2016+

MODEL S

EMERGENCY RESPONSE GUIDE

This guide is intended only for use by trained and certified rescuers and first responders. It assumes that readers have a comprehensive understanding of how safety systems work and have completed the appropriate training and certification required to safely handle rescue situations. Therefore, this guide provides only the specific information required to understand and safely handle the fully electric Model S in an emergency situation. It describes how to identify Model S and provides the locations and descriptions of its high voltage components, airbags, inflation cylinders, seat belt pre-tensioners, and the high strength materials used in its body structure. This guide includes the high voltage disabling procedure and any safety considerations specific to Model S. Failure to follow recommended practices or procedures can result in serious injury or death.

The high voltage battery is the main energy source. Model S does not have a traditional gasoline or diesel engine and therefore does not have a fuel tank. The rear motor in dual motor Model S comes in two types: regular and high performance. The images in this guide might not match the vehicle you are working on.

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IMPORTANT SAFETY INSTRUCTIONS

This document contains important instructions and warnings that must be followed when handling Model S in an emergency situation.

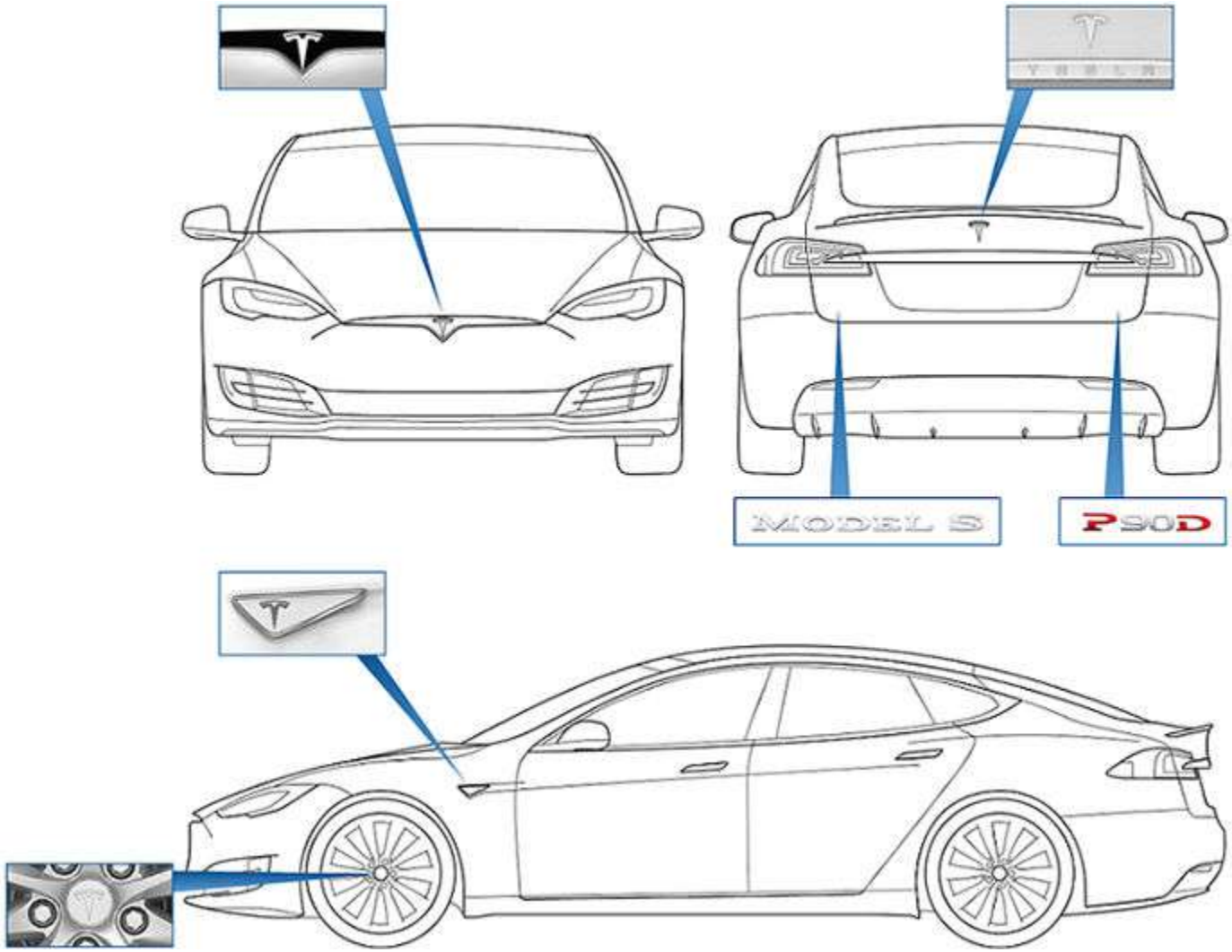
WARNINGS

- **Warning:** Always use appropriate tools, such as a hydraulic cutter, and always wear appropriate personal protective equipment (PPE) when cutting Model S. Failure to follow these instructions can result in serious injury or death.
- **Warning:** Regardless of the disabling procedure you use, ALWAYS ASSUME THAT ALL HIGH VOLTAGE COMPONENTS ARE ENERGIZED! Cutting, crushing, or touching high voltage components can result in serious injury or death.
- **Warning:** After deactivation, the high voltage circuit requires 2 minutes to de-energize.
- **Warning:** The supplemental restraint system (SRS) control unit has a backup power supply with a discharge time of approximately ten seconds. Do not touch the SRS control unit within 10 seconds of an airbag or pre-tensioner deployment.
- **Warning:** Handling a submerged vehicle without appropriate PPE can result in serious injury or death.
- **Warning:** When fire is involved, consider the entire vehicle energized. Always wear full PPE, including a self-contained breathing apparatus (SCBA).
- **Warning:** When cutting the first responder loop, double cut the loop to remove an entire section. This eliminates the risk of the cut wires accidentally reconnecting.

BADGING

Model S can be identified by its badges.

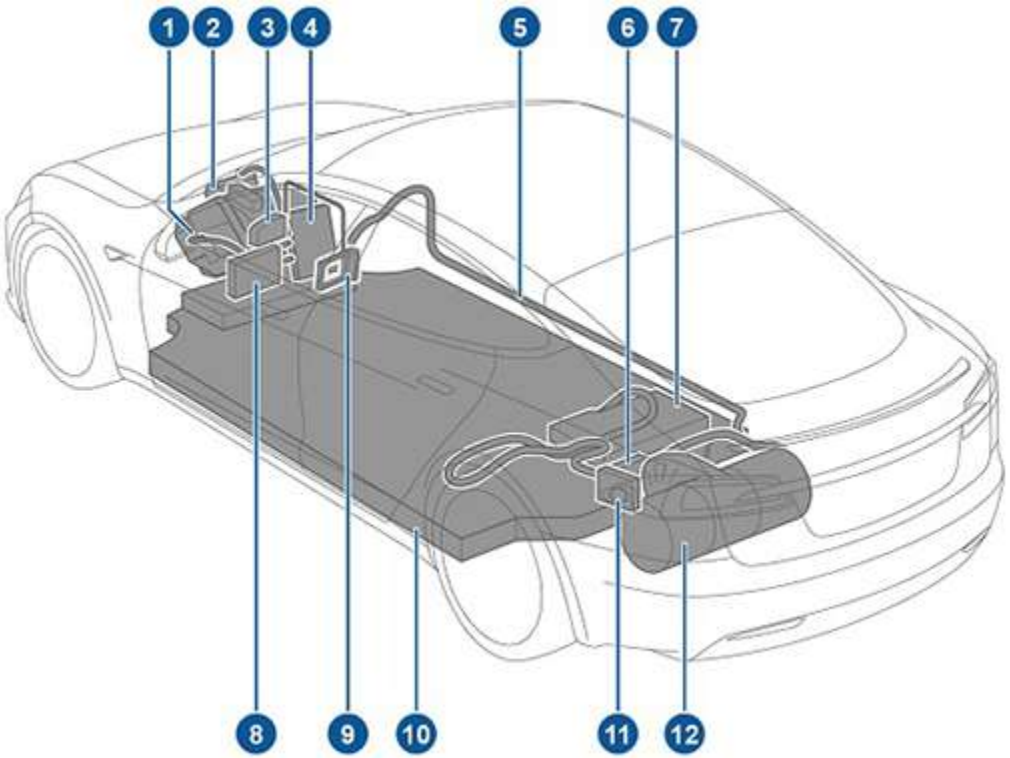
NOTE: The "D" at the end of the battery badge on the RH side of the vehicle indicates that the vehicle is a Dual Motor configuration.



TOUCHSCREEN

Model S can be identified by its 17 in (43 cm) touchscreen.

HIGH VOLTAGE COMPONENTS

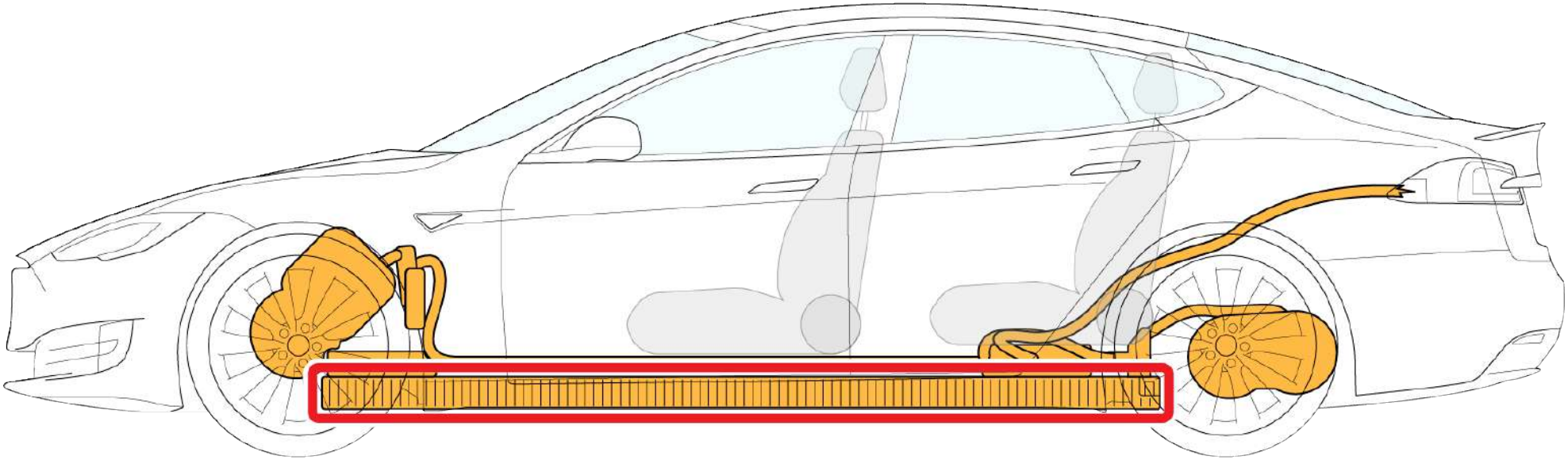


1. Front drive unit (if equipped)
2. A/C compressor
3. Battery coolant heater
4. Front junction box
5. High voltage cabling
6. Rapid splitter
7. Charger
8. DC-DC converter
9. Cabin heater
10. High voltage battery
11. Charge port
12. Rear drive unit

HIGH VOLTAGE BATTERY

Model S is equipped with a floor-mounted 400 volt lithium-ion high voltage battery. Never breach the high voltage battery when lifting from under the vehicle. When using rescue tools, pay special attention to ensure that you do not breach the floor pan. Refer to Lifting the Vehicle on page 23 for instructions on how to properly lift the vehicle.

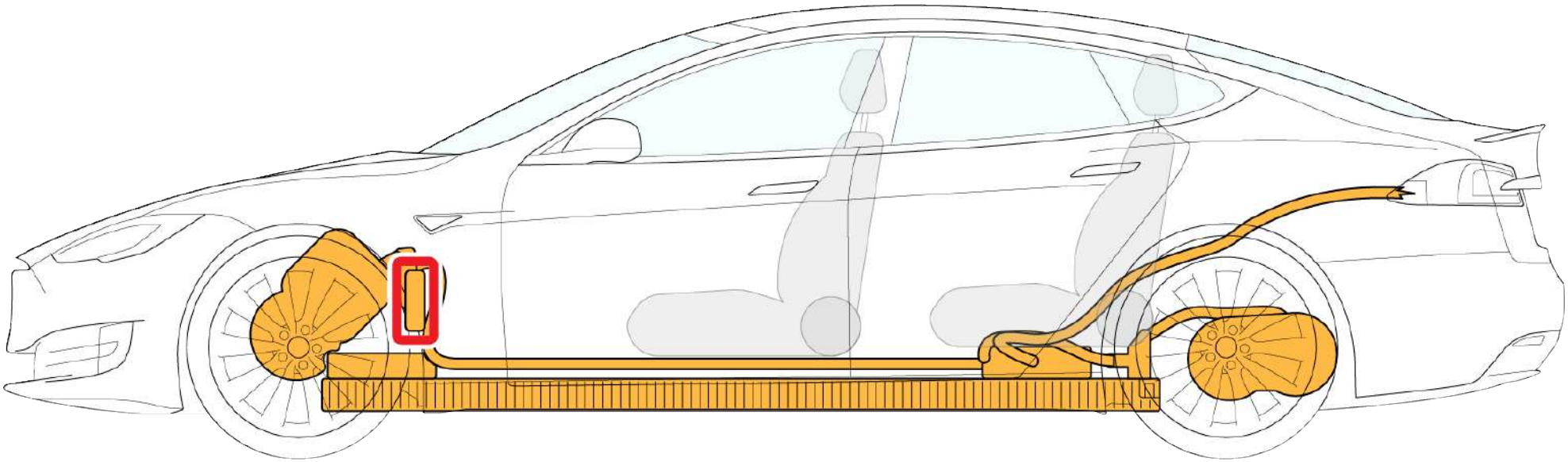
NOTE: The following image shows a Dual Motor vehicle. Vehicles without a front drive unit are similar.



DC-DC CONVERTER AND FRONT JUNCTION BOX

High voltage is present at the DC-DC converter and front junction box, as outlined in red. The DC-DC converter transforms the high voltage current from the high voltage battery to low voltage to charge the Model S 12 volt battery. The front junction box provides high voltage current to various components, such as the battery heater, air conditioning compressor, and cabin heater. Use caution when cutting in this area during a dash lift and dash roll procedure. Use work-around techniques, if necessary.

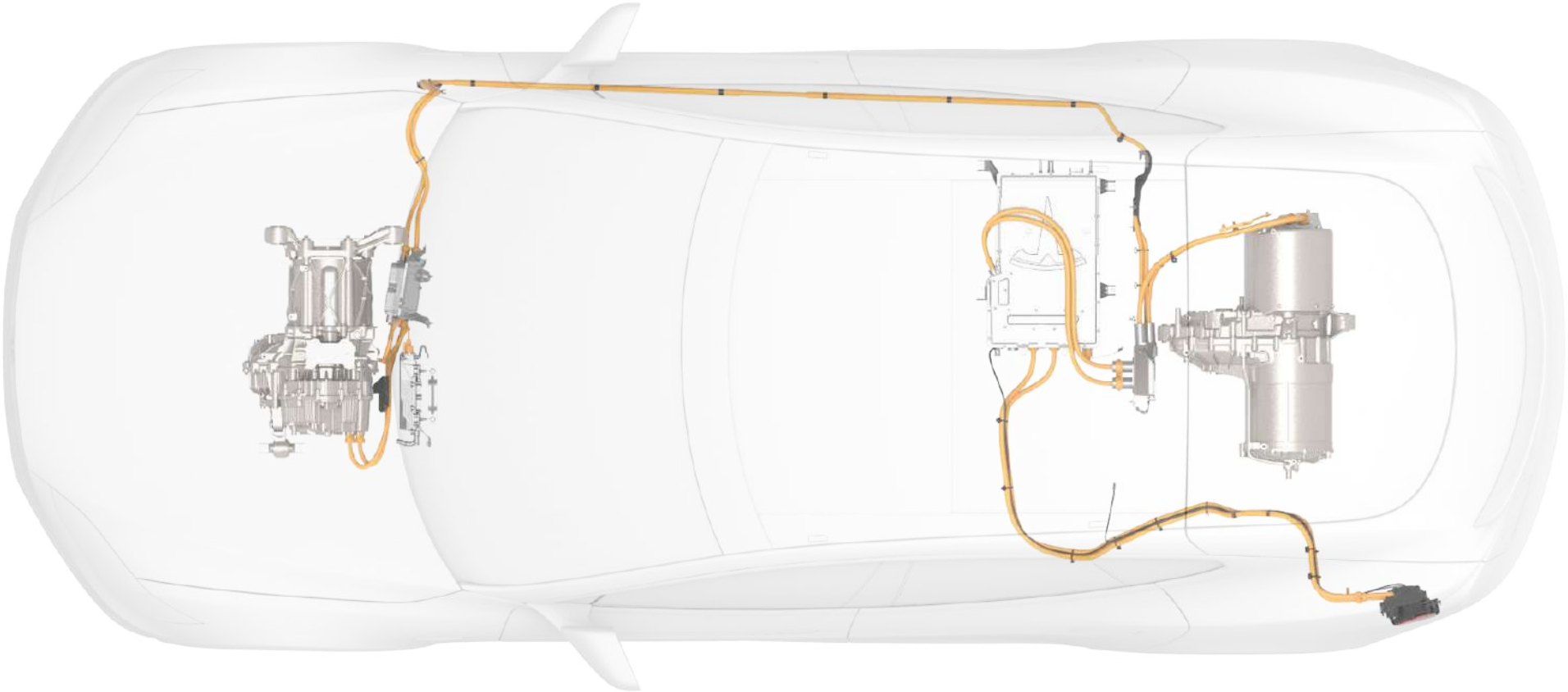
NOTE: The following image shows a Dual Motor vehicle. Vehicles without a front drive unit are similar.



HIGH VOLTAGE CABLES

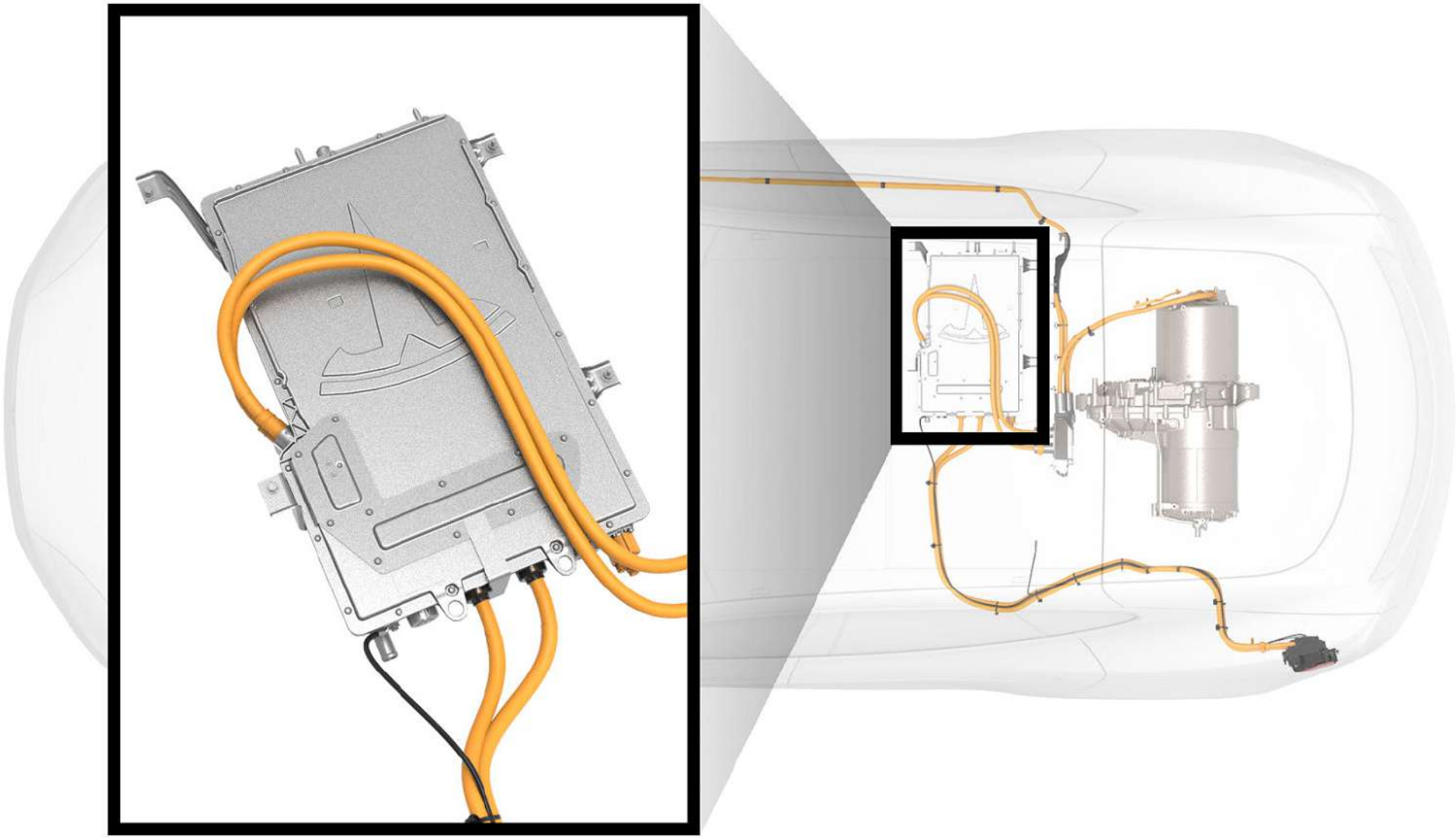
High voltage cables are shown in orange.

NOTE: The following image shows a Dual Motor vehicle. Vehicles without a front drive unit are similar.



CHARGER

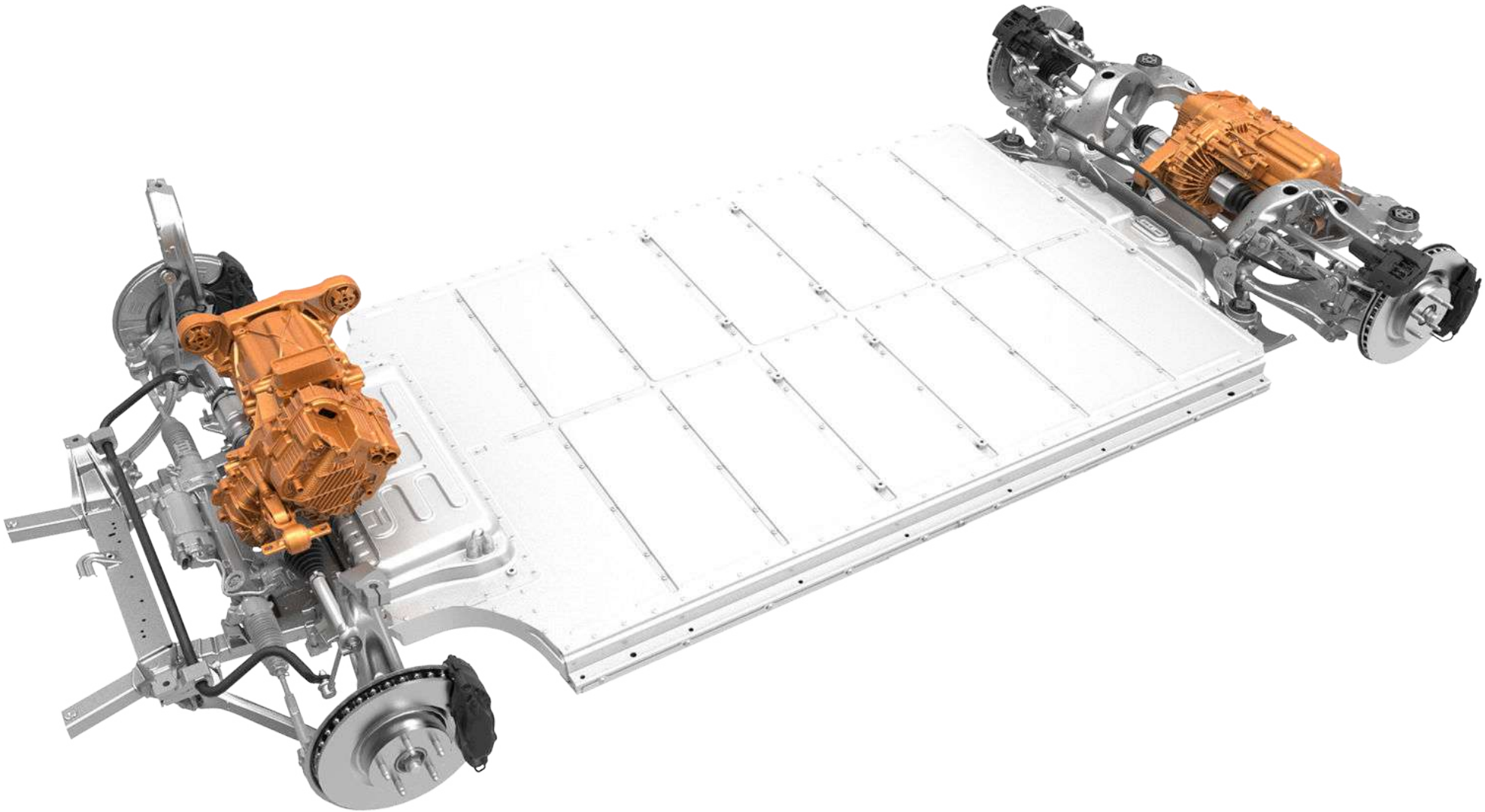
Model S has one charger located under the rear seats. This charger converts alternating current (AC) from a charging station to direct current (DC) for charging the high voltage battery. The high voltage junction box, integrated into the charger, routes any surplus energy from regenerative braking back to the high voltage battery.



DRIVE UNITS

The rear drive unit is located between the rear wheels, and the front drive unit (if equipped) is located between the front wheels. The drive units convert the direct current (DC) from the high voltage battery into 3-phase alternating current (AC) that the drive unit(s) use to power the wheels.

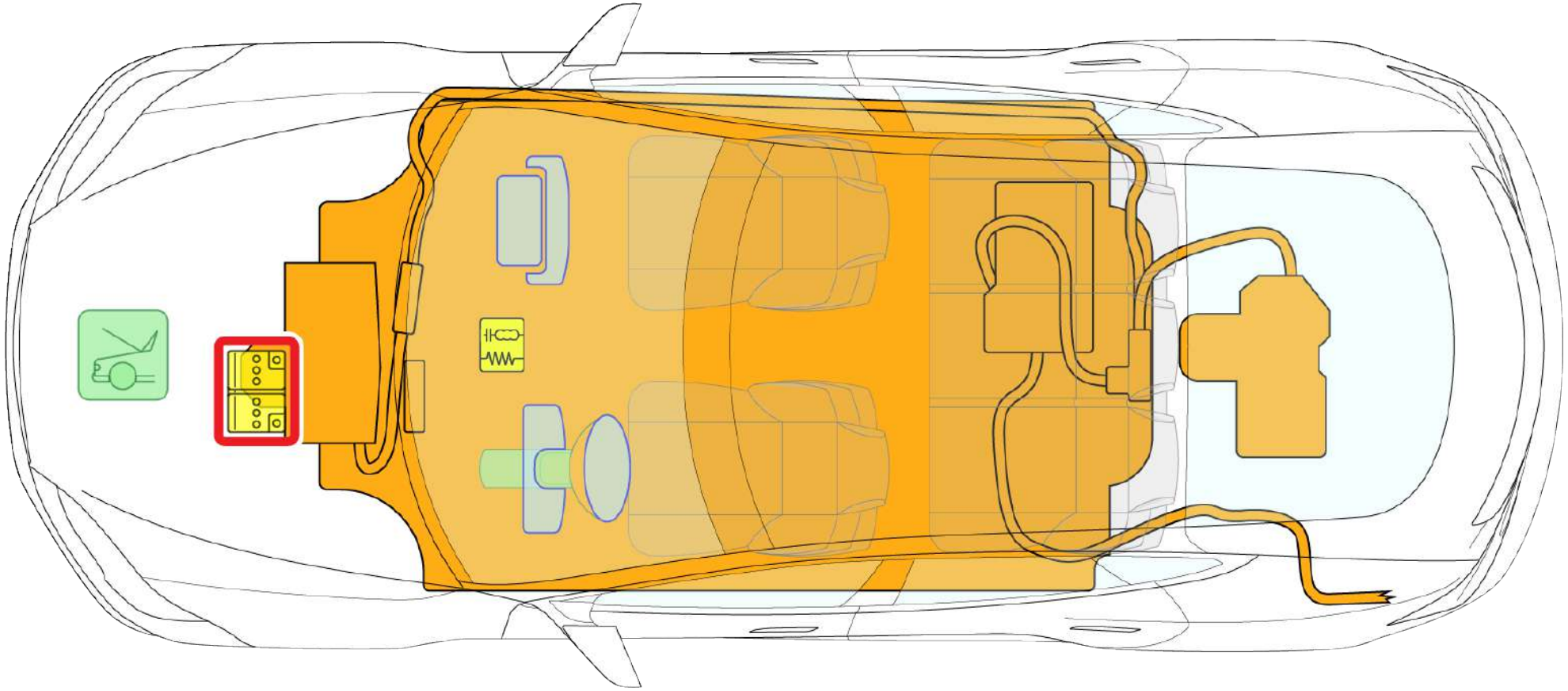
NOTE: The following image shows a Dual Motor vehicle. Vehicles without a front drive unit are similar.



12 VOLT BATTERY

In addition to the high voltage system, Model S has a low voltage electrical system. Its 12 volt battery operates the SRS, airbags, windows, door locks, touchscreen, and interior and exterior lights. The DC-DC converter in the high voltage system charges the 12 volt battery, and the 12 volt battery supplies power to the high voltage contactors, allowing high voltage current to flow into and out of the high voltage battery. The 12 volt battery, outlined in red, is located under the hood and the plastic access panel.

NOTE: The following image shows a Dual Motor vehicle. Vehicles without a front drive unit are similar.



CHOCK ALL FOUR WHEELS

Model S moves silently, so never assume it is powered off. Drivers can choose a setting that determines whether or not Model S will "creep" when a drive gear is selected. If this setting is off, Model S may not move unless the accelerator is pressed, even if shifted into Drive or Reverse. However, never assume that Model S will not move. Always chock the wheels.

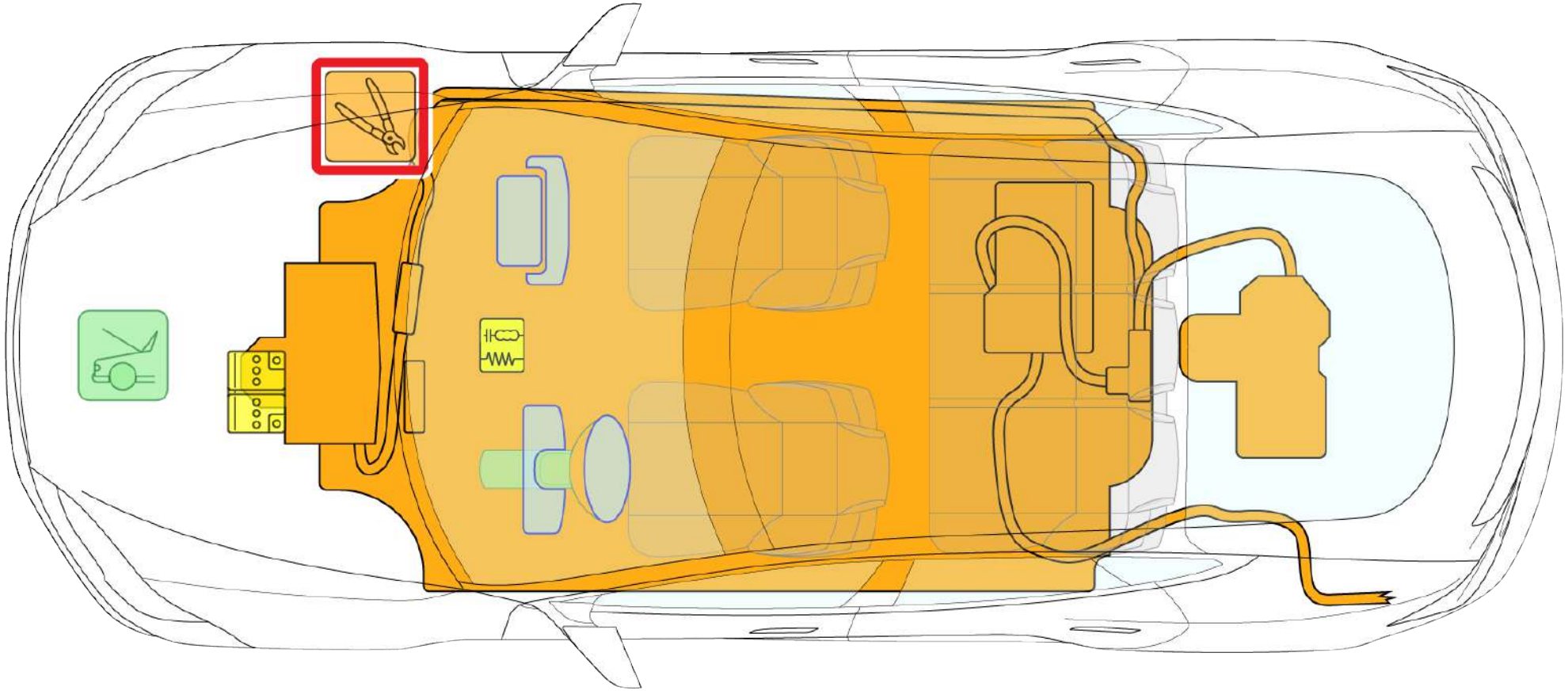
SHIFT INTO PARK

Model S moves silently, so never assume it is powered off. Pressing the accelerator pedal even slightly can cause Model S to accelerate quickly if the active gear is Drive or Reverse. To ensure that the parking brake is engaged, press the button on the end of the gear selector to shift into Park. Whenever Model S is in Park, the parking brake is automatically engaged and the instrument cluster shows the active gear as Park (P).

FRONT TRUNK FIRST RESPONDER CUT LOOP

The first responder loop is a low voltage harness. Cutting the first responder loop shuts down the high voltage system outside of the high voltage battery and disables the SRS and airbag components. Refer to Cutting the Front Trunk First Responder Loop on page 14 for instructions on how to access and cut the first responder loop.

NOTE: The following image shows a Dual Motor vehicle. Vehicles without a front drive unit are similar.

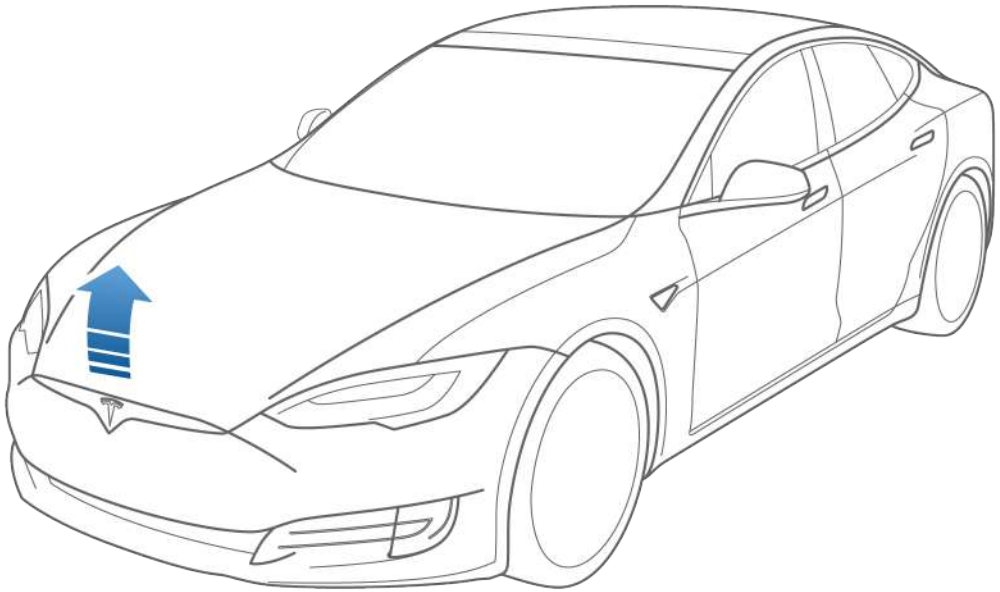


⚠ **Warning:** Regardless of the disabling procedure you use, ALWAYS ASSUME THAT ALL HIGH VOLTAGE COMPONENTS ARE ENERGIZED! Cutting, crushing, or touching high voltage components can result in serious injury or death.

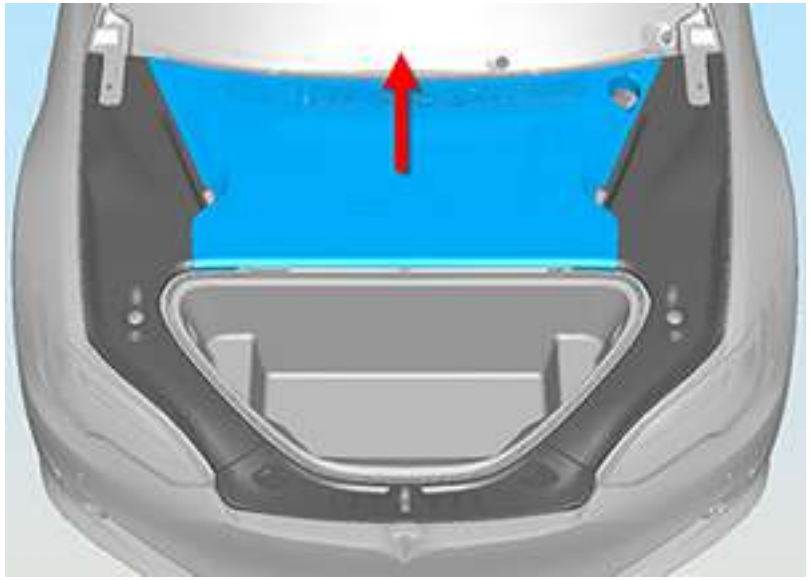
CUTTING THE FRONT TRUNK FIRST RESPONDER LOOP

When cutting the first responder loop, double cut it to remove an entire section. This prevents the wires from accidentally reconnecting.

1. Open the hood. Refer to Opening the Hood on page 26 for instructions.



2. Remove the access panel (shown in blue) by pulling it upwards to release the clips that hold it in place.



3. Double cut the first responder loop.

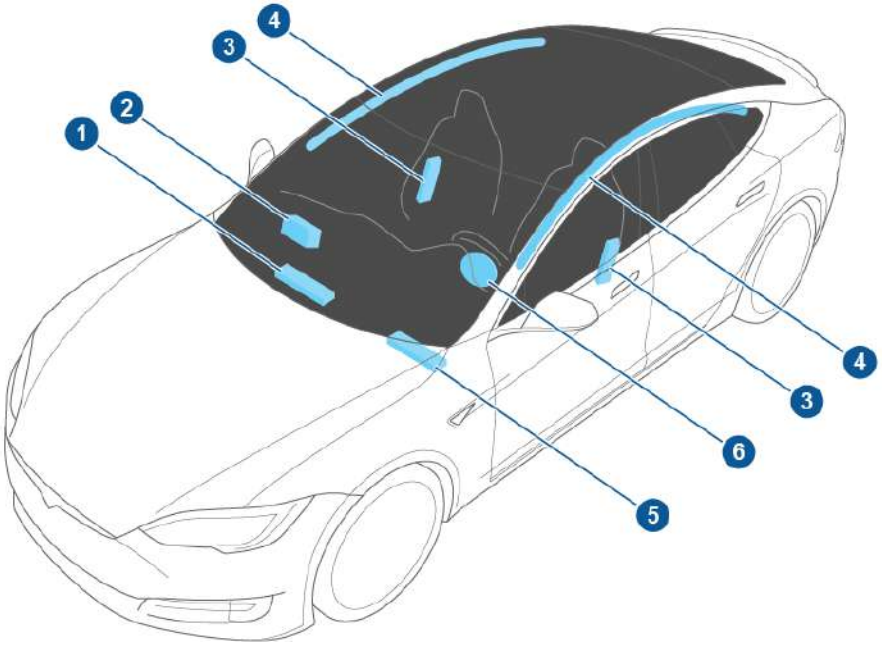
AIRBAGS

Model S is equipped with 6 airbags (8 in North America). Airbags are located in the approximate areas shown. Airbag warning information is printed on the sun visors.

NOTE: Model S is designed to deactivate high voltage in all components and cables outside of the high voltage battery when an airbag is deployed.

NOTE: Knee airbags are applicable to North American vehicles only.

NOTE: Left Hand Drive vehicle shown. On Right Hand Drive vehicles, the passenger and driver airbag locations are reversed.

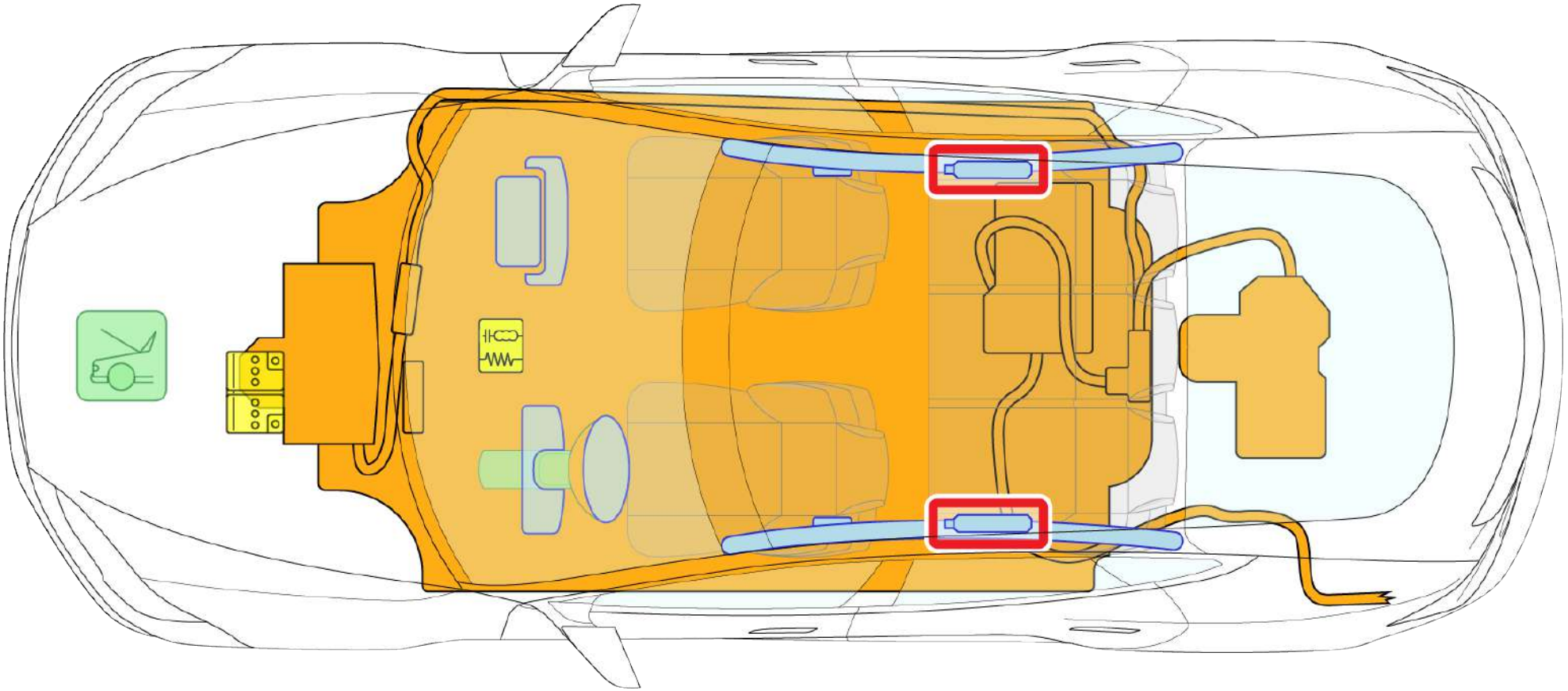


1. Passenger knee airbag (North America only)
2. Passenger front airbag
3. Seat-mounted side airbags
4. Curtain airbags
5. Driver's knee airbag (North America only)
6. Driver's front airbag

⚠ **Warning:** The SRS control unit has a backup power supply with a discharge time of approximately ten seconds. Do not touch the SRS control unit within 10 seconds of an airbag or pre-tensioner deployment.

AIRBAG INFLATION CYLINDERS

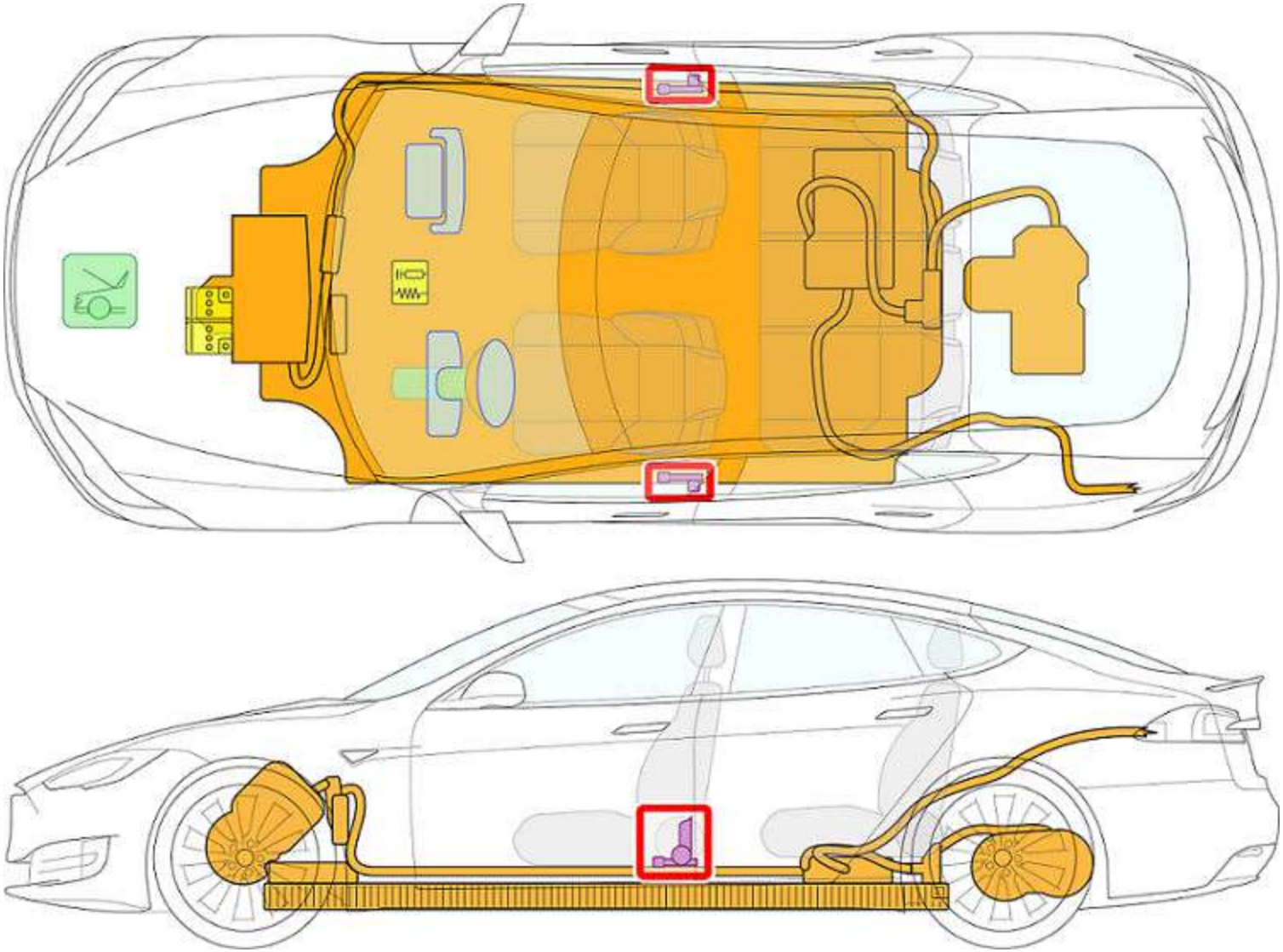
The airbag inflation cylinders, outlined in red, are located near the roof and towards the rear of the vehicle.



⚠ **Warning:** The SRS control unit has a backup power supply with a discharge time of approximately ten seconds. Do not touch the SRS control unit within 10 seconds of an airbag or pre-tensioner deployment.

SEAT BELT PRE-TENSIONERS

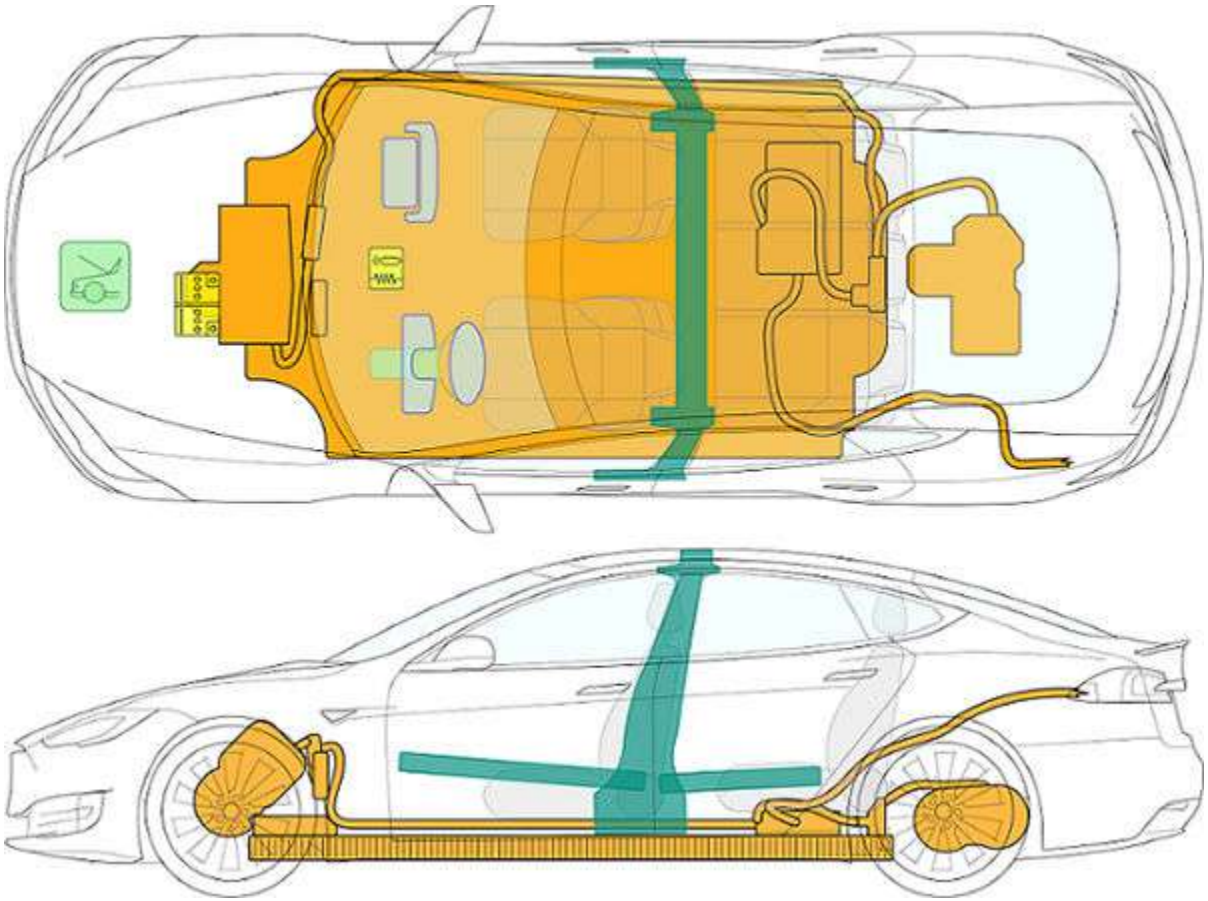
The seat belt pre-tensioners, outlined in red, are located at the bottom of the B-pillars.



⚠ **Warning:** The SRS control unit has a backup power supply with a discharge time of approximately ten seconds. Do not touch the SRS control unit within 10 seconds of an airbag or pre-tensioner deployment.

REINFORCEMENTS AND ULTRA HIGH STRENGTH STEEL

Model S is reinforced to protect occupants in a collision. Suitable tools must be used to cut or crush these areas. Reinforcements are shown in teal below.



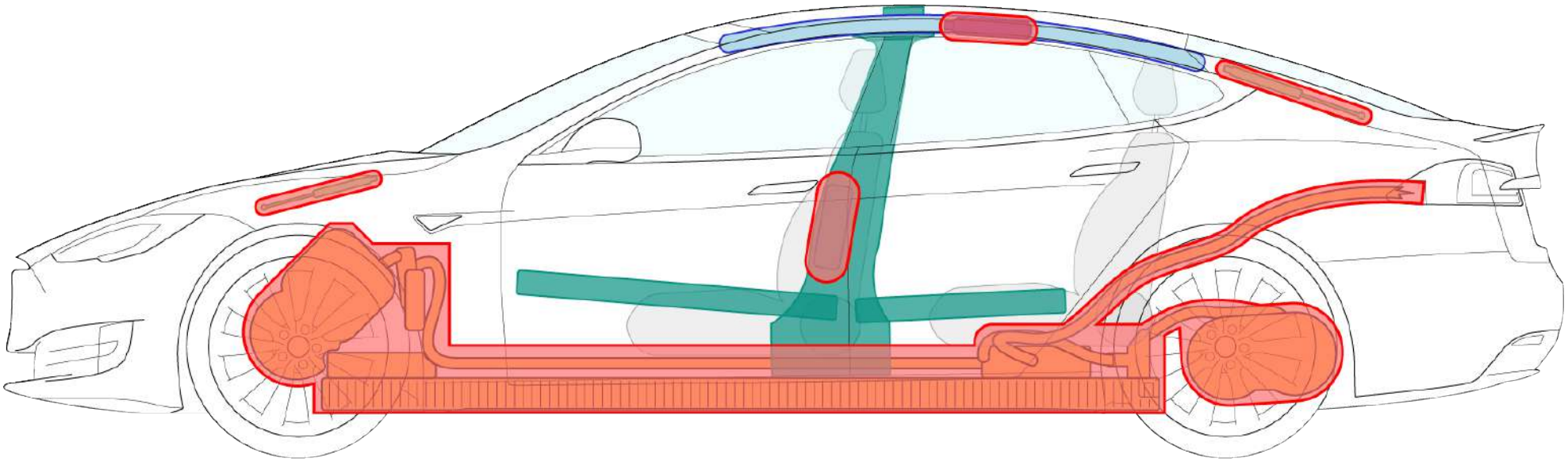
⚠ **Warning:** Always use appropriate tools, such as a hydraulic cutter, and always wear appropriate PPE when cutting Model S. Failure to follow these instructions can result in serious injury or death.

⚠ **Warning:** Regardless of the disabling procedure you use, ALWAYS ASSUME THAT ALL HIGH VOLTAGE COMPONENTS ARE ENERGIZED! Cutting, crushing, or touching high voltage components can result in serious injury or death.

NO-CUT ZONES

Model S has areas that are defined as "no-cut zones" due to the presence of high voltage, gas struts, SRS components, or other hazards. Never cut or crush in these areas. Doing so could result in serious injury or death. The "no-cut zones" are shown in pink.

NOTE: The following image shows a Dual Motor vehicle. Vehicles without a front drive unit are similar.

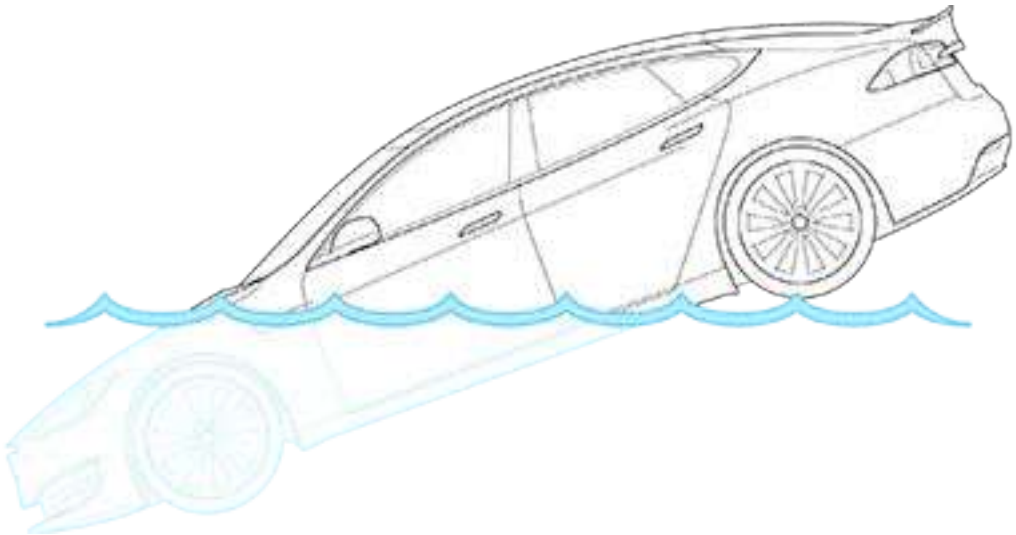


⚠ **Warning:** Always use appropriate tools, such as a hydraulic cutter, and always wear appropriate PPE when cutting Model S. Failure to follow these instructions can result in serious injury or death.

⚠ **Warning:** Regardless of the disabling procedure you use, ALWAYS ASSUME THAT ALL HIGH VOLTAGE COMPONENTS ARE ENERGIZED! Cutting, crushing, or touching high voltage components can result in serious injury or death.

FULLY OR PARTIALLY SUBMERGED VEHICLES

Treat a submerged Model S like any other submerged vehicle. The body of Model S does not present a greater risk of shock because it is in water. However, handle any submerged vehicle while wearing the appropriate PPE. Remove the vehicle from the water and continue with normal high voltage disabling.



⚠ **Warning:** Handling a submerged vehicle without appropriate PPE can result in serious injury or death.

PUSHING ON THE FLOOR PAN

The high voltage battery is located below the floor pan. Never push on the floor pan inside Model S. Doing so can breach the high voltage battery, which can cause serious injury or death.

FIREFIGHTING

USE WATER TO FIGHT A HIGH VOLTAGE BATTERY FIRE. If the battery catches fire, is exposed to high heat, or is generating heat or gases, use large amounts of water to cool the battery. It can take approximately 3,000 gallons of water, applied directly to the battery, to fully extinguish and cool down a battery fire; always establish or request an additional water supply. If water is not immediately available, use dry chemicals, CO2, foam, or another typical fire-extinguishing agent to fight the fire until water is available.

Extinguish small fires that do not involve the high voltage battery using typical vehicle firefighting procedures.

During overhaul, do not make contact with any high voltage components. Always use insulated tools for overhaul.

Heat and flames can compromise airbag inflators, stored gas inflation cylinders, gas struts, and other components which can result in an unexpected explosion. Perform an adequate knock down before entering a hot zone.

Battery fires can take up to 24 hours to extinguish. Consider allowing the battery to burn while protecting exposures.

After all fire and smoke has visibly subsided, a thermal imaging camera can be used to actively measure the temperature of the high voltage battery and monitor the trend of heating or cooling. There must not be fire, smoke, or heating present in the high voltage battery for at least one hour before the vehicle can be released to second responders (such as law enforcement, vehicle transporters, etc.). The battery must be completely cooled before releasing the vehicle to second responders or otherwise leaving the incident. Always advise second responders that there is a risk of battery re-ignition.

Due to potential re-ignition, a Model S that has been involved in a submersion, fire, or a collision that has compromised the high voltage battery should be stored in an open area at least 50 ft (15 m) from any exposure.

⚠ **Warning:** When fire is involved, consider the entire vehicle energized. Always wear full PPE, including a SCBA.

HIGH VOLTAGE BATTERY - FIRE DAMAGE

A burning or heated battery releases toxic vapors. These vapors may include volatile organic compounds, hydrogen gas, carbon dioxide, carbon monoxide, soot, particulates containing oxides of nickel, aluminum, lithium, copper, cobalt, and hydrogen fluoride. Responders should always protect themselves with full PPE, including a SCBA, and take appropriate measures to protect civilians downwind from the incident. Use fog streams or positive-pressure ventilation fans (PPV) to direct smoke and vapors.

The high voltage battery consists of lithium-ion cells. These cells are considered dry cells. If damaged, only a small amount of fluid can leak. Lithium-ion battery fluid is clear in color.

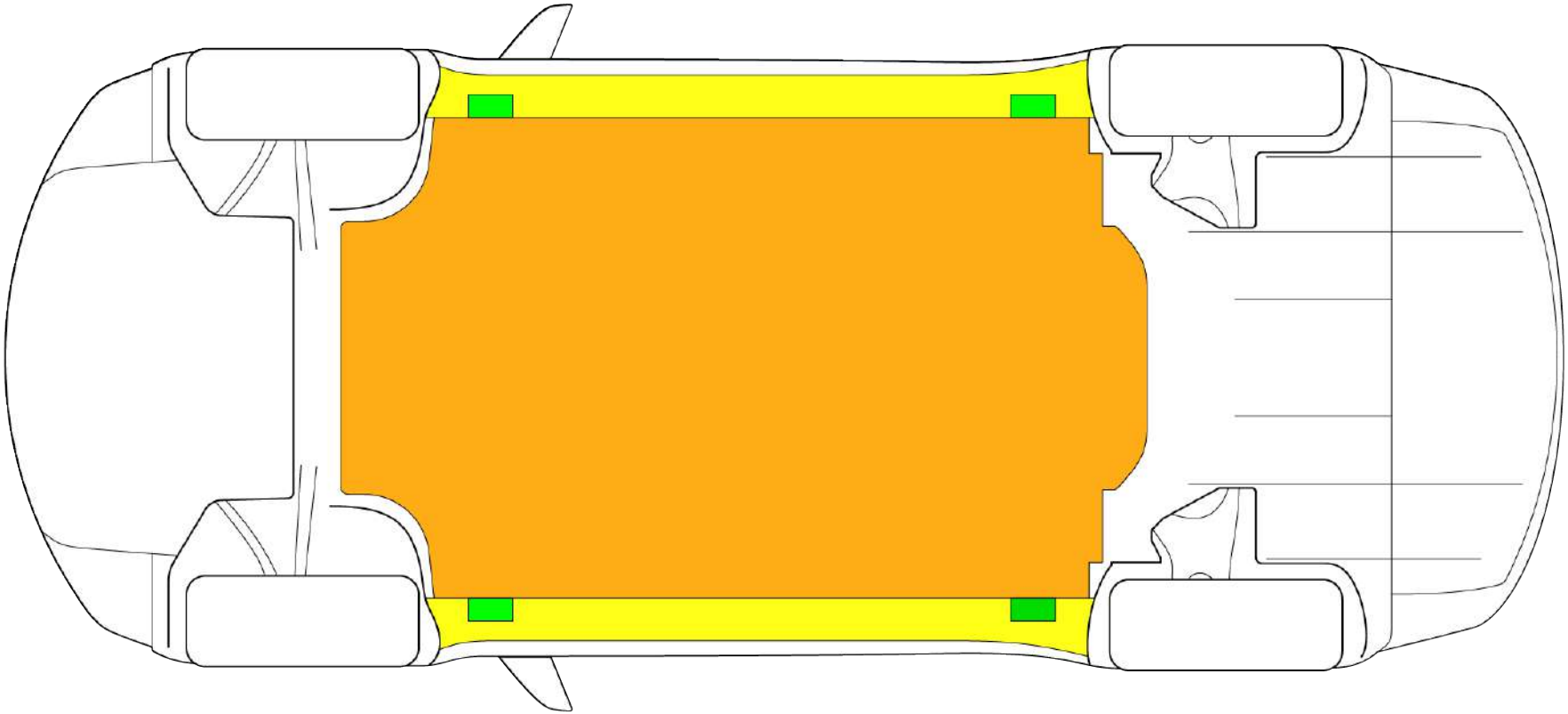
The high voltage battery, charge controller(s), DC-DC converter, and drive unit(s) are liquid cooled with a typical glycol-based automotive coolant. If damaged, this blue coolant can leak out of the high voltage battery.

A damaged high voltage battery can create rapid heating of the battery cells. If you notice smoke coming from the high voltage battery, assume that it is heating and take appropriate action as described in Firefighting on page 22.

LIFT AREAS

The high voltage battery is located under the floor pan. A large section of the undercarriage houses the high voltage battery. When lifting or stabilizing Model S, only use the designated lift areas, as shown in green.

⚠ **Warning:** DO NOT USE THE HIGH VOLTAGE BATTERY TO LIFT OR STABILIZE MODEL S.



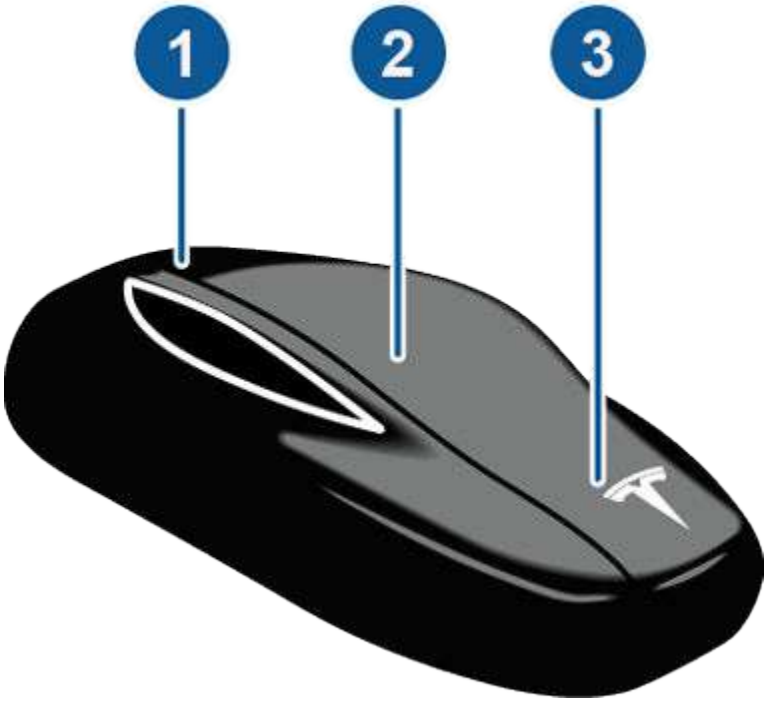
Appropriate lift areas

Safe stabilization points for a Model S resting on its side

High voltage battery

USING THE KEY

Use the key buttons as shown below.



1. Rear trunk. Double-click to open the rear trunk.
2. Unlock all. Double-click to unlock doors and both trunks.
3. Hood/front trunk. Double-click to open the hood to access the front trunk.

OPENING DOORS

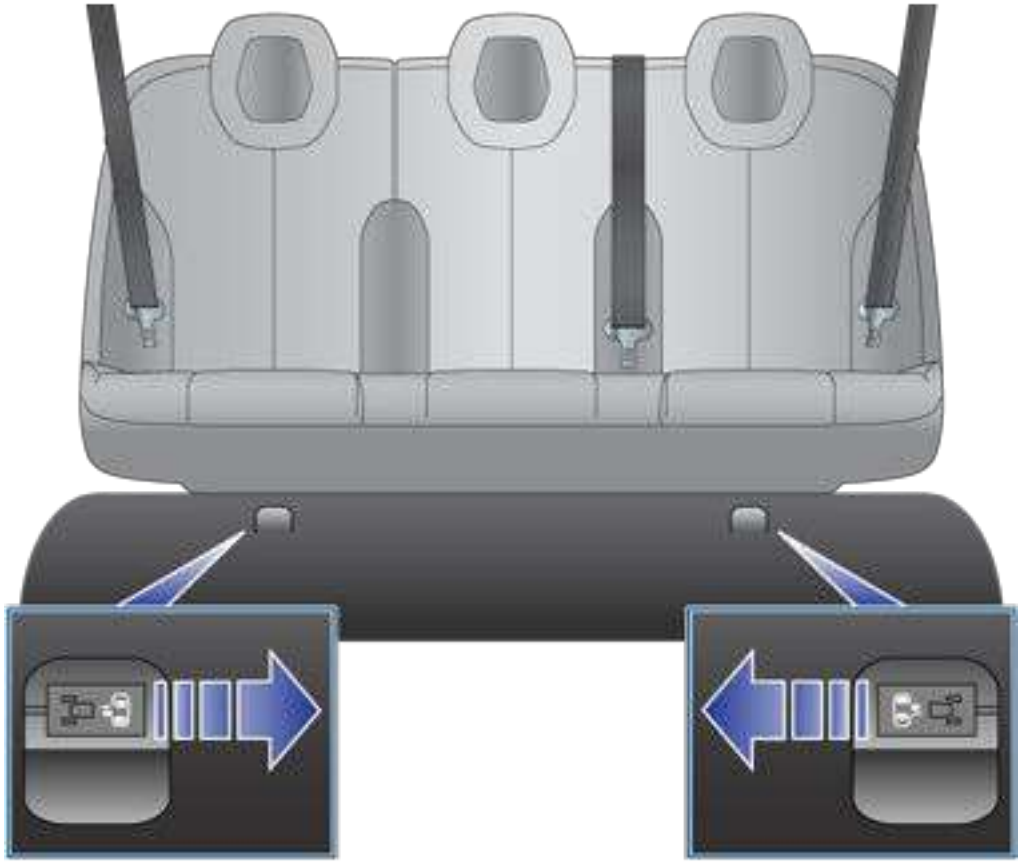
Model S has unique door handles. Under normal conditions, when you press a handle, it extends to allow you to open the door.

NOTE: When an airbag inflates, Model S unlocks all doors, the trunk, and extends all door handles.

NOTE: If the door handles do not function, open the door manually by reaching inside the window and using the interior door handle.

OPENING REAR DOORS WITHOUT POWER

Open the rear doors by folding back the edge of the carpet below the rear seats to access the mechanical release cables. Pull the release cables towards the center of the vehicle.

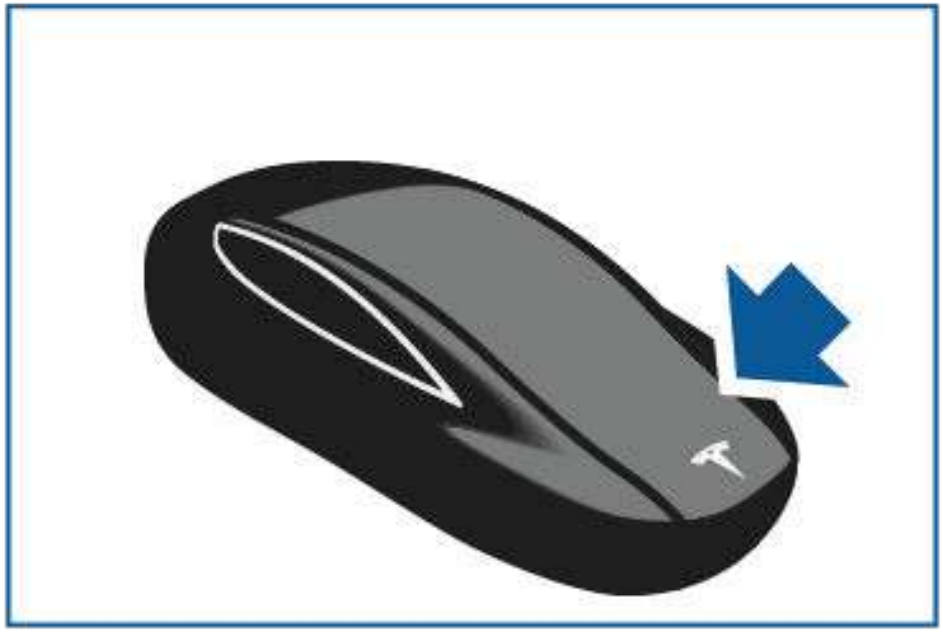


OPENING THE HOOD

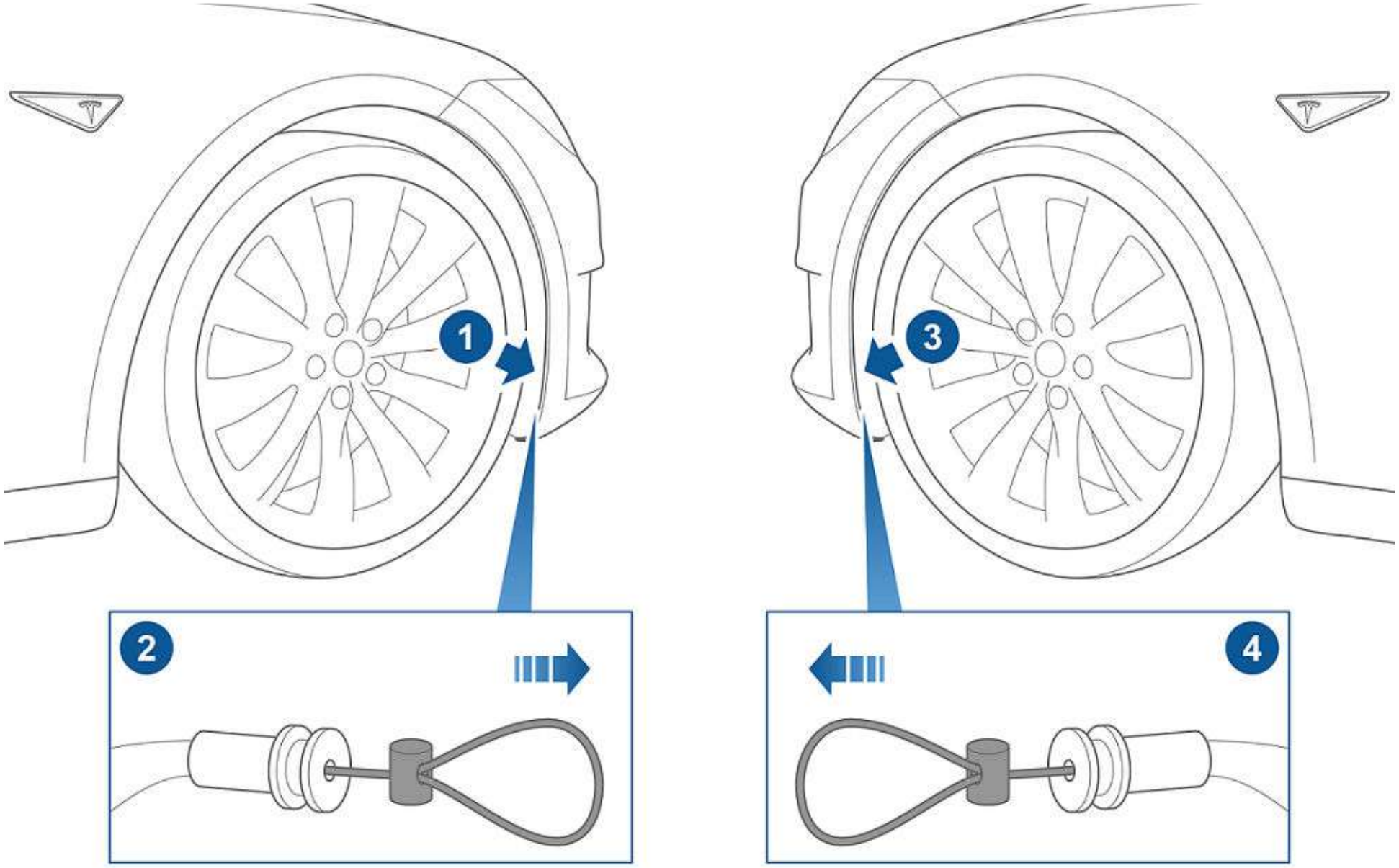
Model S does not have a traditional internal combustion engine. Therefore, the area that would normally house the engine is used as additional storage space. Tesla calls this area the “Front Trunk”.

To open the hood, use one of the following methods:

- Touch CONTROLS > FRONT TRUNK on the vehicle's touchscreen.
- Double-click the front trunk button on the key.



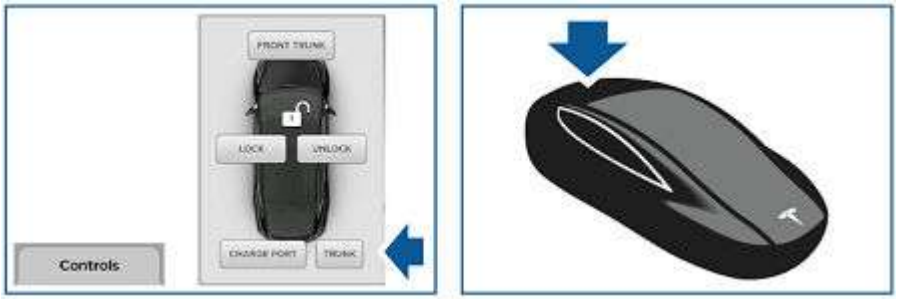
- Pull the release cables located in the front wheel arch liners. First, release the cover in the RH front wheel well and pull the strap to release the primary latch. Then, release the cover in the LH front wheel well and pull the strap to release the secondary latch.



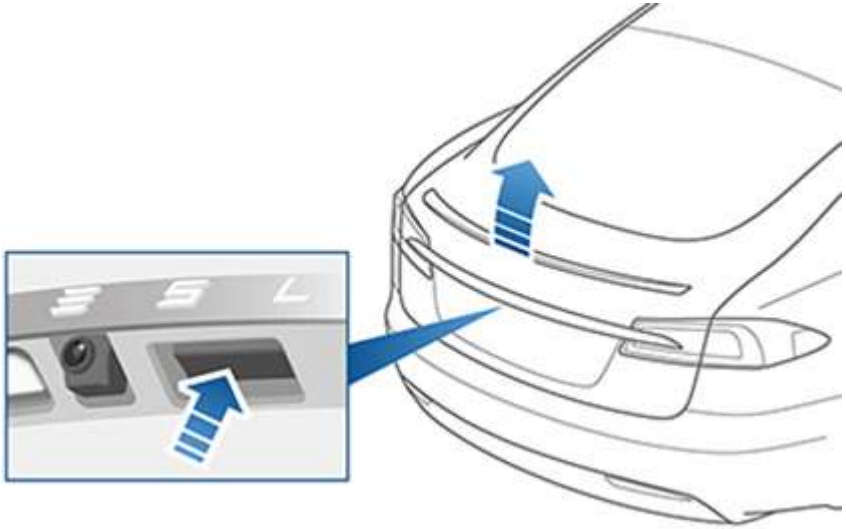
OPENING THE TRUNK

Use one of the following methods to open the trunk:

- Touch CONTROLS > TRUNK on the touchscreen.
- Double-click the trunk button on the key.



- Press the switch located under the exterior handle on the trunk.



PUSHING THE VEHICLE

⚠ **Warning:** Refer to the Owner's Manual on the touchscreen or the Roadside Assistance Guide in the glovebox for instructions on how to transport Model S. The following instructions are intended to be used when only moving Model S a very short distance to improve traffic safety. Damage caused by transporting the vehicle is not covered by the warranty.

In situations where there is minimal risk of fire or high voltage exposure (for example, the vehicle does not accelerate after coming to a stop at an intersection) and 12V power is present, Model S can be quickly pushed in order to clear the roadway. If a driver is present, simply shift Model S into Neutral and then push the vehicle. If a driver is not present, Model S may automatically shift into Park when it detects the driver leaving the vehicle (even if it has previously been shifted into Neutral).

To keep Model S in Neutral (which disengages the parking brake and allows the vehicle to be pushed) without a driver present, use the touchscreen to activate Tow Mode:

1. Shift Model S into Park.
2. Press and hold the brake pedal, then on the touchscreen touch Controls > Settings > Service & Reset > Tow Mode > ON.

When Tow mode is active, Model S displays this indicator light on the instrument panel, along with a message indicating that Model S is free-rolling.

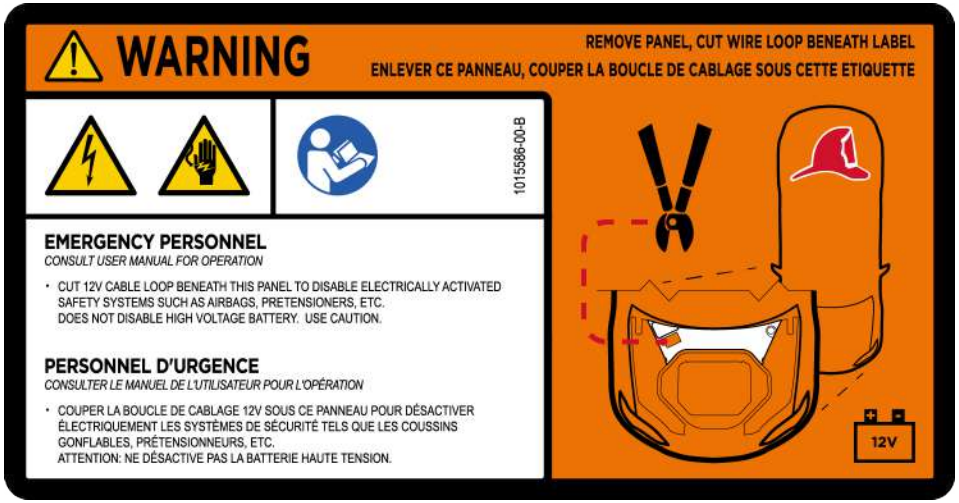
To cancel Tow Mode, shift Model S into Park.

NOTE: If the electrical system is not working, the electric parking brake cannot be released. Attempt to jump start the 12V battery. For instructions, call Tesla Roadside Assistance.

EXAMPLE OF A HIGH VOLTAGE LABEL

An example of a label located on a high voltage component is shown below. Note that, depending on the region, these labels might be translated into other languages.

⚠ **Warning:** Not every high voltage component is labeled. Always wear appropriate PPE when cutting Model S. Failure to follow these instructions can result in serious injury or death.



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