

## Wire it up !

Now that we already started to talk about nuts and bolts inside guitars, it's time to talk about the wire and the wiring inside your guitars. This is an often underrated subject and a weak wiring can definitely ruin your tone. On the other hand side, a certain cable and wiring inside your guitar can be an excellent tone shaping factor for fine tuning your sound and of course, a good wiring can decide if your guitar sounds just good, or excellent !



You can often find guitars with a very lousy inside-wiring and cheap parts, crappy soldering spots, weak cables, ultracheap caps and other things seem to be common these days. All this can affect your sound and the reliability of your guitar in a very negative way, so it's worth the time to take care of this.

First of all, investigate your existing wiring and make yourself a drawing of it. Desolder all the crappy wires and throw them away ! If you want to replace the output jack, pots, pickup selector switch etc. this is a good point of time to do it. While you are in there, you can also replace the caps from the tone control with a type and value you like and do all kinds of mods you want to. After installing all the new hardware (if you decide to do so) simply rewire everything point to point with a new high-quality wire and you are done. Take care of the soldering spots and for a good connection. Don't forget the ground connections from pot to pot and coming from the Strat's tremolo or from underneath a Tele's bridge construction. Your guitar will thank you with an enhanced reliability and a more open, breathing tone !

Now it's time to talk a little about cables in general and how to separate a good from a bad one, and of course to separate all the voodoo urban legends from reality. Back in the good old days, Fender and Gibson used what was available at

this time and especially Fender was notorious for buying large quantities of everything that was available for cheap. But the resulting tones, are still the landmark for a lot of players today, and the cable the big companies used at this time are one of the key components.

Basically we have to divide cables into two main categories:

1. Instrument Cables
2. Speaker Cables

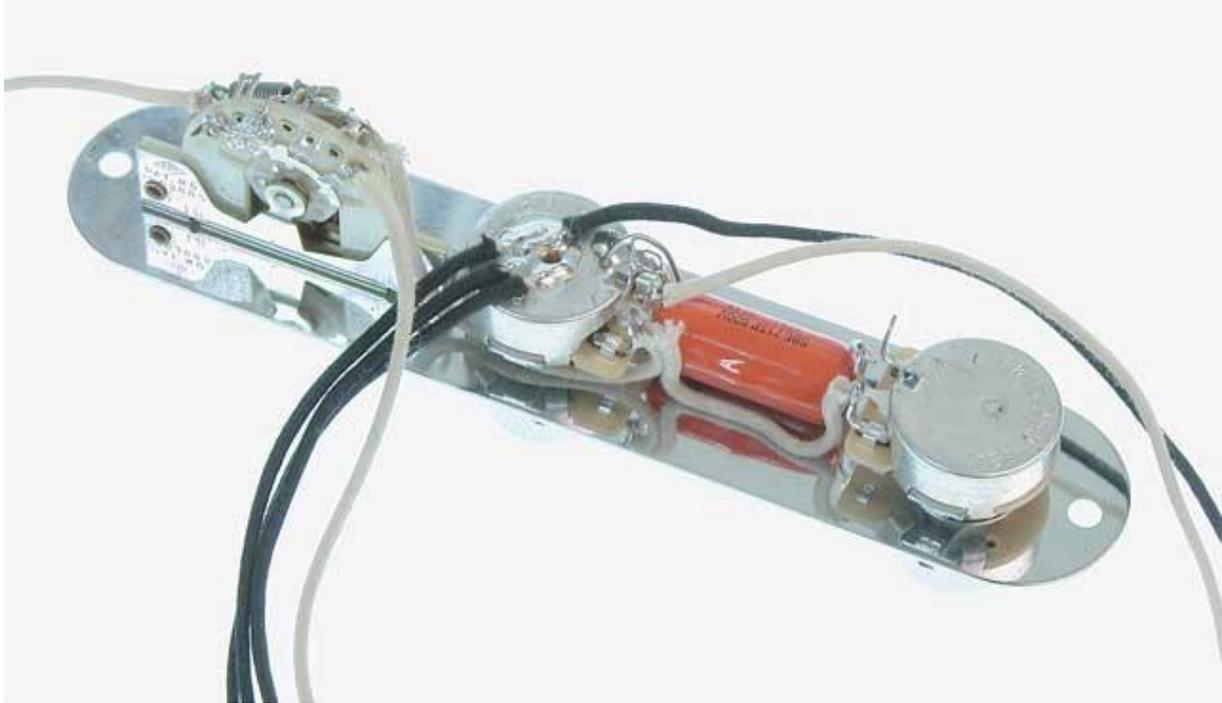
The wiring inside our guitars, is not really an instrument cord/cable run, but we can take two basic rules from instrument cables and transfer them to our guitar wiring. Instrument cables are operating in a high-impedance, small-signal environment. That simply means that they are "feeding" an amplifier or other device that has a high resistance (many thousands of ohms) path to ground. Furthermore, they are carrying a tiny current that is measured in thousandths of an ampere, and a very small voltage. Also, because they are most often connected to a device that has a fairly high output impedance, such as an electric guitar, cords with too much built-in capacitance will bleed off high frequencies badly, especially over long runs. So far, but what about low resistance and losing signal volume in the wire? Remember we said that these cords are feeding a high resistance? Even the cheapest, crummiest, tiny-gage copper wire you can find is only going to have a few ohms of resistance over a run of 100 feet or less. In practical terms, there is no difference between a few ohms of resistance and zero resistance when you are feeding an amplifier with an input impedance that is many thousands of ohms. But that extra-cheap far-east wire is going to be unsuitable for other reasons – it will probably have very high capacitance, bleeding off your high frequencies to ground.

Now, let's consider speaker cables. Speaker cables operate in an environment that is exactly the opposite of that for instrument cables. Speaker cables connect the low impedance output of an amplifier with the low impedance of loudspeakers. Furthermore, they carry a relatively high current and voltage. So these cables are very intolerant of high resistances in these cables. Ok, but what about capacitance? Capacitance is not critical in this low impedance circuit and even a fairly significant capacitance will still have an impedance that is outrageously high compared to the output impedance of the amplifier, and thus will have little impact on the high frequencies.

A lot of expensive myths are the result of applying the critical attributes of speaker cables to instrument cords or vice versa. For example, it's critical that speaker wires have low resistance – and resistance decreases as wire diameter increases – so large gage wire is good for speaker wires. Unfortunately, many musicians then apply the same logic "bigger must be better" to instrument cords. That's an expensive misunderstanding of what makes a good instrument cord!

With this keeping in mind, we can state three basic rules, for a good and suitable wire to use inside guitars:

1. Get wire having as low capacitance as possible
2. The gage is not important and a huge gage does not mean better tone
3. The cable should be easy to route inside the guitar



You can use several sources to find the best wire now, from the big companies like Mouser to your local electronic store to see what they have to offer. You can also search specialized guitar shops, most of them will have a good standard wire for you. When we are talking about tone shaping, there are at least two cables, I would like to talk about a bit:

#### Reissue vintage "cloth" or "braided" wire

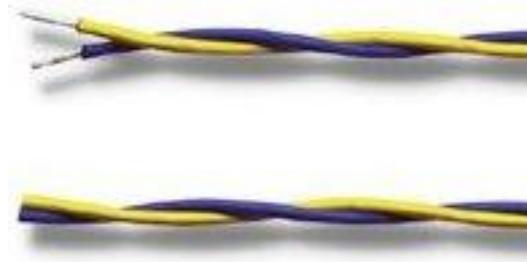
This cable is very similar to the original waxed cotton insulated wire, that Fender as well as Gibson used back in the golden guitar days. The waxed cotton insulated wire is referred to as the "cloth" wire, while the "braided" wire that Gibson used offers a braided tinned copper shield and a tinned stranded 22 gauge copper single 'hot' conductor. The braided wire is often used for the restoration or modification of Gibson guitars. The vintage cloth wire is a cotton covered 22 gauge wire, US made by the same company that made it for Fender in the old days. Perfect for restoration of older guitars and amps or for 'retro' clone projects. Waxed just like the old stuff. A pleasure to work with; just cut to length and push back the cotton braid. The lack of plastic insulation resonances results in the good, natural sound from this 22 gauge, stranded tinned high quality copper wire, so it's always worth a try. If you are looking for the vintage tone, I highly recommend to try this wire, it really makes a difference in tone. Sometimes you can even find this wire as NOS !

#### Teflon insulated silver wire

Usually this a very fine stranded wire with up to over 20 individual pure silver cores, often used in the hi-fi world. The teflon insulation is perfect for soldering jobs ... your soldering iron never can get hot enough to burn or melt the insulation ! The cable is easy to route and offers a very transparent, natural and punchy tone. Compared to a standard wire, the signal is slightly louder and the separation of the individual strings is enhanced. I like to describe the effect as "natural pickup sound". The clarity such a cable can have is stunning, and

together with good pure nickel strings you will hear things from your guitar, you never heard before. Sure, this cable, especially the high-grade military graded version, is not cheap, but worth a try in your axes if you are looking for the most transparent, natural open sound.

In closing, I would like to talk a little bit about shielded cables inside guitars. Sure, you can use shielded cables for all connections inside your axes and under some very special circumstances this can make sense. But to be honest, I don't have a single guitar with any shielded cable runs and never had a problem – and have a look inside any vintage Les Paul, Strat or Telecaster ... you will not find any shielded cables there ! A good compromise is to use a shielded cable run to connect the output jack, especially in a semi acoustic guitar. Normally this is the longest cable run inside a guitar, and so it's most susceptible for picking up some hum or noise. All the other connections are really short, so there are almost no chances that they will pick up any hum or noise. I would like to share an old school trick from the early tube-radio era, that some techs still recommend and use today. I also use it in my own guitars, and it works great ! Instead of using a shielded cable run to connect the output jack, you can use two standard wires, and twist them together, like shown on the pic !



This will provide an extra shielding and will work as good as any standard shielded cable. You can also use this little neat trick inside amps and of course any cable run inside a guitar. As a little extra bonus, you can do this to the connection cables of any Strat or Telecaster pickup, to fine tune the tone and to provide some extra shielding to singlecoil pickups. The difference in sound is easy to hear, and you have to decide if you like it or not. This is a wide field to experiment, so don't hesitate to start playing around with it. I have mercy on you and will not bother you with the physical details of this little trick ;-)