L.E.D. INSTRUCTIONS

Kit contains:

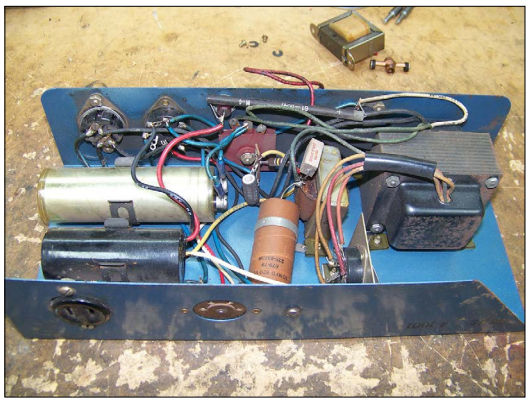
This LED flashtube kit covers models 400, 404, 500, 504, 600, 680 & 506.

For the power supply: 1-LED power supply circuit board, 2 screws, 2 spacers, 2 locknuts, 1 blue shrink sleeve, 1 white shrink sleeve, 3 tie straps.

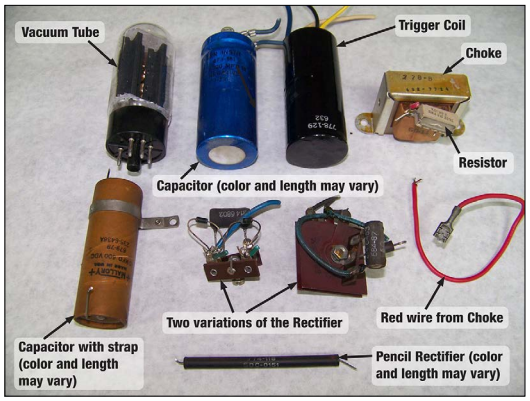
For the flashtube bowl: 1-LED circuit board & brush holder board, 4 screws, 4 lockwashers, 2 new springs, 2 white rubber o-rings, 2 aluminum spacers, 1 red mainshaft wire, 3 screws and lockwashers for washer weights.

(Click on pictures to enlarge)

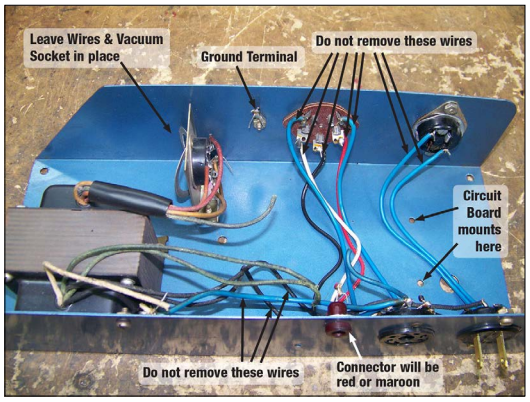
- You need to remove the drive unit from your machine. The drive unit is the whole center section that holds and spins the distributor.
- Remove the two acorn nuts at the top of the drive unit, and the two ¼" bolts at the bottom of the drive unit.
- Remove the back panel of the machine.
- Remove leads from the meter banks and the power lead from the bottom of the case at the power supply. Make a note of where the leads are connected for re-assembly later.
- Remove the belt. (It can be pulled off the pulleys by hand.)
- If your machine has a mechanical vacuum pump threaded into the drive-cone casting, remove the vacuum hose.
- Run the RPM crank wheel in a few turns to help the drive unit come out more easily.
- Grasp the drive unit from the front and remove from the case.
- Set drive unit on its side on a workbench. Remove all connections from the power supply.
- You are now going to remove all the parts except the transformer, vacuum tube socket and the wires crossing from one side of the power supply to the other side and other wires as seen in pic-2. Move the two blue wires where the circuit board mounts. Do not mount the circuit board over these wires. Move them to one side or the other. Try to route the blue wires as seen in pic-5. Leave the ground terminal in place that's located near the vacuum tube socket. ***(See pic-1A, pic-1B, pic-2)***



pic-1A (this is the power supply)

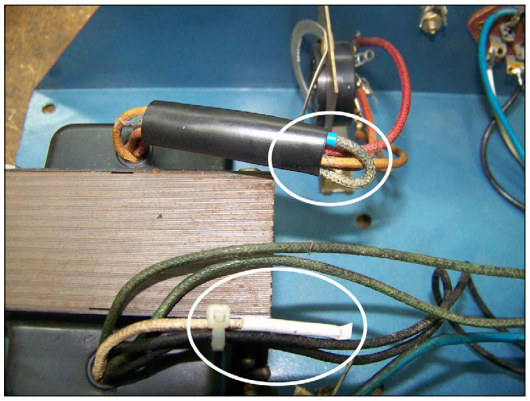


pic-1B ***(remove these parts)***



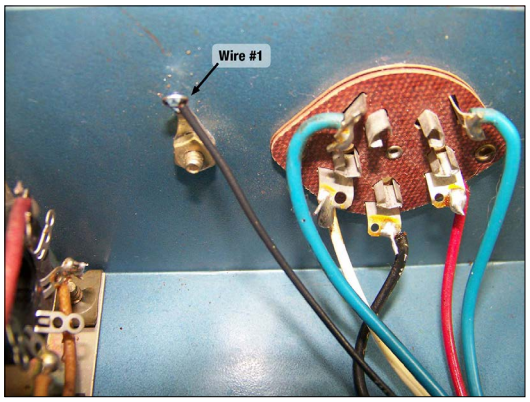
pic-2

- Leave the wires from the transformer to the vacuum tube socket in place. There will still be power at the vacuum tube socket, but it's not going anywhere.
- If you have a model 400, 500 or 600 and have my battery replacement circuit board, you are already using the two yellow wires from the transformer to power my battery replacement circuit board. If not, leave the yellow wires in place on the vacuum tube socket. If you purchase the battery kit later, the two yellow wires will power that kit.
- Snip the two green wires from the transformer off at the rectifier end – not at the transformer and not too short. You will cut them to size later. These two green wires will power the LED circuit board.
- On a side note, there are two styles of rectifiers where the green wires went. One is just two small diodes soldered to two terminals. The other style looks like two small metal plates side by side. Either way - remove them and discard. You will attach the green wires in a few more steps.
- Snip the white wire from the transformer off the ground connection and slip the white shrink sleeve over the end and heat it with a heat gun or hairdryer and tuck it out of the way with a tie strap. ***(See pic-3)***
- Snip the blue wire from the transformer to the choke and slip the blue shrink sleeve over the end and heat it up. Tuck back into the black sleeve. If you do not have a black sleeve, just tie strap the blue wire out of the way. ***(See pic-3)***



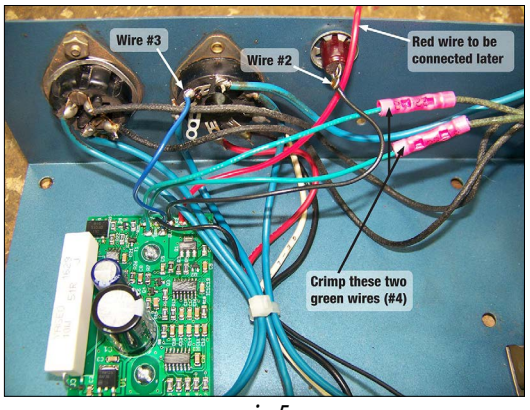
pic-3

- Mount the circuit board in place with the screws, spacers and nuts. The two aluminum spacers go between the circuit board and the floor of the power supply. Use the two existing holes that were used to hold the trigger coil & large capacitor. ***(See pic-2 BEFORE and pic-5 AFTER)***
- Now solder the five wires from the circuit board to the correct areas.
- The longer black lead (#1) from the circuit board goes across the power supply to the ground tab near the vacuum tube bracket. ***(See pic-4)***



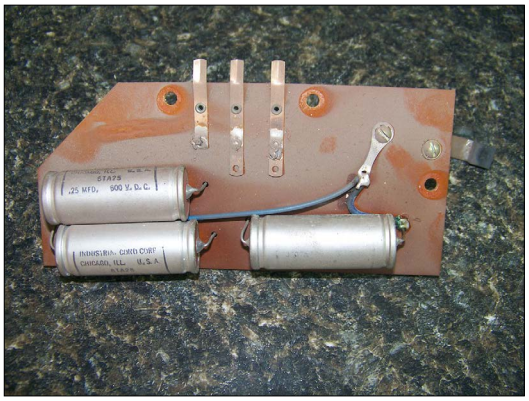
pic-4

- The shorter black lead (#2) goes to the solder tab that attaches to the female connector (maroon or red color) where the "spark plug" wire attaches. ***(See pic-5)***
- The blue wire (#3) attaches to the back of the plug where the 8-pin plug attaches. With the power supply in front of you and the transformer on the left and looking down at the plug, it attaches to the 1 o'clock position. ***(See pic-5)***
- The two green wires (#4) are crimped to the two green leads from the transformer. For a neat installation, cut them to size and bare ¼ inch of wire after matching the length. Pink butt connectors are already attached to the two green wires. These two green wires are what power your circuit board. ***(See pic-5)***

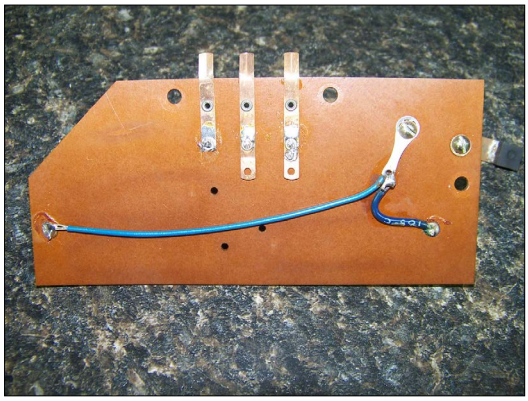


pic-5

- The red wire (#5) with the female spade will be connected later. ***(See pic-5)***
- Moving on to the three capacitor board, you need to remove the three capacitors mounted there. Snip them off with a pair of wire nippers and DISCARD them, they are no longer needed. ***(See pic-6A and pic-6B)***

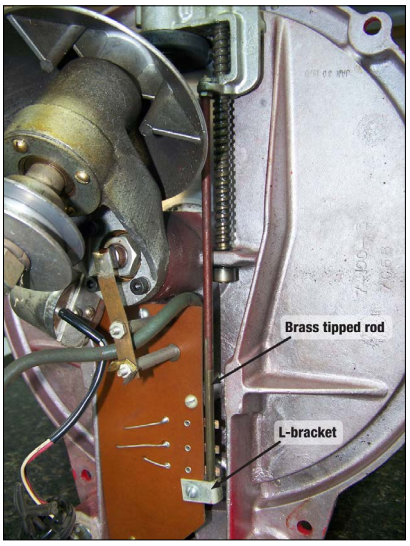


pic-6A

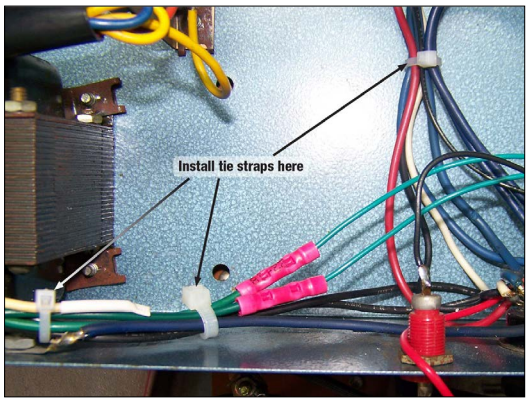


pic-6B

- Now is a good time to clean the board too. It's usually dirty, so give it a good scrubbing. (see pictures)
- Go back to your drive unit a minute and remove the brass tipped rod that is attached to the idler wheel casting. It was used to make contact with the three brass "fingers" on the three capacitor board. It is no longer needed. ***(See pic-7)***



pic-7

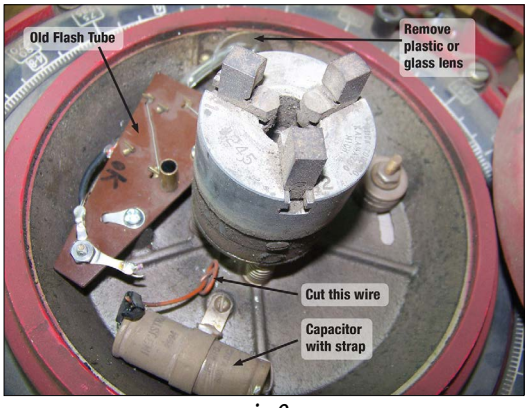


pic-8

- You can also discard the small L-bracket that held the rod in place. No need to use it when you reassemble the board later. ***(See pic-7)***
- Back to the power supply.
- Tie-strap the wires as shown in ***pic-8***. Your power supply is now done.
- Double and triple check the work you have done.

Now on to the flashtube bowl. *(See pic-9)*

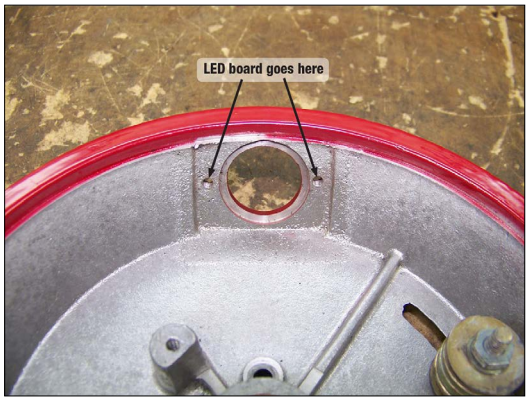
- Remove the original neon flashtube and screws. Remove the capacitor with the mounting strap.
- Nip the small wire that comes out of a small hole under the chuck & universal joint. (You will remove the rest of the wire later). Also remove the flashtube lens that the old flashtube flashed through. Early models will have a glass fisheye lens and later models used a thin plastic lens. Both were held in place with two screws and two u-shaped washers. Remove and discard them. We are not going to reuse the lens. We



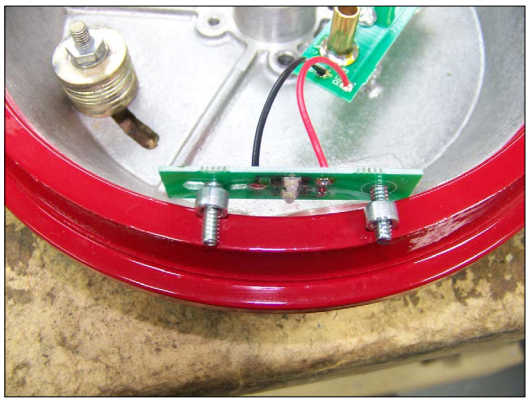
pic-9

need the two screw holes to mount the new LED circuit board.

- The stack of washers is there to balance the bowl as it spins. Since we are removing some parts that will affect the balance we will have to move some of the washers. When I am installing a LED kit for a tester I'm selling or repairing, I rebalance the bowl with a static balancer and I can get the balance very close.
- Since you are doing the work, we have to do it a little differently. I have discovered during the rebalance procedure that the balance will be close by removing some of the washers and moving them. Remove the nut and remove some washers, but leave 4 in place. Reinstall the internal tooth lock washer, nut and tighten. Move four washers over to the threaded hole that was used for the capacitor strap. Sun used three different size screws to mount the strap & capacitor. Use one of the supplied screws (either #6, #8 or #10) and corresponding lockwasher to mount the four washers. Use blue Locktite on the screw.
- Mount the rectangular board with the brush holders first to the two posts where the old flash tube was mounted with the supplied screws and lock washers.

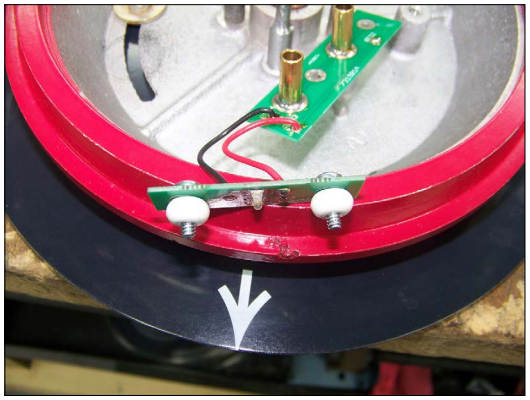


pic-10A


pic-10B

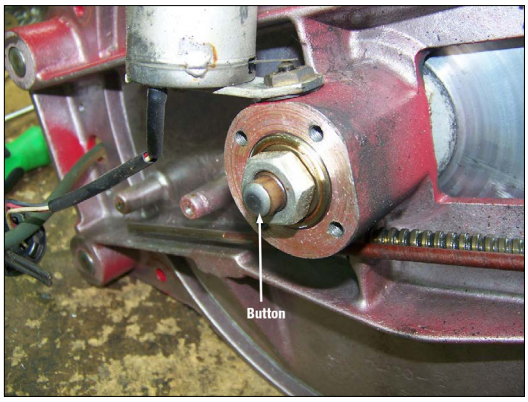
- Now we come to mounting the LED board. Sun did a few things to make mounting the LED board a little challenging.

pic-11A


pic-11B

- Some bowls will have a small square depression in the casting around the LED window. If you have that depression, mount the LED with the supplied screws, lockwashers and aluminum spacers. It may be wise to use blue Loctite on the screws. As you tighten the screws you may see the LED board flex slightly. That's not a problem, the board can take a little bend. We are trying to mount a flat circuit board to a slightly curved area. ***(See pic-10A and pic-10B)***
- If you do NOT have a depressed area around the LED window, use the mounting screws and lock washers and use the two white rubber o-rings to mount the board. The rubber o-rings will conform to the slightly curved area around the window. Use blue Loctite on the two screws when mounting the LED board. Get good thread engagement, but don't flatten the o-rings too much. ***(See pic-11A and pic-11B)***
- Remove the old springs that are under the two carbon brushes and discard them. Use the two

new springs (supplied in kit) that have better tension and will help eliminate the brushes “bouncing” at higher speeds. Reuse your two carbon brushes. Don’t mount them just yet as they are likely to fall out.

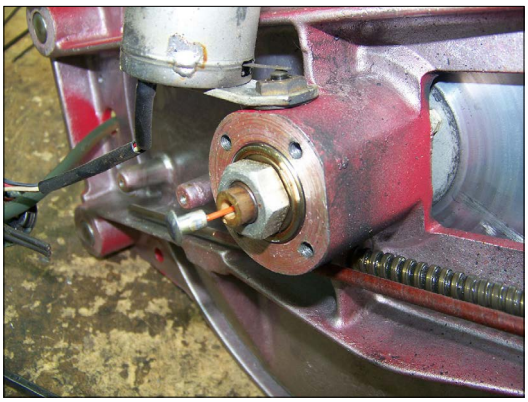


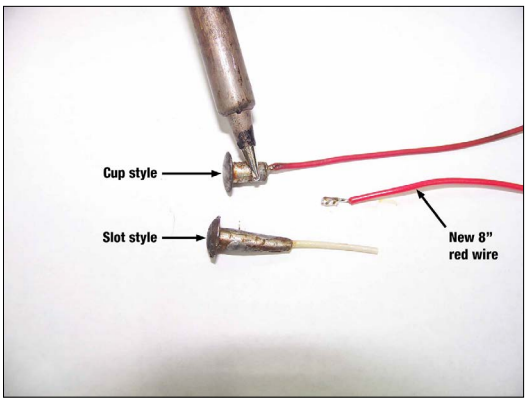
pic-12

pic-13

Last step!

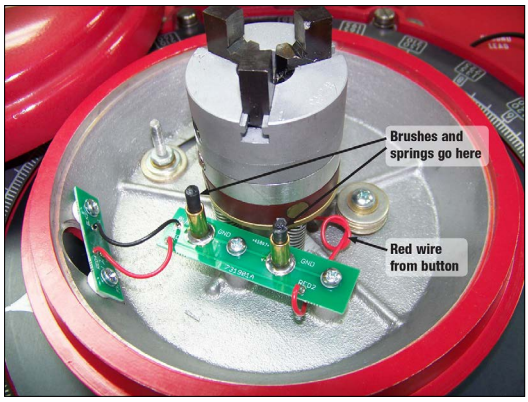
- The LED flashtube has to get power from the power supply. The only connection is the new red wire in the kit (#6) going up through the center of the mainshaft.


pic-14



pic-15

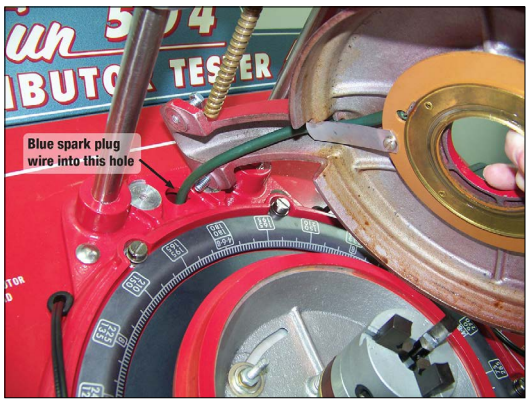
- Get your drive unit tipped back over on its side. At the bottom end of the mainshaft there is a “button” that you need to remove. Sun used 2 styles of buttons, a cup style or a slot style ***(See pic-15)***. It is pressed into the nylon spacer. Remove it with a small chisel or a pair of side cutters. It usually comes out without much trouble. The wire that you nipped off earlier will come out with the button ***(See pic-12, pic-13 and pic-14)***. The mainshaft has a hole drilled in it for the wire to get to the flashtube bowl. Hold the cup with a needle-nosed pliers and hold a solder tip against the cup of the button and pull out the wire after it heats up. Heat it up again and install the new 8 inch red wire #6 (I already soldered the end you are going to use) in the cup and let it cool. ***(See pic-15)***



pic-16

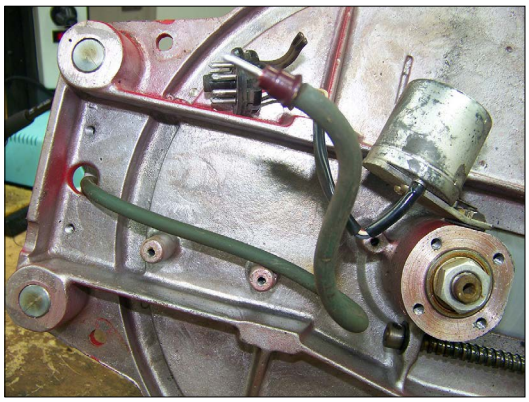
- Lightly sand the button with 600 grit sandpaper or equivalent to help it make good contact with the carbon brush.
- Now push the red wire (#6) back up in the mainshaft hole until it comes out of the hole below the chuck & universal joint. Spinning the chuck & bowl assemble while pushing the wire in seems to help it through the shaft. Tap the button back in place in the nylon spacer.
- Set your drive unit back up and loop the red wire between the two posts that the brush holder board is mounted to. Trim red wire to size with a little slack. Solder it to the “red2” solder pad on the brush holder board. ***(See pic-16)***
- Now mount your brushes & new springs in the two brass tubes. Before installing the chuck cover, clean and lube the brass contact ring under the chuck cover where the two carbon brushes will ride. Lube the contact ring with synthetic Super Lube or a light grease. Carefully mount your

chuck cover. Make sure to install it evenly over the brushes as you tighten the two bolts that hold the chuck cover. Run the blue “spark plug” wire that is attached to the ring under the chuck cover down through the hole as you install the cover. ***(See pic-17)***

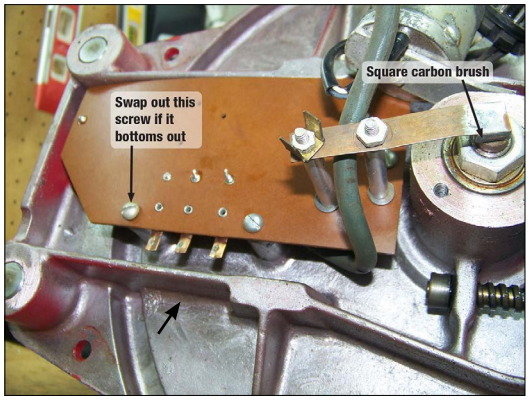


pic-17

- Now put your drive unit back on its side and install the idler wheel cone with the four Allen bolts.
- Tighten it down evenly so you do not crack the cone casting.
- Position blue spark plug wire as seen in pic-18A. Then install the board that HAD the three capacitors on it. Run the blue spark plug wire from the chuck cover under the board between the two posts ***(as seen in pic-18B)*** and install the three screws that hold it down. (The screw that went through the now discarded L bracket might be longer than the other two screws and it may bottom out before hitting the board. Just swap it with one of the screws that holds the power supply in.) The square carbon brush from the capacitor board should now be mounted on the button that you soldered the red wire to a few steps ago. ***(See pic-18A and 18B)***

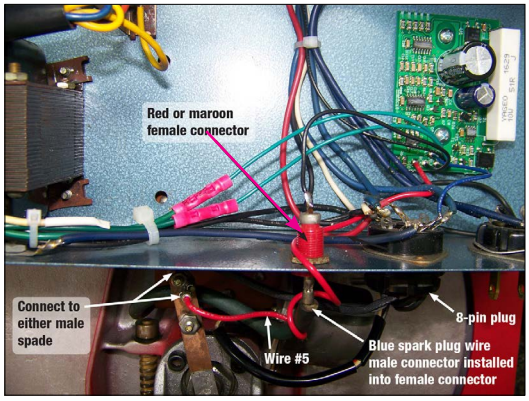

pic-18A

- Install the power supply with the four screws that hold it in place. Reconnect the 8-pin plug in the side of the power supply. It’s keyed, so it only goes in one way. Install the blue spark plug wire in the female connector (maroon or red color) on the side of the power supply. Wrap the red wire (#5) with the female connector from the LED circuit board around the spark plug wire a few times and then connect it to either one of the male spades on the old three capacitor board. It does not matter which one. ***(See pic-19)***



pic-18B

- Make sure you did not pinch the leads that go to your positive & negative clamps & boots under the power supply.
- Check your work AGAIN and reinstall the drive unit in your tester, reconnect all wires and plugs and mount the drive unit back in the machine. YOU ARE DONE!



pic-19