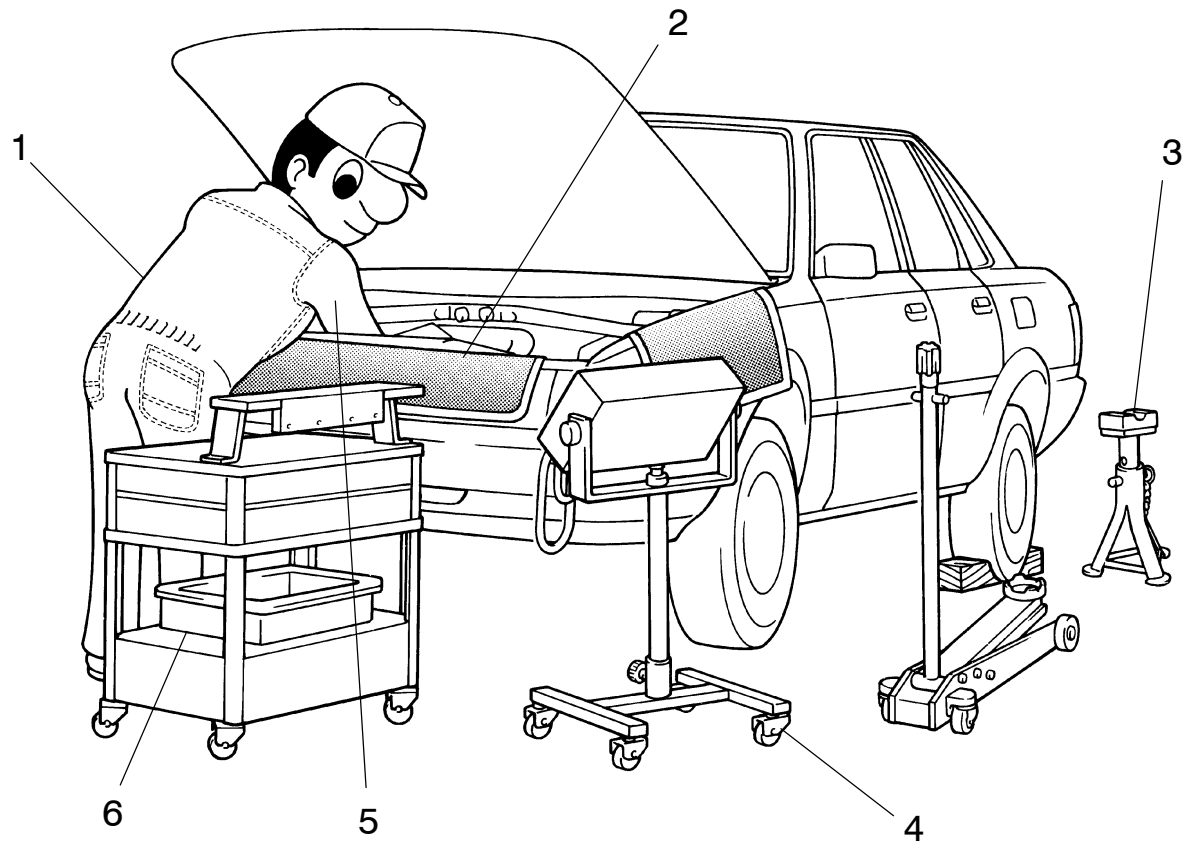
# REPAIR INSTRUCTION

010TP–01

## PRECAUTION

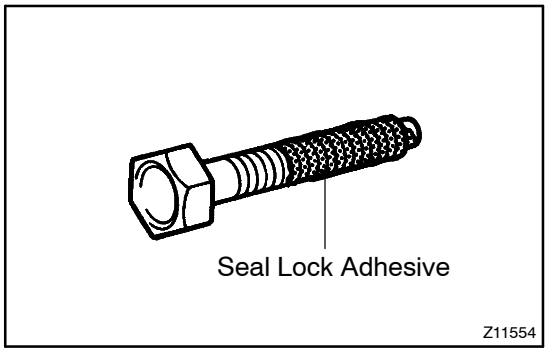
(b) HINTS ON OPERATIONS




| | | |
|---|---|---|
| 1 | Looks | • Always wear a clean uniform.<br>• Hat and safety shoes must be worn. |
| 2 | Vehicle protection | • Prepare a grille cover, fender cover, seat cover and floor mat before starting the operation. |
| 3 | Safe operation | • When working with 2 or more persons, be sure to check safety for one another.<br>• When working with the engine running, make sure to provide ventilation for exhaust fumes in the workshop.<br>• If working on high temperature, high pressure, rotating, moving, or vibrating parts, wear appropriate safety equipment and take extra care not to injure yourself or others.<br>• When jacking up the vehicle, be sure to support the specified location with a safety stand.<br>• When lifting up the vehicle, use appropriate safety equipment. |
| 4 | Preparation of tools and measuring gauge | • Before starting operation, prepare a tool stand, SST, gauge, oil, shop rag and parts for replacement. |
| 5 | Removal and installation, disassembly and assembly operations | • Diagnose with a thorough understanding of proper procedures and of the reported problem.<br>• Before removing the parts, check the general condition of the assembly and for deformation and damage.<br>• When the assembly is complicated, take notes. For example, note the total number of electrical connections, bolts, or hoses removed. Add matchmarks to insure re–assembly of components in the original positions. Temporarily mark hoses and their fittings, if needed.<br>• Clean and wash the removed parts if necessary and assemble them after a thorough check. |
| 6 | Removed parts | • Place the removed parts in a separate box to avoid mixing them up with the new parts or contaminating the new parts.<br>• As for non–reusable parts such as a gasket, an O–ring, and a self–locking nut, replace them with new ones following the instructions in this manual.<br>• Retain the removed parts for customer inspection, if requested. |

(c) JACKING UP AND SUPPORTING VEHICLE

(1) 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 01–19).




(d) PRECOATED PARTS

(1) Precoated parts are bolts and nuts. That are coated with a seal lock adhesive at the factory.

(2) If a precoated part is retightened, loosened or moved in anyway, it must be recoated with the specified adhesive.

(3) When reusing precoated parts, clean off the old adhesive and dry the part with compressed air. Then apply new seal lock adhesive appropriate to the bolts and nuts.

**NOTICE:**

**Perform the torque with the lower limit value of the torque tolerance.**

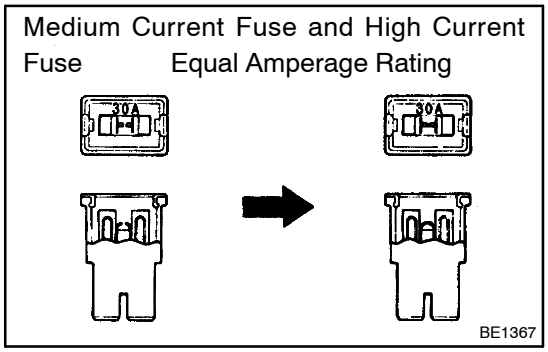
(4) Some seal lock agents harden slowly. You may have to wait for the seal lock agent to harden.

(e) GASKETS

(1) When necessary, use a sealer on gaskets to prevent leaks.

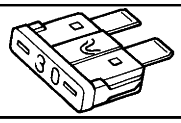
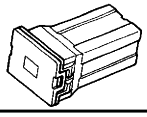
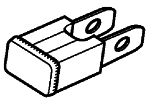
(f) BOLTS, NUTS AND SCREWS

(1) Carefully follow all the specifications for tightening torques. Always use a torque wrench.




(g) FUSES

(1) When replacing fuses, be sure that 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 |
|---|---|---|---|
|  BE5594 |  IN0365 | FUSE | FUSE |
|  BE5595 |  IN0366 | MEDIUM CURRENT FUSE | M–FUSE |
|  D27353 |  IN0367 | HIGH CURRENT FUSE | H–FUSE |

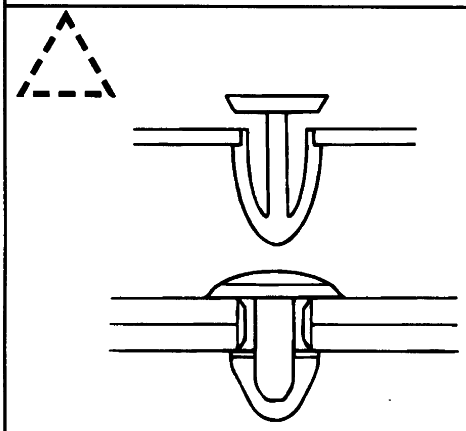
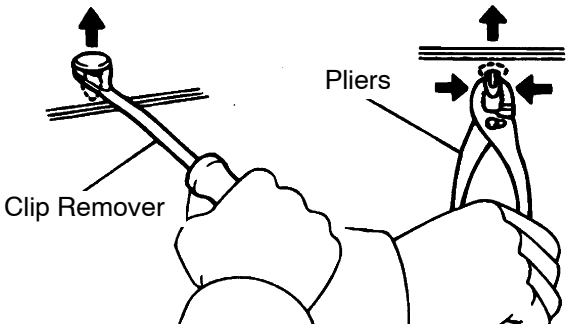
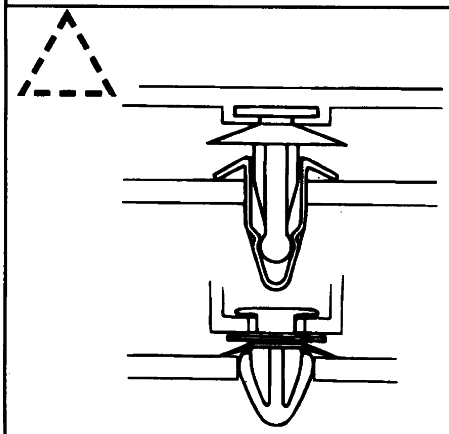
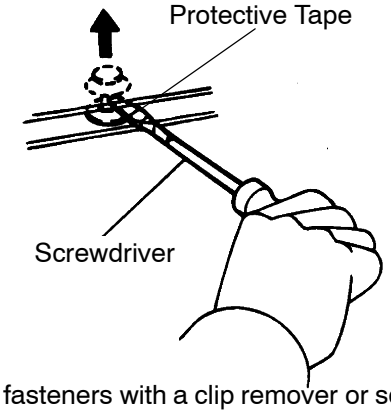
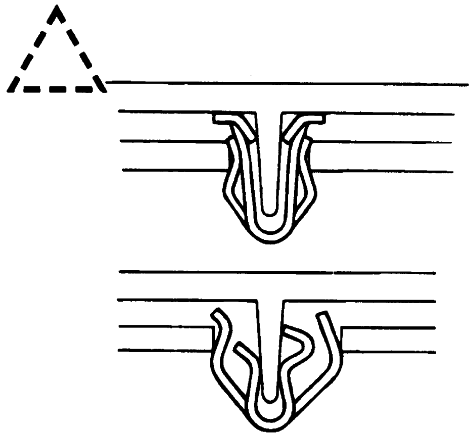
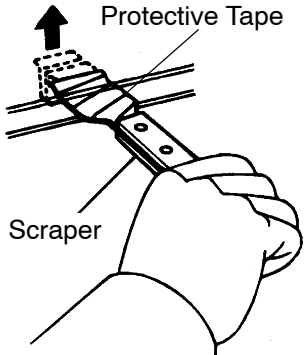
V35002

(h) CLIPS

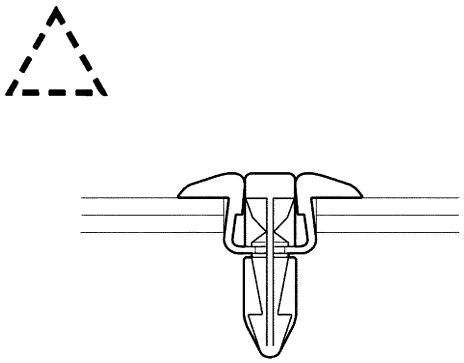
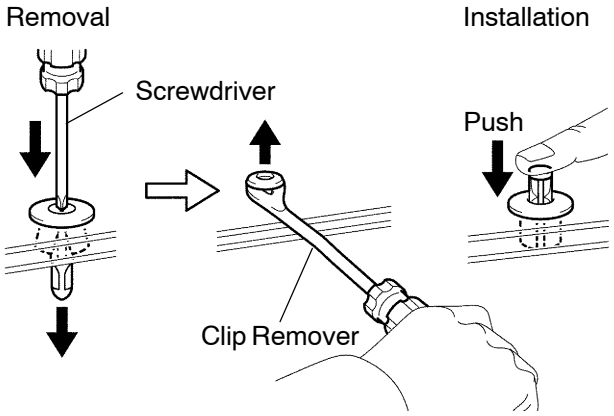
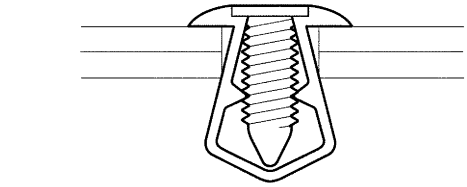
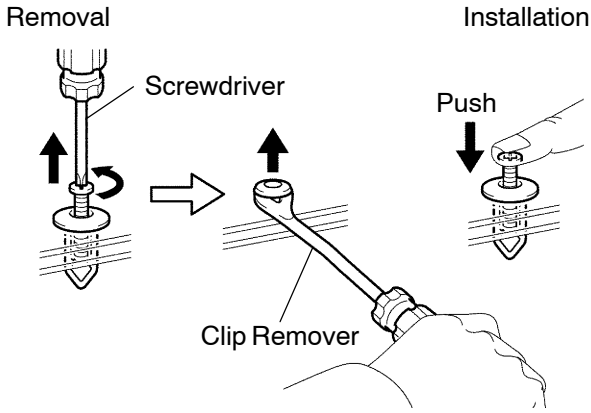
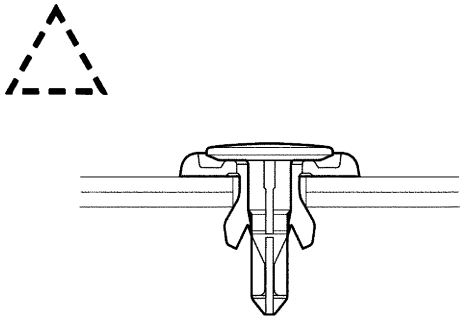
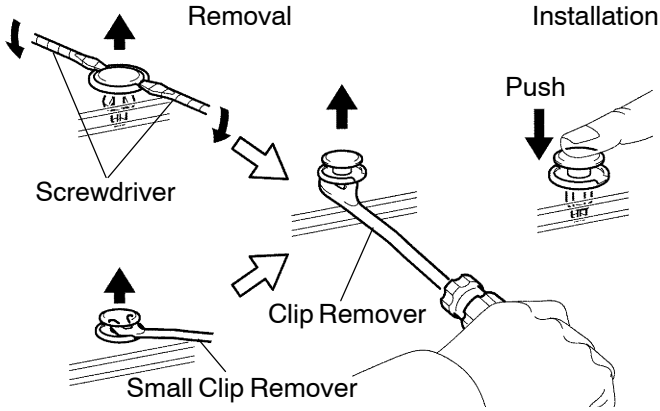
(1) The removal and installation methods of typical clips used in body parts are shown in the table below.

HINT:

If clips are damaged during a procedure, always replace the damaged clip with a new clip.

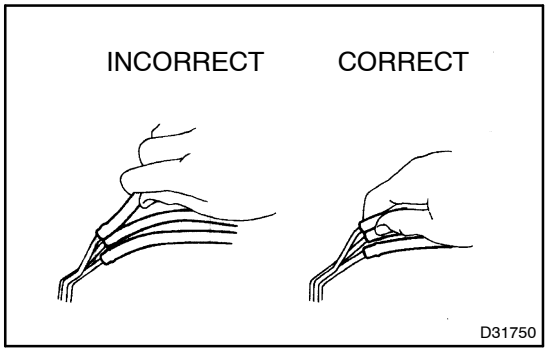
| Shape (Example) | Removal/Installation |
|---|---|
|  | <br>Remove clips from front or rear using clip remover or pliers. |
|  | <br>Remove fasteners with a clip remover or screwdriver. |
|  | <br>Remove clips with a wide scraper to prevent panel damage. |

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| Shape (Example) | Removal/Installation |
|---|---|
|  | <br>Remove rivet by pushing the center pin through and prying out the rivet shell. |
|  | <br>Remove rivet by unscrewing the center pin and prying out the rivet shell. |
|  | <br>Remove rivet by prying out the pin and then prying out the rivet shell. |

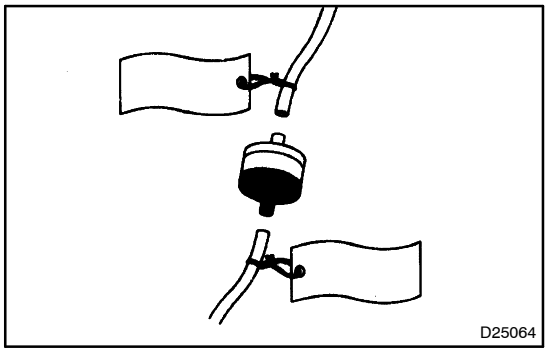
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(i) REMOVAL AND INSTALLATION OF VACUUM HOSES

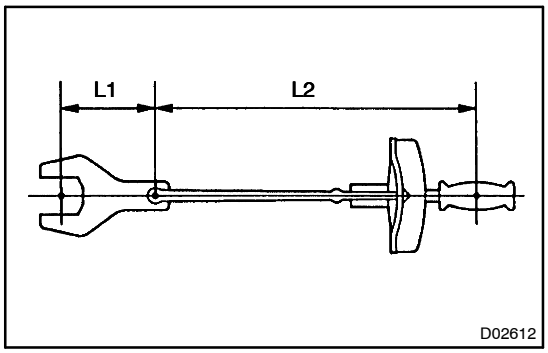
(1) To disconnect vacuum hoses, pull and twist from the end of the hose. Do not pull from the middle of the hose as this may cause damage.




(2) When disconnecting vacuum hoses, use tags to identify where they should be reconnected.

(3) After completing the job, double check that the vacuum hoses are properly connected. The label under the hood shows the proper layout.

(4) 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.

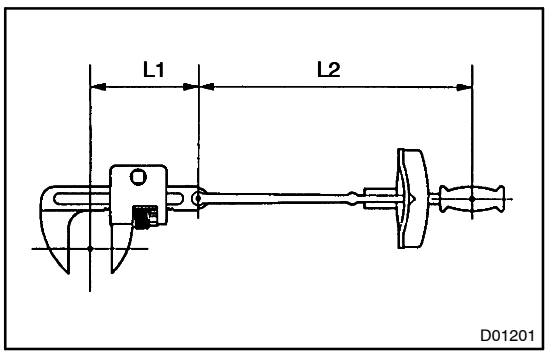



(j) TORQUE WHEN USING TORQUE WRENCH WITH EXTENSION TOOL

(1) If SST or an extension tool is combined with the torque wrench to extend its length, do not tighten the torque wrench to the specified torque values in this manual. The resulting torque will be excessive.

(2) Use the formula below to calculate special torque values for situations where SST or an extension tool is combined with the torque wrench.

(3) Formula: T' = T x L2/(L1 + L2)




| | |
|---|---|
| T' | Reading of torque wrench {N·m (kgf·cm, ft·lbf)} |
| T | Torque {N·m (kgf·cm, ft·lbf)} |
| L1 | Length of SST or extension tool (cm) |
| L2 | Length of torque wrench (cm) |

## 1. FOR VEHICLES EQUIPPED WITH SRS AIRBAG AND SEAT BELT PRETENSIONER

HINT:

The KLUGER is equipped with a Supplemental Restraint System (SRS) and seat belt pretensioner. Failure to carry out the service operations in the correct sequence could cause the SRS to unexpectedly deploy during servicing and lead to serious injury.

Furthermore, if a mistake is made when servicing the SRS, it is possible that the SRS may fail to operate properly. Before servicing (including removal or installation of parts, inspection or replacement), be sure to read the following section carefully.

(a) GENERAL NOTICE

(1) As the malfunction symptoms of the SRS are difficult to confirm the Diagnostic Trouble Codes (DTCs) become the most important source of information when troubleshooting. When troubleshooting the SRS, always check the DTCs before disconnecting the battery (see page 05–513).

(2) Work must be started at least 90 seconds after the ignition switch is turned to the LOCK position and the negative (–) terminal cable is disconnected from the battery.

(The SRS is equipped with a back–up power source. If work is started within 90 seconds after turning the ignition switch to lock and disconnecting the negative (–) terminal cable from the battery, the SRS may deploy).

When the negative (–) terminal cable is disconnected from the battery, clock and audio system memory is erased. Before starting work, make a note of the settings of each memory system. When work is finished, reset the clock and audio systems as before.

**CAUTION:**

**Never use the back–up power source (battery or other) to try to keep the system memory from being erased. The back–up power source may inadvertently power the SRS, and cause it to deploy.**

(3) In minor collisions where the SRS does not deploy, the horn button assembly, instrument panel passenger airbag assembly, front seat airbag assembly, curtain shield airbag assembly and seat belt pretensioner should be inspected before further use of the vehicle (see pages 60–17, 60–29, 60–38, 60–44 and 61–9).

(4) Never use SRS parts from another vehicle. When replacing parts, use new parts.

(5) Before repairs, remove the airbag sensor if impacts are likely to be applied to the sensor during repairs.

(6) Never disassemble and repair the airbag sensor assembly, horn button assembly, instrument panel passenger airbag assembly, front seat airbag assembly, curtain shield airbag assembly or seat belt pretensioner.

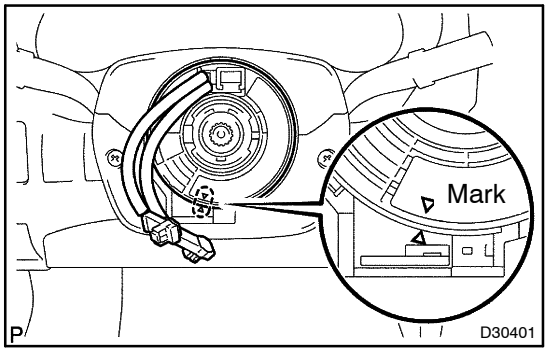
(7) Replace the center airbag sensor assembly, side airbag sensor assembly, horn button assembly or the instrument panel passenger airbag assembly, front seat airbag assembly or curtain shield airbag assembly if: 1) damage has occurred from being dropped, or 2) cracks, dents or other defects in the case, bracket or connector are present.

(8) Do not directly expose the airbag sensor assembly, horn button assembly, instrument panel passenger airbag assembly, front seat airbag assembly, curtain shield airbag assembly or seat belt pretensioner to hot air or flames.

(9) Use a voltmeter/ohmmeter with high impedance (10 kΩ/V minimum) for troubleshooting electrical circuits.

(10) Information labels are attached to the SRS components. Follow the instructions on the labels.

(11) After work on the SRS is completed, check the SRS warning lamp (see page 05–513).




(b) SPIRAL CABLE (in Combination Switch)

(1) The steering wheel must be fitted correctly to the steering column with the spiral cable in the neutral position, otherwise cable disconnection and other problems may occur. Refer to page 60–24 for information about correct installation of the steering wheel.

(c) HORN BUTTON ASSEMBLY (with Airbag)

(1) When removing the horn button assembly or handling a new horn button, it should be placed with the pad surface facing up. See the illustration below.
Placing the horn button with the pad surface facing down may lead to a serious accident if the airbag accidently inflates. Also, do not place anything on top of the horn button.

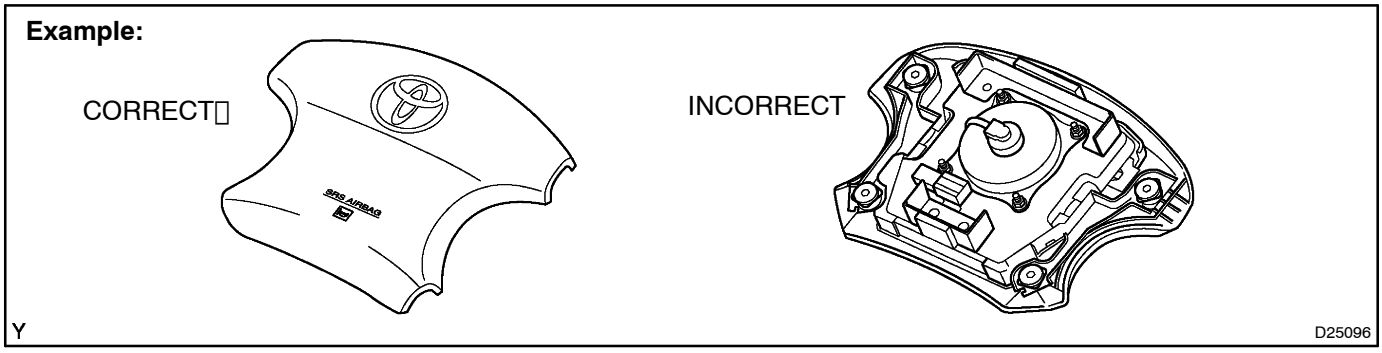
(2) Never measure the resistance of the airbag squib. This may cause the airbag to inflate, which could cause serious injury.

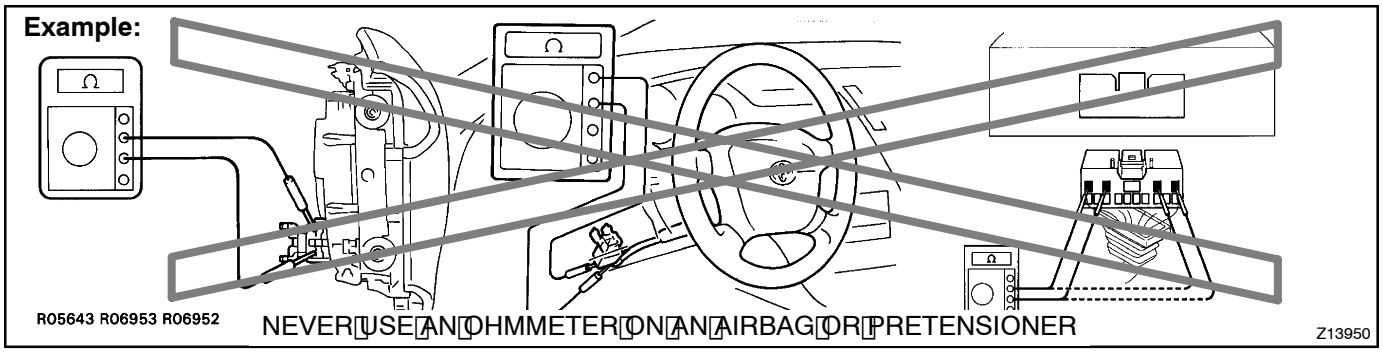
(3) Grease or detergents of any kind should not be applied to the steering wheel pad.

(4) Store the horn button assembly in an area where the ambient temperature is below 93°C (200°F), the humidity is not high and electrical noise is not nearby.

(5) When using electric welding anywhere on the vehicle, disconnect the airbag sensor (ECU) connectors (4 pins). These connectors contain shorting springs. This feature reduces the possibility of the airbag or seat belt pretensioner deploying due to currents entering the squib wiring.

(6) When disposing of the vehicle or the horn button assembly by itself, the airbag should be inflated using an SST before disposal (see page 60–17). Perform the operation in a safe place away from electrical noise.



(d) INSTRUMENT PANEL PASSENGER AIRBAG ASSY

(1) Always place a removed or new instrument panel passenger airbag assembly with the airbag inflation direction facing upward.
Placing the airbag assembly with the airbag inflation direction facing downward could cause a serious accident if the airbag inflates.

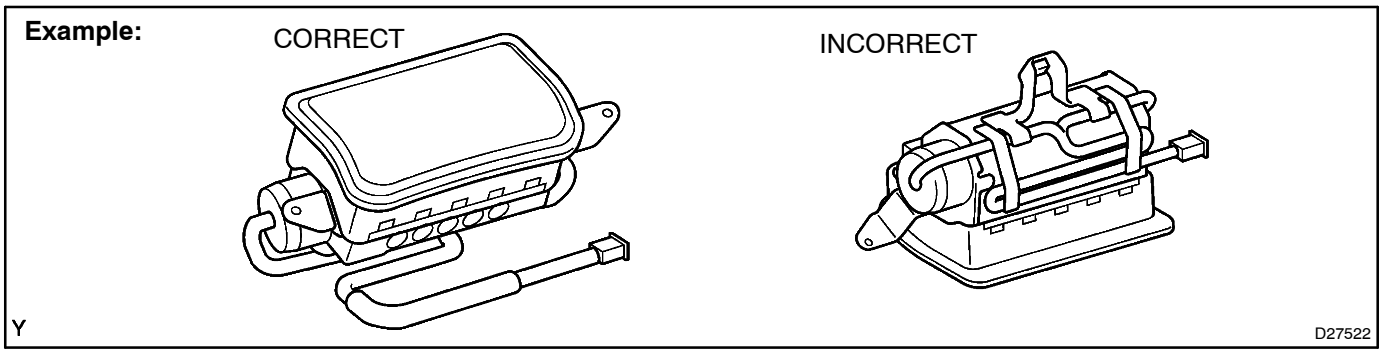
(2) Never measure the resistance of the airbag squib. This may cause the airbag to inflate, which could cause serious injury.

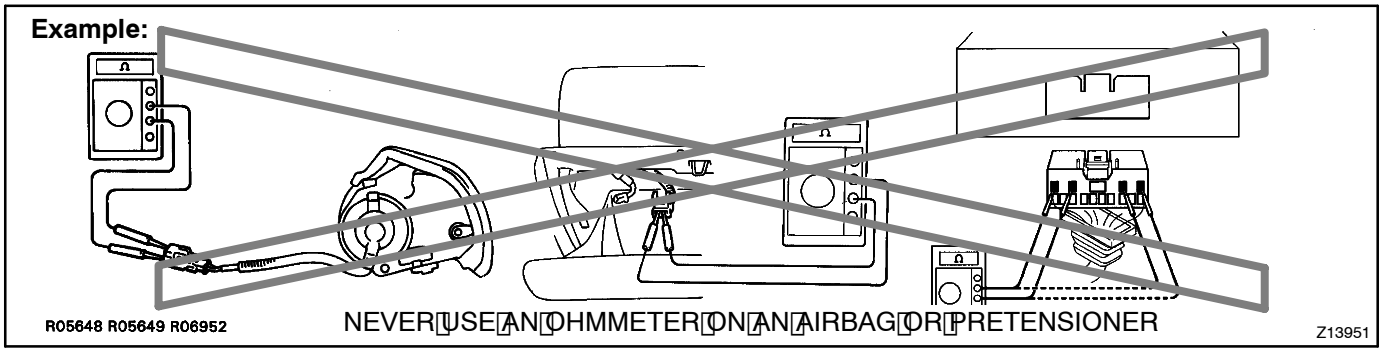
(3) Grease or detergents of any kind should not be applied to the instrument panel passenger airbag assembly.

(4) Store the airbag assembly in an area where the ambient temperature is below 93°C (200°F), the humidity is not high and electrical noise is not nearby.

(5) When using electric welding anywhere on the vehicle, disconnect the airbag ECU connectors (4 pins). These connectors contain shorting springs. This feature reduces the possibility of the airbag deploying due to currents entering the squib wiring.

(6) When disposing of a vehicle or the airbag assembly unit by itself, the airbag should be deployed using SST before disposal (see page 60–29).
Activate in a safe place away from electrical noise.




(e) CURTAIN SHIELD AIRBAG ASSEMBLY

(1) Always place the removed or new curtain shield airbag assembly in a clear plastic bag, and keep it in a safe place.

**NOTICE:**
**Plastic bag is not re–useable.**
**CAUTION:**
**Never disassemble the curtain shield airbag assembly.**

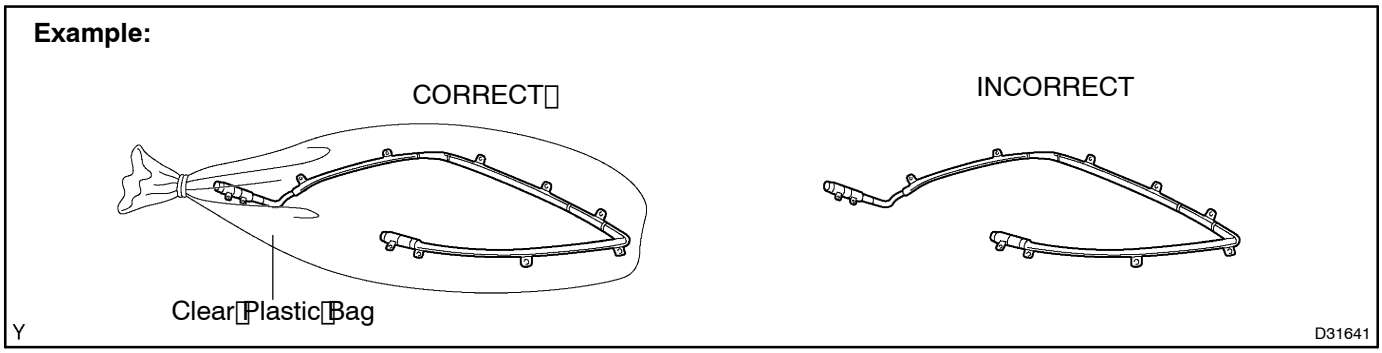
(2) Never measure the resistance of the airbag squib. This may cause the airbag to inflate, which could cause serious injury.

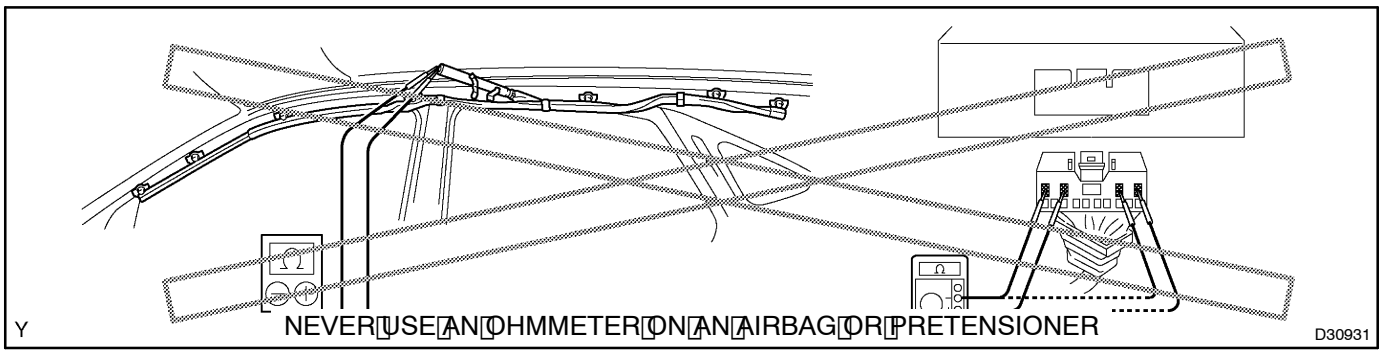
(3) Grease or detergents of any kind should not be applied to the curtain shield airbag assembly.

(4) Store the airbag assembly in an area where the ambient temperature is below 93°C (200°F), the humidity is not high and electrical noise is not nearby.

(5) When using electric welding anywhere on the vehicle, disconnect the airbag sensor (ECU) connectors (2 pins). These connectors contain shorting springs. This feature reduces the possibility of the airbag deploying due to currents entering the squib wiring.

(6) When disposing of a vehicle or the curtain shield airbag assembly unit by itself, the airbag should be deployed using SST before disposal (see page 60–38).
Activate in a safe place away from electrical noise.




(f) FRONT SEAT AIRBAG ASSEMBLY

(1) Always place a removed or new front seat airbag assembly with the airbag inflation direction facing up.
Placing the airbag assembly with the airbag inflation direction facing downward could cause a serious accident if the airbag deploys.

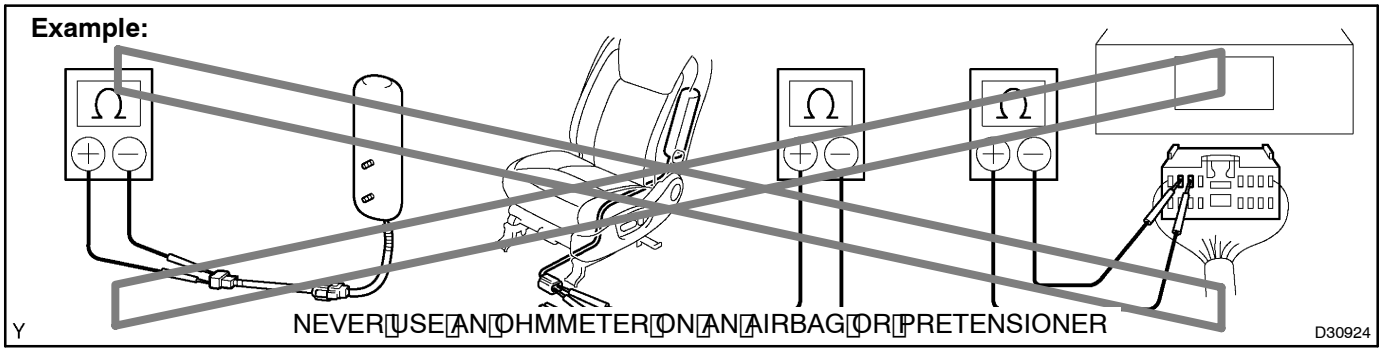
(2) Never measure the resistance of the airbag squib. This may cause the airbag to inflate, which could cause serious injury.

(3) Grease should not be applied to the front seat airbag assembly, and the airbag door should not be cleaned with detergents of any kind.

(4) Store the airbag assembly in an area where the ambient temperature is below 93°C (200°F), the humidity is not high and electrical noise is not nearby.

(5) When using electric welding anywhere on the vehicle, disconnect the airbag ECU connectors (2 pins). These connectors contain shorting springs. This feature reduces the possibility of the airbag deploying due to currents entering the squib wiring.

(6) When disposing of a vehicle or the airbag assembly unit by itself, the airbag should be deployed using SST before disposal (see page 60–44).
Activate in a safe place away from electrical noise.




(g) SEAT BELT PRETENSIONER

(1) Never measure the resistance of the seat belt pretensioner. This may cause the seat belt pretensioner to activate, which could cause serious injury.

(2) Never disassemble the seat belt pretensioner.

(3) Never install the seat belt pretensioner on another vehicle.

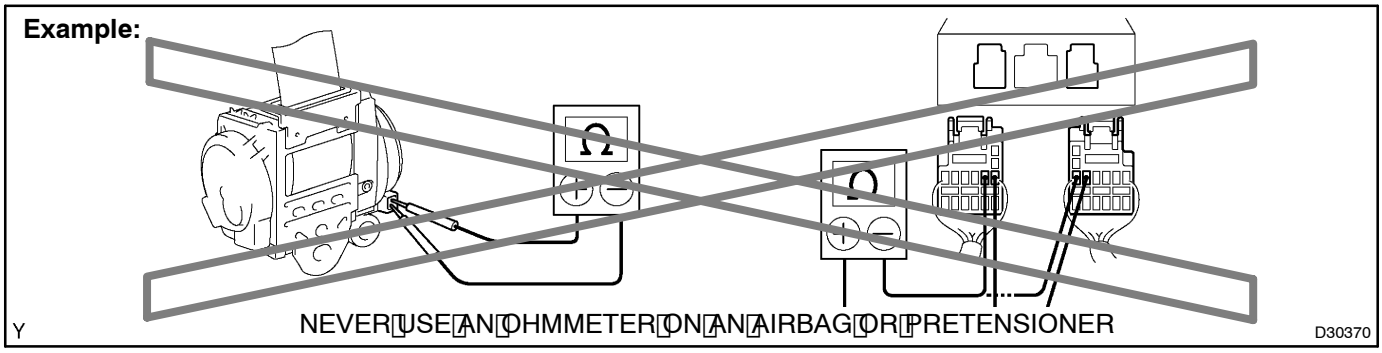
(4) Store the seat belt pretensioner in an area where the ambient temperature is below 80°C (176°F), the humidity is not high and electrical noise is not nearby.

(5) When using electric welding anywhere on the vehicle, disconnect the airbag sensor (ECU) connectors (2 pins). These connectors contain shorting springs. This feature reduces the possibility of the airbag deploying due to currents entering the squib wiring.

(6) When disposing of a vehicle or the seat belt pretensioner unit by itself, the seat belt pretensioner should be activated before disposal (see page 61–9). Activate in a safe place away from electrical noise.

(7) As the seat belt pretensioner is hot after being activated, allow some time for it to cool down sufficiently before disposal. Never apply water to try to cool down the seat belt pretensioner.

(8) Grease, detergents, oil or water should not be applied to the front seat outer belt.




(h) AIRBAG SENSOR ASSEMBLY (ECU)

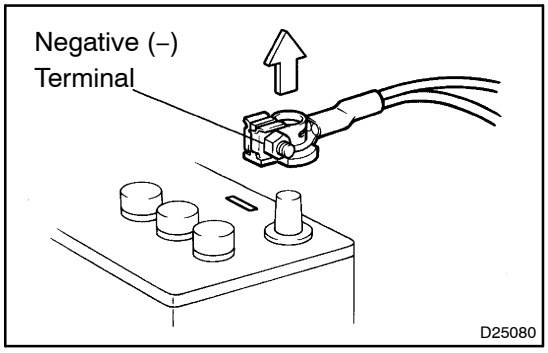
(1) Never reuse an airbag sensor assembly that has been involved in a collision where the SRS has deployed.

(2) The connectors to the airbag sensor assembly should be connected or disconnected with the sensor mounted on the floor. If the connectors are connected or disconnected while the airbag sensor assembly is not mounted to the floor, the SRS may activate.

(3) Work must be started at least 90 seconds after the power switch's power mode is changed to OFF and the negative (–) terminal cable is disconnected from the battery, even if only loosening the set bolts of the airbag sensor assembly.

(i) WIRE HARNESS AND CONNECTOR

(1) The SRS wire harness is integrated with the instrument panel wire harness assembly. All the connectors in the system are a standard yellow color. If the SRS wire harness becomes disconnected or the connector becomes broken, repair or replace it.



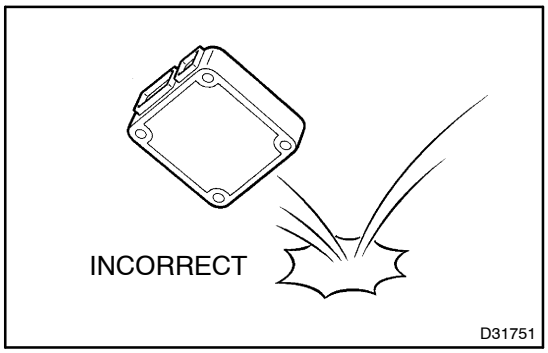

## 2. ELECTRONIC CONTROL

(a) REMOVAL AND INSTALLATION OF BATTERY TERMINAL

(1) Before performing electronic work, disconnect the battery negative (–) terminal cable beforehand to prevent component and wire damage caused by accidental short circuits.

(2) When disconnecting the terminal cable, turn the ignition switch and lighting switch OFF and loosen the terminal nut completely. Perform these operations without twisting or prying the terminal. Remove the battery cable from the battery post.

(3) Clock settings, radio settings, DTCs and other data are erased when the battery cable is removed. Before removing the battery cable, record any necessary data.




(b) HANDLING OF ELECTRONIC 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 rendered inoperative by static electricity.

(2) To disconnect electronic connectors, pull the connector itself, not the wires.

(3) Be careful not to drop electronic components, such as sensors or relays. If they are dropped on a hard surface, they should be replaced.

(4) When cleaning the engine with steam, protect the electronic components, air filter and emission–related components from water.

(5) Never use an impact wrench to remove or install temperature switches or temperature sensors.

(6) When checking the resistance of a wire connector, insert the tester probe carefully to prevent terminals from bending.

## 3. REMOVAL AND INSTALLATION OF FUEL CONTROL PARTS

(a) PLACE FOR REMOVING AND INSTALLING OF FUEL SYSTEM PARTS

(1) Work in a place with good air ventilation that does not have welders, grinders, drills, electric motors, stoves, or any other ignition sources.

(2) Never work in a pit or near a pit as vaporized fuel will collect in those places.

(b) REMOVING AND INSTALLING OF FUEL SYSTEM PARTS

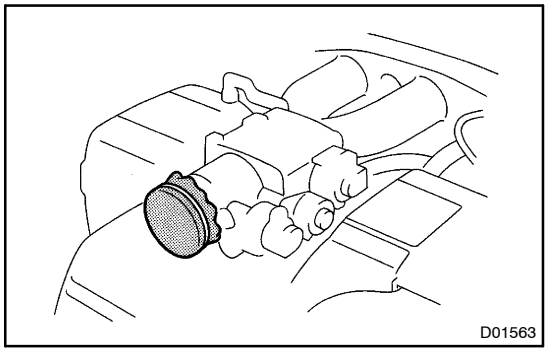
(1) Prepare a fire extinguisher before starting operation.

(2) To prevent static electricity, install a ground on the fuel changer, vehicle and fuel tank, and do not spray the area with water. The work surface will become slippery. Do not clean up spills with water as this will spread and gasoline and create a fire hazard.

(3) Avoid using electric motors, working lights and other electric equipment that can cause sparks or high temperatures.

(4) Avoid using iron hammers as they may create speaks.

(5) Dispose of fuel–contaminated shop rags separately using a fire resistant container.

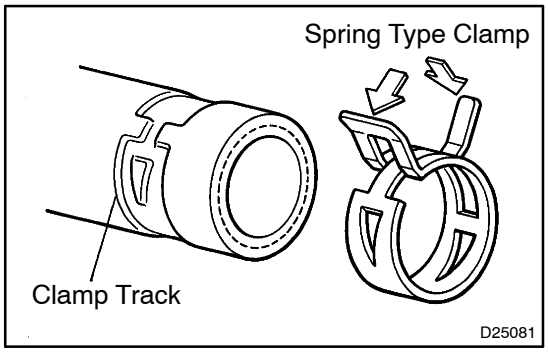



**4. REMOVAL AND INSTALLATION OF ENGINE INTAKE PARTS**

(a) If any metal particle enters the inlet pass, this may damage the engine.

(b) When removing and installing the inlet system parts, cover the openings of the removed parts and engine openings. Use clean shop rags, gummed tape, or other suitable materials.

(c) When installing the inlet system parts, check that no metal particles have entered the engine or the installed part.



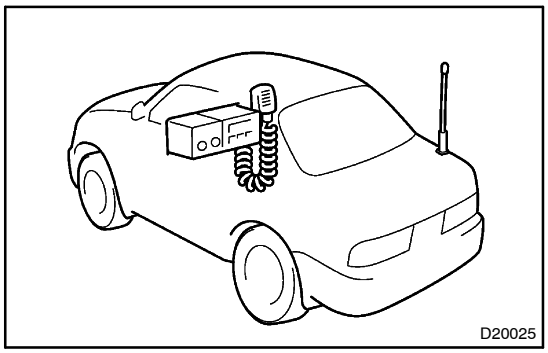

**5. HANDLING OF HOSE CLAMPS**

(a) Before removing the hose, check the clamp position so that it can be reinstalled in the same position.

(b) Replace deformed or dented clamps with a new one.

(c) When reusing a hose, attach the clamp on the clamp track portion of the hose.

(d) For a spring type clamp, you may want to spread the tabs slightly after installation by pushing in the direction of the arrow marks as shown in the illustration.




**6. FOR VEHICLES EQUIPPED WITH MOBILE COMMUNICATION SYSTEMS**

(a) Install the antenna as far away from the ECU and sensors of the vehicle electronic systems as possible.

(b) Install an antenna feeder at least 20 cm (7.87 in.) away from the ECU and sensors of the vehicle electronic systems. For details of the ECU and sensors locations, refer to the section on applicable components.

(c) Keep the antenna and feeder separate from other wirings as much as possible. This will prevent signals from the communication equipment from affecting vehicle equipment and vice–versa.

(d) Check that the antenna and feeder are correctly adjusted.

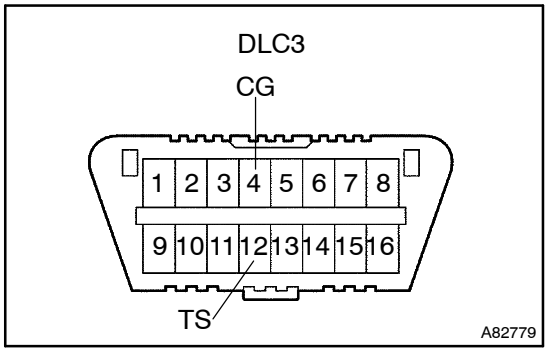
(e) Do not install high–powered mobile communication systems.

**7. FOR VEHICLES EQUIPPED WITH TRACTION CONTROL (TRC) SYSTEM**

(a) When testing with a 2–wheel drum tester such as a speedometer tester, a combination tester of the speedometer and brake, a chassis dynamometer, or when jacking up the front wheels and driving the wheels, always turn the TRC system OFF beforehand via the TRC OFF switch before testing.

**NOTICE:**

**TRC system OFF condition can be confirmed by the ”TRC OFF” warning indicator lamp in the combination meter.**




**8. FOR VEHICLES EQUIPPED WITH VEHICLE SKID CONTROL (VSC) SYSTEM**

(a) NOTICES WHEN USING DRUM TESTER

(1) Before beginning testing, disable the (VSC). To disable the VSC, turn the ignition switch OFF and connect SST to terminals TS and CG of the DLC3.

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**NOTICE:**

- **Confirm that the VSC warning lamp blinks.**
- **VSC system will be reset when the engine is restarted.**
- **For safety, secure the vehicle with restraint chains while using a wheel dynamometer.**

(b) NOTICES OF RELATED OPERATIONS TO VSC

(1) Do not carry out unnecessary installation and removal as it might affect the adjustment of VSC related parts.

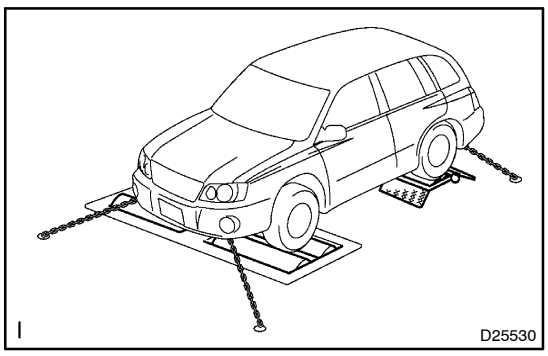
(2) Be sure to follow the instructions for work preparation and final confirmation of proper operation of the VSC system.

**9. WHEN SERVICING FULL–TIME 4WD VEHICLES**

(a) MEASURING POINTS FOR SPEEDOMETER TESTER

**NOTICE:**

- **Tester with a function of load setting cannot be used.**
- **Inspection should be done in the front wheels.**
- **Do not start, accelerate nor decelerate the vehicle suddenly.**
- **Maximum vehicle speed must be below 60 km/h (when using free roller, it must be below 50 km/h).**
- **Driving time should be within 1 minute.**



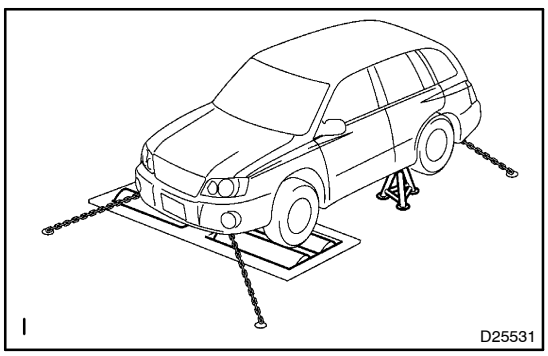

(1) Place the front wheels onto the rollers.

(2) Set the rear wheels free by free rollers or rigid racks.

(3) Fasten the vehicle with the lock chain.

(4) Start the engine, and then measure the vehicle speed by increasing the speed gradually in the D range.

(5) After the measurement completion, decrease the vehicle speed by brake gradually, and then stop the vehicle.



(b) MEASURING POINTS FOR BRAKE TESTER

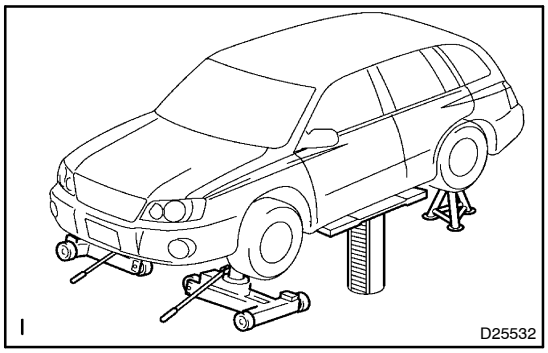
**NOTICE:**

- **Tester with a function of load measurement cannot be used**
- **High–speed type brake cannot be used.**

(1) Place the wheels to be measured (front or rear) onto the rollers.
(2) Shift the shift lever into neutral.
(3) Perform the measurement by driving the tester rollers.

HINT:

In case that the dragging force is over 10% of the load put on the axis, inspection of the wheel's rotating condition should be done with both of the left and right axes jacked up. If no abnormality is found in the rotating condition, adhesive torque of the viscous coupling causes the excessive dragging fore and therefore it means no problem exists in the vehicle.




(c) MEASURING POINTS FOR ON–VEHICLE WHEEL BALANCER

(1) Jack up all 4 wheels with 2 post lift.
(2) Fasten the vehicle by setting 2 pick–up stands in the bottom of suspension arm's tip of the front wheel s or rear wheels to be measured.
(3) Support the vehicle with rigid racks so that vehicle will not lean in the vehicle's front/rear direction.
(4) Release the parking brake.
(5) Check that no dragging force exists by turning each wheel by hand.
(6) Set the wheel balancers.
(7) Measurement should be done by using both of engine drive and wheel balancer roller drive.

**NOTICE:**

- **Start the engine, and then increase the vehicle speed gradually in the D range.**
- **Do not accelerate nor decelerate suddenly.**
- **Deceleration should be done by brake gradually.**
- **Take special care that the vehicle does not move.**
- **Measurement should be done quickly.**

**10. FOR VEHICLES EQUIPPED WITH CATALYTIC CONVERTER**

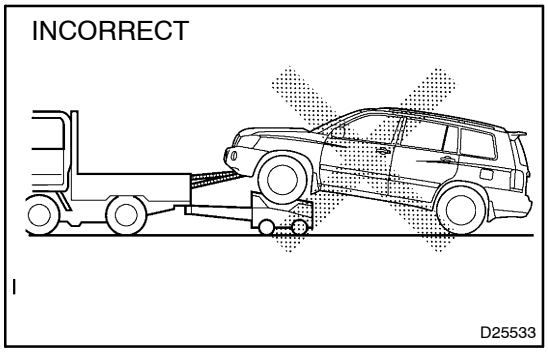
**CAUTION:**

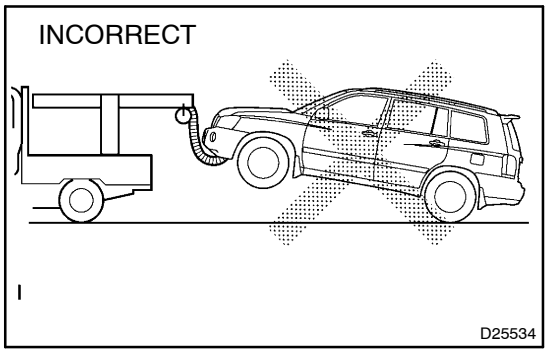
**If a large amount of unburned gasoline or gasoline vapors flow into the converter, it may cause oveheating and create a fire hazard. To prevent this, observe the following precautions.**

(a) Use only unleaded gasoline.
(b) Avoid prolonged idling.
Avoid idling the engine for more than 20 minutes.
(c) Avoid a spark jump test.
(1) Perform a spark jump test only when absolutely necessary. Perform this test as rapidly as possible.
(2) While testing, never race the engine.

(d) Avoid a prolonged engine compression measurement.
Engine compression measurements must be performed as rapidly as possible.

(e) Do not run the engine when the fuel tank is nearly empty. This may cause the engine to misfire and create an extra load on the converter.



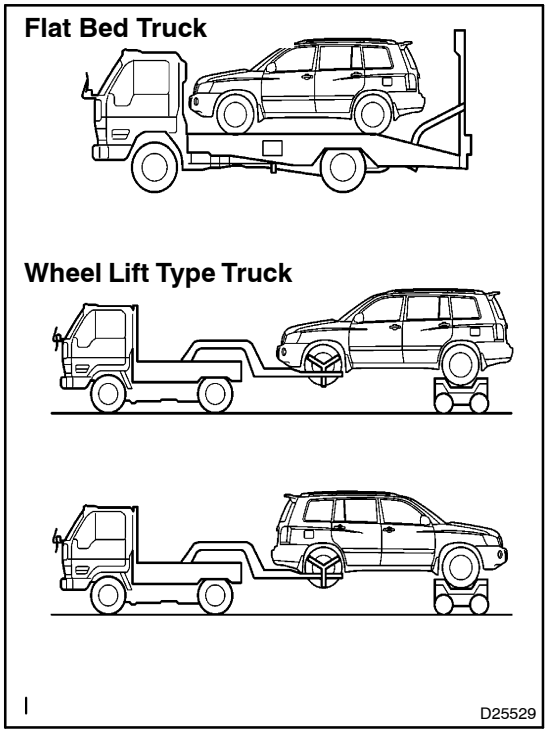

**11. WHEN TOWING FULL–TIME 4WD VEHICLES**

(a) Tow the vehicles with the 4 wheels touching the ground or the 4 wheels held up. In case that an abnormality exists in the chassis and drive train, tow the vehicle with the 4 wheels held up.

(b) Never tow the vehicle with either condition of the front wheels only or the rear only held up.

**NOTICE:**

**Towing with either condition of the front wheels only the rear wheels only held up might cause the drive train burned–out or the wheels flying off the dolly.**




(c) Towing the vehicle should be done by one of the towing methods as shown in the illustration.

(d) If the vehicle has a trouble in the chassis or drive train, use the wheel lift type truck.

| Towing Method | Parking Brake | Transaxle Shift Lever Position |
|---|---|---|
| Flat Bed Truck | Applied | Any Position |
| Wheel Lift Type Truck | Applied | Any Position |

**NOTICE:**

**Do not use any towing method other those shown above.**