

# HOW TO USE THIS MANUAL

IN00U-36

## GENERAL INFORMATION

### 1. INDEX

An INDEX is provided on the first page of each section to guide you to the item to be repaired. To assist you in finding your way through the manual, the section title and major heading are given at the top of every page.

### 2. PRECAUTION

At the beginning of each section, a PRECAUTION is given that pertains to all repair operations contained in that section.

Read these precautions before starting any repair task.

### 3. TROUBLESHOOTING

TROUBLESHOOTING tables are included for each system to help you diagnose the problem and find the cause. The fundamentals of how to proceed with troubleshooting are described on page IN-30.

Be sure to read this before performing troubleshooting.

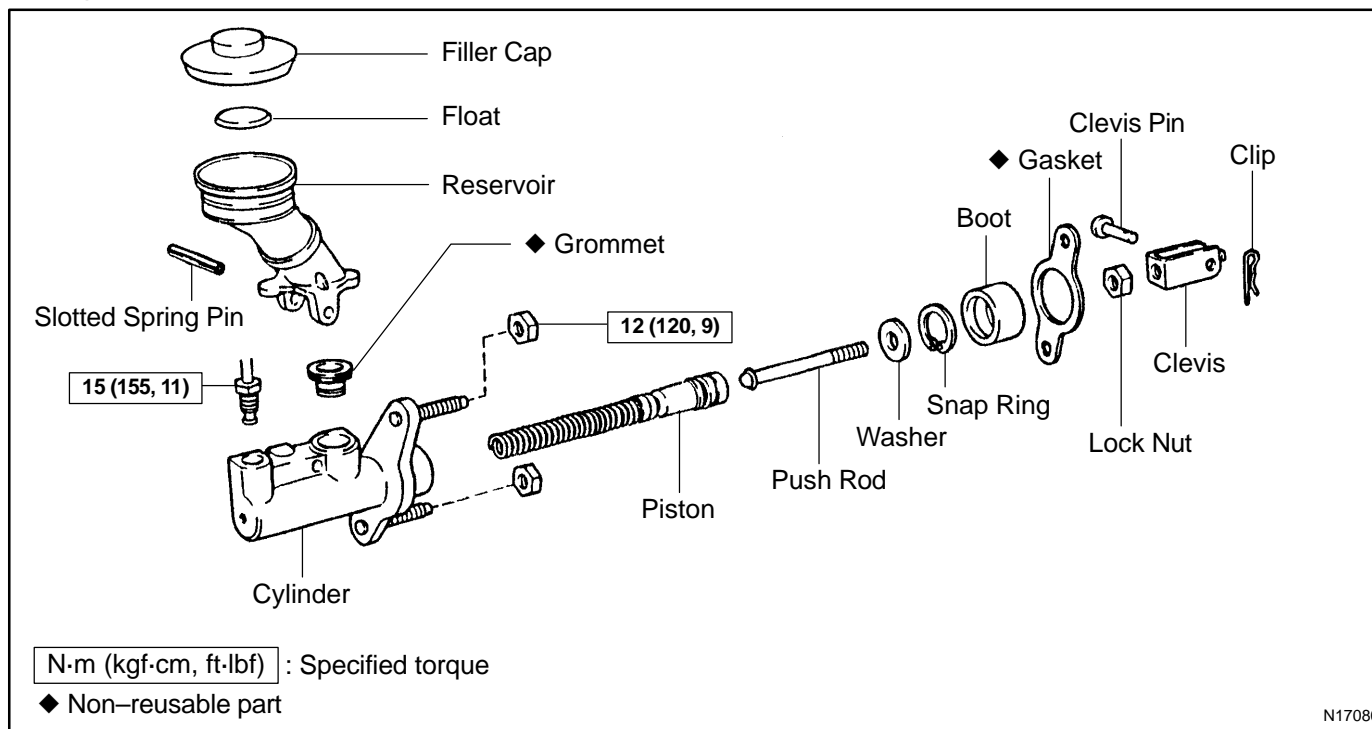
### 4. PREPARATION

Preparation lists the SST (Special Service Tools), recommended tools, equipment, lubricant and SSM (Special Service Materials) which should be prepared before beginning the operation and explains the purpose of each one.

### 5. REPAIR PROCEDURES

Most repair operations begin with an overview illustration. It identifies the components and shows how the parts fit together.

Example:



The procedures are presented in a step-by-step format:

- The illustration shows what to do and where to do it.
- The task heading tells what to do.
- The detailed text tells how to perform the task and gives other information such as specifications and warnings.

Example:

*Illustration:  
what to do and where*

*Task heading : what to do*

**21. CHECK PISTON STROKE OF OVERDRIVE BRAKE**

(a) Place SST and a dial indicator onto the overdrive brake piston as shown in the illustration.

**SST 09350-30020 (09350-06120)**

*Set part No.*

*Component part No.*

*Detailed text : how to do task*

(b) Measure the stroke applying and releasing the compressed air (392 — 785 kPa, 4 — 8 kgf/cm<sup>2</sup> or 57 — 114 psi) as shown in the illustration.

**Piston stroke: 1.40 — 1.70 mm (0.0551 — 0.0669 in.)**

*Specification*

This format provides the experienced technician with a FAST TRACK to the information needed. The upper case task heading can be read at a glance when necessary, and the text below it provides detailed information. Important specifications and warnings always stand out in bold type.

## 6. REFERENCES

References have been kept to a minimum. However, when they are required you are given the page to refer to.

## 7. SPECIFICATIONS

Specifications are presented in bold type throughout the text where needed. You never have to leave the procedure to look up your specifications. They are also found in Service Specifications section for quick reference.

## 8. CAUTIONS, NOTICES, HINTS:

- CAUTIONS are presented in bold type, and indicate there is a possibility of injury to you or other people.
- NOTICES are also presented in bold type, and indicate the possibility of damage to the components being repaired.
- HINTS are separated from the text but do not appear in bold. They provide additional information to help you perform the repair efficiently.

## 9. SI UNIT

The UNITS given in this manual are primarily expressed according to the SI UNIT (International System of Unit), and alternately expressed in the metric system and in the English System.

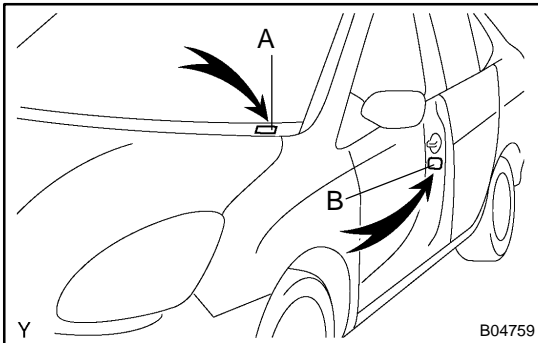
Example:

**Torque: 30 N·m (310 kgf·cm, 22 ft·lbf)**

# IDENTIFICATION INFORMATION

## VEHICLE IDENTIFICATION AND ENGINE AND MOTOR SERIAL NUMBER

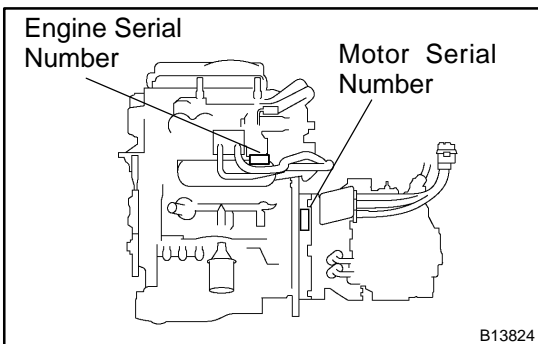
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### 1. VEHICLE IDENTIFICATION NUMBER

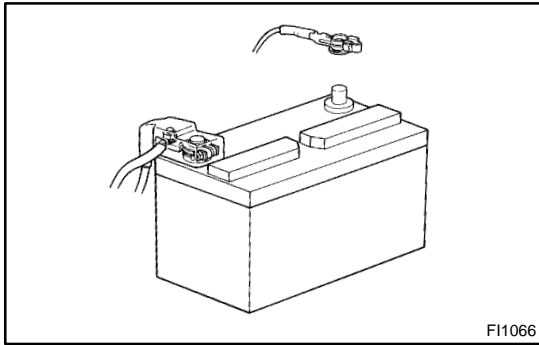
The vehicle identification number is stamped on the vehicle identification number plate and the certification label, as shown in the illustration.

- A: Vehicle Identification Number Plate
- B: Certification Label



### 2. ENGINE AND MOTOR SERIAL NUMBER

- (a) The engine serial number is stamped on the engine block, as shown in the illustration.
- (b) The motor serial numbers is stamped, as shown in the illustration.



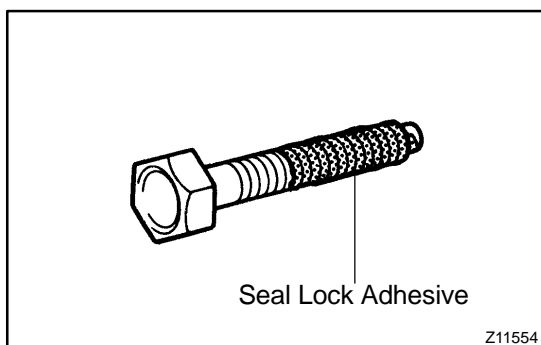
## REPAIR INSTRUCTIONS

### GENERAL INFORMATION

INOCO-17

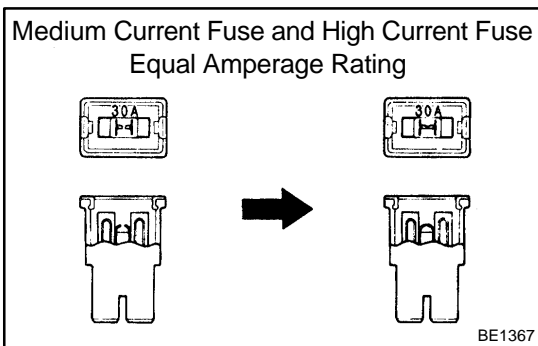
#### BASIC REPAIR HINT

- (a) Use fender, seat and floor covers to keep the vehicle clean and prevent damage.
- (b) During disassembly, keep parts in the appropriate order to facilitate reassembly.
- (c) Installation and removal of battery terminal:
  - (1) Before performing electrical work, disconnect the negative (–) terminal cable from the battery.
  - (2) If it is necessary to disconnect the battery for inspection or repair, first disconnect the negative (–) terminal cable.
  - (3) When disconnecting the terminal cable, to prevent damage to battery terminal, loosen the cable nut and raise the cable straight up without twisting or prying it.
  - (4) Clean the battery terminals and cable ends with a clean shop rag. Do not scrape them with a file or other abrasive objects.
  - (5) Install the cable ends to the battery terminals after loosening the nut, and tighten the nut after installation. Do not use a hammer to tap the cable ends onto the terminals.
  - (6) Be sure the cover for the positive (+) terminal is properly in place.
- (d) Check hose and wiring connectors to make sure that they are connected securely and correctly.
- (e) Non-reusable parts
  - (1) Always replace cotter pins, gaskets, O-rings, oil seals, etc. with new ones.
  - (2) Non-reusable parts are indicated in the component illustrations by the "◆" symbol.



- (f) Precoated parts  
Precoated parts are bolts, nuts, etc. that are coated with a seal lock adhesive at the factory.
  - (1) If a precoated part is retightened, loosened or caused to move in any way, it must be recoated with the specified adhesive.
  - (2) When reusing precoated parts, clean off the old adhesive and dry with compressed air. Then apply the specified seal lock adhesive to the bolt, nut or threads.

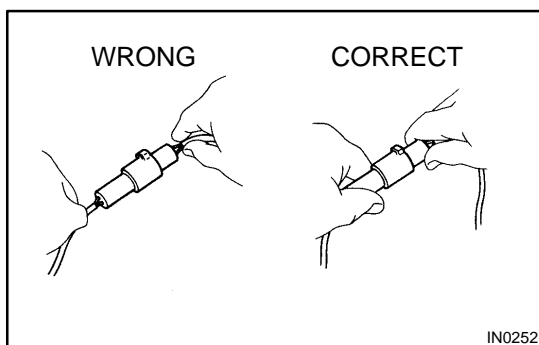
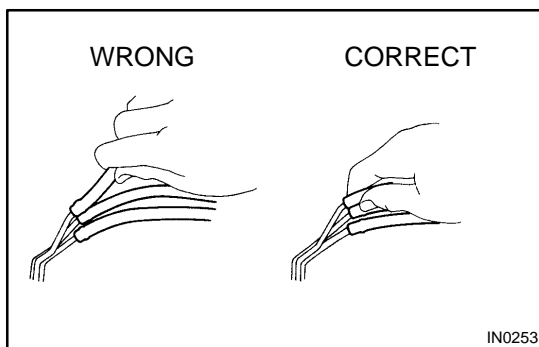
- (3) Precoated parts are indicated in the component illustrations by the "★" symbol.
- (g) When necessary, use a sealer on gaskets to prevent leaks.
- (h) Carefully observe all specifications for bolt tightening torques. Always use a torque wrench.
- (i) Use of special service tools (SST) and special service materials (SSM) may be required, depending on the nature of the repair. Be sure to use SST and SSM where specified and follow the proper work procedure. A list of SST and SSM can be found in Preparation section in this manual.



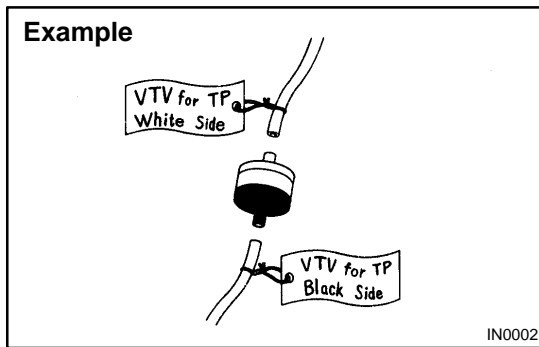
- (j) When replacing fuses, be sure the new fuse has the correct amperage rating. DO NOT exceed the rating or use one with a lower rating.

Illustration	Symbol	Part Name	Abbreviation
<p>BE5594</p>	<p>IN0365</p>	FUSE	FUSE
<p>BE5595</p>	<p>IN0366</p>	MEDIUM CURRENT FUSE	M-FUSE
<p>BE5596</p>	<p>IN0367</p>	HIGH CURRENT FUSE	H-FUSE
<p>BE5597</p>	<p>IN0367</p>	FUSIBLE LINK	FL
<p>BE5598</p>	<p>IN0368</p>	CIRCUIT BREAKER	CB

- (k) Care must be taken when jacking up and supporting the vehicle. Be sure to lift and support the vehicle at the proper locations (See page IN-8).
- Cancel the parking brake on the pedal place and shift the transmission in N position.
  - When jacking up the front wheels of the vehicle at first place stoppers behind the rear wheels.
  - When jacking up the rear wheels of the vehicle at first place stoppers before the front wheels.
  - When either the front or rear wheels only should be jacked up, set rigid racks and place stoppers in front and behind the other wheels on the ground.
  - After the vehicle is jacked up, be sure to support it on rigid racks . It is extremely dangerous to do any work on a vehicle raised on a jack alone, even for a small job that can be finished quickly.
- (l) Observe the following precautions to avoid damage to the following parts:
- (1) Do not open the cover or case of the ECU unless absolutely necessary. (If the IC terminals are touched, the IC may be destroyed by static electricity.)

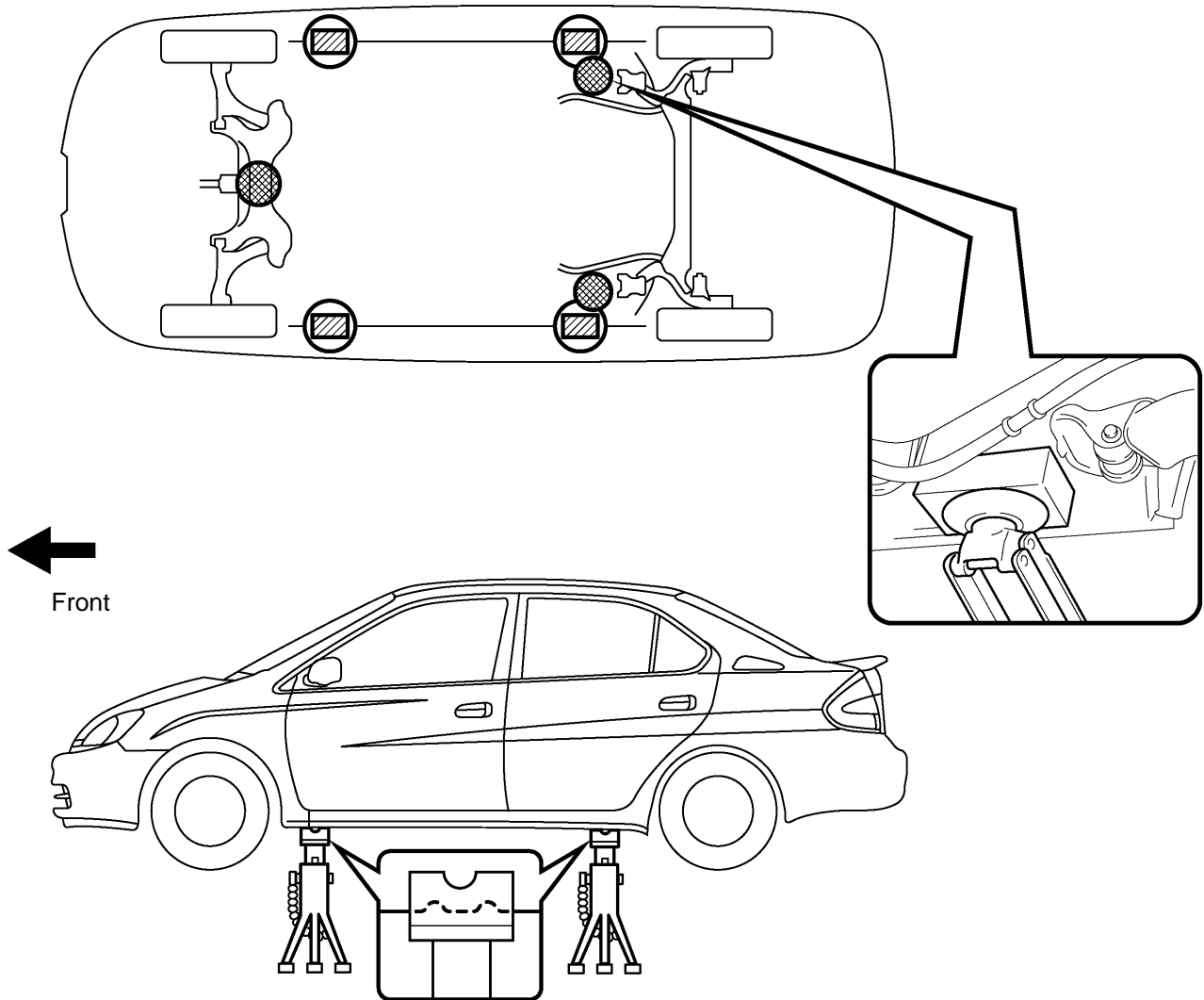


- (2) To disconnect vacuum hoses, pull off the end, not the middle of the hose.
- (3) To pull apart electrical connectors, pull on the connector itself, not the wires.
- (4) Be careful not to drop electrical components, such as sensors or relays. If they are dropped on a hard floor, they should be replaced and not reused.
- (5) When steam cleaning an engine, protect the electronic components, air filter and emission-related components from water.
- (6) Never use an impact wrench to remove or install temperature switches or temperature sensors.
- (7) When checking continuity at the wire connector, insert the tester probe carefully to prevent terminals from bending.
- (8) When using a vacuum gauge, never force the hose onto a connector that is too large. Use a step-down adapter for adjustment. Once the hose has been stretched, it may leak air.



- (m) Installation and removal of vacuum hose:
- (1) When disconnecting vacuum hoses, use tags to identify how they should be reconnected to.
  - (2) After completing a job, double check that the vacuum hoses are properly connected. A label under the hood shows the proper layout.
- (n) Bleeding of hydraulic brake booster system:  
When repairing the hydraulic brake booster or ABS, bleeding the air out of the hydraulic brake booster (See page [BR-4](#)).
- (o) Unless otherwise stated, all resistance is measured at an ambient temperature of 20°C (68°F). Because the resistance may be outside specifications if measured at high temperatures immediately after the vehicle has been running, measurement should be made when the engine has cooled down.

# VEHICLE LIFT AND SUPPORT LOCATIONS



←  
Front

**JACK POSITION** \_\_\_\_\_ ●

- Front..... Front cross member
- Rear..... Body (Position shown in the illustration)

**CAUTION :**

- When jacking-up the front and rear, make sure the vehicle is not carrying any extra weight.
- Do not position the jack at the center of the rear axle beam.

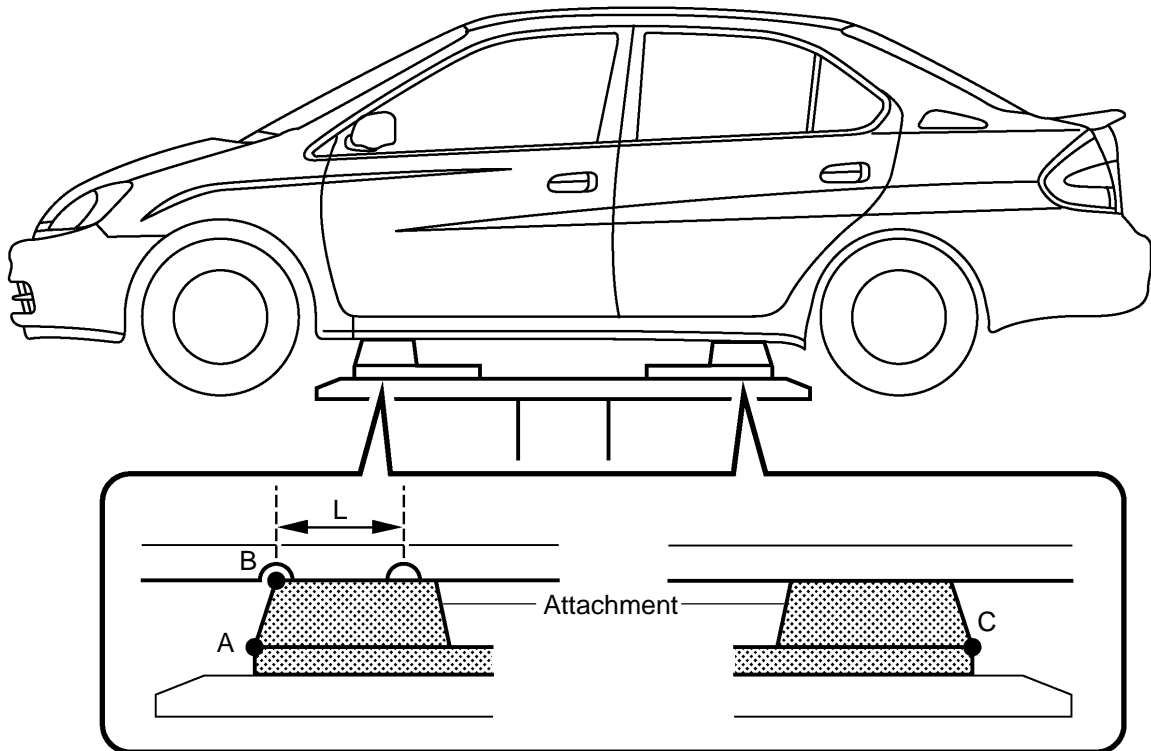
**PANTOGRAPH JACK POSITION** \_\_\_\_\_ ○

**SUPPORT POSITION**

- Safety stand and swing arm type lift..... ▣



**PLATE TYPE LIFT**



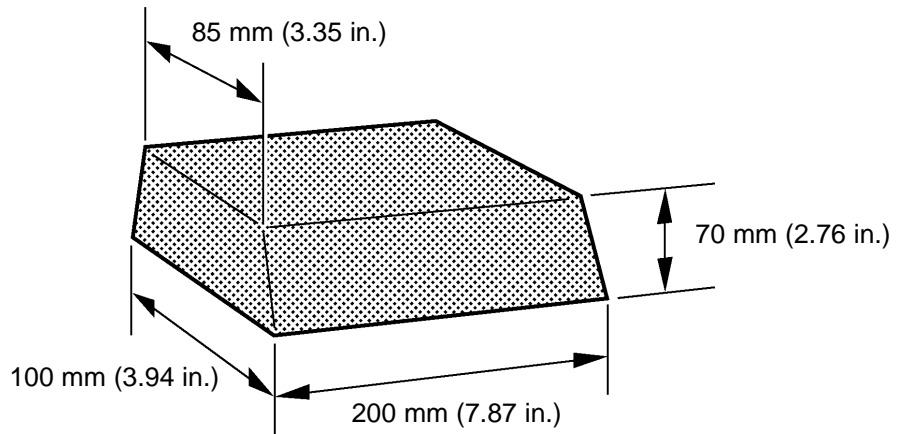
**HINT :**

Left and right set position  
 Front and rear set position

Place the vehicle over the center of the lift.

- Align the cushion gum ends of the plate with the attachment lower ends (A, C).
- Align the attachment upper end (B) with the front jack supporting point (L).

Attachment dimensions



N

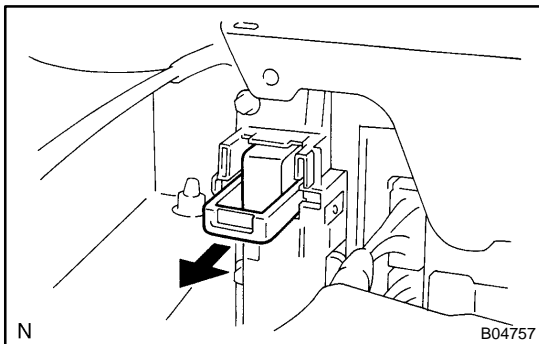
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## FOR ALL OF VEHICLES PRECAUTION

INHO-01

### 1. PRECAUTIONS FOR HIGH-VOLTAGE CIRCUIT INSPECTION AND SERVICE

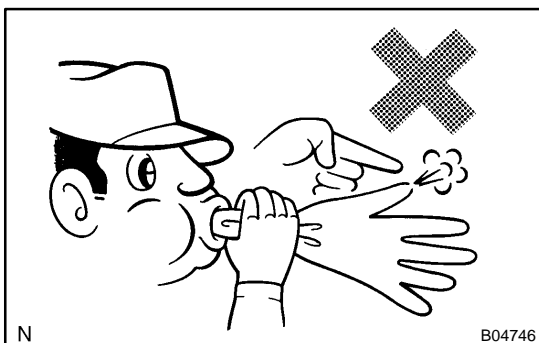
- (a) Engineers to be engaged in inspection and servicing related to high-voltage systems should undergo special training.
- (b) All the high-voltage wire harness connectors are colored orange: the HV battery and other high-voltage components are identified by the "High Voltage" caution labels. Do not carelessly touch these wires and components.



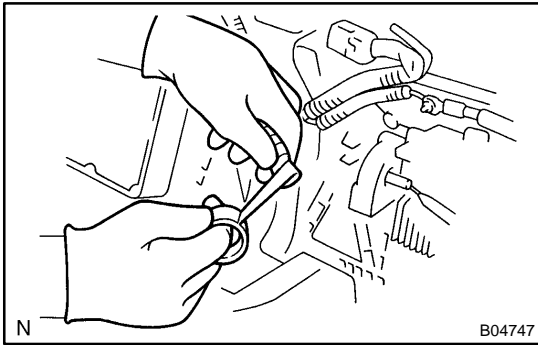
- (c) Before inspecting or servicing the high-voltage system, be sure to take measures such as wearing insulated gloves and removing the service plug to prevent electrocution. Carry the removed service plug in your pocket to prevent other technicians from reinstalling it while you are servicing the vehicle.
- (d) After removing the service plug, wait 5 minutes before touching any of the high-voltage connectors and terminals.

#### HINT:

The 5 minutes are required to discharge the high-voltage condenser inside the inverter.



- (e) Before wearing insulated gloves, make sure that they are not cracked, ruptured, torn, or damaged in any other way. Do not wear wet insulated gloves.
- (f) When servicing the vehicle, do not wear a metal object like a mechanical pencil or scale that may drop accidentally and cause a short circuit.
- (g) Before touching a bare high-voltage terminal, wear insulated gloves and ensure that the terminal is not charged with electricity (approx. 0 V) using an electrical tester.



- (h) After disconnecting or exposing a high-voltage connector or terminal, insulate it immediately using insulation tape.
- (i) The screw of a high-voltage terminal should be tightened firmly to the specified torque. Both insufficient and excessive tightening torque can cause failure.
- (j) Call other engineers' attention to the vehicle which high-voltage system is being inspected or repaired by hanging a "High Voltage Operation in Progress. Do Not Touch" sign (See the next page).
- (k) After servicing the high-voltage system and before reinstalling the service plug, check again that you have not left a part or tool inside, that the high-voltage terminal screws are firmly tightened, and that the connectors are correctly engaged.

Person in charge: \_\_\_\_\_

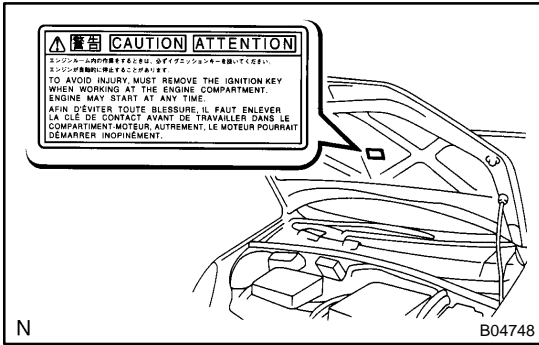
**CAUTION:  
HIGH VOLTAGE. DO  
NOT TOUCH DURING  
OPERATION.**

**CAUTION:  
HIGH VOLTAGE. DO  
NOT TOUCH DURING  
OPERATION.**

Person in charge: \_\_\_\_\_

**Copy this page and put it after folding on the roof of the vehicle in service.**

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**2. PRECAUTIONS TO BE OBSERVED WHEN INSPECTING OR SERVICING ENGINE COMPARTMENT**

The PRIUS, automatically turns the engine ON and OFF when the ignition switch is set to the ON position provided that the READY light on the instrument panel is lit. Before inspecting or servicing the engine compartment, therefore, remove the ignition switch key.

**3. ACTIONS TO BE TAKEN WHEN BATTERIES ARE DEPLETED**

(a) Actions to be taken when the auxiliary battery is depleted  
HINT:

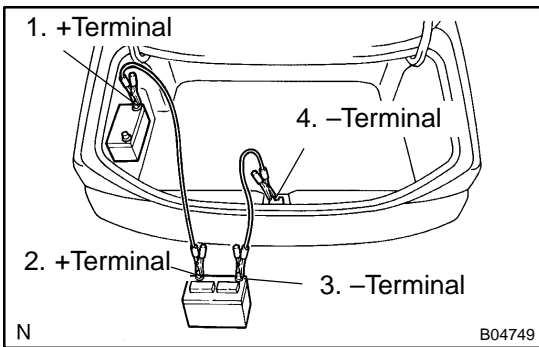
The following phenomena indicate that the auxiliary battery is depleted:

- No display appears on the instrument panel when you turn the ignition switch to the ON position.
- The hybrid system does not start.
- The headlights are dark.
- The sound from the horn is weak.

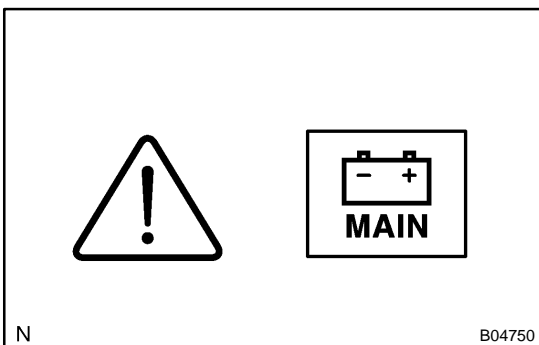
**NOTICE:**

**Never use a quick charger.**

- (1) Move the shift lever to the P position, and engage the parking brake.
- (2) Remove the ignition key plate from the ignition switch.



- (3) Using a booster cable, connect the 12 V battery of the rescue vehicle and auxiliary battery of the stalled vehicle, as shown in the illustration.
- (4) Start the engine of the rescue vehicle and run the engine at a speed slightly higher than the idling speed for 5 minutes to charge the auxiliary battery of the stalled vehicle.
- (5) Turn the ignition switch of the stalled vehicle to the START position to start the hybrid system.



If the hybrid system fails to start and the master and HV battery warning lights come on, the HV battery may have been discharged.

- (6) Disconnect the booster cable in the reverse way of the connection procedure.

**NOTICE:**

**If the auxiliary battery needs to be replaced, replace it only with a 12 V battery specially designed for the use of the PRIUS.**

(b) Actions to be taken when HV battery is depleted

**NOTICE:**

**Leaving a vehicle alone for 2 – 3 months may cause electric discharge from HV battery.**

**When this happens, replace the HV battery.**

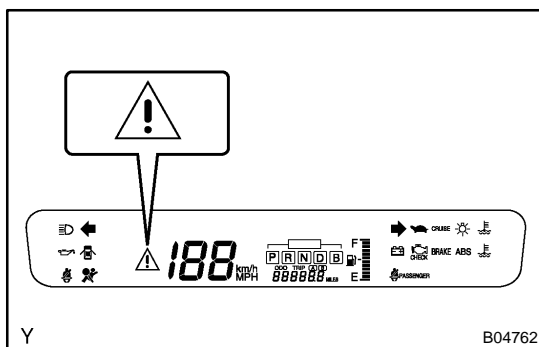
#### 4. INSPECTION MODE

**HINT:**

- The PRIUS automatically stops the engine while the vehicle is stopped with the engine warmed up and battery well charged if the A/C compressor operation is not required. Therefore, even if the vehicle stops for any reason such as a check of ignition timing, the inspection mode should be activated when continuous operation of the engine is required.
- The PRIUS has a skid control as traction control function. When the wheel speed of the front wheels exceeds that of the rear wheels, this function restrains the wheel speed of the front wheels. It is necessary to activate the inspection mode and reset the skid control when turning only the front wheels using a speedometer tester.

Activation inspection mode (Without using a hand-held tester)

- (1) Perform the following (2) through (6) within 60 sec.
- (2) Turn the ignition switch ON from OFF.
- (3) With the shift lever in P position, fully depress the accelerator pedal 2 times.
- (4) With the shift lever in N position, fully depress the accelerator pedal 2 times.
- (5) With the shift lever in P position, fully depress the accelerator pedal 2 times.
- (6) Activate the inspecting mode and check that the hybrid system error warning light on the multi-center display flashes.
- (7) Turning the ignition switch to START starts the engine's continuous operation.



**NOTICE:**

- **The idling speed in the inspection mode is approx. 1,000 rpm. The number of revolutions will increase up to 1,500 rpm if the accelerator pedal is depressed to a degree of less than 60%, and up to 2,250 rpm in a case of 60% or more.**
- **If a diagnosis code is recorded when entering the inspection mode, the master warning light and the error warning light on the multi-center display is lit.**

- **When the master warning light is lit during operation in the inspection mode, deactivate the inspection mode and inspect the diagnosed area.**

**HINT:**

When continuous operation of the engine is required for such as an exhaust leakage inspection, it is advisable as an easier way to turn ON the FULL switch of the air conditioner.

**5. SPECIAL NOTES FOR VEHICLE INSPECTION**

(a) Vehicle conditions

- (1) Before activating the service mode, turn the air conditioner off, start the engine with the shift lever at P position, and check that the engine stops within several seconds after starting. (Engine warm up check)
- (2) Activate the service mode and inspect the vehicle. The shift position for each test is as follows:

Test item	Shift lever position
1. Vehicle straight traveling test (side slip inspection)	D
2. Braking force test	N
3. Speedometer test	D
4. Exhaust gas test (idling)	P
5. Headlight test	P

- (3) Reset the service mode immediately after completion of inspection.

**NOTICE:**

**Traveling on a road without resetting the service mode may damage the transaxle.**

(b) Special notes for speedometer test

**NOTICE:**

**Rapid starting or quick acceleration/deceleration based on the speedometer tester without load setting may damage the transaxle.**

- (1) Depress the accelerator pedal slowly and gradually accelerate at the time of measurement.
- (2) After the measurement, use the brake to decelerate gradually and stop.

(c) Special note for using the chassis dynamometer

Always set an appropriate load before starting the test.

**NOTICE:**

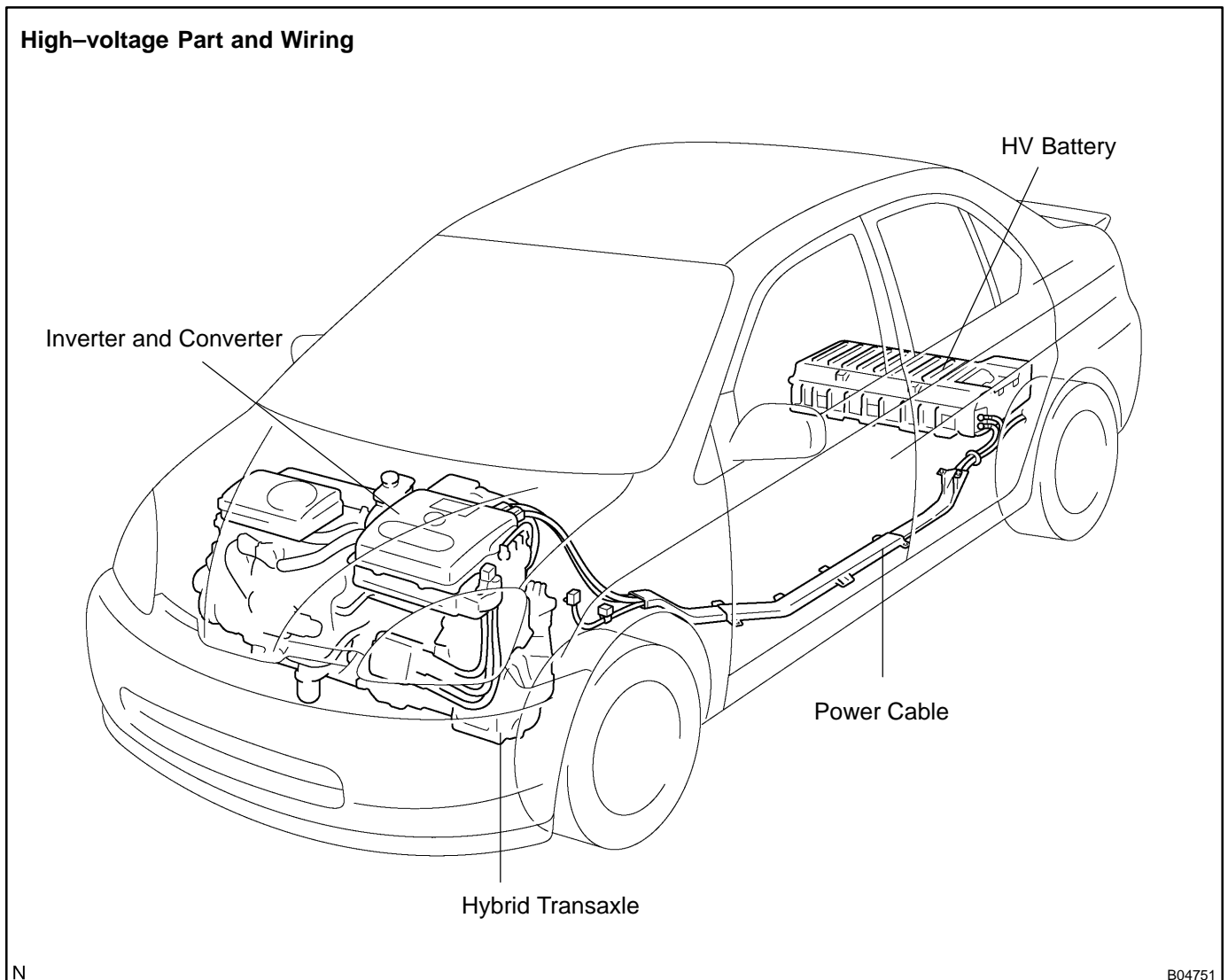
**Rapid starting or quick acceleration/deceleration with insufficient load may damage the transaxle.**

**6. ACTIONS TO BE TAKEN FOR VEHICLE DAMAGED BY IMPACT**

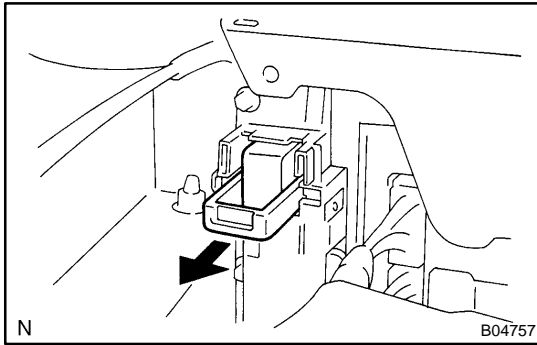
- (a) Items to be prepared (For operation at the site of accident)
- Protective clothing (Insulated gloves, rubber gloves, goggles, and safety shoes)
  - Saturated boric acid solution 20 L (Procure 800 g of boric acid powder, put it into a container, and dissolve it in water.)
  - Red litmus paper
  - ABC fire extinguisher (Applicable to both oil flames and electrical flames)
  - Waste rags or old towels (For wiping off the electrolyte)
  - Vinyl tape (For insulating cable)
  - Electrical tester
- (b) Actions to be taken at the place of accident
- (1) Wear insulated or rubber gloves, goggles and safety shoes.
  - (2) Do not touch a bare cable that could be a high-voltage cable. If you need to touch it, or if you have a danger of making an accidental contact, wear insulated gloves, measure the voltage between the cable and body ground using an electrical tester, and insulate the cable using vinyl tape.
  - (3) If the vehicle catches fire, use a ABC fire extinguisher to extinguish the fire. Trying to extinguish the fire using only a small amount of water can be more dangerous than effective: either use a greater amount of water from a fire hydrant or wait for the fire fighters.
  - (4) If the vehicle is partially submerged in water, do not touch the service plug or any of the high-voltage components and cables because of the danger of electrocution. If you need to touch them, do so only after pulling the vehicle completely out of water.
  - (5) Check the HV battery and nearby area for any leakage of the electrolyte. Do not touch any leaking liquid because it could be the highly alkaline electrolyte. If you need to wipe it off (using rags etc.), do so only after completing the following procedure: wear the rubber gloves and goggles, neutralize the electrolyte with saturated boric acid solution, and finally apply a red litmus paper to make sure that it does not turn blue.



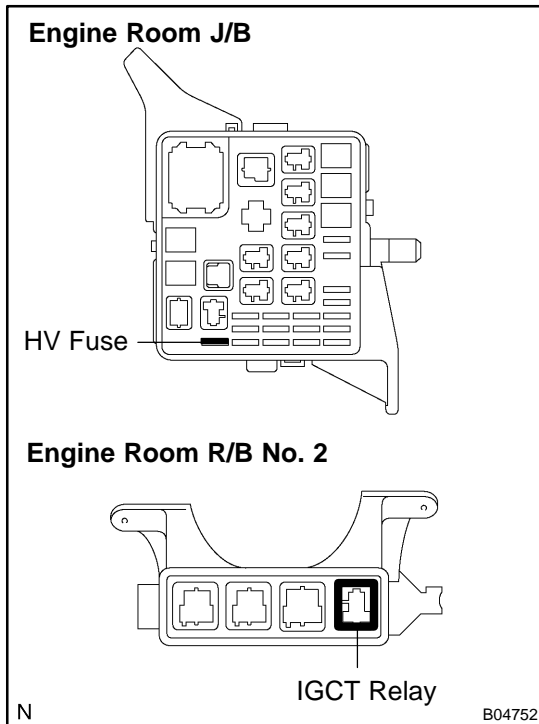
- (6) If a damage to any of the high-voltage components and cables is suspected, cut the high-voltage circuit using the procedure below.



- Move the shift lever to the P position and engage the parking brake.
- Remove the ignition key. Then disconnect the cable from the negative (–) terminal of the auxiliary battery.



- Remove the service plug with the insulated gloves on.



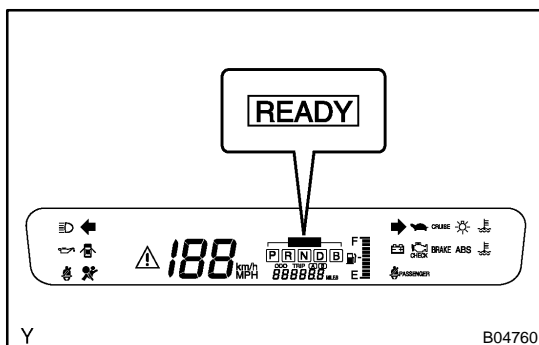
If the service plug cannot be removed due to damage to the rear portion of the vehicle, remove the HV fuse or IGCT relay instead.

(c) Moving the damaged vehicle

HINT:

If any of the following applies, tow the vehicle away using a tow truck lorry.

- One or more of the high-voltage components and cables is damaged.
- The driving, traction, or fuel system is damaged.



- The READY light is not lit when you turn ignition key to the ON position.

**NOTICE:**

- **Before towing the vehicle away using a break down lorry, disconnect the cable from the negative (-) terminal of the auxiliary battery and remove the service plug.**

**Only if none of the above applies and you see no problems that might affect the driving operation, you are allowed to drive the vehicle away from the place of accident.**

- **Perform the procedure below if the READY light goes off or you detect an abnormal noise, abnormal smell, or strong vibration while traveling:**
  - (1) Park the vehicle in a safe place.
  - (2) Move the shift lever to the P position and engage the parking brake.
  - (3) Disconnect the cable from the negative (-) terminal of the auxiliary battery.
  - (4) Remove the service plug with insulated gloves on.

(d) Actions required after moving the damaged vehicle  
If you see any liquid on the road surface, it could be the leakage of the highly alkaline electrolyte.

Wearing rubber gloves and goggles, apply a red litmus paper to the liquid. If the litmus paper turns blue, neutralize the liquid using the saturated boric acid solution and reapply a red litmus paper to make sure that it does not turn blue. Then wipe the liquid off from the road surface using waste rags, etc.

(e) Items to be prepared (When repairing damaged vehicles)

- Protective clothing (Insulated gloves, rubber gloves, goggles, and safety shoes)
- Saturated boric acid solution 20 L (Procure 800 g of boric acid powder, put it into a container, and dissolve it in water.)
- Red litmus paper
- Waste rags or old towels (For wiping off the electrolyte)
- Vinyl tape (For insulating cable)
- Electrical tester

(f) Precautions to be observed when servicing the damaged vehicle:

- (1) Wear insulated or rubber gloves, goggles, and safety shoes.
- (2) Do not touch a bare cable that could be a high-voltage cable. If you need to touch it, or if you have a danger of making an accidental contact, wear insulated gloves, measure the voltage between the cable and the body ground using an electrical tester, and insulate the cable using a vinyl tape.
- (3) Check the HV battery and nearby area for leakage. If you find any liquid, it could be the leakage of the highly alkaline electrolyte. Wear rubber gloves and goggles, and then apply a red litmus paper to the leak. If the litmus paper turns blue, neutralize the liquid using the saturated boric acid solution and reapply a red litmus paper to make sure that it does not turn blue. Then wipe the liquid off using waste rags etc.
- (4) If the electrolyte adheres to your skin, wash the skin immediately using the saturated boric acid solution or large amounts of water. If the electrolyte adheres to an article of clothing, take it off immediately.
- (5) If the electrolyte comes into contact with your eyes, call out loudly for help. Do not rub your eyes but wash them with the saturated boric acid solution or large amounts of water and seek medical care.

- (6) If a damage to any of the high-voltage components and cables is suspected, cut the high-voltage circuit using the procedure below:
  - Move the shift lever to the P position and engage the parking brake.
  - Remove the ignition key. Then disconnect the cable from the negative (–) terminal of the auxiliary battery.
  - Wear insulated gloves, and then remove the service plug.
  - If you cannot remove the service plug due to damage to the rear portion of the vehicle, remove the HV fuse or IGCT relay instead.
- (g) Precautions to be taken when disposing of the vehicle  
When scrapping the vehicle, remove the HV battery from the vehicle and return it through the route specified by the manufacturer. The same applies to any damaged HV battery.
- (h) Precautions to be observed when towing  
Tow the damaged vehicle with its front wheels or its front and rear wheels lifted off the ground.

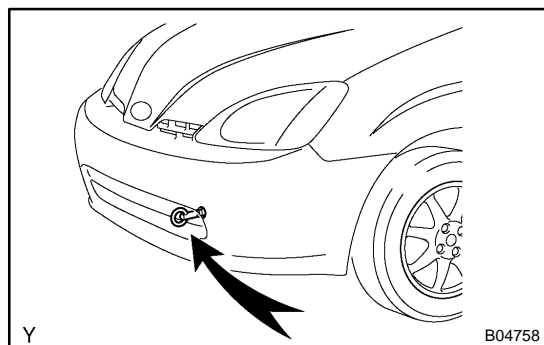
**NOTICE:**

**Towing the damaged vehicle with its front wheels on the ground may cause the motor to generate electricity. This electricity could, depending on the nature of the damage, leak and cause a fire.**

- (i) Towing with 4 wheels on the ground

**NOTICE:**

- If you have to tow the damaged vehicle using a rope, do it at a speed below 30 km/h. Such towing operation is allowed only to cover very short distance, such as the distance to a tow truck lorry, for example.
- Set the ignition switch to the ACC position and shift lever to the N position.
- If you detect any abnormality in the damaged vehicle during the towing operation, stop the towing operation immediately.



- (j) Towing eyelet
  - (1) Install the hook.
  - (2) Hook a rope onto the illustrated point for towing.