature is available on Fender Baja Tele models equipped with either a 4-way or S-1 switch. In this application we create a sort of ‘virtual’ additional pickup in which the output of one pickup is fed to the input of the next to produce a fatter and more robust tone, i.e. pickups in series. The usual method of selecting the bridge and neck together as is commonly done in guitars and basses is electrically a parallel connection of the pickups whereby each pickup’s signal is sent independently to the instruments controls. This is the way pickups are commonly wired from the guitar maker.

We can also apply the concept of series/parallel switching to *two halves of a single dual-coil pickup*. In this instance, we are treating each coil as if they were independent pickups that are positioned side by side within the same pickup cavity. Now, instead of a larger darker tone, the parallel effect creates more “jangle” and “quack”. In JBE-equipped instruments using an S-1 Deluxe pickups, you get improved Strat quack in positions #2 or #4 position of the 5 way switch. When the middle pickup alone is selected and switched into parallel mode, you get a more jangly funky rhythmic tone.

*Throughout this discussion on series/parallel wirings, keep in mind that a separate switch (in most cases a DPDT switch ( Push/Push, Push/Push, or Mini-Toggle ) is used to select the series or parallel modes during play. The guitar’s pickup selector switch continues to function just as it always has, i.e. to select pickups.*

Now, let’s examine how these forms of series/parallel wirings are physically implemented

### **Implementation #1: Series Connections Between Neck and Bridge Pickups**

In this application the neck and bridge pickups are wired first thru a DPDT switch such that the output of one pickup becomes the input to the next. This action creates a “virtual’ pickup whose resistance is the sum of the two pickups resulting in a darker tone. This is generally applied to single coil pickups such as in a Tele or Strat. The “virtual pickup” is akin to a full-size humbucker, but without modification to your guitar’s body to accommodate a new pickup. The most

common implementation of this form of series/parallel mod is found in a Baja Tele, although it is possible to do it with stock Tele as well as other multi-pickup guitars. One note of caution, combining two full-size hum buckers in this way, while possible, results in an overly dark and muted sound. You will need to experiment for yourself to determine if combining full-sized hum- buckers in series is worthwhile.

Figures 1 and 2 show how the neck and bridge pickups are wired in series using a 4-way knife switch or Fender's S1 switch. The S1 is a 4-pole/double throw switch. But in this application it does not require all four poles. Alternatively, a Double Throw/Double pole (DPDT) switch such as a Push/Push or Push/Pull pot, or mini toggle switch (aka ON/ON switch), can also be used. The option of switch type is up to you as the player as long as you use a suitable switch.

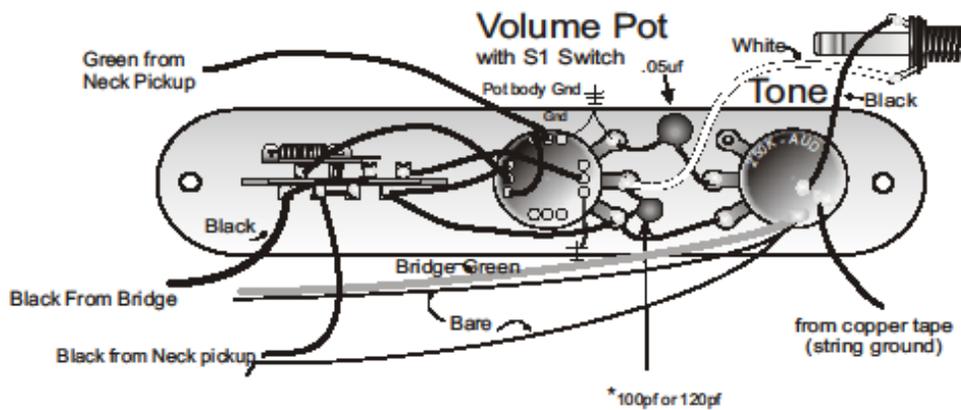
Fig.1



## T-Style Wiring with Fender S1 Switch for Switched Series/Parallel Wiring of the Bridge + Neck

This wiring diagram incorporates Fender's S1 switch as may be installed on your Fender made Telecaster. The S1 switch is proprietary to Fender and is not provided by JBE.

Engaging the S1 switch when in the middle position of your 3 way pickup selector switch enables you to put the two pickups in series with each other for a thicker tone.



Red & White wires are soldered together and insulated with heat shrink. For typical Tele-style operation do not disturb this connection.

⊕ Ground point generally the top of the pot or pot body

Keep the bare wires from contacting other connections!

\* This optional capacitor helps compensate for the natural loss of high frequencies through the guitar cord which sometimes occurs when the volume control is partially rolled back.

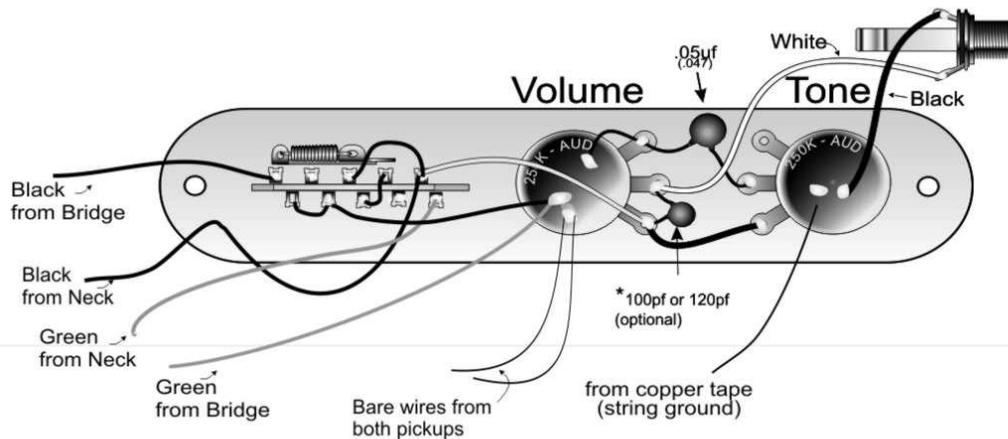
2017 JBE Pickups

Figure 2 shows the same series combination of neck and bridge pickup using a typical 4- way knife switch.



## T-Styles 4 Way Switch Wiring Bridge and Neck in Series Alt Wiring

Series wiring connect the bridge and neck such that it sums the resistance of the pickups and yields a fatter/darker tone.



- Pos 1: Bridge
- Pos 2: Bridge+Neck (Series) -
- Pos 3: Bridge+Neck (Parallel)
- Pos 4: Neck - Standard

Keep the bare wires from contacting other connections. Wrap with heat shrink!



Red & White wires are soldered together and insulated with heat shrink. For typical Tele-style operation, do not disturb this connection.

## **Implementation #2: *Series/Parallel on a Single Pickup***

I have long recommended to JBE Strat and Nashville Tele players, to wire only the *middle* pickup (generally and S-Deluxe) for switched series/parallel operation (Figure 3). This low cost mod delivers greater “quack”, in the 2 and 4 positions of the standard 5-way switch and also offers a great “funk” tone when using the center pickup by itself.

The key requirement however is that you must use a DPDT push/push pot, push/pull pot or mini toggle switch for this purpose. ***Remember, it is the middle pickup only that is wired for series/parallel in this example.***

Normally, all dual-coil pickups are bridged together, in series. Many of you will recognize this as how humbuckers are built. JBE also uses a bridged connection to combine coils, but instead of burying the bridging connection within the body of the pickup as many hum buckers do, we extend that connection via the red and white wire leads all the way thru the hookup cable. This external bridging greatly facilitates the wiring mods we are discussing here by allowing you to ‘break and make’ the bridging connection for parallel wiring.

When in parallel, resistance between pickups is reduced by  $\frac{1}{2}$  resulting in increased ‘jangle’ or ‘quack’. ***Best of all hum cancellation preserved!***

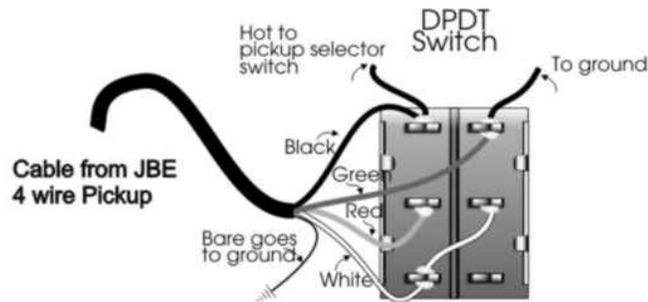
For fun, (if your life is that boring 😊), you can verify resistance changes of your new mod with a DC multi-meter and a guitar cable. Plug-in a guitar cable to your guitar input. Now, place the meter probes on the tip and sleeve of the cable. Notice how the resistance measurement changes as you switch between series and parallel wiring modes .

*Note that the actual resistance reading are not exactly those of your pickups because you also have other resistance loads such as pots and the guitar cable itself in the circuit. So, don't get wound around the axle on trying to correlate resistance readings to the pickups themselves. But, for our purposes here the resistance readings are close enough and serve to illustrate the differences between series and parallel wirings.*

Figure 3 using a DPDT Switching Pot or Mini Toggle “ON/ON” Switch. The diagram below shows the business end of a DPDT switching pot or mini toggle.



# Series/Parallel Switch Wiring



## Series / Parallel Wiring

Allows you to independently treat each coil as an independent pickup for enhanced 'quack' or chime.

A double pole/double throw (DPDT) push/pull pot or mini toggle switch is used to transition between series and parallel modes..

### Summary:

Both applications of Series/Parallel can be effective mods that are easy to implement and creates a sort of "virtual" pickup for your guitar that cost very little and does not require you to modify your instrument. Moreover, it is even possible to have both implementations of series/parallel in the same instrument by applying the concepts and a little wiring ingenuity of your own.

Lastly, and for fear of raising an unrelated issue, do not confuse the Series/Parallel mod discussed here with coil-splitting or coil-tapping. See the FAQ on our website for a discussion on the differences and tonal aspects of Coil Tapping and Coil Splitting.

And while it may be a fun project to attempt all these wirings in your guitar or bass at the same time, remember that your job is to play your instrument and not become slaved to a switching system that detracts from what is truly important...your performance.

Have fun and keep us updated on the many ingenious mods you have been able to create using series/parallel wirings.