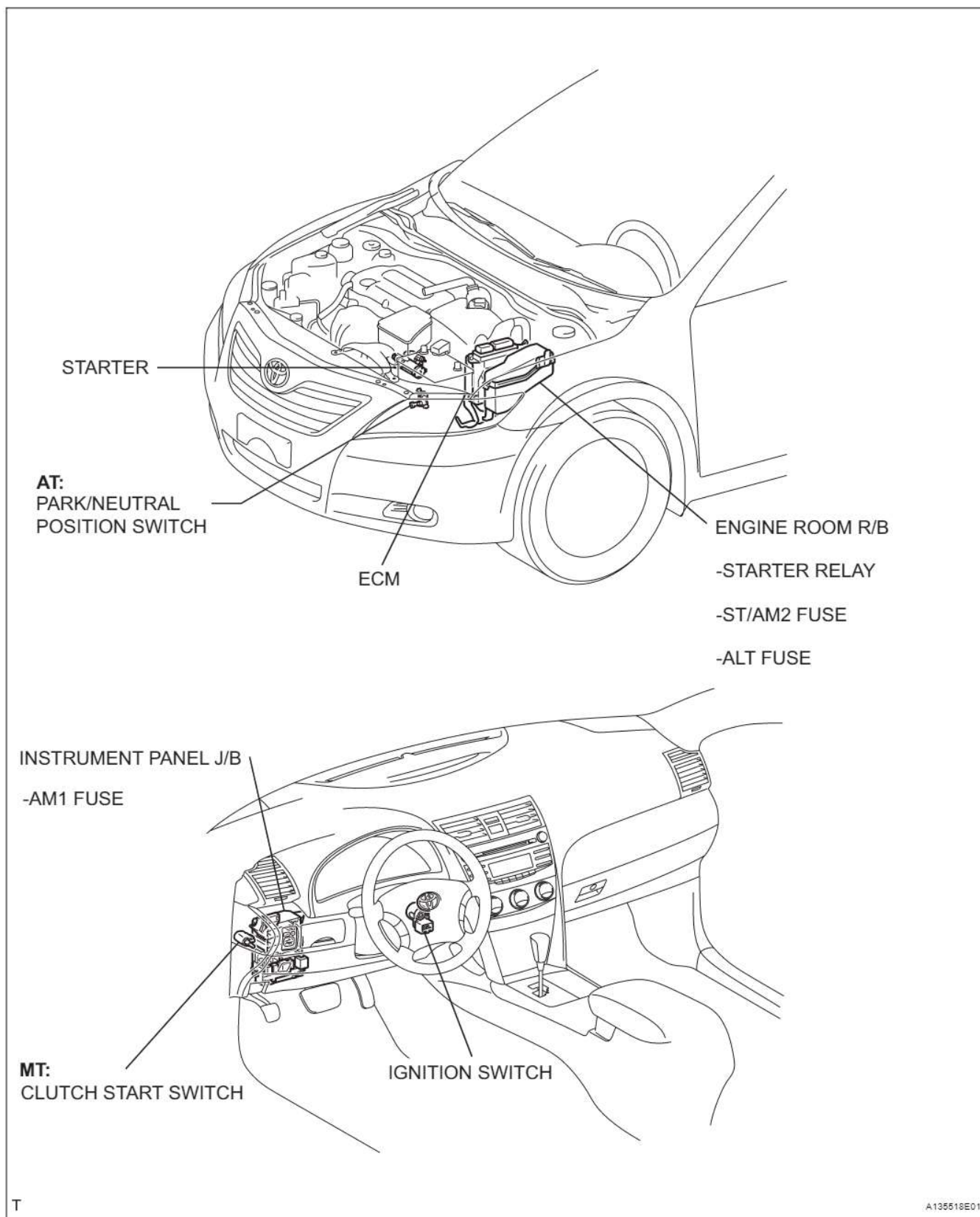


2AZ-FE STARTING – STARTING SYSTEM

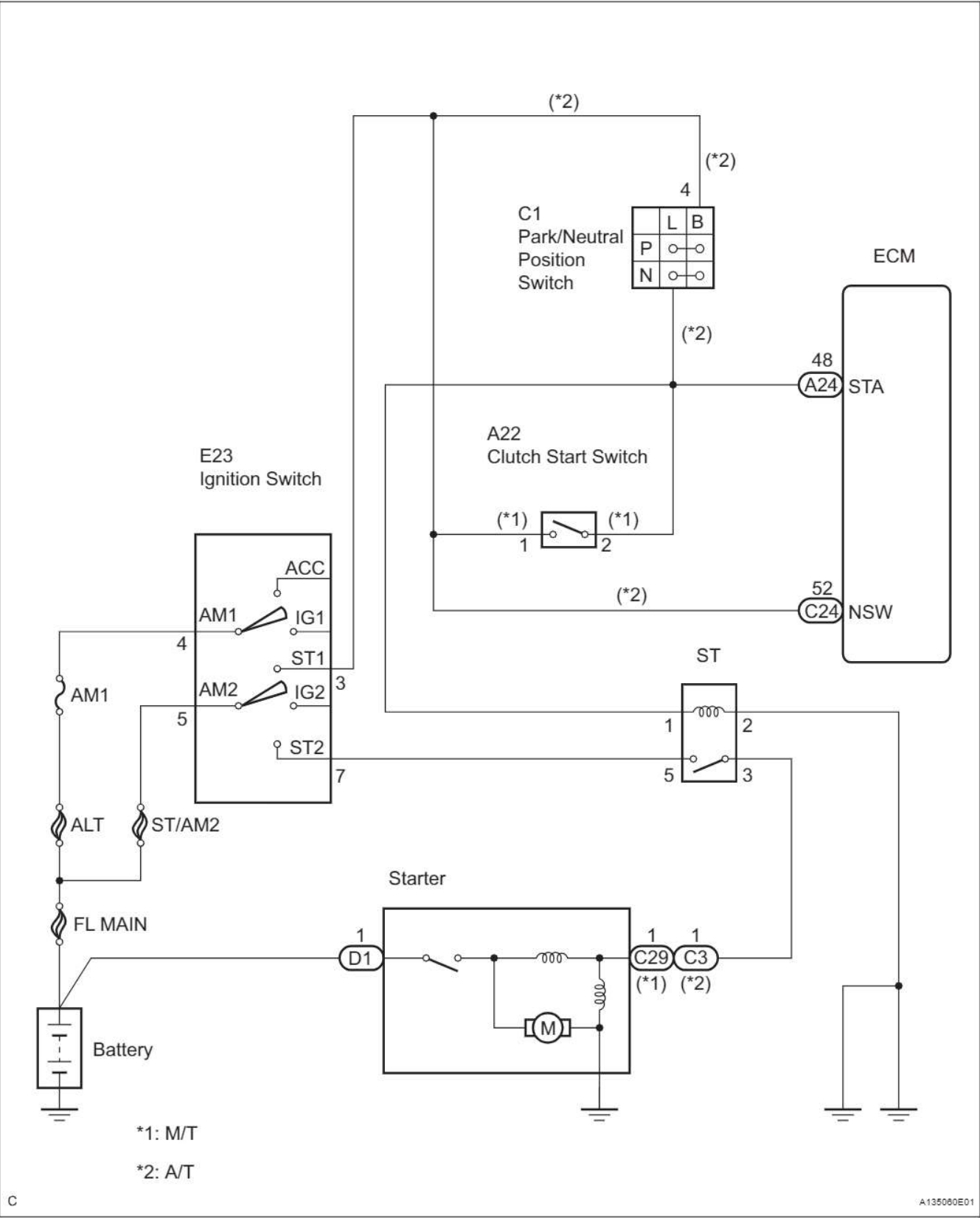
ST-1

STARTING SYSTEM**PARTS LOCATION**

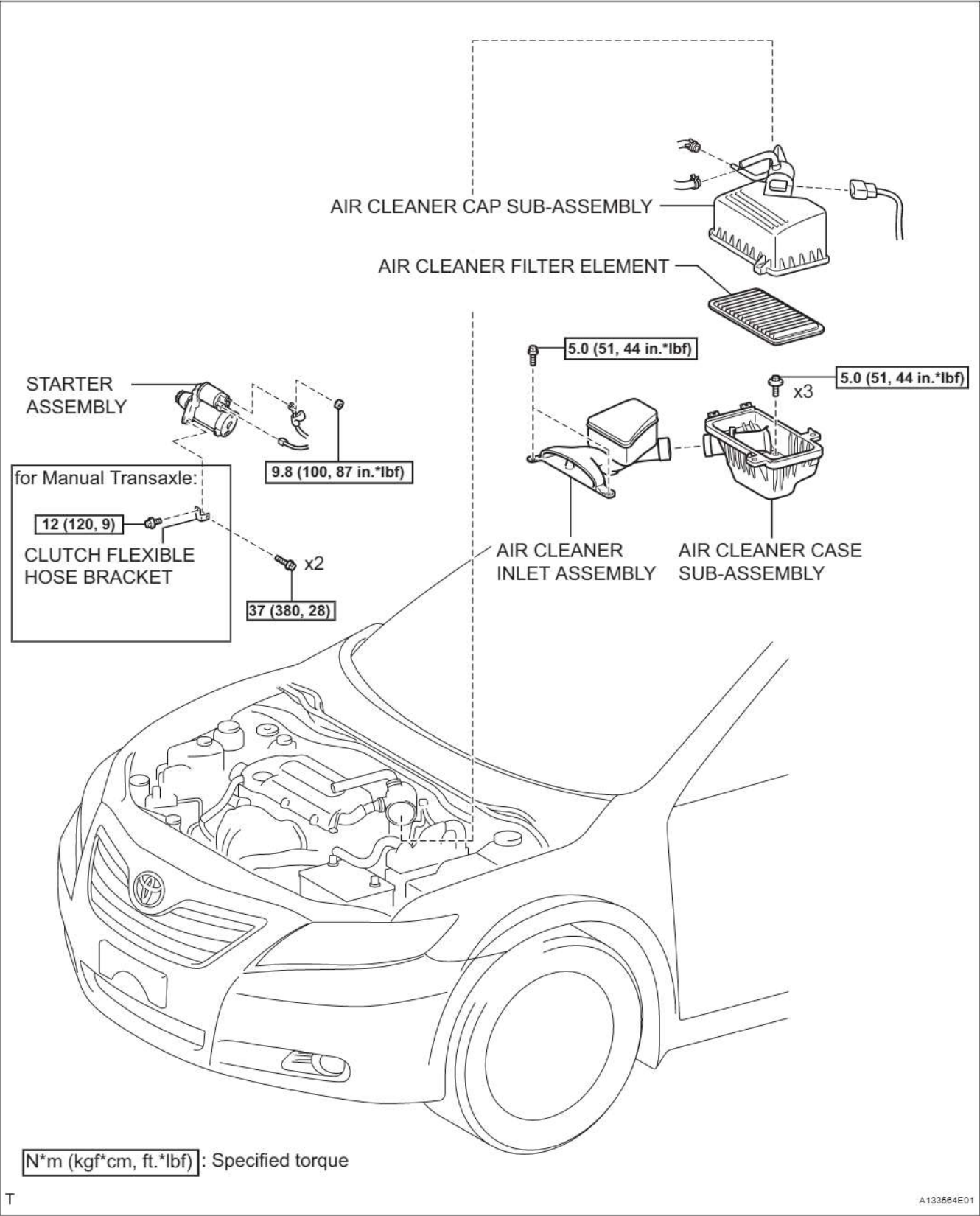
ST-2

2AZ-FE STARTING – STARTING SYSTEM

SYSTEM DIAGRAM



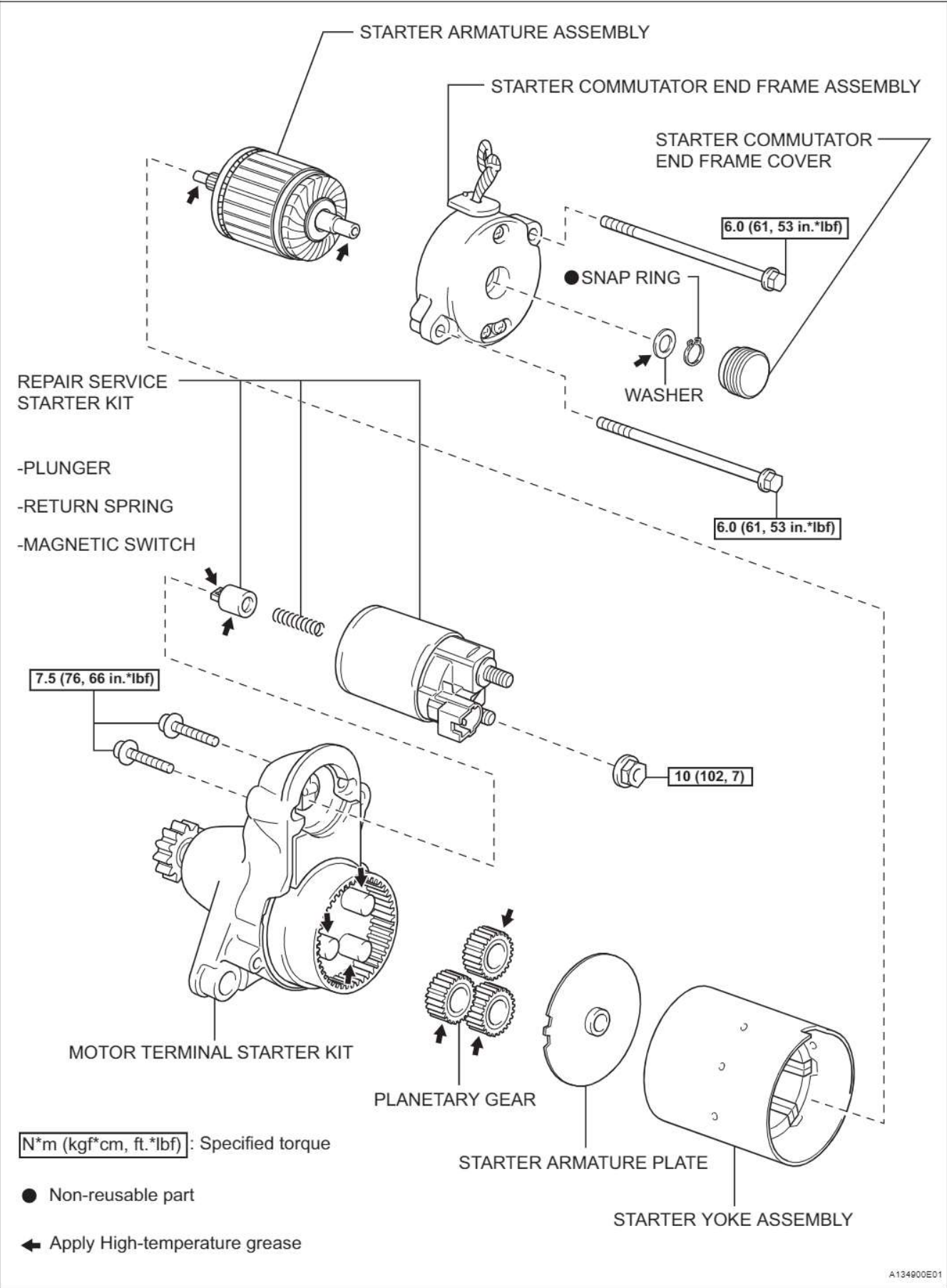
STARTER
COMPONENTS



ST

ST-4

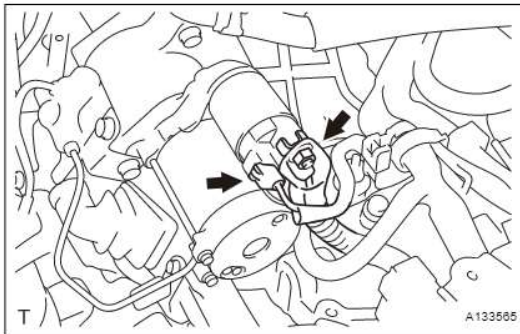
2AZ-FE STARTING – STARTER



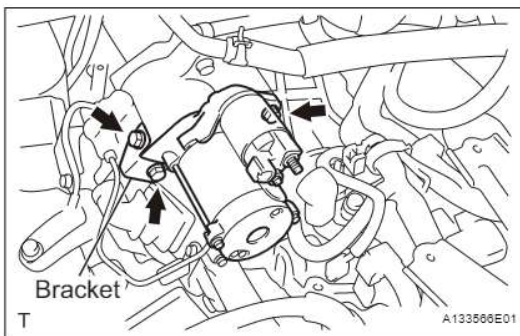
A134900E01

REMOVAL

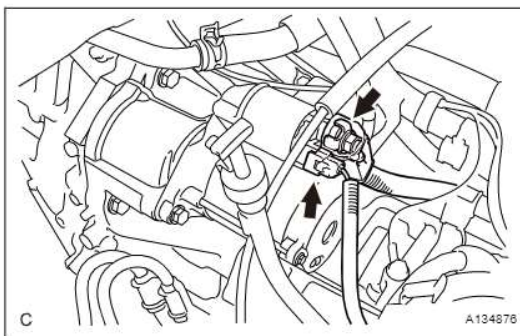
1. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL
2. REMOVE AIR CLEANER INLET ASSEMBLY (See page [EM-94](#))
3. REMOVE AIR CLEANER CAP SUB-ASSEMBLY (See page [ES-416](#))
4. REMOVE AIR CLEANER CASE SUB-ASSEMBLY (See page [EM-95](#))
5. REMOVE STARTER ASSEMBLY (for Manual Transaxle)



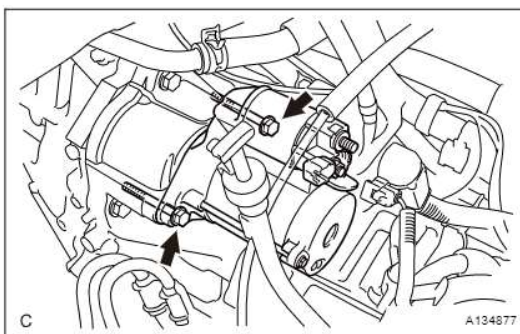
- (a) Disconnect the terminal 50 connector from the starter assembly.
- (b) Remove the nut and disconnect the wire harness from terminal 30.



- (c) Remove the 3 bolts, clutch flexible hose bracket and starter assembly.



6. REMOVE STARTER ASSEMBLY (for Automatic Transaxle)
- (a) Disconnect the terminal 50 connector from the starter assembly.
- (b) Remove the nut and disconnect the wire harness from terminal 30.



- (c) Remove the 2 bolts and starter assembly.

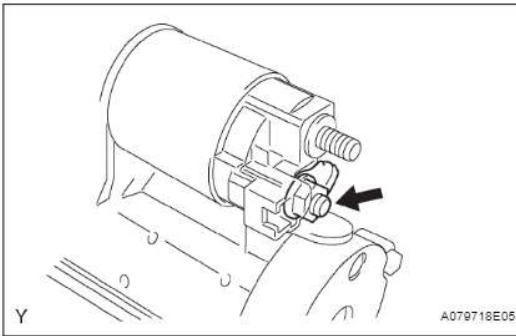
ST

ST-6

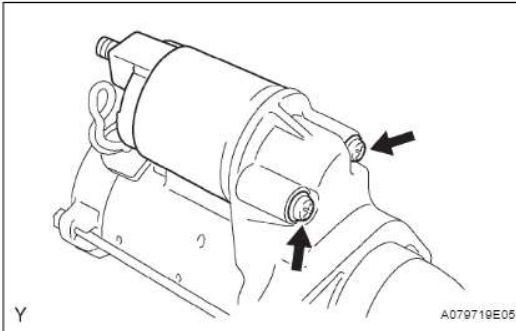
2AZ-FE STARTING – STARTER

DISASSEMBLY**1. REMOVE REPAIR SERVICE STARTER KIT**

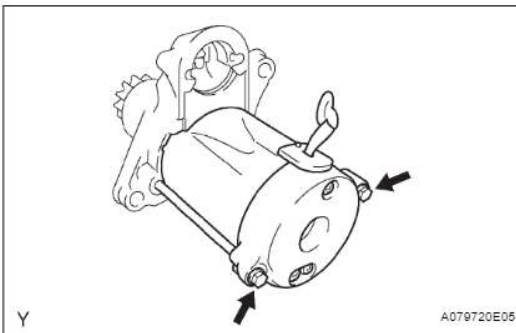
- (a) Remove the nut and disconnect the lead wire from terminal C.



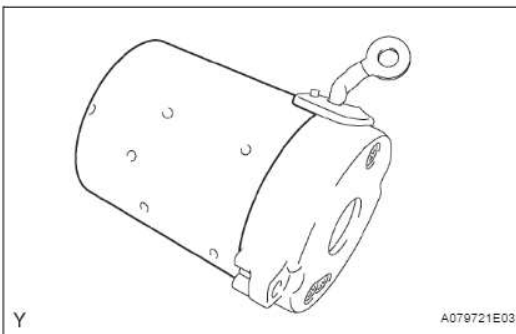
- (b) Remove the 2 screws that hold the magnetic switch to the motor terminal starter kit.
 (c) Remove the repair service starter kit.
 (d) Remove the return spring and the plunger from the repair service starter kit.

**2. REMOVE STARTER YOKE ASSEMBLY**

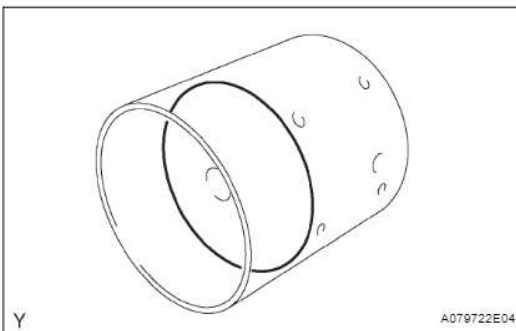
- (a) Remove the 2 through bolts and pull out the starter yoke assembly together with the starter commutator end frame assembly.



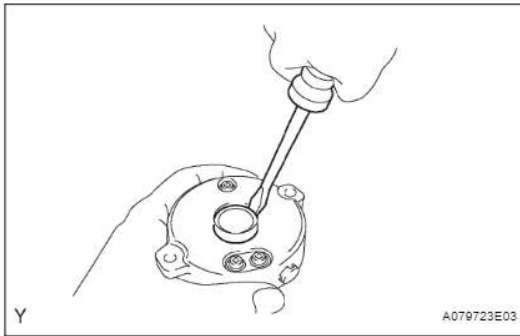
- (b) Remove the starter yoke assembly from the starter commutator end frame assembly.

**3. REMOVE STARTER ARMATURE PLATE**

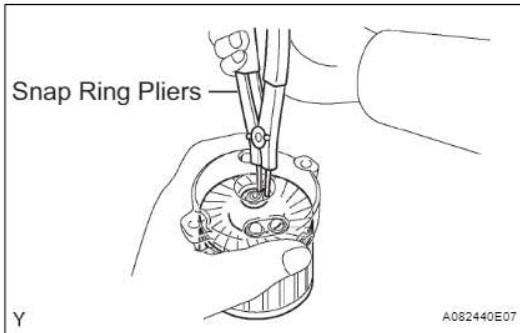
- (a) Remove the starter armature plate from the starter yoke assembly.



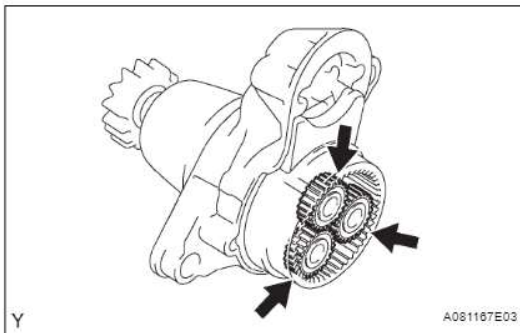
ST

2AZ-FE STARTING – STARTER**ST-7****4. REMOVE STARTER COMMUTATOR END FRAME COVER**

- (a) Using a screwdriver, remove the starter commutator end frame cover.

**5. REMOVE STARTER ARMATURE ASSEMBLY**

- (a) Using snap ring pliers, remove the snap ring and plate washer.
(b) Remove the starter armature assembly from the commutator end frame assembly.

**6. REMOVE PLANETARY GEAR**

- (a) Remove the 3 planetary gears from the motor terminal starter kit.

ST

ST-8

2AZ-FE STARTING – STARTER

INSPECTION

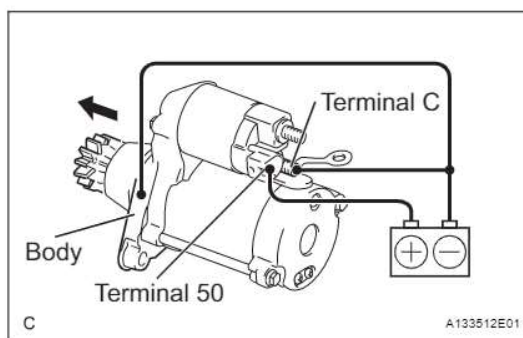
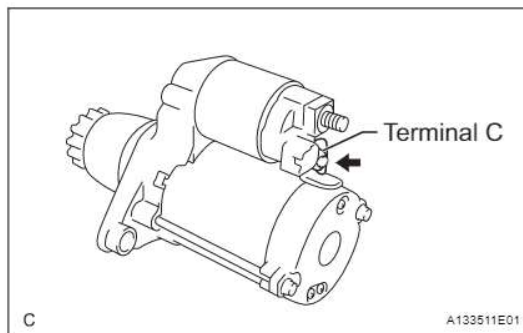
1. INSPECT STARTER ASSEMBLY

CAUTION:

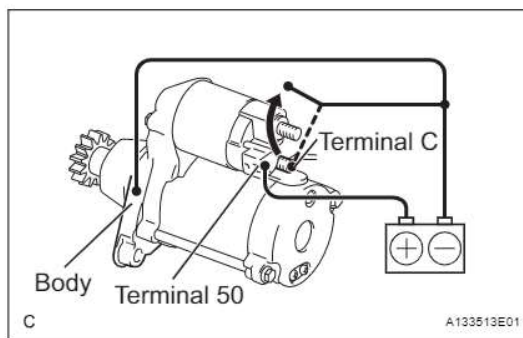
Make sure to complete each of the following tests within 5 seconds to prevent the coil from burning out.

(a) Perform pull-in test:

- (1) Disconnect the lead wire from terminal C.

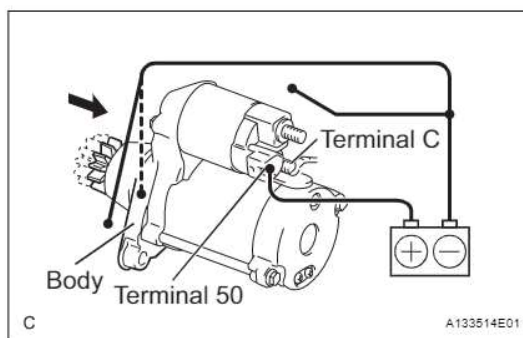


- (2) Connect the battery to the magnetic switch as shown in the illustration. Check that the clutch pinion gear moves outward. If the clutch pinion gear does not move outward, replace the repair service starter kit.



(b) Perform hold-in test:

- (1) Disconnect the negative (-) terminal lead from terminal C under the conditions for pull-in test. Check that the pinion gear remains out. If the clutch pinion gear moves inward, replace the repair service starter kit.



(c) Inspect clutch pinion gear return:

- (1) Disconnect the negative (-) lead from the starter body. Check that the clutch pinion gear moves inward. If the clutch pinion gear does not move inward, replace the repair service starter kit.

(d) Perform no-load performance test:

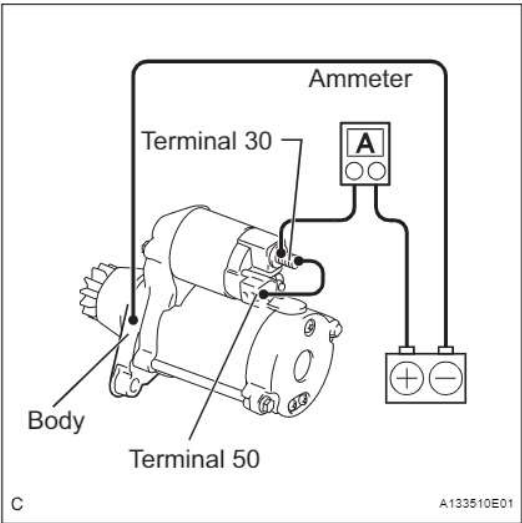
- (1) Connect the field coil wire to terminal C with the nut. Make sure that the lead is not grounded.

Torque: 10 N*m (102 kgf*cm, 7 ft.*lbf)

- (2) Clamp the starter in a vise.

ST

2AZ-FE STARTING – STARTER

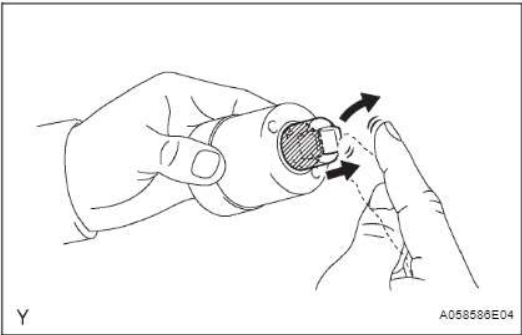


- (3) Connect the battery and an ammeter to the starter as shown in the illustration.
- (4) Check that the starter rotates smoothly and steadily with the clutch pinion gear extended. Check that the ammeter reads the specified current.

Specified current

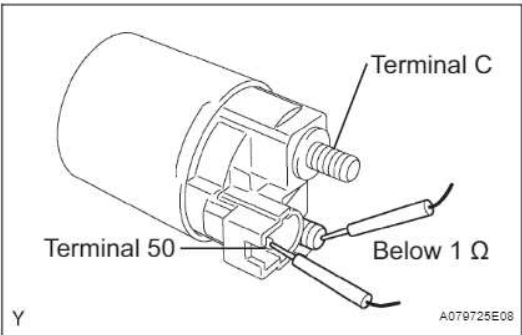
Condition	Specified condition
at 11.5 V	90 A or less

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



2. INSPECT REPAIR SERVICE STARTER KIT

- (a) Check the plunger.
- (1) Push in the plunger and check that it returns quickly to its original position. If necessary, replace the repair service starter kit.

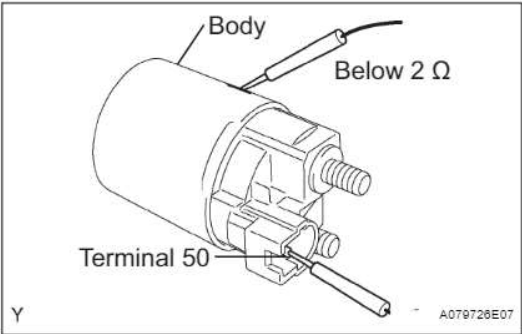


- (b) Inspect the resistance of the pull-in coil.
- (1) Using an ohmmeter, measure the resistance between terminals 50 and C.

Standard resistance

Tester connection	Specified condition
Terminal 50 - Terminal C	Below 1 Ω

If the resistance is not as specified, replace the repair service starter kit.



- (c) Inspect the resistance of the hold-in coil.
- (1) Using an ohmmeter, measure the resistance between terminal 50 and the switch body.

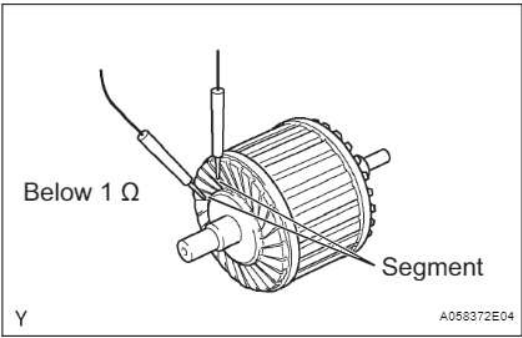
Standard resistance

Tester connection	Specified condition
Terminal 50 - Switch body	Below 2 Ω

If the resistance is not as specified, replace the repair service starter kit.

3. INSPECT STARTER ARMATURE ASSEMBLY

- (a) Check the commutator surface for dirt or burning. If the surface is dirty or burnt, smooth the surface with 400-grit sandpaper or leather.

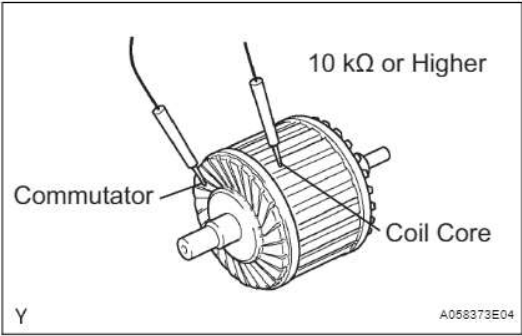


- (b) Inspect the resistance of the commutator.
- (1) Using an ohmmeter, measure the resistance between the segments of the commutator.

Standard resistance

Tester connection	Specified condition
Segment - Segment	Below 1 Ω

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

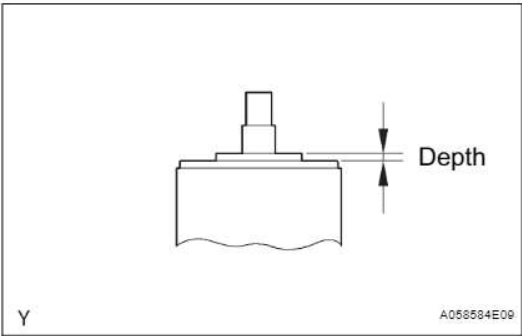


- (2) Using an ohmmeter, measure the resistance between the commutator and armature coil core.

Standard resistance

Tester connection	Specified condition
Commutator - Armature coil core	10 kΩ or higher

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



- (c) Using vernier calipers, measure the commutator depth.

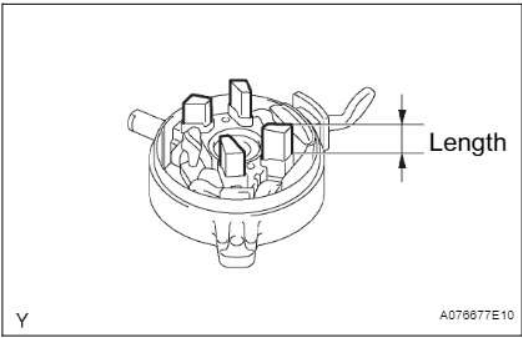
Specified depth:

3.1 mm (0.122 in.)

Maximum depth:

3.8 mm (0.150 in.)

If the depth is greater than the maximum, replace the starter armature assembly.



4. INSPECT STARTER COMMUTATOR END FRAME ASSEMBLY

- (a) Check the brush length.
- (1) Using vernier calipers, measure the brush length.

Specified length:

9.0 mm (0.354 in.)

Maximum length:

4.0 mm (0.157 in.)

If the length is less than the minimum, replace the starter commutator end frame assembly.

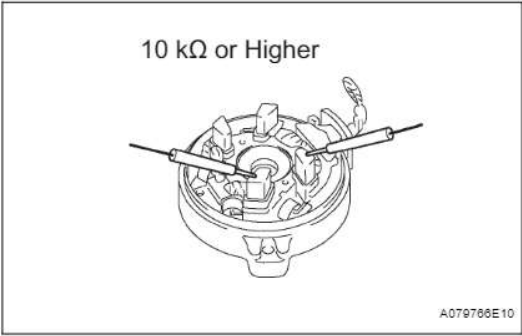
- (b) Check the resistance.

- (1) Using an ohmmeter, measure the resistance between the positive (+) and negative (-) brushes.

Resistance:

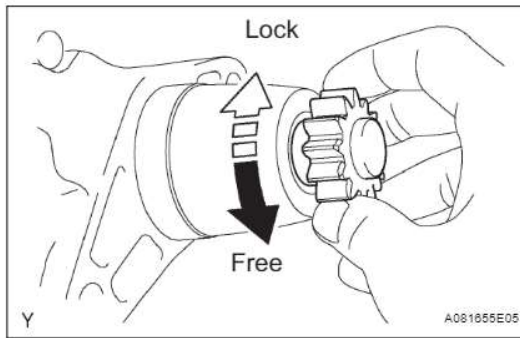
10 kΩ or higher

If the resistance is not as specified, repair or replace the starter commutator end frame assembly.



2AZ-FE STARTING – STARTER

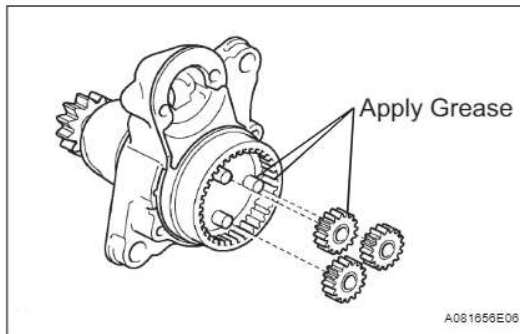
ST-11

**5. INSPECT MOTOR TERMINAL STARTER KIT**

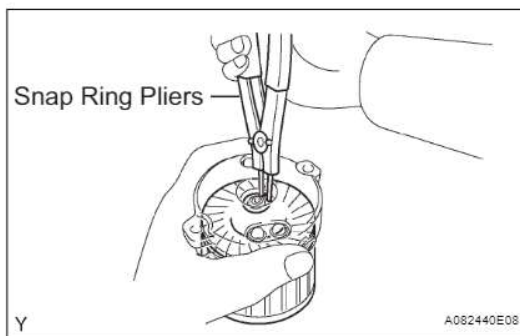
- (a) Check the starter clutch.
 - (1) Rotate the clutch pinion gear counterclockwise and check that it turns freely. Try to rotate the clutch pinion gear clockwise and check that it locks.
 If necessary, replace the motor terminal starter kit.

REASSEMBLY**1. INSTALL PLANETARY GEAR**

- (a) Apply high-temperature grease to the planetary gears and pin parts of the planetary shaft.
- (b) Install the 3 planetary gears to the motor terminal starter kit.

**2. INSTALL STARTER ARMATURE ASSEMBLY**

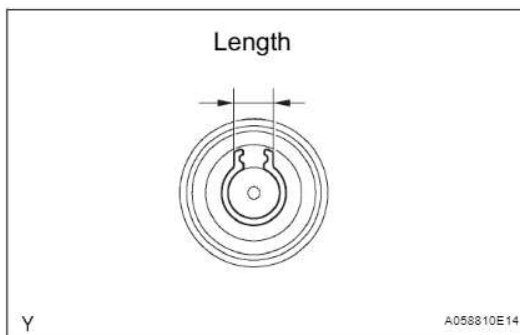
- (a) Apply high-temperature grease to the plate washer and the armature shaft.
- (b) Install the starter armature assembly to the starter commutator end frame assembly.
- (c) Using snap ring pliers, install the plate washer and a new snap ring.



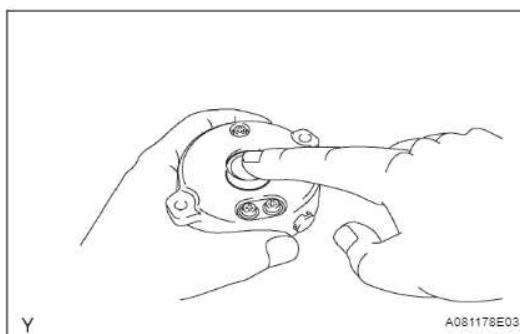
- (d) Using vernier calipers, measure the snap ring.

Maximum length:
5.0 mm (0.197 in.)

If the length is greater than the maximum, replace the snap ring with a new one.

**3. INSTALL STARTER COMMUTATOR END FRAME COVER**

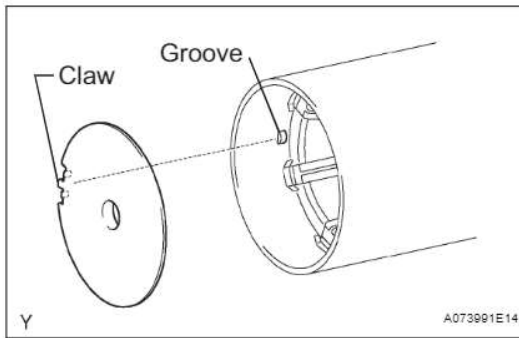
- (a) Install the starter commutator end frame cover to the starter commutator end frame assembly.



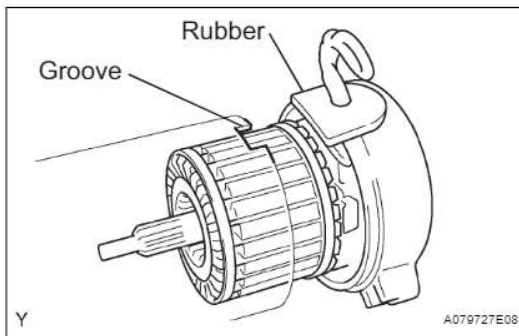
ST

ST-12

2AZ-FE STARTING – STARTER

**4. INSTALL STARTER ARMATURE PLATE**

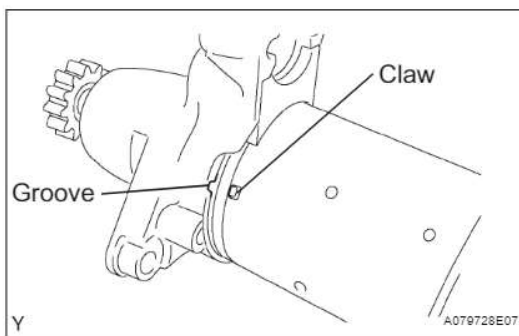
- (a) Align the claw of the armature plate with the groove inside the starter yoke assembly, and install the starter armature plate.

**5. INSTALL STARTER COMMUTATOR END FRAME ASSEMBLY**

- (a) Align the starter commutator end frame rubber with the groove of the starter yoke assembly.
 (b) Install the starter commutator end frame assembly to the starter yoke assembly.

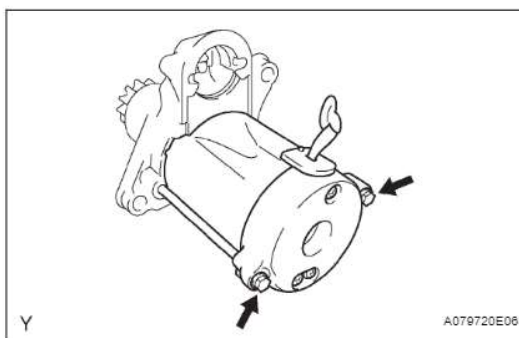
NOTICE:

The magnet of the starter yoke assembly may attract the starter armature assembly when the starter commutator end frame assembly is installed, causing the magnet to break.

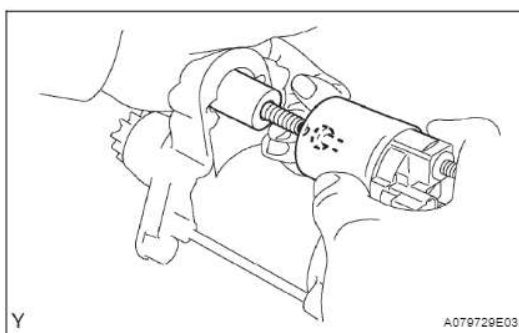
**6. INSTALL STARTER YOKE ASSEMBLY**

- (a) Align the claw of the starter yoke with the groove inside the motor terminal starter kit.

- (b) Install the starter yoke with the 2 through bolts.
Torque: 6.0 N*m (61 kgf*cm, 53 in.*lbf)



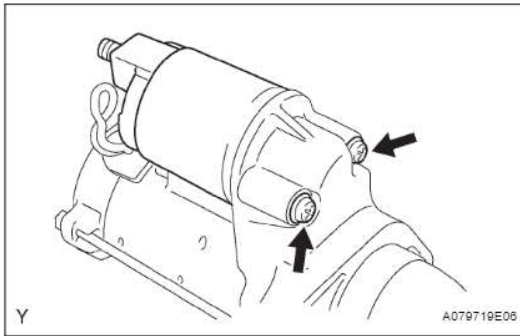
ST

**7. INSTALL REPAIR SERVICE STARTER KIT**

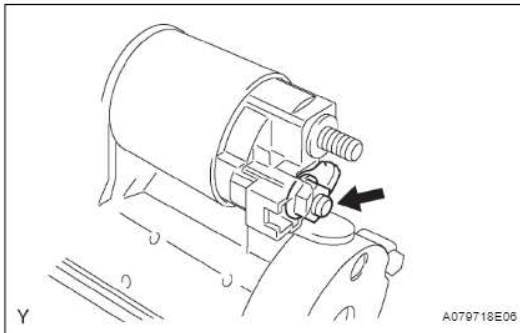
- (a) Apply high-temperature grease to the plunger and the hook.
 (b) Hang the plunger hook of the repair service starter kit to the drive lever hook.
 (c) Install the plunger and the return spring.

2AZ-FE STARTING – STARTER

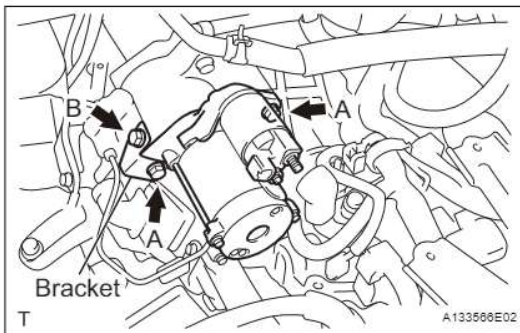
ST-13



- (d) Install the repair service starter kit with the 2 screws.
Torque: 7.5 N*m (76 kgf*cm, 66 in.*lbf)



- (e) Connect the lead wire to terminal C with the nut.
Torque: 10 N*m (102 kgf*cm, 7 ft.*lbf)



INSTALLATION

1. INSTALL STARTER ASSEMBLY (for Manual Transaxle)

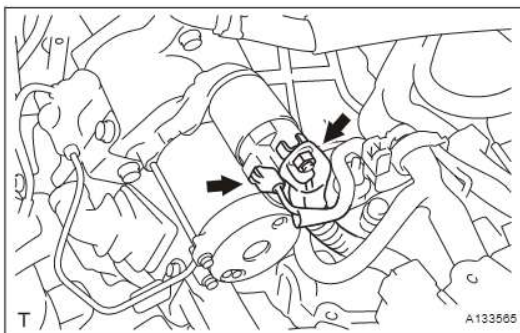
- (a) Install the starter assembly and clutch flexible hose bracket with the 3 bolts.

Torque: Bolt A

37 N*m (380 kgf*cm, 28 ft.*lbf)

Bolt B

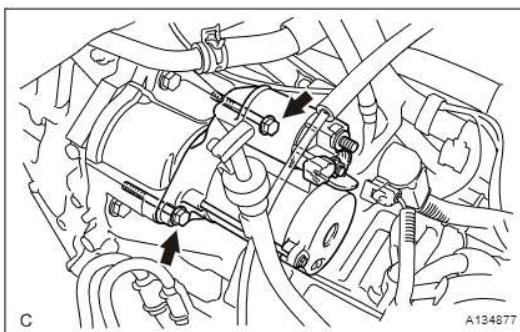
12 N*m (120 kgf*cm, 9 ft.*lbf)



- (b) Connect the wire harness to terminal 30 and install the nut. Then, attach the terminal cap.

Torque: 9.8 N*m (100 kgf*cm, 87 in.*lbf)

- (c) Connect the terminal 50 connector to the starter assembly.

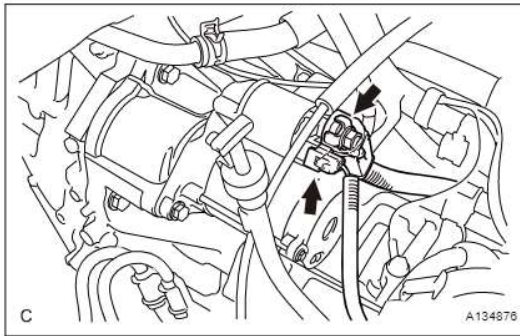


2. INSTALL STARTER ASSEMBLY (for Automatic Transaxle)

- (a) Install the starter assembly with the 2 bolts.

Torque: 37 N*m (380 kgf*cm, 28 ft.*lbf)

ST

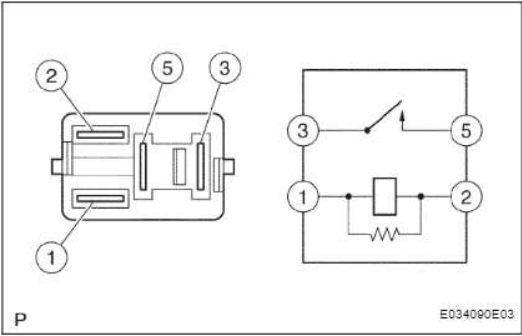
ST-14**2AZ-FE STARTING – STARTER**

(b) Connect the wire harness to terminal 30 and install the nut. Then, attach the terminal cap.

Torque: 9.8 N*m (100 kgf*cm, 87 in.*lbf)

(c) Connect the terminal 50 connector to the starter assembly.

3. **INSTALL AIR CLEANER CASE SUB-ASSEMBLY** (See page [EM-120](#))
4. **INSTALL AIR CLEANER CAP SUB-ASSEMBLY** (See page [ES-419](#))
5. **INSTALL AIR CLEANER INLET ASSEMBLY** (See page [EM-120](#))
6. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL** (See page [EM-120](#))



STARTER RELAY

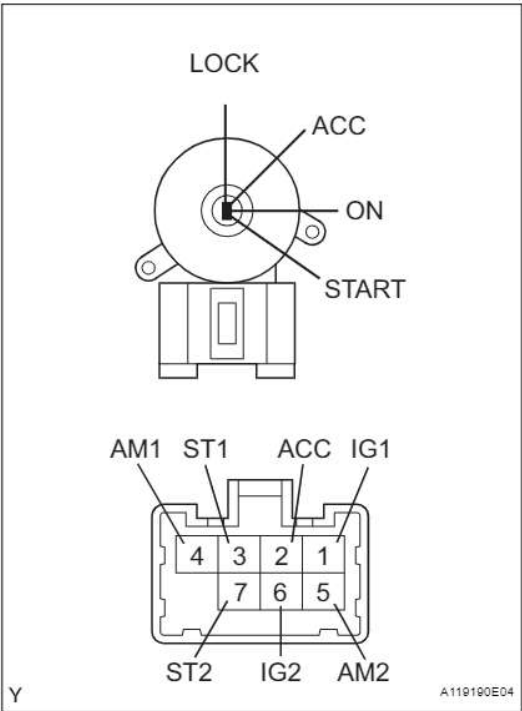
ON-VEHICLE INSPECTION

1. INSPECT STARTER RELAY ASSEMBLY
- (a) Using an ohmmeter, measure the resistance between each terminal.

Standard resistance

Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
	Below 1 Ω (when battery voltage is applied to terminals 1 and 2)

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



IGNITION SWITCH

ON-VEHICLE INSPECTION

1. INSPECT IGNITION OR STARTER SWITCH ASSEMBLY

- (a) Check the resistance.
 - (1) Using an ohmmeter, measure the resistance between the terminals.

Standard resistance

Condition	Tester Connection	Specified Condition
LOCK	Between all terminals	10 kΩ or higher
ACC	2 - 4	Below 1 Ω
ON	1 - 2 - 4	Below 1 Ω
	5 - 6	
START	1 - 3 - 4	Below 1 Ω
	5 - 6 - 7	

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