# 2. Working Precautions

### A: PRECAUTIONS WHEN WORKING WITH THE PARTS MOUNTED ON THE VEHICLE

1) When working under a vehicle which is jackedup, always be sure to use rigid rack.

2) The parking brake must always be applied during working. Also, in automatic transmission vehicles, keep the select lever set to the P (Parking) range.

3) Be sure the workshop is properly ventilated when running the engine. Further, be careful not to touch the belt or fan while the engine is operating.

4) Be careful not to touch hot metal parts, especially the radiator and exhaust system immediately after the engine has been turned off.

### B: PRECAUTIONS IN TROUBLE DI-AGNOSIS AND REPAIR OF ELEC-TRIC PARTS

1) The battery cable must be disconnected from the battery's (–) terminal, and the ignition switch must be set to the OFF position, unless otherwise required by the diagnostics.

2) Securely fasten the wiring harness with clamps and clips so that the harness does not interfere with the body end parts, edges, bolts or screws.

3) When installing parts, be careful not to catch them on the wiring harness.

4) When disconnecting a connector, do not pull the wires, but pull while holding the connector body.



5) Some connectors are provided with a lock. One type of such a connector is disconnected by pushing the lock, and the other, by moving the lock up. In either type the lock shape must be identified before attempting to disconnect the connector.

To connect, insert the connector until it snaps and confirm that it is connected securely.



6) When checking continuity between connector terminals, or measuring voltage across the terminal and ground, always touch tester probe(s) to terminals from the wiring connection side. If the probe is too thick to gain access to the terminal, use "mini" test leads.

To check water-proof connectors (which are not measurable from the wiring side), touch test probes on the terminal side and be careful not to bend or damage the terminals.



7) Sensors, relays, electrical unit, etc., are sensitive to strong impacts.

Handle them with care so that they are not dropped or mishandled.

8) For inspection of airbag system, always refer to "CAUTION" of "General Description" under AIR-BAG SYSTEM in the service manual for the same model to prevent malfunctioning.

9) When measuring the voltage or resistance of individual sensor or all electrical control modules, use a tapered pin with a diameter of 0.6 mm (0.024 in) or less and touch it to the tip of terminal. Never insert the tapered pin into the terminal at this time. Doing so may cause internal deformation and a malfunction can occur.

### C: PRECAUTIONS REGARDING THE HYBRID SYSTEM

### **1. PRECAUTIONS FOR MAINTENANCE**

The hybrid system includes a high voltage circuit. Mishandling may cause electric shocks and leakage. Therefore, perform proper operations by following procedures in this manual.

• Engineers are required to receive a special training in order to perform maintenance of high voltage system.

• All the harnesses and connectors for power cables are orange in color. In addition, caution labels indicating [High Voltage] are attached on the High voltage battery and its battery cover. Do not touch the wires and parts related to high voltage carelessly.

• Use great care when handling the high voltage system power supply circuits shown in the figure below.



• When performing maintenance of the high voltage system, make sure to take measures for preventing electrocution, by wearing insulated gloves, removing the service disconnect plug, etc. In addition, carry the removed service disconnect plug in your pocket in order to prevent other servicemen from accidentally installing during work.

#### NOTE:

Do not turn the ignition to ON with the service disconnect plug removed in order to prevent malfunctions.

• After removing the service disconnect plug, be sure to wait for ten minutes before touching the high voltage connectors and terminals.

WIRING SYSTEM

#### NOTE:

This time allows the high voltage condenser in the inverter to discharge.

• When wearing insulated gloves for work, make sure there is no holes or damages on the gloves.

• During the work, do not carry any metallic products, such as mechanical pencils and scales, which may be dropped and may cause short.

• Parts with high voltage and strong magnetic force are used. Therefore, during the work, do not carry any metallic products that may cause short, or magnetic recording media (such as cash cards and prepaid cards) whose magnetic record may get destroyed.

• When touching the high voltage terminals without insulation covering, make sure, in advance, to wear insulated gloves and to confirm that the voltage is 0 V using an insulation multimeter.

• Insulate the high voltage connectors and terminals with insulating tape immediately after removing.

• Be sure to tighten the high voltage screw terminals firmly to the specified torque. Lack of, or excess torque causes failures.

- Be careful not to allow foreign matter to enter the battery.
- Make sure to insulate the power cable terminals by wrapping insulating tape around.

• To work on the high voltage wire connections, use insulated tools, or wrap tools with vinyl tape for insulation before use.

• When using tools wrapped with vinyl tape as alternatives to insulated tools, cover tools with the standardized product, pressure-sensitive polyvinyl chloride tapes for electrical purposes (JIS C2336), and confirm the insulated condition before working, using an insulation multimeter.

• When inspecting insulated gloves, make sure there is no cracks, breakage, other damages, or air leakage by rolling insulated gloves from the opening side up to the wrist area and pressing the inflated portion. Do not use wet insulated gloves.



• When performing work, wear or use insulated gloves, protective goggles, and rubber boots for electrical purposes, insulated protective shoes or insulating rubber sheet.

• Even after the service disconnect plug is removed, make sure to wear insulated gloves during maintenance of all the parts inside the cover including the battery cover, and of underfloor power cable. (Maintenance of the high voltage battery cooling fan and cooling duct parts outside the battery cover, and the drive motor control module parts does not require to wear insulated gloves even in the compartment, because the voltage is 12 V only.)

• For maintenance of engine compartment and of CVT unit except for the power cable, insulated gloves are not required.

• During the work for the high voltage system, make sure to alert other servicemen to take precautions, for instance by displaying [HIGH VOLTAGE WORK. DO NOT TOUCH] on the vehicle. (An example is shown. Make a photocopy for use.)



HEV00088

• After performing work for the high voltage system, make sure to check again for misplaced parts and tools, tightening conditions of high voltage terminals, and connector connections, before connecting the service disconnect plug.

#### CAUTION: Make sure the connectors are connected completely without insecurity.

## WI(HEV)-19

• Make sure to check the positive and negative terminal connections during the battery removal and installation procedures.

• Never connect the battery in reverse polarity. Otherwise, the control module will be broken instantly, and other parts will also be damaged.

• Do not disconnect the battery cables while the engine is running. A large counter electromotive force will be generated, and this voltage may damage electronic parts such as control modules.

• When disconnecting the connectors of the electrical components, always be sure to turn the ignition switch to OFF.

• When measuring the voltage or resistance of individual sensor or all electrical control modules, use a tapered pin with a diameter of 0.6 mm (0.024 in) or less and touch it to the tip of terminal. Never insert the tapered pin into the terminal at this time. Doing so may cause internal deformation and a malfunction can occur.

• Take care not to allow water to get into the connectors when servicing or washing the vehicle in rainy weather. Avoid exposure to water even if the connectors are waterproof.

• Use the engine ground terminal or engine assembly for the grounding point when measuring the voltage and resistance in engine compartment.

• All parts related to the hybrid system are precision parts. Do not drop or otherwise apply impact. Do not reuse the parts that are dropped accidentally.

• Use the body ground bolt on the inverter frame as the grounding point, when measuring voltage and resistance in rear of the vehicle.



Take the ignition key or access key out of the vehicle, except when the key is needed inside.
When the part is replaced or the label is detached, make sure to attach a new label in the original position

 when the part is and direction.



• This engine starts and stops automatically, when the Hybrid READY indicator light in the meter illuminates. Make sure to turn the ignition to OFF before performing maintenance.

• When the state of battery charge is in a good condition while the engine is warmed-up, the engine will be stopped automatically while the vehicle is stopped. Therefore, when continuous running of the engine is necessary during vehicle stoppage in the cases such as ignition timing inspection, set to «Auto Start Stop Cancel Drive Mode (Engine only or Engine + Motor)».

### **WI(HEV)-20**