PROCEDURE

1.INSPECT STARTER ASSEMBLY 28100

NOTICE:
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.

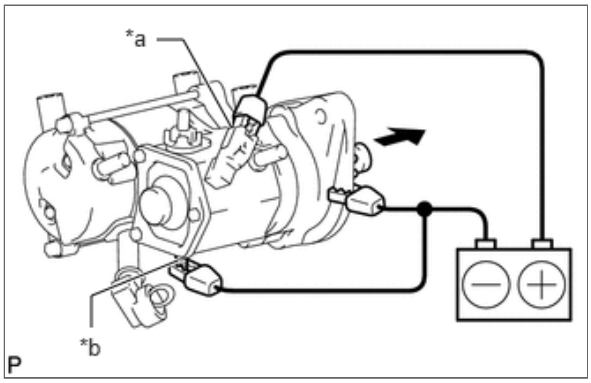
NOTICE:
Each of the following tests must be performed within 3 to 5 seconds to prevent the coil from burning out.

a. Mount the starter assembly in a vise between aluminum plates.

b. Perform a pull-in test.

i. Remove the nut and disconnect the lead wire from terminal C.

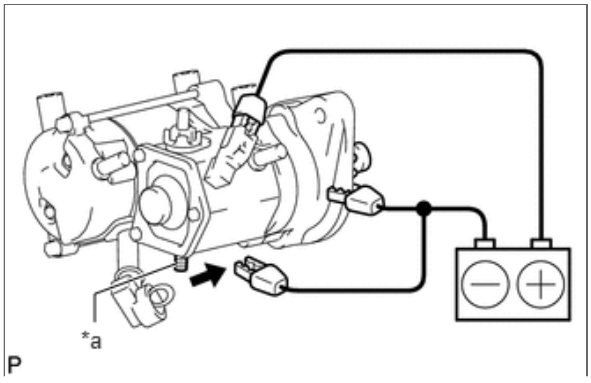
ii.



*a	Terminal 50
*b	Terminal C

Connect the battery to the magnet starter switch assembly as shown in the illustration. Then check that the clutch pinion gear extends.
If the clutch pinion gear does not extends, inspect the magnet starter switch assembly. If the magnet starter switch assembly is not as specified, replace it.

c.

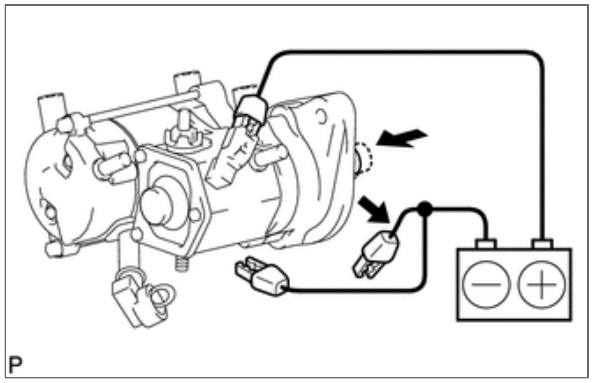


*a	Terminal C

Perform a holding test.

i. Disconnect the negative (-) terminal lead from terminal C with the condition specified in the pull-in test above being maintained. Check that the pinion gear remains out.
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.

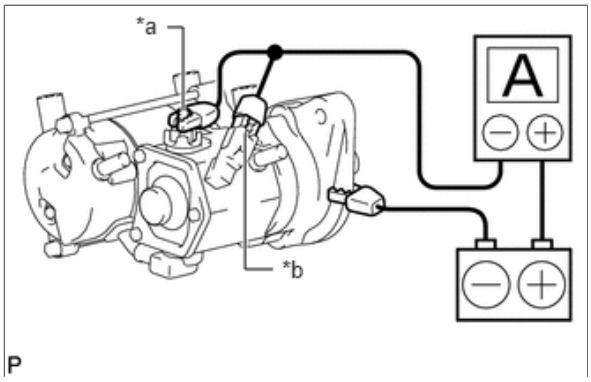
i. Disconnect the negative (-) terminal lead from the starter body. Check that the clutch pinion gear returns inward.
If the clutch pinion gear does not return inward, inspect the magnet starter switch assembly. If the magnet starter switch assembly is not as specified, replace it.

e. Perform an operation test without load.

i. Connect the lead wire to terminal C with the nut.

Torque:
5.9 N*m (60 kgf*cm, 52 in.*lbf)

ii.



*a	Terminal 30
*b	Terminal 50

Connect the battery and an ammeter to the starter assembly as shown in the illustration.

iii. Check that the starter rotates smoothly and steadily while the pinion gear is extended. Then measure the current.

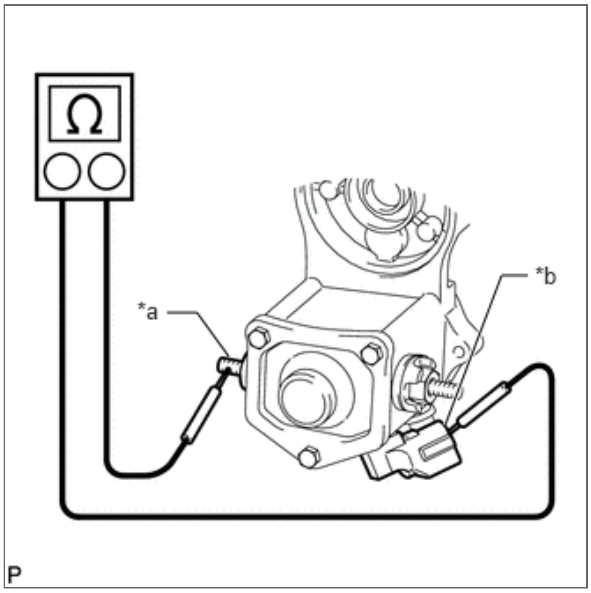
Specified current:
90 A or less at 11.5 V

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

HINT:
Inspect the starter brush holder assembly, starter yoke assembly and starter armature assembly. If there is a malfunction, replace the part and perform this test again.

2.INSPECT MAGNET STARTER SWITCH ASSEMBLY 28150

a.



*a	Terminal C
*b	Terminal 50

Inspect the pull-in coil.

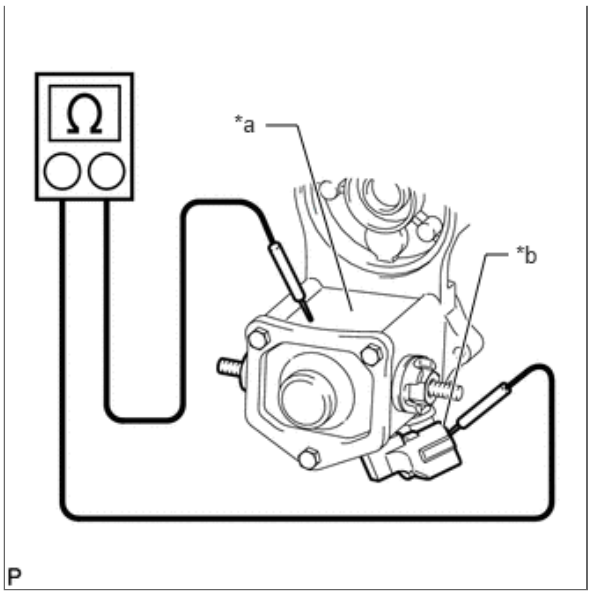
i. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
Terminal 50 - Terminal C	Always	Below 1 Ω

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

b.



*a	Switch Body
*b	Terminal 50

Inspect the holding coil.

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

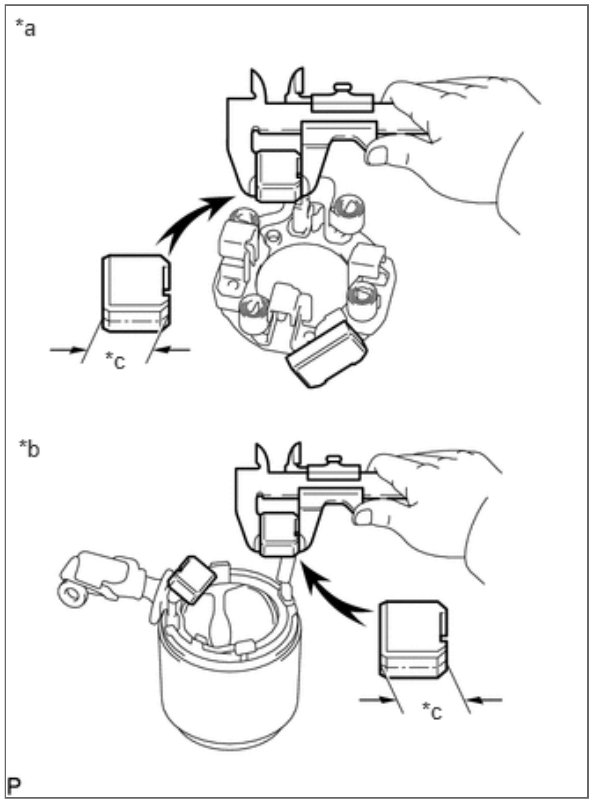
Standard Resistance:

Tester Connection	Condition	Specified Condition
Terminal 50 - Switch body	Always	Below 2 Ω

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

3.INSPECT BRUSH

a.



*a	Brush Holder Assembly Side
*b	Starter Yoke Assembly Side
*c	Length

Using a vernier caliper, measure the brush length.

Standard length:
15.5 mm (0.610 in.)

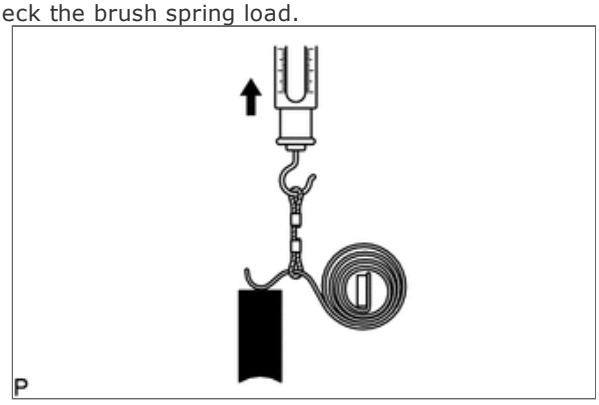
Minimum length:
8.5 mm (0.335 in.)

If the length is less than the minimum, replace the starter brush holder assembly and starter yoke assembly.

4.INSPECT STARTER BRUSH HOLDER ASSEMBLY 28140

a. Check the brush spring load.

i.



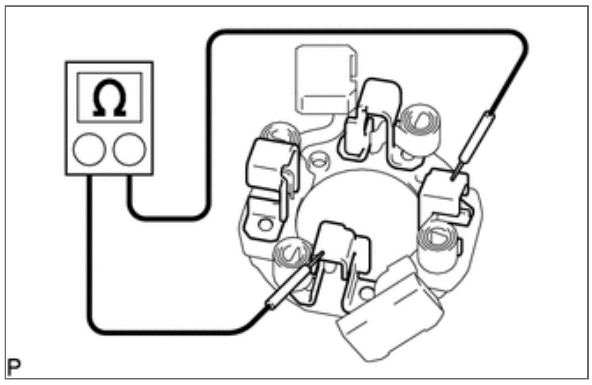
Take a pull scale reading immediately after the brush spring separates from the brush.

Standard spring load:
17.6 to 23.5 N (1.8 to 2.4 kgf, 4.0 to 5.3 lbf)

Minimum spring load:
11.8 N (1.2 kgf, 2.7 lbf)

If the spring load is less than the minimum, replace the starter brush holder assembly.

b.



Inspect the insulation.

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

Standard Resistance:

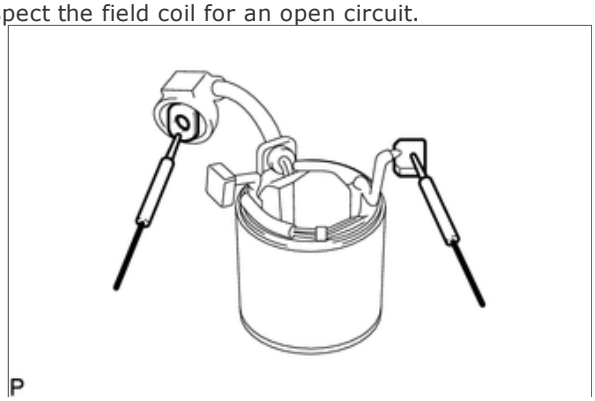
Tester Connection	Condition	Specified Condition
Positive (+) brush holder - Negative (-) brush holder	Always	10 kΩ or higher

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

5.INSPECT STARTER YOKE ASSEMBLY 28120

a. Inspect the field coil for an open circuit.

i.



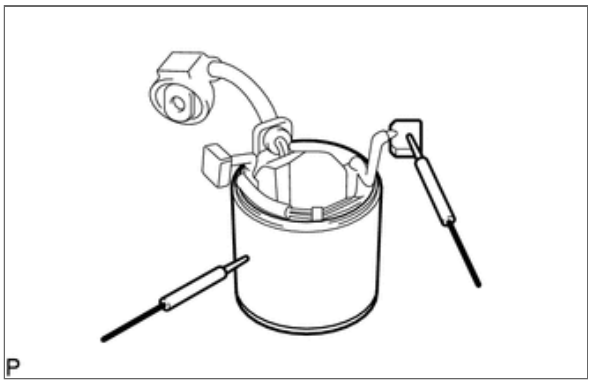
Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
Lead Wire - Brush	Always	Below 1 Ω

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

ii.



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

Standard Resistance:

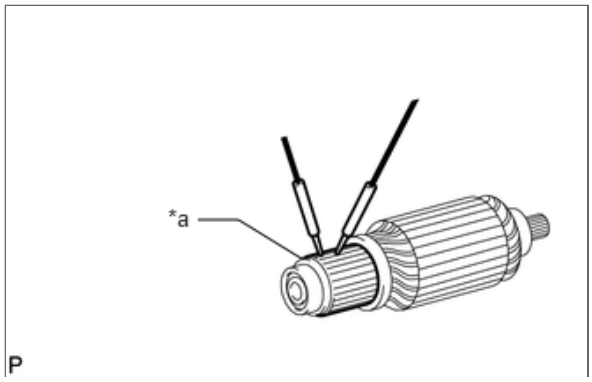
Tester Connection	Condition	Specified Condition
Starter yoke body - Brush	Always	10 kΩ or higher

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

6.INSPECT STARTER ARMATURE ASSEMBLY 28160

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.

b.



*a	Segment

Inspect the commutator for an open circuit.

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

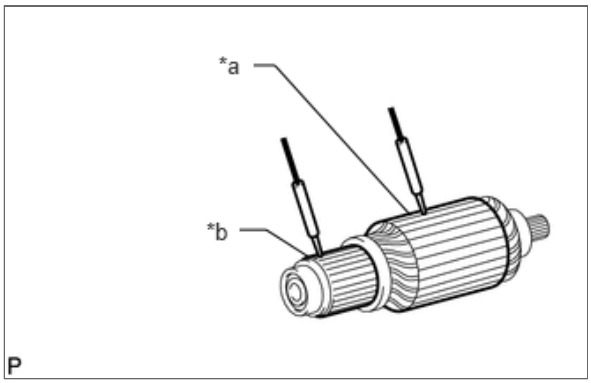
Standard Resistance:

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 a short circuit.

i.



*a	Coil Core
*b	Segment

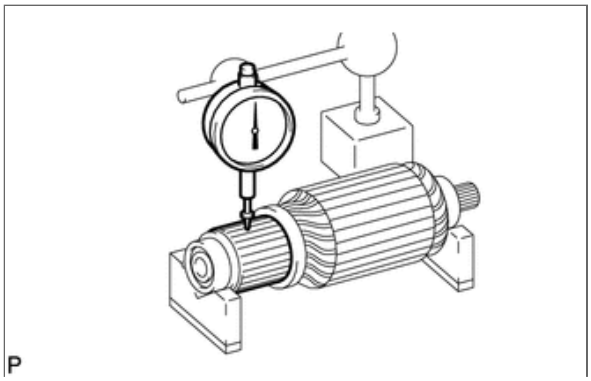
Measure the resistance according to the value(s) in the table below.

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 circle runout.

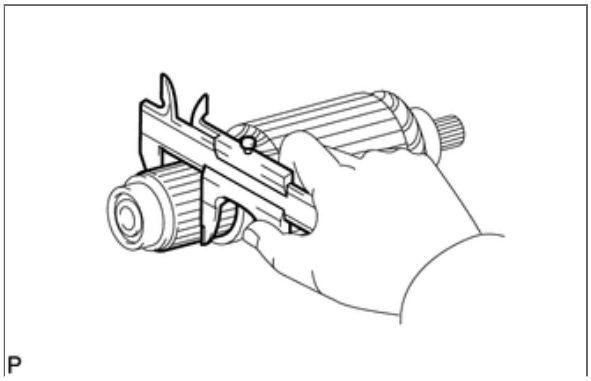
i. Place the commutator on V-blocks.

ii. Using a dial indicator, measure the circle runout.

Maximum runout:
0.05 mm (0.00197 in.)

If the circle runout is more than the maximum, replace the starter armature assembly.

e.



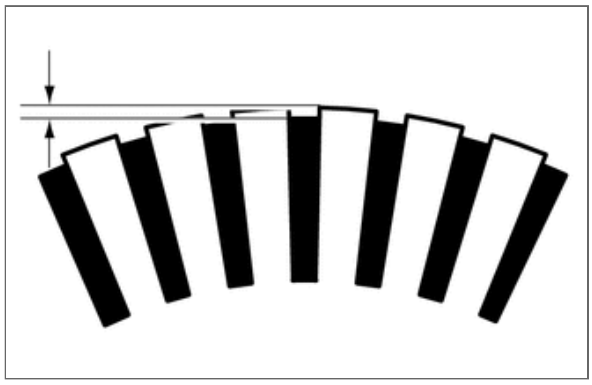
Using a vernier caliper, measure the commutator diameter.

Standard diameter:
30.0 mm (1.18 in.)

Minimum diameter:
29.0 mm (1.14 in.)

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

f.



Using a vernier caliper, measure the undercut depth of the commutator.

Standard undercut depth:
0.6 mm (0.0236 in.)

Minimum undercut depth:
0.2 mm (0.00787 in.)

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

7.INSPECT STARTER CLUTCH SUB-ASSEMBLY 28011

a.

➡	Free
⇨	Lock

Rotate the pinion gear clockwise and check that it turns freely. Try to rotate the pinion gear counterclockwise and check that it locks.
If the result is not as specified, replace the starter clutch sub-assembly.

b. Turn the pinion gear by hand while applying inward force and check the movement of the bearing.
If resistance is felt or the bearing sticks, replace the starter clutch sub-assembly.