10 Steps to Replacing the Input Jacks on a Hot Rod Deluxe / Deville

These same steps apply to the Blues Deluxe/Deville

DISCLAIMER: You should have a good working knowledge of electronics safety. If you don't PLEASE take it to a tech! By proceeding you agree that I take no responsibility for any damage done to yourself or your amp.

Printer Friendly version (text only)

Why They Break

As you may have heard, the stock jacks are notoriously unreliable. Safety regulations require Fender to use plastic jacks because of the way the jacks ground to the chassis. If Fender wants to sell Hot Rod Deluxes all over the world they must use these jacks, because some country's electrical safety laws are more strict than the United States'.

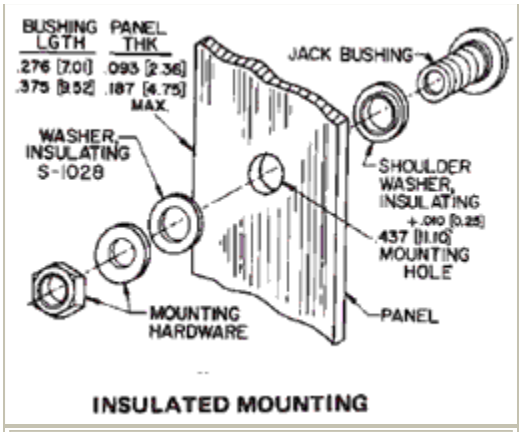
Unfortunately, these jacks can be damaged when owners try to walk 20 feet with a 10 foot guitar cable! (We've all done it! :P) Over time this stresses out the jack, and eventually the inner pieces begin losing their solid connection to the printed circuit board (PCB). Sooner or later you'll find the jacks are cutting in and out, or not working at all. You can help prevent this is by wrapping your guitar cable under the amp's carrying handle. This way if you can't reach your beer the pull will be absorbed by the handle and not the jacks.

On Hot Rod amplifiers made from 2004 on, Fender has replaced the input jacks with better jacks, though they're still plastic. The new jacks are apparently more rugged, and an answer to the many concerns from owners. The effects loop still uses the older jacks though, as the "traffic" there isn't as bad as with the guitar inputs. Remember, wrapping your guitar cable around the carrying handle will help protect the jacks.

I've noticed that Torres is now offering a "kit" for replacing the Hot Rod's jacks, though you'll fork over three times as much as you'll need to if you order it. Order the parts directly from Mouser, and follow the FREE directions here, as I'm not interested in making big profits off of anyone. My directions were up at least a year and a half before Torres ever made his "kit" available. I done it first, I done it best.

Only replace the stock jacks if they're disfunctional. In other words: "If it ain't broke, don't fix it!" Countless times my Hot Rod was working fine, and I just had to "fix" something until it was broke. Save yourself the hassle. Also, if you're clueless about electronics a qualified tech will gladly do this for you. The job isn't hard, is not destructive, and any mistakes can be fixed, but electronics experience will *definately* make this easier. I'm sure you're ready to get started, so here we go..

1. The first step is to acquire the correct replacement part(s). I personally recommend using Switchcrafts, as they're the same high quality jacks Leo used in his greatest amps. To get the correct part just go to Mouser Electronics, the correct part # is 502-12A. Insulating washers are also recommended to prevent ground loops, which can cause unnecessary noise—also found at Mouser; part # 502-S-1029 is for the shoulder washer, and part # 502-S-1028 is for the outer washer. (See diagram below.) I'd get between one and four of each, as the FX loop's *preamp out* and *footswitch* jacks can be replaced in the same manner as both input jacks. (Unfortunately, the *poweramp in* can NOT be replaced with these same parts.)



According to Switchcraft's website, S-1029 is the insulating shoulder washer, and S-1028 is the insulating washer.

The stock jacks are plastic, therefore they do not conduct electricity. Since the stock jacks do not conduct electricity they are not grounded directly to the chassis. For Fender to sell their amps all over the world, the stock jacks must be grounded to the chassis in a certain way. If you mount the Switchcrafts directly to the chassis, which are metal, they will be grounded directly to the chassis. I have heard of cases where this could cause ground loops, or an increase in noise. Preferably, for the amp to be really quiet, there should be a "ground bus" with the circuit grounding to the chassis in one spot. Failing to isolate the metal jacks from the chassis destroys the purpose of a ground bus because the circuit would be grounded to the chassis in multiple spots. An insulating washer is a nonconductive washer that isolates the metal jack from the chassis, and therefore forces it to ground through the "ground bus."

If you're in a pinch you can always run down to Radioshack and buy a bag of two cheap Chinese jacks. These will cost you about US$3.50 a bag. What complicates this tutorial is that Switchcraft and Radioshack jacks are designed slightly different, therefore installation will also be slightly different. Furthermore you can use either *closed-circuit* or *open-circuit* jacks! I'll divulge further into this later.

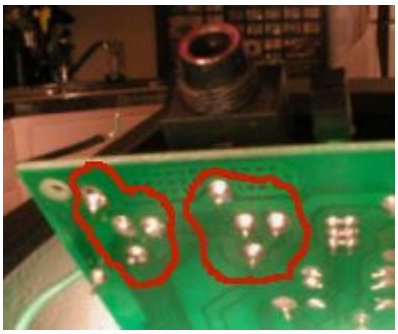
You'll also need some wire. Due to the low current from the guitar's pickups, any 22 or 20 guage wire will work great, and is readily available from many sources—including Radioshack. It is preferrable to use "stranded" wire due to its flexibility.

2. **WARNING: We must always drain the filter caps before working on the inside of an amp. Fully charged caps can kill! Click here to learn how to drain them.**
Remove the chicken head knobs, nuts, and washers.
Remove back of amp.

3. Remove the **green ground wire** near the input jacks. This will make accessing the bottom of the PCB *much*

easier. Just be sure it's screwed back into the chassis before you turn the amp on, or you won't hear your guitar. We're going to have to take the PCB partially out of the chassis so that we can get underneath it. To do this there are six black screws we must remove that hold the PCB in. Look for them. It's not "easy" getting the PCB out, but be patient and push it back softly yet firmly, it will come out. Be careful. If you have to remove any other wires (as you do in the Blues Deluxe/Deville) be sure to write down where they went, or take a photograph with a digital camera.

4. Once we're under the PCB and viewing the plastic jacks, there are four metal connectors, which I'll refer to as "lugs," covered with solder that must be unsoldered. These are circled red in the photo to the right. If you don't have a solder removing device you'll have to heat each lug and quickly pull on the jack. This may take a little bit of patience as solder tends to cool quickly. Just be persistant.



Now that we've removed a plastic jack, look at the bottom of it. Four lugs should be coming out of holes on the bottom. These lugs should have numbers above them. In this case they should be 1, 4, 5, and 2. NOTE: To get a better view, click the picture to the right to enlarge it.

5. After deciding which brand of jack to use (Switchcraft or Radioshack), we must now decide which *type* of jack we're going to use. The most ideal type is a **closed-circuit** mono jack—also called a "shorting jack." (The Switchcrafts from Mouser are this type.) It has three lugs and physically performs the same action as the plastic jack we're replacing. Logically, we can assume the plastic jack is also "closed-circuit."

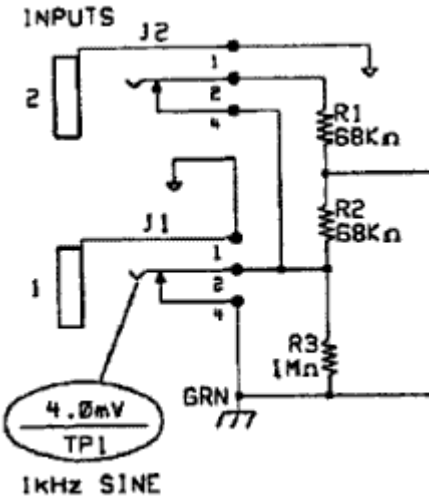
The other option is to use an **open-circuit** mono jack, which also works but slightly changes the circuit. When one input is normally used two 68KΩ resistors are placed in parallel, and the total input resistance is 34KΩ. With an open-circuit jack more signal will be attenuated as the resistance will be 68KΩ for each input. I prefer the closed-circuit jacks because it stays true to the classic Fender design. On the other hand, the open-circuit jack is simplier and a little easier to work with.

To the right is an example of both jacks (Switchcrafts are not included)—compared to the plastic jack. You can enlarge the picture by clicking on it. I'm sure you're now wondering, "Waiting a minute, the plastic jack has an extra lug called "5", why aren't we hooking it up? We don't need to. We'll discuss that more in a little bit.

Important info for Switchcraft users: The positioning of the lugs on the Switchcraft and the Radioshack jacks are NOT the same. The Switchcraft's "2" and "4" lugs are

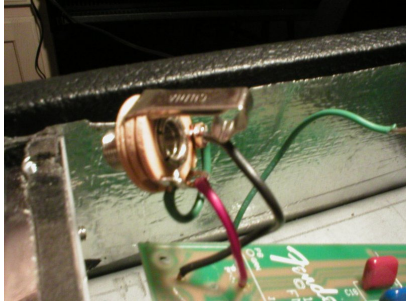
backwards when compared to the Radioshack's lugs. In other words, the lug that's marked "2" in the above right picture is actually "4" on the Switchcraft jacks. Also, the lug that's marked "4" in the same picture is actually "2" on the Switchcrafts. Obviously, the only lug that's positioned similarly for both the Switchcraft and the Radioshack jacks is "1". (Thanks fiestared.) I now use Switchcrafts, but I've only taken pictures of the Radioshack jacks. If you're confused and need help, e-mail me.

6. If you're going to do this, you need to first feel confident. And the only way that's going to happen is if you understand the parts you're replacing.



- "1" is the *ground lug*, so it should be obvious that it's connected straight to ground. Most of the noise and interference that your guitar picks up is sent there. Electricity is always trying to find its way to the ground, and will go the easiest path it can find to get there.
- "2" is the *signal lug*—or the lug that your guitar's signal is transported through. If that's not hooked up, then the amplifier won't "hear" your guitar.
- "4" is the *shorting lug*. For input #1 it's connected straight to ground. For input #2 it's soldered to lug "2" on input #1; sometimes this is connected to ground, other times it is not—it depends on whether input #1 is also being used. Basically, if a guitar cable is not plugged into the jack, "4" automatically shorts to the 'signal lug.' Usually it shorts it to ground, but not always—as I mentioned. This is helpful for minimizing all types of electromagnetic interference.
- "5" is there because of the way the plastic jack is designed. If you look at the circuit board you can see that "5" is located at a dead end—it runs straight into "2". Therefore, we don't need to hook it up. You don't have to worry about it, period. It's not even included on the schematic! If you pop the clear plastic top off of the old jack you can get a better idea of how it works.

7a. If you're using a **closed-circuit mono jack**, keep reading. If not, skip this step.

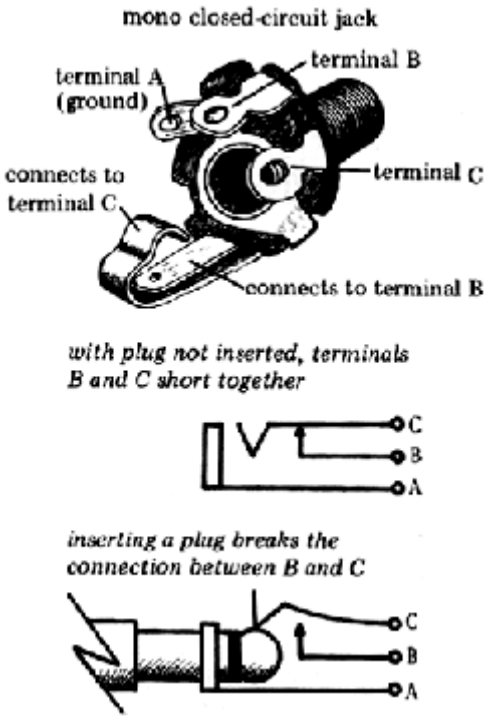


Input 1: Here we can clearly see the green jumper wire between shorting lug and ground lug. If we look in the background of the first picture, we can see where I didn't unscrew the ground wire (long green wire) and it broke while I was soldering. DOH! That's something else you should do. I'll have to resolder it back into place before I do testing later.

Solder a wire from your new jack's ground lug to where "1" used to be. (Pictured: **black** wire) This was also the ground on the old jack. Solder a wire from the jack's signal lug to where "2" used to be. (Pictured: **red** wire) Since the closed-circuit has an extra lug you're going to have to do something with it right? If you didn't use it, it'd function the same as a regular open-circuit jack. Connect the extra lug to where "4" used to be on either jacks. NOTE: If you're replacing Input 1 you can just place a jumper between the extra lug and the ground lug. (Pictured: **green** wire, don't mistake it with the OTHER green ground wire in the background.)

Input 1 was installed upside down, which accidently caused an annoying short.

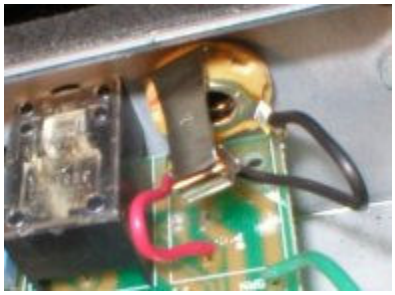
There was enough solder in the hole where "4" used to be, after I removed the removed the plastic jack. I think this is important because it makes sure the current path is continuous (i.e. there's no broken connections). If there wasn't enough solder there, then just hook the wire straight into the hole and solder it. Unfortunately, you can not do the same jumper (green wire) for Input 2—it will change the original circuit. Look at Input 2 on the schematic, "4" is not connected straight to ground, it is connected to lug #2 of input 1. If you connect it to ground it will alter the circuit, and we're just trying to replace the broken jack.



Here's a little diagram/schematic of the closed-circuit (sometimes called a "shorting jack"). Hopefully it'll help you better understand how it works.

I installed jack #1 wrong as you can see in the photos. It's upside-down, jack #2 is correctly placed. You see, if the metal arm is on top you may end up pushing down on it too hard (to get the jack into the chassis's hole). I did this and accidently bended the arm and created a short to ground. (Even when a guitar cable was plugged in, the little arm was still touching the big arm.) We obviously don't want that because our guitar's signal would go straight to ground instead of being amplified! Result: You couldn't use the amp because it wouldn't amplify! It can't amplify a signal that isn't there. You don't need the same problem; install the jack with

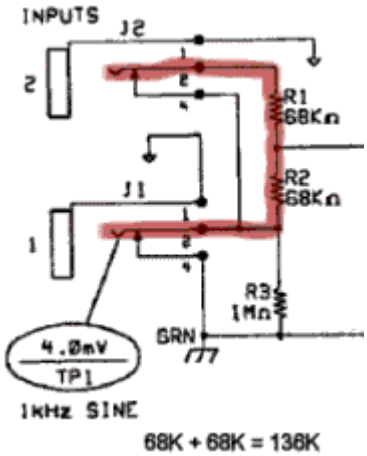
the arms sitting toward the PCB. It'll save you the headache of unscrewing the jack and rebending the arm.



7b. I don't recommend using an **open-circuit mono jack**, but if you are—read this.

Now that you have your jack, solder a wire from the mono jack's ground to where "1" used to be. (Pictured: **black** wire) This was also the ground on the old jack. Solder a wire from the jack's signal lug to where "2" used to be. (Pictured: **red** wire) Just make sure the circuit wasn't broken when you removed "4"—the thicker line. This is part of the ground circuit and you don't want to break it, or you'll have to run a jumper. That's it. In this case the holes where 4 and 5 were don't need to be hooked up. They are just there for a little closed-circuit "fanciness." Just remember that the circuit is altered and will react differently when you have two guitar cables—one plugged into each input. It's rather hard to screw up an open-circuit jack—basically the only thing you can do wrong is mix up the signal and ground lugs.

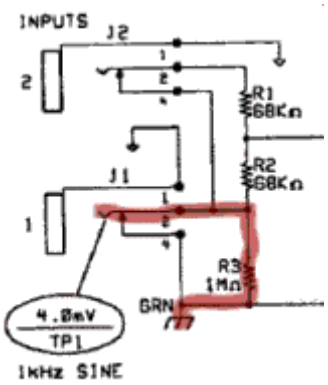
8. If we have a multimeter, we can easily test the jacks to make sure they work properly before ever powering up the amp. (Thanks to nonsqtr for bringing this to my attention.) Put a guitar cable into each input, but don't plug the other ends—which would normally be plugged into a guitar—into anything. With your multimeter, measure the resistance between the two jacks by placing your multimeter's probes onto the tip of the "male" ends (pictured below). The reading should be somewhere around 136KΩ. It doesn't have to be perfect, 129KΩ to 142KΩ is fine—but 1.14MΩ isn't! You'd have to have your *signal lug (#2)* and *shorting lug (#4)* mixed up on Input 1 to get that reading. If we observe the line on the schematic that is highlight in red, we can see why we get 136KΩ. Electricity always travels the path of least resistance; it has to travel between two 68KΩ resistors to get from one signal lug to the other. 68KΩ + 68KΩ = 136KΩ



9. Be sure the green ground wire is screwed back into the chassis if you've removed it. Now we'll need to test the jack(s) which we've replaced to make sure they're installed correctly. I designed the table below, which flows from left to right, to help you figure out what each reading should be. If you've replaced Input 1, then I recommend testing all possible answers (there are four of them) for Input 1. If you've replaced both jacks, then I'd do all eight possible readings and make sure they're accurate. Place the multimeter's probe on the "tip" of the guitar cable, and place the other multimeter's probe at "chassis ground"—which can be anywhere on the metal chassis enclosure. Measure the resistance (Ω), which should be close to 1.0MΩ, shorthand for 1,000,000Ω. Now take the multimeter's probe (that's on male 1/4" tip) and move it down so that it touches the side of the "male" input—correctly called the "sleeve." This is the round metal tube-like part which absorbs any noise and grounds it. The reading should indicate a DIRECT connection to ground. Theoretically, resistance should be zero ohms; but since nothing conducts perfectly expect to read 5 ohms or less on the multimeter. If you didn't get these numbers, then you did something wrong! What? You hooked the lugs up backward?

Start here! ➡

Which Input?	Cable in OTHER jack too?	What are you testing?	Approx Resistance
Input 1	NO	Tip to Ground	1.0 MΩ
		Sleeve to Ground	0 - 5 Ω
	YES	Tip to Ground	1.0 MΩ
		Sleeve to Ground	0 - 5 Ω
Input 2	NO	Tip to Ground	136 KΩ*
		Sleeve to Ground	0 - 5 Ω
	YES	Tip to Ground	1.136 MΩ
		Sleeve to Ground	0 - 5 Ω



Here is a pictured example of the first reading on the chart: 0.98MΩ is "close enough" to 1.0MΩ.

10. Don't forget to use insulating washers if you've ordered them. If your readings are all okay, then screw everything back into place. It should work! If not, and you can't figure out why, hit the "E-mail Me" link in the menu and I'll try to help you. Now that wasn't as hard as it looked, was it? A lot of text for some pretty easy work. If this was your first "amp experience" hopefully this has given you enough confidence to try some other mods or fixes. Enjoy your new success!

The finished form!

By Justin Holton