

Last Modified: 3-27-2012	6.4 F	From: 201203
Model Year: 2013	Model: FR-S	Doc ID: RM000000UYV0BHX
Title: INTRODUCTION: HOW TO USE THIS MANUAL: GENERAL INFORMATION (2013 FR-S)		

GENERAL INFORMATION

1. GENERAL DESCRIPTION

- (a) This manual is written in accordance with SAE J2008.
- (b) Repair operations can be separated mainly into the following 3 processes:
 - (1) Diagnosis
 - (2) Removing/Installing, Replacing, Disassembling/Reassembling, Checking and Adjusting
 - (3) Final Inspection
- (c) The following procedure is omitted from this manual. However, this procedure must be performed.
 - (1) Use a jack or lift to perform operations.
 - (2) Clean all removed parts.
 - (3) Perform a visual check before and after performing any work.

2. INDEX

- (a) An alphabetical INDEX section is provided at the end of the manual as a reference to help find the item to be repaired.

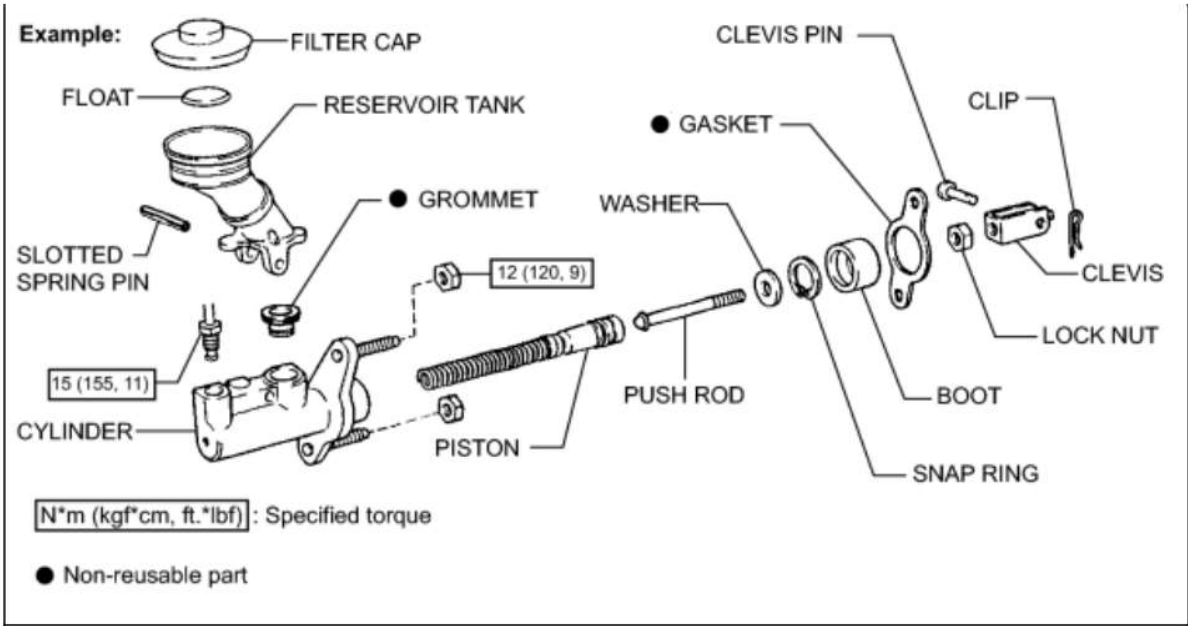
3. PREPARATION

- (a) Use of Special Service Tools (SST) and Special Service Materials (SSM) may be required, depending on the repair procedure. Be sure to use SST and SSM when they are required and follow the work procedure properly. A list of SST and SSM is in the "Preparation" section of this manual.

4. REPAIR PROCEDURES

- (a) A component illustration is placed under the title where necessary.
- (b) Non-reusable parts, grease application areas, precoated parts and torque specifications are noted in the component illustrations.

The following illustration is an example.



(c) Torque specifications, grease application areas and non-reusable parts are emphasized in the procedures.

HINT:

There are cases where such information can only be explained by using an illustration. In these cases, torque, oil and other information are described in the illustration.

(d) Only items with key points are described in the text. What to do and other details are explained using illustrations next to the text. Both the text and illustrations are accompanied by standard values and notices.

Illustration	What to do and where to do it
Task heading	What work will be performed
Explanation text	• How to perform the task • Information such as specifications and warnings, which are written in boldface text

(e) Illustrations of similar vehicle models are sometimes used. In these cases, minor details may be different from the actual vehicle.

(f) Procedures are presented in a step-by-step format.

5. SERVICE SPECIFICATIONS

(a) Specifications are presented in boldface text throughout the manual. The specifications are also found in the "Service Specifications" section for reference.

6. TERM DEFINITIONS

CAUTION	Possibility of injury to you or other people.
NOTICE	Possibility of damage to components being repaired.
HINT	Provides additional information to help you perform repairs.

7. INTERNATIONAL SYSTEM OF UNITS

- (a) The units used in this manual comply with the International System of Units (SI UNIT) standard. Other units from the metric system and the English systems are also provided.

Example:

Torque: 30 N·m (310 kgf·cm, 22ft·lbf)



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Title: INTRODUCTION: TERMS: ABBREVIATIONS USED IN MANUAL (2013 FR-S)		

ABBREVIATIONS USED IN MANUAL

ABBREVIATION	MEANING
ABS	Anti-Lock Brake System
A/C	Air Conditioner
AC	Alternating Current
ACC	Accessory
ACIS	Acoustic Control Induction System
ACM	Active Control Engine Mount
ACSD	Automatic Cold Start Device
ACT	Actuator
A.D.D	Automatic Disconnecting Differential
ADM	P.T. Astra Daihatsu Motor
A/F	Air-Fuel Ratio
AFS	Adaptive Front-Lighting System
AHC	Active Height Control Suspension
AID	Air Injection Control Driver
ALR	Automatic Locking Retractor
ALT	Alternator
AMP	Amplifier
ANT	Antenna
ASG	Automated Sequential Gearbox
ASL	Automatic Sound Levelizer
ASSB	Assembly Services Sdn. Bhd.
A/T, ATM	Automatic Transmission (Transaxle)
A-TRAC, A-TRC	Active Traction Control
ATDC	After Top Dead Center
ATF	Automatic Transmission Fluid
AUTO	Automatic
AUX	Auxiliary
AVG	Average
AVS	Adaptive Variable Suspension
AWD	All Wheel Drive
B+, +B	Battery Voltage

BA	Brake Assist
BACS	Boost Altitude Compensation System
BATT	Battery
BDC	Bottom Dead Center
B/L	Bi-Level
B/S	Bore-Stroke Ratio
BTDC	Before Top Dead Center
BVSV	Bimetallic Vacuum Switching Valve
Calif.	California
CAN	Controller Area Network
CB	Circuit Breaker
CCM	Carbon Ceramic Material
CCo	Catalytic Converter for Oxidation
CCV	Canister Closed Valve
CD	Compact Disc
CF	Cornering Force
CG	Center of Gravity
CH	Channel
CKD	Complete Knock Down
CNG	Compressed Natural Gas
COMB.	Combination
CPS	Combustion Pressure Sensor
CPU	Central Processing Unit
CRAWL	Crawl Control
CRS	Child Restraint System
CTR	Center
C/V	Check Valve
CV	Control Valve
CVT	Continuously Variable Transmission (Transaxle)
CW	Curb Weight
DC	Direct Current
DEF	Defogger
DFL	Deflector
DIFF.	Differential
DIFF. LOCK	Differential Lock
D/INJ	Direct Injection
DLC	Data Link Connector

DLI	Distributorless Ignition
DOHC	Double Overhead Camshaft
DP	Dash Pot
DS	Dead Soak
DSP	Digital Signal Processor
DTC	Diagnostic Trouble Code
DVD	Digital Versatile Disc
EBD	Electric Brake Force Distribution
EC	Electrochromic
ECAM	Engine Control And Measurement System
ECD	Electronically Controlled Diesel
ECDY	Eddy Current Dynamometer
ECT	Electronic Controlled Automatic Transmission
ECU	Electronic Control Unit
ED	Electro-Deposited
EDU	Electronic Driving Unit
EDIC	Electric Diesel Injection Control
EFI	Electronic Fuel Injection
E/G	Engine
EGR	Exhaust Gas Recirculation
ELR	Emergency Locking Retractor
EMPS	Electric Motor Power Steering
EPS	Electric Power Steering
ENG	Engine
ES	Easy & Smooth
ESA	Electronic Spark Advance
EVAP	Evaporative Emission Control
E-VRV	Electric Vacuum Regulating Valve
EX	Exhaust
FE	Fuel Economy
FF	Front-Engine-Front-Wheel-Drive
F/G	Fuel Gauge
FIPG	Formed In Place Gasket
FL	Fusible Link
	Front Left
F/P	Fuel Pump
FR	Front

	Front Right
F/W	Flywheel
FW/D	Flywheel Damper
FWD	Front Wheel Drive
GAS	Gasoline
GND	Ground
GPS	Global Positioning System
GSA	Gear Shift Actuator
GTMC	Gac Toyota Motor Co., Ltd.
GTS	Global TechStream
H/B	Hatchback
H-FUSE	High Current Fuse
HID	High Intensity Discharge (Headlight)
HPU	Hydraulic Power Unit
HSG	Housing
HT	Hard Top
HV	Hybrid Vehicle
HWS	Heated Windshield System
IC	Integrated Circuit
IDI	Indirect Diesel Injection
IFS	Independent Front Suspension
IG	Ignition
IIA	Integrated Ignition Assembly
IMC	INDUS Motor Company Ltd.
IN	Intake (Manifold, Valve)
INT	Intermittent
I/P	Instrument Panel
IRS	Independent Rear Suspension
ISC	Idle Speed Control
ISCV	Idle Speed Control Valve
KD	Kick-Down
KDSS	Kinetic Dynamic Suspension System
LAN	Local Area Network
LCD	Liquid Crystal Display
LED	Light Emitting Diode
LEV	Low Emission Vehicle
LH	Left-Hand

LHD	Left-Hand Drive
LIN	Local Interconnect Network
L/H/W	Length, Height, Width
LLC	Long-Life Coolant
LNG	Liquefied Natural Gas
LPG	Liquefied Petroleum Gas
LSD	Limited Slip Differential
LSP & BV	Load Sensing Proportioning and Bypass Valve
LSPV	Load Sensing Proportioning Valve
MAP	Manifold Absolute Pressure
MAX.	Maximum
MIC	Microphone
MIL	Malfunction Indicator Lamp
MIN.	Minimum
MG1	Motor Generator No. 1
MG2	Motor Generator No. 2
MMT	Multi-mode Manual Transmission
MP	Multipurpose
MPI	Multipoint Electronic Injection
MPX	Multiplex Communication System
M/T	Manual Transmission (Transaxle)
MT	Mount
MTG	Mounting
N	Neutral
NA	Natural Aspiration
NO.	Number
O2S	Oxygen Sensor
OC	Oxidation Catalyst
OCV	Oil Control Valve
O/D	Overdrive
OEM	Original Equipment Manufacturing
OPT	Option
ORVR	On-board Refilling Vapor Recovery
O/S	Oversize
P & BV	Proportioning and Bypass Valve
PBD	Power Back Door
PCS	Power Control System

	Pre-crash Safety System/Pre-collision System
PCV	Positive Crankcase Ventilation
PKB	Parking Brake
PPS	Progressive Power Steering
PROM	Programmable Read Only Memory
PS	Power Steering
PSD	Power Slide Door
PTC	Positive Temperature Coefficient
PTO	Power Take-Off
PZEV	Partial Zero Emission Vehicle
P/W	Power Window
R & P	Rack and Pinion
RAM	Random Access Memory
RBS	Recirculating Ball Type Steering
REAS	Relative Absorber System
R/F	Reinforcement
RFS	Rigid Front Suspension
RH	Right-Hand
RHD	Right-Hand Drive
RL	Rear Left
ROM	Read Only Memory
RR	Rear
	Rear Right
RRS	Rigid Rear Suspension
RSE	Rear Seat Entertainment
RWD	Rear Wheel Drive
SC	Supercharger
SCV	Swirl Control Valve (for gasoline engine)
	Suction Control Valve (for diesel engine)
SFTM	Sichuan Faw Toyota Motor Co., Ltd.
SIA	Subaru of Indiana Automotive, Inc.
SICS	Starting Injection Control System
SLLC	Super Long Life Coolant
SOC	State Of Charge
SOHC	Single Overhead Camshaft
SPEC	Specification
SPI	Single Point Injection

SPV	Spill Control Valve
SRS	Supplemental Restraint System
SSM	Special Service Materials
SST	Special Service Tools
STD	Standard
STJ	Cold-Start Fuel Injection
SULEV	Super Ultra Low Emission Vehicle
T/A	Transaxle
TACH	Tachometer
TASA	Toyota Argentina S.A.
TCAP	Toyota Caetano Portugal, S.A.
TCM	Transmission Control Module
TCV	Timing Control Valve (for diesel engine)
	Tumble Control Valve (for gasoline engine)
TDB	Toyota do Brasil Ltda.
TDC	Top Dead Center
TDV	Toyota de Venezuela, C.A.
TEMP.	Temperature
TFT	TOYOTA Free-Tronic
TFTM	Tianjin Faw Toyota Motor Co., Ltd.
THS II	TOYOTA Hybrid System II
TIS	Total Information System for Vehicle Development
T/M	Transmission
TMC	Toyota Motor Corporation
TMCA	Toyota Motor Corporation Australia Ltd.
TMMBC	Toyota Motor Manufacturing de Baja California, S. de R.L. de C.V.
TMMC	Toyota Motor Manufacturing Canada Inc.
TMMF	Toyota Motor Manufacturing France S.A.S.
TMMI	Toyota Motor Manufacturing, Indiana, Inc.
TMMIN	P.T. Toyota Motor Manufacturing Indonesia
TMMK	TOYOTA Motor Manufacturing Kentucky, Inc.
TMMR	Toyota Motor Manufacturing Russia
TMMT	Toyota Motor Manufacturing Turkey Inc.
TMMTX	Toyota Motor Manufacturing, Texas, Inc.
TMUK	Toyota Motor Manufacturing (UK) Ltd.
TMP	Toyota Motor Philippines Corp.
TMT	Toyota Motor Thailand Co. Ltd.

TMV	Toyota Motor Vietnam Co., Ltd.
TPCA	Toyota Peugeot Citroen Automobiles Czech, s.r.o.
TRAC/TRC	Traction Control System
TSAM	Toyota South Africa Motors (Pty) Ltd.
TVIP	TOYOTA Vehicle Intrusion Protection
TWC	Three-Way Catalyst
U/D	Underdrive
U/S	Undersize
VCV	Vacuum Control Valve
VDIM	Vehicle Dynamics Integrated Management
VENT	Ventilator
VGRS	Variable Gear Ratio Steering
VIM	Vehicle Interface Module
VIN	Vehicle Identification Number
VLC	Valve Lift Control
VPS	Variable Power Steering
VSC	Vehicle Stability Control
VSV	Vacuum Switching Valve
VTV	Vacuum Transmitting Valve
VVT-i	Variable Valve Timing-intelligent
W/, w/	With
WGN	Wagon
W/H	Wire Harness
W/O, w/o	Without
X-REAS	X-Relative Absorber System
1ST, 1st	First
2ND, 2nd	Second
2WD	Two Wheel Drive Vehicle (4 x 2)
3RD, 3rd	Third
4TH, 4th	Fourth
4WD	Four Wheel Drive Vehicle (4 x 4)
4WS	Four Wheel Steering System
5TH, 5th	Fifth
6TH, 6th	Sixth
7TH, 7th	Seventh
8TH, 8th	Eighth



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GLOSSARY OF SAE AND SCION TERMS

This glossary lists all SAE-J1930 terms and abbreviations used in this manual in compliance with SAE recommendations, as well as their SCION equivalents.

SAE ABBREVIATION	SAE TERM	SCION TERM ()-ABBREVIATION
A/C	Air Conditioning	Air Conditioner
ACL	Air Cleaner	Air Cleaner, A/CL
AIR	Secondary Air Injection	Air Injection (AI)
AP	Accelerator Pedal	-
B+	Battery Positive Voltage	+B, Battery Voltage
BARO	Barometric Pressure	-
CAC	Charge Air Cooler	Intercooler
CARB	Carburetor	Carburetor
CFI	Continuous Fuel Injection	-
CKP	Crankshaft Position	Crank Angle
CL	Closed Loop	Closed Loop
CMP	Camshaft Position	Cam Angle
CPP	Clutch Pedal Position	-
CTOX	Continuous Trap Oxidizer	-
CTP	Closed Throttle Position	LL ON, Idle ON
DFI	Direct Fuel Injection	Direct Injection (DI./INJ)
DI	Distributor Ignition	-
DLC3	Data Link Connector 3	OBD II Diagnostic Connector
DTC	Diagnostic Trouble Code	Diagnostic Trouble Code
DTM	Diagnostic Test Mode	-
ECL	Engine Coolant Level	-
ECM	Engine Control Module	Engine Electronic Control Unit (ECU)
ECT	Engine Coolant Temperature	Coolant Temperature, Water Temperature (THW)
EEPROM	Electrically Erasable Programmable Read Only Memory	Electrically Erasable Programmable Read Only Memory (EEPROM)
EFE	Early Fuel Evaporation	Cold Mixture Heater (CMH), Heat Control Valve (HCV)
EGR	Exhaust Gas Recirculation	Exhaust Gas Recirculation (EGR)

EI	Electronic Ignition	Distributorless Ignition (DLI)
EM	Engine Modification	Engine Modification (EM)
EPROM	Erasable Programmable Read Only Memory	Programmable Read Only Memory (PROM)
EVAP	Evaporative Emission	Evaporative Emission Control (EVAP)
FC	Fan Control	-
FEEPROM	Flash Electrically Erasable Programmable Read Only Memory	-
FEPROM	Flash Erasable Programmable Read Only Memory	-
FF	Flexible Fuel	-
FP	Fuel Pump	Fuel Pump
GEN	Generator	Alternator
GND	Ground	Ground (GND)
HO ₂ S	Heated Oxygen Sensor	Heated Oxygen Sensor (HO ₂ S)
IAC	Idle Air Control	Idle Speed Control (ISC)
IAT	Intake Air Temperature	Intake or Inlet Air Temperature
ICM	Ignition Control Module	-
IFI	Indirect Fuel Injection	Indirect Injection (IDL)
IFS	Inertia Fuel-Shutoff	-
ISC	Idle Speed Control	-
KS	Knock Sensor	Knock Sensor
MAF	Mass Airflow	Air Flow Meter
MAP	Manifold Absolute Pressure	Manifold Pressure Intake Vacuum
MC	Mixture Control	Electric Bleed Air Control Valve (EBCV) Mixture Control Valve (MCV) Electric Air Control Valve (EACV)
MDP	Manifold Differential Pressure	-
MFI	Multiport Fuel Injection	Electronic Fuel Injection (EFI)
MIL	Malfunction Indicator Lamp	Check Engine Light
MST	Manifold Surface Temperature	-
MVZ	Manifold Vacuum Zone	-
NVRAM	Non-Volatile Random Access Memory	-
O ₂ S	Oxygen Sensor	Oxygen Sensor, O ₂ Sensor (O ₂ S)
OBD	On-Board Diagnostic	On-Board Diagnostic System (OBD)
OC	Oxidation Catalytic Converter	Oxidation Catalytic Convert (OC), CCo
OL	Open Loop	Open Loop
PAIR	Pulsed Secondary Air Injection	Air Suction (AS)
PCM	Powertrain Control Module	-

PNP	Park/Neutral Position	-
PROM	Programmable Read Only Memory	-
PSP	Power Steering Pressure	-
PTOX	Periodic Trap Oxidizer	Diesel Particulate Filter (DPF) Diesel Particulate Trap (DPT)
RAM	Random Access Memory	Random Access Memory (RAM)
RM	Relay Module	-
ROM	Read Only Memory	Read Only Memory (ROM)
RPM	Engine Speed	Engine Speed
SC	Supercharger	Supercharger
SCB	Supercharger Bypass	E-ABV
SFI	Sequential Multiport Fuel Injection	Electronic Fuel Injection (EFI), Sequential Injection
SPL	Smoke Puff Limiter	-
SRI	Service Reminder Indicator	-
SRT	System Readiness Test	-
ST	Scan Tool	-
TB	Throttle Body	Throttle Body
TBI	Throttle Body Fuel Injection	Single Point Injection Central Fuel Injection (CI)
TC	Turbocharger	Turbocharger
TCC	Torque Converter Clutch	Torque Converter
TCM	Transmission Control Module	Transmission ECU, ECT ECU
TP	Throttle Position	Throttle Position
TR	Transmission Range	-
TVV	Thermal Vacuum Valve	Bimetallic Vacuum Switching Valve (BVSV) Thermostatic Vacuum Switching Valve (TVSV)
TWC	Three-Way Catalytic Converter	Three-Way Catalytic (TWC) Manifold Converter CC _{RO}
TWC+OC	Three-Way + Oxidation Catalytic Converter	CC _R + CC _O
VAF	Volume Airflow	Air Flow Meter
VR	Voltage Regulator	Voltage Regulator
VSS	Vehicle Speed Sensor	Vehicle Speed Sensor
WOT	Wide Open Throttle	Full Throttle
WU-OC	Warm Up Oxidation Catalytic Converter	-
WU-TWC	Warm Up Three-Way Catalytic Converter	-

3GR	Third Gear	-
4GR	Fourth Gear	-



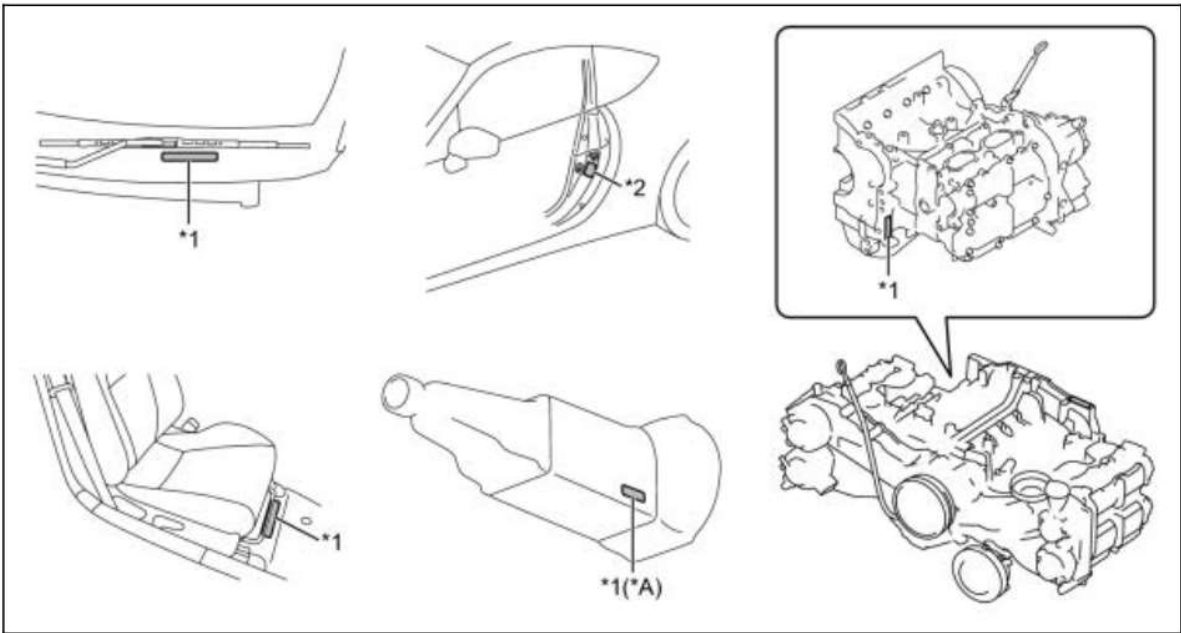
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Title: INTRODUCTION: IDENTIFICATION INFORMATION: VEHICLE IDENTIFICATION AND SERIAL NUMBERS (2013 FR-S)		

VEHICLE IDENTIFICATION AND SERIAL NUMBERS

1. VEHICLE IDENTIFICATION NUMBER

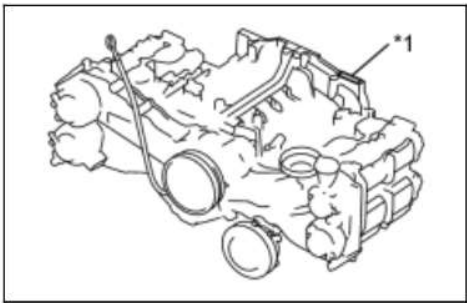
(a) The vehicle identification number is stamped on the vehicle body and on the certification label as shown in the illustration.



Text in Illustration

*A	Manual transmission	-	-
*1	Vehicle Identification Number	*2	Certification Label

2. ENGINE SERIAL NUMBER AND TRANSMISSION SERIAL NUMBER

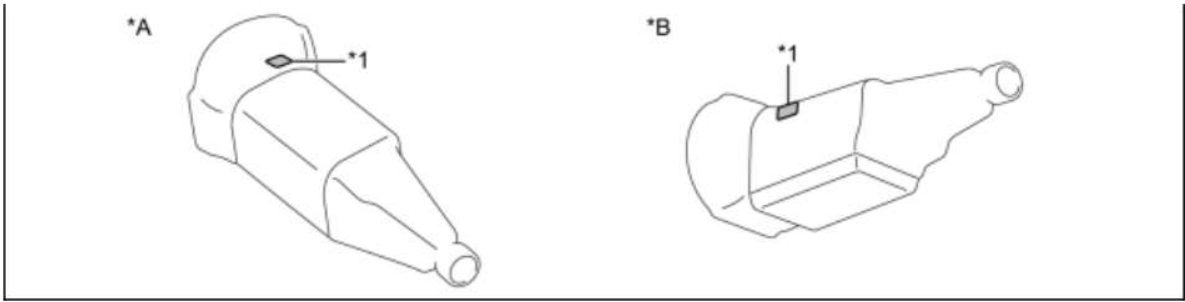


(a) The engine serial number is stamped on the cylinder block of the engine as shown in the illustration.

Text in Illustration

*1	FA20 Engine Serial Number
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(b) The transmission serial number is printed on the transmission number label.



Text in Illustration

*A	TL70	*B	TX6A
*1	Transmission Number Label	-	-



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Title: INTRODUCTION: HOW TO TROUBLESHOOT ECU CONTROLLED SYSTEMS: ELECTRONIC CIRCUIT INSPECTION PROCEDURE (2013 FR-S)		

ELECTRONIC CIRCUIT INSPECTION PROCEDURE

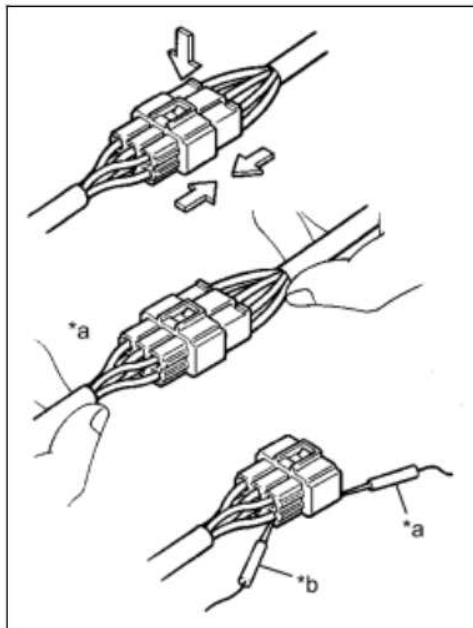
1. BASIC INSPECTION

(a) WHEN MEASURING RESISTANCE OF ELECTRONIC PARTS

- (1) Unless otherwise stated, all resistance measurements are standard values measured at an ambient temperature of 20°C (68°F). Resistance measurements may be inaccurate if measured at high temperatures, i.e. immediately after the vehicle has been running. Measurements should be made after the engine has cooled down.

(b) HANDLING CONNECTORS

Text in Illustration



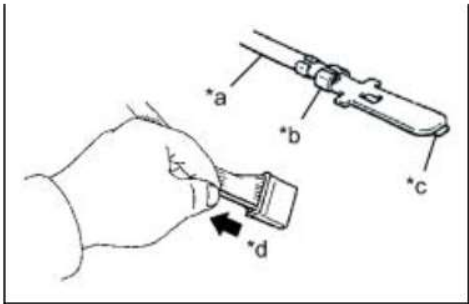
*a	INCORRECT
*b	CORRECT

- (1) When disconnecting a connector, first squeeze the mating connector housing halves tightly together to release the lock, and then press the lock claw and separate the connector.
- (2) When disconnecting a connector, do not pull on the harnesses. Grasp the connector directly and separate it.
- (3) Before connecting a connector, check that there are no deformations, damage, looseness or missing terminals.
- (4) When connecting a connector, press firmly until it locks with a "click" sound.
- (5) If checking a connector with a TOYOTA electrical tester, check the connector from the backside (harness side) using a mini test lead.

NOTICE:

- As a waterproof connector cannot be checked from the backside, check it by connecting a sub-harness.
- Do not damage the terminals by moving the inserted tester needle.

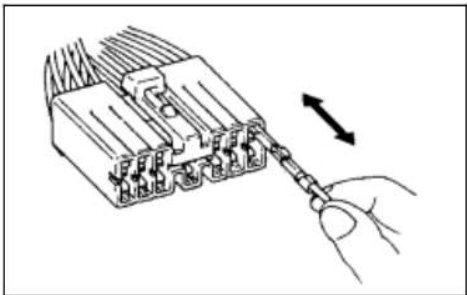
(c) CHECKING CONNECTORS



Text in Illustration

*a	Core Wire
*b	Looseness of Crimping
*c	Terminal Deformation
*d	Pull Lightly

- (1) Checking when a connector is connected: Squeeze the connectors together to confirm that they are fully connected and locked.
- (2) Checking when a connector is disconnected: Check by pulling the wire harness lightly from the backside of the connector. Look for unlatched terminals, missing terminals, loose crimps or broken conductor wires. Visually check for corrosion, metallic or foreign matter and water, and bent, rusted, overheated, contaminated or deformed terminals.



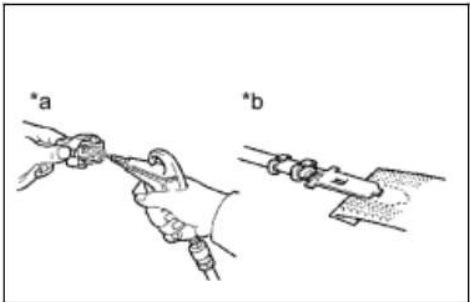
- (3) Checking the contact pressure of the terminal:
Prepare a spare male terminal. Insert it into a female terminal, and check for ample tension when inserting and after full engagement.

NOTICE:
When testing a gold-plated female terminal, always use a gold-plated male terminal.

(d) CONNECTOR TERMINAL REPAIR METHOD

Text in Illustration

*a	CORRECT
*b	INCORRECT

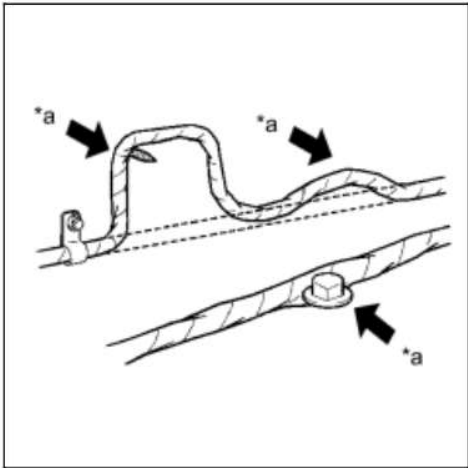


- (1) If there is any foreign matter on the terminal, clean the contact point with compressed air or a cloth. Never rub the contact point using sandpaper as the plating may come off.
- (2) If there is abnormal contact pressure, replace the female terminal. If the male terminal is gold-plated (gold color), use a gold-plated female terminal; if it is silver-plated (silver color), use a silver-plated female terminal.

- (3) Damaged, deformed or corroded terminals should be replaced. If the terminal does not lock into the housing, the housing may have to be replaced.

(e) WIRE HARNESS HANDLING

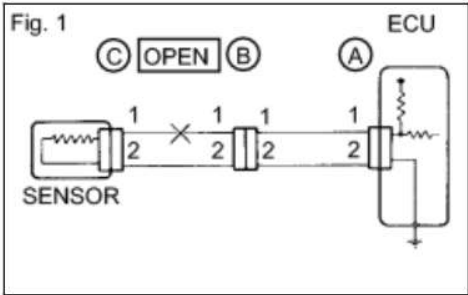
Text in Illustration



*a	INCORRECT
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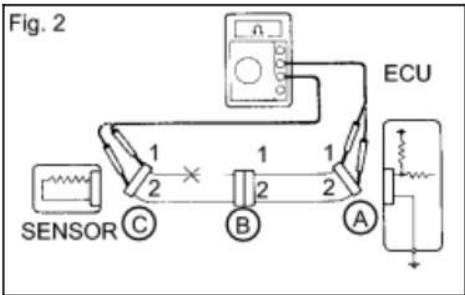
- (1) If removing a wire harness, check the wiring and clamps before proceeding so that it can be restored in the same way.
- (2) Never twist, pull or slacken the wire harness more than necessary.
- (3) The wire harness should never come into contact with any high temperature part, rotating, moving, vibrating or sharp-edged parts. Avoid contact with panel edges, screw tips and other sharp items.
- (4) When installing parts, never pinch the wire harness.
- (5) Never cut or break the cover of the wire harness. If it is cut or broken, repair it with insulating tape or replace the wire harness.

2. CHECK FOR OPEN CIRCUIT



- (a) For an open circuit in the wire harness in Fig. 1, measure the resistance and voltage as follows:

(b) Check the resistance.



- (1) Disconnect connectors A and C and measure the resistance between the terminals of the connectors.

Standard Resistance (Fig. 2):

TESTER CONNECTION	SPECIFIED CONDITION
Connector A terminal 1 - Connector C terminal 1	10 k Ω or higher
Connector A terminal 2 - Connector C terminal 2	Below 1 Ω

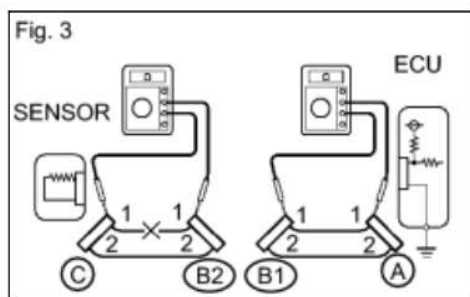
HINT:

Measure the resistance while lightly shaking the wire harness vertically and horizontally.

If the results match the values specified above, an open circuit exists between terminal 1 of connector A and terminal 1 of connector C.

(2) Disconnect connector B and measure the resistance between the terminals of the connectors.

Standard Resistance (Fig. 3):



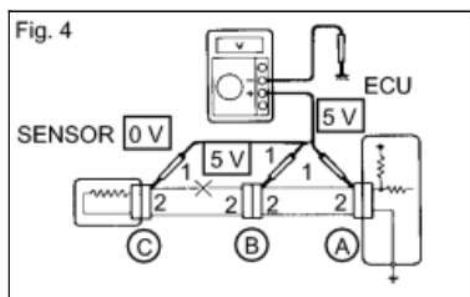
TESTER CONNECTION	SPECIFIED CONDITION
Connector A terminal 1 - Connector B1 terminal 1	Below 1 Ω
Connector B2 terminal 1 - Connector C terminal 1	10 k Ω or higher

If the results match the values specified above, an open circuit exists between terminal 1 of connector B2 and terminal 1 of connector C.

(c) Check the voltage.

(1) In a circuit in which voltage is applied to the ECU connector terminal, an open circuit can be checked by conducting a voltage check.

With each connector still connected, measure the voltage between body ground and the following terminals (in this order): 1) terminal 1 of connector A, 2) terminal 1 of connector B, and 3) terminal 1 of connector C.

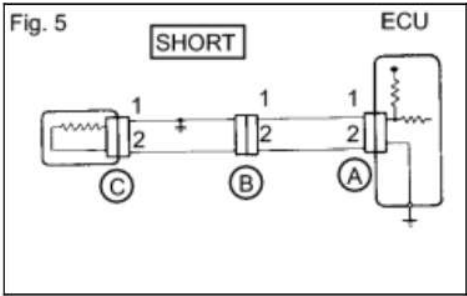


Standard Voltage (Fig. 4):

TESTER CONNECTION	SPECIFIED CONDITION
Connector A terminal 1 - Body ground	5 V
Connector B terminal 1 - Body ground	5 V
Connector C terminal 1 - Body ground	Below 1 V

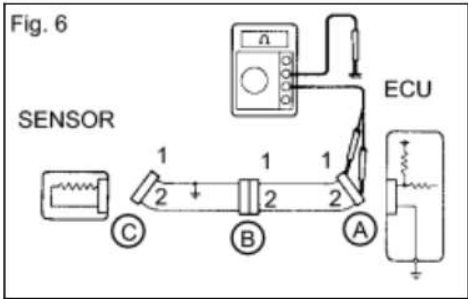
If the results match the values specified above, an open circuit exists in the wire harness between terminal 1 of connector B and terminal 1 of connector C.

3. CHECK FOR SHORT CIRCUIT



(a) If a wire in the harness is shorted to ground (Fig. 5), locate the shorted section by measuring the resistance as follows:

(b) Check the resistance to body ground.



(1) Disconnect connectors A and C and measure the resistance.

Standard Resistance (Fig. 6):

TESTER CONNECTION	SPECIFIED CONDITION
Connector A terminal 1 - Body ground	Below 1 Ω
Connector A terminal 2 - Body ground	10 k Ω or higher

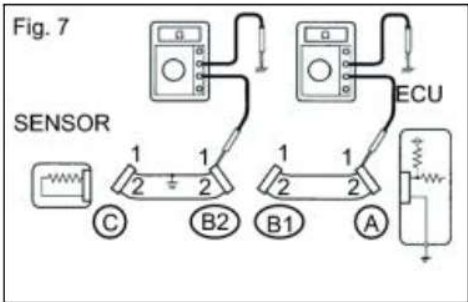
HINT:

Measure the resistance while lightly shaking the wire harness vertically and horizontally.

If the results match the values specified above, a short circuit exists between terminal 1 of connector A and terminal 1 of connector C.

(2) Disconnect connector B and measure the resistance.

Standard Resistance (Fig. 7):



TESTER CONNECTION	SPECIFIED CONDITION
Connector A terminal 1 - Body ground	10 k Ω or higher
Connector B2 terminal 1 - Body ground	Below 1 Ω

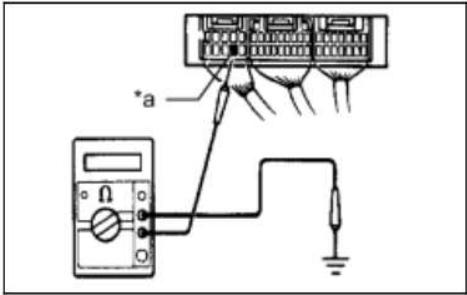
If the results match the values specified above, a

short circuit exists between terminal 1 of connector B2 and terminal 1 of connector C.

4. CHECK AND REPLACE ECU

NOTICE:

- The connector should not be disconnected from the ECU. Perform the inspection from the backside of the connector on the wire harness side.
 - When no measuring condition is specified, perform the inspection with the engine stopped and the ignition switch ON.
 - Check that the connectors are fully seated. Check for loose, corroded or broken wires.
- (a) First, check the ECU ground circuit. If it is faulty, repair it. If it is normal, the ECU could be faulty. Temporarily replace the ECU with a normally functioning one and check if the symptoms occur. If the trouble symptoms disappear, replace the original ECU.

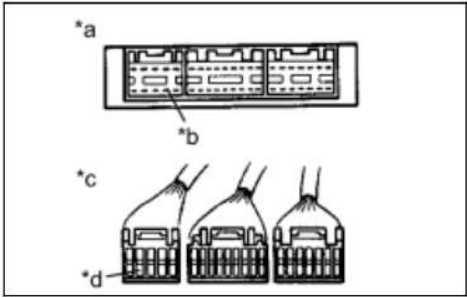


- (1) Measure the resistance between the ECU ground terminal and body ground.

Text in Illustration

*a	Ground
----	--------

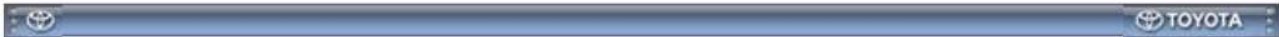
Standard resistance:
Below 1 Ω



- (2) Disconnect the ECU connector. Check the ground terminals on the ECU side and wire harness side for bent terminals, corrosion or foreign matter. Lastly, check the contact pressure of the female terminals.

Text in Illustration

*a	Component without harness connected (ECU)
*b	Ground
*c	Front view of wire harness connector (to ECU)
*d	Ground



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Title: INTRODUCTION: HOW TO TROUBLESHOOT ECU CONTROLLED SYSTEMS: GENERAL INFORMATION (2013 FR-S)		

GENERAL INFORMATION

A large number of ECU controlled systems are used in this vehicle. In general, ECU controlled systems are considered to be very intricate, requiring a high level of technical knowledge to troubleshoot. However, most problem checking procedures only involve inspecting the ECU controlled system circuits one by one. An adequate understanding of the system and a basic knowledge of electricity is enough to perform effective troubleshooting, accurate diagnosis and necessary repairs.

(For using the Techstream*)

HINT:

***: The Techstream is the name for the diagnostic tester in North America.**

- o Before using the Techstream, read the operator's manual thoroughly.
- o If the Techstream cannot communicate with the ECU controlled systems when connected to the DLC3 with the ignition switch ON and the Techstream turned on, there is a problem on the vehicle side or the Techstream side.
 - i. If communication is possible when the Techstream is connected to another vehicle, inspect the diagnosis data link line (bus (+) line), CANH and CANL lines, and the power circuits for the vehicle ECUs.
 - ii. If communication is still not possible when the Techstream is connected to another vehicle, the problem is probably in the Techstream itself. Perform the Self Test procedure outlined in the Techstream operator's manual.

1. TROUBLESHOOTING PROCEDURES

- The troubleshooting procedures consist of diagnosis procedures for when a DTC is stored and diagnosis procedures for when no DTC is stored. The basic idea is explained in the following table.

PROCEDURE TYPE	DETAILS	TROUBLESHOOTING METHOD
DTC Based Diagnosis	The diagnosis procedure is based on the DTC that is stored.	The malfunctioning part is identified based on the DTC detection conditions using a process of elimination. The possible trouble areas are eliminated one-by-one by use of the Techstream and inspection of related parts.
Symptom Based Diagnosis (No DTCs stored)	The diagnosis procedure is based on problem symptoms.	The malfunctioning part is identified based on the problem symptoms using a process of elimination. The possible trouble areas are eliminated one-by-one by use of the Techstream and inspection of related parts.

- Vehicle systems are complex and use many ECUs that are difficult to inspect independently. Therefore, a process of elimination is used, where components that can be inspected

individually are inspected, and if no problems are found in these components, the related ECU is identified as the problem and replaced.

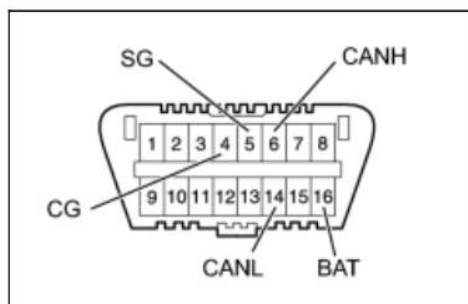
- It is extremely important to ask the customer about the environment and the conditions present when the problem occurred (Customer Problem Analysis). This makes it possible to simulate the conditions and confirm the symptom. If the symptom cannot be confirmed or the DTC does not recur, the malfunctioning part may not be identified using the troubleshooting procedure, and the ECU for the related system may be replaced even though it is not defective. If this happens, the original problem will not be solved.
- In order to prevent endless expansion of troubleshooting procedures, the troubleshooting procedures are written with the assumption that multiple malfunctions do not occur simultaneously for a single problem symptom.
- To identify the malfunctioning part, troubleshooting procedures narrow down the target by separating components, ECUs and wire harnesses during the inspection. If the wire harness is identified as the cause of the problem, it is necessary to inspect not only the connections to components and ECUs but also all of the wire harness connectors between the component and the ECU.

2. DESCRIPTION

- (a) The data of each system and Diagnostic Trouble Codes (DTCs) can be read from the Data Link Connector 3 (DLC3) of the vehicle. When the system seems to be malfunctioning, use the Techstream to check for malfunctions and perform repairs.

3. CHECK DLC3

- (a) The vehicle ECUs use ISO 15765-4 communication protocol. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 15765-4 format.



TERMINAL NO. (SYMBOL)	TERMINAL DESCRIPTION	CONDITION	SPECIFIED CONDITION
4 (CG) - Body ground	Chassis ground	Always	Below 1 Ω
5 (SG) - Body ground	Signal ground	Always	Below 1 Ω
16 (BAT) - Body ground	Battery positive	Always	11 to 14 V
6 (CANH) - 14 (CANL)	CAN bus line	Ignition switch off*	57 to 63 Ω
6 (CANH) - 4 (CG)	HIGH-level CAN bus line	Ignition switch off*	200 Ω or higher
14 (CANL) - 4 (CG)	LOW-level CAN bus line	Ignition switch off*	200 Ω or higher
6 (CANH) - 16 (BAT)	HIGH-level CAN bus line	Ignition switch off*	6 k Ω or higher
14 (CANL) - 16 (BAT)	LOW-level CAN bus line	Ignition switch off*	6 k Ω or higher

NOTICE:

*: Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the ignition switch, any other switches or the doors.

If the result is not as specified, the DLC3 may have a malfunction. Repair or replace the harness or connector.



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Title: INTRODUCTION: HOW TO TROUBLESHOOT ECU CONTROLLED SYSTEMS: HOW TO PROCEED WITH TROUBLESHOOTING (2013 FR-S)		

HOW TO PROCEED WITH TROUBLESHOOTING

1. OPERATION FLOW

HINT:

Perform troubleshooting in accordance with the procedure below. The following is an outline of basic troubleshooting procedure. Confirm the troubleshooting procedure for the circuit you are working on before beginning troubleshooting.

1.	VEHICLE BROUGHT TO WORKSHOP
-----------	------------------------------------

NEXT



2.	CUSTOMER PROBLEM ANALYSIS
-----------	----------------------------------

(a) Ask the customer about the conditions and environment when the problem occurred.

NEXT



3.	INSPECT BATTERY VOLTAGE
-----------	--------------------------------

Standard voltage:

11 to 14 V

If the voltage is below 11 V, recharge or replace the battery before proceeding to the next step.

NEXT



4.	SYMPTOM CONFIRMATION AND DTC (AND FREEZE FRAME DATA) CHECK
-----------	---

(a) Visually check the wire harnesses, connectors and fuses for open and short circuits.

(b) Warm up the engine to the normal operating temperature.

(c) Confirm the problem symptoms and conditions, and check for DTCs.

Result:

RESULT	PROCEED TO
DTC is output	A
DTC is not output	B

B ► GO TO STEP 6

A



5.	DTC CHART
-----------	------------------

(a) Find the output DTC in the DTC chart. Look at the Trouble Area column for a list of potentially malfunctioning circuits and/or parts.

NEXT ► GO TO STEP 7

6.	PROBLEM SYMPTOMS CHART
-----------	-------------------------------

(a) Find the problem symptoms in the problem symptoms table. Look at the Suspected Area column for a list of potentially malfunctioning circuits and/or parts.

NEXT



7.	CIRCUIT INSPECTION OR PARTS INSPECTION
-----------	---

(a) Identify the malfunctioning circuit or part.

NEXT



8.	ADJUST, REPAIR OR REPLACE
-----------	----------------------------------

(a) Adjust, repair or replace the malfunctioning circuit or parts.

NEXT

9.	CONFIRMATION TEST
-----------	--------------------------

- (a) After the adjustment, repairs or replacement of components, confirm that the malfunction no longer exists. If the malfunction does not recur, perform a confirmation test under the same conditions and in the same environment as when the malfunction first occurred.

NEXT **END**

2. CUSTOMER PROBLEM ANALYSIS**HINT:**

- When troubleshooting, confirm that the problem symptoms have been accurately identified. Preconceptions should be discarded in order to make an accurate judgment. To clearly understand what the problem symptoms are, it is extremely important to ask the customer about the problem and the conditions at the time the malfunction occurred.
- Gather as much information as possible for reference. Past problems that seem unrelated may also help in some cases.
- The following 5 items are important points for problem analysis:

What	Vehicle model, system name
When	Date, time, occurrence frequency
Where	Road conditions
Under what conditions?	Driving conditions, weather conditions
How did it happen?	Problem symptoms

3. SYMPTOM CONFIRMATION AND DIAGNOSTIC TROUBLE CODE**HINT:**

The diagnostic system in this vehicle has various functions.

- The first function is the Diagnostic Trouble Code (DTC) check. A DTC is a code stored in the ECU memory whenever a malfunction in the signal circuits to the ECU occurs. In a DTC check, a previous malfunction's DTC can be checked by a technician during troubleshooting.
- Another function is the Input Signal Check, which checks if the signals from various switches are sent to the ECU correctly.

By using these functions, the problem areas can be narrowed down and troubleshooting can be more effective. Diagnostic functions are incorporated in the following systems of this vehicle.

SYSTEM	SYMPTOM CONFIRMATION AND DIAGNOSTIC TROUBLE CODE				
	DTC CHECK	DTC CHECK	SENSOR CHECK/TEST MODE (INPUT SIGNAL CHECK)	DATA LIST	ACTIVE TEST

	(NORMAL MODE)	(CHECK MODE)			
SFI System (FA20)	○	○	-	○	○
Ignition System (FA20)	-	-	-	-	-
Fuel System (FA20)	-	-	-	-	-
Emission Control System (FA20)	-	-	-	-	-
Intake System (FA20)	-	-	-	-	-
Cooling Fan System (FA20)	-	-	-	-	-
Starting System (FA20)	-	-	-	-	-
Key Inter Lock System (FA20)	-	-	-	-	-
Cruise Control System	○	-	-	○	○
Automatic Transmission System (TX6A)	○	○	-	○	○
Tire Pressure Warning System	○	-	○	○	○
Vehicle Stability Control System	○	-	○	○	○
Power Steering System	○	-	-	○	-
Audio and Visual System	-	-	-	-	-
Charging System (FA20)	○	○	-	○	○
Electric Power Control System	○	-	-	○	-
LIN Communication System	○	-	-	-	-
CAN Communication System	○	-	-	-	-
Power Door Lock Control System	-	-	-	○	○
Wireless Door Lock Control System	○	-	-	○	○
Key Reminder Warning System	-	-	-	○	-
Engine Immobiliser System	○	-	-	○	○
Lighting System (INT)	-	-	-	○	○
Meter / Gauge System	○	-	-	○	○
Clock System	-	-	-	-	-
Airbag System	○	○	-	○	-

Occupant Classification System	○	-	-	○	-
Seat Heater System	-	-	-	-	-
Seat Belt Warning System	-	-	-	○	○
Air Conditioning System	-	-	-	○	○
Power Window Control System	○	-	-	○	○
Window Defogger System	-	-	-	○	○
Luggage Compartment Door Opener System	-	-	-	○	○
Power Mirror Control System	-	-	-	-	-
Wiper and Washer System	-	-	-	-	-
Lighting System (EXT)	○	-	-	○	○
Horn System	-	-	-	-	-

- In the DTC check, it is very important to determine whether the problem indicated by the DTC either: 1) still occurs, or 2) occurred in the past but has returned to normal. In addition, the DTC should be compared to the problem symptom to see if they are related. For this reason, DTCs should be checked before and after confirmation of symptoms (i.e., whether or not problem symptoms exist) to determine current system conditions, as shown in the flowchart below.
- Never skip the DTC check. Failing to check for DTCs, depending on the case, may result in unnecessary troubleshooting for systems operating normally or lead to repairs not related to the problem. Follow the procedure listed in the flowchart in the correct order.
- The following flowchart shows how to proceed with troubleshooting using the DTC check. Directions from the flowchart will indicate how to proceed either to DTC troubleshooting or to the troubleshooting of each problem symptom.

1.	DTC CHECK
-----------	------------------

NEXT

2.	MAKE A NOTE OF DTC DISPLAYED AND THEN CLEAR DTCs
-----------	---

NEXT

3.	SYMPTOM CONFIRMATION
-----------	-----------------------------

Result:

RESULT	PROCEED TO
No symptoms exist	A
Symptoms exist	B

B ► GO TO STEP 5**A**
▼

4.	SIMULATION TEST USING SYMPTOM SIMULATION METHODS
-----------	---

NEXT

5.	DTC CHECK
-----------	------------------

Result:

RESULT	PROCEED TO
DTC is not output	A
DTC is output	B

B ► TROUBLESHOOT FOR PROBLEM INDICATED BY DTC**A**
▼

6.	SYMPTOM CONFIRMATION
-----------	-----------------------------

Result:

RESULT	PROCEED TO
Symptoms exist	A

No symptoms exist

B

If a DTC was displayed in the initial DTC check, the problem may have occurred in a wire harness or connector in that circuit in the past. Check the wire harness and connectors.

B ► **END**

A ► **TROUBLESHOOT FOR EACH PROBLEM SYMPTOM**

If problem symptoms are present, but no DTCs were stored again after they were cleared, then the problem causing the symptom may be occurring for something that does not store DTCs (the DTC that was displayed in the initial DTC check may have been from a past problem or a secondary problem).

4. SYMPTOM SIMULATION

HINT:

The most difficult case in troubleshooting is when no problem symptoms occur. In such a case, a thorough problem analysis must be carried out. A simulation of the same or similar conditions and environment in which the problem occurred in the customer's vehicle should be carried out. No matter how much skill or experience a technician has, troubleshooting without confirming the problem symptoms will lead to important repairs being overlooked and mistakes or delays.

For example:

With a problem that only occurs when the engine is cold or as a result of vibration caused by the road during driving, the problem can never be determined if the symptoms are being checked on a stationary vehicle or a vehicle with a warmed-up engine. Vibration, heat or water penetration (moisture) is difficult to reproduce. The following symptom simulation tests are effective substitutes for the conditions and can be applied to a stationary vehicle. Important points in the symptom simulation test:

In the symptom simulation test, the problem symptoms as well as the problem area or parts must be confirmed. First, narrow down the possible problem circuits according to the symptoms. Then, connect the tester and carry out the symptom simulation test, judging whether the circuit being tested is defective or normal. Also, confirm the problem symptoms at the same time. Refer to Problem Symptoms Table for each system to narrow down the possible causes.

To reproduce DTCs, it is necessary to satisfy the respective DTC detection conditions.

(a) **VIBRATION METHOD:** When a malfunction seems to occur as a result of vibration.

Text in Illustration

*a	Vibrate Slightly
*b	Shake Slightly

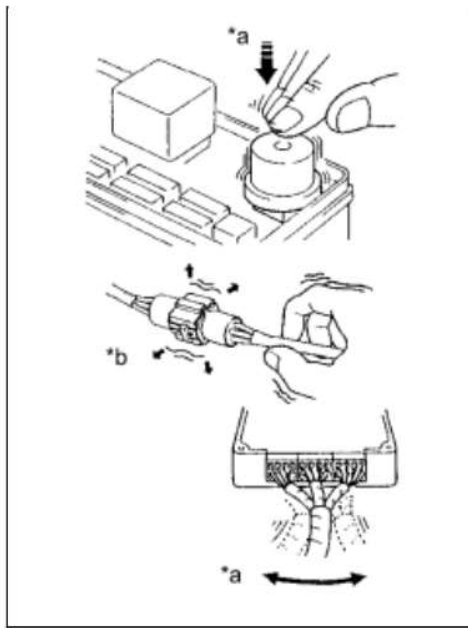
(1) PARTS OR SENSORS

Apply slight vibration with a finger to the part or sensor suspected to be the cause of the problem, and check whether the malfunction occurs.

NOTICE:

Applying strong vibration to relays may open the relays.

(2) CONNECTORS



Slightly shake the connector vertically and horizontally.

(3) WIRE HARNESS

Slightly shake the wire harness vertically and horizontally.

HINT:

The connector joint and fulcrum of the vibration are the major areas that should be checked thoroughly.

(b) HEAT METHOD: When a malfunction seems to occur when the area in question is heated.

- (1) Heat the component that is the possible cause of the malfunction with a hair dryer or similar device. Check if the malfunction occurs.

NOTICE:

- Do not heat components to more than 60°C (140°F). Exceeding this temperature may damage the components.
- Do not apply heat directly to parts in an ECU.

(c) WATER SPRINKLING METHOD: When a malfunction seems to occur on a rainy day or in high-humidity.

- (1) Sprinkle water onto the vehicle and check if the malfunction occurs.

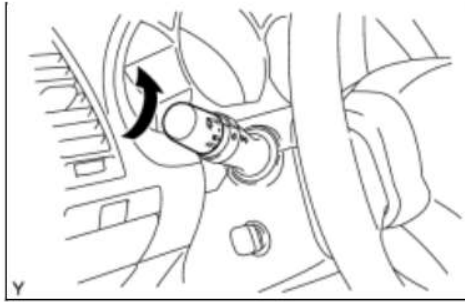


NOTICE:

- Never sprinkle water directly into the engine compartment. Indirectly change the temperature and humidity by spraying water onto the front of the radiator.
- Never apply water directly onto the electronic components.

HINT:

If the vehicle has or had a water leak problem, the leak may have damaged the ECU or connections. Look for evidence of corrosion or short circuits. Proceed with caution during water tests.



(d) **HIGH ELECTRICAL LOAD METHOD:** When a malfunction seems to occur when the electrical load is high.

- (1) Turn on the heater blower, headlights, rear window defogger and all other electrical loads. Check if the malfunction recurs.

5. DIAGNOSTIC TROUBLE CODE CHART

Look for output Diagnostic Trouble Codes (DTCs) (from the DTC checks) in the appropriate section's Diagnostic Trouble Code chart. Use the chart to determine the trouble area and the proper inspection procedure. A description of each of the chart's columns is shown in the table below.

ITEM	DESCRIPTION
DTC No.	Indicates the diagnostic trouble code.
Detection Item	Indicates the system or details of the problem.
Trouble Area	Indicates the suspected areas of the problem.
See page	Indicates the page where the inspection procedure for each circuit is to be found, or gives instruction for checking and repairs.

6. PROBLEM SYMPTOMS TABLE

When no DTC is output but the problem still occurs, use the Problem Symptoms Table. The suspected areas (circuits or parts) for each problem symptom are shown in the table. The suspected areas are listed in order of probability. A description of each of the table columns is shown in the following table.

HINT:

In some cases, the problem is not detected by the diagnostic system even though a problem symptom occurs. It is possible that the problem occurs outside the detection range of the diagnostic system, or that the problem occurs in a completely different system.

ITEM	DESCRIPTION
Symptom	-
Suspected Area	Indicates the circuit or part which needs to be checked.
See page	Indicates the page where the inspection procedure is located.

7. INSPECTION

A description of the main points for inspection of suspected areas is shown in the following table.

ITEM	DESCRIPTION
Description	The major role and operation of the circuit or system and its component parts are explained.
DTC No., DTC	

Detection Condition and Trouble Area	Indicates the diagnostic trouble codes, DTC detection conditions and suspected areas for a problem.
Wiring Diagram	This is a wiring diagram for the circuit or system. This diagram can be used together with the Electrical Wiring Diagram to thoroughly understand the circuit. Wire colors are indicated by alphabetical codes. B = Black, L = Blue, R = Red, BR = Brown, LG = Light Green, V = Violet, G = Green, O = Orange, W = White, GR = Gray, P = Pink, Y = Yellow, SB = Sky Blue The first letter indicates the basic wire color and the second letter indicates the color of the stripe.
Inspection Procedure	This shows the procedure not only to determine whether the circuit is normal or abnormal, but also to determine whether the problem is located in the sensors, actuators, wire harness or ECU.
Illustration of the ECU connector during the check	The illustration shows whether the connector being checked is connected or disconnected. The connections for an electrical tester are indicated by (+) or (-) after the terminal name. For inspections between a connector and body ground, information about the ground is not shown in the illustration.



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Title: INTRODUCTION: REPAIR INSTRUCTION: CUSTOMIZE PARAMETERS (2013 FR-S)		

CUSTOMIZE PARAMETERS

- 1. CUSTOMIZE WIRELESS DOOR LOCK CONTROL SYSTEM [INFO](#)
- 2. CUSTOMIZE KEY REMINDER WARNING SYSTEM [INFO](#)
- 3. CUSTOMIZE LIGHTING SYSTEM (INT) [INFO](#)
- 4. CUSTOMIZE METER / GAUGE SYSTEM [INFO](#)
- 5. CUSTOMIZE SEAT BELT WARNING SYSTEM [INFO](#)
- 6. CUSTOMIZE WINDOW DEFOGGER SYSTEM [INFO](#)
- 7. CUSTOMIZE LIGHTING SYSTEM (EXT) [INFO](#)



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Title: INTRODUCTION: REPAIR INSTRUCTION: INITIALIZATION (2013 FR-S)		

INITIALIZATION

1. PROCEDURES NECESSARY WHEN ECU OR OTHER PARTS ARE REPLACED

REPLACEMENT PART	NECESSARY PROCEDURE	EFFECT/INOPERATIVE FUNCTION WHEN NECESSARY PROCEDURES ARE NOT PERFORMED	SEE PAGE
ECM	Vehicle Identification Number (VIN) registration	MIL comes on	INFO
	ECU communication ID registration (Engine immobiliser system)	Engine start	INFO
• TCM • Automatic transmission assembly • Valve body assembly • Transmission wire • Shift solenoid valve S1, S2, S3, S4, SL1, SL2, SLT, SLU, and/or SR • Engine assembly	Reset memory	• Large shift shock • The deterioration of fuel efficiency	INFO
• Brake actuator assembly (Skid control ECU) • Steering sensor • Steering column assembly • Rack and pinion power steering gear assembly • Adjust front wheel alignment	VSC sensor neutral memorization	VSC system does not operate normally (warning indicator light comes on).	INFO

Power steering ECU assembly	Rotation angle sensor initialization and torque sensor zero point calibration	- P/S warning light comes on - EPS control	INFO
Steering column assembly	Rotation angle sensor initialization and torque sensor zero point calibration	Steering effort is different between turning steering wheel to left and right	
- Door control receiver - Tire pressure warning valve and transmitter	- Transmitter ID registration - Initialization	- When DTC detection conditions of "transmitter ID not received" DTC are met, TPWS indicator blinks for 1 minute, and then illuminates. - Tire pressure warning function	INFO
- Key - Main body ECU (network gateway ECU) - Combination meter assembly	Code registration (Engine immobiliser system)	Engine start	INFO
- Door control transmitter assembly - Door control receiver	Code registration (Wireless door lock system)	Wireless door lock control system	INFO
- Power window regulator motor assembly - Door window regulator sub-assembly - Door glass - Front door frame sub-assembly rear lower - Front door sush - Front door opening trim weatherstrip	Initialize power window control system	- Auto up/down function - Jam protection function - Operation function after ignition switch is turned off	INFO

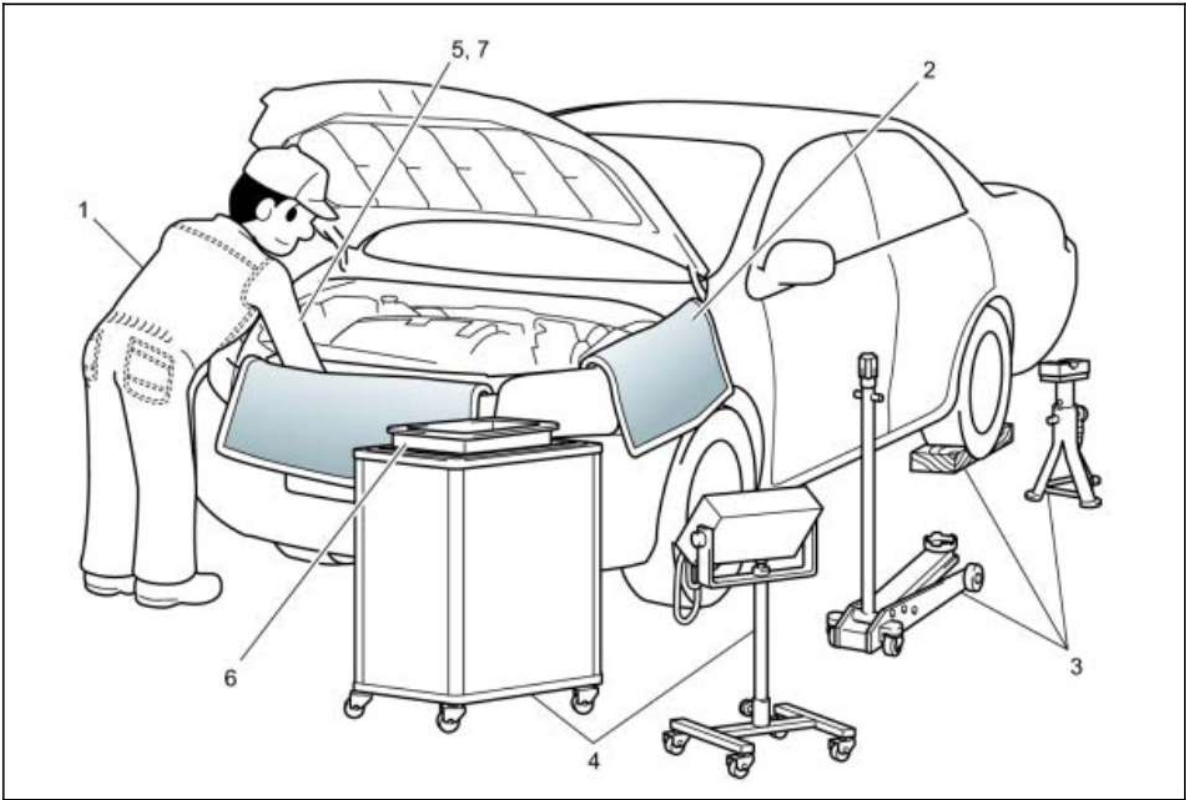


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Title: INTRODUCTION: REPAIR INSTRUCTION: PRECAUTION (2013 FR-S)		

PRECAUTION

1. BASIC REPAIR HINT

(a) HINTS ON OPERATIONS



1	Attire	• Always wear a clean uniform. • A hat and safety shoes must be worn.
2	Vehicle protection	Prepare a grille cover, fender cover, seat cover and floor mat before starting work.
3	Safety procedures	• When working with 2 or more persons, be sure to check the safety of one another. • When working with the engine running, make sure to provide ventilation for exhaust fumes in the workshop. • 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. • When jacking up the vehicle, be sure to support the specified locations with safety stands. • When lifting up the vehicle, use appropriate safety equipment.
	Preparation of	

4	tools and measuring equipment	Before starting work, prepare a tool stand, SST, measuring equipment, oil, and any replacement parts required.
5	Removal and installation, disassembly and assembly operations	• Diagnose with a thorough understanding of proper procedures and of the reported problem. • Before removing any parts, check the general condition of the assembly and for deformation and damage. • If the procedure is complicated, take notes. For example, note the total number of electrical connections, bolts or hoses removed. Add matchmarks to ensure reassembly of components in the original positions. Temporarily mark hoses and their fittings if needed. • 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 new parts or contaminating the new parts. • For non-reusable parts such as gaskets, O-rings and self-locking nuts, replace them with new ones as instructed in this manual. • Retain the removed parts for customer inspection, if requested.
7*	Checks to perform after work is finished	• Make sure that removed and installed parts (oil filler cap, level dipstick, floor mat, etc.) are properly installed/tightened. • Make sure that none of the cloths or tools that were used have been left in the engine compartment or within the vehicle. • Check that there are no oil leaks.

CAUTION:

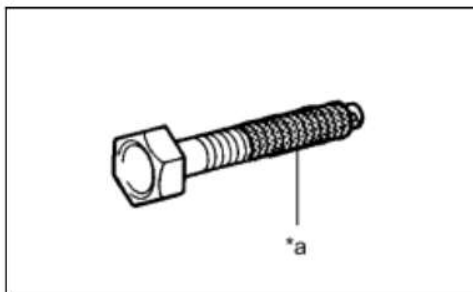
***: Be sure to perform these checks properly, Not performing these checks properly after finishing work can lead to serious accident or injury.**

(b) JACKING UP AND SUPPORTING THE 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.

(c) PRECOATED PARTS**Text in Illustration**

*a	Seal Lock Adhesive
----	--------------------



- (1) Precoated parts are bolts and nuts that are coated with seal lock adhesive at the factory.
- (2) If a precoated part is retightened, loosened or moved in any way, it must be recoated with the specified adhesive.
- (3) When reusing a precoated part, clean off the old adhesive and dry the part with compressed air. Then apply new seal lock adhesive appropriately to that part.
- (4) Some seal lock agents harden slowly. You may have to wait for the seal lock adhesive to harden.

(d) GASKETS

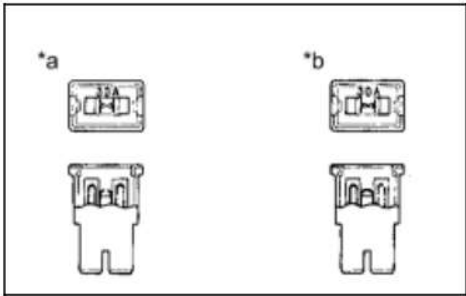
(1) When necessary, use a sealer on gaskets to prevent leaks.

(e) BOLTS, NUTS AND SCREWS

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

(2) Make sure that no foreign matter (burrs, paint, etc.) gets trapped under the heads of the bolts and nuts when tightening them.

(f) FUSES

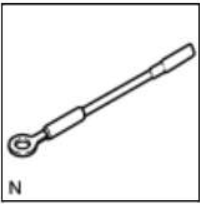
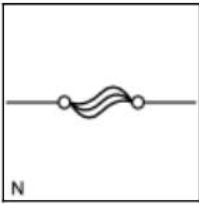
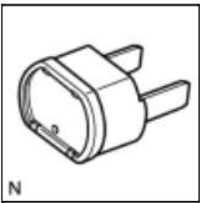
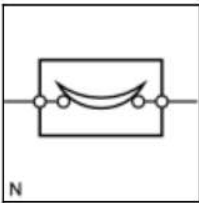


Text in Illustration

*a	INCORRECT
*b	CORRECT

- (1) When inspecting a fuse, check that the wire of the fuse is not broken.
- (2) If the wire of a fuse is broken, confirm that there are no shorts in its circuit.
- (3) When a fuse is replaced, a fuse with the same amperage rating must be used.

ILLUSTRATION	SYMBOL	PART NAME	ABBREVIATION
		FUSE	FUSE
		MEDIUM CURRENT FUSE	M-FUSE
		HIGH CURRENT FUSE	H-FUSE

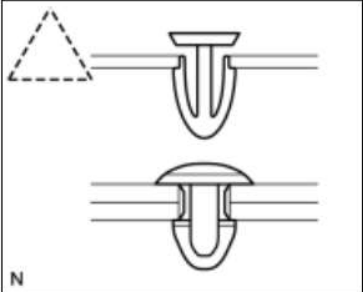
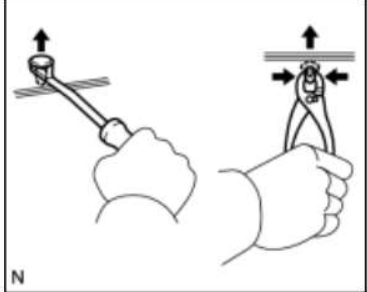
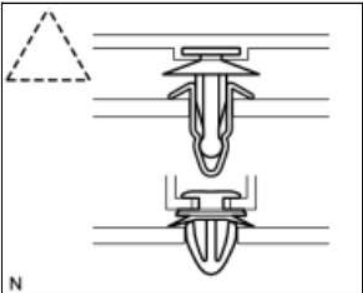
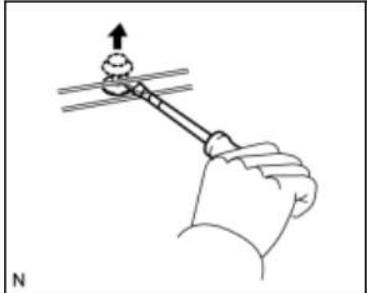
 N	 N	FUSIBLE LINK	FL
 N	 N	CIRCUIT BREAKER	CB

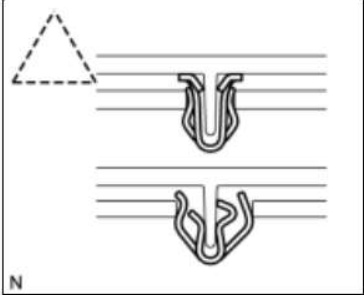
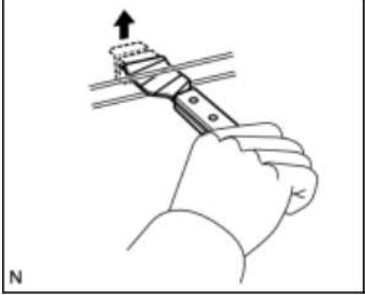
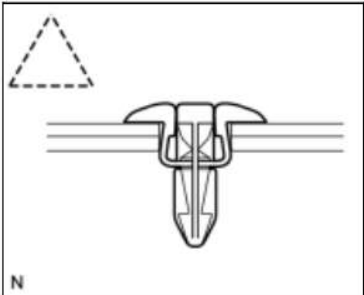
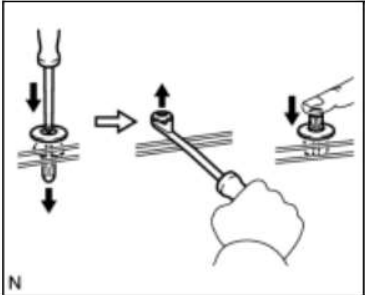
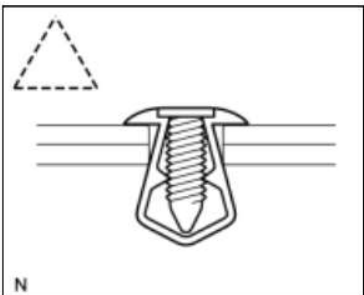
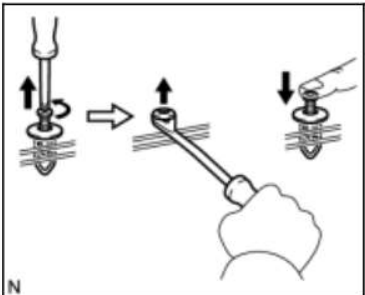
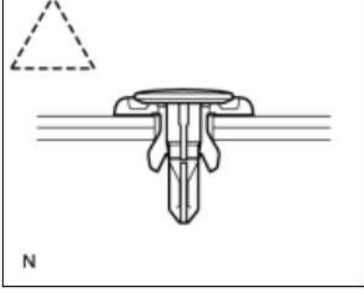
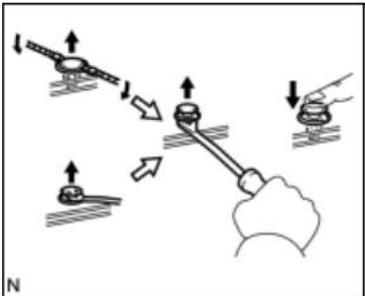
(g) CLIPS

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

HINT:

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

SHAPE (EXAMPLE)	REMOVAL/INSTALLATION
 N	 N Remove the clips with a clip remover or pliers.
 N	 N Remove the clips with a clip remover or screwdriver.

	
	Remove the clips with a wide scraper to prevent panel damage.
	
	Remove the clips by pushing the center pin through and prying out the shell.
	
	Remove the clips by unscrewing the center pin and prying out the shell.
	
	Remove the clips by prying out the pin and then prying out the shell.

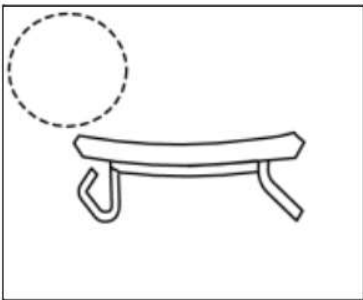
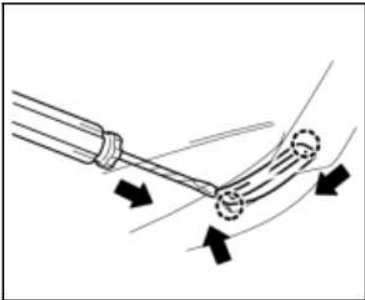
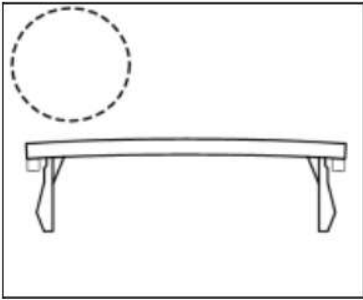
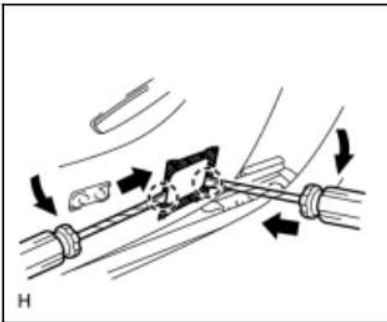
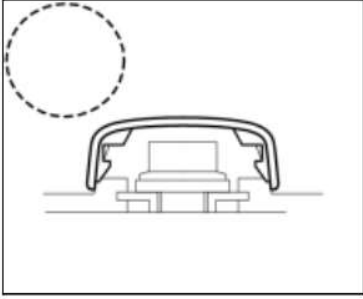
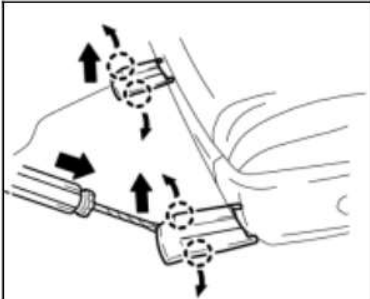
(h) CLAWS

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

HINT:

If claws are damaged during a procedure, always replace the cap or cover that has damaged claws

with a new one.

SHAPE (EXAMPLE)	ILLUSTRATION	PROCEDURE
		Using a screwdriver, disengage the claws and remove the cap or cover.
		Using a screwdriver, disengage the claws and remove the cap or cover.
		Using a screwdriver, disengage the claws and remove the cap or cover.

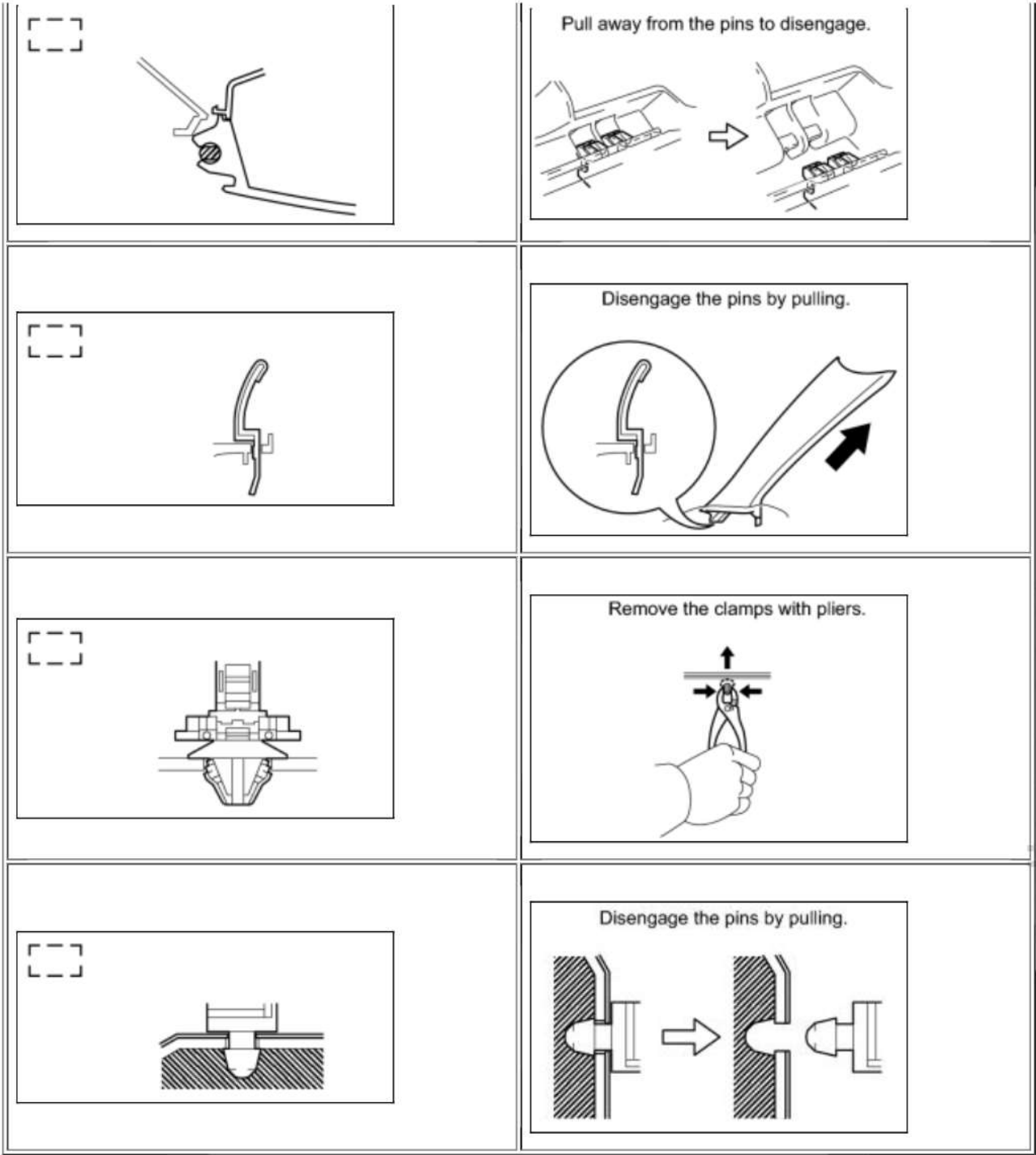
(i) HINGES, GUIDES, CLAMPS, PINS, ETC.

(1) The removal and installation methods of typical hinges, guides, clamps and pins used for vehicle body parts are shown in the table below.

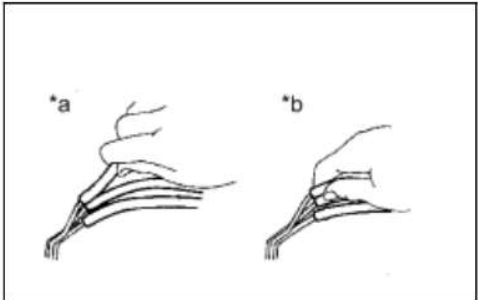
HINT:

If clamps are damaged during a procedure, always replace the cap or cover that has damaged clamps with a new one.

SHAPE (EXAMPLE)	REMOVAL/INSTALLATION



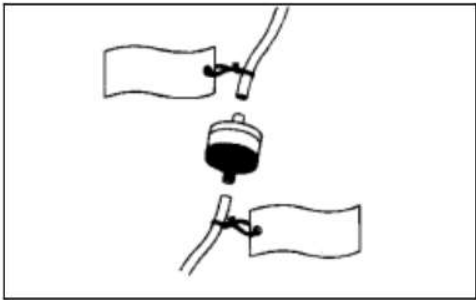
(j) REMOVAL AND INSTALLATION OF VACUUM HOSES



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

Text in Illustration

*a	INCORRECT
*b	CORRECT

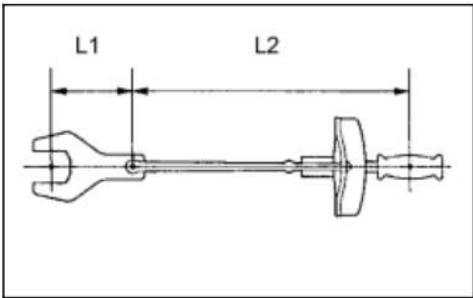


(2) When disconnecting vacuum hoses, use tags to identify where they should be reconnected.

(3) After completing any hose related repairs, 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. If a hose has been stretched, air may leak. Use a step-down adapter if necessary.

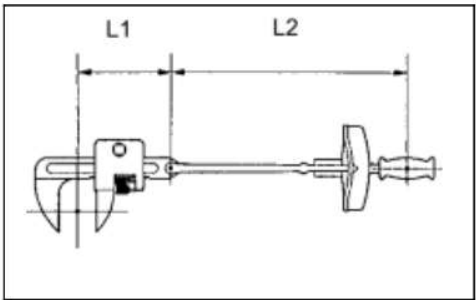
(k) TORQUE WHEN USING TORQUE WRENCH WITH EXTENSION TOOL



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

Formula

$$T' = (L2 / (L1 + L2)) * T$$



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 (in.)}
L2	Length of torque wrench {cm (in.)}

NOTICE:

If an extension tool or SST is combined with a torque wrench and used to tighten to a torque specification in this manual, the actual torque will be excessive and parts will be damaged.

2. FOR VEHICLES EQUIPPED WITH SRS AIRBAG AND SEAT BELT PRETENSIONER

This vehicle is equipped with a Supplemental Restraint System (SRS).

CAUTION:

- Before performing pre-disposal deployment of any SRS component, review and closely follow all applicable environmental and hazardous material regulations. Pre-disposal deployment may be considered hazardous material treatment.
- 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) The power window system utilizes a mechanism in which the door glass moves down slightly when the door is opened, and in which the glass moves up when the door closed in order to prevent the door molding from being damaged. When the negative (-) battery terminal needs to be disconnected for servicing, fully open the driver and passenger door glasses in advance.
- (2) As malfunctions 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 for DTCs before disconnecting the battery.

- (3) Work must be started at least 90 seconds after the ignition switch is turned off and after the cable is disconnected from the negative (-) battery terminal.

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

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

CAUTION:

Never use a back-up power source (battery or other) to avoid clearing the system memory. The back-up power source may inadvertently power the SRS and cause it to deploy.

- (4) If the vehicle has been involved in a minor collision where the SRS does not deploy, the steering pad, front passenger airbag assembly, knee airbag assembly, front seat side airbag assembly, curtain shield airbag assembly and front seat outer belt assembly should be inspected before further use of the vehicle.
- (5) Never use SRS parts from another vehicle. When replacing parts, use new ones.
- (6) Before repairs, remove the airbag sensor assemblies if impacts are likely to be applied to the sensor during repairs.
- (7) Never disassemble and attempt to repair any airbag sensor assemblies or airbag assemblies.
 1. Steering pad
 2. Front passenger airbag assembly
 3. Front seat side airbag assembly
 4. Curtain shield airbag assembly
 5. Front seat outer belt assembly
- (8) Replace the airbag sensor assemblies and the airbag assemblies if: 1) damage has occurred from being dropped, or 2) cracks, dents or other defects in the case, bracket or connector are present.
- (9) Do not directly expose the airbag sensor assemblies or airbag assemblies to hot air or flames.
- (10) Use a voltmeter/ohmmeter with high impedance (minimum = 10 k Ω) for troubleshooting electrical circuits.

- (11) Information labels are attached to the SRS components. Follow the instructions on the labels.
- (12) After work on the SRS is completed, check the SRS warning light.
- (b) SPIRAL CABLE
 - (1) The steering wheel must be fitted correctly to the steering column with the spiral cable at the neutral position. Otherwise, cable damage and other problems may occur. Refer to the information about correct installation of the steering wheel **INFO**.
- (c) STEERING PAD
 - (1) Always place a removed or new steering pad with the surface facing upward. Placing the steering pad with the pad surface facing downward could cause a serious accident if the airbag deploys. Also, do not place anything on top of the steering pad.
 - (2) Never measure the resistance of the airbag squib. This may cause the airbag to deploy, which could cause serious injury.
 - (3) Grease or detergents of any kind should not be applied to the steering pad.
 - (4) Store the steering pad in an area where the ambient temperature is below 93°C (199°F), the humidity is not high and there is no electrical noise.
 - (5) Before using an electric welder anywhere on the vehicle, disconnect the airbag ECU assembly connectors. These connectors contain shorting springs. This feature reduces the possibility of the airbag deploying due to current entering the squib wiring.
 - (6) When disposing of the vehicle or the steering pad by itself, the airbag should be deployed using SST before disposal **INFO**. Deploy the airbag in a safe place away from electrical noise.
- (d) FRONT PASSENGER AIRBAG ASSEMBLY
 - (1) Always place a removed or new front passenger airbag assembly with the pad surface facing upward. Placing the airbag assembly with the airbag deployment 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 deploy, which could cause serious injury.
 - (3) Grease or detergents of any kind should not be applied to the front passenger airbag assembly.
 - (4) Store the airbag assembly in an area where the ambient temperature is below 93°C (199°F), the humidity is not high and there is no electrical noise.
 - (5) Before using an electric welder anywhere on the vehicle, disconnect the airbag ECU assembly connectors. These connectors contain shorting springs. This feature reduces the possibility of the airbag deploying due to current entering the squib wiring.
 - (6) When disposing of the vehicle or the airbag assembly unit by itself, the airbag should be deployed using SST before disposal **INFO**. Deploy the airbag in a safe place away from electrical noise.
- (e) FRONT SEAT SIDE AIRBAG ASSEMBLY
 - (1) Always place a removed or new front seat side airbag assembly with the airbag deployment direction facing upward.
 - (2) Never measure the resistance of the airbag squib. This may cause the airbag to deploy, which could cause serious injury.
 - (3) Grease or detergents of any kind should not be applied to the front seat side airbag assembly.
 - (4) Store the airbag assembly in an area where the ambient temperature is below 93°C (199°F), the humidity is not high and there is no electrical noise.
 - (5) Before using an electric welder anywhere on the vehicle, disconnect the airbag ECU assembly connectors. These connectors contain shorting springs. This feature reduces the possibility of the airbag deploying due to current 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 **INFO** . Deploy the airbag in a safe place away from electrical noise.
- (f) CURTAIN SHIELD AIRBAG ASSEMBLY
- (1) Always place a removed or new curtain shield airbag assembly in a clear plastic bag, and keep it in a safe place.

CAUTION:

The plastic bag should be disposed of after use.

NOTICE:

Never disassemble the curtain shield airbag assembly.

- (2) Never measure the resistance of the airbag squib. This may cause the airbag to deploy, 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 (199°F), the humidity is not high and there is no electrical noise.
- (5) Before using an electric welder anywhere on the vehicle, disconnect the airbag ECU assembly connectors. These connectors contain shorting springs. This feature reduces the possibility of the airbag deploying due to current 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 **INFO** . Deploy the airbag in a safe place away from electrical noise.
- (g) FRONT SEAT OUTER BELT ASSEMBLY (SEAT BELT PRETENSIONER)
- (1) Never measure the resistance of the front seat outer belt assembly. This may cause the pretensioner of the front seat outer belt assembly to activate, which could cause serious injury.
- (2) Never disassemble the front seat outer belt assembly.
- (3) Never install the front seat outer belt assembly on another vehicle.
- (4) Store the seat outer belt assembly in an area where the ambient temperature is below 80°C (176°F), the humidity is not high and there is no electrical noise.
- (5) Before using an electric welder anywhere on the vehicle, disconnect the airbag ECU assembly connectors. These connectors contain shorting springs. This feature reduces the possibility of the airbag deploying due to current entering the squib wiring.
- (6) When disposing of a vehicle or the front seat outer belt assembly unit by itself, the front seat outer belt assembly should be activated before disposal **INFO** . Activate the front seat outer belt assembly in a safe place away from electrical noise.
- (7) As the front seat outer belt assembly is hot after being activated, allow some time for it to cool down sufficiently before disposal. Never apply water to cool down the front seat outer belt assembly.
- (8) Grease, detergents, oil or water should not be applied to the front seat outer belt assembly.

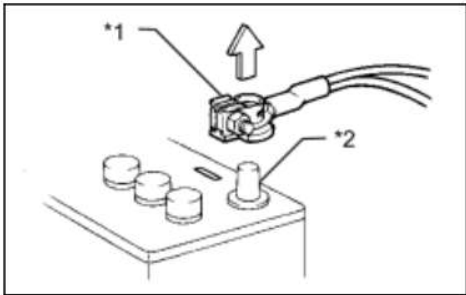
(h) AIRBAG ECU ASSEMBLY

- (1) Never reuse a airbag ECU assembly that has been involved in a collision where the SRS has deployed.
- (2) The connectors to the airbag ECU assembly should be connected or disconnected with the airbag ECU assembly installed to the vehicle. If the connectors are connected or disconnected while the airbag ECU assembly is not installed, the SRS may activate.
- (3) Work must be started at least 90 seconds after the ignition switch is turned off and the cable is disconnected from the negative (-) battery terminal, even if only loosening the bolts of the airbag ECU assembly.

(i) WIRE HARNESS AND CONNECTOR

- (1) All the connectors in the system are a standard yellow color. If an SRS wire harness has an open circuit or a connector is broken, replace it.

3. ELECTRONIC CONTROL



Text in Illustration

*1	Cable
*2	Negative (-) Battery Terminal

NOTICE:

- The power window system utilizes a mechanism in which the door glass moves down slightly when the door is opened, and in which the glass moves up when the door closed in order to prevent the door molding from being damaged. When the negative (-) battery terminal needs to be disconnected for servicing, fully open the driver and passenger door glasses in advance.
- Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.
- After the ignition switch is turned off, the navigation receiver assembly (for Navigation Receiver Type) or radio and display receiver assembly (for Radio and Display Type with Intuitive Parking Assist System) records various types of memory and settings. As a result, after turning the ignition switch off, make sure to wait at least 60 seconds before disconnecting the cable from the negative (-) battery terminal.

(a) DISCONNECTING AND RECONNECTING NEGATIVE BATTERY CABLE

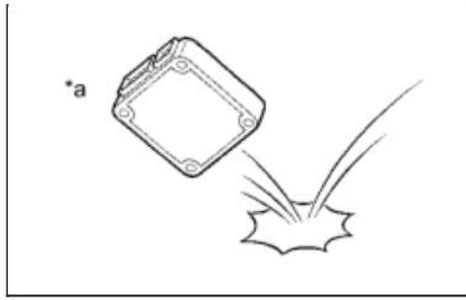
- (1) Before performing work on electronic components, disconnect the cable from the negative (-) battery terminal to prevent damage to the electrical system or components.
- (2) When disconnecting the cable, turn the ignition switch and headlight switch off and loosen the cable nut completely. Perform these operations without twisting or prying the cable. Then disconnect the cable.
- (3) Clock settings, radio settings, audio system memory, DTCs and other data will be cleared when the cable is disconnected from the negative (-) battery terminal. Write down any necessary data before disconnecting the cable.

(b) HANDLING OF ELECTRONIC PARTS

Text in Illustration

*a	INCORRECT
----	-----------

- (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) Do not pull on the wires when disconnecting electronic connectors. Pull on the connector itself.
- (3) Do not 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 components 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 measuring the resistance between terminals of a wire connector, insert the tester probe carefully to prevent the terminals from bending.

4. REMOVAL AND INSTALLATION OF FUEL CONTROL PARTS

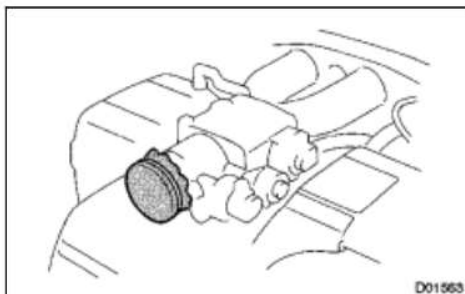
(a) PLACE FOR REMOVING AND INSTALLING FUEL SYSTEM PARTS

- (1) Work in a location with good air ventilation that does not have welders, grinders, drills, electric motors, stoves, or any other ignition sources nearby.
- (2) Never work in a pit or near a pit as fuel vapors will collect there.

(b) REMOVING AND INSTALLING FUEL SYSTEM PARTS

- (1) Prepare a fire extinguisher before starting work.
- (2) To prevent static electricity, install a ground wire between the fuel changer and vehicle, and do not spray the surrounding area with water. Be careful when performing work in this area, as the floor surface will become slippery. Do not clean up gasoline spills with water, as this may cause the gasoline to spread, and possibly create a fire hazard.
- (3) Avoid using electric motors, work lights and other electric equipment that can cause sparks or high temperatures.
- (4) Avoid using iron hammers as they may create sparks.
- (5) Dispose of fuel-contaminated cloth separately using a fire resistant container.

5. REMOVAL AND INSTALLATION OF ENGINE INTAKE PARTS



- (a) If any metal particles enter intake system parts, this may damage the engine.

- (b) When removing and installing intake system parts, cover the openings of the removed parts and engine openings. Use adhesive tape or other suitable materials.
- (c) When installing intake system parts, check that no metal particles have entered the engine or

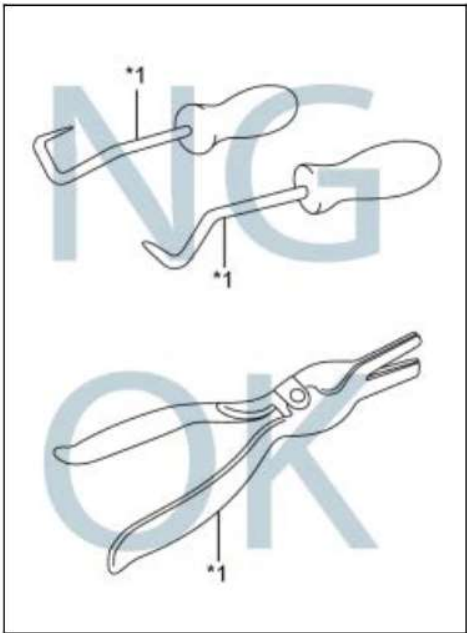
installed parts.

6. REMOVING AND INSTALLING HOSES

(a) Before removing and installing hoses

- Using hoses that are damaged or deformed may cause seeping, leaking, or coming off hoses, etc. Leaked oil may disperse into the exhaust pipe and ignite or cause fumes, so take sufficient care during inspection and maintenance.
- Neglecting to remove hoses when working on areas that require removal of hoses may damage the interior of the hoses. Be sure to remove such hoses when working.

(b) When removing, installing, and inspecting hoses

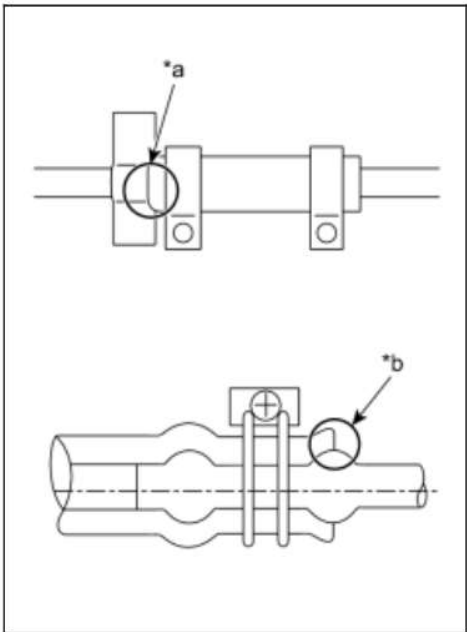


(1) Comply with the following when removing hoses.

- When using standard hose removers, do not use hose removers with pointed tips (hose pluckers) as pointed tips may damage the hose or the surface of the pipe.
- When using pliers, etc. to make hose removal process easier, be sure to protect the hose with a cloth, then pull it out by hand in a straight line while rotating it slightly.

Text in Illustration

*1	Hose Remover
----	--------------



(2) When continuing to use the same hose, perform the following inspection, and replace with a new hose if a fault is found.

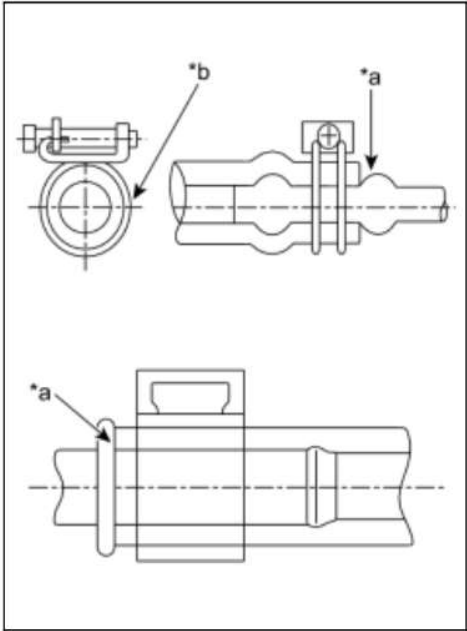
- Replace hoses that have ridden up on the stay or spool.
- Bend hoses and check carefully to see whether they exhibit damage to their outer or inner surfaces, cracks, fractures, hardened or softened rubber, swelling, peeling interiors, or deformation due to foreign matter adhering to or penetrating the hose. Replace with a new hose if any of these problems are found.

Text in Illustration

*a	Hose riding up on stay
*b	Hose riding up on spool

(3) Comply with the following when installing hoses.

- Take sufficient care with regard to where the hose is installed.
- Do not use lubricant.
- Push in firmly up to the specified position (the seat or spool).
- Check whether the hose clamp position, orientation, and hose layout are correct (Check that the positioning and orientation are correct, that the hose is not too long or too short, that the hose is not different to before the procedure was done, and that sufficient space has been left between the hose and other parts in the area).
- After attaching the hoses, check that they are not leaking or losing fluid (Check that the hoses are firmly fixed in place with the clamps).



Text in Illustration

*a	Push the hose against the spool (Do not push the hose firmly enough to cause wrinkles on its tip).
*b	Apply clamping force evenly around the exterior of the hose.

(4) For hose clips and hose clamps, perform the following inspection and replace with new ones if a fault is found.

- Check for the presence of deformation, rust, damage, and foreign matter.
- For clips, check that the springs are performing properly, and that the clip has sufficient clamping force.
- For clamps, check that the clamp can be screw-tightened, that the clamp is not elliptical in shape, and that the screws are undamaged.

(5) For pipes, perform the following inspection, and replace with a new pipe if a fault is found.

Check that there is no damage, rust, peeling (including peeling plating), foreign matter, bending, breakage, or fracturing.

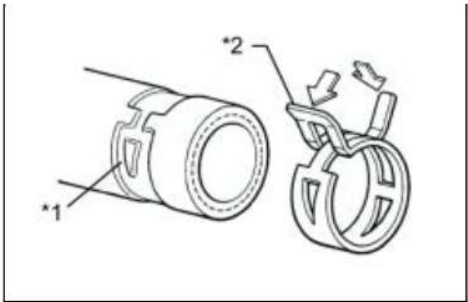
(6) Replace the following parts with new ones when removing or changing the attachment position of the hose.

Transmission oil cooler hose and fuel hose

7. HANDLING OF HOSE CLAMPS

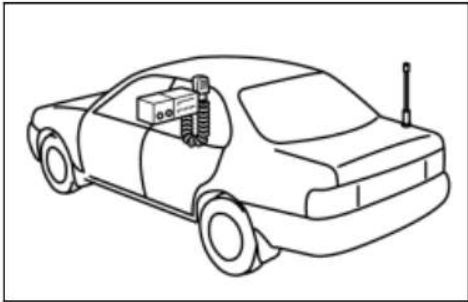
Text in Illustration

*1	Clamp Track
*2	Spring Type Clamp



- (a) Before removing a hose, check the clamp position so that it can be reinstalled in the same position.
- (b) Replace any deformed or dented clamps with new ones.
- (c) When reusing a hose, attach the clamp on the clamp track portion of the hose.
- (d) For a spring type clamp, it may be necessary to spread the tabs slightly after installation by pushing them in the direction of the arrows as shown in the illustration.

8. FOR VEHICLES EQUIPPED WITH MOBILE COMMUNICATION SYSTEMS



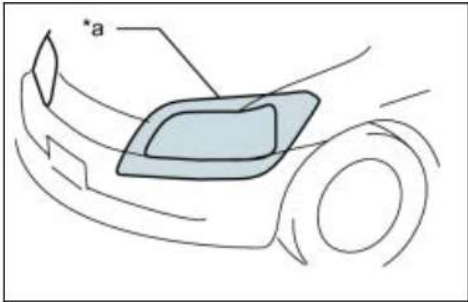
- (a) Install the antenna as far away from the ECU and sensors of the vehicle electronic systems as possible.
- (b) Install the antenna and feeder at least 20 cm (7.87 in.) away from the ECU and sensors of the vehicle electronic systems. For details about ECU and sensor locations, refer to the section on the applicable components.
- (c) Keep the antenna and feeder separate from other wiring as much as possible. This will prevent signals sent 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 a high-powered mobile communication system.

9. HEADLIGHT INSPECTION OR MAINTENANCE

- (a) When the headlight dimmer switch assembly is set to head, do not touch the discharge headlight high-voltage socket area.

NOTICE:

When performing inspection or maintenance, the discharge headlight precautions must be followed.



- (b) When the headlights are illuminated, do not cover the headlights for 3 minutes or more.

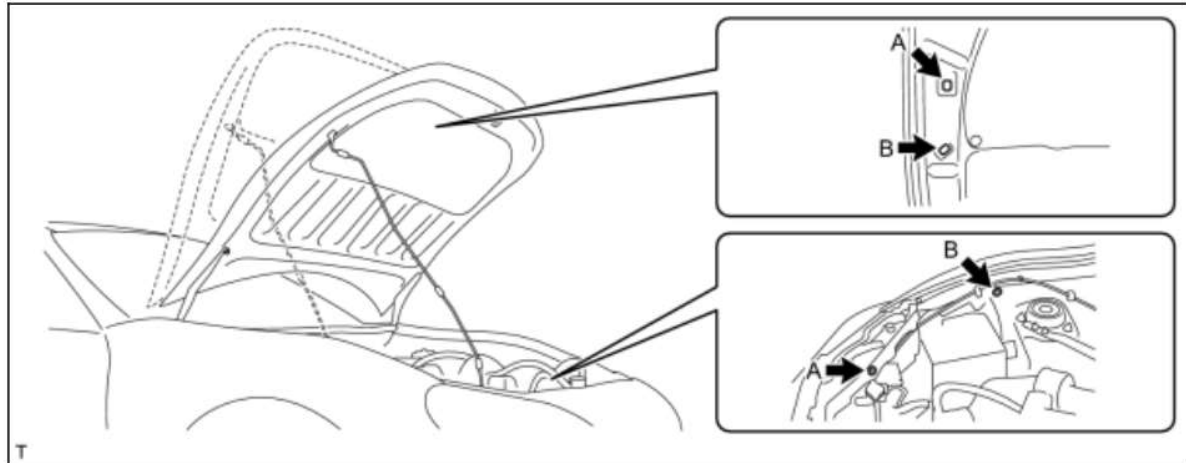
Text in Illustration

*a	Illumination for 3 minutes or more prohibited if covered
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NOTICE:

As the headlight's outer lens is made of resin, the resulting heat created when covering the headlight for an extended period of time may deform the headlight.

10. SET FRONT HOOD STAY



- (a) When performing inspections or general maintenance, use the front hood stay in its normal attachment position.

NOTICE:

When performing inspections or general maintenance, do not remove the front hood stay.

- (b) When it is necessary to open the engine hood further to remove the engine, etc., set the front hood stay in attachment position B, as shown in the illustration.

11. FOR VEHICLES EQUIPPED WITH TRACTION CONTROL (TR(A)C) AND VEHICLE STABILITY CONTROL (VSC) SYSTEMS

When testing with a 2-wheel drum tester such as a speedometer tester, a combination speedometer and brake tester, or a chassis dynamometer, or when jacking up the front wheels and turning the wheels, perform the following procedure to enter inspection mode and disable the TR(A)C and VSC systems INFO

HINT:

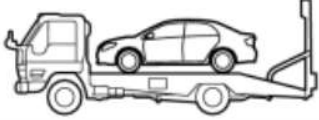
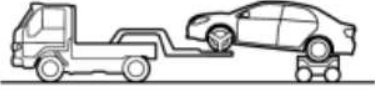
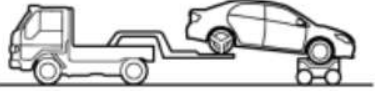
- The vehicle may slip unexpectedly out of the dynamometer because of TR(A)C and VSC operation.
- Pressing the VSC OFF switch does not disable TR(A)C and VSC operation completely.

NOTICE:

- Make sure that the VSC OFF indicator light will come on.
- Secure the vehicle with chains for safety.

12. PRECAUTIONS FOR TOWING REAR WHEEL DRIVE VEHICLES

- (a) Use one of the following methods to tow the vehicle.
- (b) If the vehicle has trouble with the chassis or drivetrain, use method 1 (flatbed truck).

Towing Method \ Conditions	Parking Brake	Shift Lever Position	
		Automatic transmission	Manual transmission
1. Flatbed Truck 	Applied	Neutral	Any
2. Wheel Lift Type Truck From Front (using dollies)  From Rear (using dollies) 	Applied	Neutral	Any

NOTICE:

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

- (c) If a tow truck is not available, in an emergency the vehicle may be temporarily towed using a cable or chain secured to the emergency towing eyelet(s).

This should only be attempted on hard surfaced roads for distances of less than 30 km, and at speeds below 30km/h (19 mph).

A driver must be in the vehicle to steer and operate the brakes. The vehicle's wheels, drivetrain, axles, steering and brakes must be in good condition.

NOTICE:

If the towing speed or distance exceeds the above limits, or the vehicle is towed in a backward direction with the wheels on the ground, the drivetrain or vehicle may be damaged.

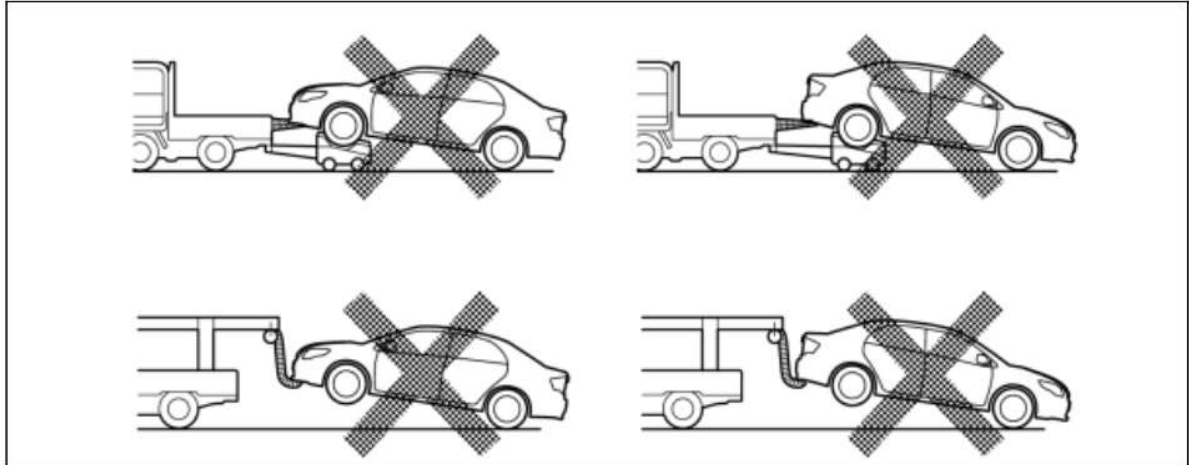
(1) Emergency towing procedure

1. Turn the ignition switch ON.
2. Depress the brake pedal and move the shift lever to N.
3. Release the parking brake.
4. Release the brake pedal slowly.

NOTICE:

- Use extreme caution when towing the vehicle. Avoid sudden starts or erratic driving maneuvers which place excessive stress on the emergency towing eyelet and the cables or chains.
- Do not turn off the ignition switch. Turning off the ignition switch may result in engagement of the steering lock, resulting in a hazardous situation or accident.

- (d) The towing methods shown below are dangerous and can damage the vehicle, so do not use them.



(1) Do not tow the vehicle with only 2 wheels on the ground.

CAUTION:

If the vehicle is towed with only the front wheels on the ground, the steering may move, causing the vehicle to become unstable.

NOTICE:

If the vehicle is towed with only the rear wheels on the ground, the drivetrain may overheat and be damaged.

(2) Do not use a sling-type towing method either from the front or rear.

NOTICE:

If a sling-type tow truck is used, damage may occur to the vehicle body.

13. FOR VEHICLES EQUIPPED WITH CATALYTIC CONVERTER

CAUTION:

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

- (a) Use only unleaded gasoline.
- (b) Avoid performing unnecessary spark tests.
 - (1) Perform a spark test only when absolutely necessary. Perform this test as rapidly as possible.
 - (2) While testing, never race the engine unless instructed.
- (c) Avoid a prolonged engine compression measurement. Engine compression measurements must be performed as rapidly as possible.
- (d) 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.



Last Modified: 3-27-2012	6.4 F	From: 201203
Model Year: 2013	Model: FR-S	Doc ID: RM000000UY0AOX
Title: INTRODUCTION: REPAIR INSTRUCTION: VEHICLE LIFT AND SUPPORT LOCATIONS (2013 FR-S)		

VEHICLE LIFT AND SUPPORT LOCATIONS

1. NOTICE ABOUT VEHICLE CONDITION WHEN RAISING VEHICLE

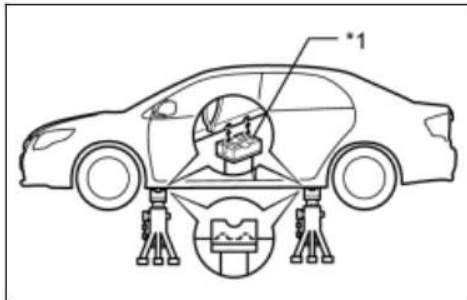
- (a) The vehicle must be unloaded before jacking up or raising the vehicle. Never jack up or raise a heavily loaded vehicle.
- (b) When removing any heavy components like the engine or transaxle, the vehicle center of gravity will shift. To stabilize the vehicle, place a balance weight in a location that will prevent the vehicle from rolling or shifting, or place a transmission jack under the appropriate jack position at the opposite end of the vehicle.

2. NOTICE FOR USING 4 POST LIFT

- (a) Follow the safety procedures outlined in the lift's instruction manual.
- (b) Do not damage the tires or wheels while driving onto the lift.
- (c) Use wheel chocks to secure the vehicle.

3. NOTICE FOR USING JACK AND SAFETY STANDS

- (a) Work on a level surface. Use wheel chocks at all times.

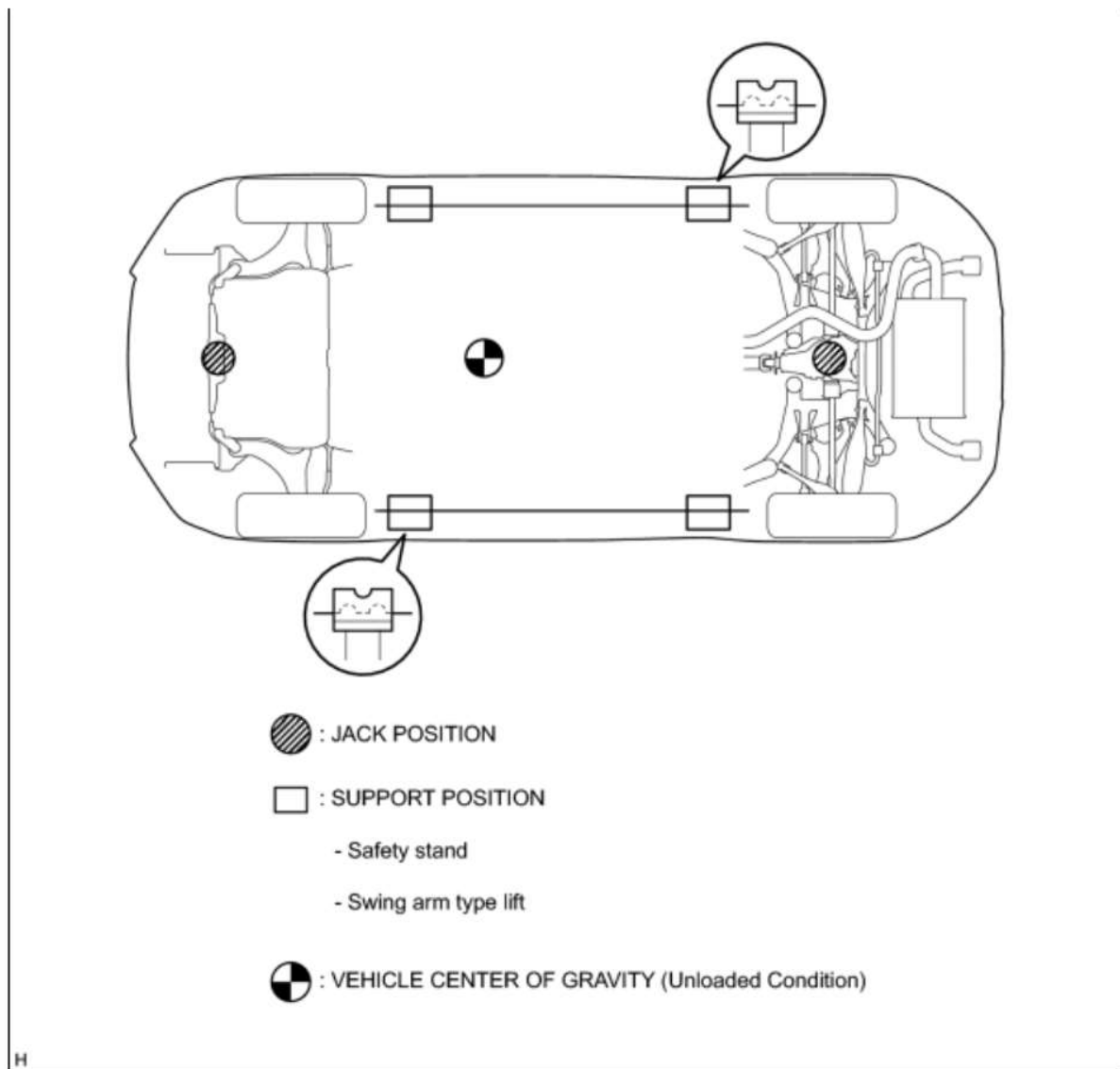


- (b) Use safety stands with rubber attachments as shown in the illustration.

Text in Illustration

*1	Rubber Attachment
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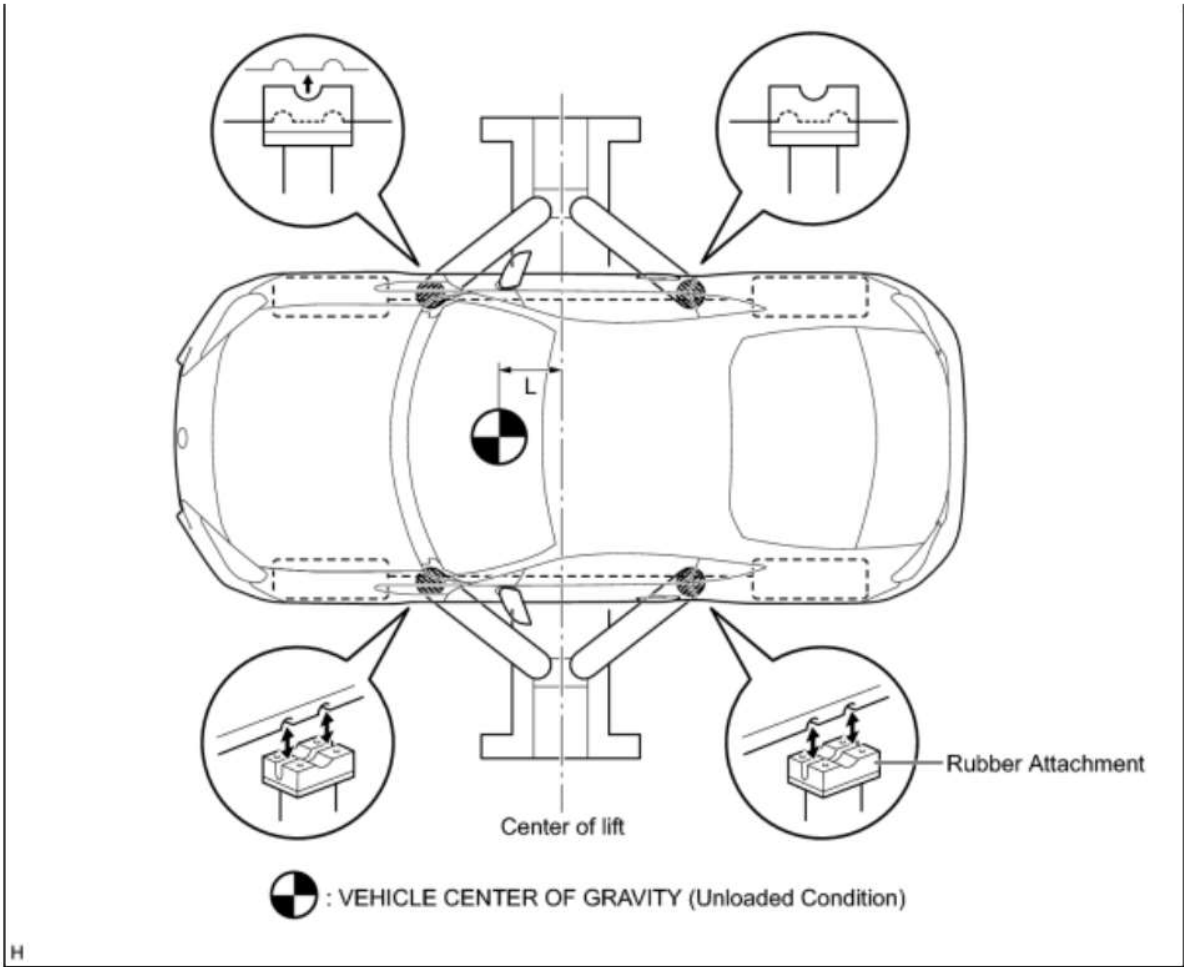
- (c) Set the jack and safety stands exactly under the specified locations on the vehicle.
- (d) Do not work on or leave the vehicle supported only by a jack. Be sure to support the vehicle with safety stands.
- (e) When jacking up the vehicle, first release the parking brake and move the shift lever to N.
- (f) When jacking up the entire vehicle:
 - (1) When jacking up the front wheels first, make sure wheel chocks are behind the rear wheels.
 - (2) When jacking up the rear wheels first, make sure wheel chocks are in front of the front wheels.
- (g) When jacking up only the front or rear wheels of the vehicle:
 - (1) Before jacking up the front wheels, place wheel chocks on both sides of the rear wheels.
 - (2) Before jacking up the rear wheels, place wheel chocks on both sides of the front wheels.
- (h) When lowering a vehicle that only has its front or rear wheels jacked up.



- (1) Before lowering the front wheels, make sure wheel chocks are in front of the rear wheels.
- (2) Before lowering the rear wheels, make sure wheel chocks are behind the front wheels.

4. NOTICE FOR USING A SWING ARM TYPE LIFT

- (a) Follow the safety procedures outlined in the lift's instruction manual.
- (b) Use swing arms equipped with rubber attachments as shown in the illustration.
- (c) Position the vehicle so that its center of gravity is centered on the lift (length of "L" in the illustration should be as short as possible).
- (d) Ensure that the rubber cushions or swing arms do not contact the body cladding or lower mouldings.
- (e) Be sure to lock the swing arms before raising the vehicle (if equipped with arm locks).
- (f) Use the lift to raise the vehicle until the tires are off the ground, then stop the lift and shake the front and rear of the vehicle to make sure that it is stable.



5. NOTICE FOR USING PLATE TYPE LIFT

- (a) Follow the safety procedures outlined in the lift's instruction manual.
- (b) Use plate lift attachments (rubber lifting blocks) on top of the plates.
- (c) Be sure to set the vehicle to the specified position described in the following chart and shown in the following illustration.

Right and left set position	Center the vehicle on the lift.
Front and rear set position	- Match the attachments to positions A in the illustration. - Do not use a plate lift with attachments that are unable to reach positions A in the illustration.

- (d) Ensure that the plate lift or rubber lifting blocks do not contact the body cladding or lower mouldings.
- (e) Use the lift to raise the vehicle until the tires are off the ground, then stop the lift and shake the front and rear of the vehicle to make sure that it is stable.

