

Installation of a Tekonsha Prodigy P2 Trailer Brake Controller in a 2016 Tesla Model X

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Disclaimer: This documents the installation of a Prodigy P2 trailer brake controller on my Model X. The Prodigy P3 controller is similar and can also be installed using these directions (although the photographs show the P2). Tesla Motors is constantly changing and improving the vehicle, and there may be differences between my car and your car. Under no circumstances will I or Tesla Motors be responsible for any damage to your car, trailer, ego, or anything else, should you decide to do something as misguided as following directions you downloaded from the Internet.

Background

Types of trailer brakes

Light trailers typically do not have their own braking systems, but rely on the tow vehicle to stop them. Trailers over a certain weight (typically 3000 lbs, but the law varies by location) must be equipped with a friction braking system which acts on their own wheels. Cheaper trailers typically use a "Surge Brake" system in which the force of the trailer pushing against the tow vehicle actuates a hydraulic cylinder in the hitch assembly, and this hydraulic pressure in turn actuates the trailer's brakes. Surge Brakes are also favored among rental equipment because they are entirely self-contained and do not require any input from the tow vehicle. Heavier trailers typically use electrically actuated brakes which rely on an analog signal directly from the tow vehicle to actuate the brakes.

What is a brake controller?

A brake controller is the electronics that converts the stopping action of the tow vehicle to an analog signal which actuates the trailer brakes. There are a number of different ways that brake controllers sense the stopping of the vehicle; some work by measuring the pressure applied to the tow vehicle's brake pedal; some work by using an accelerometer to measure the deceleration of the tow vehicle. The brake controller has a gain control that must be adjusted to each trailer and load, so it applies the maximum amount of brake without skidding the trailer's tires. A heavier load on the trailer requires more braking.

Why would I want one in my Model X?

A brake controller is only required for towing trailers that are equipped with electronic brakes. If you do not intend to tow such a trailer, then you can stop reading here.

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Presumably because a brake controller is something that few owners will need, Tesla Motors did not include one in the Model X. Fortunately, they did include the required wiring harness, and the installation of an aftermarket brake controller is a simple “do it yourself” task for someone of moderate mechanical skills.

Why the Tekonsha Prodigy P2?

The Prodigy P2 brake controller is readily available from local automotive supply stores or from Amazon. Prodigy also makes a slightly more expensive P3 controller which should be functionally equivalent to the P2, but has a nicer display that would make diagnosing problems easier. The P3 controller is also of slightly different dimensions, and I’m not sure how well it would fit in the location I chose for the installation.

Before you start, you’ll need...

A Prodigy P2 brake controller kit (including the wiring pigtail that comes with it).

A drill with a 7/64ths bit to drill the pilot holes for the self-tapping screws that mount the controller. Double check that this is an appropriate size before drilling.

A #2 Phillips screwdriver to mount the controller and a small flat head screwdriver.

Small putty knife to assist in removing trim clips and a small knife or razor blade to cut electrical tape.

Tesla Part Number 1072586-00-A pigtail harness to connect the vehicle wiring harness to the brake controller. You should have received one of these with your tow-package equipped Model X.

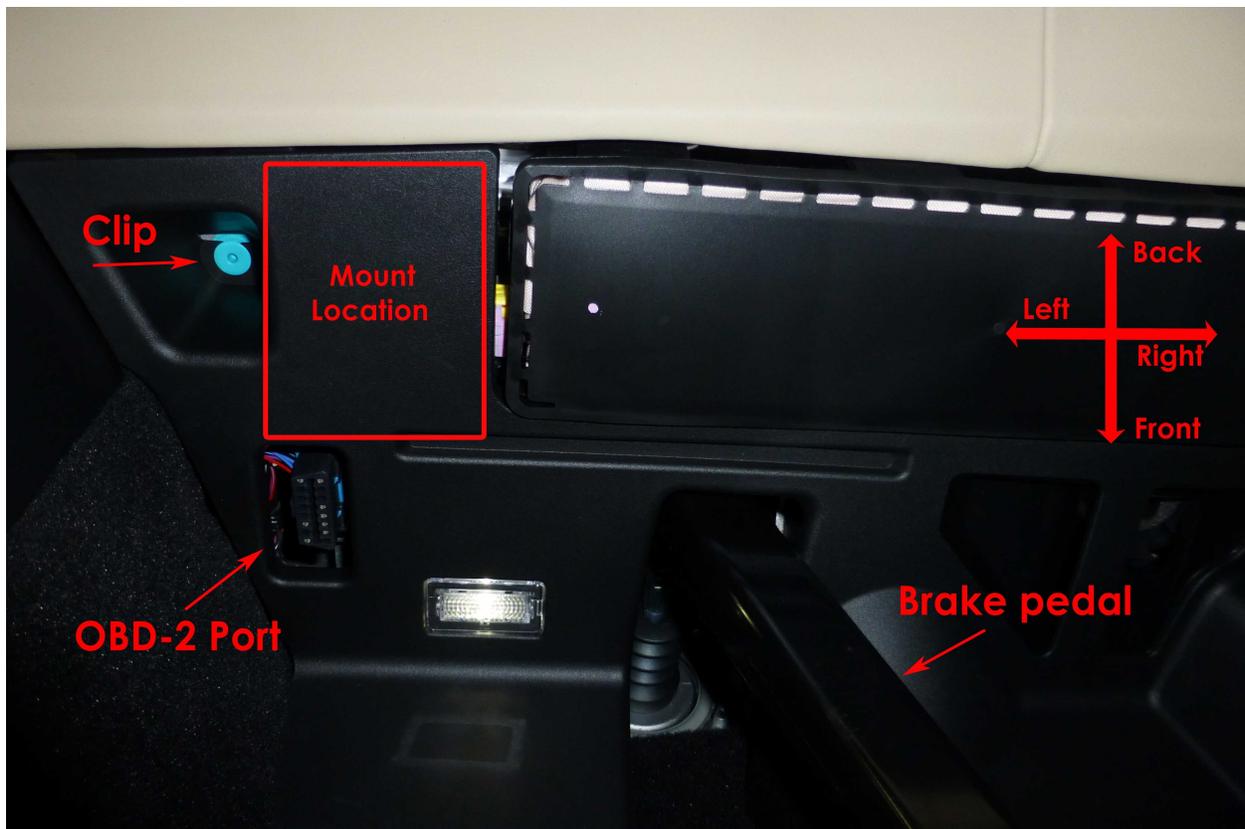
Tesla Part Number 1011813-00-A trim clips (quantity 2). If you are careful, they can be reused. They are cheap, so if you are special-ordering the wiring harness, you might get a spare or two.

Tools and parts necessary to splice four wires. See the discussion in Step 7, two of the splices can be made with the “blue” butt connectors that come with the Prodigy controller. However, the other two wire splices are dissimilar enough in size that to do this properly you need special “step-down” butt splices that are designed for connecting 16-14AWG wire to 12-10AWG wire. You can get cheap ones on [Amazon](#), but [Digikey.com](#) sells good ones made by Molex which have heat-shrink insulation; and will only set you back around \$15. For the step-down connections you’ll need two [P/N WM18950-ND](#). Since you’re ordering from [Digikey](#) anyway, go ahead and order two [P/N WM18426CT-ND](#) for the 16-14AWG to 16-14AWG connections. Buy some spares in case you make a mistake. You’ll also need a wire cutter/stripper, a crimp tool designed for insulated terminals, and a heat gun for shrinking the insulation.

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Drill holes in my Model X?

The controller needs to be installed in a location accessible to the driver and it needs to be securely installed, facing forward (within 20 degrees), so it can properly sense the vehicle deceleration. Mounting with velcro or a similar system is definitely not appropriate. I also wanted an unobtrusive location where it would not stand out, and a location where the two mounting holes that need to be drilled would not be noticed if the controller was removed in the future. The following shows the Driver's Footwell Cover (view is looking upwards; note that all directions in this document are described relative to the vehicle, not the part). For orientation purposes, note the OBD-2 diagnostic port and the brake pedal location. We will be removing this cover to mount the Prodigy P2 in the location shown as well as to access the vehicles wiring harness.



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Installing the Controller

Step 1: Remove the Driver's Floor Mat

The driver's floor mat is secured to the floor carpet by four velcro-like pads, one in each corner. This photograph shows the bottom side of the floor mat. Pry the pads free from the underlying carpet and remove the floor mat.



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Step 2: Loosen the side of the center console

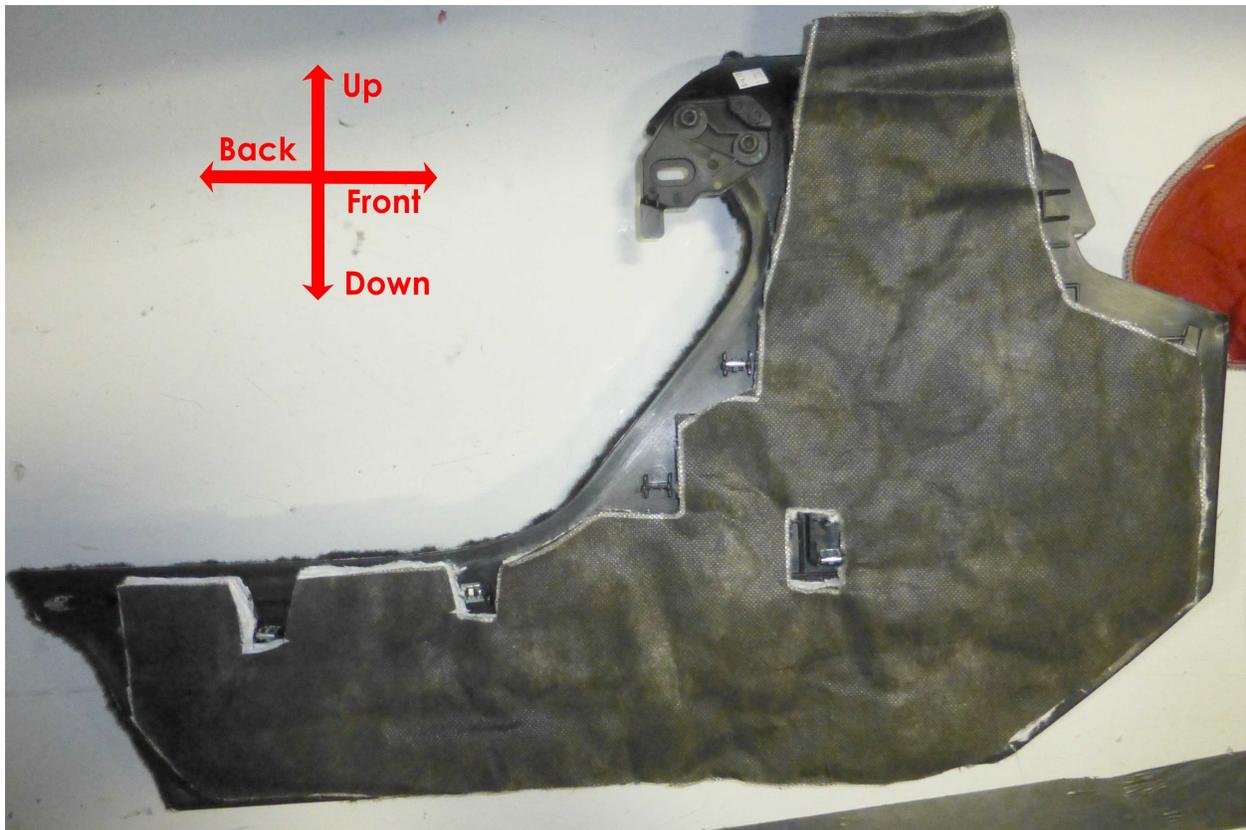
Gently pry the forward edge of the center console to the left of the vehicle to release at least three of the snap fasteners that hold it in place. This will allow clearance to remove the carpeted piece that lies under and in front of it. If your carpet is very stiff, releasing more than three may be required. A small putty knife, preferably plastic, will assist in this process without marring or breaking the console.



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Step 3: Remove the Center Console Closeout Panel

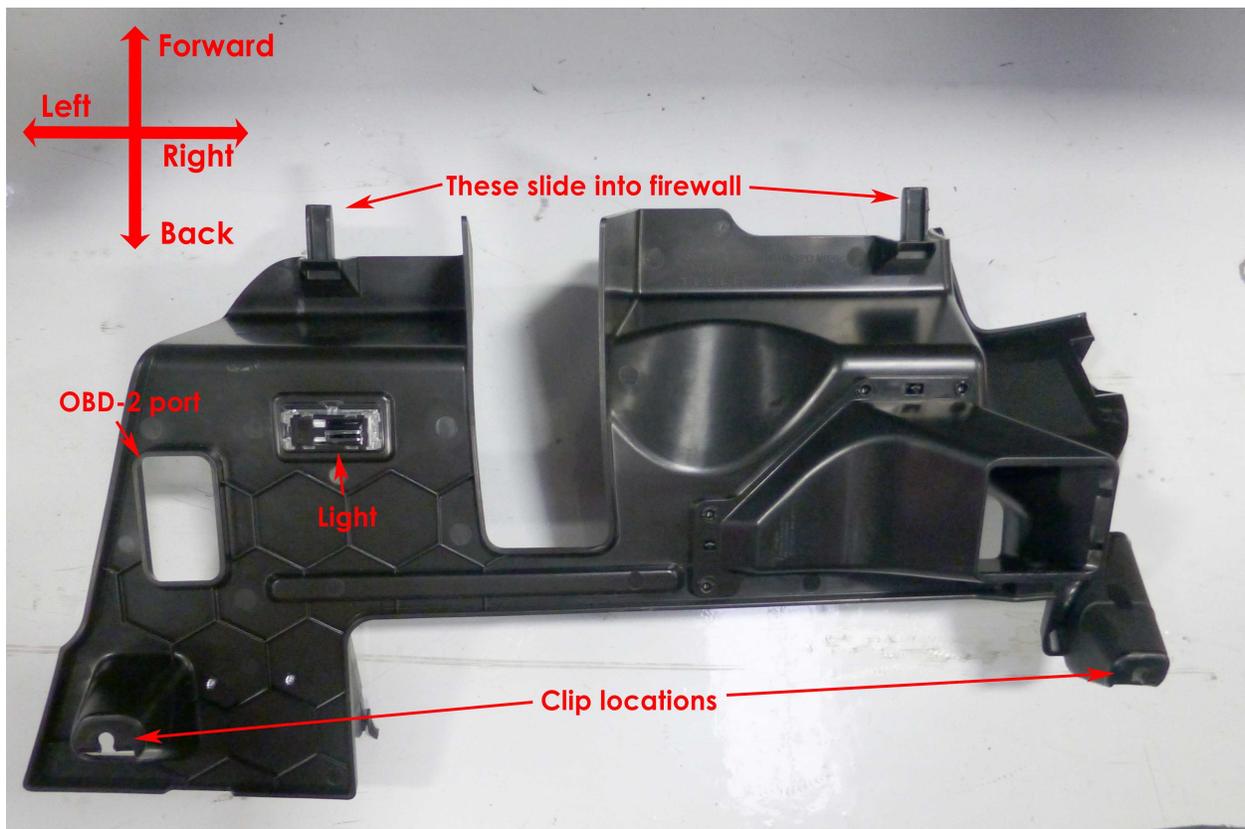
Remove the Center Console Closeout Panel (carpeted kick panel to the right of the accelerator pedal) that is partially covered by the center console. The following photograph shows the back side which gives the location of the fasteners which need to be gently pried loose.



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Step 4: Removal of the Driver's Footwell Cover

Now the vehicle is prepared for the removal of the Driver's Footwell Cover to which we will be attaching the Prodigy P2 controller. It is secured by two blue plastic clips on the rear edge, and has two protrusions that slide into the firewall to secure the forward edge. The blue plastic clips are firmly mounted to the vehicle, but sit in a slot in the trim piece. They are easily damaged. Flex the rear edge of this piece forward by bowing the middle downward and the plastic clips will slide out of the slots in the trim piece leaving the clips attached to the vehicle. Lower the rear edge gently and draw the piece rearward, disengaging the two protrusions that slide into the firewall. Using a small flat head screwdriver to depress the clip holding the wiring harness to the attached light, gently disconnect the wiring harness from the attached light, and remove the cover from the vehicle.



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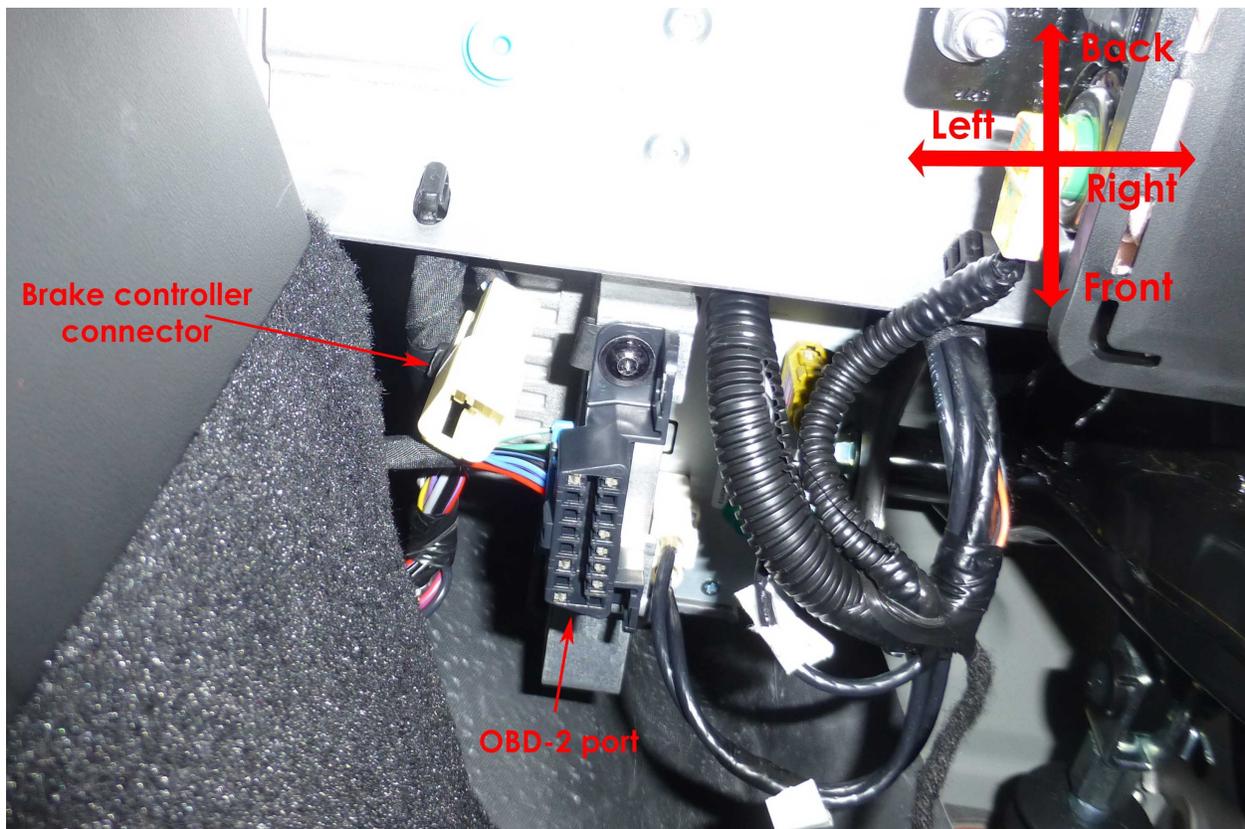
Step 5: Remove the plastic clips from the vehicle

With the Driver's Footwell Cover removed, you have better access to the blue plastic clips. Remove them from the vehicle. This will make reinstallation easier. If you break one, they are Tesla Motors P/N 1011813-00-A.

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Step 6: Free the trailer wiring connector from the vehicle wiring harness

During vehicle construction, the unused connector that will be going to our brake controller is secured to the adjacent harness with vinyl tape. Cut or remove this tape to free this connector; be careful not to nick or damage the wires in this area! On some vehicles there is a length of extra tape which makes it easy to remove without cutting.



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Step 7: Splice the Wiring Pigtails Together

Splice the wiring pigtail that comes with the Prodigy P2 controller to the Tesla P/N 1072586-00-A pigtail that came with your Model X vehicle using butt connectors and a crimp tool. Do this splicing with the pigtail NOT connected to the vehicle, as an accidental short could result in vehicle damage. Using a wire stripper, and being careful not to nick the wire, strip 3/8" of insulation off each of the four wires on each pigtail. The table below shows the wire sizes so you can use the correct stripping tool.

Use Digikey [P/N WM18426CT-ND](#) (blue) butt splice connectors to join the 14AWG and 16AWG wires. To join the 12 AWG wires to the smaller sizes, use Digikey [P/N WM18950-ND](#) (yellow) step-down butt splice connectors.

Cut the Prodigy harness to 7" and the Tesla harness to 8". This will leave enough wire to hid the splices above the footwell cover, and enough to have a second chance if you make a mistake. Crimp the appropriate butt splice connector onto each of the four wires on the Prodigy pigtail first, and then connect them one at a time to the Tesla pigtail wires. Be sure to put the larger wire in the large end of the [P/N WM18950-ND](#) splices (the end without the blue stripe). When properly crimped, you should not be able to pull the wires out by hand. Use the heat-gun to shrink the butt splice insulation until it adheres to the wire insulation.



WARNING: The colors do not connect to each other. Connect them according to the following table. Misconnecting these wires will probably destroy the Prodigy P2 and could damage the vehicle. Double-check your work before proceeding.
WARNING: Be sure the wires are connected securely. This is not the place to twist and tape them. Failure of one of these connections will result in loss of trailer braking and possibly cause an accident.

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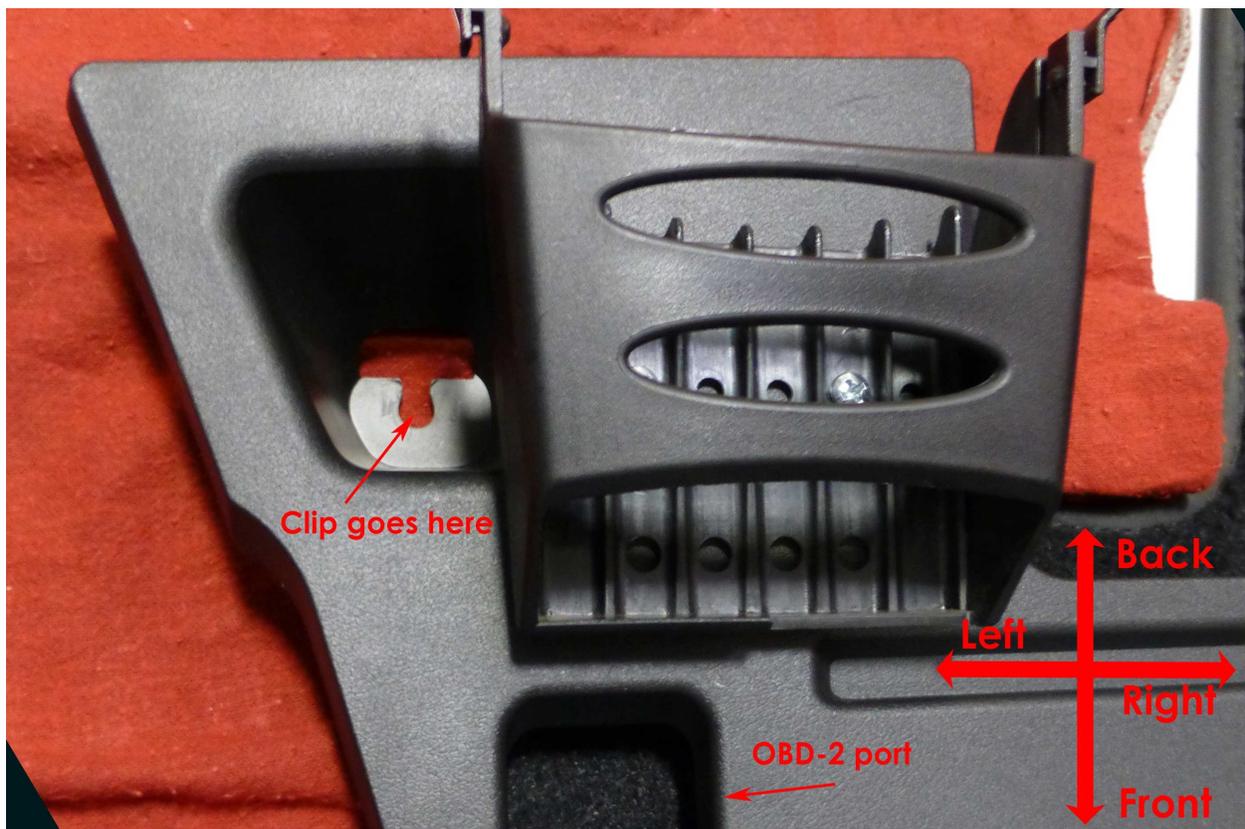
Function	Tesla P/N 1072586-00-A	Prodigy Harness	Type Butt Splice
+12V DC Power	RED - 14 AWG	BLACK - 12 AWG	Digikey WM18950-ND (yellow)
Vehicle Ground	BLACK - 14 AWG	WHITE - 16 AWG	Digikey WM18426-ND (blue)
Stoplight Signal/Brake Switch	WHITE - 16 AWG	RED - 16 AWG	Digikey WM18426-ND (blue)
Output to Trailer Brakes	BLUE - 16 AWG	BLUE - 12 AWG	Digikey WM18950-ND (yellow)

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Step 8: Fasten the Prodigy P2 to the Driver's Footwell Cover

Secure the mounting bracket to the bottom of the Driver's Footwell Cover. The location that worked for me was as far left as possible, without blocking access to the recessed hole that supports the left blue mounting clip, and as far to the front of the vehicle as possible, without blocking access to the OBD-2 diagnostic port. Be sure the bracket is mounted square to the direction of travel of the vehicle. Be sure you are happy with the cosmetics of the location you chose. Drill two small pilot holes in the footwell cover and secure the bracket with the two self-tapping screws that came with the Prodigy P2, as shown.

Connect the wiring harness you fabricated in Step 7 to the Prodigy P2 and insert the Prodigy P2 in the mounting bracket at this time (not shown).



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Step 9: Reinstall the Driver's Footwell Cover

Connect the wiring harness fabricated in Step 7 to the vehicle connector which we freed from the vehicle harness in Step 6 above.

Insert both small blue clips in the corresponding slots in the footwell cover.

Reconnect the wire connector to the light on the footwell cover.

Reinstall the footwell cover by guiding the front protrusions into the corresponding slots in the firewall, then lifting the rear edge and pushing the blue clips into their corresponding holes. As you do so, you will need to guide the new wiring harness to neatly capture it above the footwell cover. I found routing it around the left side of the cover works best. Be sure it doesn't block access to the OBD-2 port.

Step 10: Reinstall the Center Console Closeout Panel

Inspect the clips on the panel to be sure that they are not dislodged in any way. Firm pressure will snap them into place.

Step 11: Refasten the center console as it was loosened to remove the carpeted kick panel

Firm pressure over the loosened clips will refasten them.

Step 12: Reinstall the Driver's Floor Mat

Align the pads on the driver's floor mat with the pads on the underlying carpet and press the floor mat down to reattach it. **WARNING: Be sure the floor mat is securely attached. If it can shift, it could jam the accelerator or brake pedal, causing an accident.**

After Installation

Step 13: Completion

Congratulations, your installation is complete. The brake controller signal is now present on the trailer connector (7-pin round for USA cars, 13 pin Jaeger for European cars) adjacent to the hitch assembly at the back of the vehicle.

Follow the instructions in the Prodigy P2 manual to configure it for your trailer. When not in use, a small piece of black vinyl tape covering the display will make it less intrusive, or the unit itself can be unplugged and removed from its mounting tray.