

NCAT

Solid State Relays Testing & Replacement



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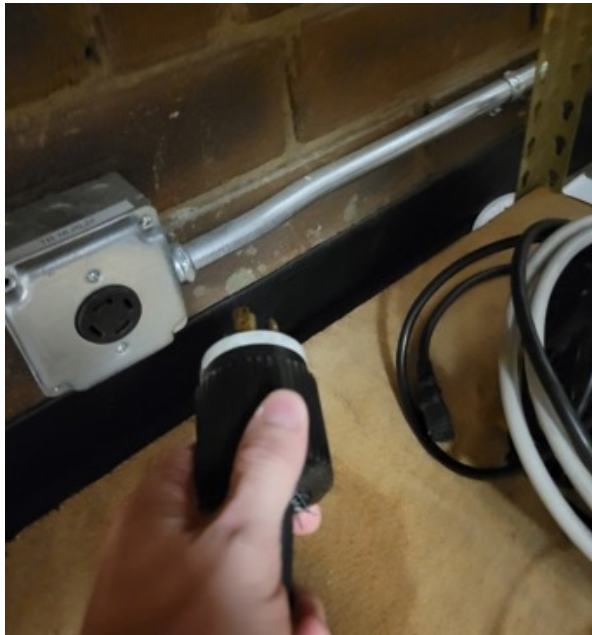
NCAT Solid State Relays Testing & Replacement

There are 3 Solid State Relays that control different parts of the NCAT oven. These parts are the Blower Fan, Chamber Elements, and Filter Element.

You will need a multimeter and screwdriver to access and test the relays.

To Test the Relays, you will first need access to them in the lower tray. Follow the following steps to gain access to the Relays and test.

1. Disconnect furnace from power supply.



If the NCAT power is hard lined to power remove the wires from the main terminal block at the back of the unit. Only remove the top wires on the terminal block. Do not loosen the screws on the bottom half. The bottom half wires go into the oven to power the unit.

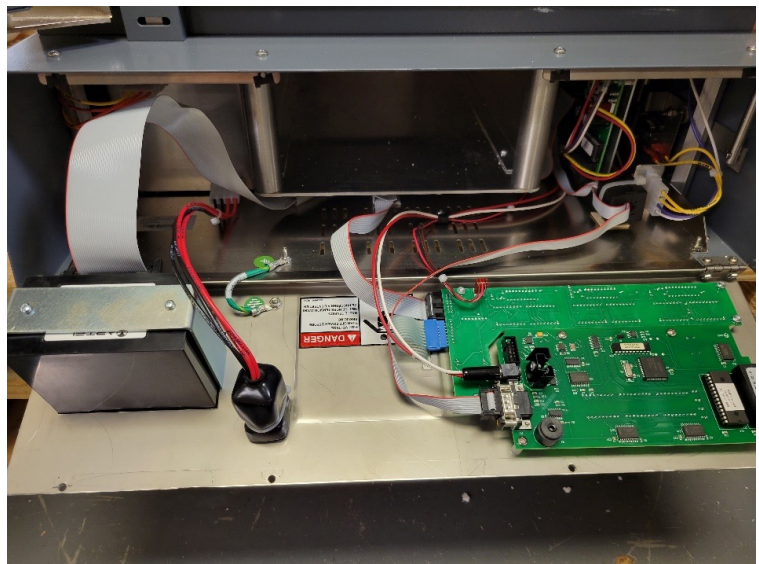


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2. Remove the 10 screws around the tray and wire cover.

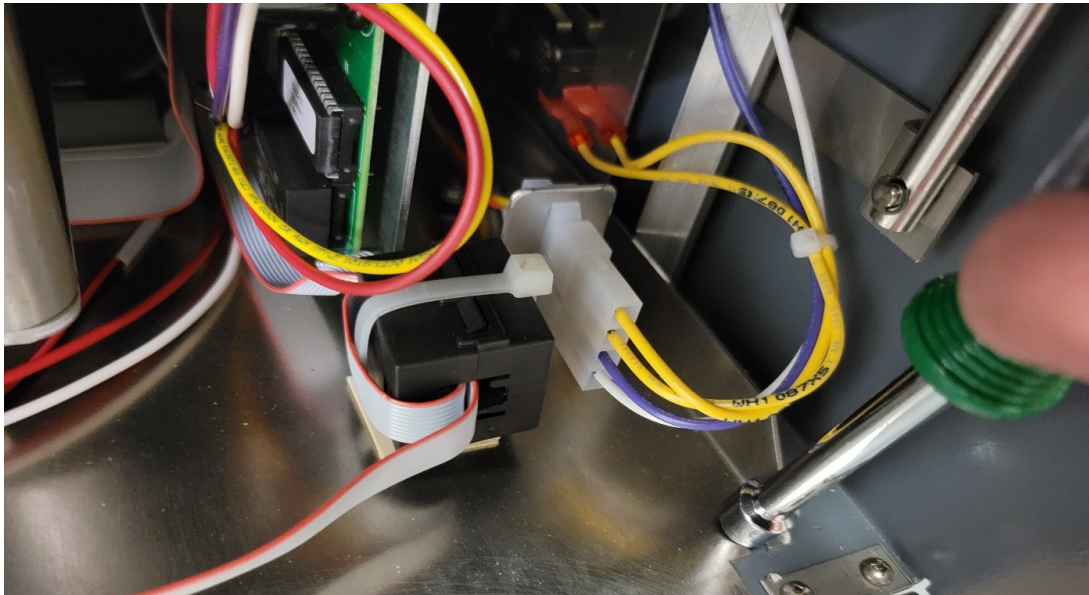


3. Remove the 4 screws on the front panel and lower the front panel on its hinges.

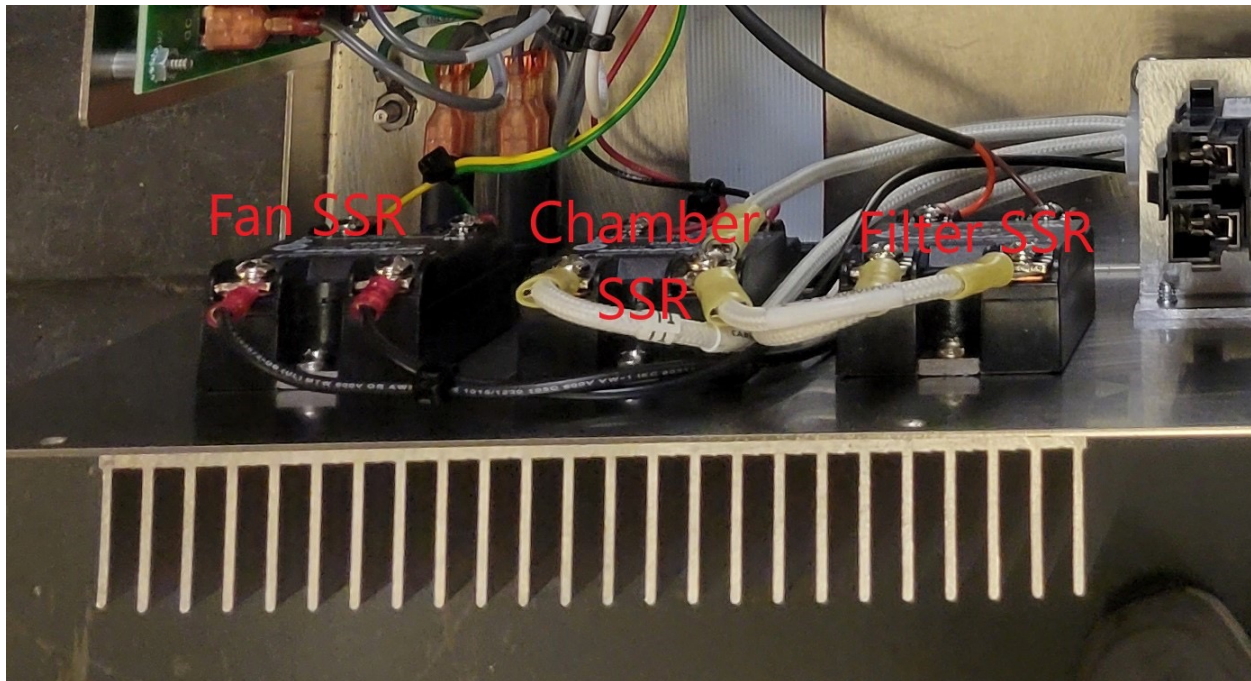


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4. Loosen the two nuts behind the front panel that secure the tray with an 11/32" nut driver or wrench.



5. Slowly pull the tray out approximately 2 inches to access the relays. Do not pull forcefully or too far from the NCAT as wire harnesses are still connected to the front panel and could be damaged.



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6. With the solid-state relays now visible at the lower left-hand side of the tray you can test the relays for functionality.

- a. The relay on the far-left side is for the blower motor. This relay will have two black wires connected to pins "1" and "2," a yellow wire to pin "3," and a green wire to pin "4."
- b. The relay in the middle is for the chamber elements. This relay will have two white wires connected to pins "1" and "2," a red wire to pin "3," and a black wire to pin "4."
- c. The relay on the right side is for the filter element. This relay will have two white wires connected to pins "1" and "2," an orange wire to pin "3," and a brown wire to pin "4."

7. Connect the multimeter leads to the terminal pins number 3 and 4 of the solid-state relay.

CAUTION: You will also be measuring live voltage which is a potential shock hazard!

- a. Each relay has 4 screw terminal each labeled "1", "2", "3", and "4". Terminal pins "1" and "2" on all three relays are considered the output and will only have AC Voltage across them at various times of operation. Terminal "3" and "4" on all three relays are considered the input and will only have DC voltage across them at various times of operation. Pin "3" is the DC positive terminal and pin "4" is the negative terminal.

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8. Power the NCAT on.
9. Allow the NCAT to go into the preheat mode.
10. Note if the CYCLE FILTER and CYCLE CHAMBER LEDs illuminate on the front control panel.
 - a. These LEDs indicate the main microprocessor control board is attempting to apply power to the solid-state relays. If they are not illuminated the solid-state relays should not have power applied to them and the main logic board may be defective.



11. Determining if relays are defective:
 - a. A solid-state relay can be considered good if the input of the relays, pins "3" and "4", have a 5 to 15VDC signal applied across them and at the same time no AC voltage can be measured across pins "1" and "2". This indicates the relay is closed and sending voltage.
 - b. The second condition for a good solid-state relay is if the input relays, pins "3" and "4" have no DC voltage signal applied across them and at the same time an AC voltage can be measured across pins "1" and "2". This indicates the relay is open as expected.
 - c. A solid-state relay is considered defective if the input relays, pins "3" and "4" have a 5 to 15VDC signal applied across them and at the same time an AC voltage can be measured across pins "1" and "2". This indicates that the solid-state relay is stuck OPEN when it should be CLOSED.

- d. If the temperature set point for the CYCLE FILTER or CYCLE CHAMBER of the NCAT oven is surpassed and the CYCLE FILTER or CYCLE CHAMBER LED is not illuminated this could indicate that the Filter or Chamber Element solid-state relay could be defective respectively. This indicates the solid-state relay is stuck CLOSED when it should be OPEN for the corresponding parts.

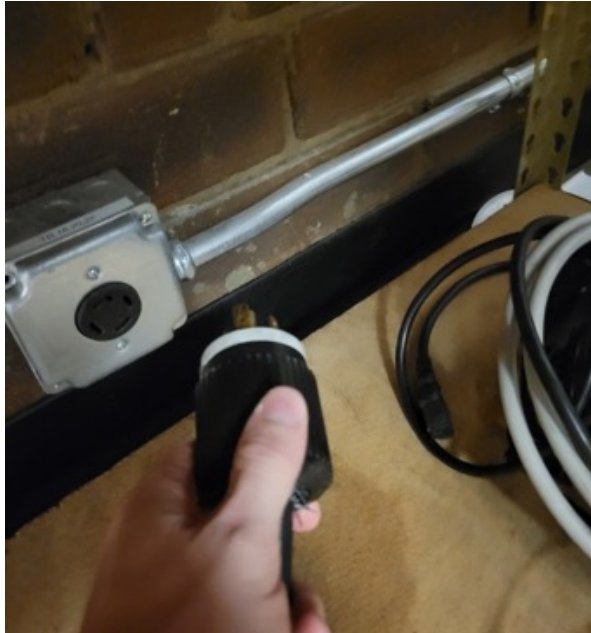
12. To test the blower motor solid-state relay, press the start button to initiate a cycle run. If the blower turns on, then the solid-state relay is working properly. If the blower does not turn on during the cycle run or does turn on during the preheat mode, the solid-state relay may be defective. Take voltage measurements as previously described to determine if it is defective.

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NCAT Solid State Relays – Replacing

Once you have determined you need to replace one or more of the solid-state relays follow the following procedure.

1. Disconnect furnace from power supply.



If the NCAT power is hard lined to power remove the wires from the main terminal block at the back of the unit. Only remove the top wires on the terminal block. Do not loosen the screws on the bottom half. The bottom half wires go into the oven to power the unit.



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2. Remove the 10 screws around the tray and wire cover.

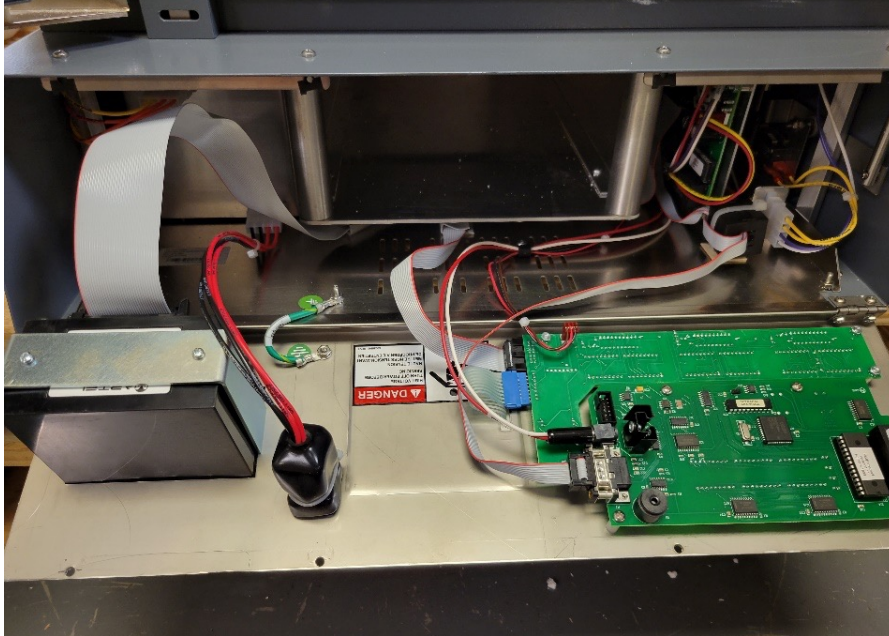


3. Remove the 4 screws on the front panel and lower the front panel on its hinges.



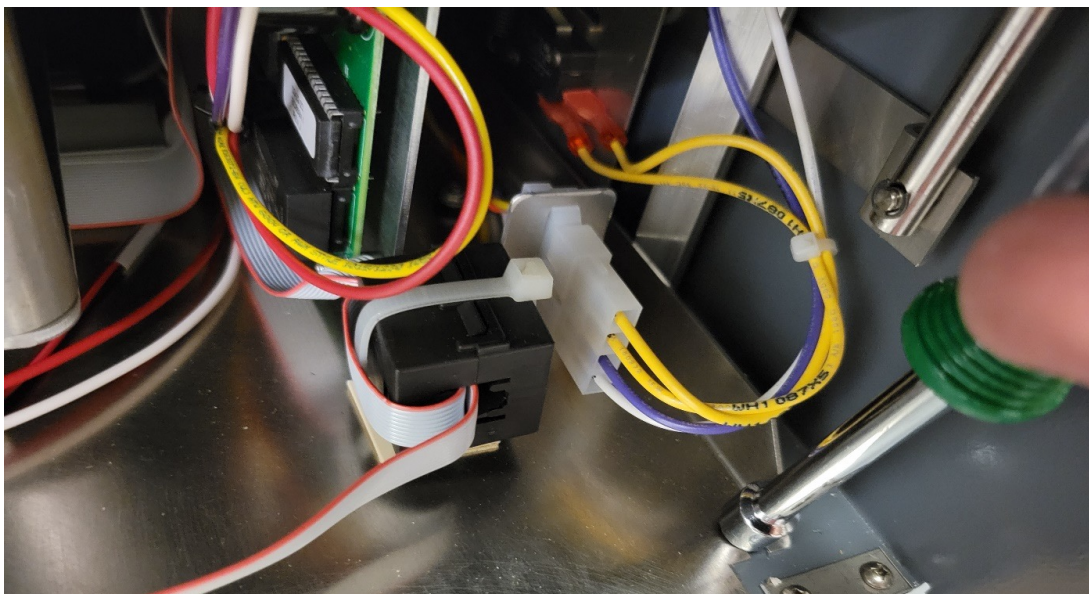
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4. Disconnect the ribbon cables for the printer and scale, ground wire, 3 position red connector, and power jack wires from the front panel that connect to the tray.



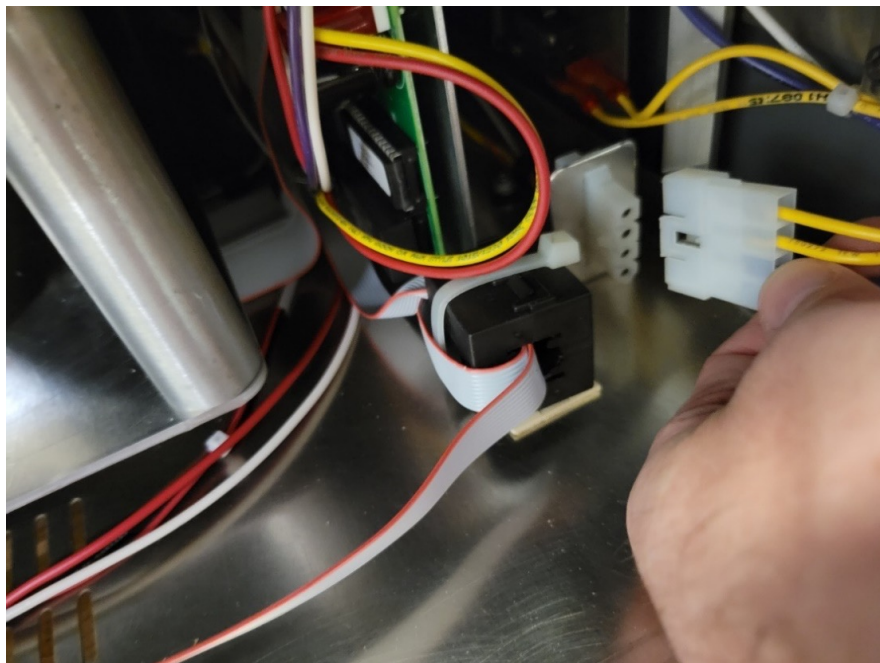
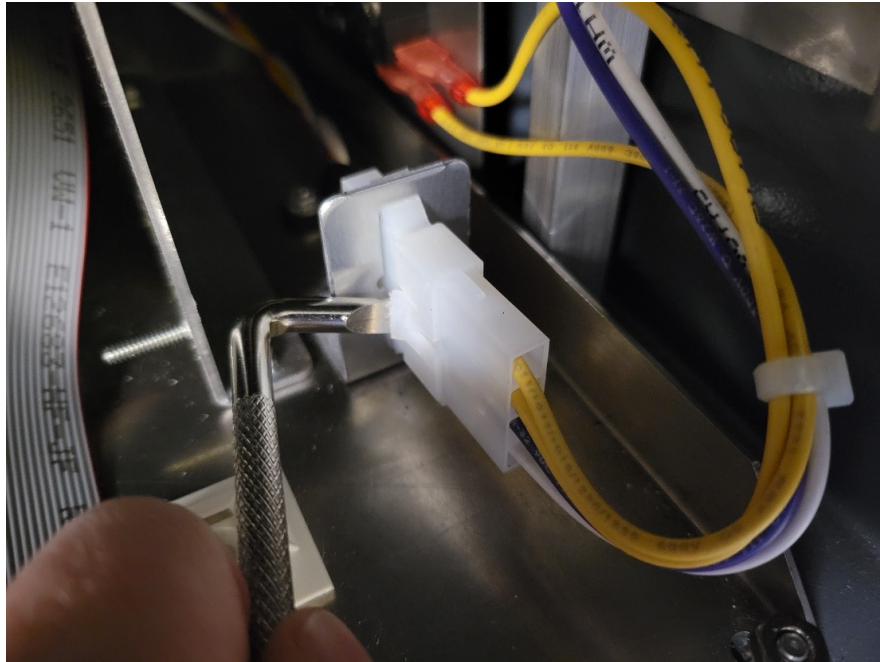
***Note position of Ribbon cables if connectors are not keyed.
When reinstalling plug in the same orientation for proper function.

5. Loosen the two nuts behind the front panel that secure the tray with an 11/32" nut driver or wrench.



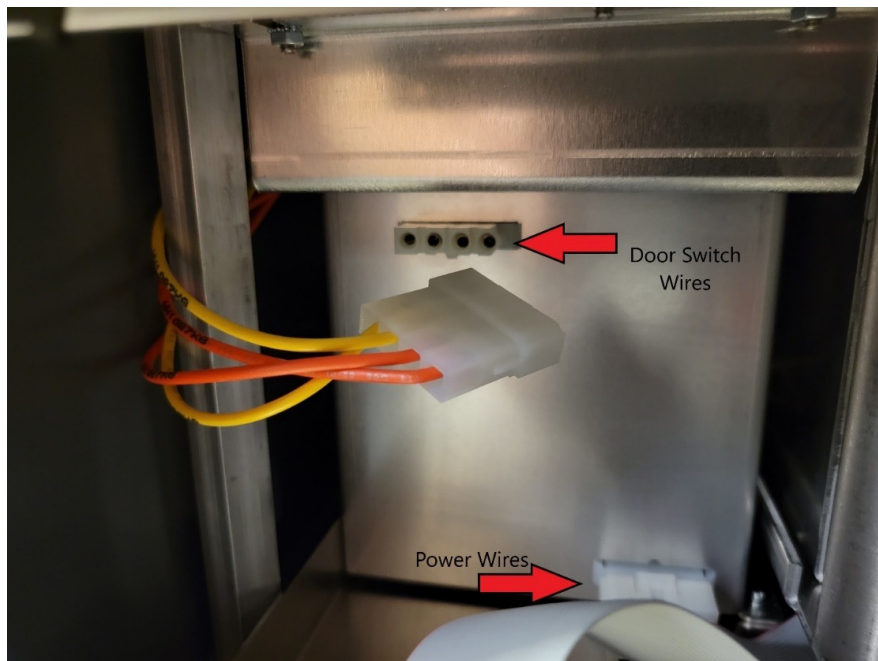
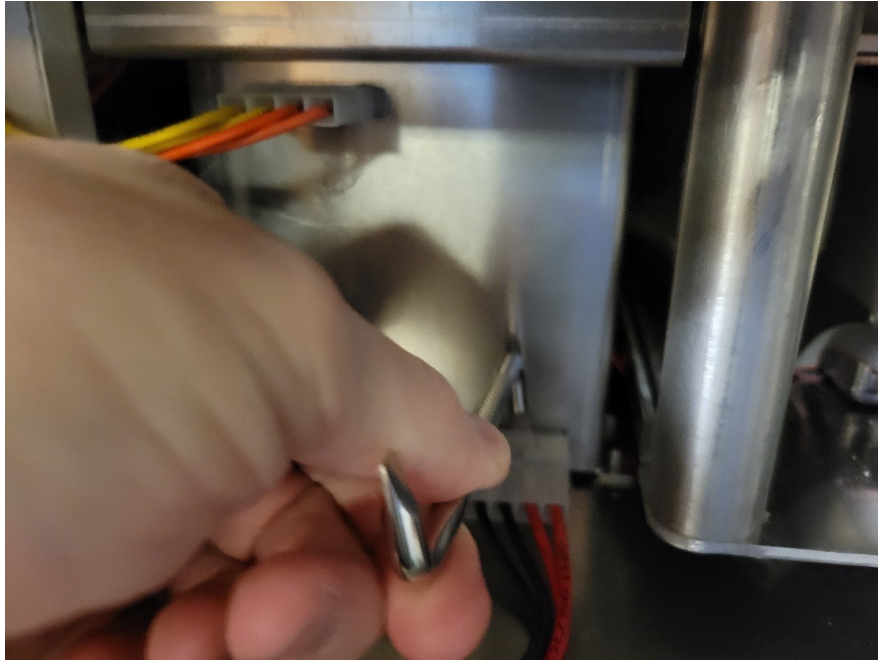
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6. On the right side of the NCAT disconnect the Door Solenoid wires by lifting the locking tab and pulling on the connector to separate.



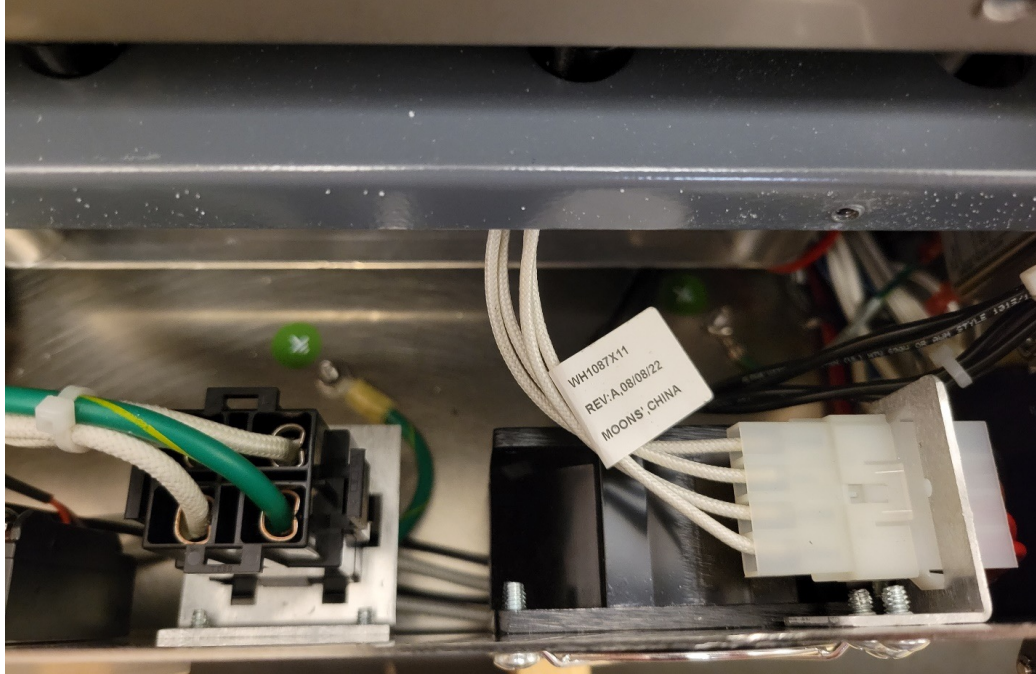
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7. On the left side of the NCAT disconnect the Door Switch and Power wires by lifting on the locking tabs and pulling on the connector to separate.

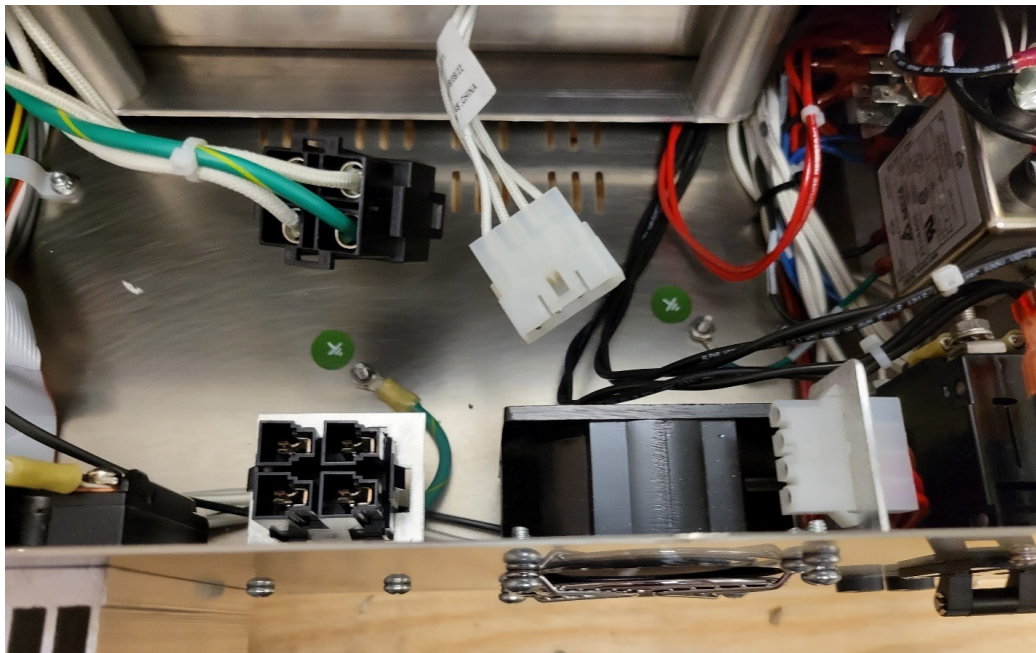


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8. Slowly pull the tray out approximately 2 inches to access the element wires. Do not pull forcefully or too far from the NCAT as wire harnesses are still connected and could be damaged.



9. Disconnect the element connector by squeezing the tabs on either side and pull up. Disconnect the 4-position connector by lifting the locking tab and pull to disconnect.

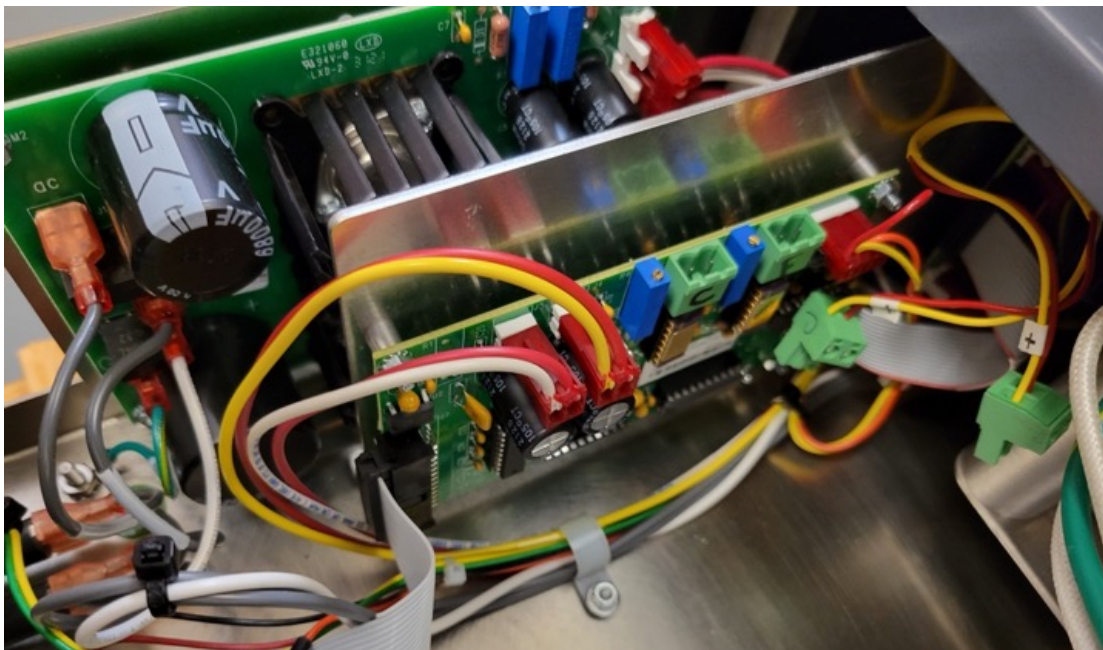


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10. Pull the tray out until you can access the green 2 Position thermocouple connectors. If the thermocouple connectors are not marked with a 'C' for Chamber and 'F' for Filter do so now to correctly plug them in when reinstalling the oven tray.

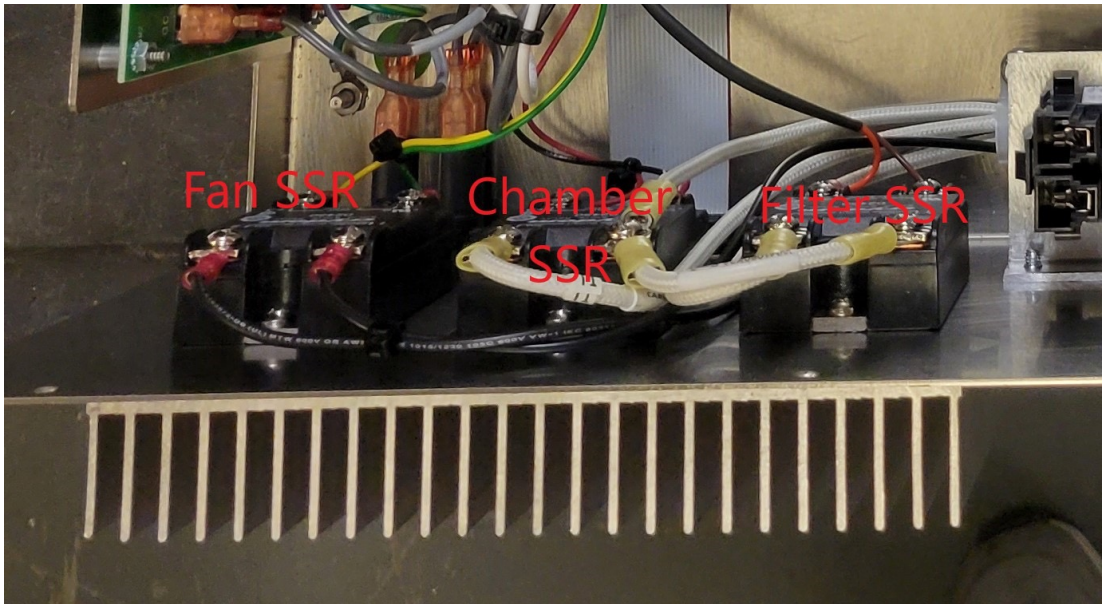


11. Unplug the thermocouple wires.



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12. Pull the tray out enough so you can access the solid-state relays and remove them.



13. Remove the wires from the solid-state relay you want to replace one at a time and connect to the new solid-state relay at the same position marked on the solid-state relay.

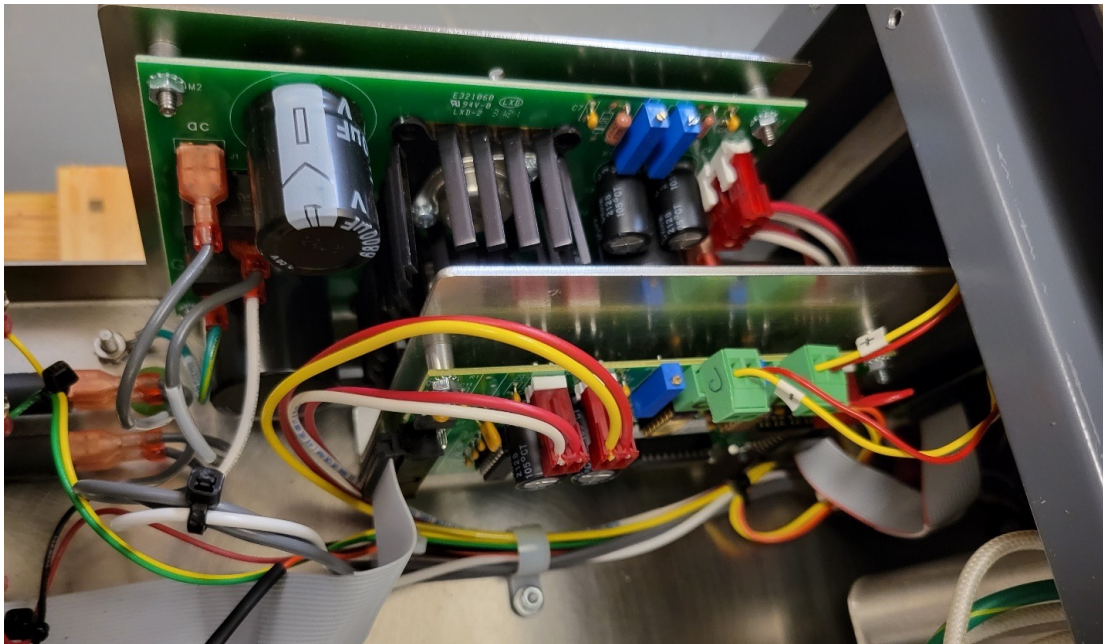
- a. The relay on the far-left side is for the fan/blower motor. This relay will have two black wires connected to pins "1" and "2," a yellow wire to pin "3," and a green wire to pin "4."
- b. The relay in the middle is for the chamber elements. This relay will have two white wires connected to pins "1" and "2," a red wire to pin "3," and a black wire to pin "4."
- c. The relay on the right side is for the filter element. This relay will have two white wires connected to pins "1" and "2," an orange wire to pin "3," and a brown wire to pin "4."

14. Remove the defective solid-state relay from the tray by unscrewing the mounting screws that hold it to the tray.

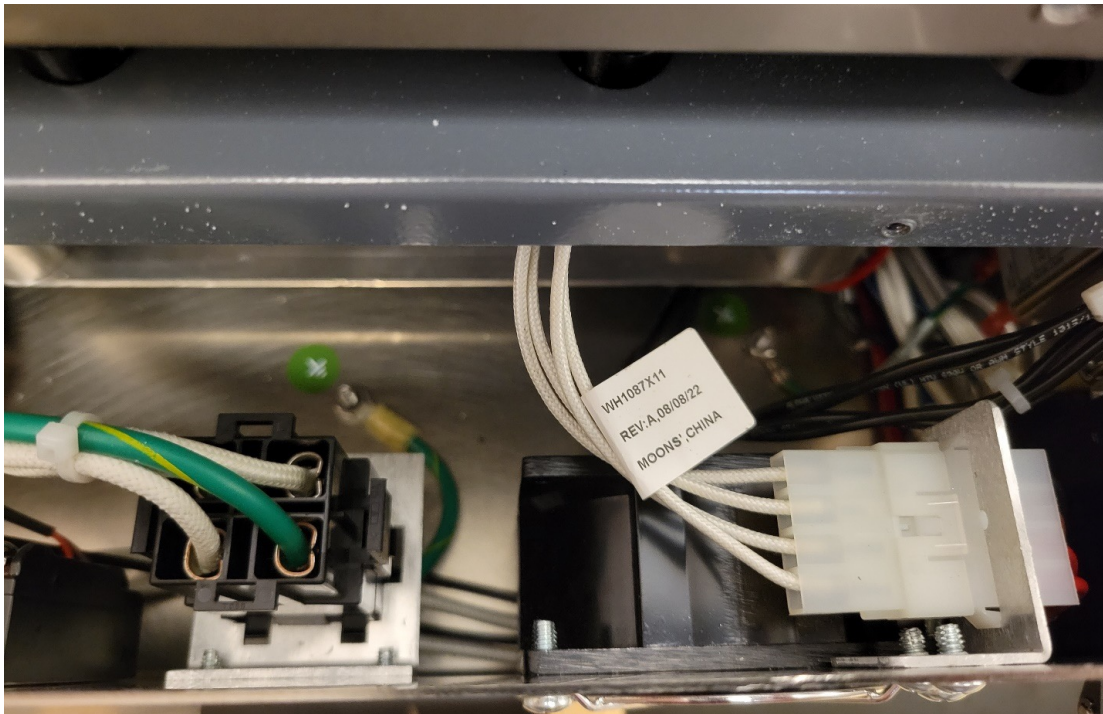
15. Attach the new solid-state relay where the defective relay was removed from in the same orientation.

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16. Push the tray in and plug in the chamber and filter thermocouples into their respective locations.



17. Continue pushing the tray in and plug in the element and fan wires.

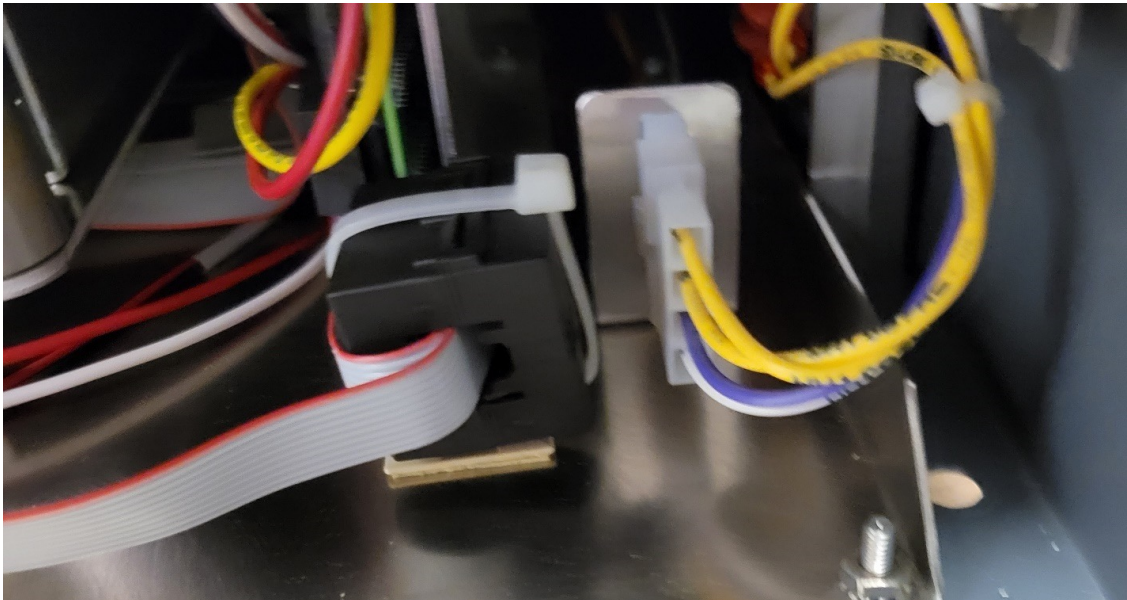


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18. Push the tray all the way in guiding the wires in so that they do not get pinched or stuck.

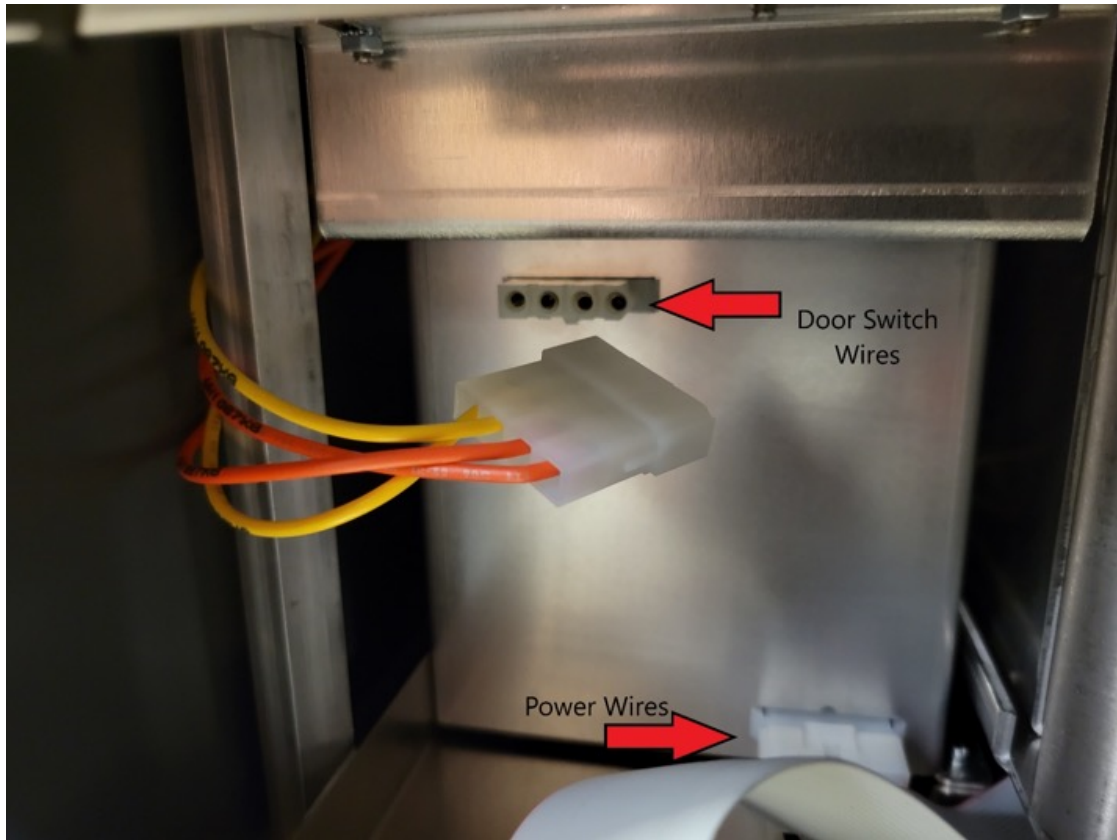


19. On the right side of the NCAT reconnect the Door Solenoid wires.

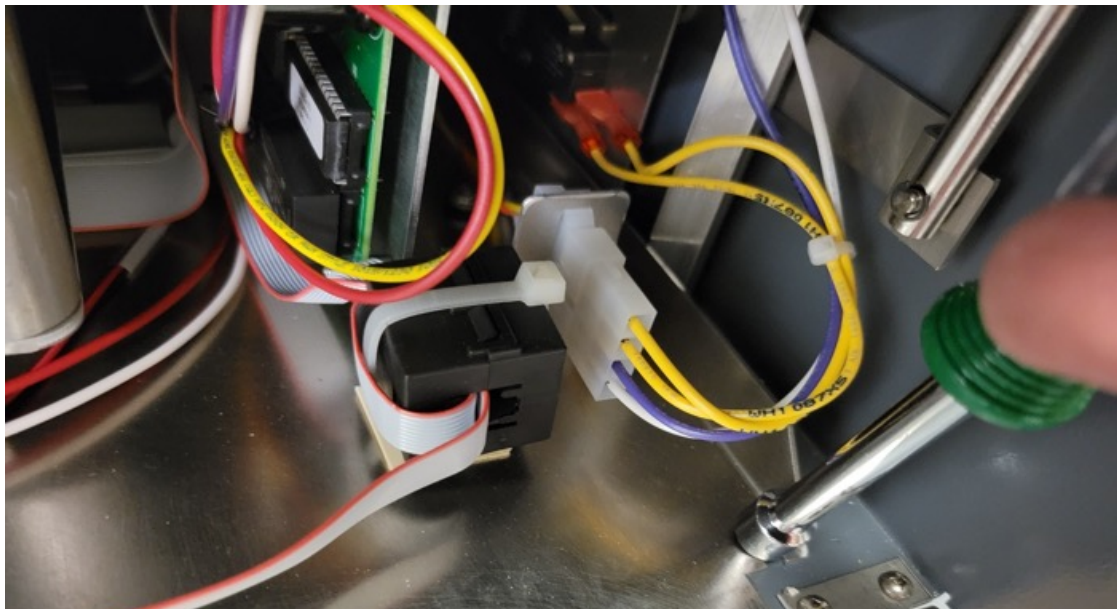


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20. On the left side of the NCAT reconnect the Door Switch and Power wires.

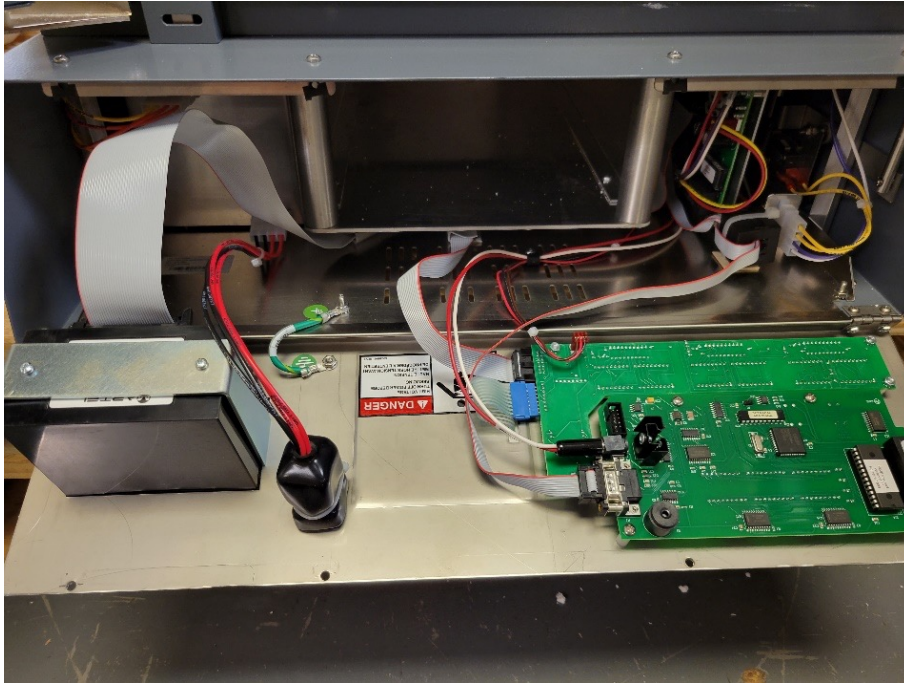


21. Tighten the two nuts behind the front panel that secure the tray.



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22. Reconnect the ribbon cables, ground wire, 3-position red connector, and power jack wires to the front panel that connect from the tray.



23. Raise the front panel on its hinges and install the 4 screws on the front panel to secure in place.



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24. With tray secure and front panel screws holding the panel in place reinstall the 10 screws and wire cover on the back of the unit.



25. Plug unit back into power source and test for functionality.