English

For Dismantlers

e VITARA

EV System
Lithium-ion Battery
- 305.3V-49kWh model
- 381.6V-61kWh model

Removal Manual

Contents

Precautions

WARNING/CAUTION/NOTICE/NOTE

Please read this manual and follow its instructions carefully. To emphasize special information, the words, WARNING, CAUTION, NOTICE and NOTE have special meanings. Pay special attention to the messages highlighted by these signal words.

⚠WARNING:

Indicates a potential hazard that could result in death or serious injury.

⚠CAUTION:

Indicates a potential hazard that could result in minor or moderate injury.

NOTICE:

Indicates a potential hazard that could result in vehicle or equipment damage.

NOTE:

Indicates special information to make maintenance easier or instructions clearer.

Precautions for Electrical System Work

Disconnect the negative cable at the lead-acid battery before performing electrical work such as disconnecting the connector.

NOTICE:

If the electrical system is operated without removing the negative cable at the lead-acid battery, harnesses, connectors, etc. may be burned due to a short circuit in the electrical system. Always disconnect the negative cable at the lead-acid battery before performing any electrical work.

- To disconnect the negative cable at the lead-acid battery, perform the following procedure:

Turn off the ignition.

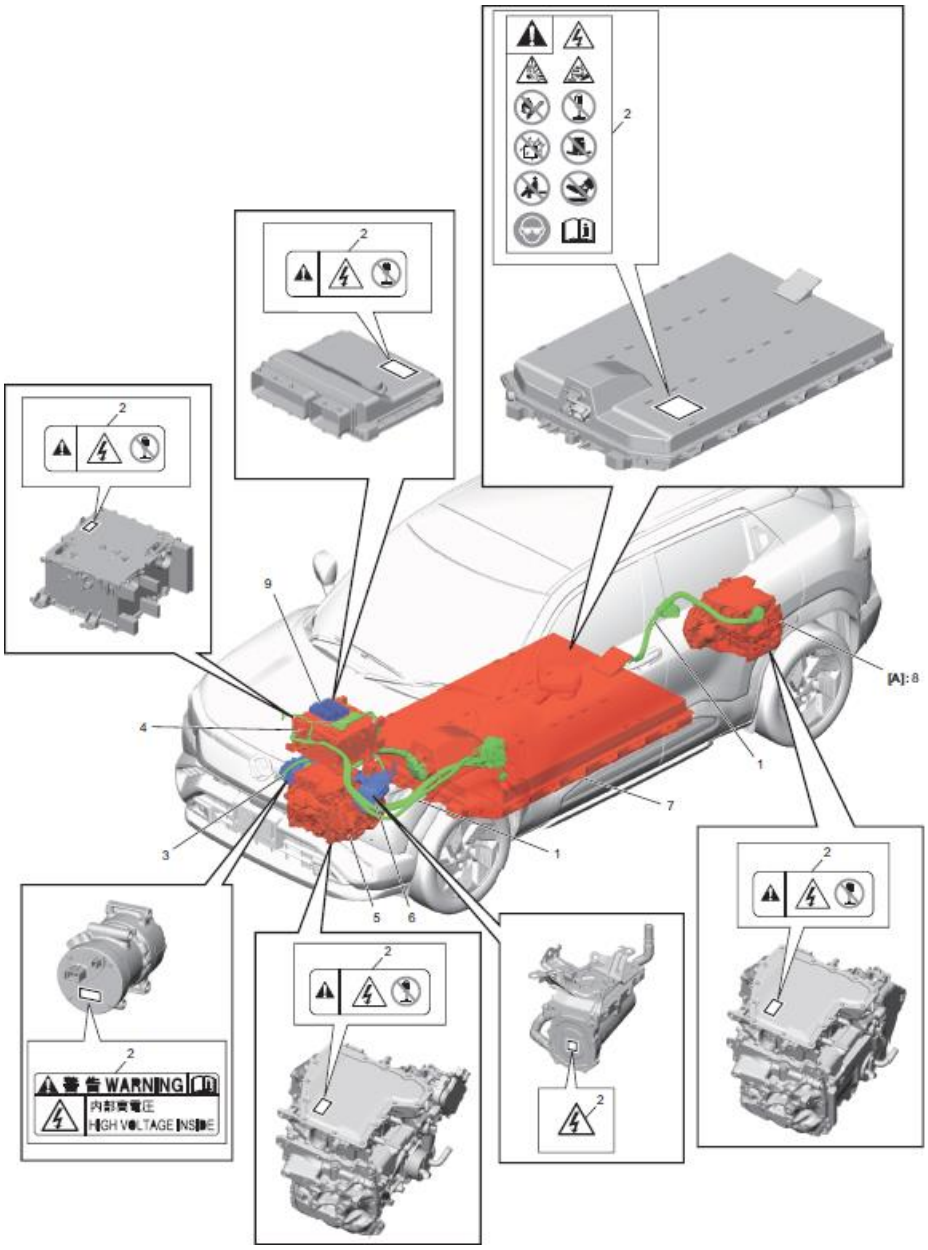
Wait for 5 minutes or more.

Disconnect the negative cable at the lead-acid battery.

Precautions for High Voltage Systems

The EV system has a high voltage circuit. Improper handling may cause electric shock, electric leakage, etc. Therefore, perform proper work in accordance with this manual.

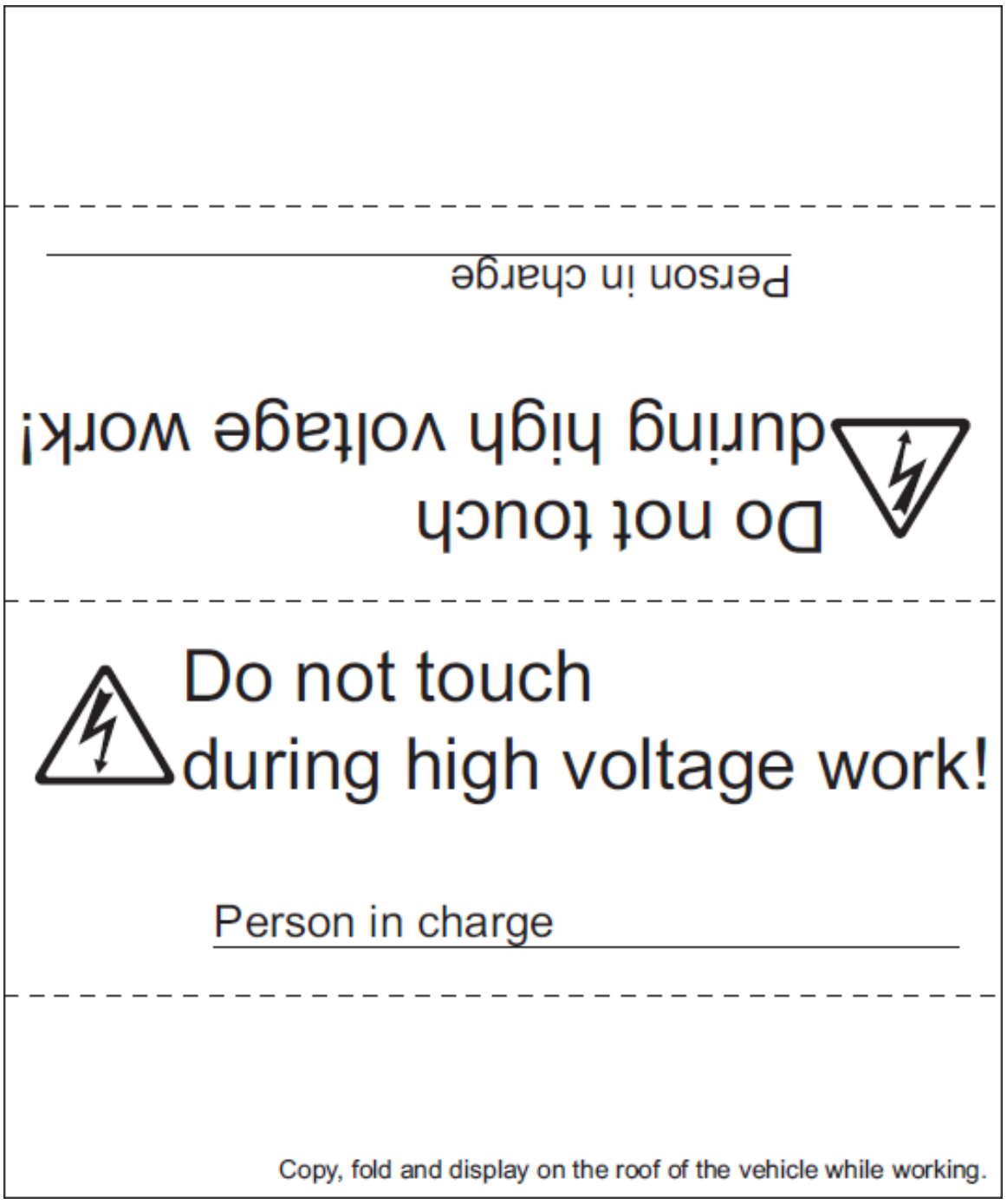
- Since components with strong magnetic force are also used, people with electronic medical equipment such as pacemakers should not inspect and maintain high voltage systems.
- High voltage wiring (high voltage cable) (1) which is a wire harness of a high voltage circuit and its connector are unified in orange. A Warning label (2) of high voltage is affixed on the high voltage systems. Handle the wiring and components of these high voltage systems with care and do not touch them carelessly.



[A]: 4WD model	6. Electric heater assembly
3. A/C compressor	7. Traction battery
4. ESU	8. Rear e axle
5. Front e axle	9. PWC control module

・When performing inspections and maintenance related to high-voltage circuits, observe the following points and take measures to prevent electric shock.

– Call attention to other service staff during the work, such as marking the vehicle as “Do not touch during high voltage work.”.



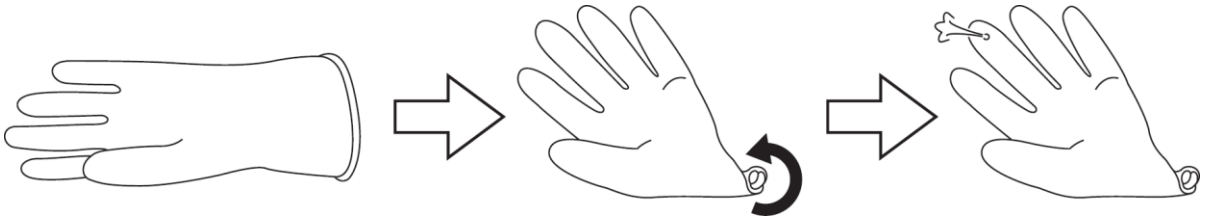
– Do not carry metal products (such as pens) with a short-circuit risk or magnetic recording media (such as cash cards) with a risk of data corruption.

– Inspect insulating gloves for damage such as cracks and tears, and moisture before using, and do not use insulating gloves with these abnormalities. Also, be careful of damage such as tears while using it.

NOTE

For damage such as cracks and tears, check as follows.

1. Place the thumb side down to maintain the shape of the insulated glove.
2. Up roll the insulated gloves to wrist with keeping the air inside the gloves from leakage.
3. Check for air leaks from the inflated insulated gloves.



– Remove the service plug.
Also, the removed service plug is carried in a pocket so as not to be erroneously connected by other service staff during the work.
– Allow at least 10 minutes before touching high-voltage connectors or terminals after removing the service plug.

NOTE

Since the high voltage capacitor in the INV is charged, a discharge time of 10 minutes or more is secured.

– Use insulated gloves and insulated tools for maintenance of the high voltage system even after the service plug is removed.
– Wear insulated gloves before touching high-voltage terminals without insulating coating and check that the voltage is 0V with the tester.
– Immediately insulate high-voltage connectors and terminals with insulating tape after removal.

Vehicle Lifting Points

⚠WARNING:

Improperly lifting the vehicle using a hoist could cause serious personal injury and/or damage to the vehicle.
Take the following precautions when lifting the vehicle with a hoist:

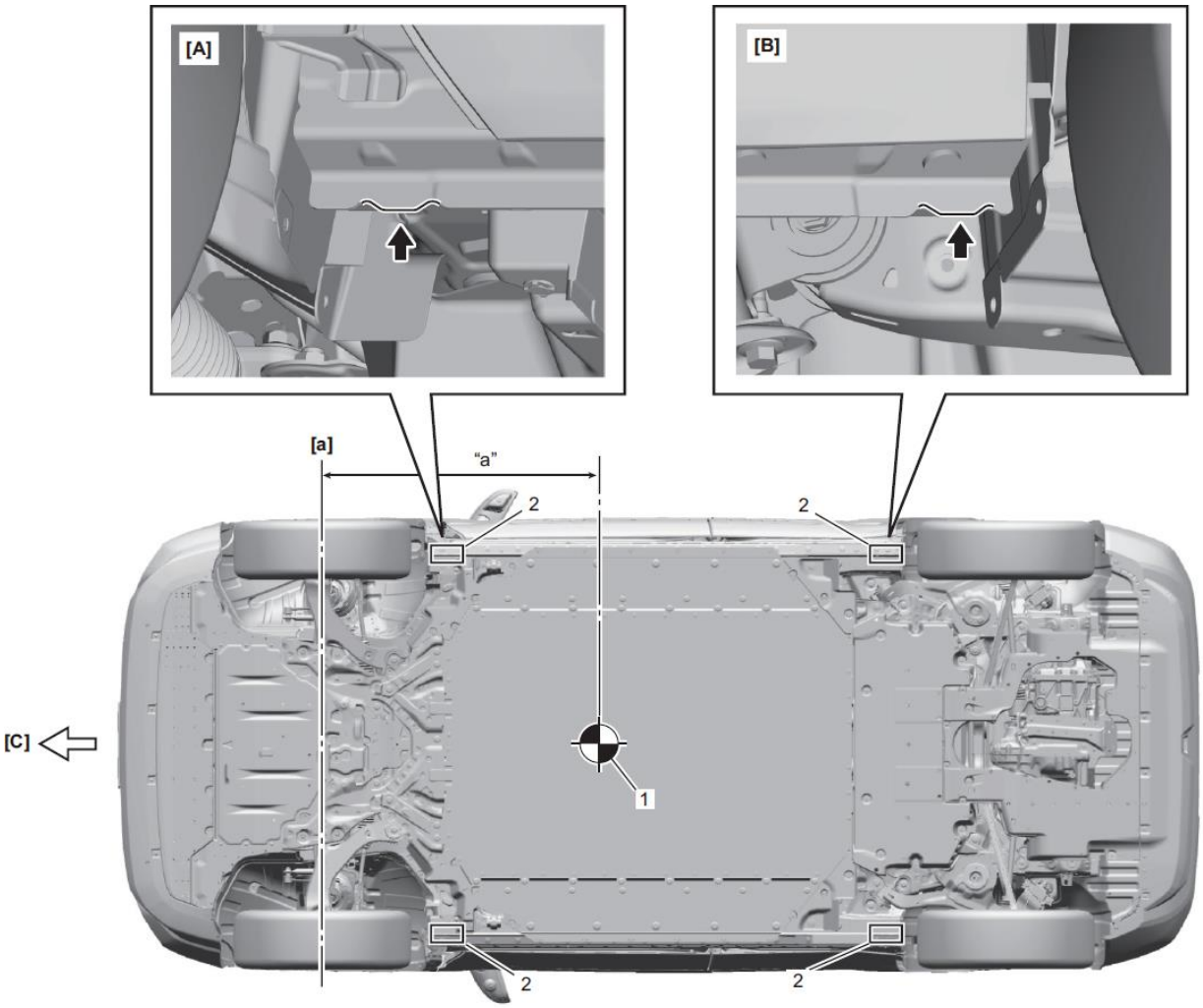
- Before applying the hoist arms to the underbody, keep in mind how the balance of the vehicle will change when components are removed during the intended service.
- Before lifting up the vehicle, check that the ends of the hoist arms are not in contact with components such as the brake and fuel lines, and related brackets.
- When using a frame contact hoist, apply the right and left arms to the symmetrically located points shown in the figure. Lift up the vehicle until all 4 tires are slightly off the ground and check that the vehicle will not fall off the hoist by rocking the vehicle body back and forth. Work should be started only after this confirmation.
- Lock the hoist after the vehicle has been raised up to the desired height.

When Using Frame Contact Hoist

NOTICE:

Improper placing hoist arms to the vehicle may damage body parts such as side sill splash guard.

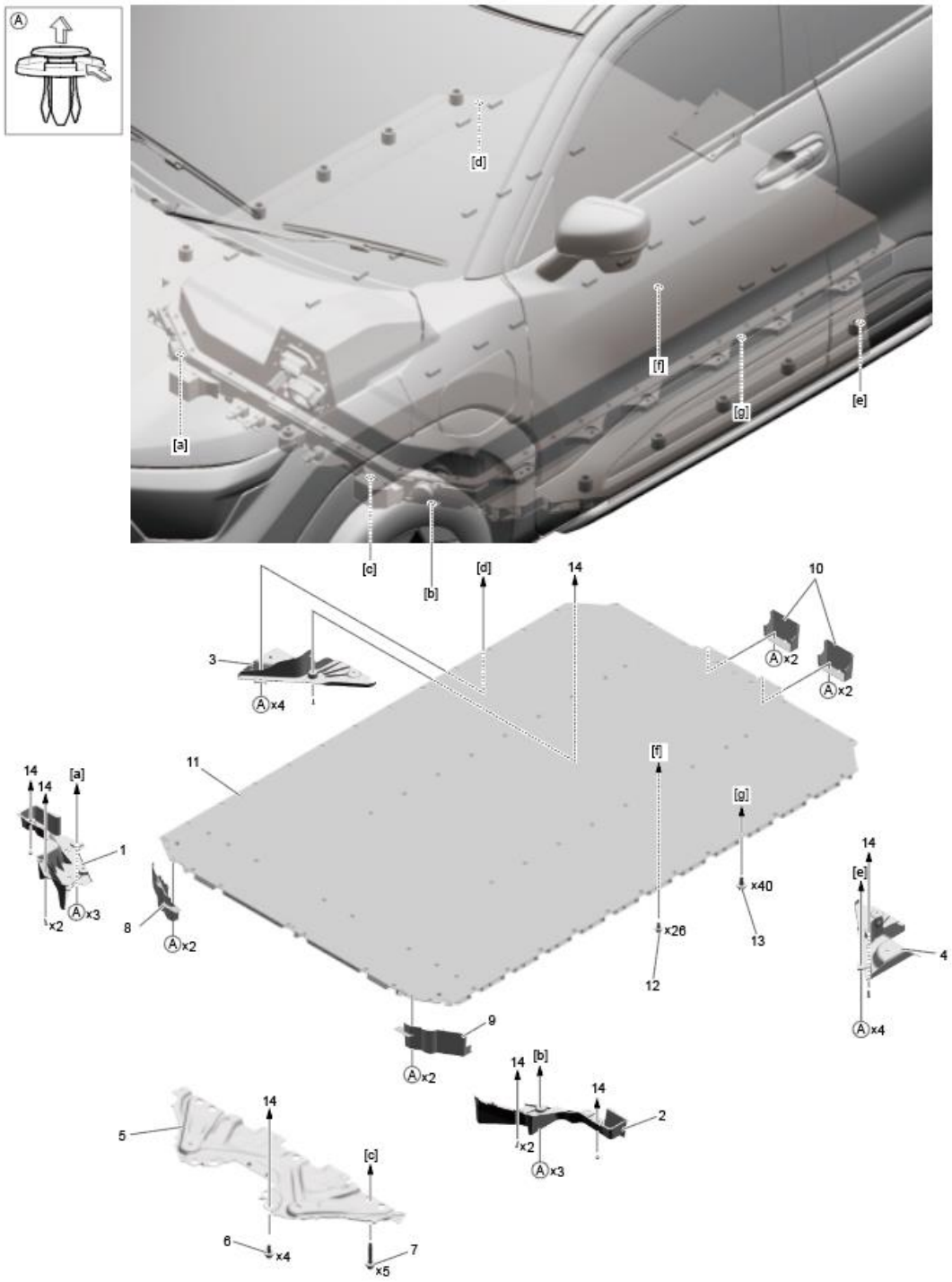
When lifting up the vehicle, check that there is space between the ends of the hoist arms and body parts.



[A]: Front side	[a]: Wheel center	2. 2post lift position (swing arm lift and plate lift)
[B]: Rear side	"a": Approx. 1,048 – 1,214 mm (41.3 – 47.8 in.)	
[C]: Vehicle front	1. Position of center of gravity without load in vehicle	

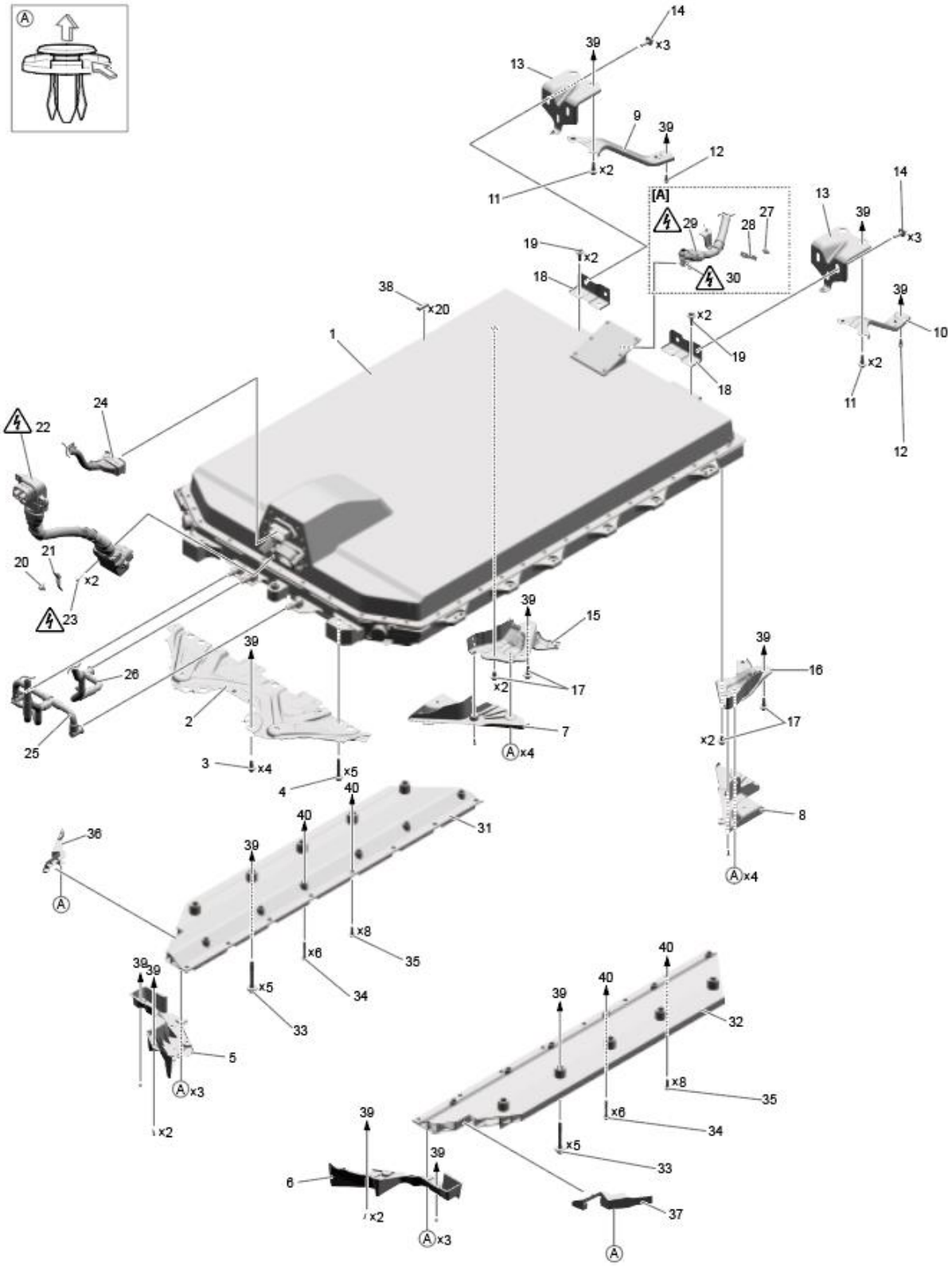
Traction Battery Components

Around Protect Plate Cover



1. Floor under front right cover	6. Brace bracket No.1 bolt	11. Protect plate cover
2. Floor under front left cover	7. Brace bracket No.2 bolt	12. Protect plate No.1 bolt
3. Floor under rear right cover	8. Internal pressure valve No.1cover	13. Protect plate No.2 bolt
4. Floor under rear left cover	9. Internal pressure valve No.2 cover	14. To vehicle body
5. Brace bracket	10. Internal pressure valve No.3 cover	

Around Traction Battery



[A]: 4WD model	14. Center No.1 bracket bolt	28. Striker bracket (rear PCU HV cable connector)
1.Traction battery 49 kWh model : 305.3 V / 414.4 kg 61 kWh (2WD) model : 381.6 V /471.4 kg 61 kWh (4WD) model :381.6 V / 474.6 kg	15. Side right bracket bolt	29. Rear PCU HV cable
2.Brace bracket	16. Side left bracket bolt	30. Rear PCU HV cable bolt
3.Brace bracket No.1 bolt	17. Side bracket bolt	31. Energy right absorber
4.Brace bracket No.2 bolt	18. Center No.2 bracket	32. Energy left absorber
5.Floor under front right cover	19. Center No.2 bracket bolt	33. Energy absorber No.1 bolt
6.Floor under front left cover	20. EV battery striker	34. Energy absorber No.2 bolt
7.Floor under rear right cover	21. Striker bracket	35. Energy absorber No.3 bolt
8.Floor under rear left cover	22. Main HV cable	36. Energy absorber right cover
9.Rear suspension frame right brace	23. Main HV cable bolt	37. Energy absorber left cover
10.Rear suspension frame left brace	24. Traction battery connector (Main harness)	38. Upper cover cushion
11.Rear suspension frame brace bolt	25. Battery cooling No.1 hose	39. To vehicle body
12.Rear brace bolt	26. Battery cooling No.2 hose	40. To traction battery
13.Center No.1 bracket	27. EV battery striker (rear PCU HV cable connector)	⚠ Insulation gloves and insulation tools should be used for removal and installation.

Removal

1. Remove Lead-Acid Battery

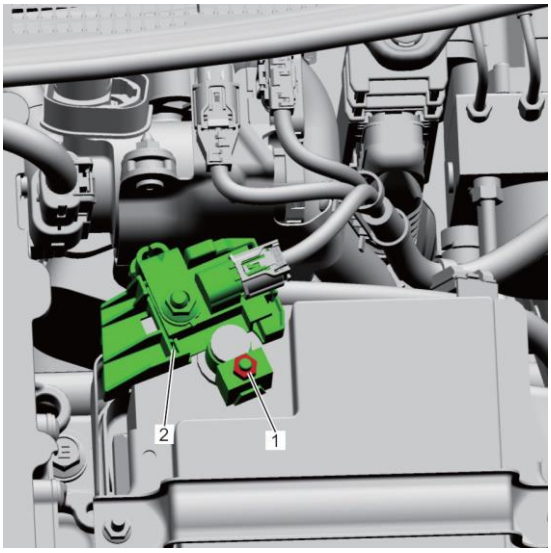
⚠WARNING:

Failure to observe the following precautions when handling lead-acid battery may cause severe personal injury.

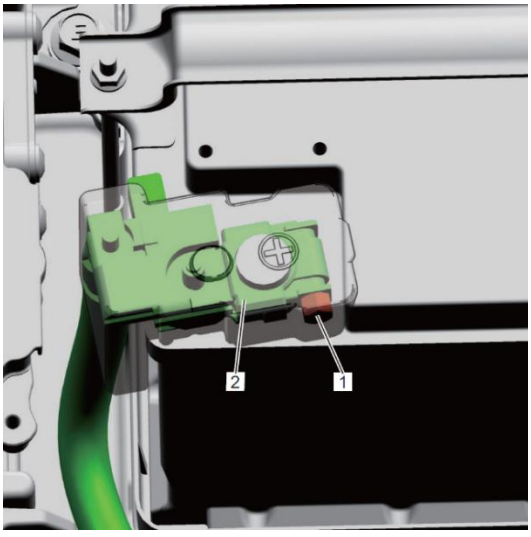
- **Never expose lead-acid battery to open flame or electric spark. Lead-acid battery generates highly flammable and explosive hydrogen gas.**
- **Battery fluid is corrosive acid. Do not allow it to contact eyes, skin, fabrics or painted surfaces of vehicle. If fluid contacts any of them, immediately and thoroughly flush affected area with water.**
- **Keep lead-acid battery out of reach of children.**

Removal

1) Loosen battery negative terminal nut (1), and then remove battery sensor assembly (2) from lead-acid battery.



2) Loosen battery positive terminal clamp (1), and then disconnect battery positive (+) cable (2).



2. Remove Service Plug

⚠WARNING:

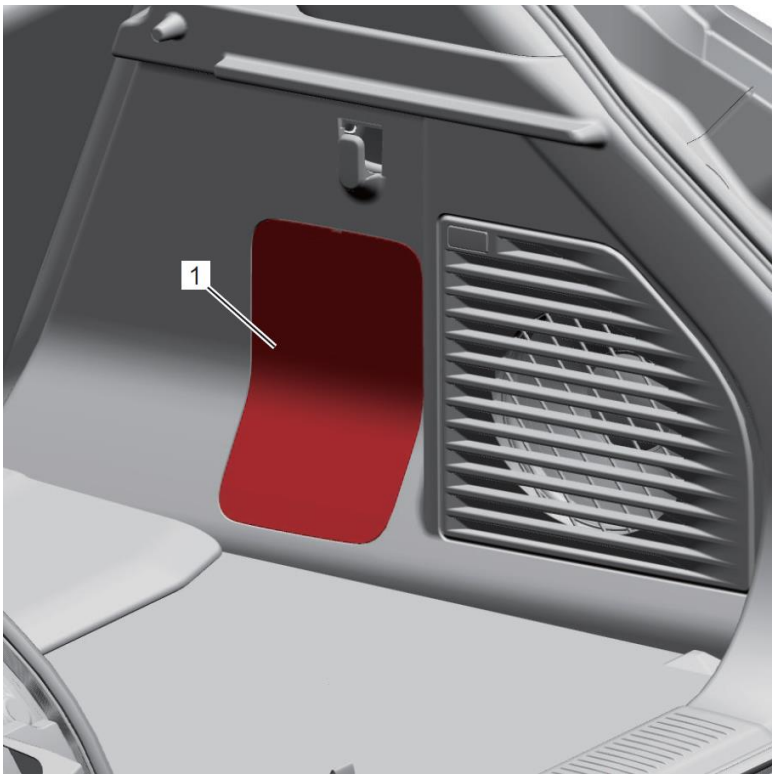
- **Failure to observe the following precautions when removing/installing or disassembling/ assembling and reassembling the high voltage parts can cause service personnel electric shock or injury.**

NOTE

"READY ON" with the service plug disconnected may cause an EV control system malfunction.
Do not perform "READY ON" without special instructions.

Removal

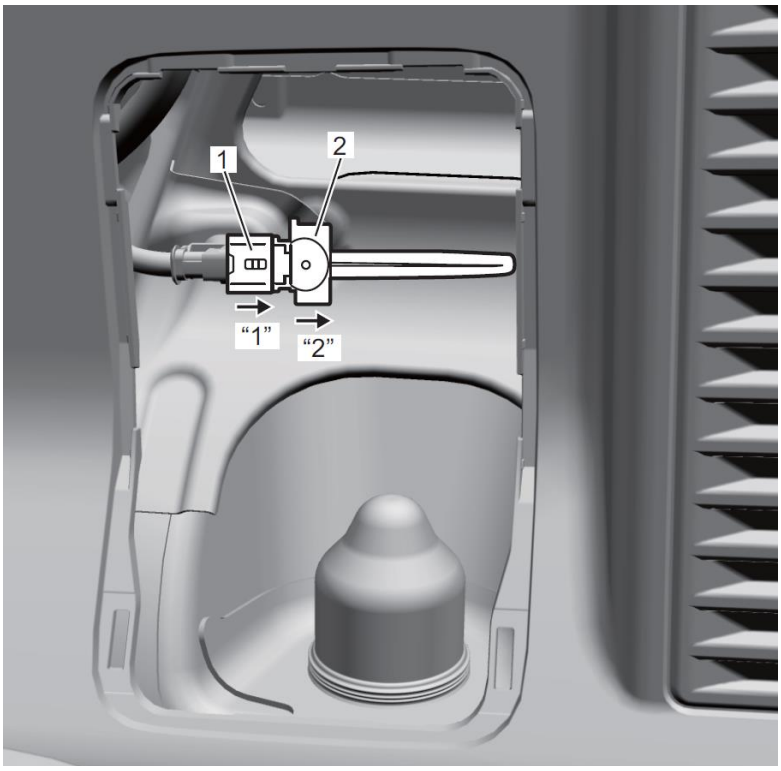
1) Remove quarter lower trim cap (1).



2) Remove service plug as follows.

a) Slide lock (1) in direction of arrow “1” to release it.

b) While lock is released, pull service plug (2) in direction of arrow “2” to remove it.



3) Wait for at least 10 minutes from the completion step 2).

NOTE

It is necessary to wait at least 10 minutes for condenser of inverter in front e-axle assembly and in rear e-axle assembly (4WDmodel) to be completely discharged.

3. ESU Voltage Inspection

⚠WARNING:

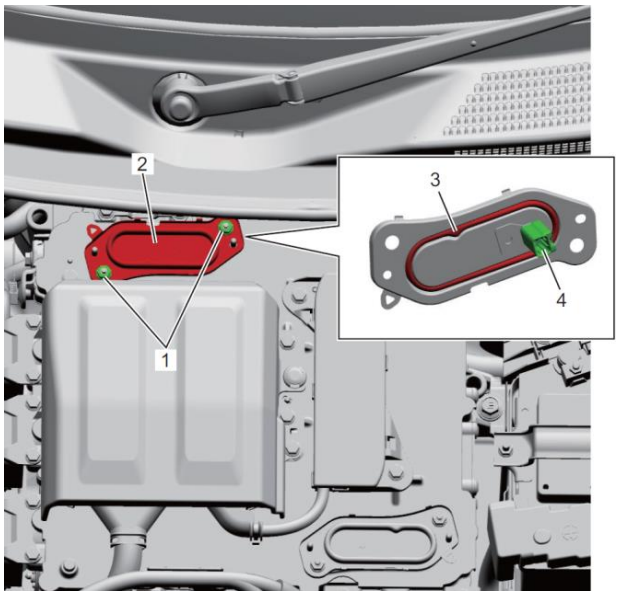
- Failure to observe the following precautions when removing/installing or disassembling/ assembling and reassembling the high voltage parts can cause service personnel electric shock or injury.
  - Be sure to use insulating protective equipment (insulating gloves, safety glasses, and insulating safety shoes) and insulating tools when “Insulating Protective Equipment and Insulating Tools” is described in the service procedure.
- If the voltage detected by ESU is 1 V or higher, there is a possibility of electrical leakage from the high voltage system. Failure to observe the following precautions when removing high voltage parts can cause service personnel electric shock or injury.
  - Be sure to wear insulating protective equipment (insulating gloves, safety glasses, and insulating safety shoes).
  - Be sure to use insulation tools.
  - Do not attempt to disassemble high voltage parts.

Voltage Inspection

1) Use “WARNING: HIGH VOLTAGE DO NOT TOUCH” sign to notify other service personals. (Refer to “Precautions for High Voltage Systems”)
2) Using “Insulating Protective Equipment and Insulating Tools”, remove connector cover No.1 nuts (1), and then connector cover No.1 (2).

NOTICE:

- Failure to observe the following items may result in damage to ESU or other components.
- Do not touch seal rubber (3) of connector cover No. 1.
- Check that interlock connector (4) is attached to connector cover No. 1. Also, do not touch terminal part of interlock connector.
- Prevent the entry of foreign object and water droplets into ESU.

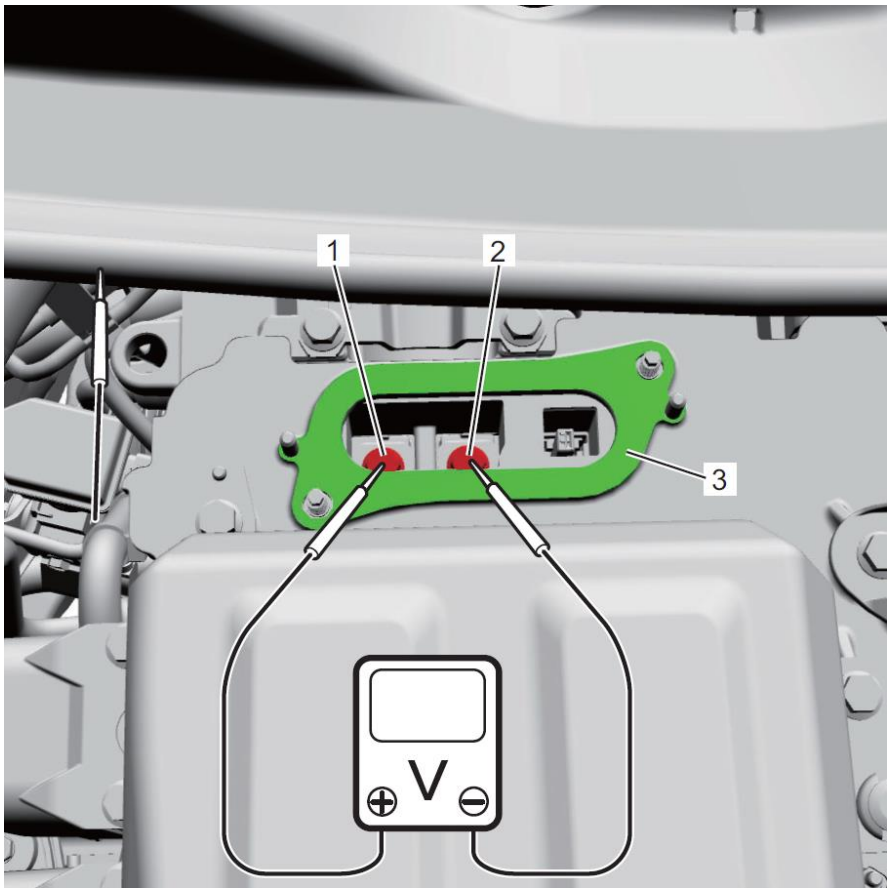


3) Using “Insulating Protective Equipment and Insulating Tools”, measure the voltage between the following points and check that voltage is less than 1V at each point.

NOTE

Measure using voltmeter with a measurement range of 750 V or higher.

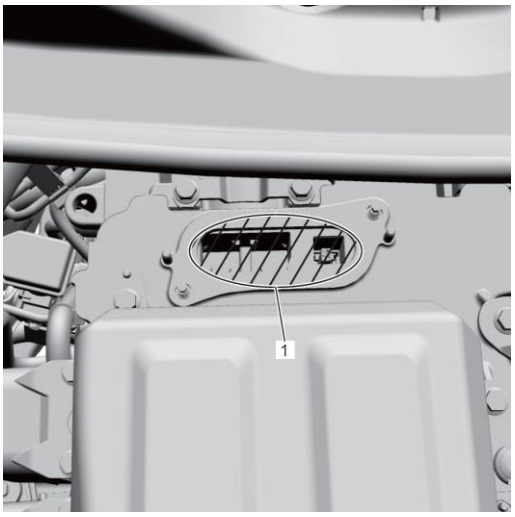
Measurement Order	Tester positive (+) terminal	Tester negative (-) terminal
1	PCU connector terminal bolt (main HV cable CBI circuit side) (1)	PCU connector terminal bolt (main HV cable CEI circuit side) (2)
2	PCU connector terminal bolt (main HV cable CEI circuit side) (2)	PCU connector terminal bolt (main HV cable CBI circuit side) (1)
3	PCU connector terminal bolt (main HV cable CBI circuit side) (1)	ESU body (3)
4	PCU connector terminal bolt (main HV cable CEI circuit side) (2)	ESU body (3)
5	ESU body (3)	PCU connector terminal bolt (main HV cable CBI circuit side) (1)
6	ESU body (3)	PCU connector terminal bolt (main HV cable CEI circuit side) (2)



4) Protect ESU opening (1) with tape to prevent foreign object contamination.

NOTE

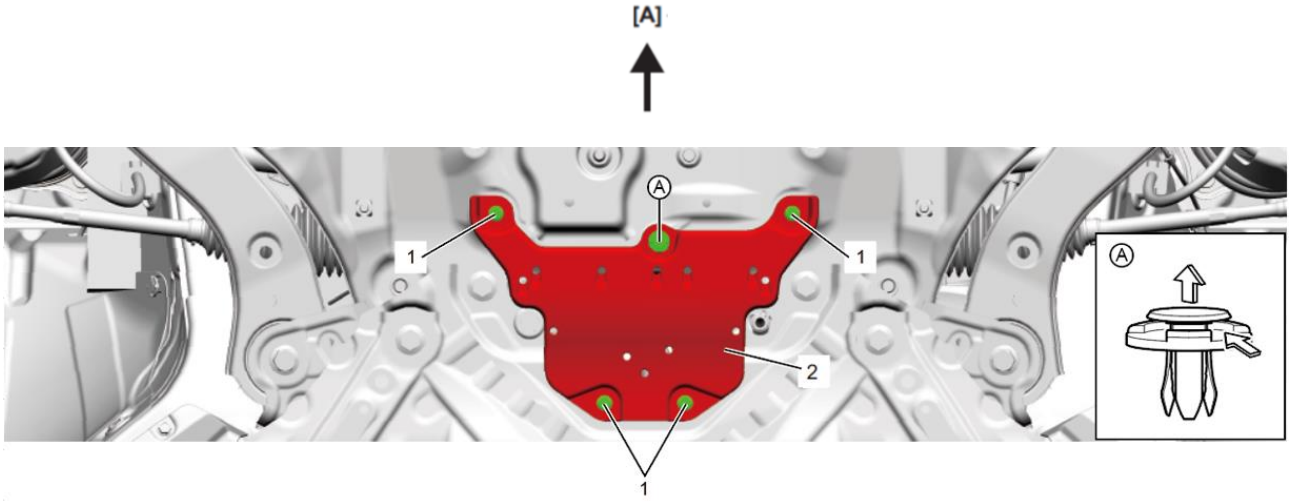
Use tape that does not leave adhesive residue.



4. Remove Motor Under Cover and Suspension Frame Cover

Removal

Remove bolts (1), and clips, and then remove suspension frame cover (2).



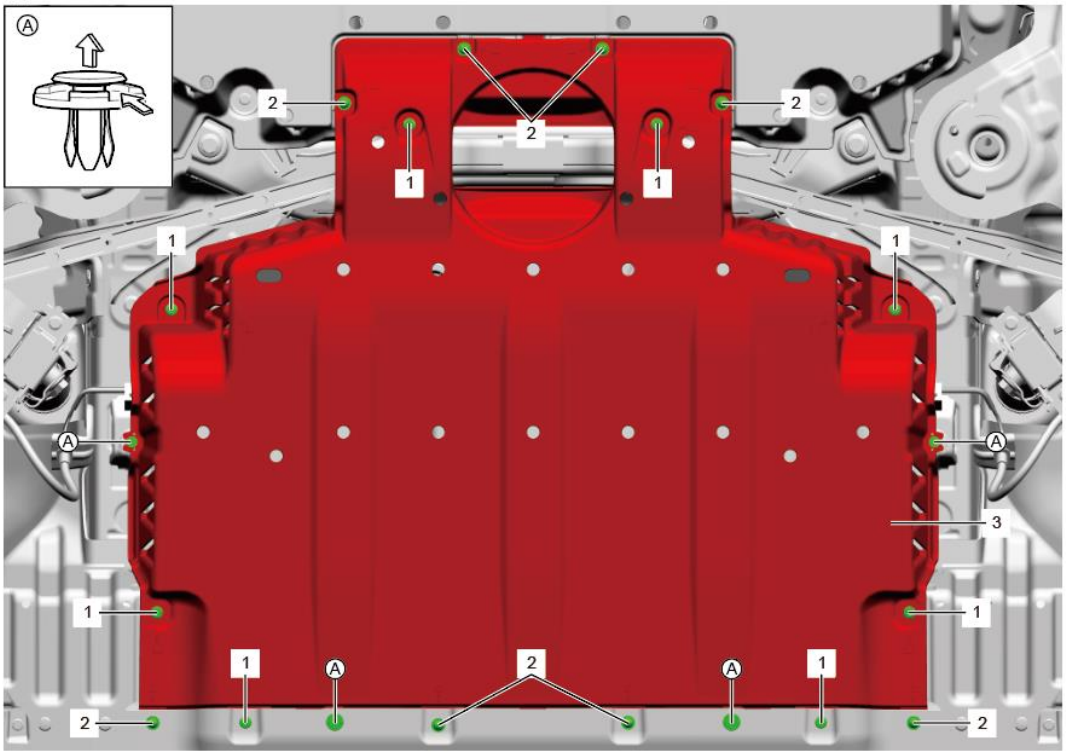
[A]; Vehicle forward

5. Remove Rear Floor Under Cover

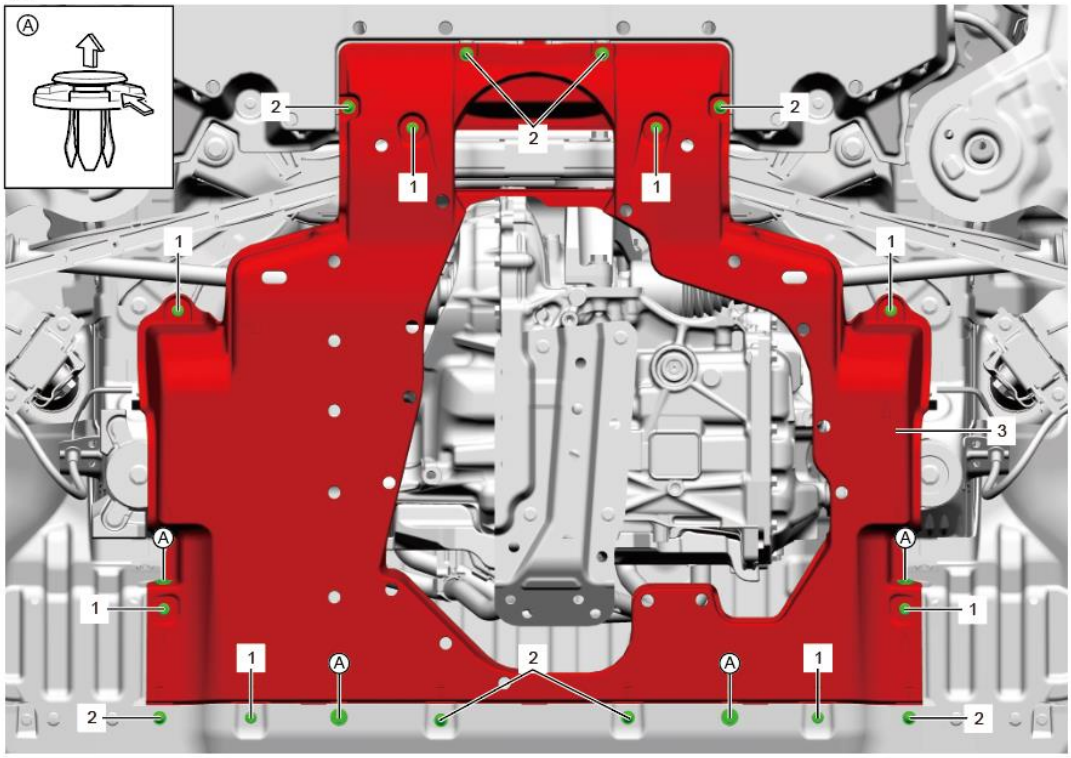
Removal

1) Remove bolts (1), screws (2) and clips(A), and then remove rear floor under rear cover (3).

[A]

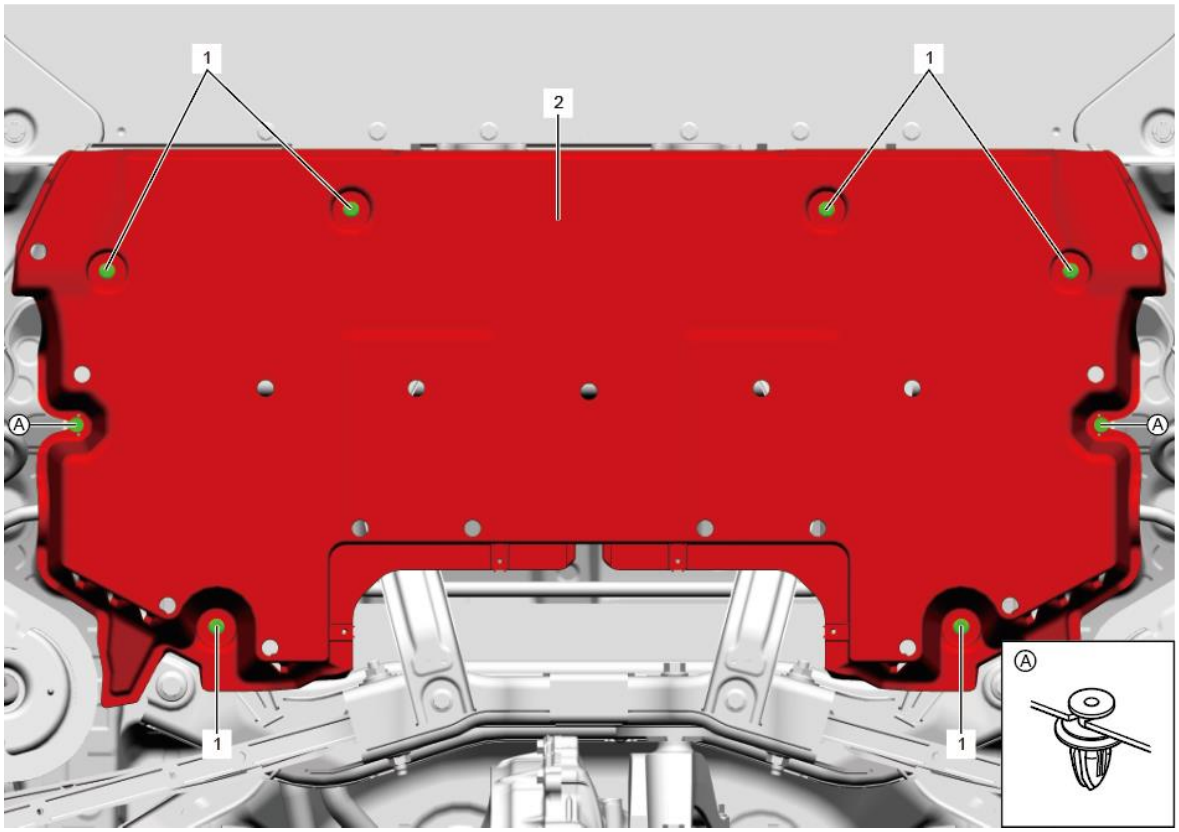


[B]



[A]: 2WD	[B]: 4WD

2) Remove bolts (1) and clips(A), and then remove rear floor under front cover (2).



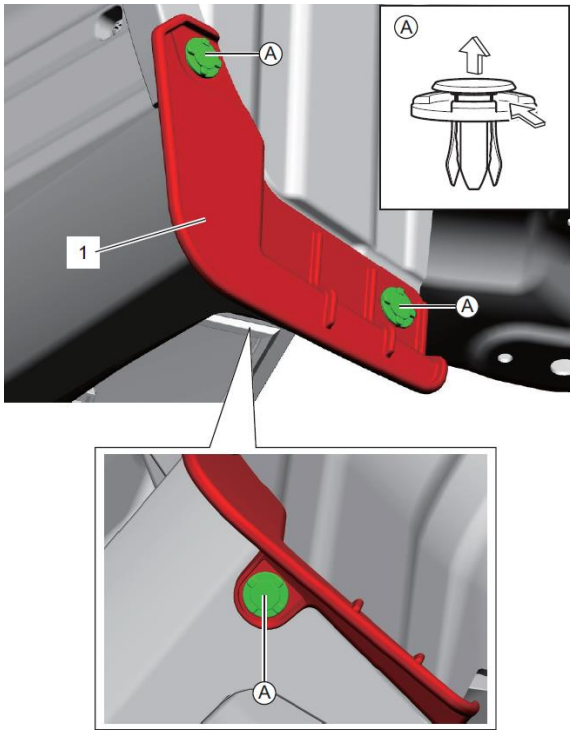
6. Remove Splash Guard

Removal

NOTE

The figure shows the left side components, and the right side components are symmetric.

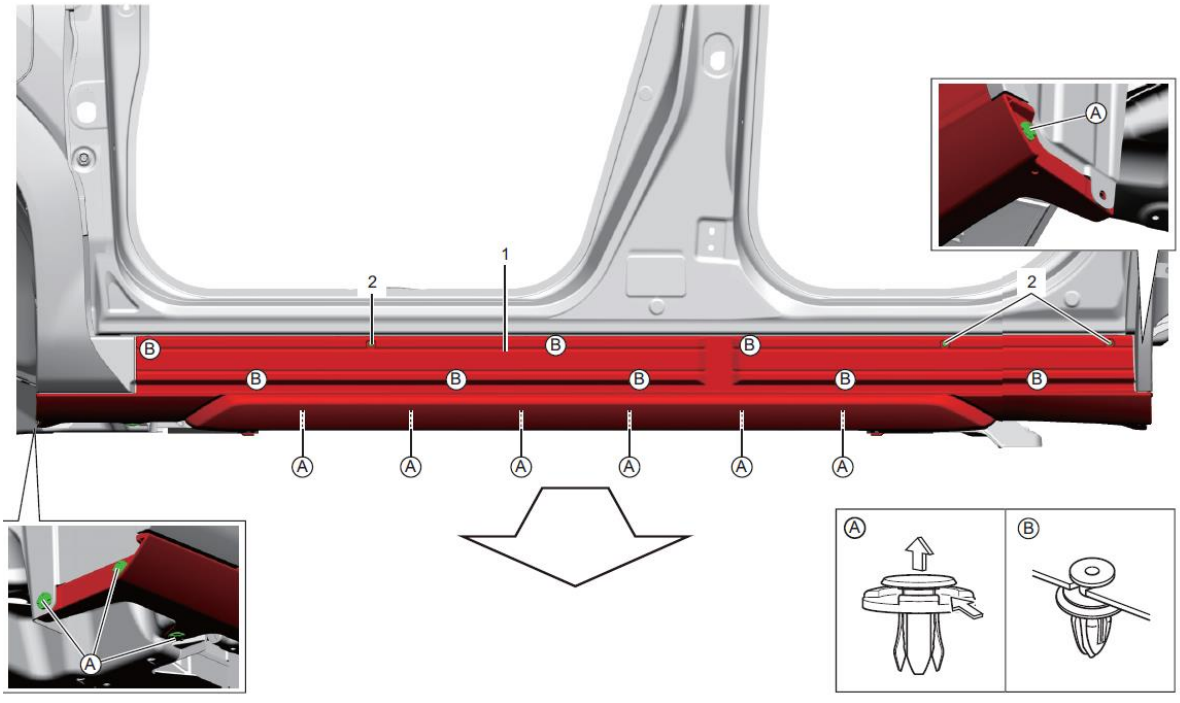
1) Remove clips(A), and then remove side sill rear strake (1).



2) Remove side sill splash guard (1) as follows.

a) Remove screws (2) and clips (A).

b) Pull side sill splash guard in arrow direction to release clips (B), and then remove side sill splash guard.

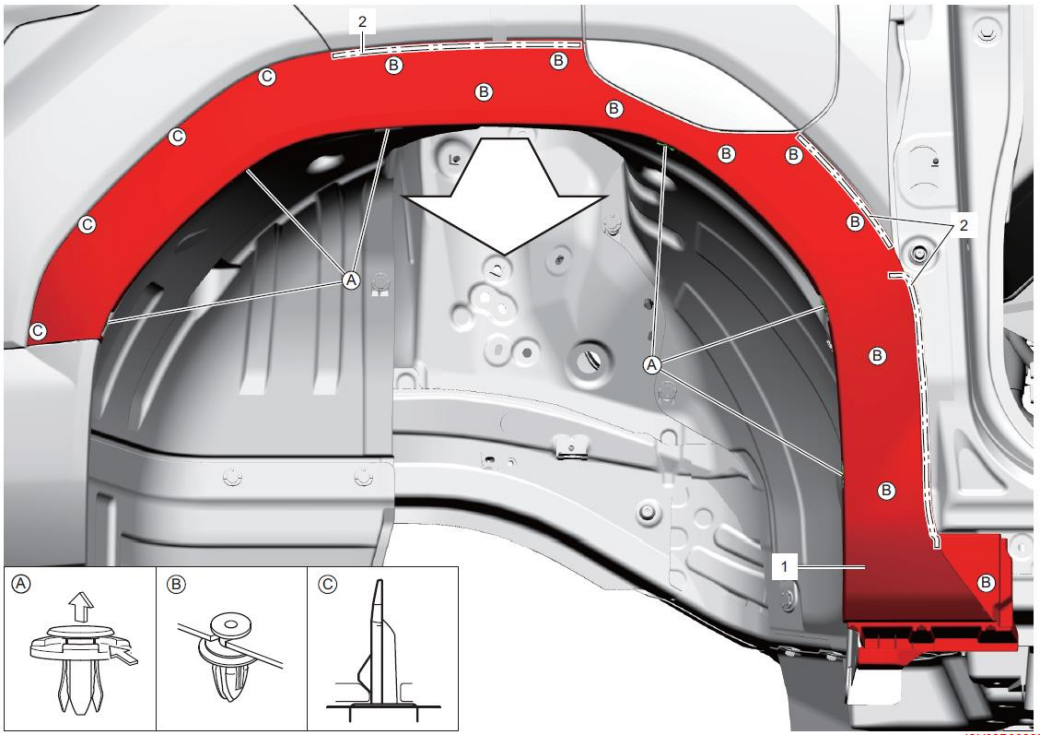


3) Remove left front fender splash guard (1) as follows.

a) Remove clips (A).

b) Pull left front fender splash guard in arrow direction to remove double-stick tapes (2).

c) Release hooks and remove clips (B), and then remove left front fender splash guard.

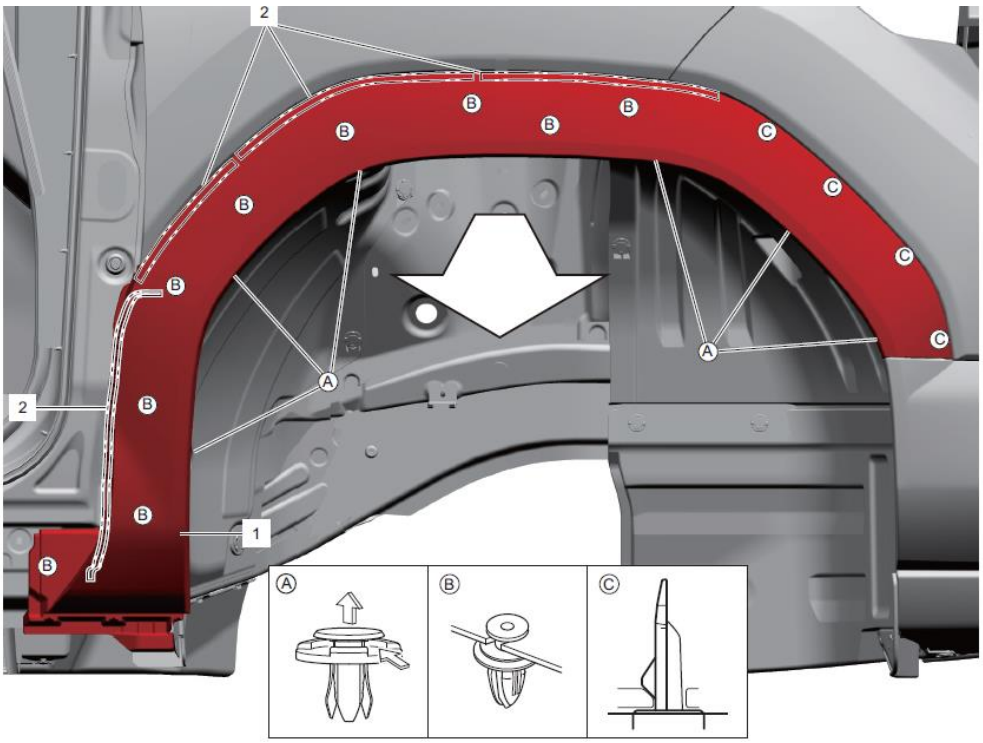


4) Remove right front fender splash guard (1) as follows.

a) Remove clips (A).

b) Pull right front fender splash guard in arrow direction to remove double-stick tapes (2).

c) Release hooks and remove clips (B), and then remove right front fender splash guard.



7. Remove Traction Battery

⚠WARNING:

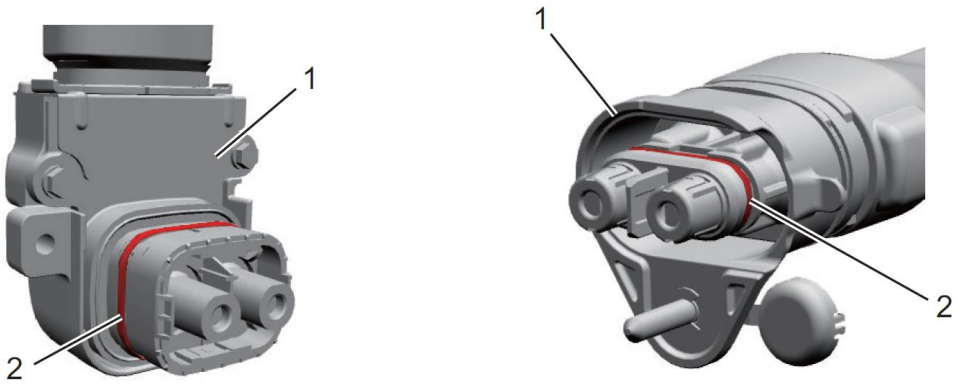
- Failure to observe the following precautions when removing/installing or disassembling/ assembling and reassembling the high voltage parts can cause service personnel electric shock or injury.
  - Be sure to use insulating protective equipment (insulating gloves, safety glasses, and insulating safety shoes) and insulating tools when "Insulating Protective Equipment and Insulating Tools" is described in the service procedure.
- If the voltage detected by ESU is 1 V or higher, there is a possibility of electrical leakage from the high voltage system. Failure to observe the following precautions when removing high voltage parts can cause service personnel electric shock or injury.
  - Be sure to wear insulating protective equipment (insulating gloves, safety glasses, and insulating safety shoes).
  - Be sure to use insulation tools.
  - Do not attempt to disassemble traction battery.
- Since traction battery is very heavy, failure to take observe the following precautions when servicing traction battery can cause serious accidents such as battery falling.
  - Check weight of traction battery. (Traction Battery Specifications):
  - Be sure to follow removal and installation procedures when removing or installing traction battery.
  - Be sure to perform removal and installation of traction battery with at least two people.
  - Be sure to use a forklift, crane, or hoist for moving and transporting traction battery.
- If the removing any part of cooling system is removed while the coolant temperature is hot and pressure is high, the inside coolant will instantaneously boil up and spew out. This could cause severe burns or could cause a fire if coolant is splashed over the your body or hot components, as the coolant contains a flammable anti-freeze material.
  -Do not removing any part of cooling system when coolant temperature is hot and pressure is high.
  -Also, always check that the coolant temperature is cold before removing any part of cooling system.

NOTICE:

Failure to take the following instructions may cause damage to traction battery or other components.

- Disconnect connectors without damaging connector terminals, connector housing, or traction battery.
- Do not touch seal rubber (2) of each high voltage cable connector (1).

[A]



[A]; 4WD model

- Use insulating tape or protective tape that does not leave adhesive residue on high voltage cable connector terminals and traction battery connector terminals.
- Make sure that foreign materials and water droplets do not enter traction battery.
- Make sure not to apply strong impacts to traction battery.
- Make sure traction battery is kept in horizontal position when storing or transporting it.
- Do not stand on traction battery.
- Do not bring removed traction battery near open flames or heat sources.
- Keep traction battery in a place where it will not get wet from rain or be exposed to direct sunlight when storing it.

Preparation

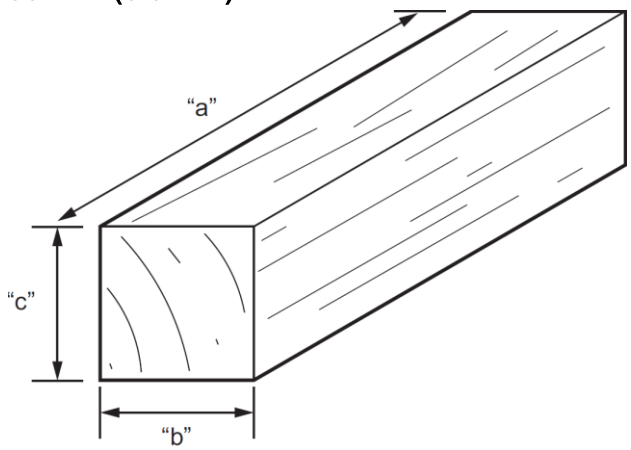
Prepare at least three wooden blocks in advance, as they are required when removing or installing traction battery. Use the following as a guideline for size of wooden blocks.

NOTE

Prepare wooden blocks of different heights according to size of forklift craws.

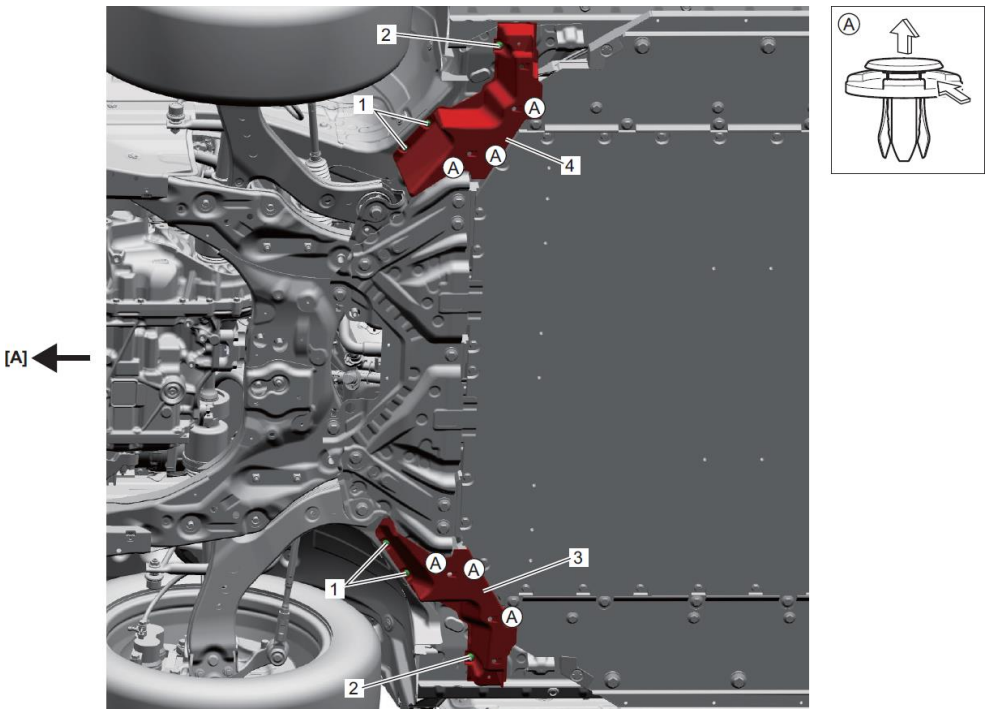
Wooden Block Size

- Length “a”: 1000 mm (39.37 in.)
- Width “b”: 100 mm (3.94 in.)
- Hight (reference) “c”: 100 mm (3.94 in.)



Removal

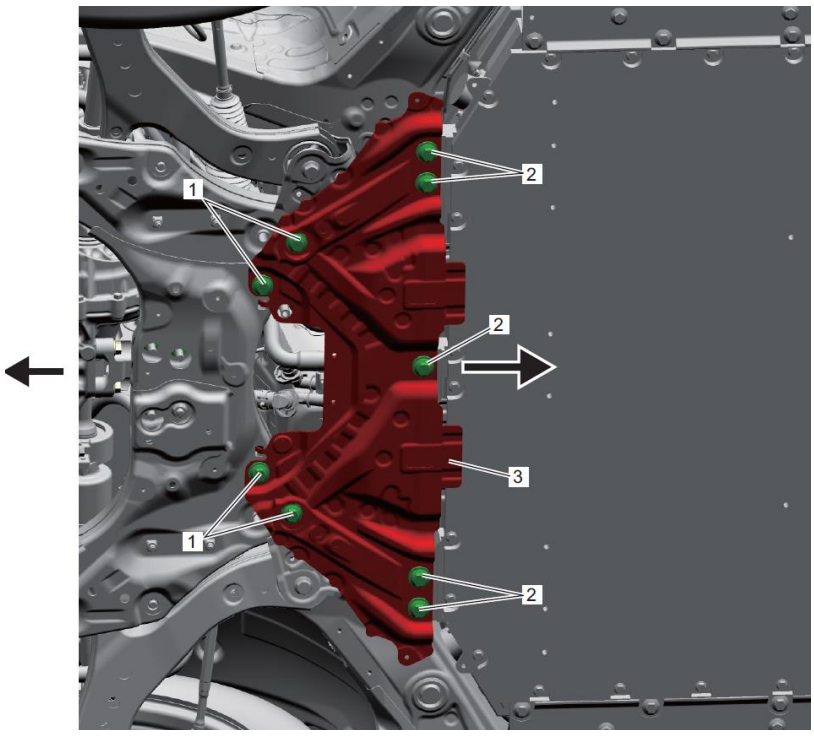
1) Remove floor under front cover bolts (1), floor under front cover nut (2) and Clips (A), and then remove floor under front right cover (3) and floor under front left cover (4).



[A]; Vehicle forward

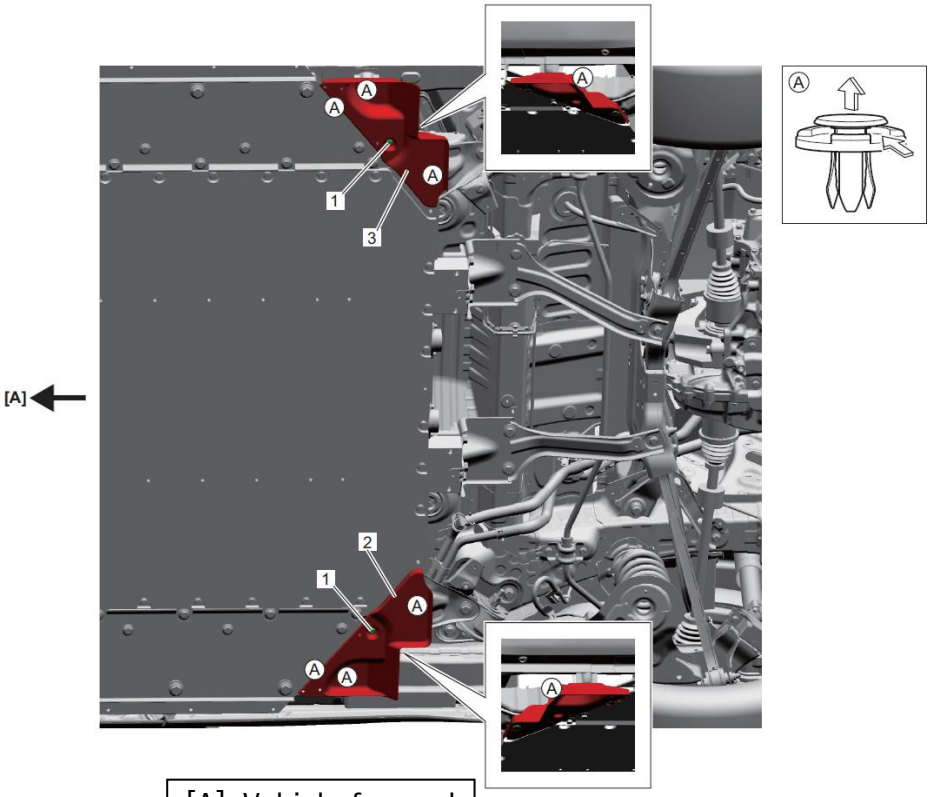
2) Hoist vehicle. (Refer to “Vehicle Lifting Points”).

3) Remove brace bracket No.1 bolts (1) and brace bracket No.2 bolts (2), and then remove brace bracket (3) pulling it in arrow direction.



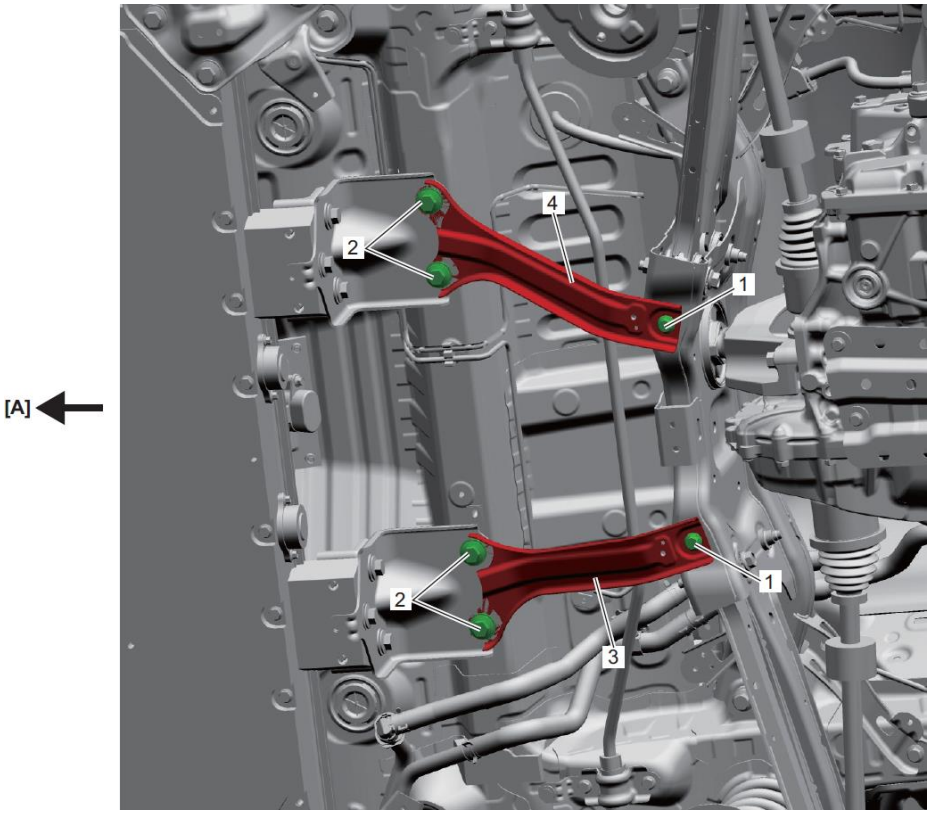
[A]; Vehicle forward

4) Remove floor under rear cover bolts (1) and clips (A), and then remove floor under rear right cover (2) and floor under rear left cover (3).



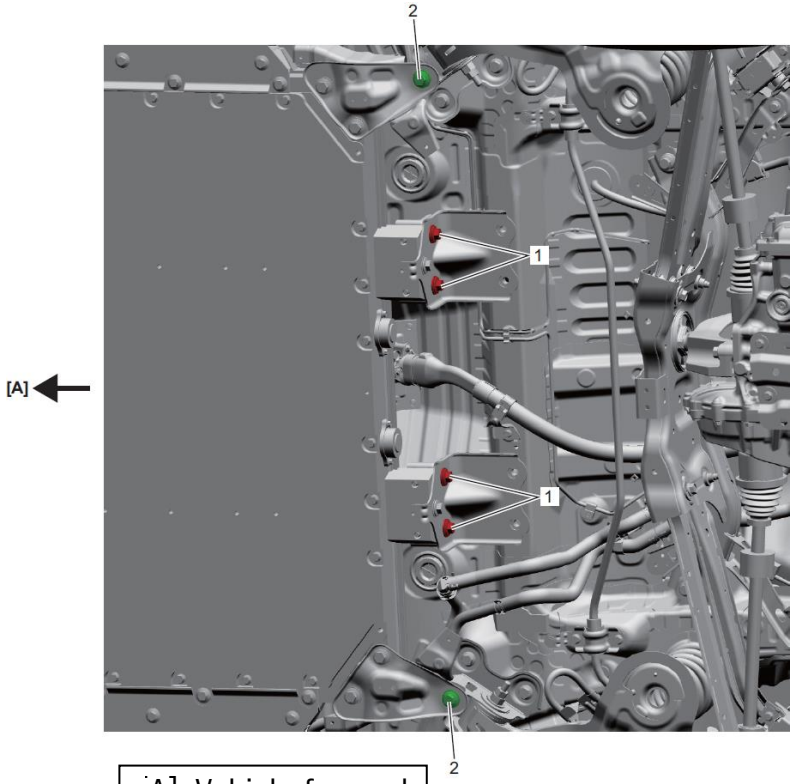
[A]; Vehicle forward

5) Remove rear brace bolts (1) and center No.1 bracket bolts (2), and then remove rear suspension frame right brace (3) and rear suspension frame left brace (4).



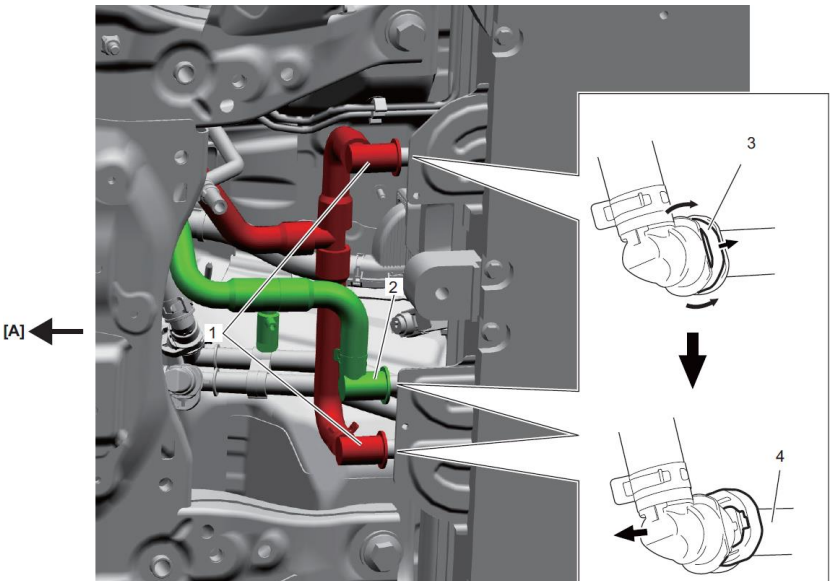
[A]; Vehicle forward

6) Remove center No.1 bracket bolts (1) and side bracket bolts (2) shown in figure.



[A]; Vehicle forward

7) Ensure that coolant has been removed prior to this operation.
If the coolant has not been removed, the following steps will cause a large amount of coolant to spill.
Disconnect battery cooling No.1 hose joints (1) and battery cooling No.2 hose joint (2) as follows.
   a) Spread locks (3) of each joint to left and right and pull them out.
   b) Disconnect hose joints from pipes (4) of traction battery.



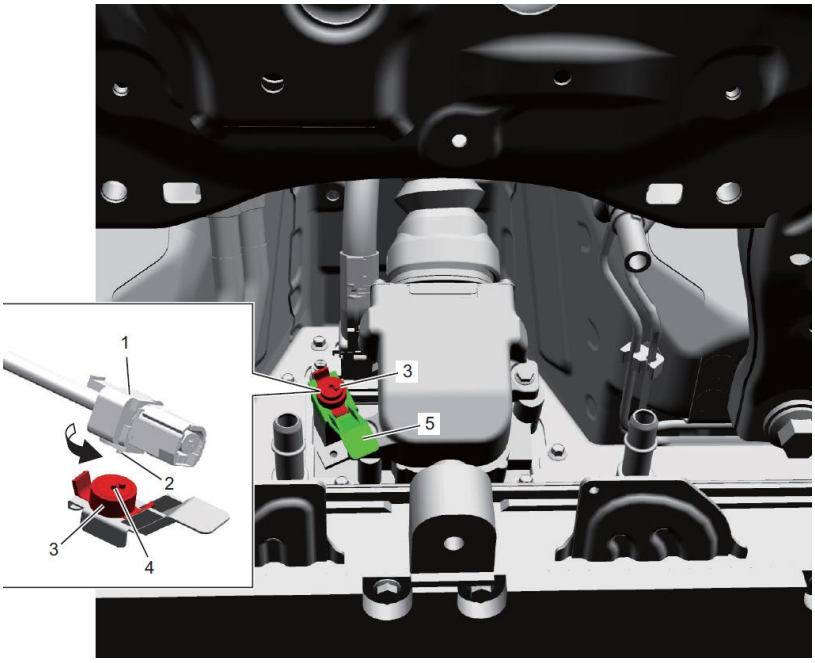
[A]; Vehicle forward

8) Using “Insulating Protective Equipment and Insulating Tools”, disconnect main HV cable connector as follows.

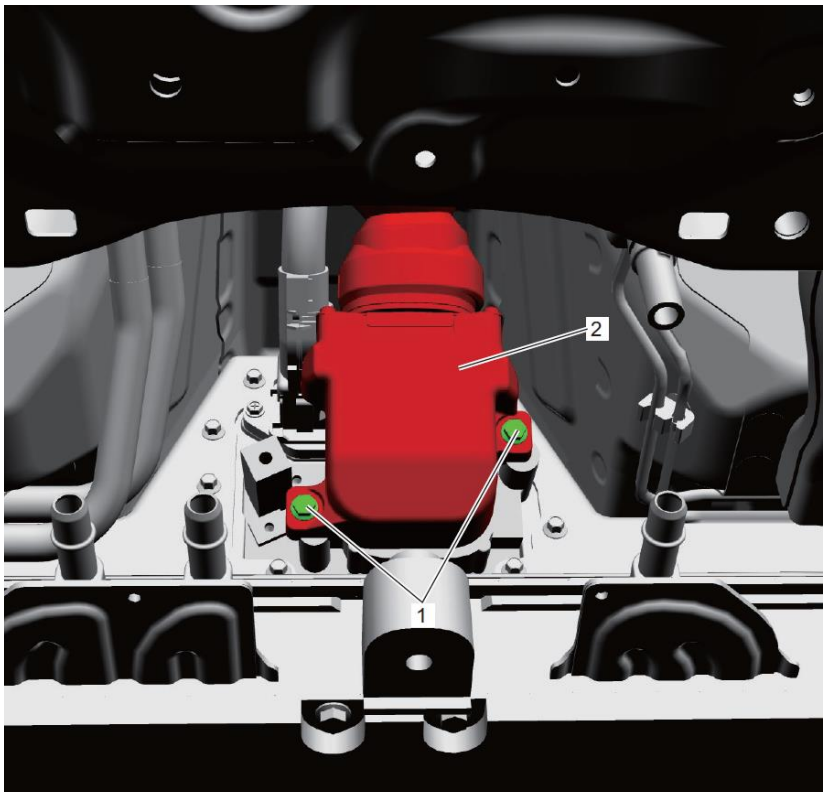
a) Insert protrusion (2) of service plug (1) into hole (4) of EV battery striker (3), and then unlock EV battery striker turning service plug counterclockwise.

b) Remove EV battery striker.

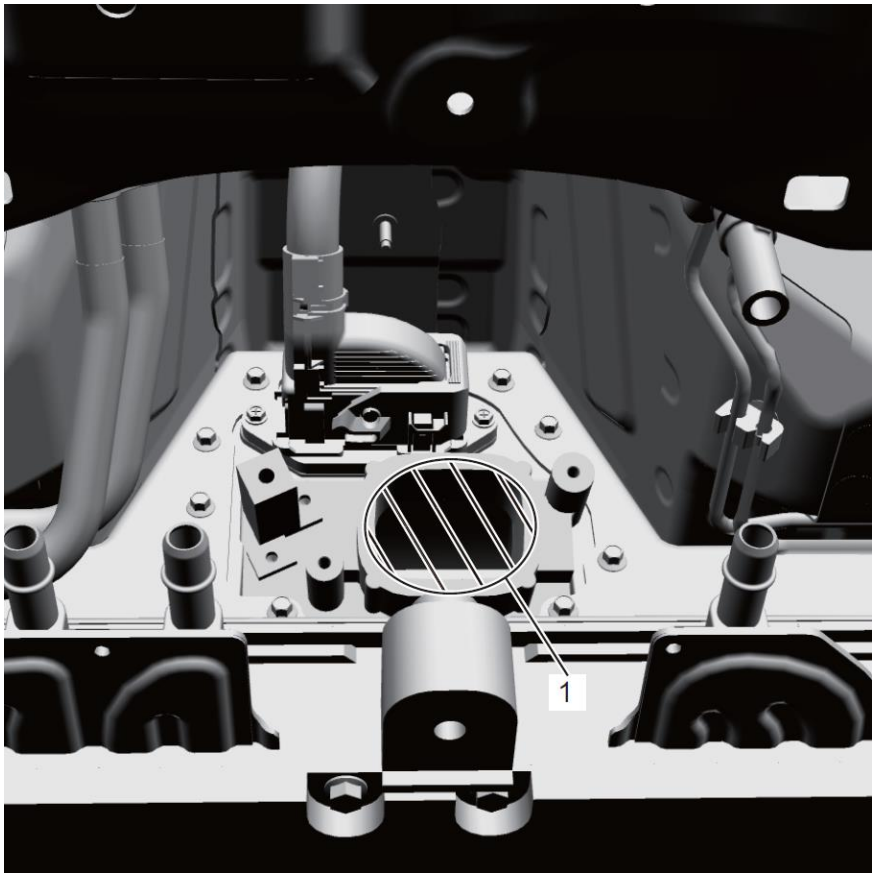
c) Remove striker bracket (5).



d) Remove main HV cable connector bolts (1), and then disconnect main HV cable connector (2).



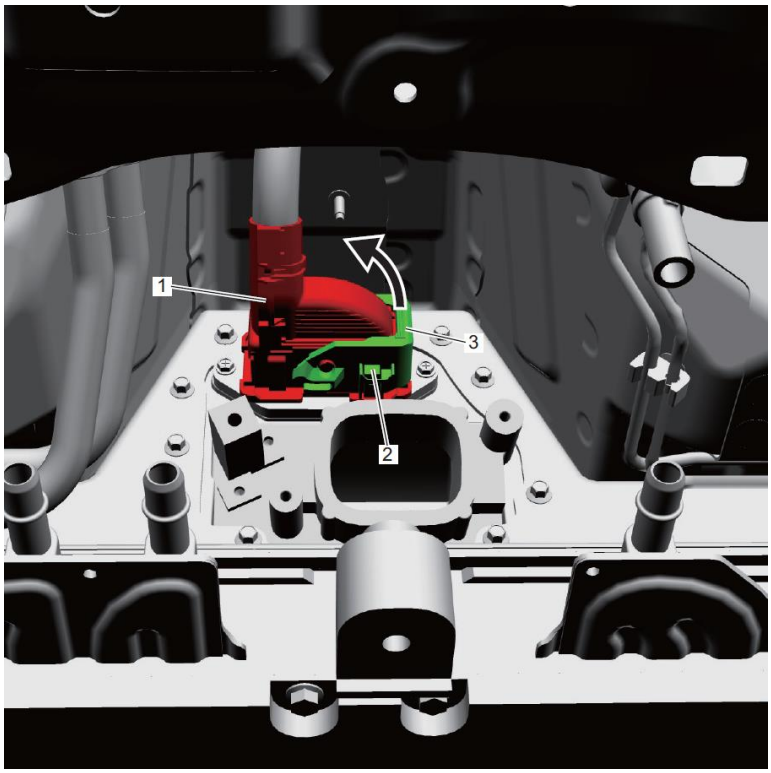
e) Protect main HV cable connector connection part (1) of traction battery with protective tape to prevent foreign object contamination.



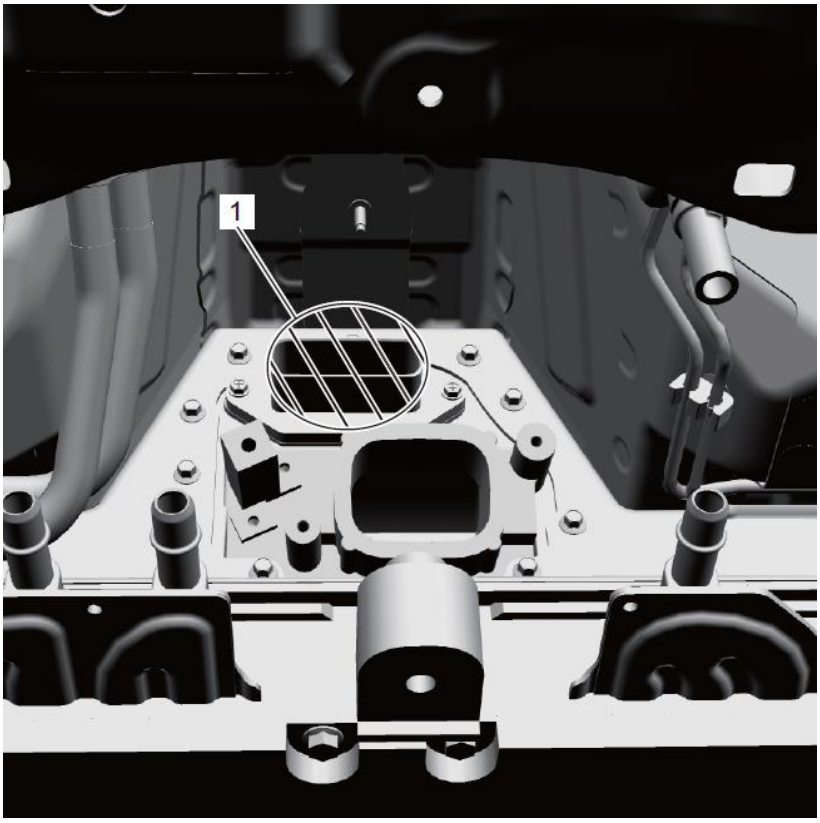
9) Disconnect traction battery connector as follows.

a) Push lock (2) of traction battery connector (1).

b) Turn lock lever (3) in arrow direction until it stops, and then disconnect traction battery connector.



c) Protect traction battery connector connection part (1) of traction battery with protective tape to prevent foreign object contamination.

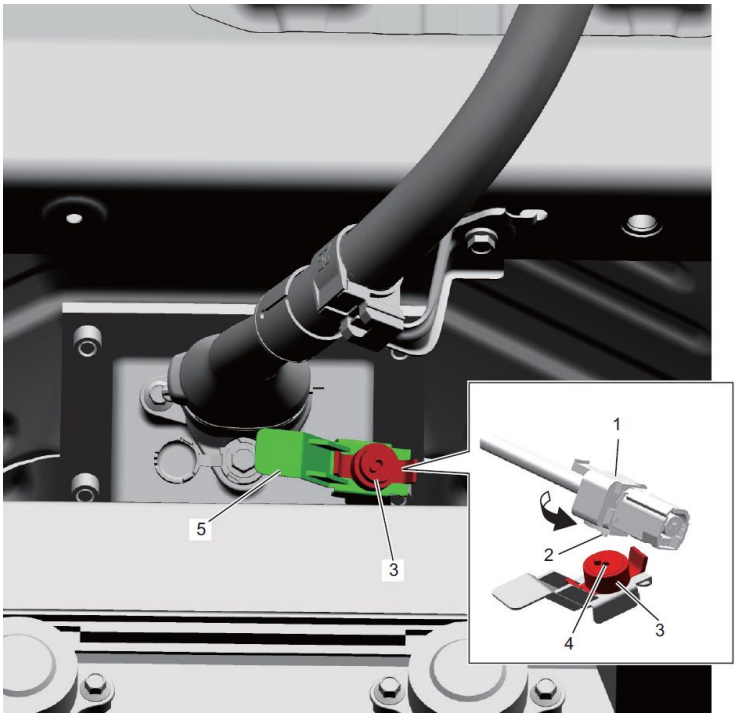


10) For 4WD model, using “Insulating Protective Equipment and Insulating Tools”, disconnect rear PCU HV cable connector as follows.

a) Insert protrusion (2) of service plug (1) into hole (4) of EV battery striker (3), and then unlock EV battery striker turning service plug counterclockwise.

b) Remove EV battery striker.

c) Remove striker bracket (5).



d) Disconnect rear PCU HV cable connector as follows.

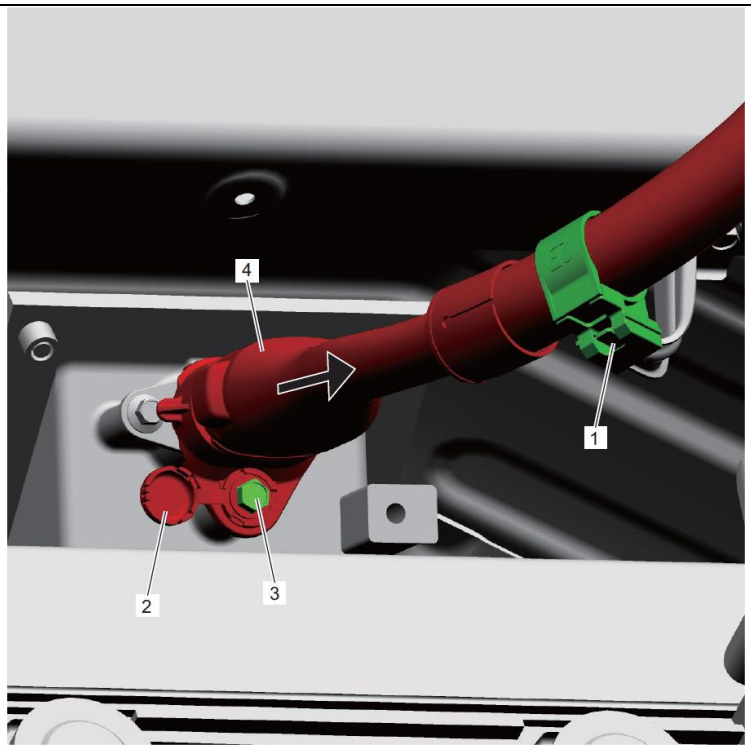
i. Disconnect rear PCU HV cable clamp (1).

ii. Open rear PCU HV cable connector bolt cap (2), and then loosen rear PCU HV cable connector bolt (3).

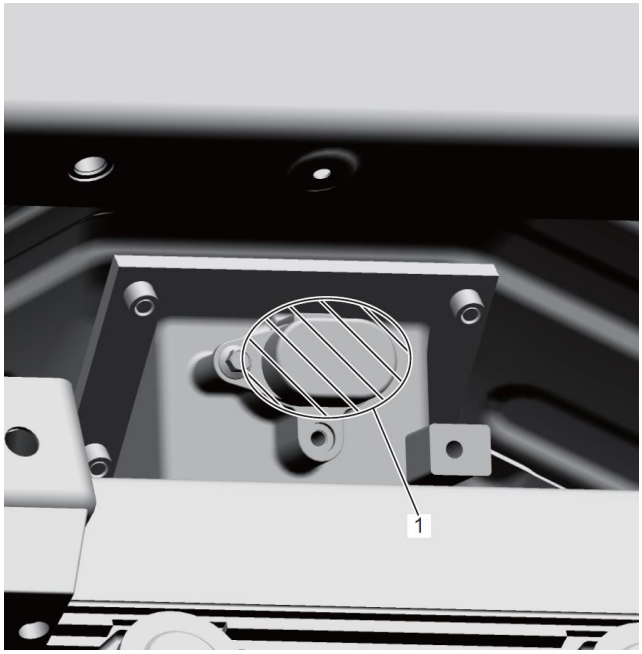
iii. Disconnect rear PCU HV cable connector (4) pulling it in arrow direction.

NOTE

If rear PCU HV cable connector cannot be disconnected, loosen rear PCU HV cable connector bolt until it can be disconnected referring to step i).



e) Protect rear PCU HV cable connector connection part (1) of traction battery with protective tape to prevent foreign object contamination.

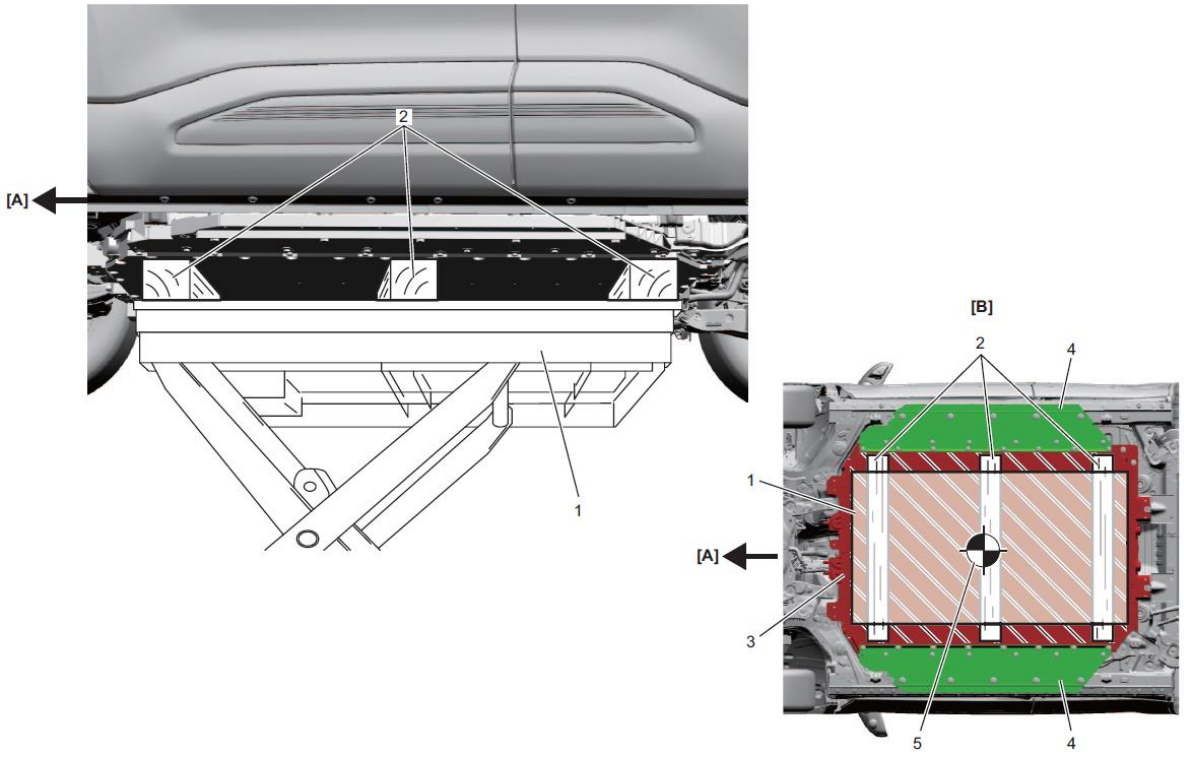


11) Remove traction battery as follows.

a) Set engine lifter (1) and three wooden blocks (2) as shown in figure to support traction battery (3).

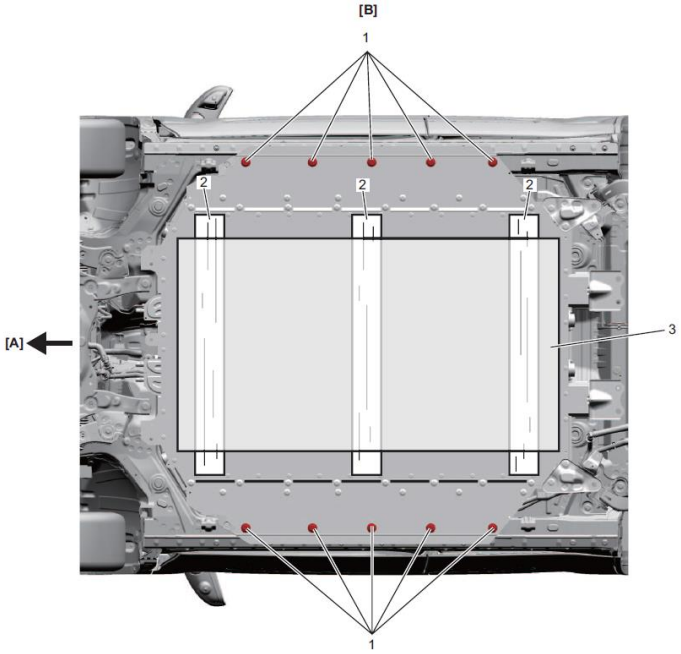
NOTE

Set wooden blocks in hatched area of traction battery shown in figure, ensuring they do not overlap left and right energy absorbers (4).



[A]: Vehicle forward	5. Traction battery center of gravity position(reference)
[B]: Vehicle bottom	

b) Remove energy absorber No.1 bolts.

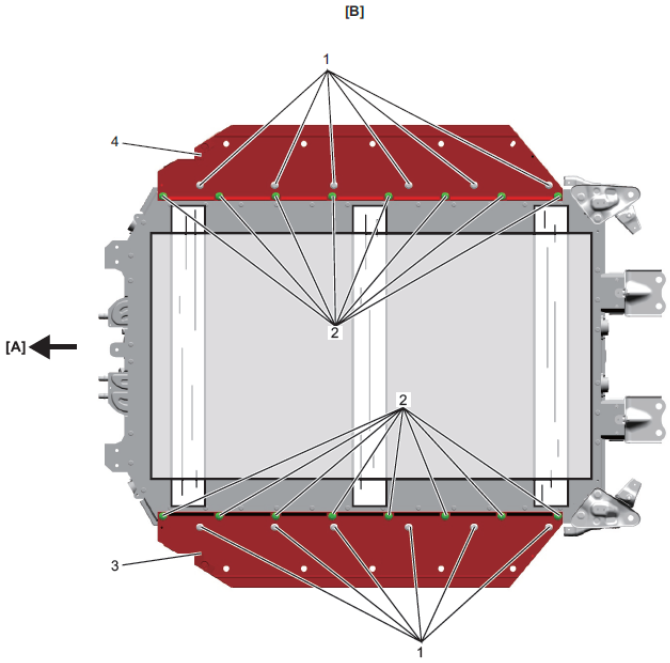


[A]: Vehicle forward	2. Wooden block
[B]: Vehicle bottom	3. Engine lifter

c) Slowly lower engine lifter and remove traction battery.

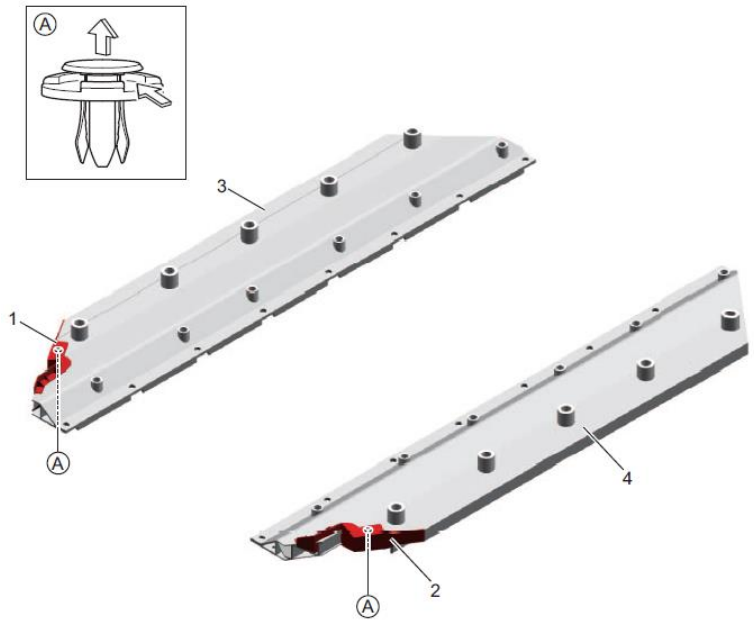
12) One person holds energy right absorber (3), while another person removes energy absorber No.2 bolts (1) and energy absorber No.3 bolts (2), and then removes energy right absorber.

13) Apply same manner to remove energy left absorber (4) as in Step 12).

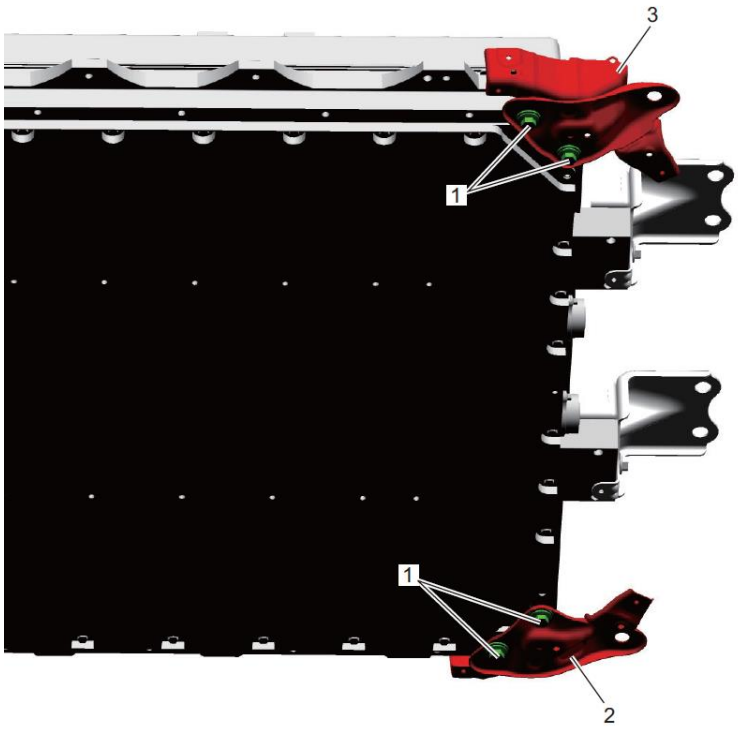


[A]: Traction battery forward	[B]: Traction battery bottom

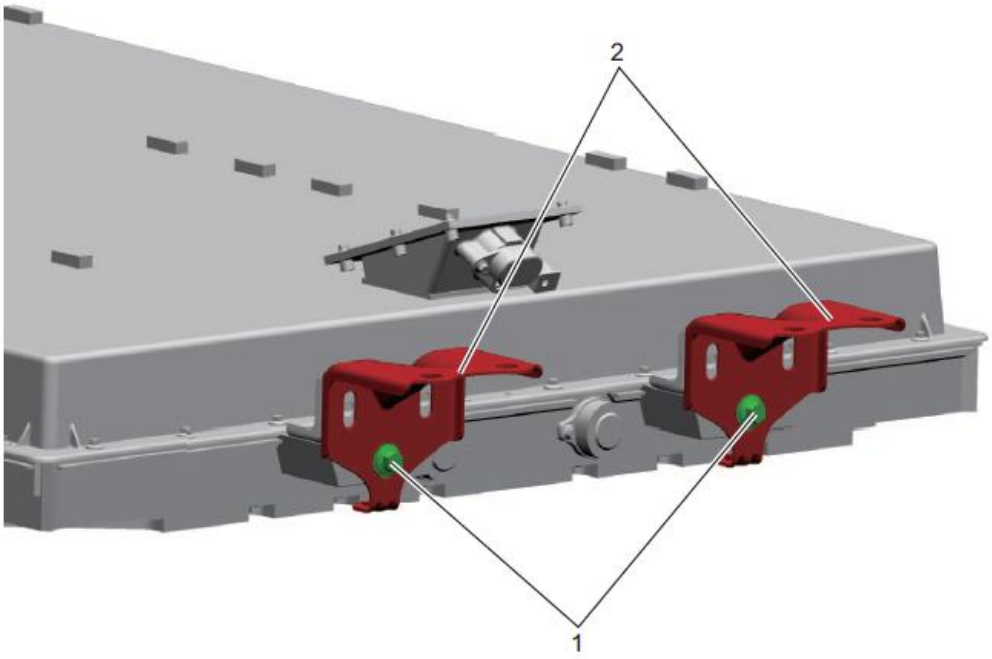
14) If necessary, remove clips (A), and then remove energy absorber right cover (1) and energy absorber left cover (2) from energy right absorber (3) and energy left absorber (4).



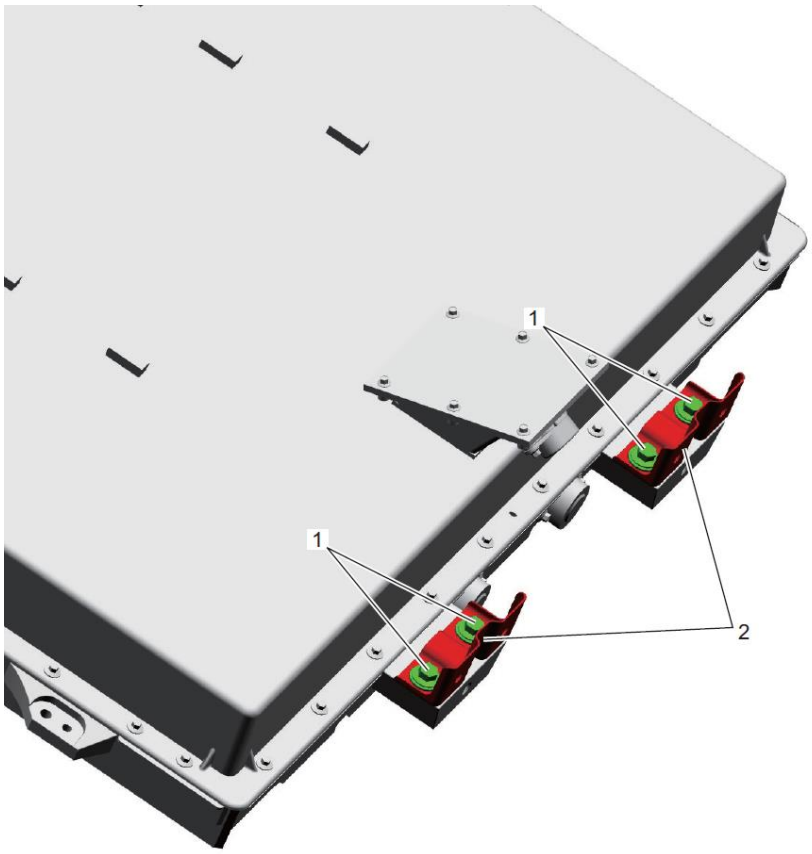
15) Remove side bracket bolts (1), and then remove side bracket (2) and side left bracket(3).



16) Remove center No.1 bracket bolts (1), and then remove center No.1 brackets (2).



17) Remove center No.2 bracket bolts (1), and then remove center No.2 brackets (2).



18) Lower traction battery from engine lifter as follows.

- When using a forklift, etc.:
  a) Set forklift claws (1) between wooden blocks (2) as shown in figure, and lower traction battery (3) from engine lifter.
- Store removed traction battery (3) on wooden blocks (2) or similar.