

## MARK VII SWITCH MODIFICATION FOR REPAIR

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### Disclaimer:

I am not a professional and this document is NOT meant to be a "how-to." It is meant to be "how I did it." If you follow any of these procedures you do so at your own risk. Any recommendations I give are recommendations that I am giving to myself. All work takes on a level of risk and it is your responsibility to determine if these methods are acceptable risks for your situation. As it were, if you do see any errors, please notify me and I will make updates.

**Note that you do not need to disassemble your switch as I have. Mine is disassembled here for demonstration.**

### Theory of the repair

Inside the switch are three formica selector boards that move into three different configurations and press leaf switches up or down for each of the FWD/OFF/REV states. Over time, the leaf switches get dirty from arc fouling. This modification will allow a user to inject sensor safe electronic contact cleaner into the switch.



**Formica selector boards**



**Materials:**

Masking tape and marker

3/32" drill bit

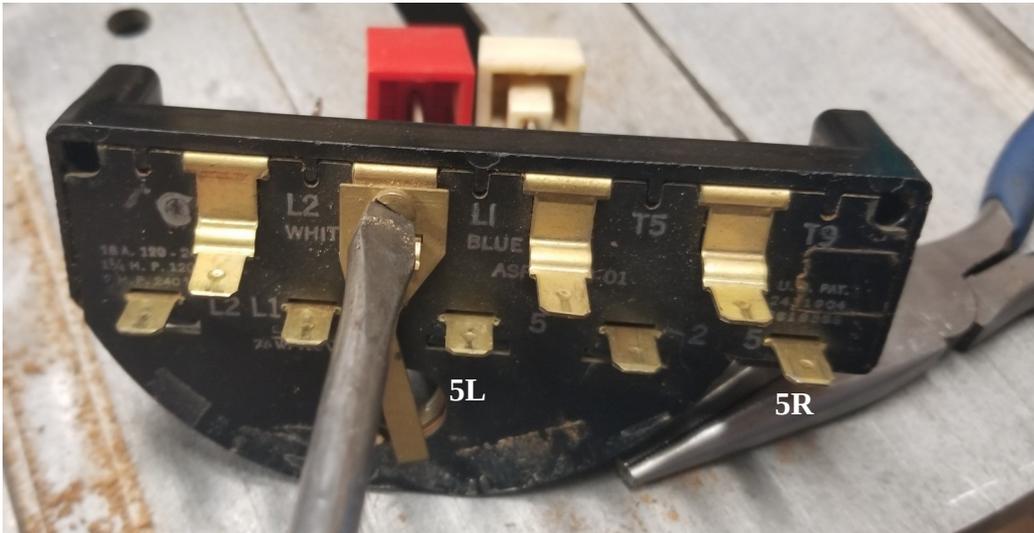
Micrometer

Multimeter

Sensor safe electrical contact cleaner (also known as Mass Air Flow sensor cleaner). I recommend against using carburetor cleaner as it may damage plastic components.

**METHOD****Remove the switch from the headstock:**

Open the headstock of the Mark VII to access the back of the switch. You'll see nine wire posts on the switch. There has been some documented variation in the wire colors, so it is wise to both photograph the wire positions and label them using masking tape. They are labeled "L2 White", "L1 Blue", "T5", "T9", "L2", "L1", "5", "2", "5". For clarity, the two connections labeled "5" I will refer to as "5R" and "5L" as shown in the photo below. After labeling and disconnecting the wires, remove the switch from the headstock.

**Initial Test:**

After removing the wires, use a multimeter to test continuity. If it fails any of these then this fix \*should\* (hopefully) work.

1) In the stop position, there should be no continuity between any of the contacts.

2) In the forward position, there should ONLY be continuity between:

T9 and 5R

T5 and 2

"L2 White" and L2

"L1 Blue" and L1

3) In the reverse position, there should ONLY be continuity between:

T9 and 2

T5 and 5L

"L2 White" and L2

"L1 Blue" and L1

## Modification and Repair:

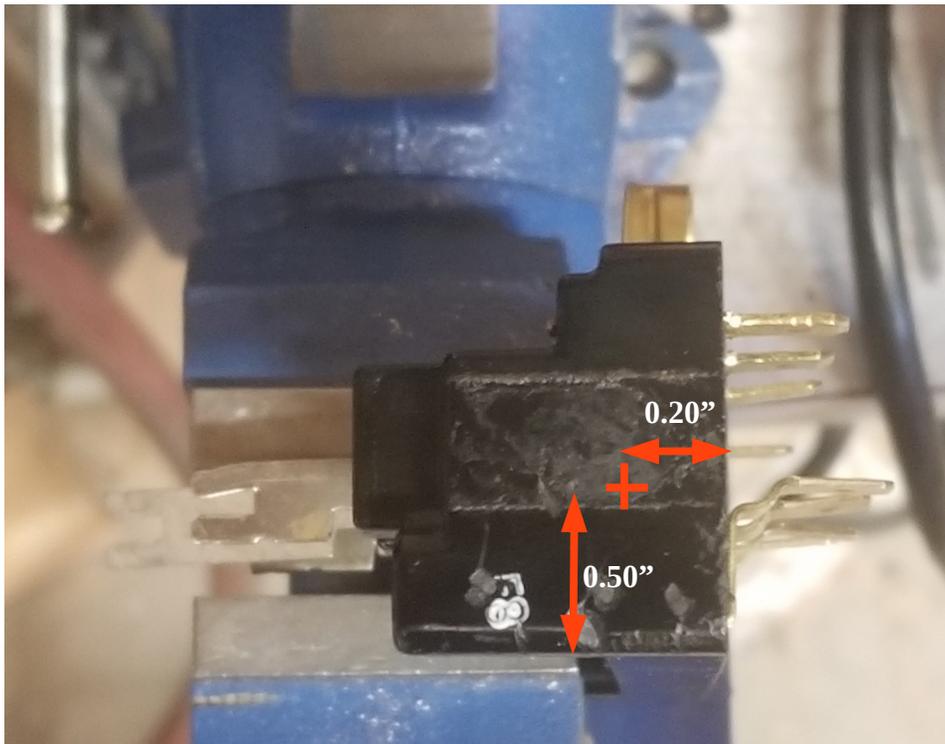
### Caution:

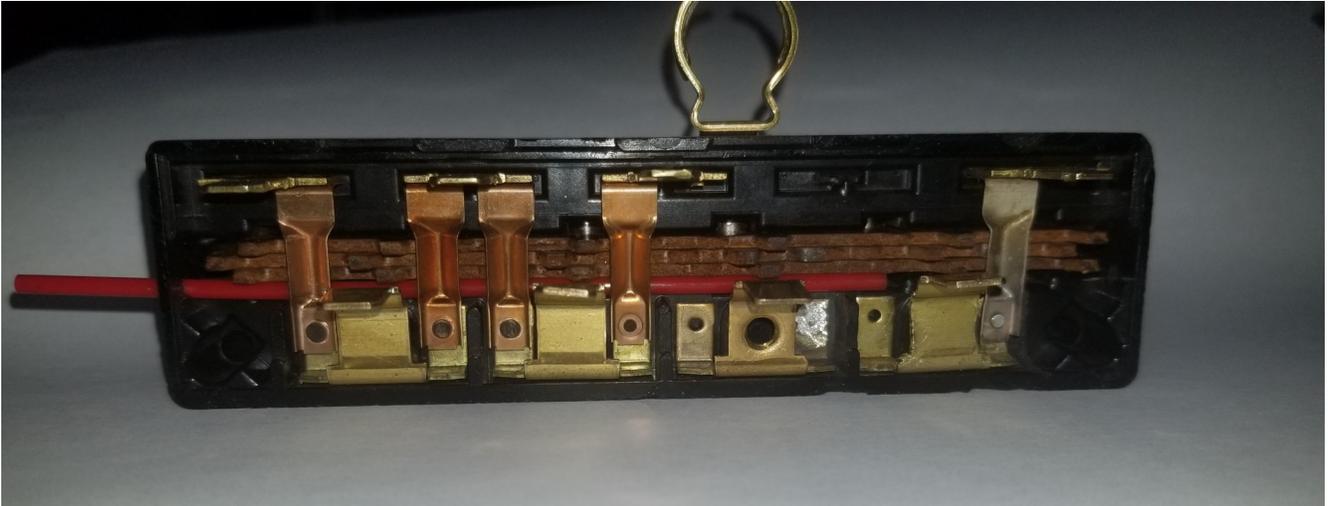
[1] The body is only about 1/8" thick and the drill bit can damage the selector boards easily. Be careful to not let your drill bit slip and damage the them once you've penetrated the case. This happened to me, but fortunately it wasn't bad enough to cause critical damage.

[2] I believe the case is made of brittle Bakelite, or a derivative, so take care and work slowly to not crack or chip it.

### Procedure:

1) Using a 3/32" drill bit, gently and slowly drill a small hole into each side of the switch at the locations marked in the image below. Try to be as close to these measurements as possible. The closer you are, the easier it'll be. Again, be careful to only drill through the 1/8" case





These two holes will allow you to put the straw from a can of sensor safe electrical contact cleaner into the body of the switch. My straw measured  $\frac{11}{128}$ " in diameter and fit perfectly. The straw is guided on one side by the selector boards and on the other side by the inside of the case. It should not require any force to slide the straw into the case. If you encounter resistance, gently twist the straw in your fingers and it should free up. **Do not force the straw into the case as it may cause damage the contacts. It should slide in gently.**

### Use and maintenance

With the Shopsmith unplugged, and as part of the regular cleaning procedure, slide the straw from the sensor safe electronic contact cleaner into the body of the switch as described above. It should go in at least 2.5 inches. While drawing the straw out of the body, inject a gentle and continuous spray of contact cleaner. It shouldn't be necessary (and I advise against) spraying it at full blast. Do this in both of the access holes. When complete, perform the test procedure again to determine if it needs another application.

If it works fine, then go ahead and put your Mark VII back together and give it a try!

### Final note

I would like to ask that someone who is more capable than I to determine the specs for an appropriate spark snubber. My switch was fouled across the L1 and L2 leafs, but others might have fouling across other leafs. If anyone is able to design a snubber, I would be happy to add their snubber design and a thanks to this writeup.

I hope this got you back up and running! :)

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