Power Wheels® Jeep® Wrangler Push Button-Operated Modification Instruction Manual

Marquette University
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The design for modification of the Power Wheels® Jeep® Wrangler ("Design") was undertaken primarily by, and at the direction of, Marquette University engineers; (a) it is not possible to foresee or to anticipate all possible user conditions during the design modification process; and (b) the Design has not been designed, or reviewed in accordance with any applicable federal or state safety laws or regulations and, specifically, has not been reviewed or evaluated in any way by the United States Food and Drug Administration (FDA). This Design is offered on an "as is" basis without any express or implied warranty, including the implied warranties of fitness for a particular purpose and merchantability. The safe and effective implementation of the Design is solely the responsibility of the user and the user expressly assumes all risk for any damage or injury by any person arising out of or related to the use of the vehicle to which the Design may be applied.

Parts List

Item	Quantity	Link
12V Ride-on Jeep *	1	Jeep
Electronics		
Push Button	1	Push button – Small Push button - Large
Toggle switch	1	Toggle switch
Relay Harness	1	Relay wires
12 Volt Relay switch	1	Relay switch
Seating		
Five-point harness	1	Harness
Lap belt	1	Lap Belt
General		
Wire nuts	Various sizes	
14 AWG Black Wire		
14 AWG Red Wire		
1/8 Rivets		
Finishing Washer		
6-32 Screws	Various lengths	
6-32 Lock Nuts		
6-32 Washers		

Tools

- Phillips Head Screwdriver
- Electric Drill
    - 1/8 bit
    - 9/64 bit
    - 1/4 bit
- Socket Wrenches
    - 5/32
    - 9/16
- Wire Strippers
- Angle Cutters
- Needle Nose Pliers
- Rivet Gun

Assembly Instructions

Assembling the car

The Power Wheels Jeeps come disassembled in their flat boxes. Because the car is being modified, it is not necessary to fully assemble the car at the beginning. The list below describes what steps in the assembly instructions that need to be completed at the beginning of the build.

1. Follow the instruction 1-12 in the instruction manual to attach the front and back wheels

Prepping Car for Rewiring

To rewire the Power Wheels Jeeps, you need to remove some of the covers that come preassembled. These pieces are not designed to be removed, but if removed correctly will snap back into place once the wiring has been modified.

1. Remove the four screws in the panel above the shifter shown in Figure 1

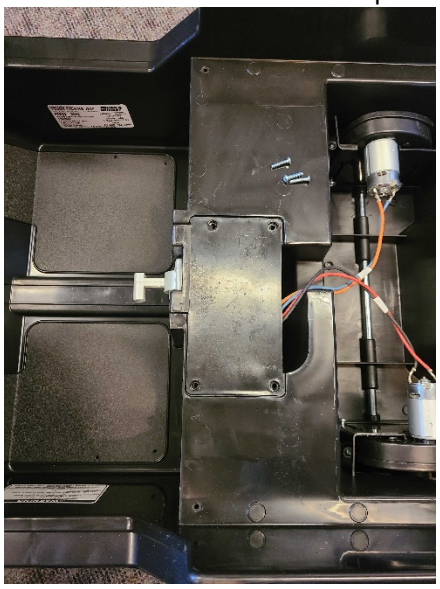

Figure 1. Location of the screws under the seat that must be removed to access wiring

2. Remove the two screws that attach the shifter to the car shown below in Figure 2

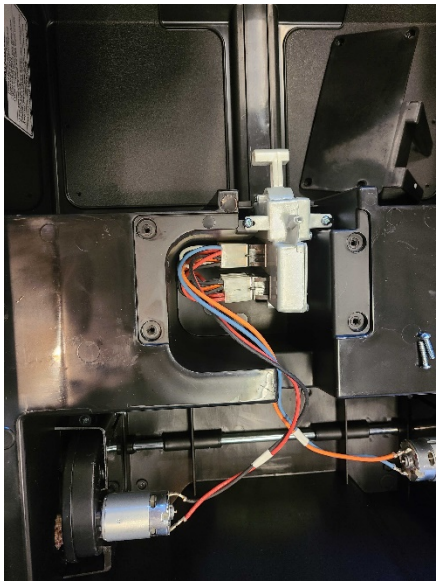

Figure 2. Location of the 2 screws need to remove the shifter

3. Remove the cover for the wire channel running down the center of the floor of the car seen in Figure 3

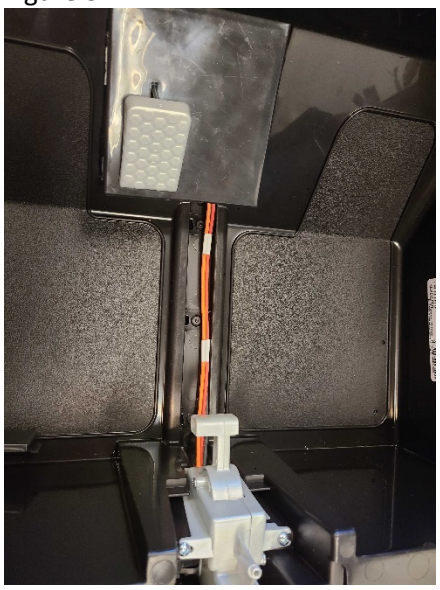

Figure 3. Exposed channel once cover is removed

4. Remove the foot pedal panel by flipping the car upside down and pulling the panel off while pushing in clips from under the car shown in Figure 4.

   Note: Using a flathead screwdriver to depress the panel clips is the easiest way to snap them off

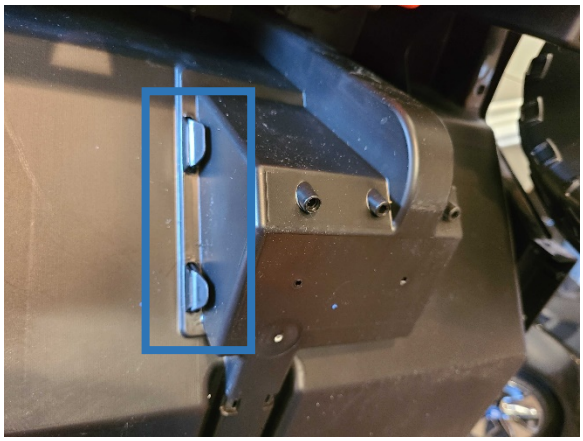

Figure 4. Clips below the car to remove the panel boxed in blue

5. Disconnect the wires from the foot pedal as shown in Figure 5

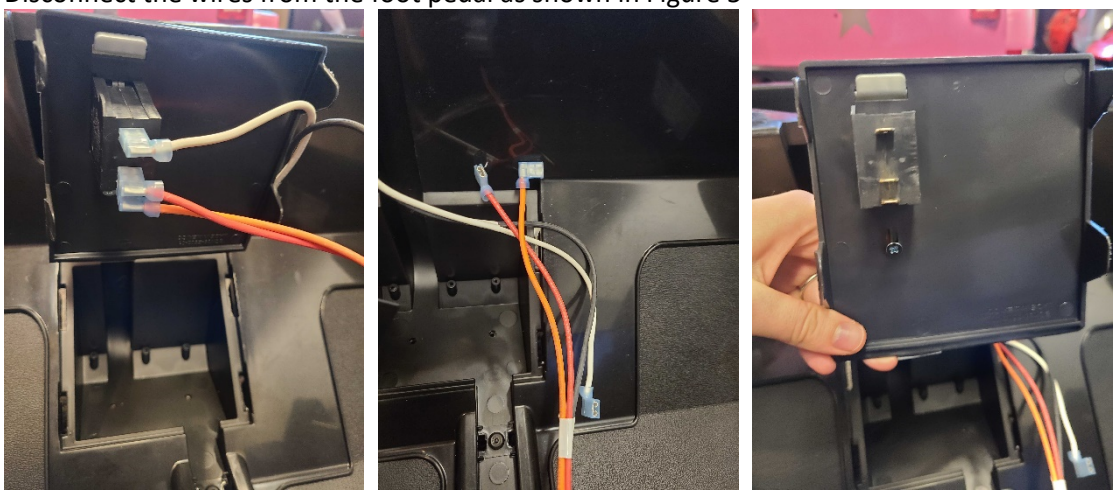

Figure 5. Left: Wires connected to the foot petal; Middle: Wires disconnected from the foot pedal; Right: Foot pedal without wires attached.

6. Cut all the wires going from the clear foot pedal connector show in Figure 6

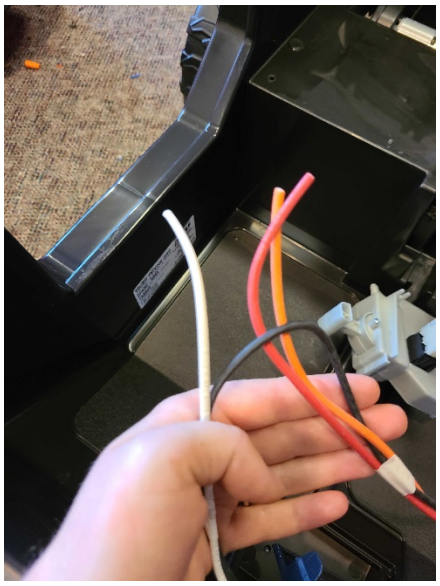

Figure 6. Cut foot pedal wires

7. Cut the black wire coming from the battery plug so that it is the same length as the white wire cut in step six (see figure 6).
8. Follow the orange wire back to the shifter and cut the wire, removed the orange wire from the car. The two remaining wires from the shifter (red and black) are your motor wires. See Figure 7

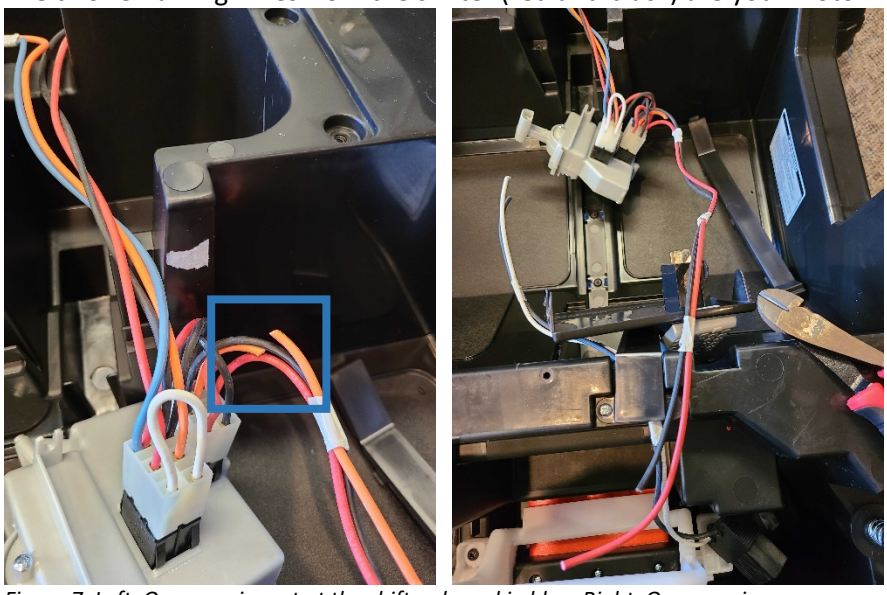

Figure 7. Left: Orange wire cut at the shifter, boxed in blue; Right: Orange wire remove from the car

9. Extend the white and black battery wires so that they can reach the back of the car using two 4ft pieces of 14 AWG wire. Strip one end of the extension wires and the black and white battery leads and attach them using wire nuts. Then place the extended wire down the channel to the back of the car. See Figure 8

   Note: The white wire is the positive battery lead and black is the negative. As such, we attach a red extension to the white wire and a black extension to the black wire.

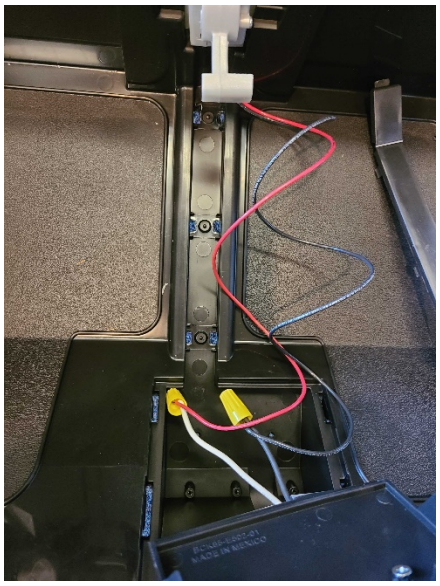

Figure 8. Extended battery wires. The positive wire is extended with red wire and the negative with black.

Push Button

When selecting a button, we discuss each child's need with our therapist. The therapist considers the child's diagnosis as well as their therapy goals when selecting a button size. We use 2.5" or 5" jelly bean buttons.

1. Feed the rod for the steering wheel through the steering wheel. Ensure the bend in the rod points the same way as the top of the steering wheel. See Figure 9 below.
   Note: The order in which you assemble the steering wheel is not the same as stated in the instructions

Figure 9. Steering wheel rod attached to the steering wheel properly. Bend in the steering wheel boxed in blue.

2. Place the pin through the rod
3. Place the cap on the steering wheel. Screw in the cap if applicable.
4. Stabilize the button between the three posts on the steering wheels.
5. Drill a hole for the first screw.

6. Place a washer on a 6-32 screw and then place the screw through the hole in the button and the post on the steering wheel then place another washer on the screw and a lock nut. See Figure 10

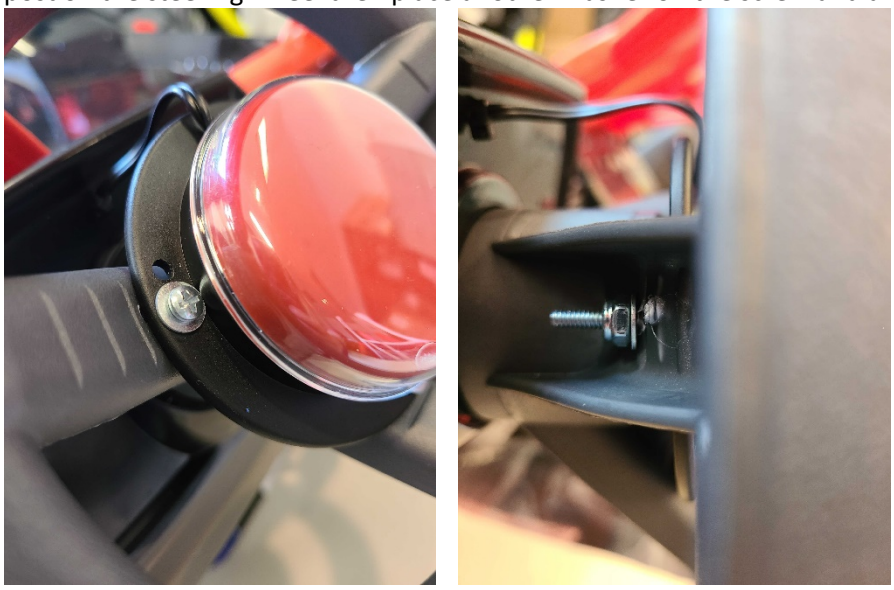

Figure 10. Left: Screw and washer on the top of the button; Right: Washer and nut under the steering wheel

7. Push the buttons firmly down and drill a new hole through the button and next post. Secure with a screw and then place the screw through a washer and the hole in the button and the post then place another washer on the screw and a lock nut.
8. Repeat one more time for the final post

Figure 11. Large button securely attached to the steering wheel

9. Cut off the Aux connector on the button cable.
10. Drill a hole through the front of the dashboard using an 9/64 drill bit as seen in Figure 12

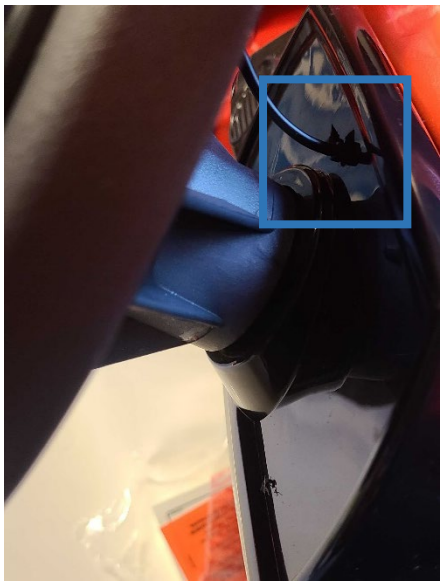

Figure 12. Front dashboard hole boxed in blue

11. Drill another hole on the back side of the dashboard. This hole should be low enough that it will come out under the hood.

Figure 13. Hole in the dashboard under the hood boxed in blue.

12. Feed the wire from the button through the dashboard holes
13. Pull the push button wire all the way under the hood. Make sure you leave enough slack so that the steering wheel can fully rotate from side to side
14. Zip tie both ends of the wire so that a child is not able to pull the wire through back through the holes. Ensure you leave enough slack so that the wheel can turn fully in both directions.
15. Mount the dashboard following step 13 in the instruction manual
16. Place the steering wheel rod into place, because the steering wheel is already attached you will have to rotate the rod 90 degrees to get it around the post and then snap it in place and place the rod through the hole in the front shaft. See Figure 14 - Figure 16

Figure 14. Left: Steering wheel 90^{o} from being in place; Right: Steering wheel rod 90^{o} from being in place.

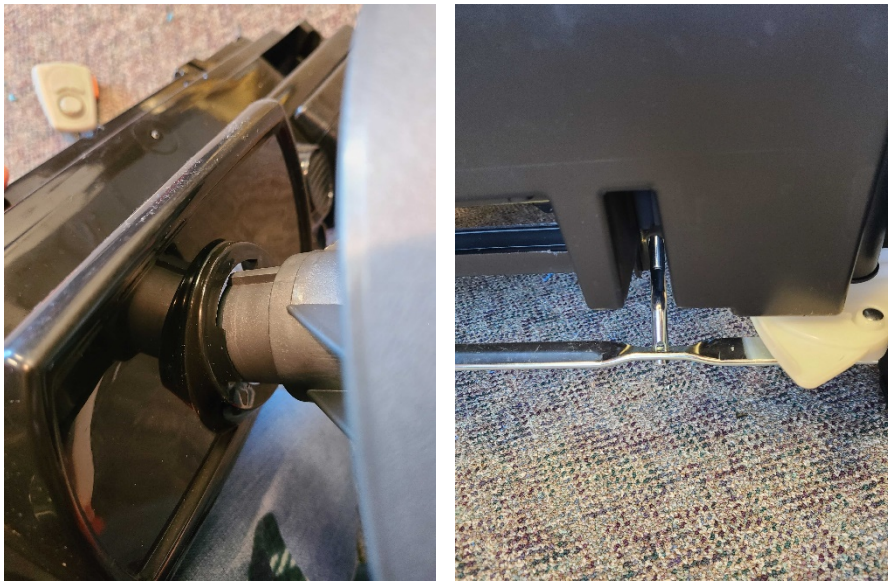

Figure 15. Left: Steering wheel lined up; Right: Steering wheel rod lined up

Figure 16. Left: Steering wheel in place; Right: Steering wheel rod in place

17. Place the grey cap over the end and place the screw through it
18. Feed the remaining wire down to the pedal. Shown in Figure 17.

Figure 17. The track of the button wire boxed in blue

19. Feed the button wires down the channel to the back of the car along with the extended battery wires.
20. Zip tie the extended battery wires and button wires down in the pedal compartment.
21. Replace the cover from “Prepping Car for Rewiring” step 4 making sure the wire nuts on the battery leads are hidden by the foot pedal.
22. Place the battery and button wires down the channel and replace the cover from “Prepping Car for Rewiring” step 3.
23. Place the battery and button wire under the shifter and then secure the shifter back in place, see Figure 18

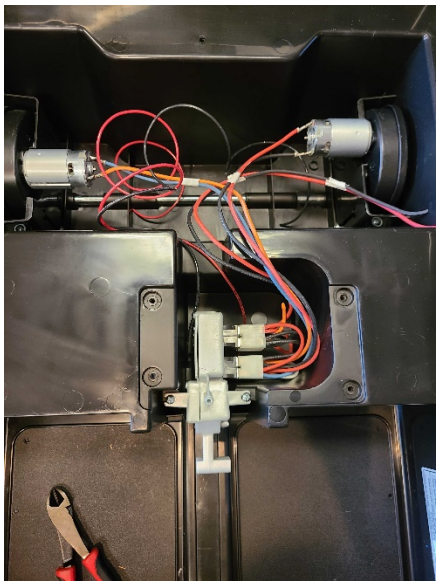

Figure 18. Shifter secured in place

Toggle Switch

1. Drill a hole using an ¼ inch drill bit on the back of the jeep

Figure 19. Toggle switch location

2. Feed the toggle switch with one nut on it through the outside hole.

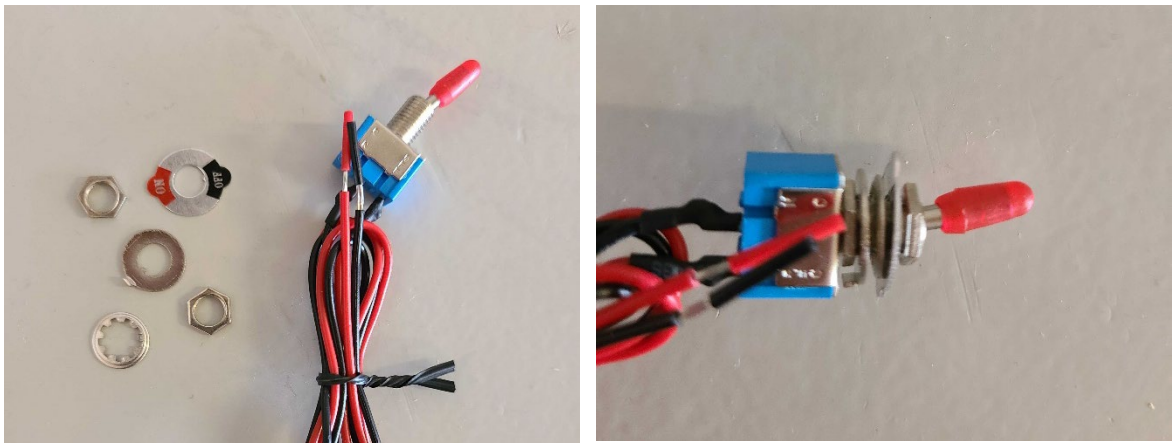

Figure 20. Left: All components of the toggle switch including, 2 nuts, one spring washer, one washer with a bite, and one washer with "on/off" labels; Right: All components placed on the toggle switch in order.

3. Place a washer with a bite, the spring washer, on/off label washer, and nut on the toggle switch and tighten

   Note: The toggle switch should be places so that off is down and on is up. The switch has a notch to indicate off as seen in Figure 21.

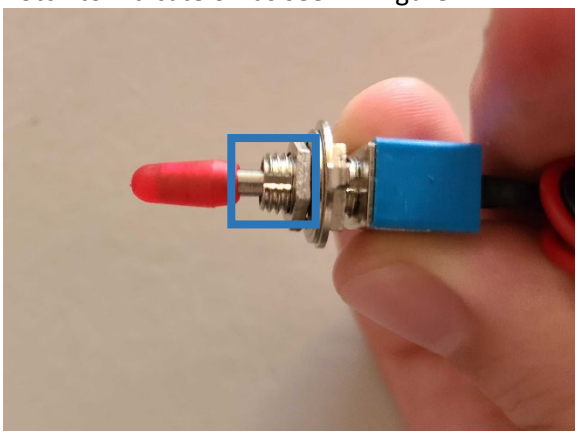

Figure 21. Boxed in blue is the notch on the toggle switch

4. Drill a hole under the seat across from the hole above using an 9/64 drill bit, see Figure 22.

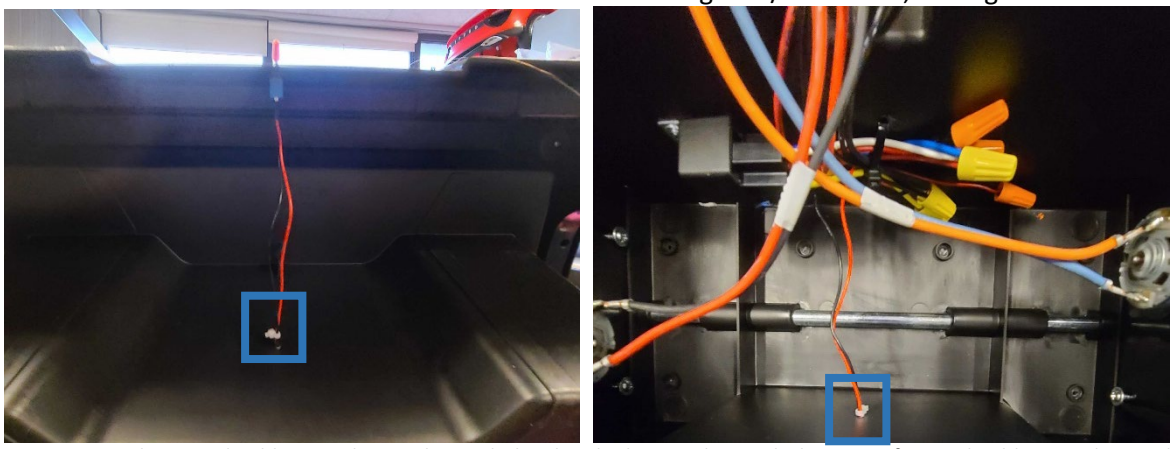

Figure 22. Right: Boxed in blue toggle switch wire hole when looking underneath the car; Left Boxed in blue toggle switch wire hole when looking under the seat.

5. Feed the wire through the second hole under the seat seen in Figure 18.
6. Place a 2 small zip ties around the wire on either side of the plastic wall to stop it from slipping back through the hole

Relay Switch

Installing a relay switch allows you to create a circuit with high voltage and one with low voltage. In addition to the relay switch we attach a relay harness that allows up to connect the wires without having to solider.

1. Attach the 12V relay switch to the relay harness
2. Drill a hole on the wall under the seat using an 9/64 drill bit. Secure the relay switch via the attached bracket using a 6-32 screw, lock nut and washers.

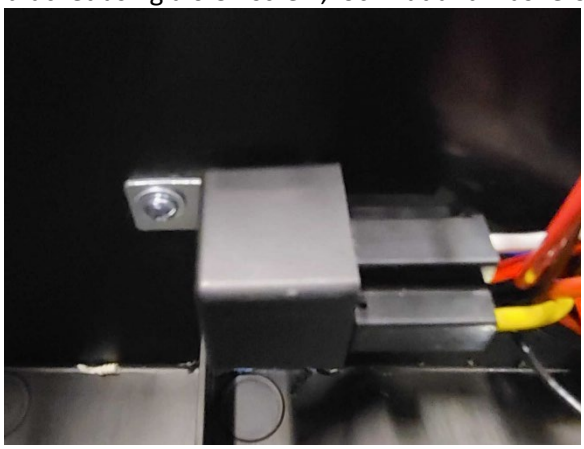

Figure 23. The relay switch mounted to the jeep

3. Trim the access from all the wires to the appropriate length to attach to the relay wires using the wiring schematic below

   Note: Before starting to wire identify all wires coming to the back of the car

   - **Battery wire:** Red and black 14 AWG wire coming from the channel from the front of the car.
   - **Motor wire:** Red and black wires coming from the shifter.
   - **Push button:** Black wires coming from the channel from the front of the car.
   - **Toggle switch:** Red and black wires coming from the wall under the seat.

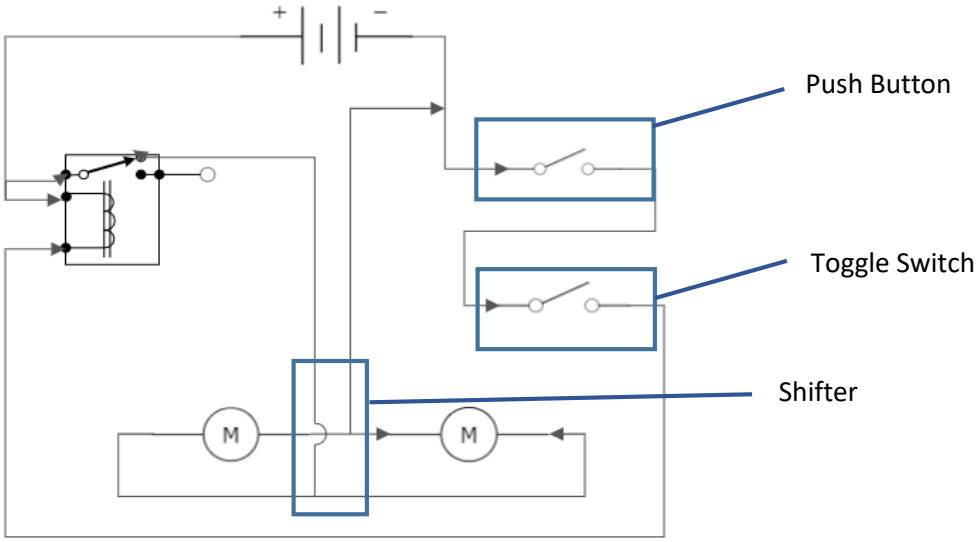

Figure 24. Shows the schematic for the new wiring

4. Place a wire nut on the center wire of the relay wires
5. Attach the black battery lead to one of the push button leads and the black motor lead
6. Attach the read battery lead to Port 30 (white) and Port 86 (black) on the relay switch
7. Attach the read lead of the motor to Port 87 (red) on the relay switch
8. Attach the final lead from the relay switch Port 85 (yellow) to the toggle switch
9. Attach the remaining leads from the button and the toggle switch together
10. Verify the car works as expected
11. Secure down the wires. Drill a hole on either side of the wire cluster. Feed a zip-tie through the holes and tighten down on the wires. See Figure 25

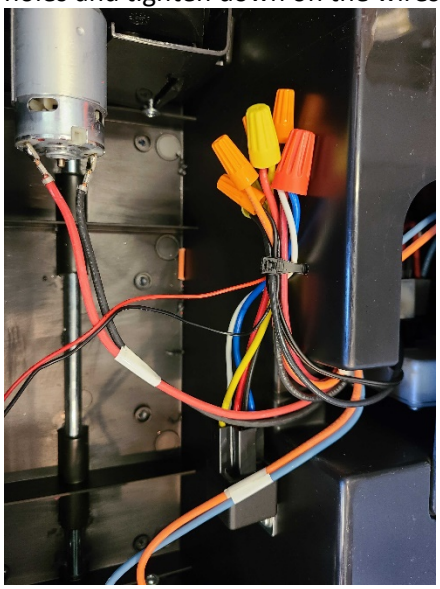

Figure 25. Secured wires

Final Assembly

1. Attach the hood clips following step 14 in the instruction manual
2. Attach hood following step 22 in the instruction manual
3. Attach windshield following step 23 in the instruction manual
4. Attach the rearview mirrors following step 24 in the instruction manual
5. Attach the roll bar following steps 27-33 in the instruction manual

Seat Modifications

Depending on the child's need a 5-point Harness or lap belt is added to the seat to ensure the child stay securely in the car. Notably, depending on the child's height additional structure may be added so that the shoulder straps of the 5-point harness sit at shoulder height.

5-Point Harness

Figure 26. 5-Point Harness

1. Position the 5-point harness against the seat of the vehicle as shown in Figure 26.
2. Mark 5 points on the seat, one for each location where the strap on each belt can attach to the seat.
3. Drill all 5 holes using a 1/8 drill bit.
4. Cut small holes in each strap of the 5-point harness to attach to the seat.
5. Use a rivet with a finishing washer to secure each strap to the seat.
6. Attach the seat to the vehicle following steps 25 and 26 in the instruction manual.

Lap belt

Figure 27. Lap belt boxed in blue

1. Position the lap belt against the seat of the vehicle as shown in Figure 23.
2. Cut the loop side off the belt
3. Mark the two location of the seat for the belt to connect.
4. Drill each hole using a 1/8 drill bit.
5. Use a rivet with a finishing washer to secure each strap to the seat. Connect the loop side to one side of the seat and the strap to the other side of the seat.
6. Attach the seat to the vehicle following steps 25 and 26 in the instruction manual.