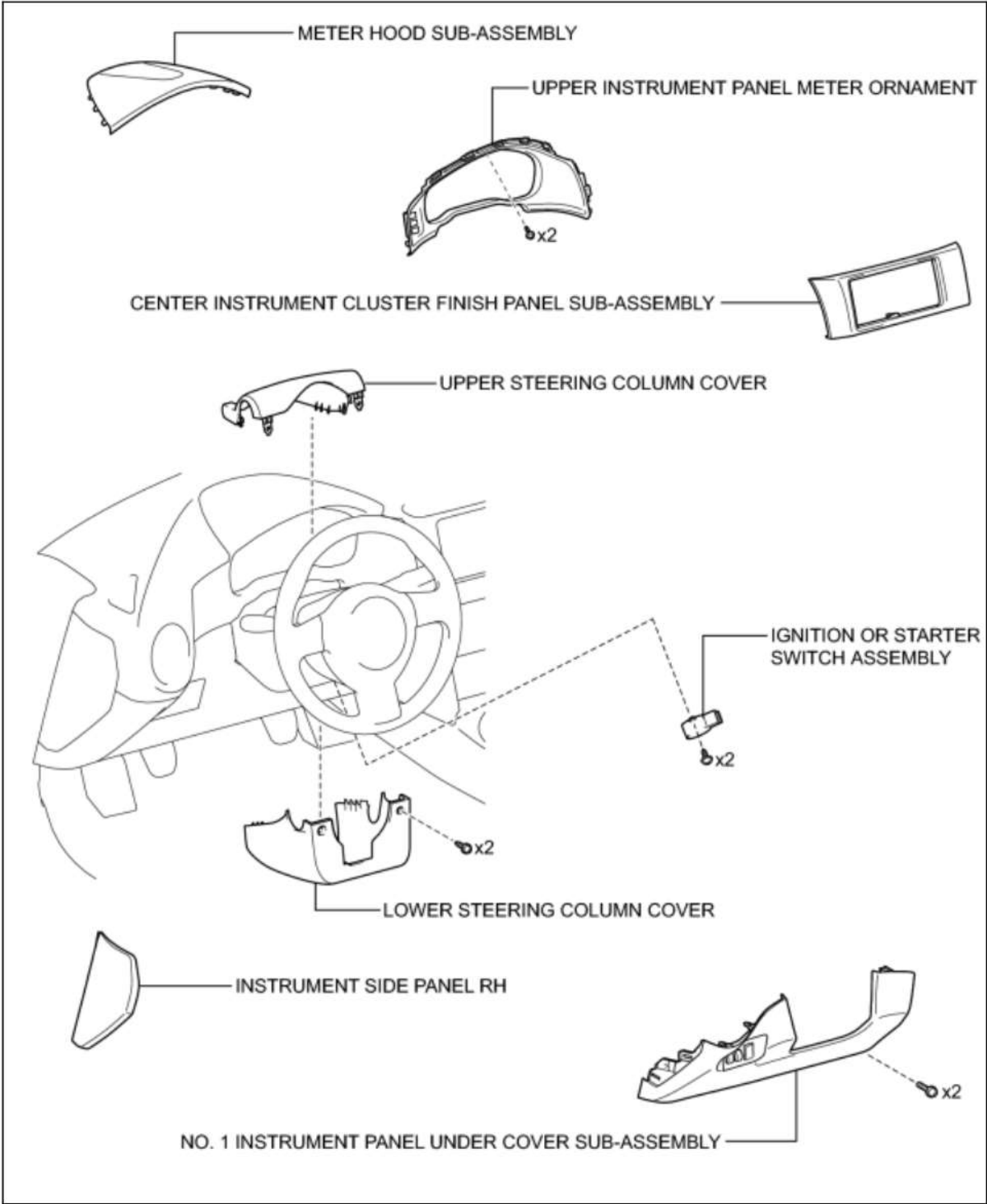


Last Modified: 3-27-2012	6.4 K	From: 201203
Model Year: 2013	Model: FR-S	Doc ID: RM000003VP800LX
Title: FA20 STARTING: IGNITION SWITCH: COMPONENTS (2013 FR-S)		

COMPONENTS

ILLUSTRATION



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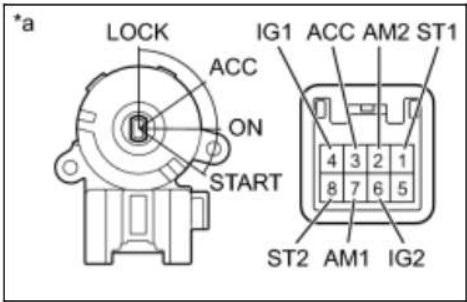
Last Modified: 3-27-2012	6.4 G	From: 201203
Model Year: 2013	Model: FR-S	Doc ID: RM000003VP700NX
Title: FA20 STARTING: IGNITION SWITCH: INSPECTION (2013 FR-S)		

INSPECTION

1. INSPECT IGNITION OR STARTER SWITCH ASSEMBLY

(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:



TESTER CONNECTION	SWITCH CONDITION	SPECIFIED CONDITION
All combinations of all terminals	LOCK	10 kΩ or higher
2 (AM2) - 3 (ACC)	ACC	Below 1 Ω
2 (AM2) - 3 (ACC) - 4 (IG1) 6 (IG2) - 7 (AM1)	ON	Below 1 Ω
1 (ST1) - 2 (AM2) - 4 (IG1) 6 (IG2) - 7 (AM1) - 8 (ST2)	START	Below 1 Ω

Text in Illustration

*a	Component without harness connected (Ignition or starter Switch Assembly)
----	--

If the result is not as specified, replace the ignition or starter switch assembly.



Last Modified: 3-27-2012	6.4 A	From: 201203
Model Year: 2013	Model: FR-S	Doc ID: RM000003VP600UX
Title: FA20 STARTING: IGNITION SWITCH: INSTALLATION (2013 FR-S)		

INSTALLATION

1. INSTALL IGNITION OR STARTER SWITCH ASSEMBLY

- (a) Install the 2 screws, and install the ignition or starter switch.
- (b) Connect the connector.

2. INSTALL UPPER STEERING COLUMN COVER [INFO](#)

3. INSTALL LOWER STEERING COLUMN COVER [INFO](#)

4. INSTALL NO. 1 INSTRUMENT PANEL UNDER COVER SUB-ASSEMBLY [INFO](#)

5. INSTALL UPPER INSTRUMENT PANEL METER ORNAMENT [INFO](#)

6. INSTALL METER HOOD SUB-ASSEMBLY [INFO](#)

7. INSTALL CENTER INSTRUMENT CLUSTER FINISH PANEL SUB-ASSEMBLY [INFO](#)

8. INSTALL INSTRUMENT SIDE PANEL RH [INFO](#)



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Last Modified: 3-27-2012	6.4 A	From: 201203
Model Year: 2013	Model: FR-S	Doc ID: RM000003VP900UX
Title: FA20 STARTING: IGNITION SWITCH: REMOVAL (2013 FR-S)		

REMOVAL

1. REMOVE INSTRUMENT SIDE PANEL RH [INFO](#)
2. REMOVE CENTER INSTRUMENT CLUSTER FINISH PANEL SUB-ASSEMBLY [INFO](#)
3. REMOVE METER HOOD SUB-ASSEMBLY [INFO](#)
4. REMOVE UPPER INSTRUMENT PANEL METER ORNAMENT [INFO](#)
5. REMOVE NO. 1 INSTRUMENT PANEL UNDER COVER SUB-ASSEMBLY [INFO](#)
6. REMOVE LOWER STEERING COLUMN COVER [INFO](#)
7. REMOVE UPPER STEERING COLUMN COVER [INFO](#)
8. REMOVE IGNITION OR STARTER SWITCH ASSEMBLY



(a) Disconnect the connector.

(b) Remove the 2 screws, and remove the ignition switch.



Last Modified: 3-27-2012	6.4 J	From: 201203
Model Year: 2013	Model: FR-S	Doc ID: RM000002U5203MX
Title: FA20 STARTING: KEY INTER LOCK SYSTEM: Key Cannot be Removed or Inserted (2013 FR-S)		

Key Cannot be Removed or Inserted

DESCRIPTION

When an ACC signal and a P signal is input, the control unit relay assembly outputs a signal to the key inter lock solenoid.

WIRING DIAGRAM

Refer to System Diagram [INFO](#) .

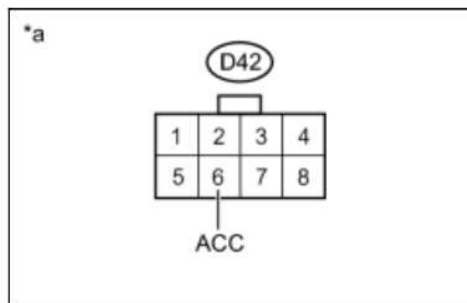
INSPECTION PROCEDURE

NOTICE:

Inspect the fuses for circuits related to this system before performing the following inspection procedure.

PROCEDURE

1. CHECK WIRE HARNESS AND CONNECTOR (ACC VOLTAGE)



(a) Disconnect the D42 control unit relay assembly connector.

(b) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

TESTER CONNECTION	SWITCH CONDITION	SPECIFIED CONDITION
D42-6 (ACC) - Body ground	Ignition switch ON	11 to 14 V

Text in Illustration

*a	Front view of wire harness connector (to control unit relay assembly)
----	--

NG  **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK



2.

CHECK WIRE HARNESS AND CONNECTOR (CONTROL UNIT RELAY ASSEMBLY - BODY GROUND)

- (a) Disconnect the D42 control unit relay assembly connector.
 (b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
D42-1 (E) - Body ground	Always	Below 1 Ω

NG  **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK



3.

INSPECT P SWITCH (FLOOR SHIFT SHIFT LEVER HOUSING)

- (a) Inspect the P switch (floor shift shift lever housing)  .

NG  **REPLACE P SWITCH (FLOOR SHIFT SHIFT LEVER HOUSING)**

OK



4.

CHECK WIRE HARNESS AND CONNECTOR (CONTROL UNIT RELAY ASSEMBLY - P SWITCH (FLOOR SHIFT SHIFT LEVER HOUSING))

- (a) Disconnect the D42 control unit relay assembly connector.

(b) Disconnect the D28 P switch (floor shift shift lever housing) connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
D42-4 (P) - D28-1 (P)	Always	Below 1 Ω

Standard Resistance (Check for Short):

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
D42-4 (P) or D28-1 (P) - Body ground	Always	10 k Ω or higher

NG  **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK



5.	CHECK WIRE HARNESS AND CONNECTOR (P SWITCH (FLOOR SHIFT SHIFT LEVER HOUSING) - BODY GROUND)
-----------	--

(a) Disconnect the D28 P switch (floor shift shift lever housing) connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

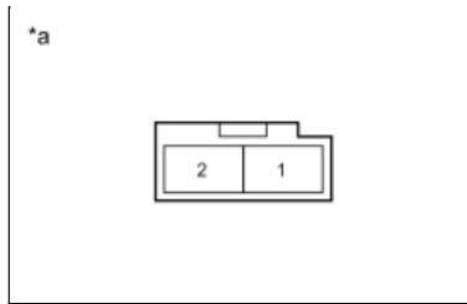
TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
D28-3 (E) - Body ground	Always	Below 1 Ω

NG  **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK



6.	CHECK KEY INTER LOCK SOLENOID
-----------	--------------------------------------



(a) Disconnect the D60 key inter lock solenoid connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
1 - 2	20°C (68°F)	13.05 to 15.95 Ω

Text in Illustration

*a	Component without harness connected (Key Inter Lock Solenoid)
----	--

NG ► **REPLACE KEY INTER LOCK SOLENOID**

OK
▼

7.	CHECK WIRE HARNESS AND CONNECTOR (CONTROL UNIT RELAY ASSEMBLY - KEY INTER LOCK SOLENOID)
-----------	---

(a) Disconnect the D42 control unit relay assembly connector.

(b) Disconnect the D60 key inter lock solenoid connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
D42-5 (KLS+) - D60-2	Always	Below 1 Ω

Standard Resistance (Check for Short):

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
D42-5 (KLS+) or D60-2 - Body ground	Always	10 k Ω or higher

REPAIR OR REPLACE HARNESS OR

NG  CONNECTOR

OK


8.	CHECK WIRE HARNESS AND CONNECTOR (KEY INTER LOCK SOLENOID - BODY GROUND)
----	---

- (a) Disconnect the D60 key inter lock solenoid connector.
- (b) Measure the resistance according to the value(s) in the table below.
- Standard Resistance:

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
D60-1 - Body ground	Always	Below 1 Ω

NG  REPAIR OR REPLACE HARNESS OR CONNECTOR

OK  REPLACE CONTROL UNIT RELAY ASSEMBLY



Last Modified: 3-27-2012	6.4 G	From: 201203
Model Year: 2013	Model: FR-S	Doc ID: RM0000057TO000X
Title: FA20 STARTING: KEY INTER LOCK SYSTEM: ON-VEHICLE INSPECTION (2013 FR-S)		

ON-VEHICLE INSPECTION

1. CHECK KEY INTER LOCK OPERATION

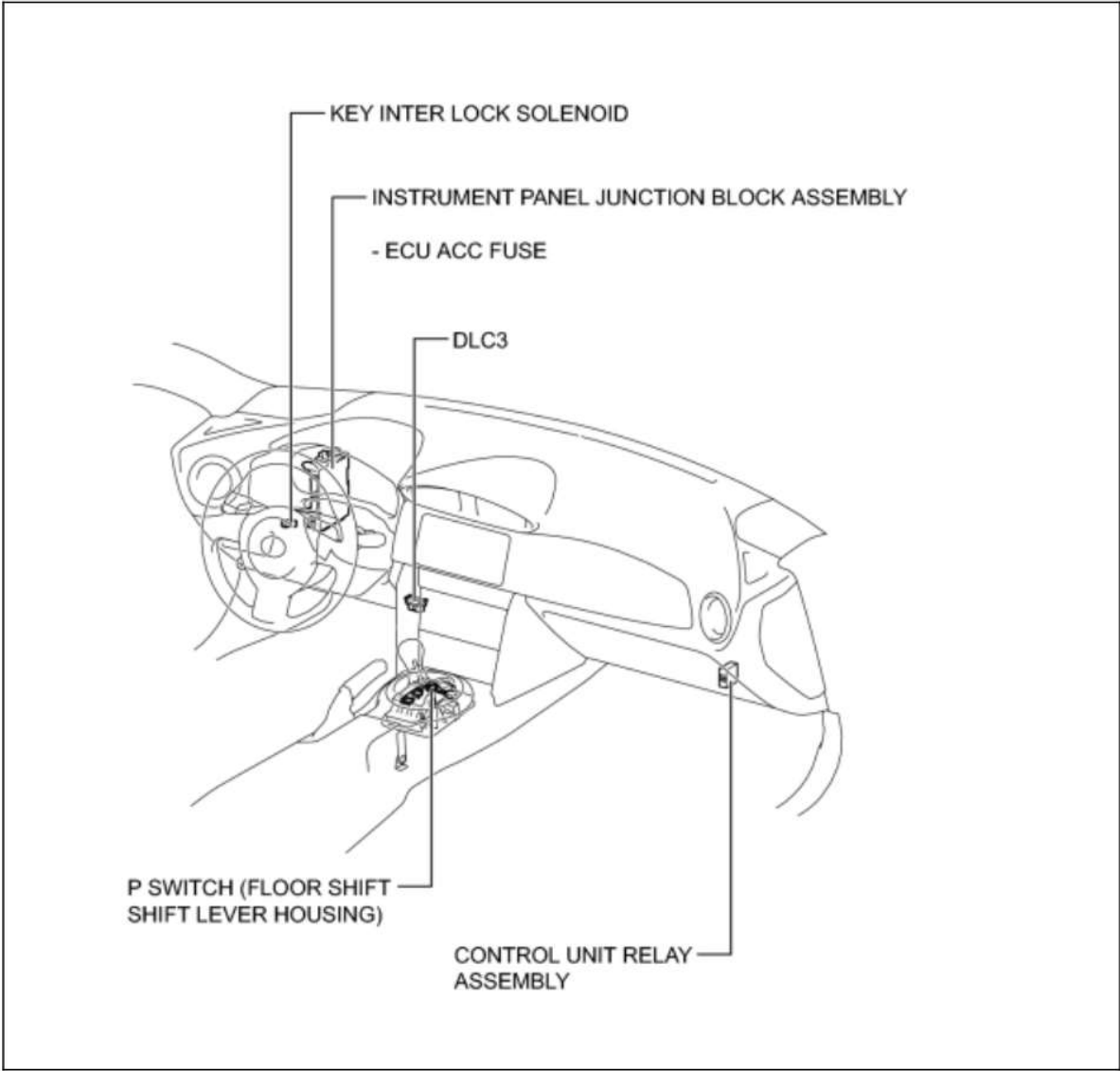
- (a) Turn the ignition switch to ON.
- (b) Depress the brake pedal and move the shift lever to any position other than P.
- (c) Check that the ignition key cannot be turned to LOCK.
- (d) Move the shift lever to P, turn the ignition key to LOCK and check that the ignition key can be removed. If the operation cannot be done as specified, inspect the key inter lock circuit.



Last Modified: 3-27-2012	6.4 R	From: 201203
Model Year: 2013	Model: FR-S	Doc ID: RM000000BNP000X
Title: FA20 STARTING: KEY INTER LOCK SYSTEM: PARTS LOCATION (2013 FR-S)		

PARTS LOCATION

ILLUSTRATION



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Last Modified: 3-27-2012	6.4 T	From: 201203
Model Year: 2013	Model: FR-S	Doc ID: RM000003N4Y00WX
Title: FA20 STARTING: KEY INTER LOCK SYSTEM: PROBLEM SYMPTOMS TABLE (2013 FR-S)		

PROBLEM SYMPTOMS TABLE

Key Inter Lock System

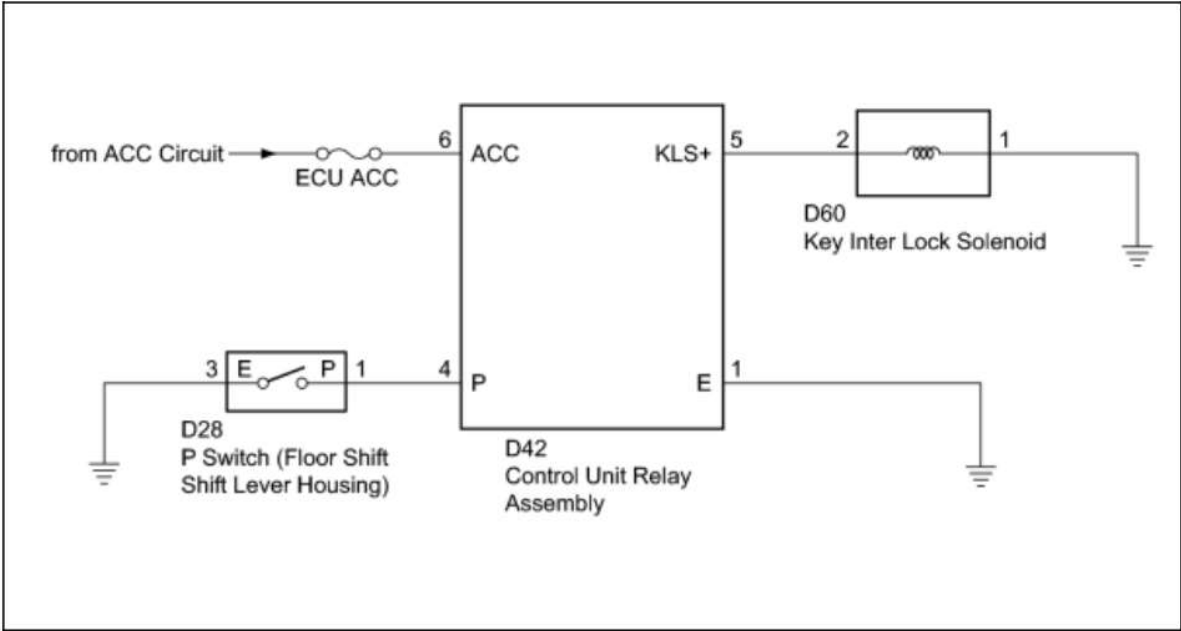
SYMPTOM	SUSPECTED AREA	SEE PAGE
Key cannot be removed or inserted	Key inter lock circuit	INFO



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Last Modified: 3-27-2012	6.4 U	From: 201203
Model Year: 2013	Model: FR-S	Doc ID: RM000003N95014X
Title: FA20 STARTING: KEY INTER LOCK SYSTEM: SYSTEM DIAGRAM (2013 FR-S)		

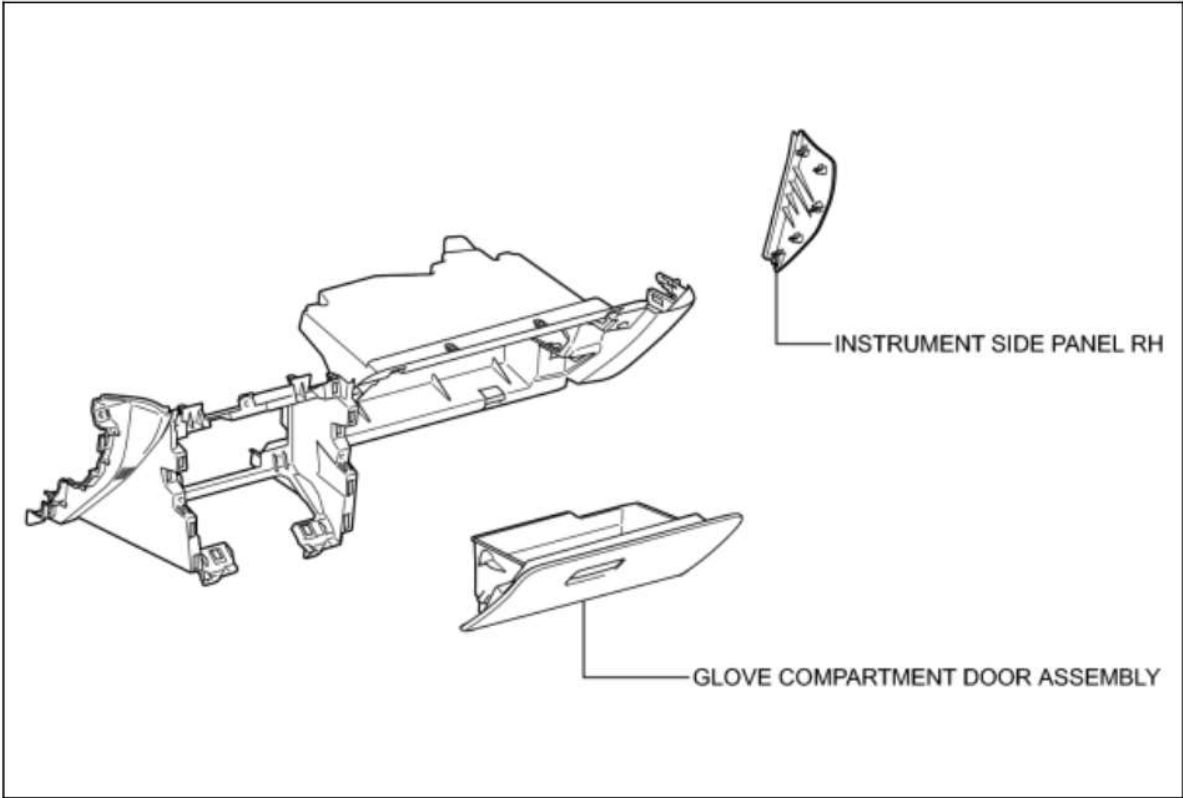
SYSTEM DIAGRAM



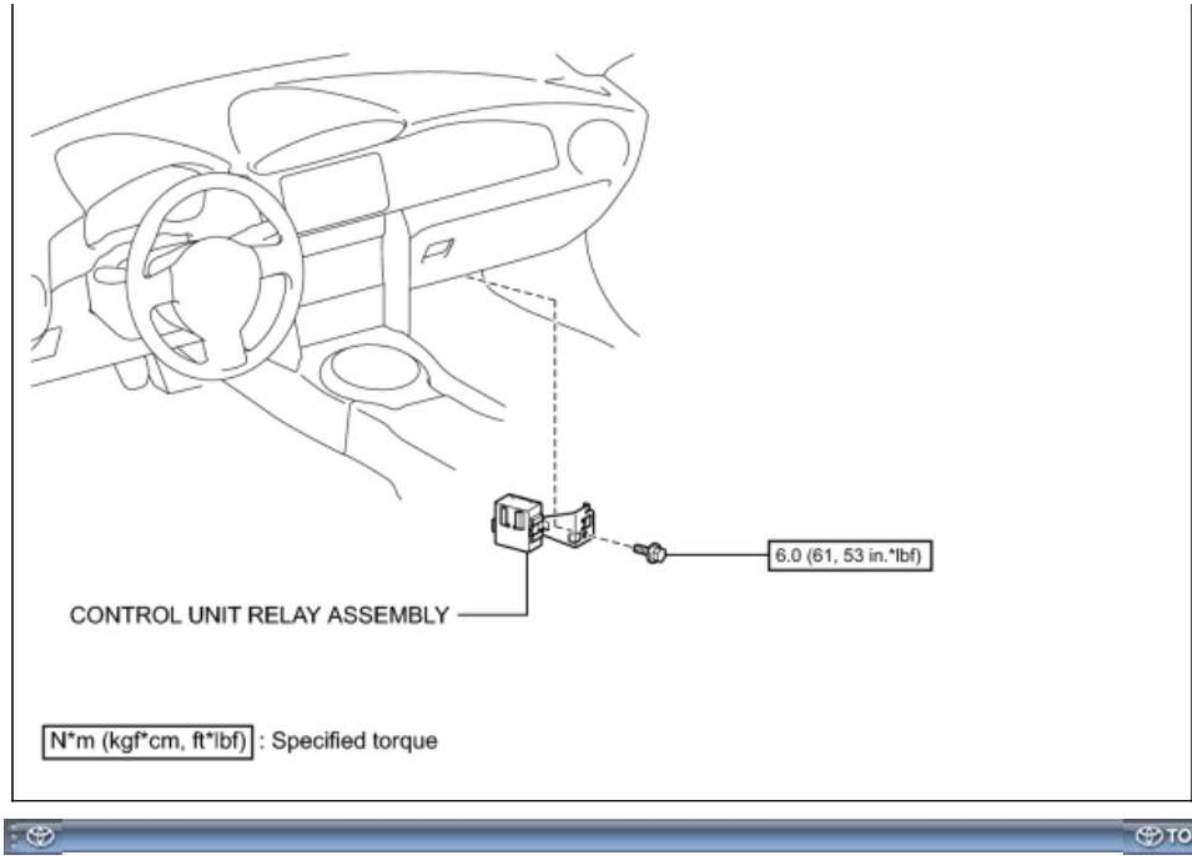
Last Modified: 3-27-2012	6.4 K	From: 201203
Model Year: 2013	Model: FR-S	Doc ID: RM0000048MW007X
Title: FA20 STARTING: KEY LOCK UNIT: COMPONENTS (2013 FR-S)		

COMPONENTS

ILLUSTRATION



ILLUSTRATION



Last Modified: 3-27-2012	6.4 A	From: 201203
Model Year: 2013	Model: FR-S	Doc ID: RM0000048QE007X
Title: FA20 STARTING: KEY LOCK UNIT: INSTALLATION (2013 FR-S)		

INSTALLATION

1. INSTALL CONTROL UNIT RELAY ASSEMBLY

(a) Install the control unit relay with the bolt.

Torque: 6.0 N·m (61 kgf·cm, 53in·lbf)

2. INSTALL GLOVE COMPARTMENT DOOR ASSEMBLY

INFO

3. INSTALL INSTRUMENT SIDE PANEL RH

INFO

4. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

INFO

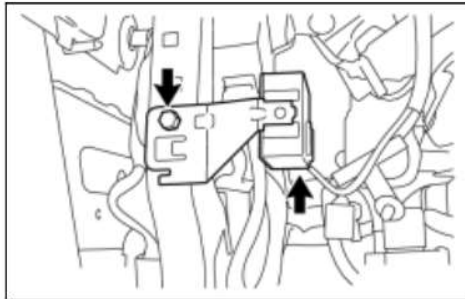


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Last Modified: 3-27-2012	6.4 A	From: 201203
Model Year: 2013	Model: FR-S	Doc ID: RM0000048QF007X
Title: FA20 STARTING: KEY LOCK UNIT: REMOVAL (2013 FR-S)		

REMOVAL

1. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL INFO
2. REMOVE INSTRUMENT SIDE PANEL RH INFO
3. REMOVE GLOVE COMPARTMENT DOOR ASSEMBLY INFO
4. REMOVE CONTROL UNIT RELAY ASSEMBLY



(a) Disconnect the control unit relay assembly connector.

(b) Remove the bolt and control unit relay assembly unit.



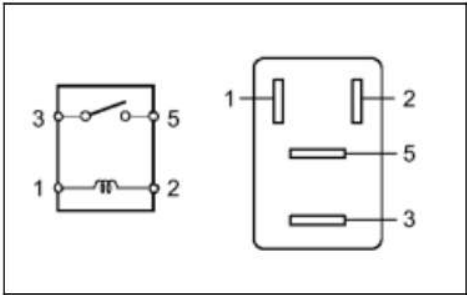
Last Modified: 3-27-2012	6.4 G	From: 201203
Model Year: 2013	Model: FR-S	Doc ID: RM000001FFP03HX
Title: FA20 STARTING: RELAY: ON-VEHICLE INSPECTION (2013 FR-S)		

ON-VEHICLE INSPECTION

1. INSPECT ST RELAY

(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:



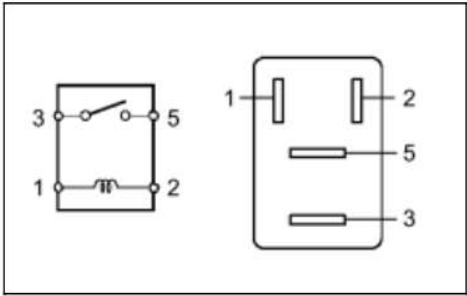
TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
1 - 2	Battery voltage not applied to terminals 1 and 2 Measurement temperature : 20 °C	93.8 to 136.4 kΩ
3 - 5	Battery voltage not applied to terminals 1 and 2	10 kΩ or higher
3 - 5	Battery voltage applied to terminals 1 and 2	Below 1 Ω

If the result is not as specified, replace the starter relay.

2. REMOVE INHIBITOR RELAY

(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:



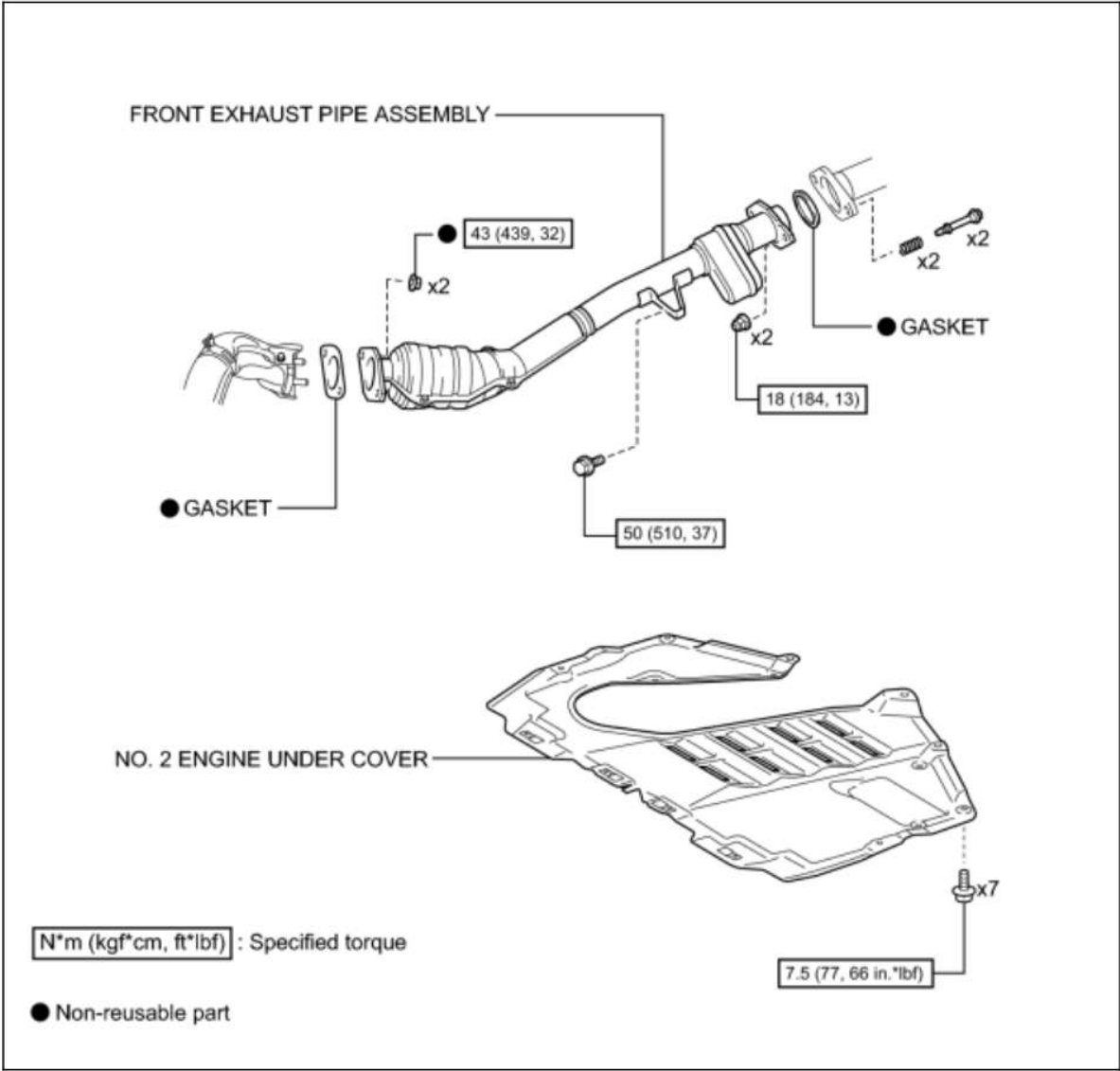
TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
1 - 2	Battery voltage not applied to terminals 1 and 2 Measurement temperature : 20 °C	93.8 to 136.4 kΩ
3 - 5	Battery voltage not applied to terminals 1 and 2	10 kΩ or higher
3 - 5	Battery voltage applied to terminals 1 and 2	Below 1 Ω

If the result is not as specified, replace the starter relay.

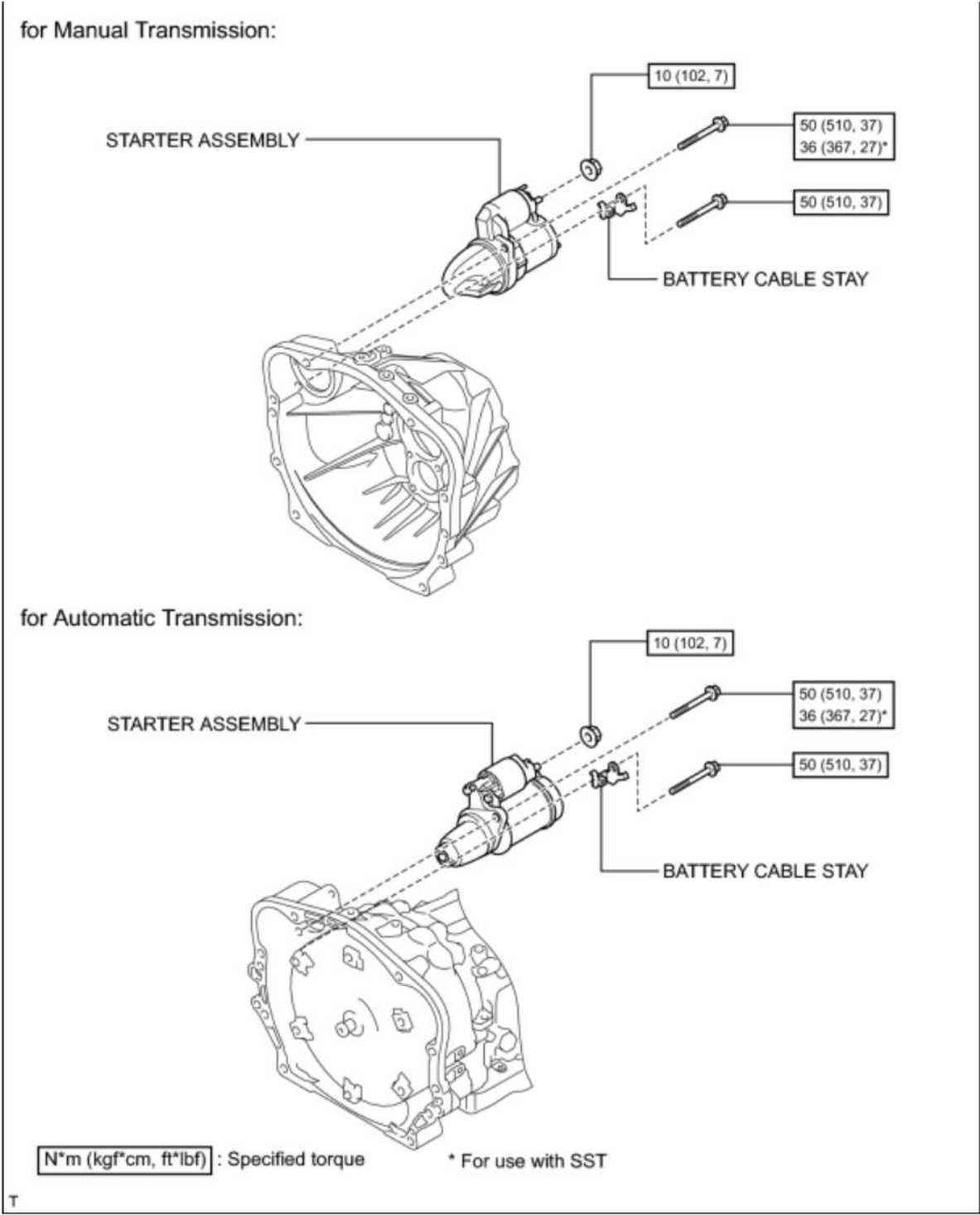
Last Modified: 3-27-2012	6.4 K	From: 201203
Model Year: 2013	Model: FR-S	Doc ID: RM000001UBV007X
Title: FA20 STARTING: STARTER: COMPONENTS (2013 FR-S)		

COMPONENTS

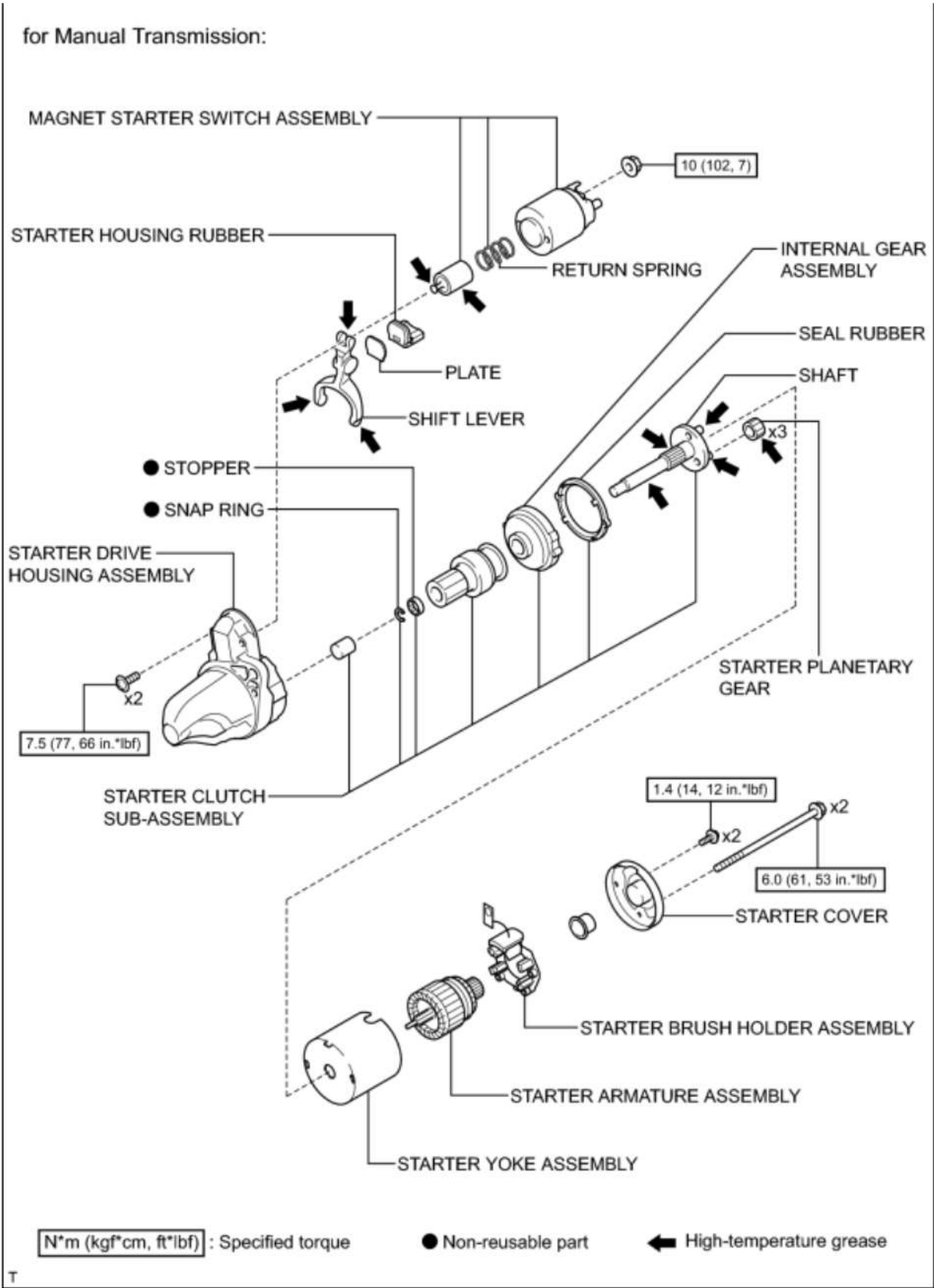
ILLUSTRATION



ILLUSTRATION

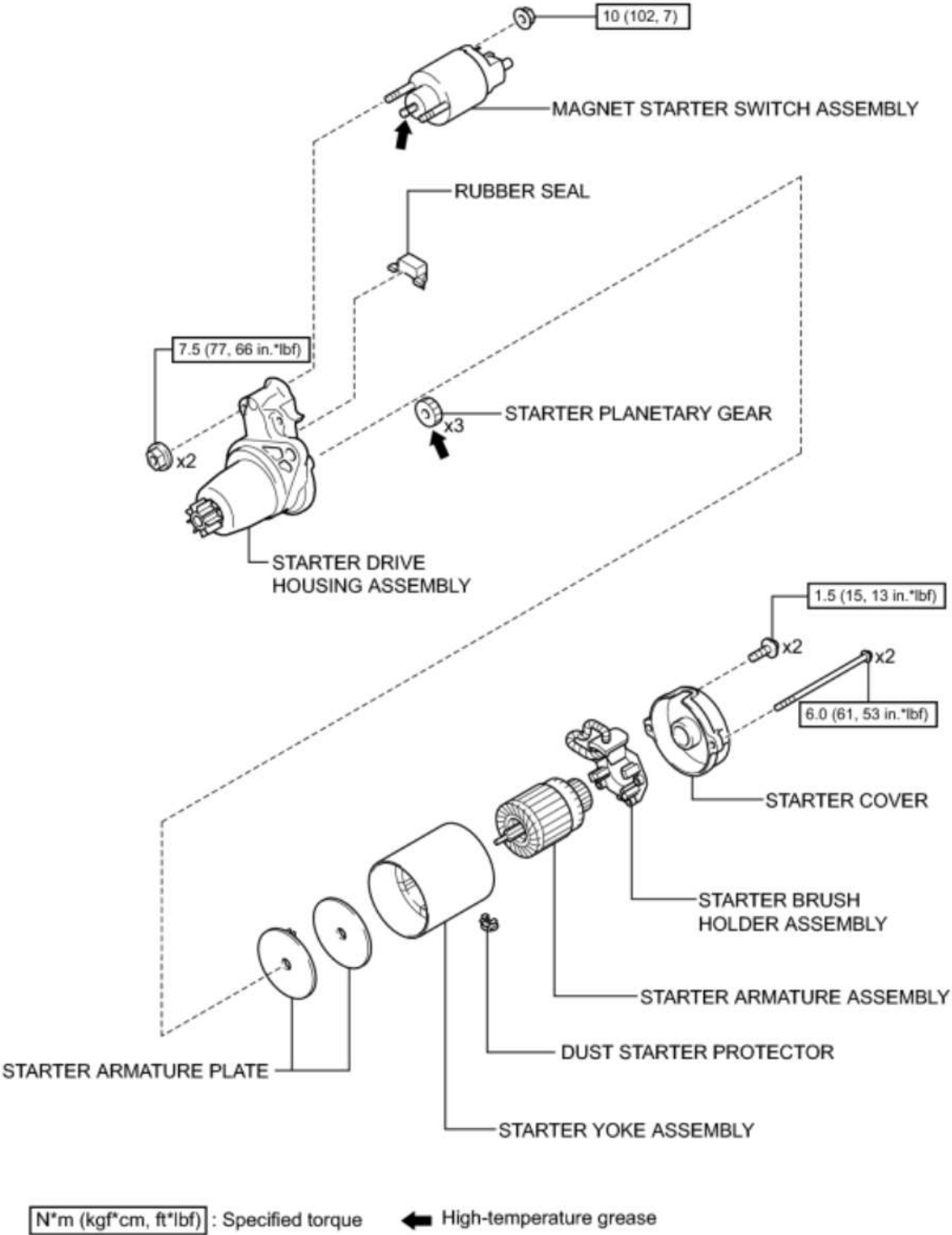


ILLUSTRATION

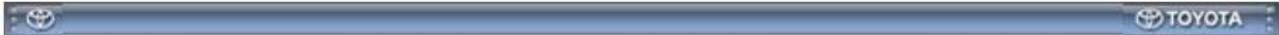


ILLUSTRATION

for Automatic Transmission:



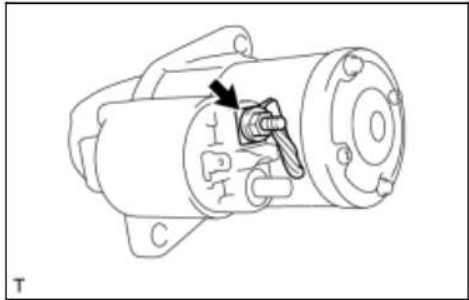
T



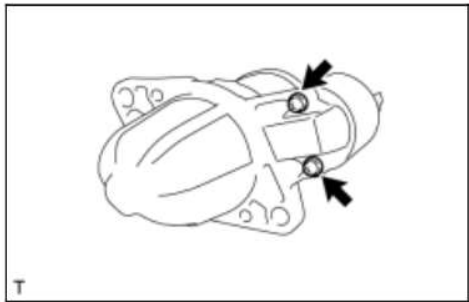
Last Modified: 3-27-2012	6.4 A	From: 201203
Model Year: 2013	Model: FR-S	Doc ID: RM000000EGY01TX
Title: FA20 STARTING: STARTER: DISASSEMBLY (2013 FR-S)		

DISASSEMBLY

1. REMOVE MAGNET STARTER SWITCH ASSEMBLY (for Manual Transmission)

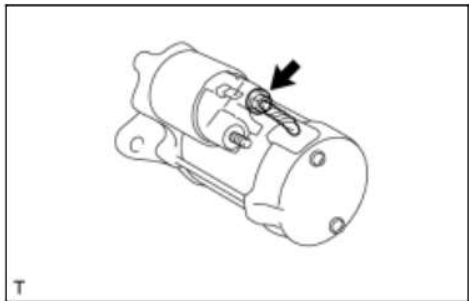


(a) Remove the nut and disconnect the lead wire from terminal C.

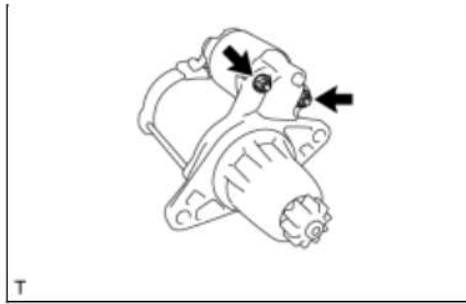


(b) Remove the 2 screws and the magnet starter switch assembly from the starter drive housing assembly.

2. REMOVE MAGNET STARTER SWITCH ASSEMBLY (for Automatic Transmission)

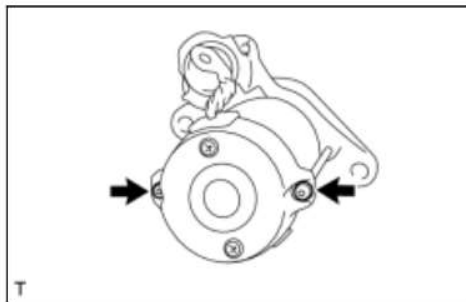


(a) Remove the nut and disconnect the lead wire from terminal C.

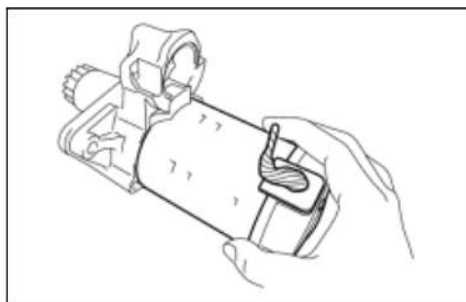


- (b) Remove the 2 nuts and the magnet starter switch assembly from the starter drive housing assembly.

3. REMOVE STARTER YOKE ASSEMBLY (for Automatic Transmission)

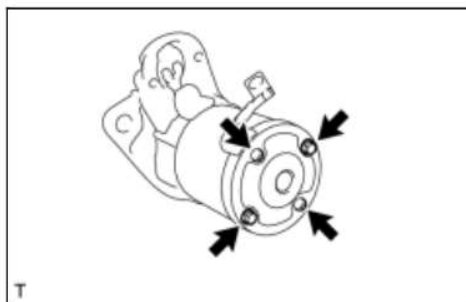


- (a) Using a "TORX" socket wrench T25, remove the 2 through bolts.



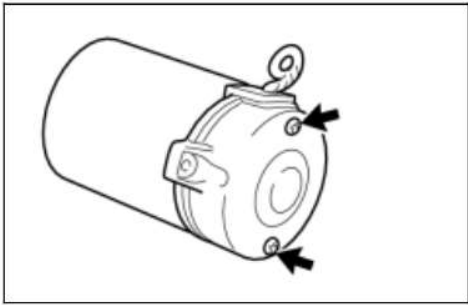
- (b) Remove the starter yoke assembly and starter cover from the starter drive housing assembly.

4. REMOVE STARTER COVER (for Manual Transmission)

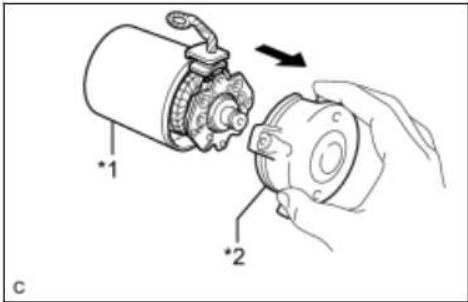


- (a) Remove the 2 through bolts and 2 screws, and remove the starter cover.

5. REMOVE STARTER COVER (for Automatic Transmission)



(a) Remove the 2 screws.



(b) Remove the starter cover from the starter yoke assembly.

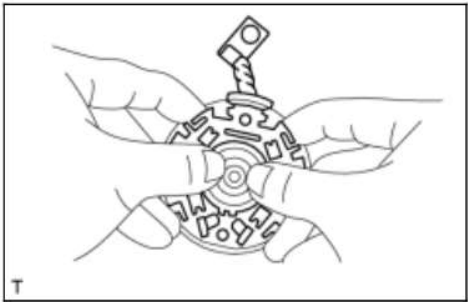
Text in Illustration

*1	Starter Yoke Assembly
*2	Starter Cover

NOTICE:
Hold the lead wire and remove the starter cover.

(c) Remove the dust starter protect from the starter yoke assembly.

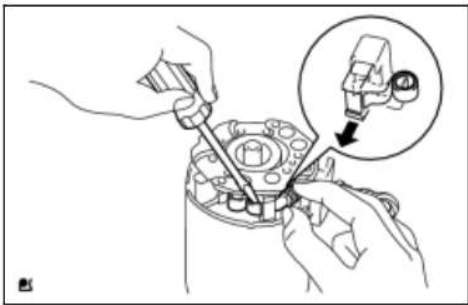
6. REMOVE STARTER BRUSH HOLDER ASSEMBLY (for Manual Transmission)



(a) Remove the starter brush holder assembly.

HINT:
Hold the brush with your fingers so that the brush spring does not come flying out.

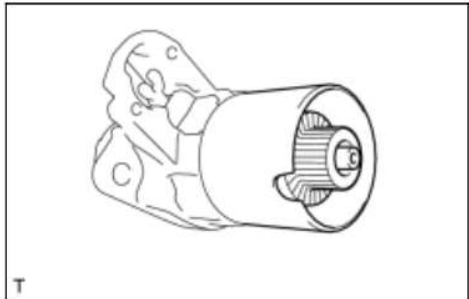
7. REMOVE STARTER BRUSH HOLDER ASSEMBLY (for Automatic Transmission)



(a) Using a screwdriver, disengage the spring from the bush.

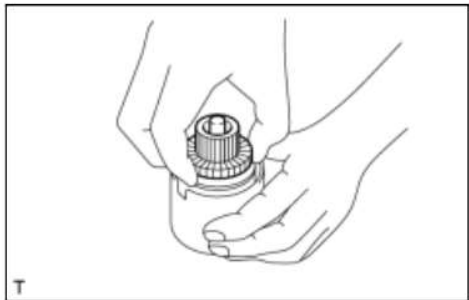
- (b) Disconnect the 4 brush from the starter brush holder assembly.
- (c) Remove the starter brush holder assembly.

8. REMOVE STARTER YOKE ASSEMBLY (for Manual Transmission)



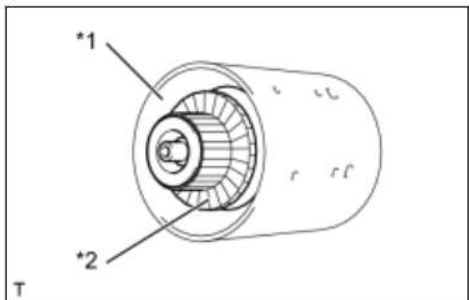
- (a) Remove the starter yoke assembly and starter armature assembly together from the starter drive housing assembly.

9. REMOVE STARTER ARMATURE ASSEMBLY (for Manual Transmission)



- (a) Pull out the starter armature assembly from the starter yoke assembly.

10. REMOVE STARTER ARMATURE ASSEMBLY (for Automatic Transmission)



- (a) Pull out the starter armature assembly from the starter yoke assembly.

Text in Illustration

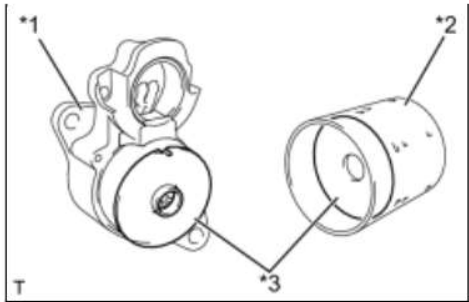
*1	Starter Yoke Assembly
*2	Starter Armature Assembly

11. REMOVE STARTER ARMATURE PLATE (for Automatic Transmission)

- (a) Remove the starter armature plate from the starter yoke assembly and starter drive housing assembly.

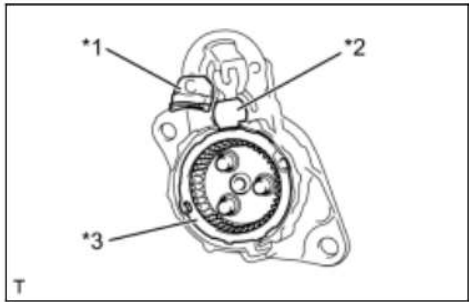
Text in Illustration

*1	Starter Drive Housing Assembly
----	--------------------------------



*2	Starter Yoke Assembly
*3	Starter Armature Plate

12. REMOVE STARTER HOUSING RUBBER (for Manual Transmission)

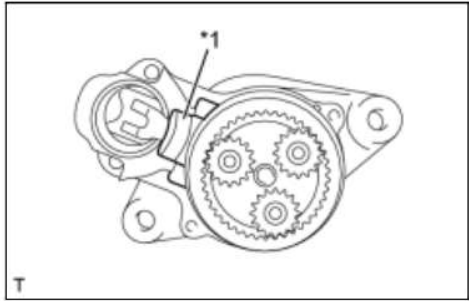


(a) Remove the starter housing rubber, seal rubber and plate from the starter drive housing assembly.

Text in Illustration

*1	Starter Housing Rubber
*2	Plate
*3	Seal Rubber

13. REMOVE RUBBER SEAL (for Automatic Transmission)

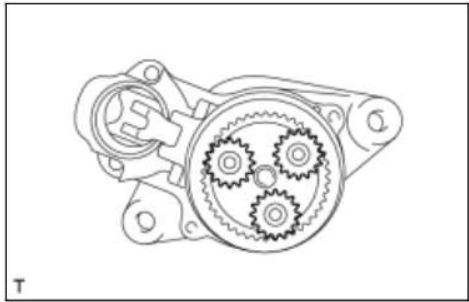


(a) Remove the rubber seal from the starter drive housing assembly.

Text in Illustration

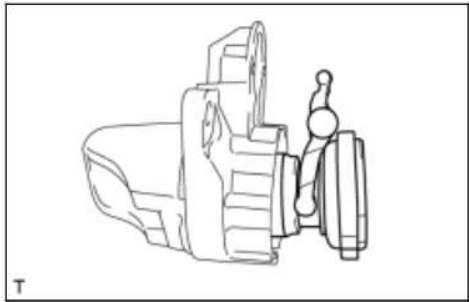
*1	Rubber Seal
----	-------------

14. REMOVE STARTER PLANETARY GEAR

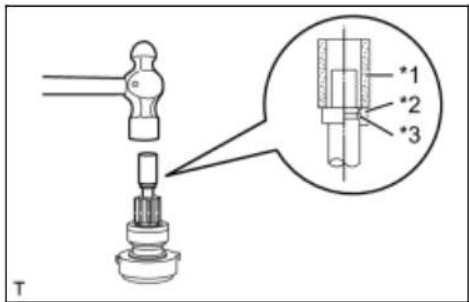


(a) Remove the 3 starter planetary gears from the starter clutch sub-assembly.

15. REMOVE STARTER CLUTCH SUB-ASSEMBLY (for Manual Transmission)



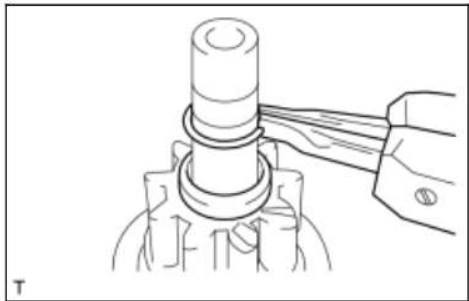
(a) Remove the starter clutch sub-assembly together with the drive lever set pin from the starter drive housing assembly.



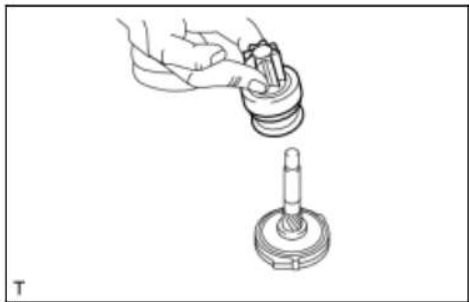
(b) Using a 14 mm deep socket wrench, remove the stopper from snap ring.

Text in Illustration

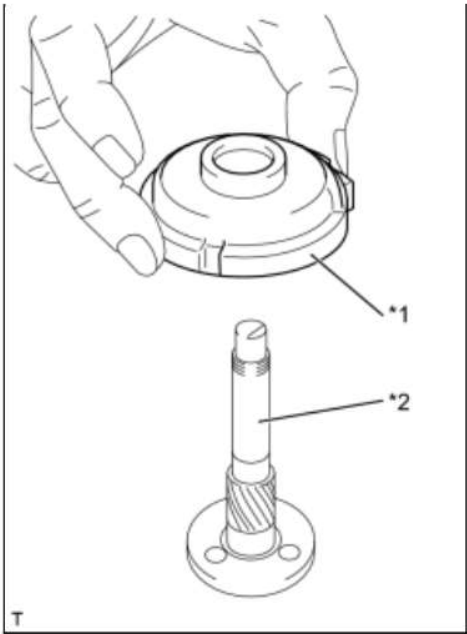
*1	14 mm Deep Socket Wrench
*2	Stopper
*3	Snap Ring



(c) Using snap ring pliers, remove the snap ring and stopper.



(d) Pull out the over running clutch from the shaft.



(e) Remove the internal gear assembly from the shaft.

Text in Illustration

*1	Internal Gear Assembly
*2	Shaft



Last Modified: 3-27-2012	6.4 G	From: 201203
Model Year: 2013	Model: FR-S	Doc ID: RM00000162401EX
Title: FA20 STARTING: STARTER: INSPECTION (2013 FR-S)		

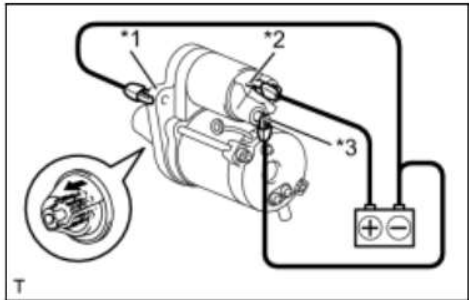
INSPECTION

1. INSPECT STARTER ASSEMBLY

CAUTION:
As a large electric current passes through the cable during this inspection, a thick cable must be used. If not, the cable may become hot and cause injury.

NOTICE:
The following tests must each be performed within 3 to 5 seconds to prevent the coil from burning out.

- (a) Mount the starter in a vise between aluminum plates.
- (b) Perform a pull-in test.
 - (1) Remove the nut, and then disconnect the lead wire from terminal C.



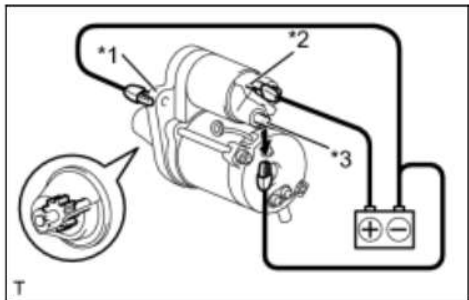
- (2) Connect the battery to the starter as shown in the illustration. Check that the clutch pinion gear extends.

Text in Illustration

*1	Body
*2	Terminal 50
*3	Terminal C

If the clutch pinion gear does not move, inspect the magnet starter switch assembly. If the magnet starter switch assembly is not as specified, replace it.

- (c) Perform a holding test.



- (1) Disconnect the negative (-) terminal lead from terminal C while the conditions specified in the pull-in test above are maintained. Check that the pinion gear remains out.

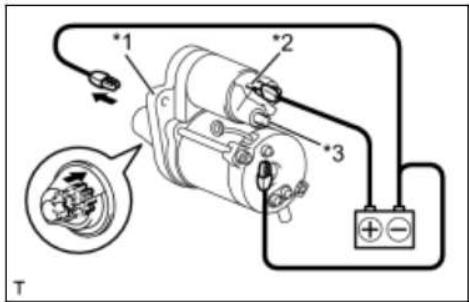
Text in Illustration

*1	Body
*2	Terminal 50
*3	Terminal C

If the clutch pinion gear returns inward, inspect the magnet starter switch assembly. If the magnet starter switch assembly is not as specified, replace it.

(d) Inspect the clutch pinion gear return.

- (1) Disconnect the negative (-) terminal lead from the starter body. Check that the clutch pinion gear returns inward.



Text in Illustration

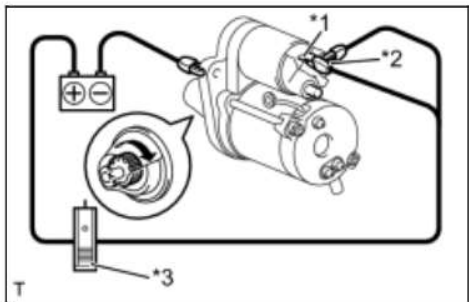
*1	Body
*2	Terminal 50
*3	Terminal C

If the clutch pinion gear does not return inward, inspect the magnet starter switch assembly. If the magnet starter switch assembly is not as specified, replace it.

(e) Perform an operation test without load.

- (1) Connect the lead wire to terminal C with the nut.

Torque: 10 N·m (102 kgf·cm, 7ft·lbf)



- (2) Connect the battery and an ammeter to the starter as shown in the illustration.

Text in Illustration

*1	Terminal 50
*2	Terminal 30
*3	Ammeter

- (3) Check that the starter rotates smoothly and steadily while the clutch pinion gear is extended. Then measure the current.

Standard Current:

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
Battery positive terminal - Terminal 30 - Terminal 50	11.5 V	Below 90 A

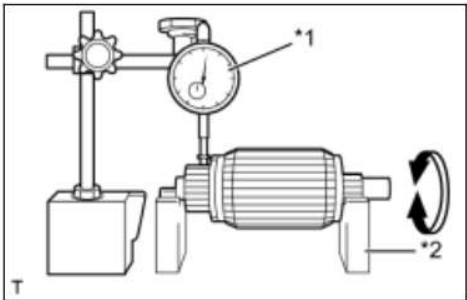
If the result is not as specified, inspect the starter assembly.

HINT:

Inspect the starter armature assembly, starter commutator end frame assembly and magnet starter switch assembly. If there is a malfunction, replace the part and perform again this test.

2. INSPECT STARTER ARMATURE ASSEMBLY (for Manual Transmission)

- (a) Check the commutator for signs of seizure or stepped wear caused by roughness of the surface. If there is light wear, use sandpaper to repair.

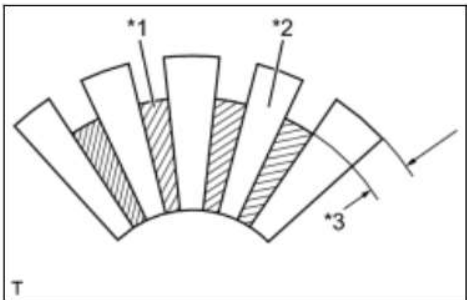


(b) Check for runout on the commutator. If excessive, replace the armature.

Standard runout:
0.05 mm (0.002 in.)
Maximum runout:
0.10 mm (0.004 in.)

Text in Illustration

*1	Dial Gauge
*2	V-block

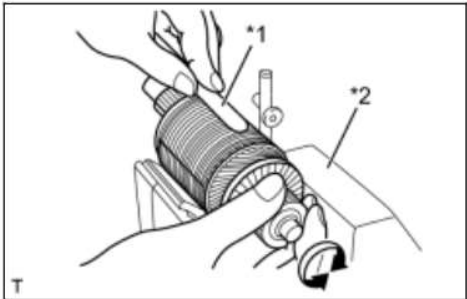


(c) Check the depth of the segment mold. If it is not within the standard, replace the armature.

Standard depth:
0.50 mm (0.020 in.)

Text in Illustration

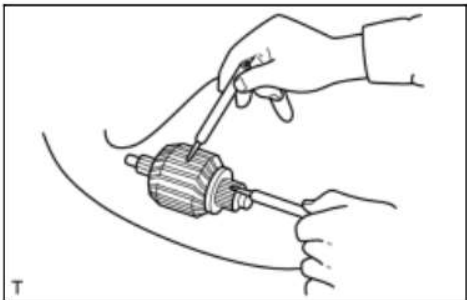
*1	Mold
*2	Segment
*3	Depth of Mold



(d) Place the armature on the growler tester to check for short circuits. While slowly turning the armature, support the steel sheet for the armature core. If the circuit of the armature is shorted, the steel sheet will vibrate, causing it to move towards the core. When the steel sheet has moved or vibrated, replace the armature.

Text in Illustration

*1	Steel Sheet
*2	Growler Tester



(e) Touch the probe of one side to the commutator segment, and the other probe to the shaft. If there is continuity, replace the armature.

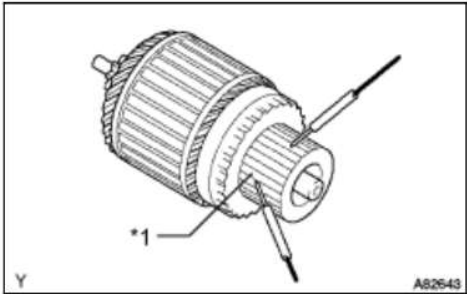
3. INSPECT STARTER ARMATURE ASSEMBLY (for Automatic Transmission)

(a) Check the commutator for dirt and/or burns on the surface.

If the surface is dirty or burnt, correct it with sandpaper (No. 400) or a lathe. If necessary, replace the starter armature assembly.

(b) Inspect the commutator for an open circuit.

(1) Measure the resistance according to the value(s) in the table below.



Text in Illustration

*1	Segment
----	---------

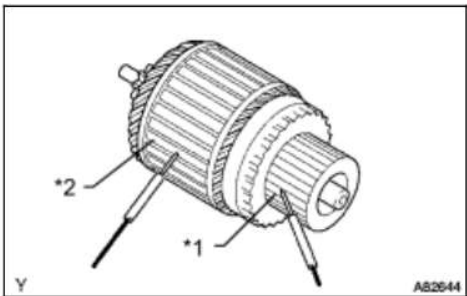
Standard Resistance:

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
Segment - Segment	Always	Below 1 Ω

If the result is not as specified, replace the starter armature assembly.

(c) Inspect the commutator for short circuits.

(1) Measure the resistance according to the value(s) in the table below.



Text in Illustration

*1	Segment
*2	Coil Core

Standard Resistance:

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
Segment - Coil core	Always	10 kΩ or higher

If the result is not as specified, replace the starter armature assembly.

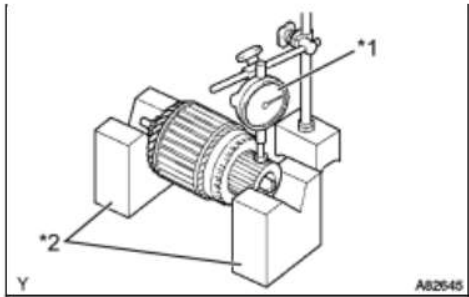
(d) Check the commutator for signs of seizure or stepped wear caused by roughness of the surface. If there is light wear, use sandpaper to repair.

(e) Check for runout on the commutator. If excessive, replace the armature.

Standard runout:
0.02 mm (0.0008 in.)
Maximum runout:
0.05 mm (0.002 in.)

Text in Illustration

*1	Dial Gauge
----	------------

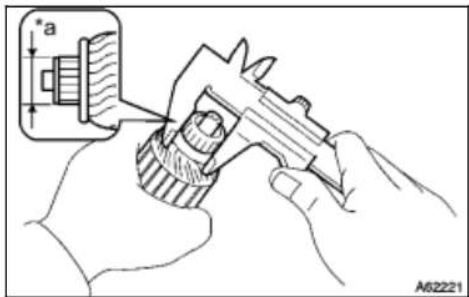


*2	V-block

If the result is not as specified, replace the starter armature assembly.

(f) Using vernier caliper, measure the commutator diameter.

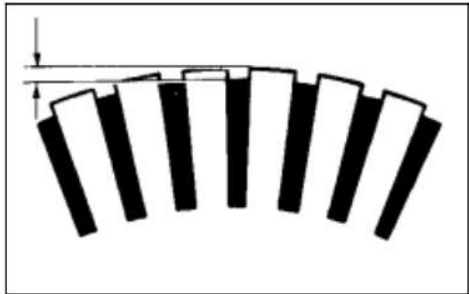
Text in Illustration



*a	Diameter
----	----------

Standard diameter:
29 mm (1.1417 in.)
Minimum diameter:
28 mm (1.1024 in.)

If the diameter is less than the minimum, replace the starter armature assembly.



(g) Using vernier caliper, measure the under cut depth of the segment. If it is not within the standard, replace the starter armature assembly.

Standard depth:
0.7 mm (0.0276 in.)
Minimum depth:
0.2 mm (0.0079 in.)

4. INSPECT STARTER YOKE ASSEMBLY (for Manual Transmission)

(a) Make sure that the pole is set at the predetermined position.

5. INSPECT STARTER BRUSH HOLDER ASSEMBLY (for Manual Transmission)

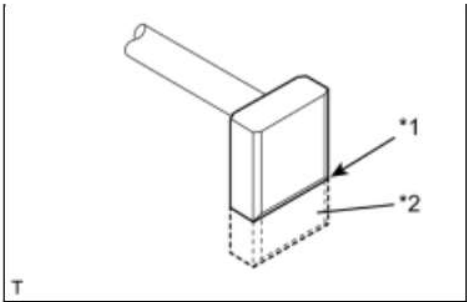
(a) Visually check the brush. If there is any abnormal wear or cracks, replace the brush.

(b) Measure the length of the brush. If it exceeds the service limits, replace the brush.

Standard length:
12.3 mm (0.484 in.)
Minimum length:
7.0 mm (0.276 in.)

Text in Illustration

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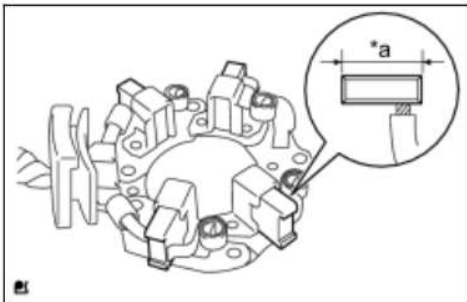
*1	Service Limit Line
*2	Brush

- (c) Check that the brush moves smoothly in the brush holder.
- (d) Measure the brush spring force with a spring scale. Replace the brush holder if below the service limit.

Standard brush spring force:
15.9 to 19.5 N (1.6 to 2.0 kgf, 3.6 to 4.4 lbf)
Minimum brush spring force:
2.5 N (0.3 kgf, 0.6 lbf)

6. INSPECT STARTER BRUSH HOLDER ASSEMBLY (for Automatic Transmission)

- (a) Using a vernier caliper, measure the brush length.



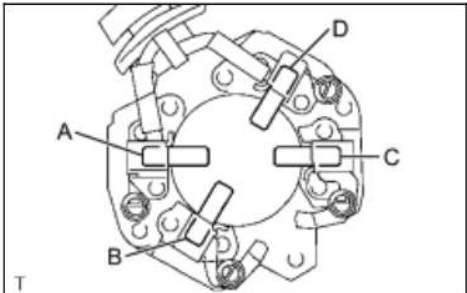
Text in Illustration

*a	Length
----	--------

Standard length:
14.4 mm (0.5669 in.)
Minimum length:
9.0 mm (0.3543 in.)
If the length is less than the minimum, replace the starter brush holder assembly.

- (b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

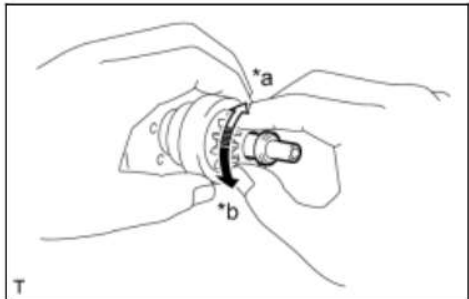


TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
A - B A - C B - D C - D	Always	10 kΩ or higher
A - D B - C	Always	Below 1 Ω

If the result is not as specified, replace the starter brush holder assembly.

7. INSPECT STARTER CLUTCH SUB-ASSEMBLY (for Manual Transmission)

- (a) Check the gear teeth on the planetary gear, internal gear and starter clutch for wear or damage.
If any of the gears is damaged, replace the starter center bearing clutch sub-assembly.
- (b) Check the starter clutch pinion gear.



- (1) Hold the starter clutch, rotate the pinion gear clockwise and check that it turns freely. Try to rotate the pinion gear counterclockwise and check that it locks.

Text in Illustration

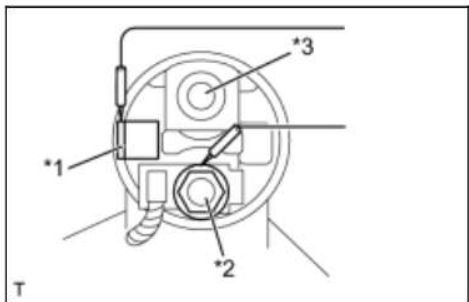
*a	Free
*b	Lock

If necessary, replace the starter clutch sub-assembly.

8. INSPECT MAGNET STARTER SWITCH ASSEMBLY (for Manual Transmission)

- (a) Check that there is continuity between terminals 50 and C, and between terminal 50 and ground. Also, check to be sure there is no continuity between terminal C and 30.

Standard Resistance:



TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
Terminal C - Terminal 50	Always	Below 1 Ω
Terminal 50 - Switch body	Always	Below 1 Ω
Terminal C - Terminal 30	Always	1 MΩ or higher

Text in Illustration

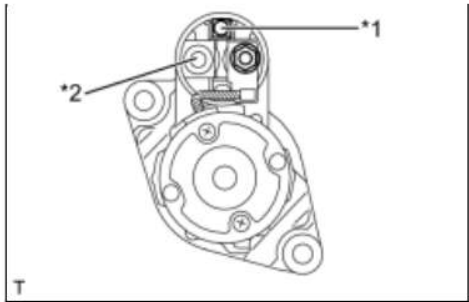
*1	Terminal 50
*2	Terminal C
*3	Terminal 30

- (b) Using a lead wire, connect the switch assembly terminal 50 to the positive terminal of the battery, and the starter body to the ground terminal of the battery. The pinion should be forced to be pushed out on the shaft.

HINT:

With the pinion forced to be pushed out on the shaft, the starter motor can sometimes rotate because the current flows, through pull-in coil, to motor. This is not a problem.

- (c) Disconnect the connector from terminal C. Then, using a lead wire, connect the positive terminal of the battery and



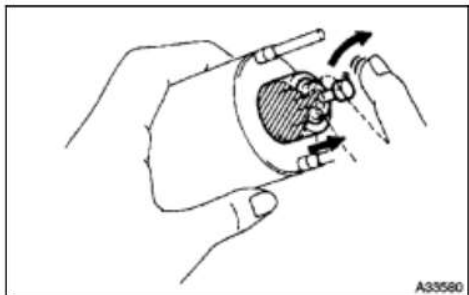
terminal C, and ground terminal to starter body. In this test set up, the pinion should return to its original position even when it is pulled out with a screwdriver.

Text in Illustration

*1	Terminal 50
*2	Terminal C

9. INSPECT MAGNET STARTER SWITCH ASSEMBLY (for Automatic Transmission)

(a) Check the plunger.



- (1) Push in the plunger and check that it returns quickly to its original position.
- If necessary, replace the magnet starter switch assembly.

(b) Inspect the pull-in coil.

- (1) Measure the resistance according to the value(s) in the table below.

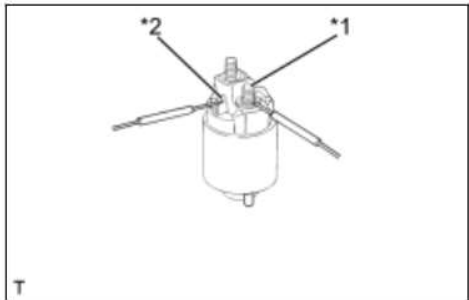
Standard Resistance:

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
Terminal C - Terminal 50	Always	Below 1 Ω

Text in Illustration

*1	Terminal C
*2	Terminal 50

If the result is not as specified, replace the magnet starter switch assembly.

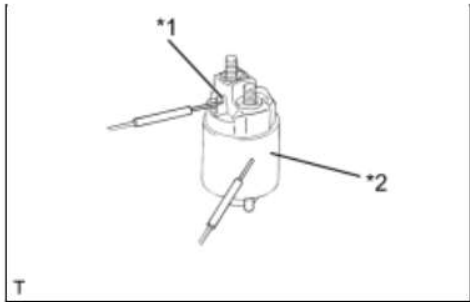


(c) Inspect the holding coil.

- (1) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

TESTER CONNECTION	CONDITION	SPECIFIED
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		CONDITION
Terminal 50 - Switch body	Always	Below 2 Ω

Text in Illustration

*1	Terminal 50
*2	Switch Body

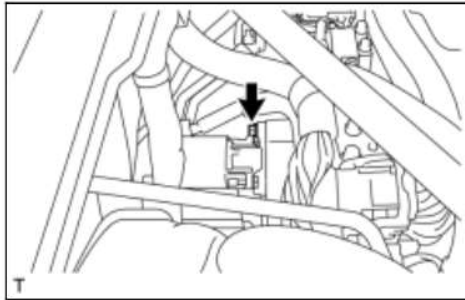
If the result is not as specified, replace the magnet starter switch assembly.



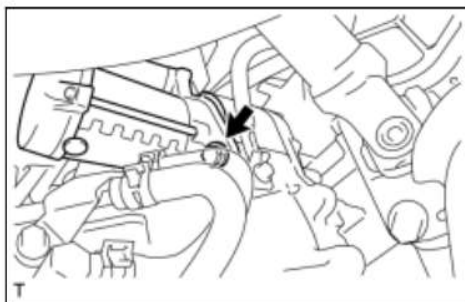
Last Modified: 3-27-2012	6.4 A	From: 201203
Model Year: 2013	Model: FR-S	Doc ID: RM000000V3F029X
Title: FA20 STARTING: STARTER: INSTALLATION (2013 FR-S)		

INSTALLATION

1. INSTALL STARTER ASSEMBLY

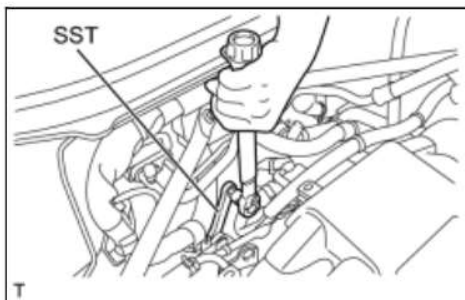


(a) Temporarily install the upper side bolts.



(b) Install the lower side bolt.

Torque: 50 N·m (510 kgf·cm, 37ft·lbf)



(c) Install the upper side bolt and starter assembly.

SST: 09249-37010

without SST - Torque: 50 N·m (510 kgf·cm, 37ft·lbf)

with SST - Torque: 36 N·m (367 kgf·cm, 27ft·lbf)

HINT:

- Use a torque wrench with a fulcrum length of 260 mm (10.2 in.). When using a torque wrench with a fulcrum length that is not 260 mm (10.24 in.), calculate the torque specification for the torque wrench and SST based on the "without SST" torque specification [INFO](#).
- Make sure SST and the wrench are connected in a straight line.

(d) Engage the wire clamp.

(e) Connect the starter connector.

(f) Connect the starter wire with the nut.

Torque: 10 N·m (102 kgf·cm, 7ft·lbf)

2. INSTALL FRONT EXHAUST PIPE ASSEMBLY [INFO](#)

3. INSTALL NO. 2 ENGINE UNDER COVER [INFO](#)

4. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL [INFO](#)

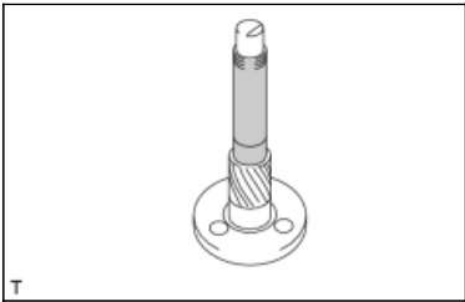


Last Modified: 3-27-2012	6.4 A	From: 201203
Model Year: 2013	Model: FR-S	Doc ID: RM000000EH001TX
Title: FA20 STARTING: STARTER: REASSEMBLY (2013 FR-S)		

REASSEMBLY

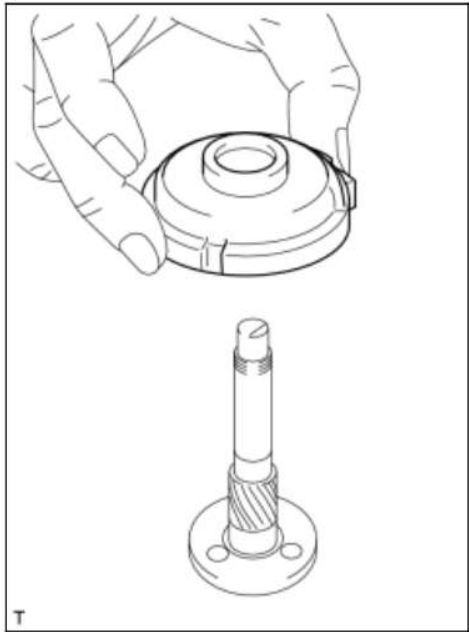
1. INSTALL STARTER CLUTCH SUB-ASSEMBLY (for Manual Transmission)

(a) Apply high-temperature grease to the shaft as shown in the illustration.



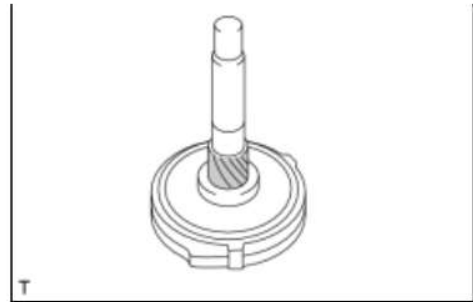
Text in Illustration

	High-temperature Grease
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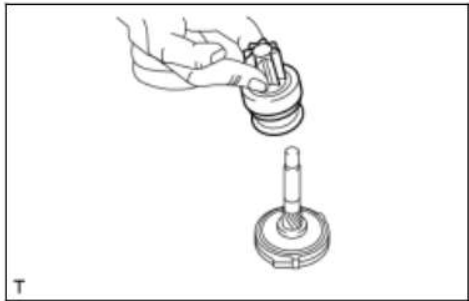
(b) Install the internal gear to the shaft.

(c) Apply high-temperature grease to the shaft as shown in the illustration.

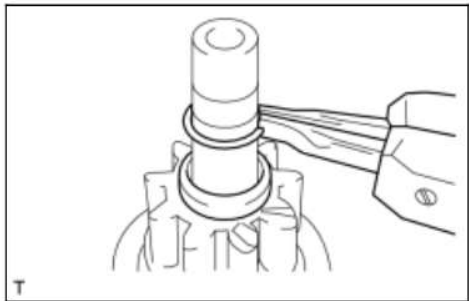


Text in Illustration

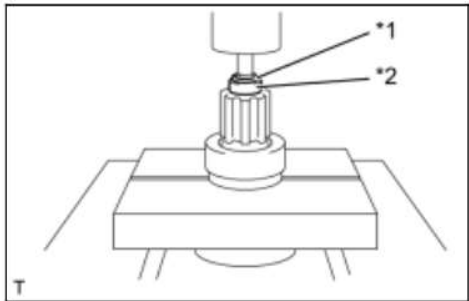
	High-temperature Grease
---	-------------------------



(d) Install the over running clutch to the shaft.



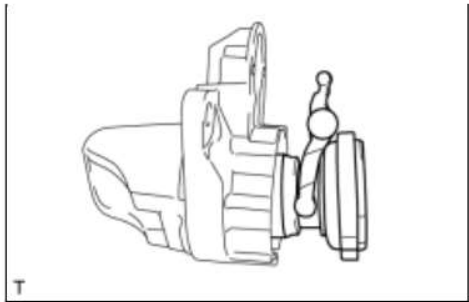
(e) Install the stopper to the shaft.
Using snap ring pliers, install the snap ring.



(f) Using a press, press the snap ring into the stopper.

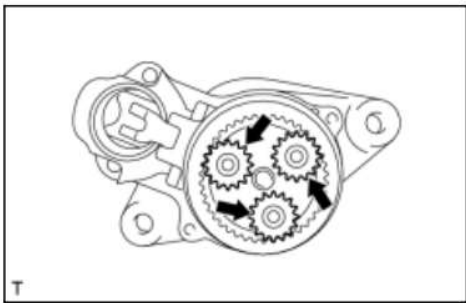
Text in Illustration

*1	Snap Ring
*2	Stopper



(g) Install the starter clutch sub-assembly together with the drive lever set pin to the starter drive housing assembly.

2. INSTALL STARTER PLANETARY GEAR (for Manual Transmission)

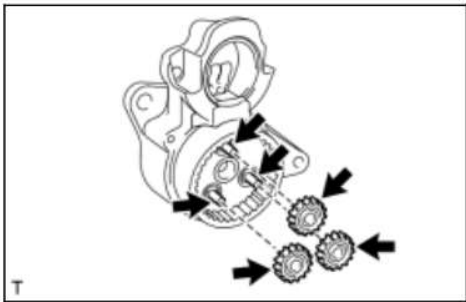


- (a) Apply high-temperature grease to the planetary gears and pins of the planetary shaft.
- (b) Install the 3 starter planetary gears.

Text in Illustration

	High-temperature Grease
---	-------------------------

3. INSTALL STARTER PLANETARY GEAR (for Automatic Transmission)

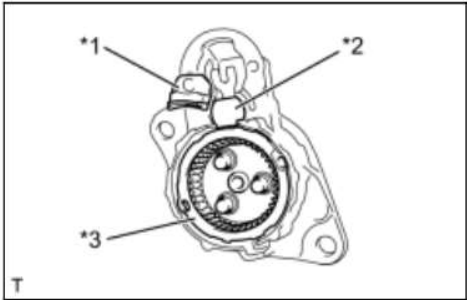


- (a) Apply high-temperature grease to the planetary gears and pins of the planetary shaft.
- (b) Install the 3 starter planetary gears.

Text in Illustration

	High-temperature Grease
---	-------------------------

4. INSTALL STARTER HOUSING RUBBER (for Manual Transmission)

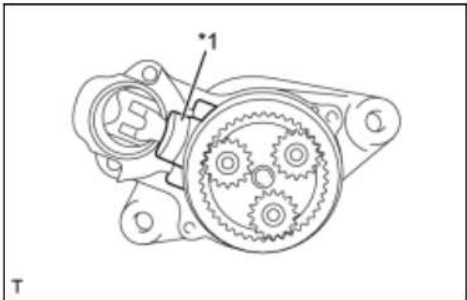


(a) Install the starter housing rubber, seal rubber and plate to the starter drive housing assembly.

Text in Illustration

*1	Starter Housing Rubber
*2	Plate
*3	Seal Rubber

5. INSTALL RUBBER SEAL (for Automatic Transmission)

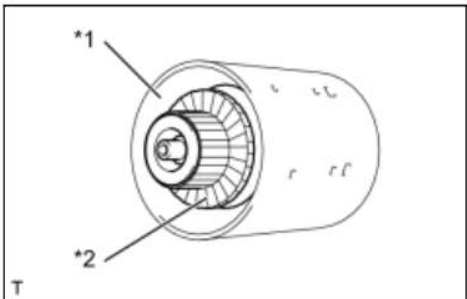


(a) Install the rubber seal to the starter drive housing assembly.

Text in Illustration

*1	Rubber Seal
----	-------------

6. INSTALL STARTER ARMATURE ASSEMBLY (for Automatic Transmission)

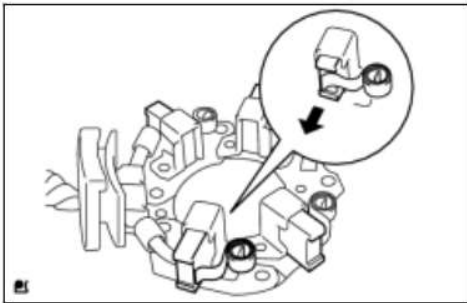


(a) Install the starter armature assembly to the starter yoke assembly.

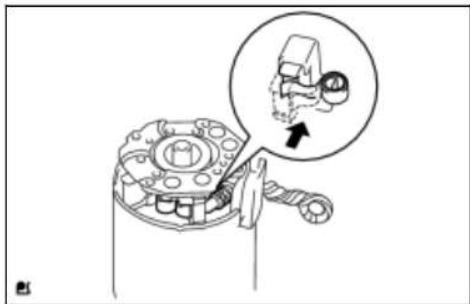
Text in Illustration

*1	Starter Yoke Assembly
*2	Starter Armature Assembly

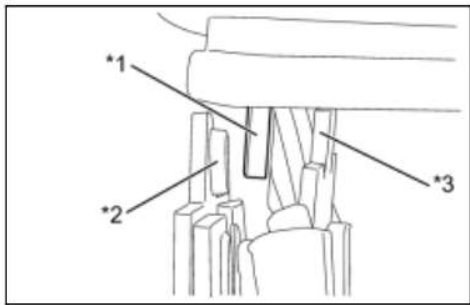
7. INSTALL STARTER BRUSH HOLDER ASSEMBLY (for Automatic Transmission)



(a) Install the 4 brushes and 4 brush springs.



(b) Install the starter brush holder assembly to the starter armature assembly. Push the 4 brushes.



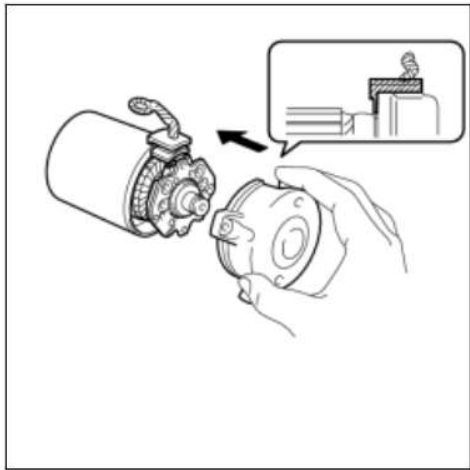
(c) Insert the grommet between the positive (+) motor read wire and the negative (-) brush holder plate.

Text in Illustration

*1	Grommet
*2	Negative (-) Brush Holder Plate
*3	Positive (+) Motor Read Wire

8. INSTALL STARTER COVER (for Automatic Transmission)

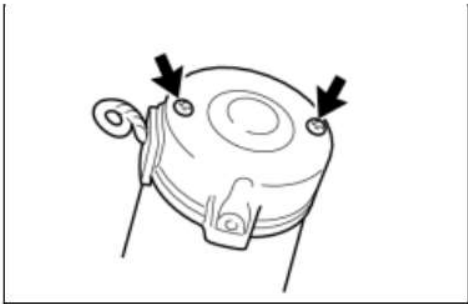
(a) Install the dust starter protector to the starter yoke assembly.



(b) Align the starter brush holder assembly read wire rubber with the groove of the starter cover.

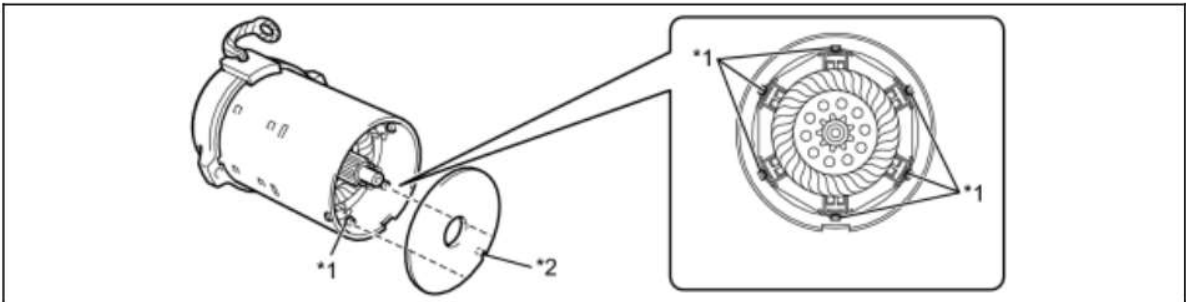
(c) Install the starter cover to the starter brush holder assembly with 2 screws.

- Torque: 1.5 N·m (15 kgf·cm, 13in·lbf)



9. INSTALL STARTER ARMATURE PLATE (for Automatic Transmission)

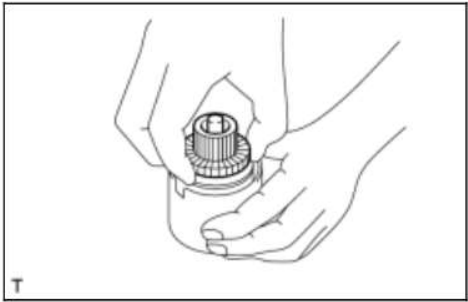
- (a) Align the claw of the starter yoke assembly with the groove the starter armature plate.
- (b) Install the starter armature plate to the starter yoke assembly.



Text in illustration

*1	Claw	*2	Groove
----	------	----	--------

10. INSTALL STARTER ARMATURE ASSEMBLY (for Manual Transmission)



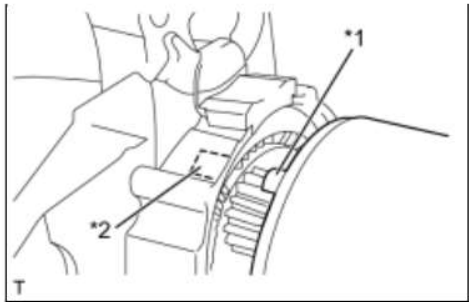
- (a) Install the starter armature assembly to the starter yoke assembly.

11. INSTALL STARTER YOKE ASSEMBLY (for Manual Transmission)

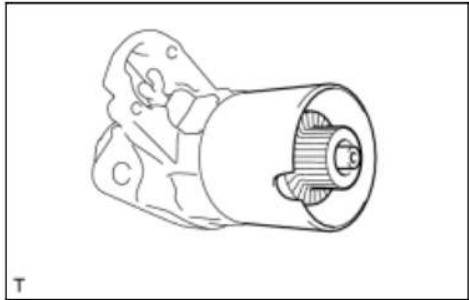
- (a) Align the claw of the starter yoke assembly with the groove inside the starter drive housing assembly.

Text in Illustration

*1	Claw
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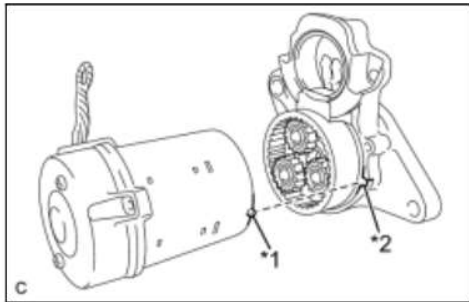


*2	Groove



- (b) Install the starter yoke assembly together with the starter armature assembly to the starter drive housing assembly.

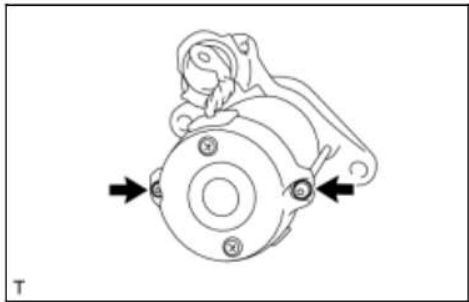
12. INSTALL STARTER YOKE ASSEMBLY (for Automatic Transmission)



- (a) Align the claw of the starter yoke assembly with the groove inside the starter drive housing assembly.
- Install the starter yoke assembly together with the starter armature assembly to the starter drive housing assembly.

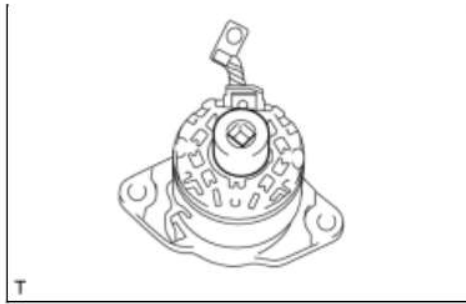
Text in Illustration

*1	Claw
*2	Groove



- (b) Using a "TORX" socket wrench T25, install the 2 through bolts.
- Torque: 6.0 N·m (61 kgf·cm, 53in·lbf)**

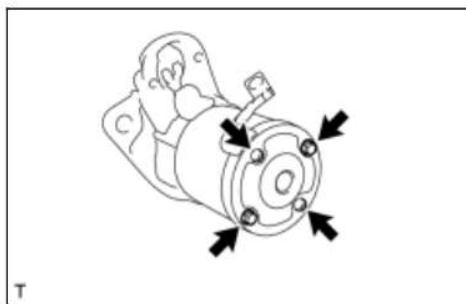
13. INSTALL STARTER BRUSH HOLDER ASSEMBLY (for Manual Transmission)



- (a) Install a 24 mm socket to the starter brush holder assembly.

- (b) Install the starter brush holder assembly to the starter armature assembly.

14. INSTALL STARTER COVER (for Manual Transmission)

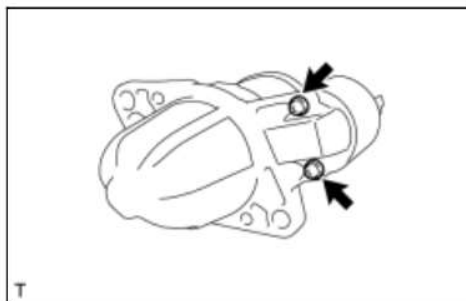


- (a) Install the starter cover with 2 screws and 2 bolts.

Bolt - Torque: 6.0 N·m (61 kgf·cm, 53in·lbf)

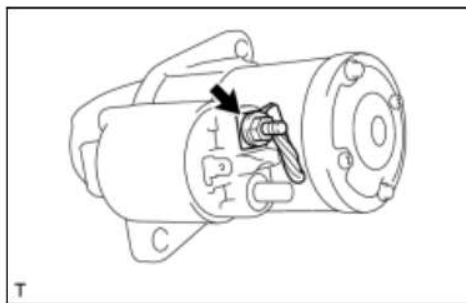
Screw - Torque: 1.4 N·m (14 kgf·cm, 12in·lbf)

15. INSTALL MAGNET STARTER SWITCH ASSEMBLY (for Manual Transmission)



- (a) Install the magnet starter switch assembly with the 2 screws.

Torque: 7.5 N·m (77 kgf·cm, 66in·lbf)

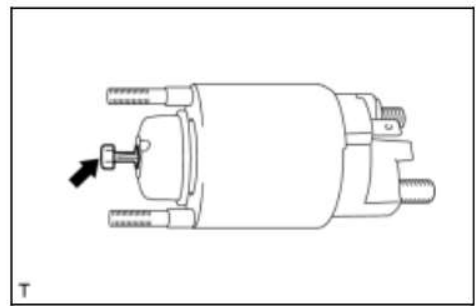


- (b) Connect the lead wire to terminal C with the nut.

Torque: 10 N·m (102 kgf·cm, 7ft·lbf)

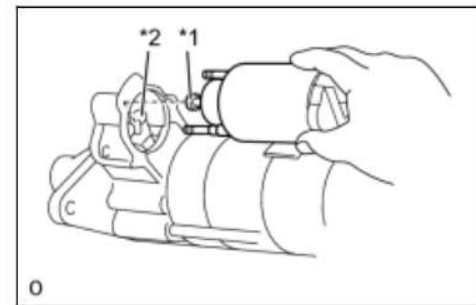
16. INSTALL MAGNET STARTER SWITCH ASSEMBLY (for Automatic Transmission)

- (a) Apply high-temperature grease to the plunger and hook as shown in the illustration.



Text in Illustration

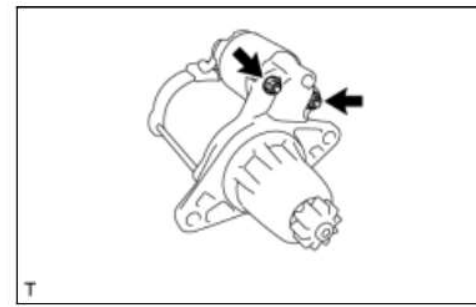
	High-temperature grease
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(b) Hook the plunger and hook of the magnet starter switch assembly to the lever of the starter drive housing assembly.

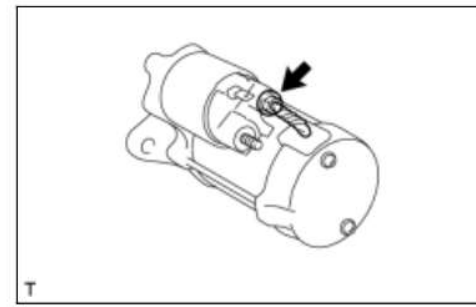
Text in Illustration

*1	Plunger and Hook
*2	Lever



(c) Install the magnet starter switch assembly with the 2 screws.

Torque: 7.5 N·m (77 kgf·cm, 66in·lbf)



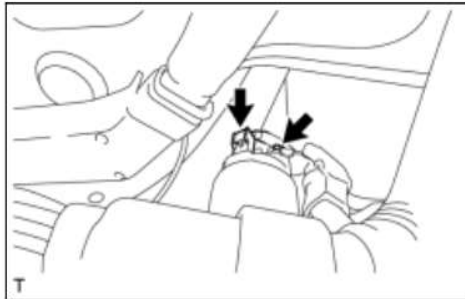
(d) Connect the lead wire to terminal C with the nut.

Torque: 10 N·m (102 kgf·cm, 7ft·lbf)

Last Modified: 3-27-2012	6.4 A	From: 201203
Model Year: 2013	Model: FR-S	Doc ID: RM000000V3I029X
Title: FA20 STARTING: STARTER: REMOVAL (2013 FR-S)		

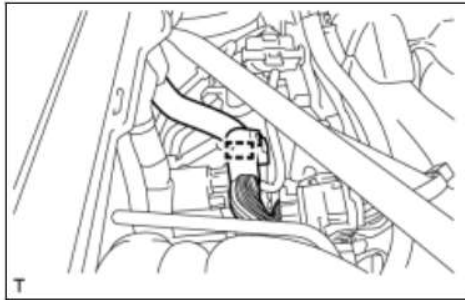
REMOVAL

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL** INFO
2. **REMOVE NO. 2 ENGINE UNDER COVER** INFO
3. **REMOVE FRONT EXHAUST PIPE ASSEMBLY** INFO
4. **REMOVE STARTER ASSEMBLY**

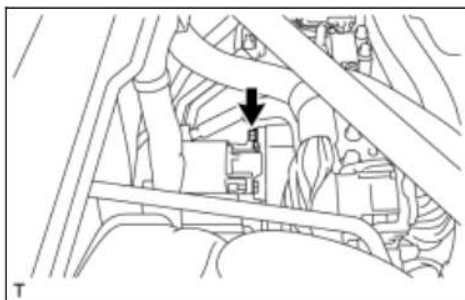


(a) Remove the nut and disconnect the starter wire.

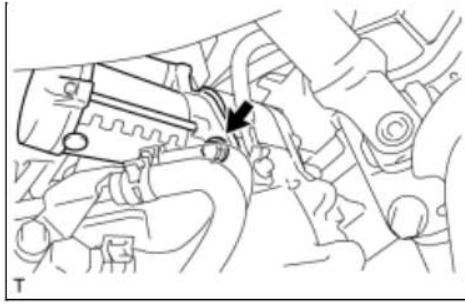
(b) Disconnect the starter connector.



(c) Disengage the wire clamp.



(d) Remove the upper side bolt.



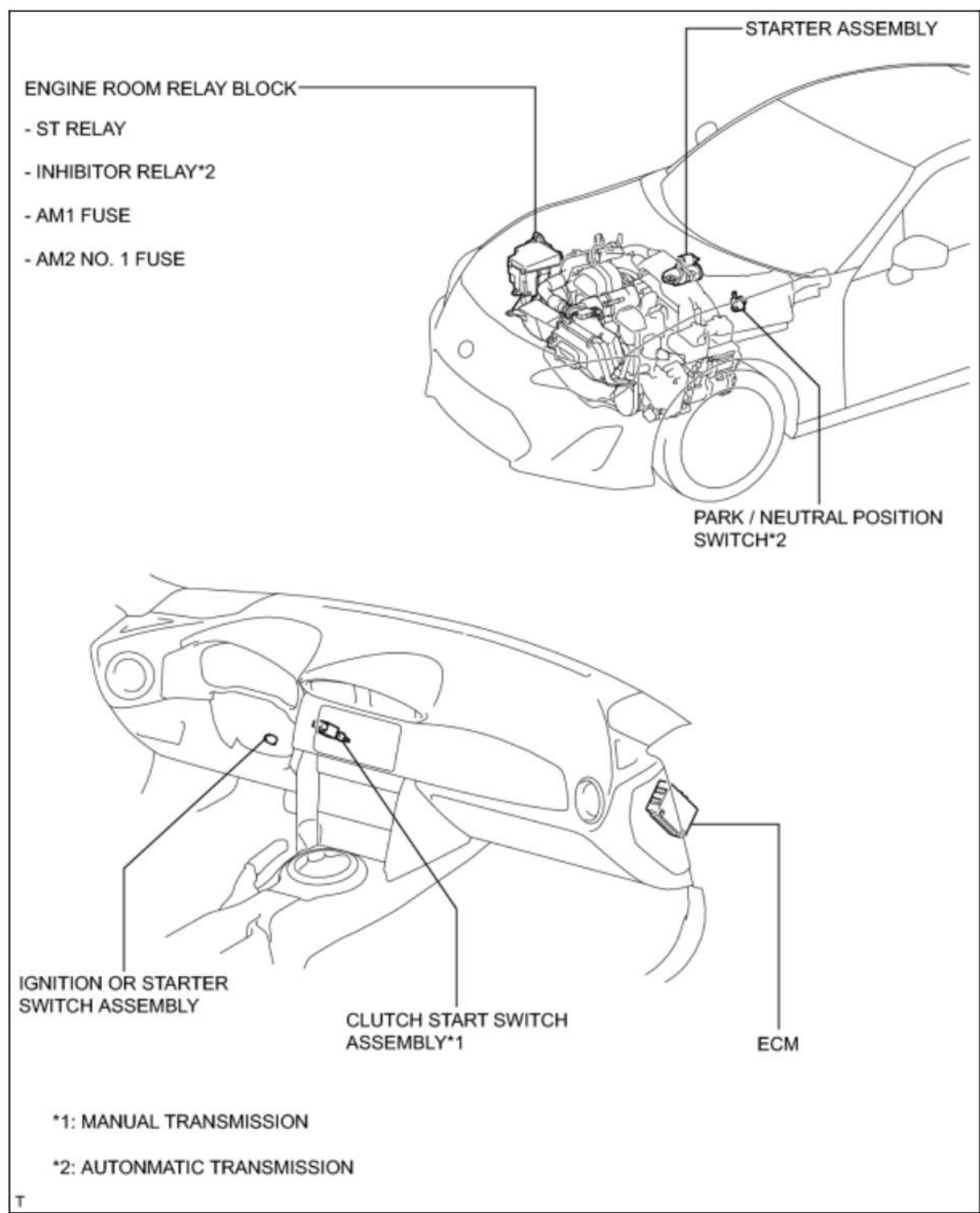
(e) Remove the lower side bolt, battery cable stay and starter assembly.



Last Modified: 3-27-2012	6.4 R	From: 201203
Model Year: 2013	Model: FR-S	Doc ID: RM0000048MU006X
Title: FA20 STARTING: STARTING SYSTEM: PARTS LOCATION (2013 FR-S)		

PARTS LOCATION

ILLUSTRATION



Last Modified: 3-27-2012	6.4 U	From: 201203
Model Year: 2013	Model: FR-S	Doc ID: RM0000048MV006X
Title: FA20 STARTING: STARTING SYSTEM: SYSTEM DIAGRAM (2013 FR-S)		

SYSTEM DIAGRAM

