CHARGING SYSTEM

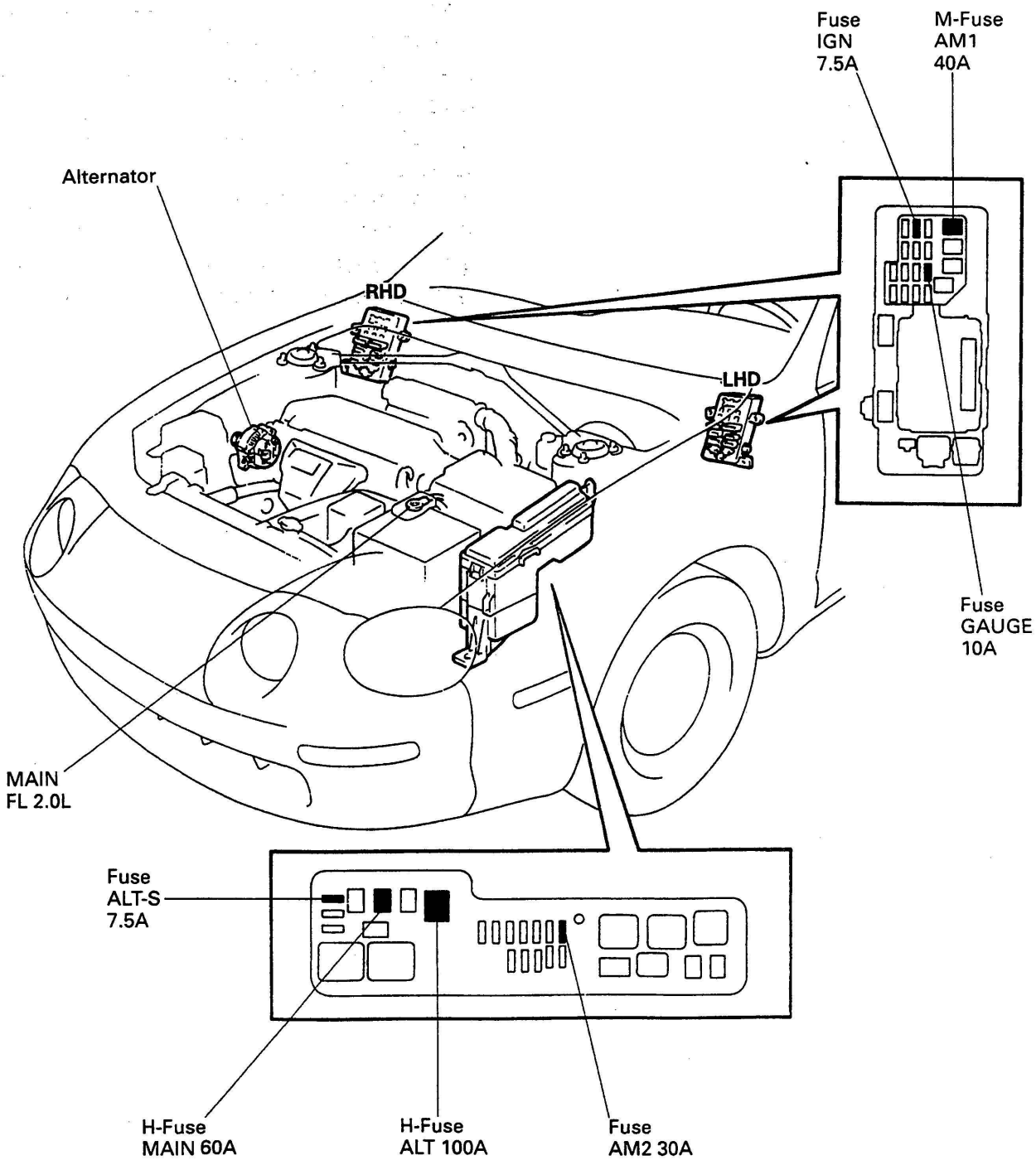
DESCRIPTION ..... CH– 2
PRECAUTION ..... CH– 3
SYSTEM CIRCUIT ..... CH– 4
OPERATION ..... CH– 5
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ALTERNATOR
(ST202) ..... CH– 12
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(ST191/NIPPONDENSO) ..... CH– 27
ALTERNATOR
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DESCRIPTION

CH073-01

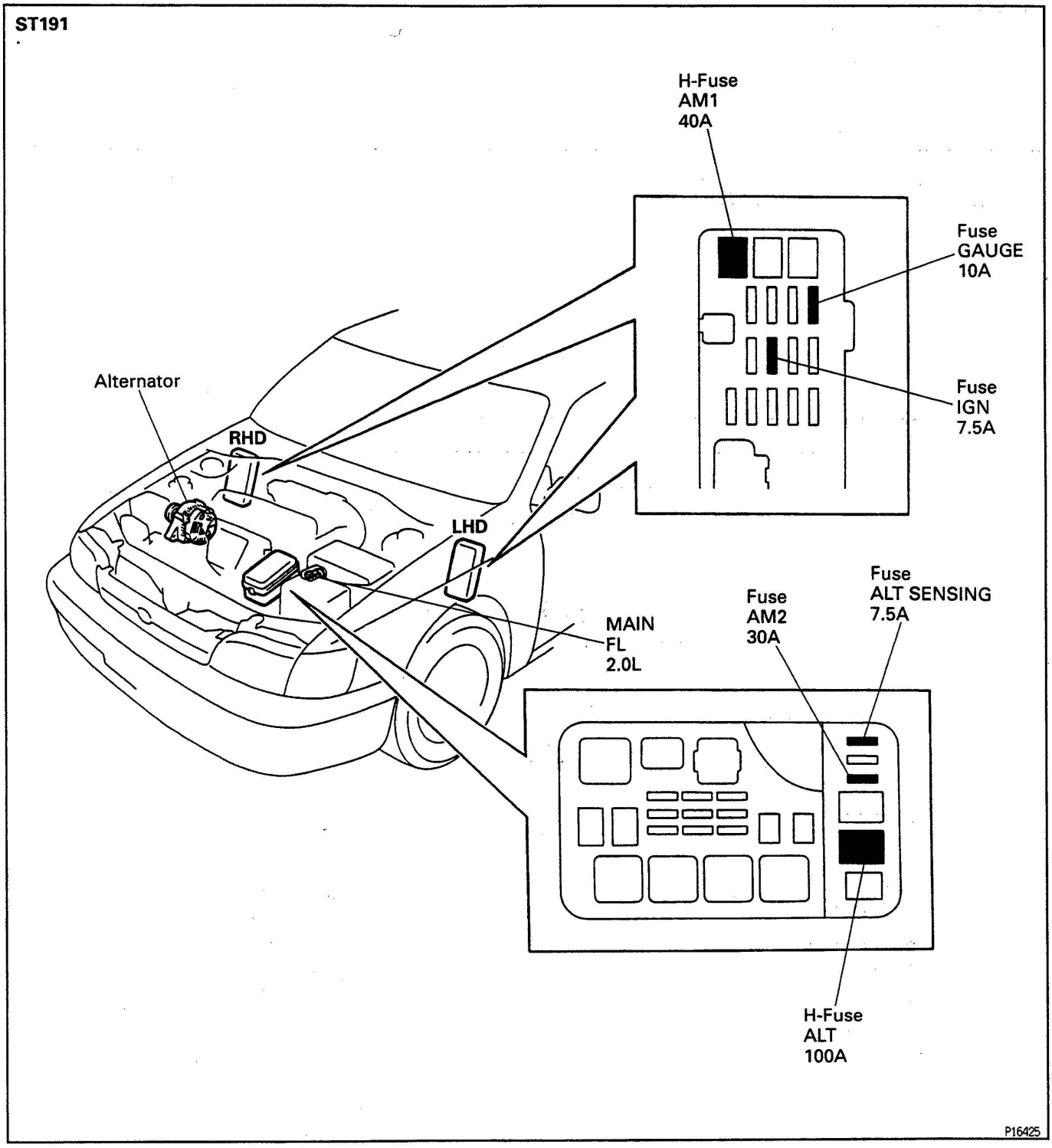
The alternator is a small, high—rpm, high—performance type with a IC regulator incorporated. The IC regulator uses integrated circuits and controls the voltage produced by the alternator.

ST202



P17195

ST191



PRECAUTION

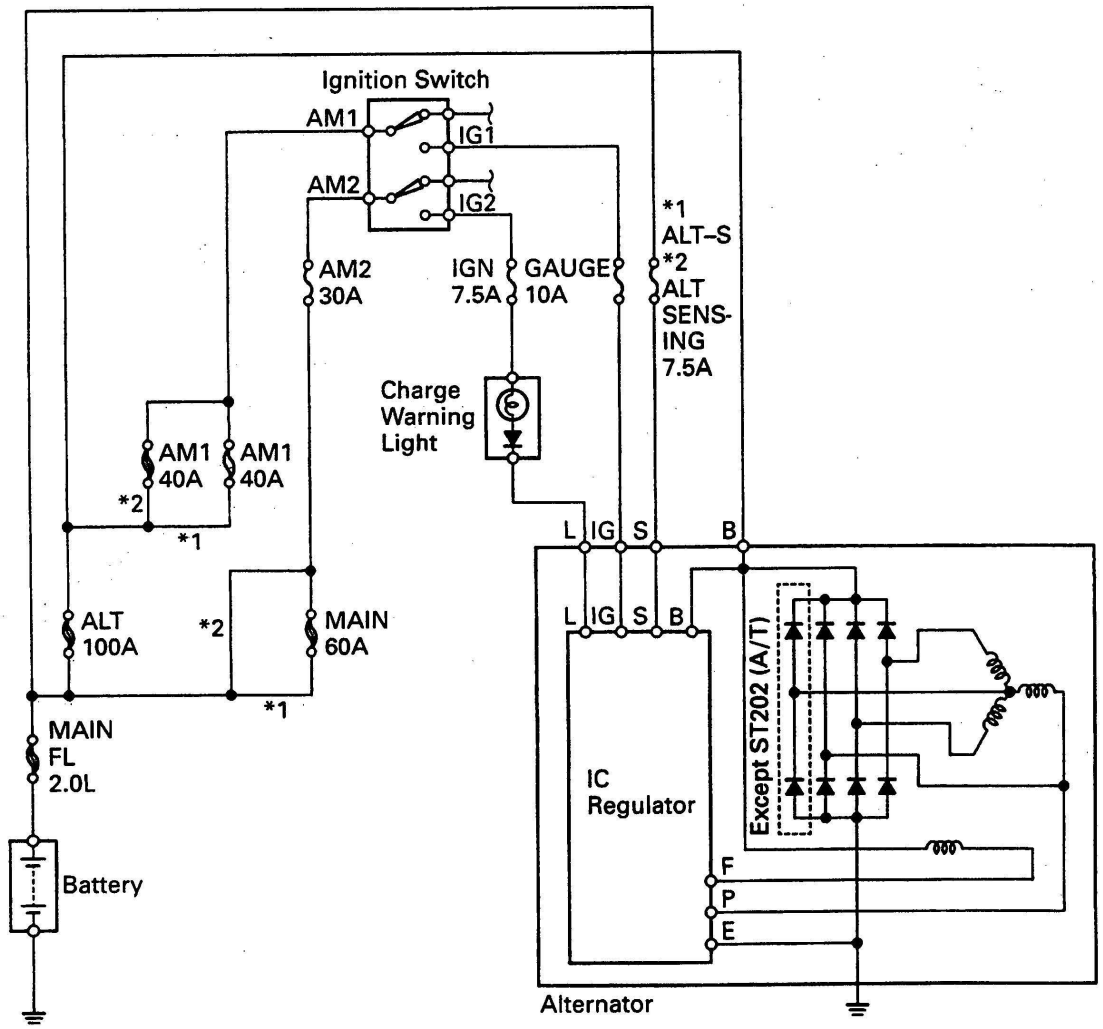
CHOOK–05

1. **Check that the battery cables are connected to the correct terminals.**
2. **Disconnect the battery cables when the battery is given a quick charge.**
3. **Do not perform tests with a high voltage insulation resistance tester.**
4. **Never disconnect the battery while the engine is running.**

SYSTEM CIRCUIT

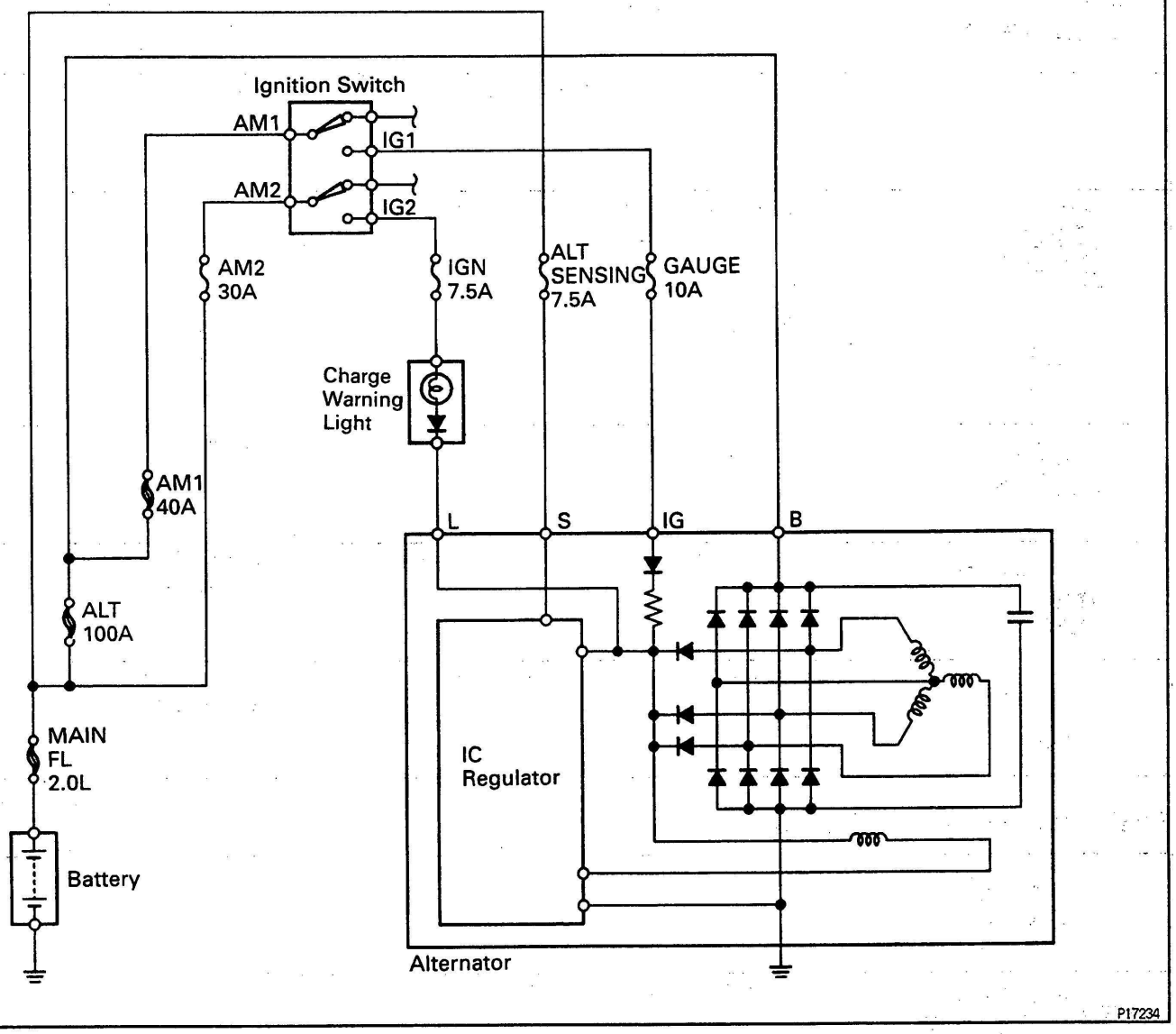
CH074–01

ST202, ST191 (w/ NIPPONDENSO Alternator)



P16423

ST191 (w/ BOSCH Alternator)



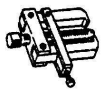
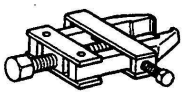
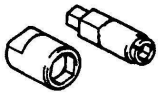
OPERATION

When the ignition switch is turned ON, current from the battery flows from terminal L of the CH00P-0E alternator through the IC regulator to terminal E, causing the charge warning light to light up. Then, when the engine is started, the voltage output increases as the alternator speed increases. When the voltage output becomes greater than the battery voltage, current for recharging flows from terminal B. Simultaneously, voltage at terminal L increases and the potential difference between battery and terminal L disappears, causing the charge warning light to go off. When the voltage output exceeds the regulator adjustment voltage, the transistor inside the IC regulator regulates the voltage so that the voltage from the alternator remains constant.

PREPARATION

CH00Q–08

SST (SPECIAL SERVICE TOOLS)

	09285–76010	Injection Pump Camshaft Bearing Cone Replacer	NIPPONDENSO: Rotor rear bearing cover BOSCH: Rotor rear bearing, Rotor
	09286–46011	Injection Pump Spline Shaft Puller	NIPPONDENSO: Rectifier end frame
	09608–20012	Front Hub & Drive Pinion Bearing Tool Set	
	(09608–00030)	Replacer	NIPPONDENSO: Rotor front bearing
	09820–00021	Alternator Rear Bearing Puller	Rotor rear bearing
	09820–00030	Alternator Rear Bearing Replacer	NIPPONDENSO: Rotor rear bearing
	09820–63010	Alternator Pulley Set Nut Wrench Set	NIPPONDENSO: Alternator pulley nut

CH00S–09

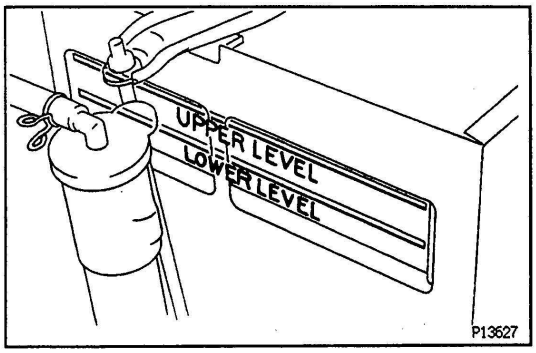
RECOMMENDED TOOLS

	09082–00050	TOYOTA Electrical Tester Set	
	09200–00010	Engine Adjust Kit	
	09905–00013	Snap Ring Pliers	NIPPONDENSO: Alternator washer for M/T

CH00U–06

EQUIPMENT

Belt tension gauge	
Torque wrench	
Vernier calipers	Rotor (Slip ring), Brush

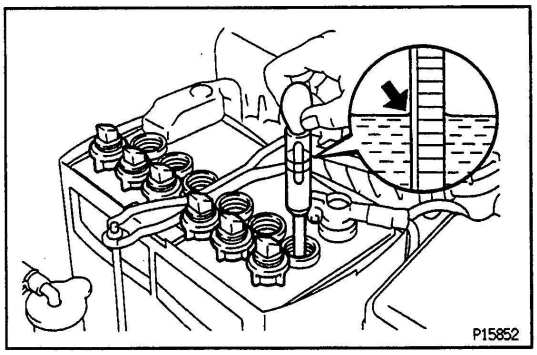


ON–VEHICLE INSPECTION

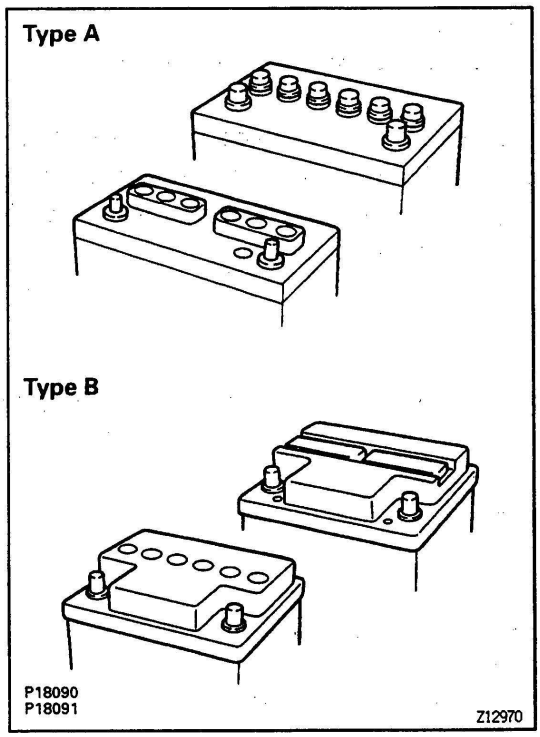
CH075–01

1. CHECK BATTERY SPECIFIC GRAVITY AND ELECTROLYTE LEVEL

(a) Check the electrolyte level of each cell.
If insufficient, refill with distilled (or purified) water.



(b) Check the specific gravity of each cell.



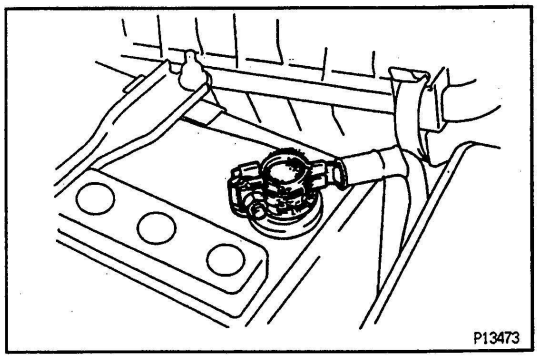
The specific gravity of the battery varies according to whether the battery shape is Type A or Type B as shown in the illustration.

Standard specific gravity at 20°C (68°F):

Type A 1.25 – 1.27

Type B 1.26 – 1.29

If the specific gravity is less than specification, charge the battery.



2. CHECK BATTERY TERMINALS, FUSIBLE LINK AND FUSES

(a) Check that the battery terminals are not loose or corroded.
If the terminals are corroded, clean the terminals.

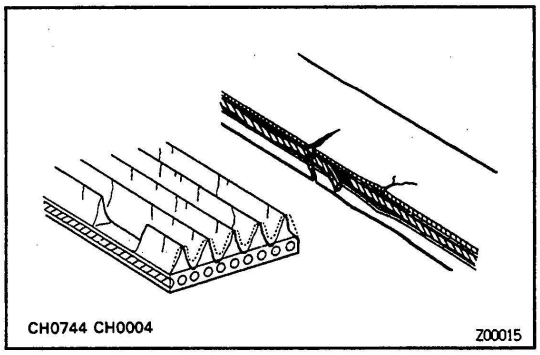
(b) Check the fusible link, H–fuses, M–fuse and fuses for continuity.

Fusible link:

MAIN 2.0L

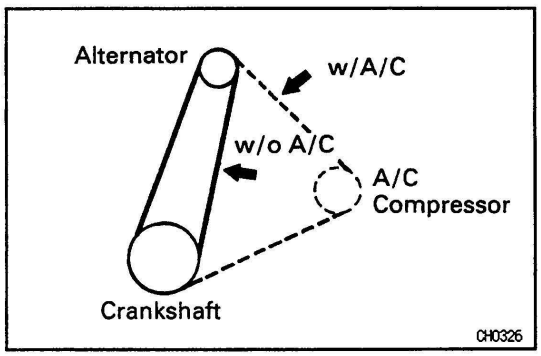
H–fuse:
ALT 100A
MAIN 60A (ST202)
AM1 40A (ST191)
M–fuse:
AM1 40A (ST202)
Fuse:
AM2 30A
ALT–S 7.5A (ST202)
ALT SENSING 7.5A (ST191)
GAUGE 10A
IGN 7.5A

CH

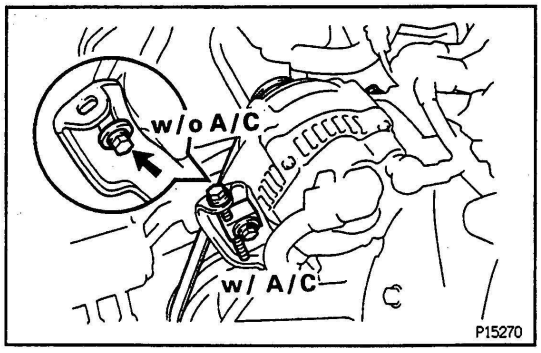


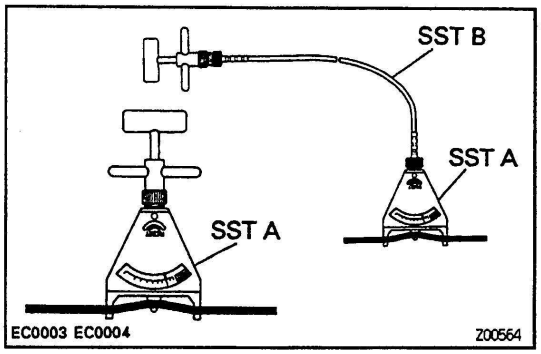
3. INSPECT DRIVE BELT

(a) Visually check the drive belt for excessive wear, frayed cords etc.
If any defect has been found, replace the drive belt.
HINT: Cracks on the rib side of a drive belt are considered acceptable. If the drive belt has chunks missing from the ribs, it should be replaced.



(b) Check the drive belt deflection by pressing on the belt at the points indicated in the illustration with 98 N (10 kgf, 22 lbf) of pressure.
Drive belt deflection:
w/ A/C
New belt
6 – 7 mm (0.24 – 0.35 in.)
Used belt
9 – 11 mm (0.35 – 0.43 in.)
w/o A/C
New belt
11 – 15 mm (0.43 – 0.59 in.)
Used belt
13 – 17 mm (0.51 – 0.67 in.)
If the belt deflection is not as specified, adjust it.





Reference:

Using SST, check the drive belt tension.

SST A 09216–00021

SST B 09216–00030

Drive belt tension:

w/ A/C

New belt

686 – 785 N (70 – 80 kgf)

Used belt

441 – 539 N (45 – 55 kgf)

w/o A/C

New belt

686 – 785 N (70 – 80 kgf)

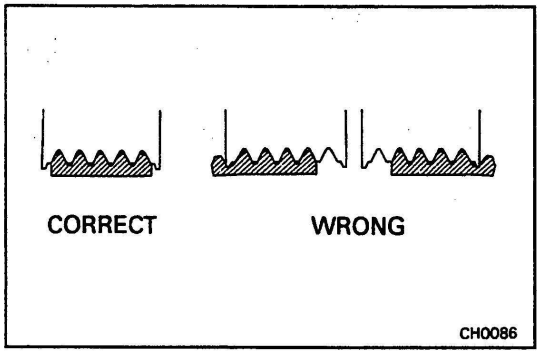
Used belt

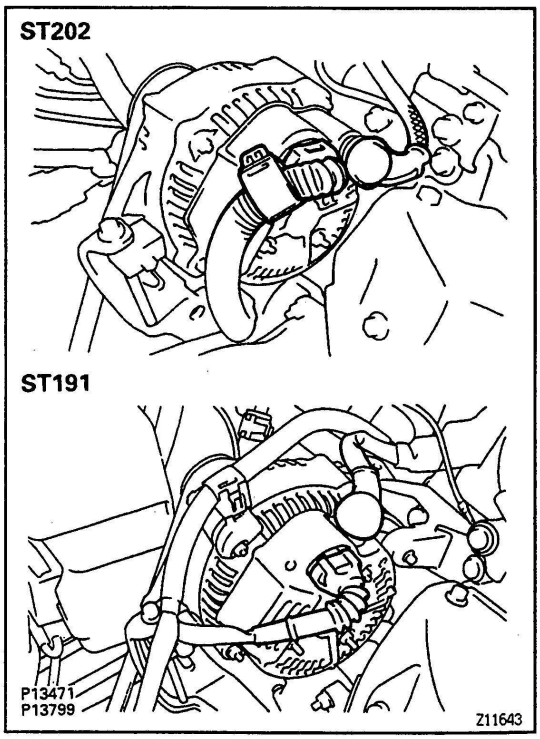
196 – 343 N (20 – 35 kgf)

If the belt tension is not as specified, adjust it.

HINT:

- "New belt" refers to a belt which has been used less than 5 minutes on a running engine.
- "Used belt" refers to a belt which has been used on a running engine for 5 minutes or more.
- After installing a belt, check that it fits properly in the ribbed grooves.
- Check with your hand to confirm that the belt has not slipped out of the groove on the bottom of the pulley.
- After installing a new belt, run the engine for about 5 minutes and recheck the belt tension.





4. VISUALLY CHECK ALTERNATOR WIRING AND LISTEN FOR ABNORMAL NOISES

(a) Check that the wiring is in good condition.

(b) Check that there is no abnormal noise from the alternator while the engine is running.

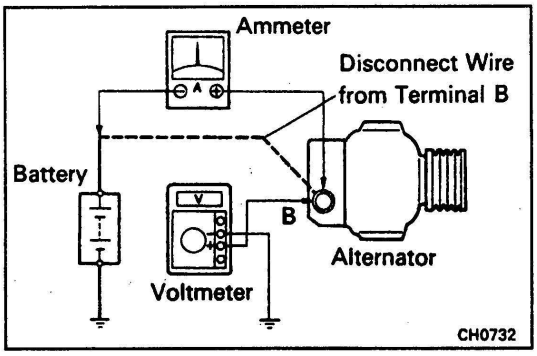
5. CHECK CHARGE WARNING LIGHT CIRCUIT

(a) Warm up the engine and then turn it off.

(b) Turn off all accessories.

(c) Turn the ignition switch "ON". Check that the charge warning light is lit.

(d) Start the engine. Check that the light goes off.
If the light does not go off as specified, troubleshoot the charge light circuit.

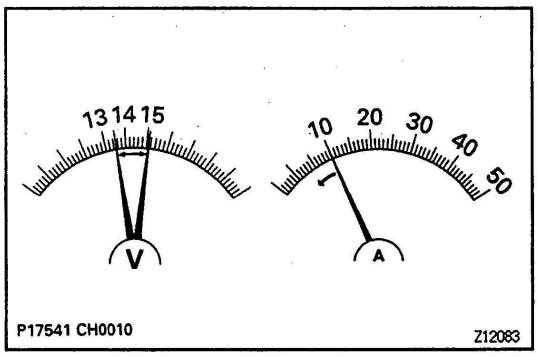


6. INSPECT CHARGING CIRCUIT WITHOUT LOAD

HINT: If a battery/alternator tester is available, connect the tester to the charging circuit as per manufacturer's instructions.

(a) If a tester is not available, connect a voltmeter and ammeter to the charging circuit as follows:

- Disconnect the wire from terminal B of the alternator, and connect it to the negative (–) tester probe of the ammeter.
- Connect the positive (+) tester probe of the ammeter to terminal B of the alternator.
- Connect the positive (+) tester probe of the voltmeter to terminal B of the alternator.
- Ground the negative (–) tester probe of the voltmeter.



(b) NIPPONDENSO:
Check the charging circuit as follows:
With the engine running from idling to 2,000 rpm, check the reading on the ammeter and voltmeter.

Standard amperage:

10 A or less

Standard voltage:

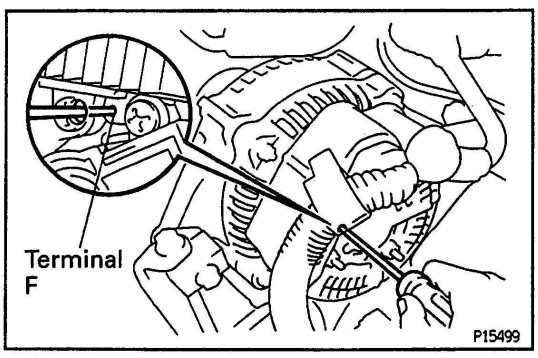
13.9 – 15.1 V at 25°C (77°F)

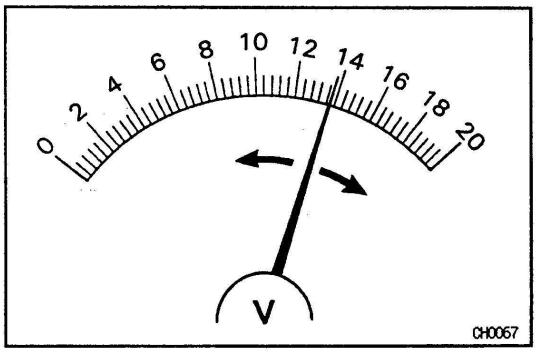
13.5 – 14.3 V at 115°C (239°F)

If the voltmeter reading is more than standard voltage, replace the IC regulator.

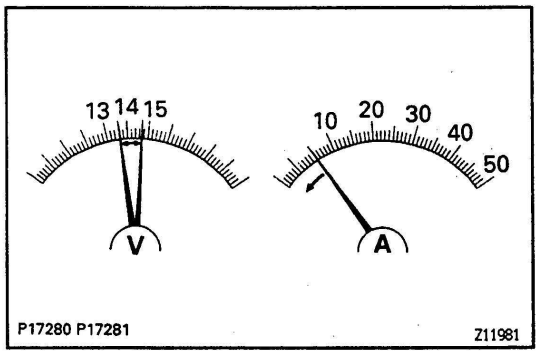
If the voltmeter reading is less than standard voltage, check the IC regulator and alternator as follows:

- With terminal F grounded, start the engine and check the voltmeter reading of terminal B.



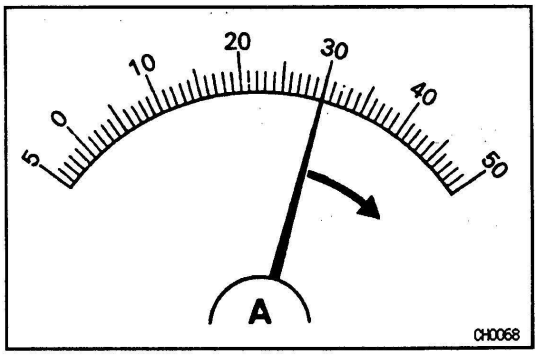


- If the voltmeter reading is more than standard voltage, replace the IC regulator.
- If the voltmeter reading is less than standard voltage, check the alternator.



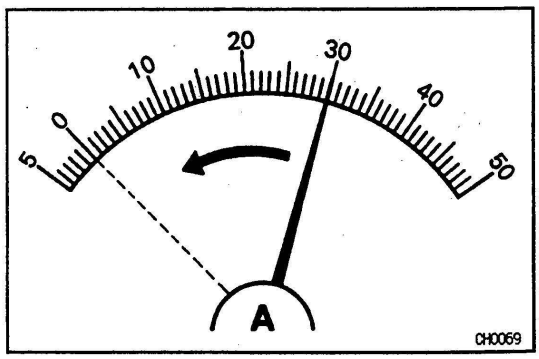
(c) BOSCH:
Check the charging circuit as follows:
With the engine running from idling to 2,500 rpm, check the reading on the ammeter and voltmeter.
Standard amperage:
5 A or less
Standard voltage:
14.3 – 14.7 V at 25°C (77°F)
13.6 – 14.4 V at 130°C (266°F)
If the voltmeter reading is more than standard voltage, replace the IC regulator.
If the voltmeter reading is less than standard voltage, check the alternator.

CH



7. INSPECT CHARGING CIRCUIT WITH LOAD

(a) With the engine running at 2,000 rpm, turn on the high beam headlights and place the heater blower switch at "HI".
(b) Check the reading on the ammeter.
Standard amperage:
30 A or more

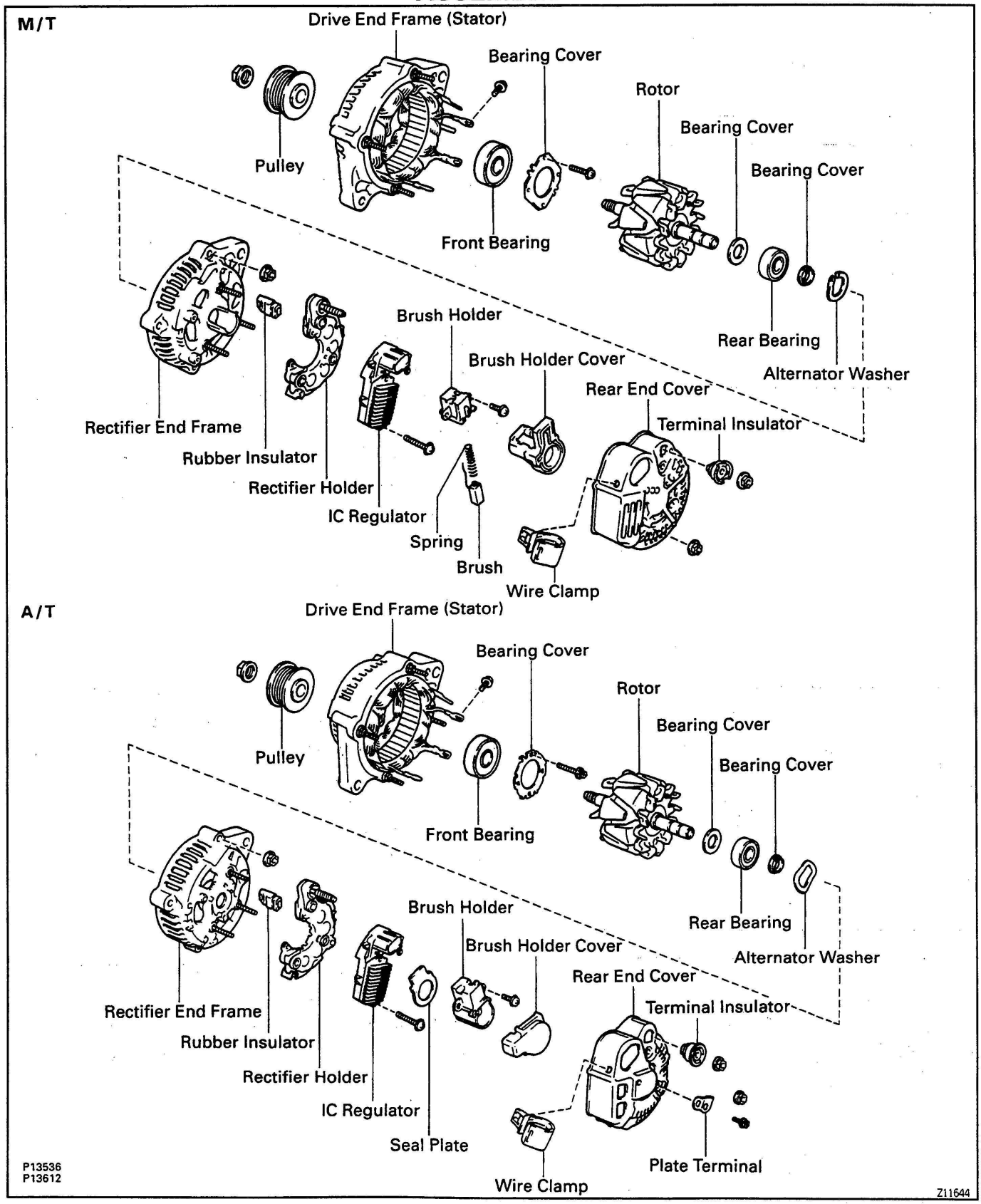


If the ammeter reading is less than the standard amperage, repair the alternator.
HINT: If the battery is fully charged, the indication will sometimes be less than standard amperage.

ALTERNATOR (ST202)

COMPONENTS FOR DISASSEMBLY AND ASSEMBLY

CH010-0L



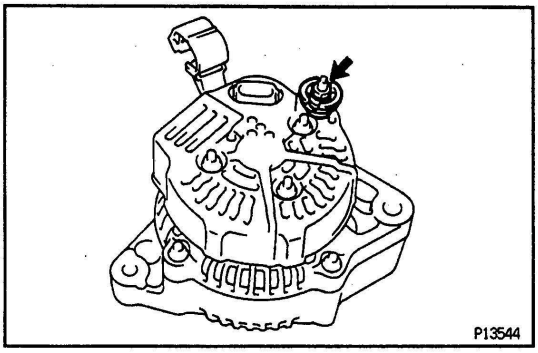
CH06Q–02

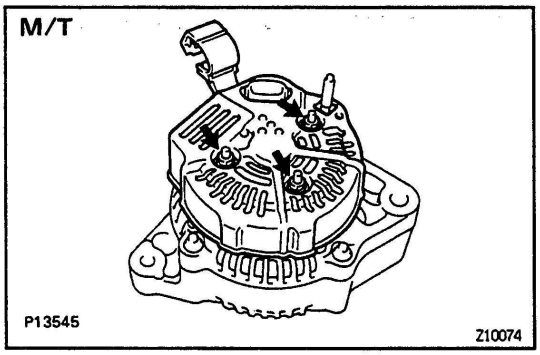
ALTERNATOR DISASSEMBLY

(See Components for Disassembly and Assembly)

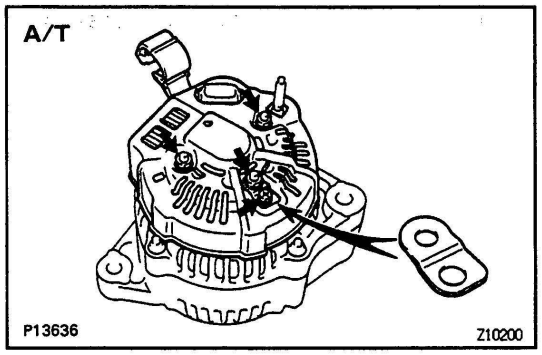
1. REMOVE REAR END COVER

(a) Remove the nut and terminal insulator.





(b) M/T:
Remove the 3 nuts and end cover.



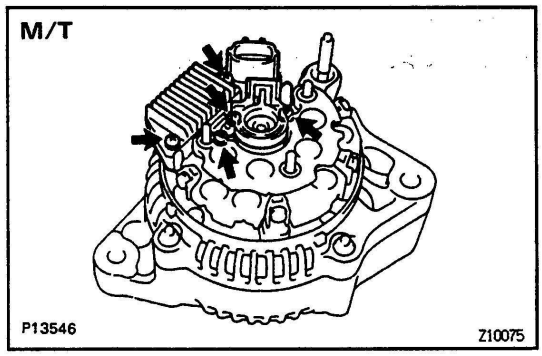
(c) A/T:
Remove the bolt, 3 nuts, plate terminal and end cover.

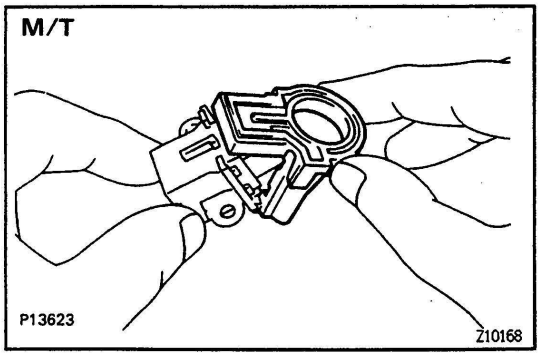
(d) Remove the wire clamp from the end cover.

2. REMOVE BRUSH HOLDER AND IC REGULATOR

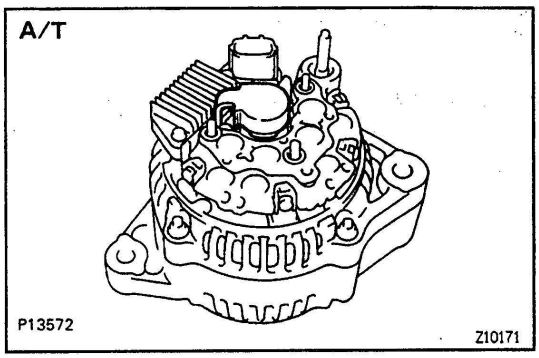
M/T:

(a) Remove the 5 screws, brush holder and IC regulator.



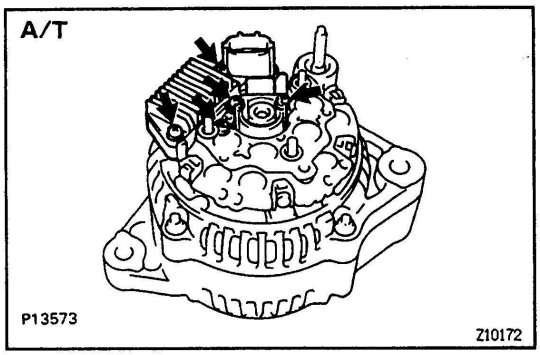


(b) Remove the brush holder cover from the brush holder.

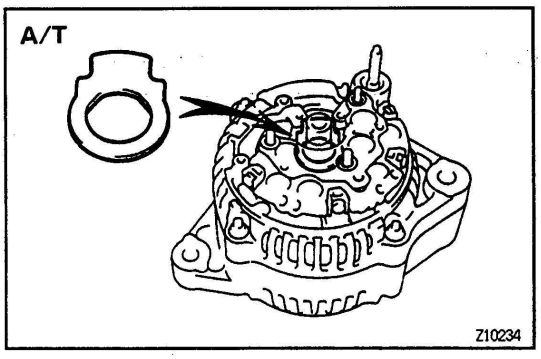


A/T:

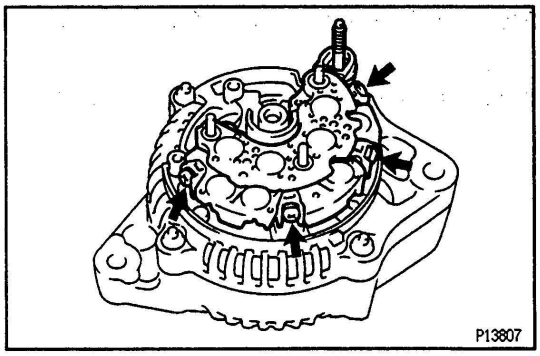
(a) Remove the brush holder cover from the brush holder.



(b) Remove the 5 screws, brush holder and IC regulator.

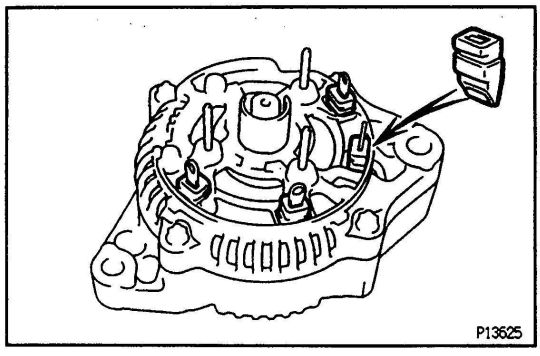


(c) Remove the seal plate from the rectifier end frame.

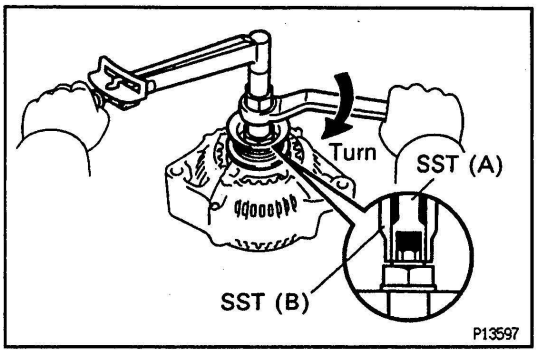


3. REMOVE RECTIFIER HOLDER

(a) Remove the 4 screws and rectifier holder.



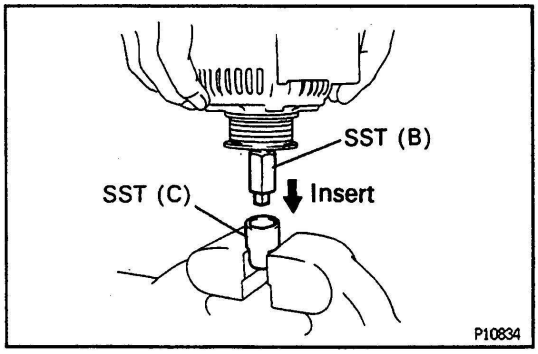
(b) Remove the 4 rubber insulators.



4. REMOVE PULLEY

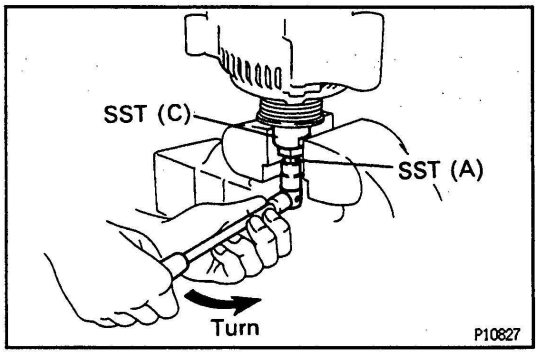
(a) Hold SST (A) with a torque wrench, and tighten SST (B) clockwise to the specified torque.
SST 09820–63010
Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)

(b) Check that SST (A) is secured to the rotor shaft.



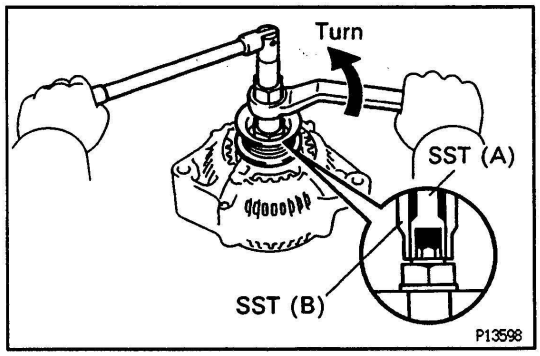
(c) Mount SST (C) in a vise.

(d) Insert SST (B) into SST (C), and attach the pulley nut to SST (C).

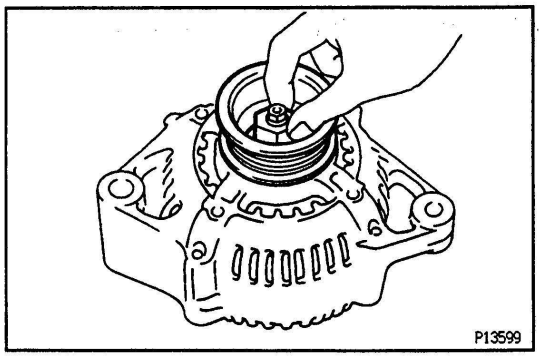


(e) To loosen the pulley nut, turn SST (A) in the direction shown in the illustration.
NOTICE: To prevent damage to the rotor shaft, do not loosen the pulley nut more than one–half of a turn.

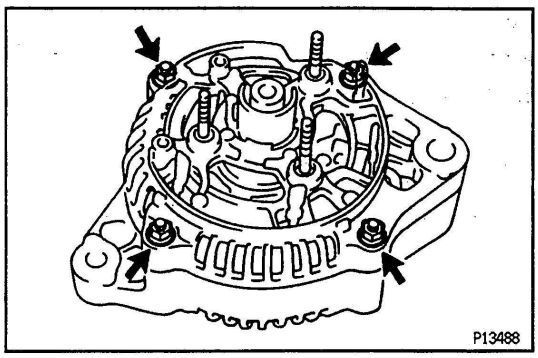
(f) Remove the alternator from SST (C).



(g) Turn SST (B), and remove SST (A and B).

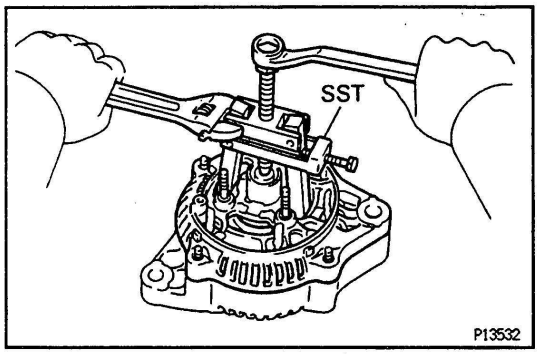


(h) Remove the pulley nut and pulley.

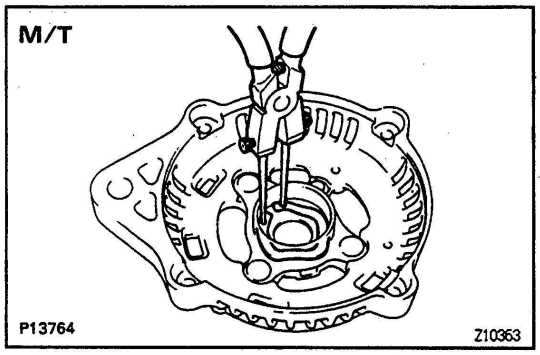


5. REMOVE RECTIFIER END FRAME

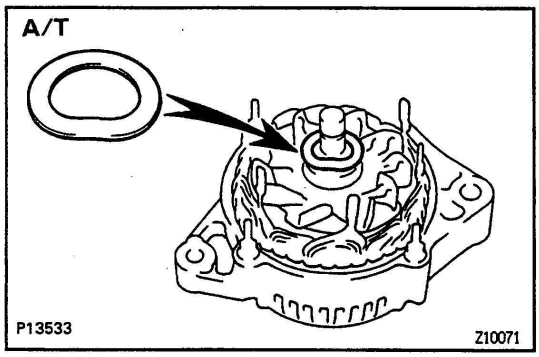
(a) Remove the 4 nuts.



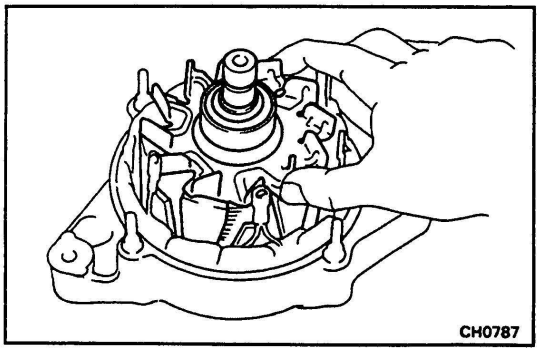
(b) Using SST, remove the rectifier end frame.
SST 09286–46011



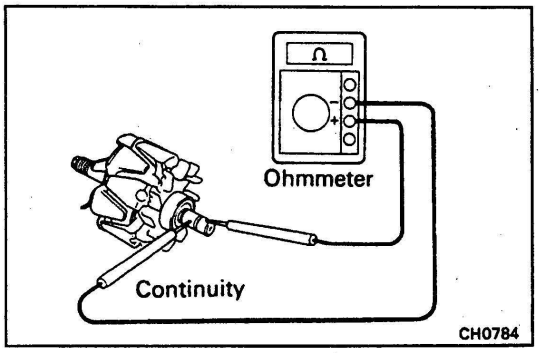
(c) M/T:
Using snap ring pliers, remove the alternator washer from the rectifier end frame.



(d) A/T:
Remove the alternator washer from the rotor.



6. REMOVE ROTOR FROM DRIVE END FRAME



ALTERNATOR INSPECTION AND REPAIR CH06R-02

Rotor

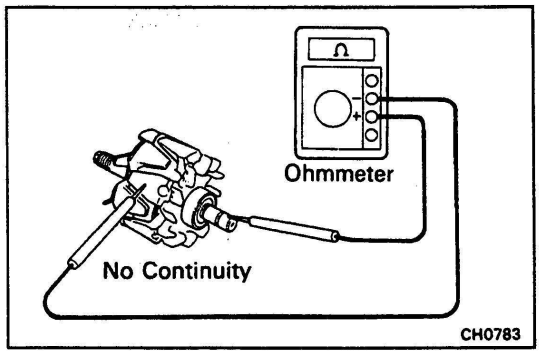
1. INSPECT ROTOR FOR OPEN CIRCUIT

Using an ohmmeter, check that there is continuity between the slip rings.

Standard resistance:

2.8 – 3.0 Ω at 20°C (68°F)

If there is no continuity, replace the rotor.

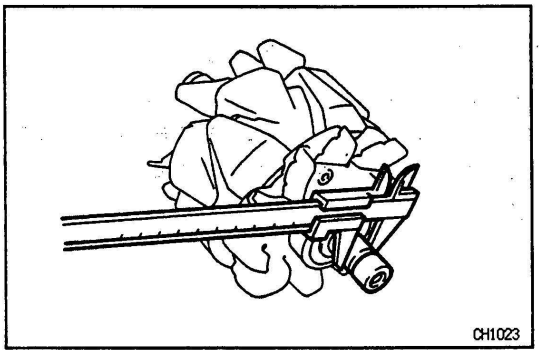


2. INSPECT ROTOR FOR GROUND

Using an ohmmeter, check that there is no continuity between the slip ring and rotor.

If there is continuity, replace the rotor.

CH



3. INSPECT SLIP RINGS

(a) Check that the slip rings are not rough or scored.

If rough or scored, replace the rotor.

(b) Using a vernier caliper, measure the slip ring diameter.

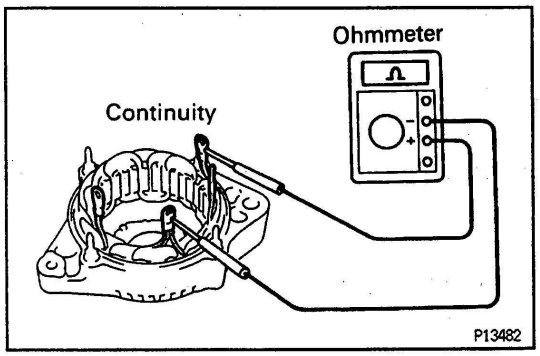
Standard diameter:

14.2 – 14.4 mm (0.559 – 0.567 in.)

Minimum diameter:

12.8 mm (0.504 in.)

If the diameter is less than minimum, replace the rotor.

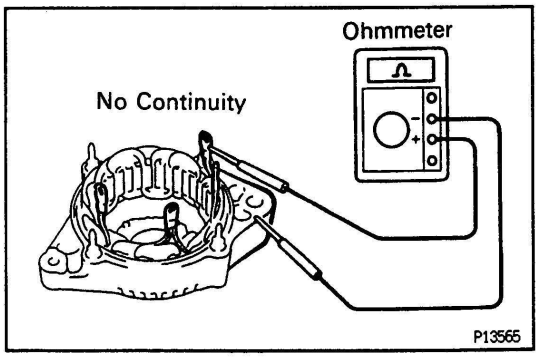


Stator (Drive End Frame)

1. INSPECT STATOR FOR OPEN CIRCUIT

Using an ohmmeter, check that there is continuity between the coil leads.

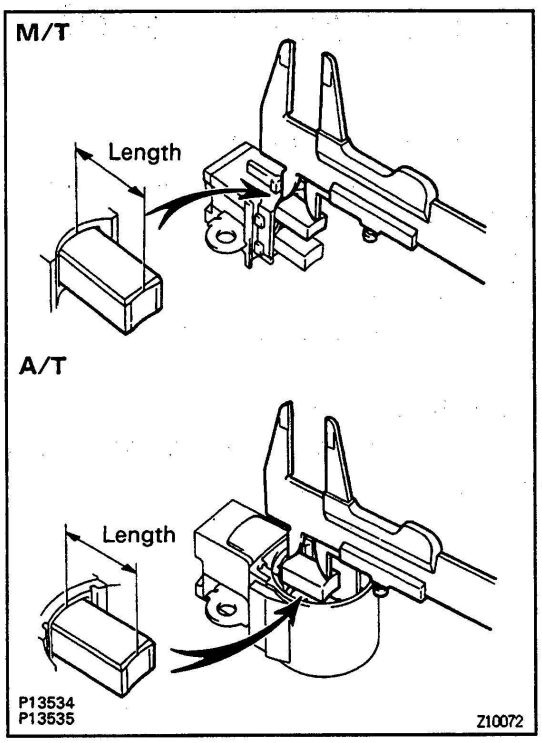
If there is no continuity, replace the drive end frame assembly.



2. INSPECT STATOR FOR GROUND

Using an ohmmeter, check that there is no continuity between the coil lead and drive end frame.

If there is continuity, replace the drive end frame assembly.



Brushes

1. INSPECT EXPOSED BRUSH LENGTH

Using vernier calipers, measure the exposed brush length.

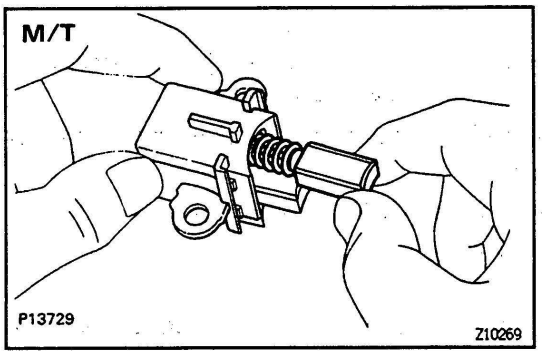
Standard exposed length:

10.5 mm (0.413 in.)

Minimum exposed length:

1.5 mm (0.059 in.)

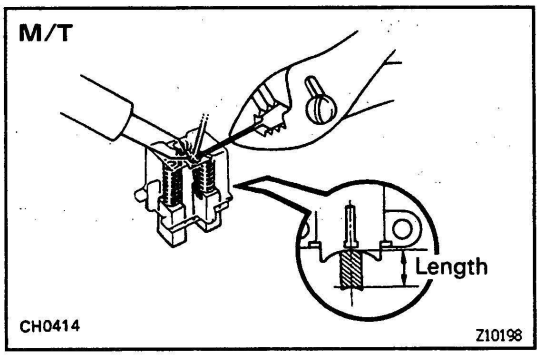
If the exposed length is less than minimum, replace the brushes (M/T) or brush holder assembly (A/T).



2. M/T:
IF NECESSARY, REPLACE BRUSHES

(a) Unsolder and remove the brush and spring.

(b) Run the wire of a new brush through the spring and the hole in the brush holder, and insert the spring and brush into the brush holder.



(c) Solder the brush wire to the brush holder at specified exposed length.

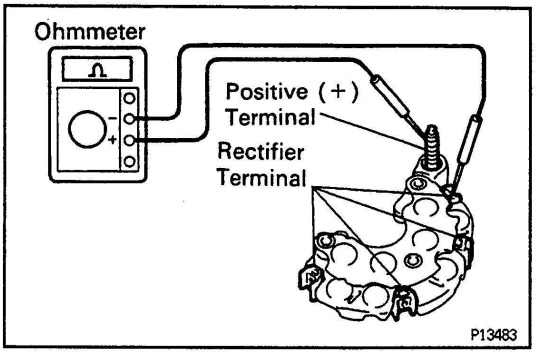
Exposed length:

10.5 mm (0.413 in.)

(d) Check that the brush moves smoothly in the brush holder.

(e) Cut off the excess wire.

(f) Apply insulation paint to the soldered area.



Rectifiers (Rectifier Holder)

1. INSPECT POSITIVE RECTIFIER

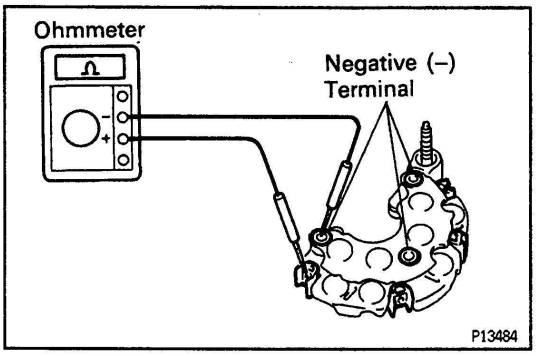
(a) Using an ohmmeter, connect one tester probe to the positive (+) terminal and the other to each rectifier terminal.

(b) Reverse the polarity of the tester probes and repeat step (a).

(c) Check that one shows continuity and the other shows no continuity.

If continuity is not as specified, replace the rectifier holder.

CH



2. INSPECT NEGATIVE RECTIFIER

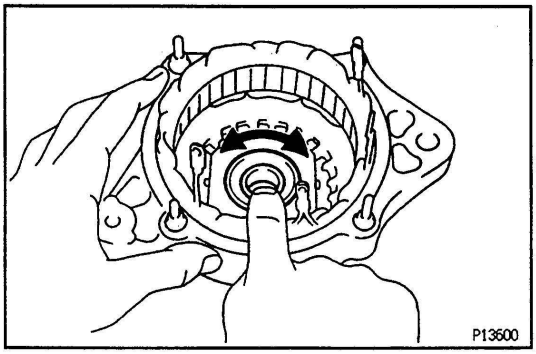
(a) Using an ohmmeter, connect one tester probe to each negative (–) terminal and the other to each rectifier terminal.

(b) Reverse the polarity of the tester probes and repeat step (a).

(c) Check that one shows continuity and the other shows no continuity.

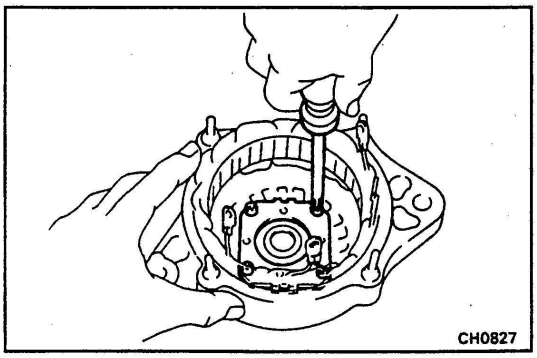
If continuity is not as specified, replace the rectifier holder.

Bearings



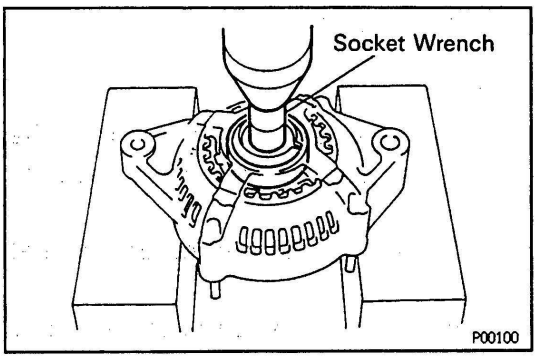
1. INSPECT FRONT BEARING

Check that the bearing is not rough or worn.

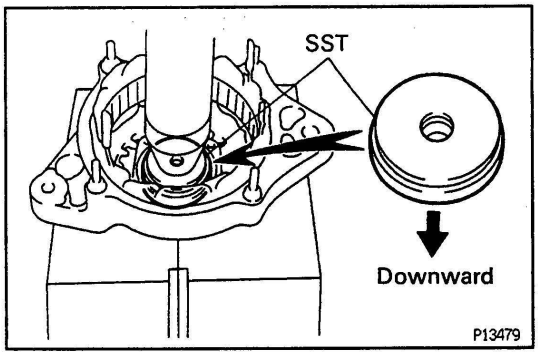


2. IF NECESSARY, REPLACE FRONT BEARING

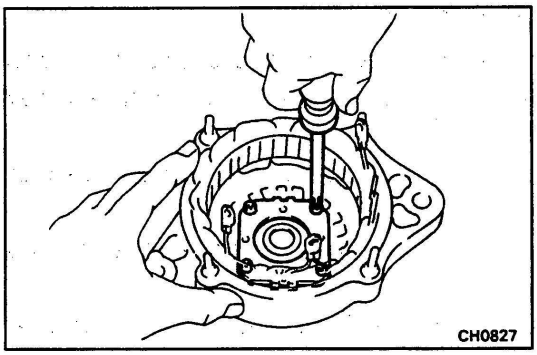
(a) Remove the 4 screws, bearing retainer and bearing.



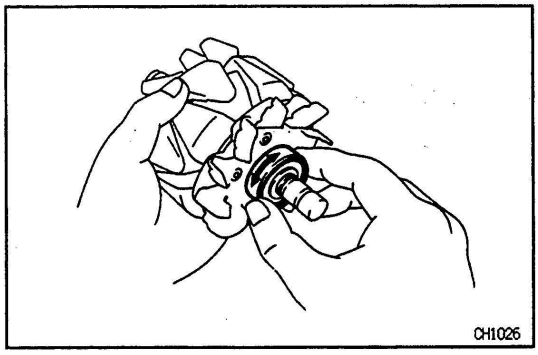
(b) Using a socket wrench and press, press out the bearing.



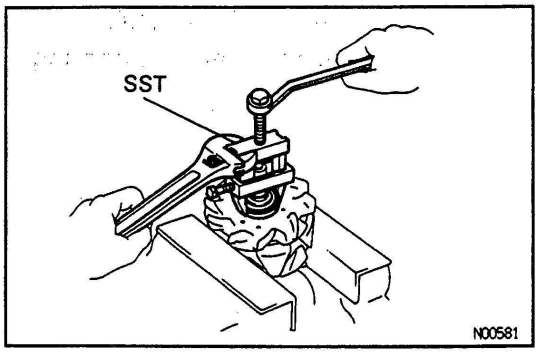
(c) Using SST and a press, press in a new bearing.
SST 09608–20012 (09608–00030)



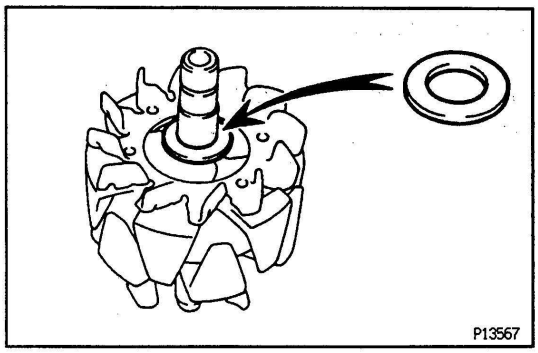
(d) Install the bearing retainer with the 4 screws.
Torque: 2.6 N·m (27 kgf·cm, 23 in.·lbf)



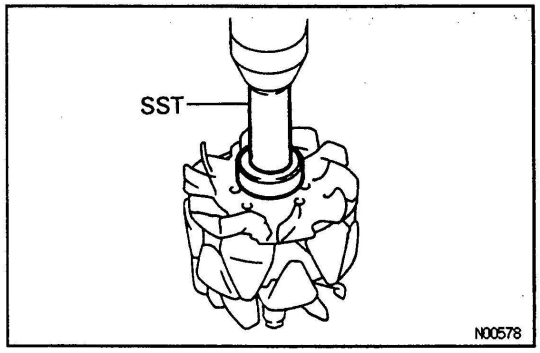
3. INSPECT REAR BEARING
Check that the bearing is not rough or worn.



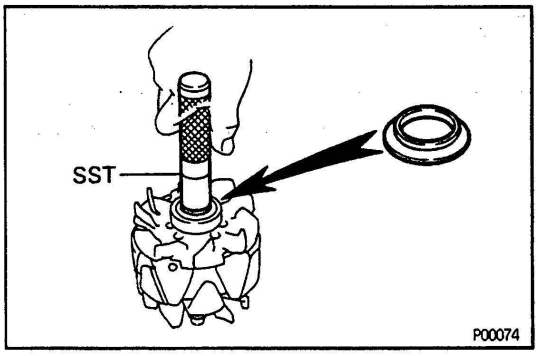
4. IF NECESSARY, REPLACE REAR BEARING
(a) Using SST, remove the bearing cover (outside) and bearing.
SST 09820–00021
NOTICE: Be careful not to damage the fan.
(b) Remove the bearing cover (inside).



(c) Place the bearing cover (inside) on the rotor.



(d) Using SST and a press, press in a new bearing.
SST 09820–00030



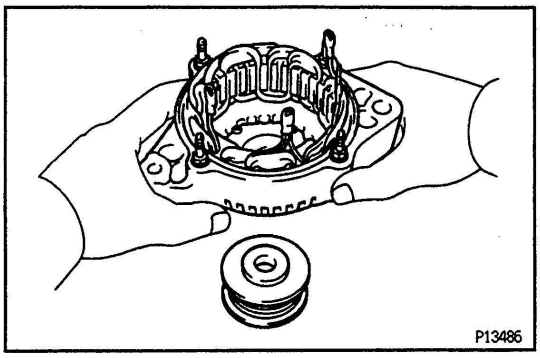
(e) Using SST, push in the bearing cover (outside).
SST 09285–76010

CH068–03

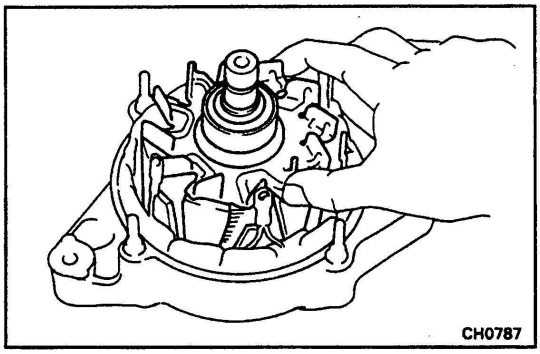
ALTERNATOR ASSEMBLY

(See Components for Disassembly and Assembly)

1. PLACE RECTIFIER END FRAME ON PULLEY

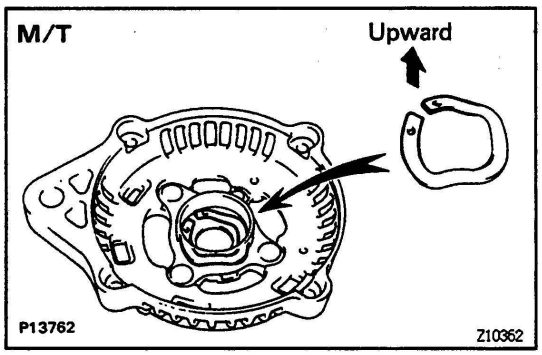


2. INSTALL ROTOR TO DRIVE END FRAME

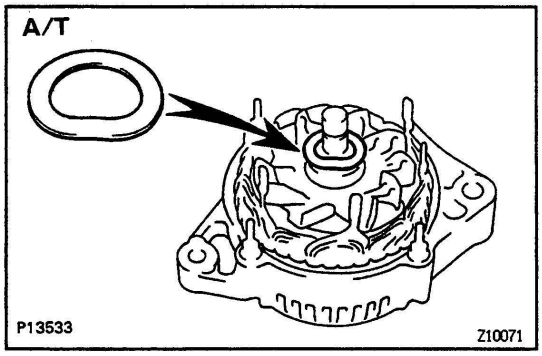


3. INSTALL RECTIFIER END FRAME

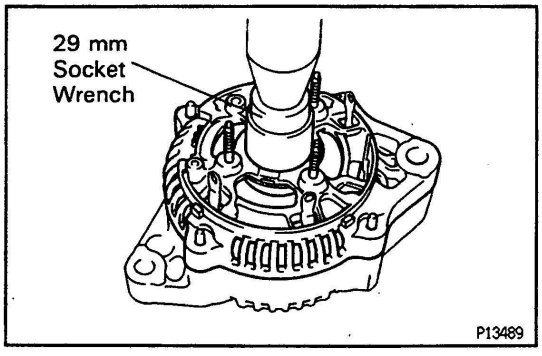
(a) M/T:
Install the alternator washer to the rectifier end frame.
NOTICE: Be careful of the alternator washer installation direction.

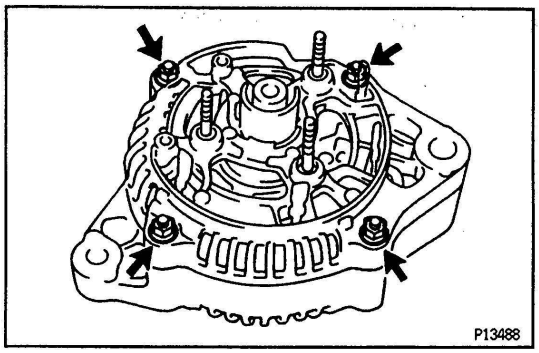


(b) A/T:
Place the alternator washer on the rotor.

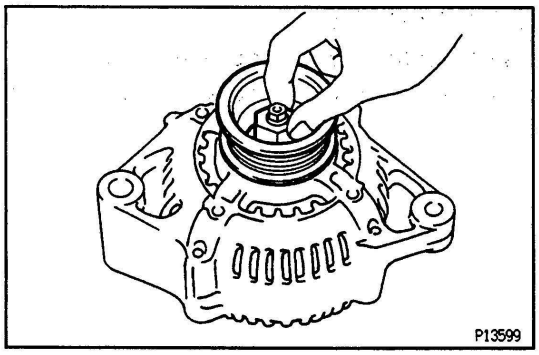


(c) Using a 29 mm socket wrench and press, slowly press in the rectifier end frame.



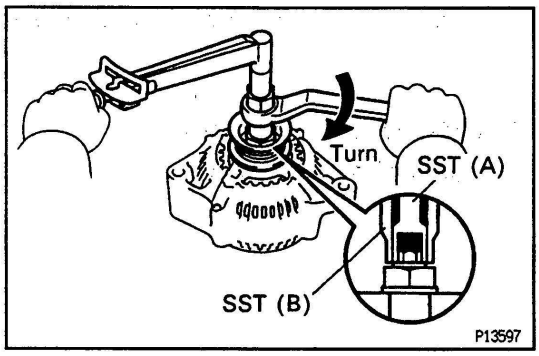


(d) Install the 4 nuts.
Torque: 4.5 N·m (46 kgf·cm, 40 in.·lbf)



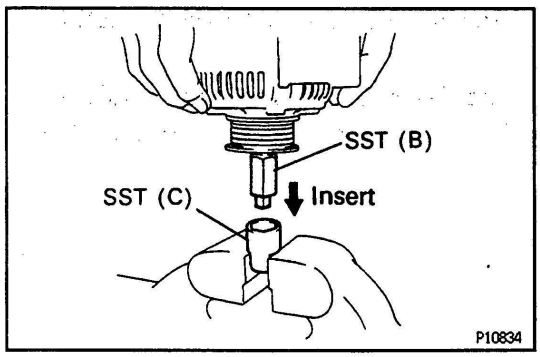
4. INSTALL PULLEY

(a) Install the pulley to the rotor shaft by tightening the pulley nut by hand.



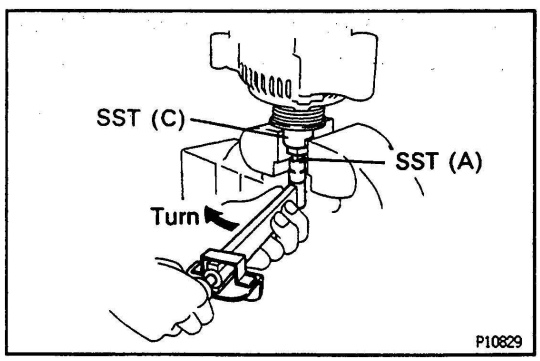
(b) Hold SST (A) with a torque wrench, and tighten SST (B) clockwise to the specified torque.
SST 09820–63010
Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)

(c) Check that SST (A) is secured to the pulley shaft.



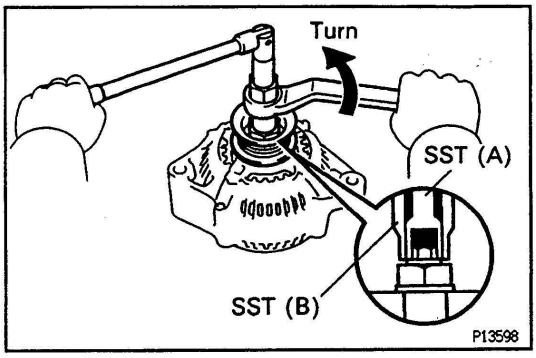
(d) Mount SST (C) in a vise.

(e) Insert SST (B) into SST (C), and attach the pulley nut to SST (C).

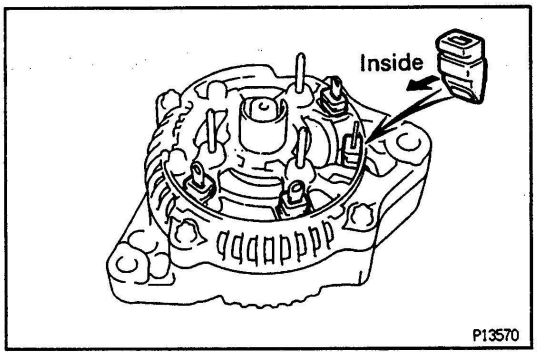


(f) To torque the pulley nut, turn SST (A) in the direction shown in the illustration.
Torque: 110 N·m (1,125 kgf·cm, 81 ft·lbf)

(g) Remove the alternator from SST (C).

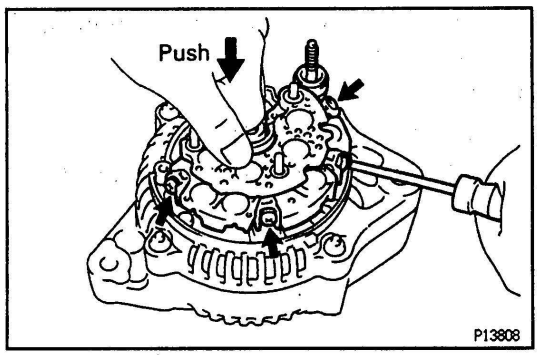


(h) Turn SST (B), and remove SST (A and B).

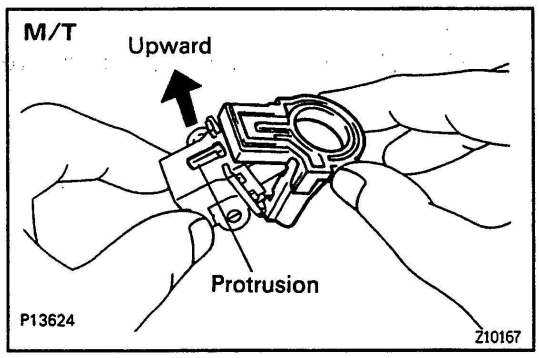


5. INSTALL RECTIFIER HOLDER

(a) Install the 4 rubber insulators on the lead wires.
NOTICE: Be careful of the rubber insulators installation direction.



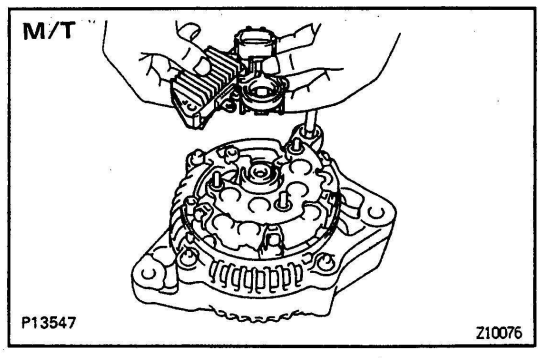
(b) Install the rectifier holder while pushing it with the 4 screws.
Torque:
M/T: 2.0 N·m (20 kgf·cm, 17 in.·lbf)
A/T: 3.1 N·m (32 kgf·cm, 27 in.·lbf)



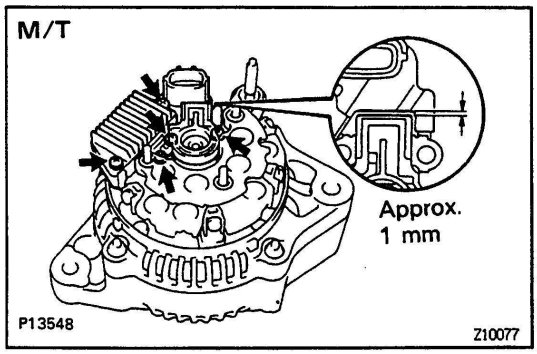
6. INSTALL IC REGULATOR AND BRUSH HOLDER

M/T:

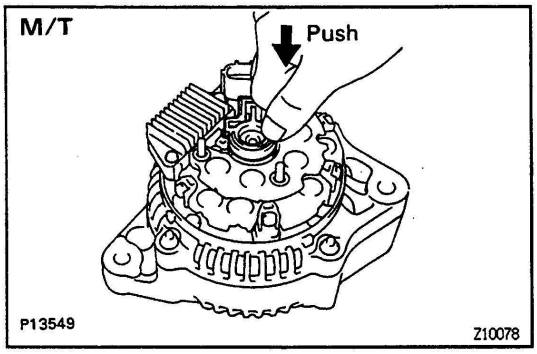
(a) Install the brush holder cover to the brush holder.
NOTICE: Be careful of the holder installation direction.



(b) Place the IC regulator together with the brush holder horizontally on the rectifier end frame.

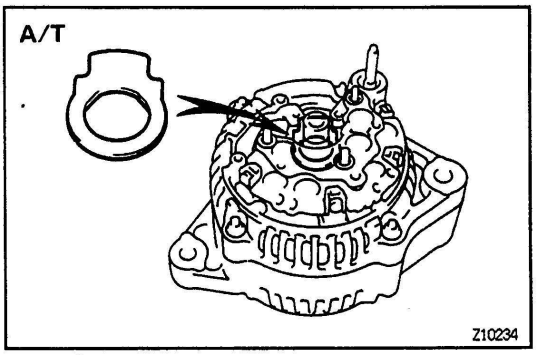


(c) Install the 5 screws until there is a clearance of approx. 1 mm (0.04 in.) between the brush holder and IC regulator.



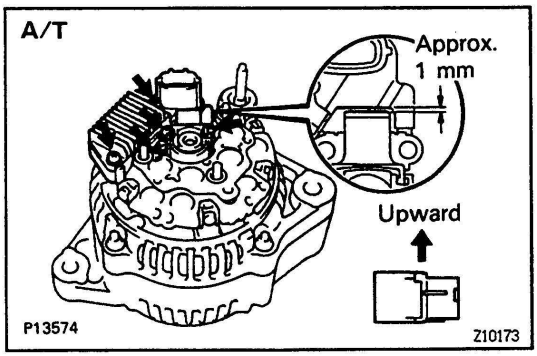
(d) Fit the brush holder cover.

CH



A/T:

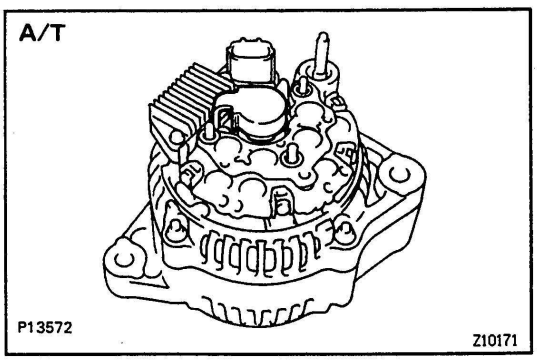
(a) Place the seal plate on the rectifier end frame.



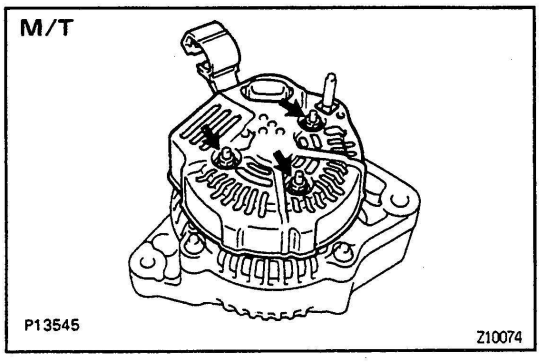
(b) Place the IC regulator and brush holder on the rectifier end frame.

NOTICE: Be careful of the holder installation direction.

(c) Install the 5 screws until there is a clearance of approx. 1 mm (0.04 in.) between the brush holder and IC regulator.

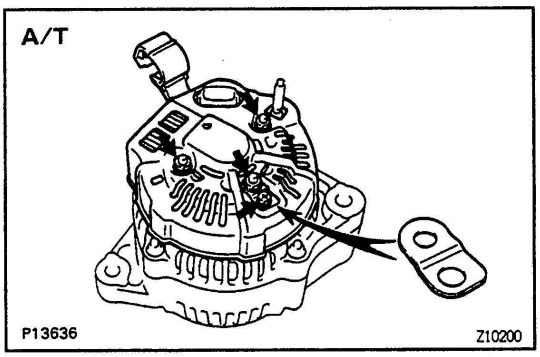


(d) Place the brush holder cover on the brush holder.

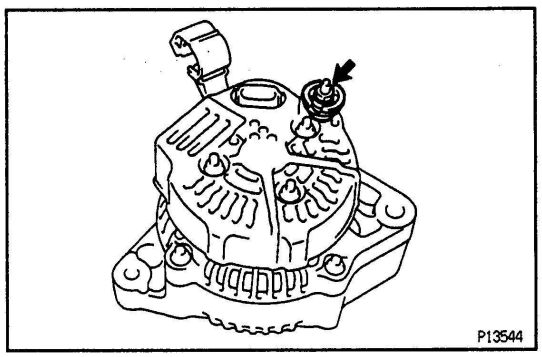


7. INSTALL REAR END COVER

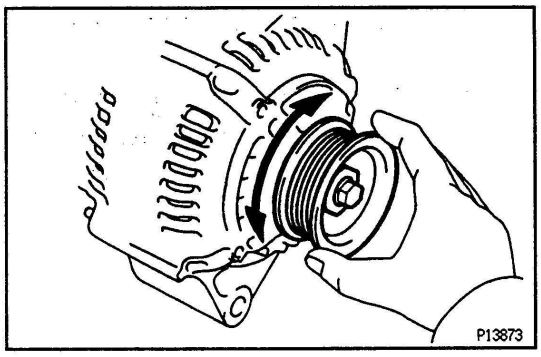
(a) M/T:
Install the end cover with the 3 nuts.
Torque: 4.5 N·m (46 kgf·cm, 40 in.·lbf)



(b) A/T:
Install the end cover and plate terminal with the bolt and 3 nuts.
Torque:
Nut: 4.5 N·m (46 kgf·cm, 40 in.·lbf)
Bolt: 3.9 N·m (40 kgf·cm, 35 in.·lbf)



(c) Install the terminal insulator with the nut.
Torque: 4.1 N·m (42 kgf·cm, 36 in.·lbf)

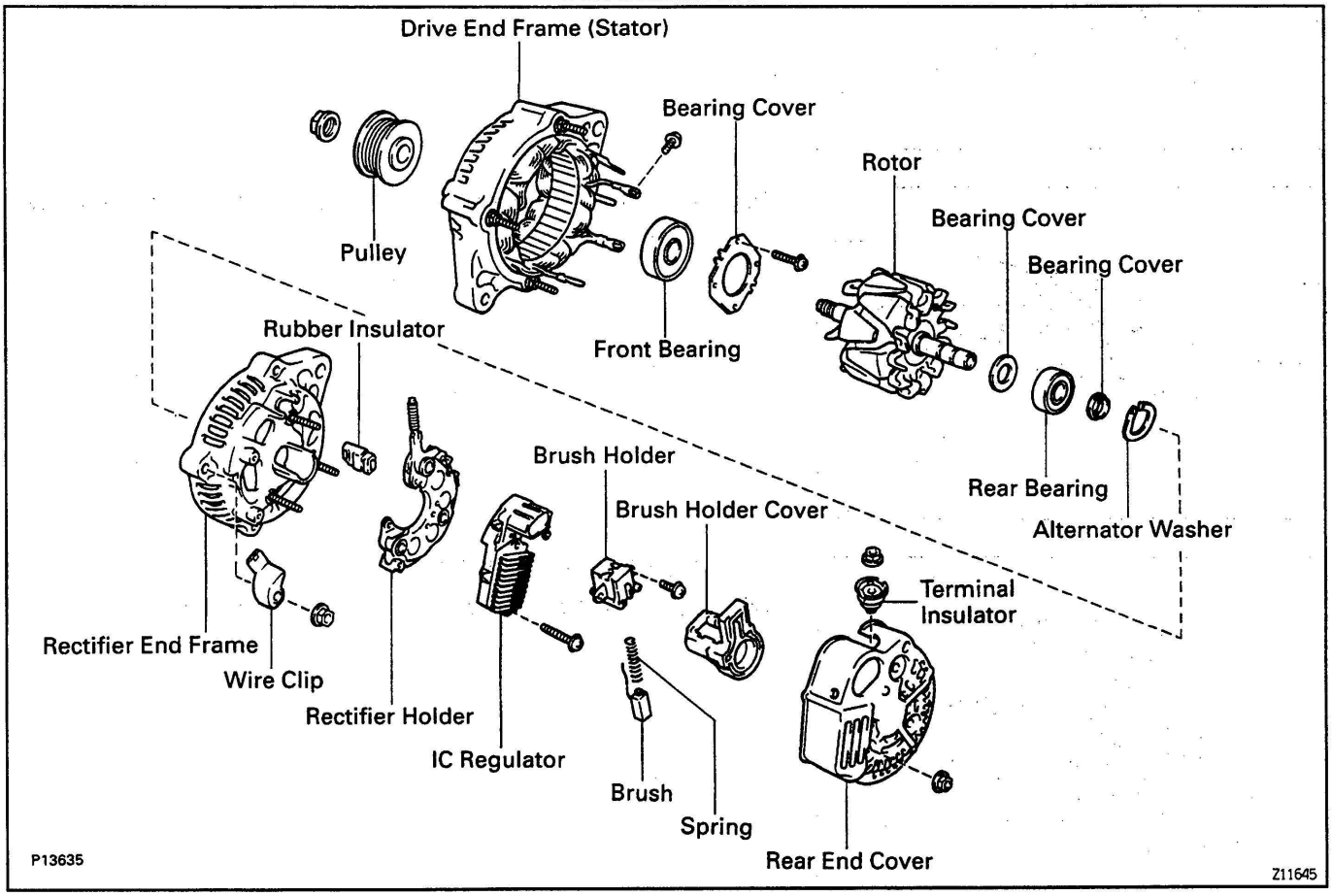


8. CHECK THAT ROTOR ROTATES SMOOTHLY

ALTERNATOR (ST191/NIPPONDENSO)

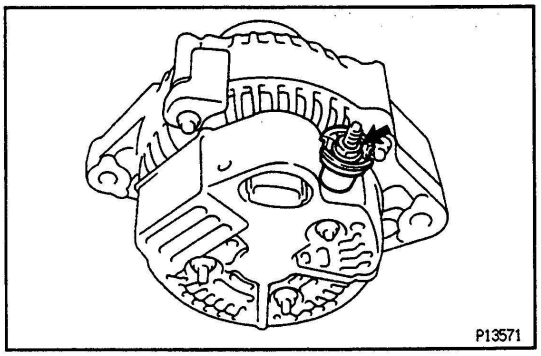
COMPONENTS FOR DISASSEMBLY AND ASSEMBLY

CH010-0M



CH09C-02

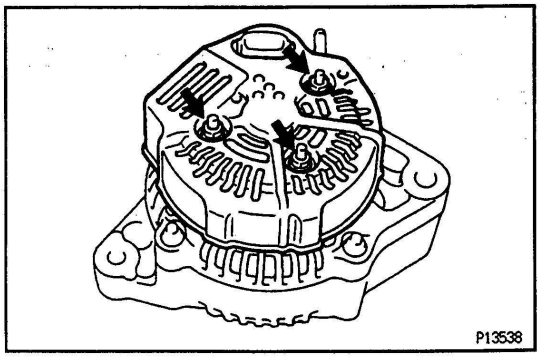
ALTERNATOR DISASSEMBLY



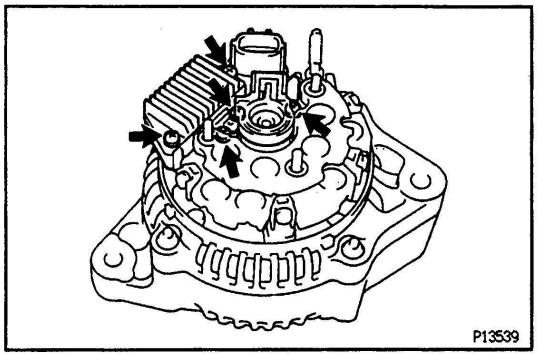
(See Components for Disassembly and Assembly)

1. REMOVE REAR END COVER

(a) Remove the nut and terminal insulator.

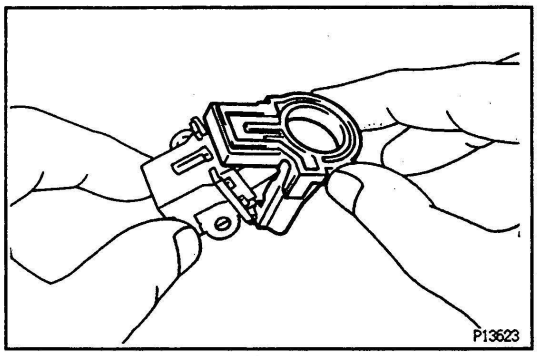


(b) Remove the 3 nuts and end cover.

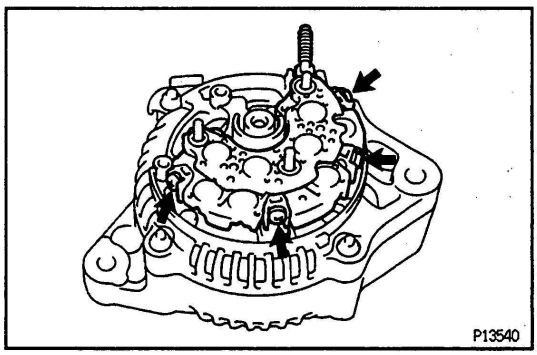


2. REMOVE BRUSH HOLDER AND IC REGULATOR

(a) Remove the 5 screws, brush holder and IC regulator.

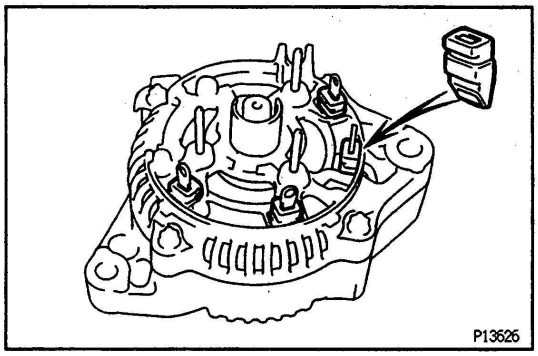


(b) Remove the brush holder cover from the brush holder.

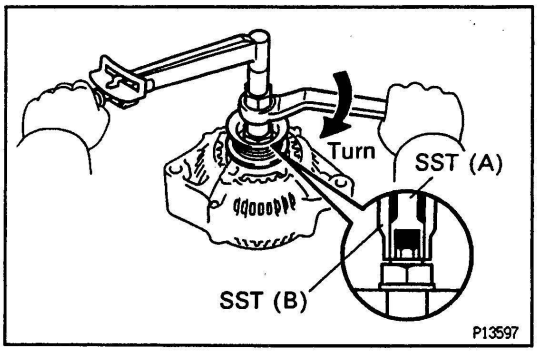


3. REMOVE RECTIFIER HOLDER

(a) Remove the 4 screws and rectifier holder.



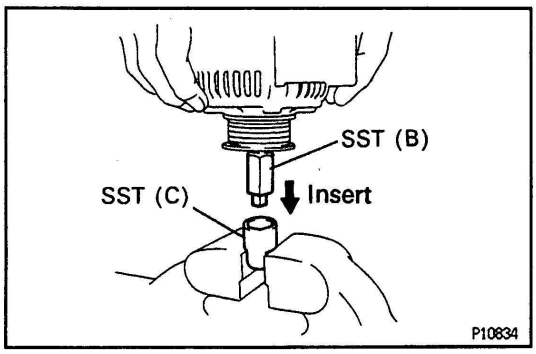
(b) Remove the 4 rubber insulators.



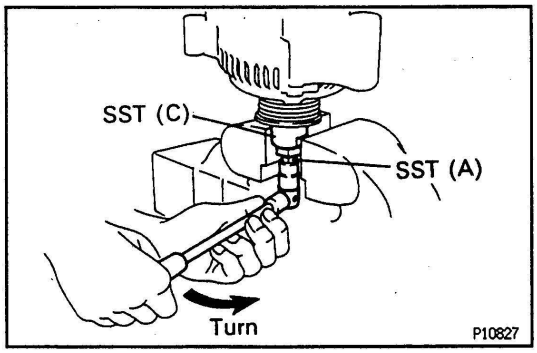
4. REMOVE PULLEY

(a) Hold SST (A) with a torque wrench, and tighten SST (B) clockwise to the specified torque.
SST 09820–63010
Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)

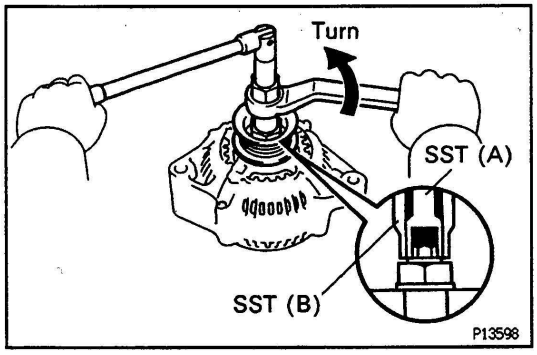
(b) Check that SST (A) is secured to the rotor shaft.



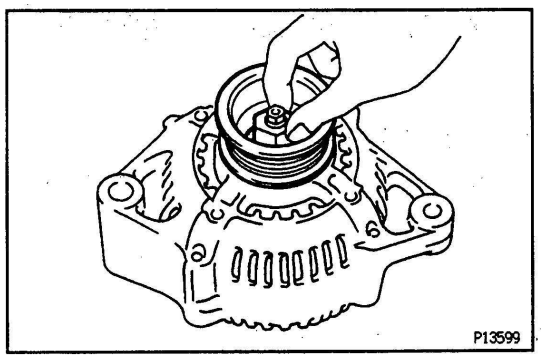
(c) Mount SST (C) in a vise.
(d) Insert SST (B) into SST (C), and attach the pulley nut to SST (C).



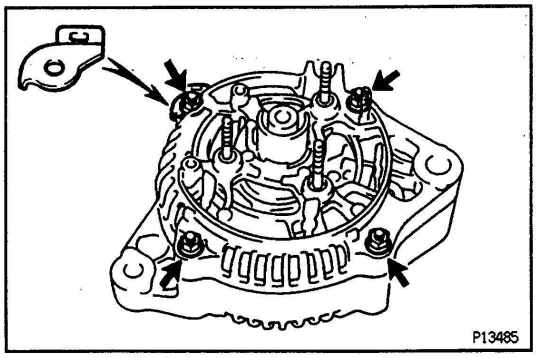
(e) To loosen the pulley nut, turn SST (A) in the direction shown in the illustration.
NOTICE: To prevent damage to the rotor shaft, do not loosen the pulley nut more than one–half of a turn.
(f) Remove the alternator from SST (C).



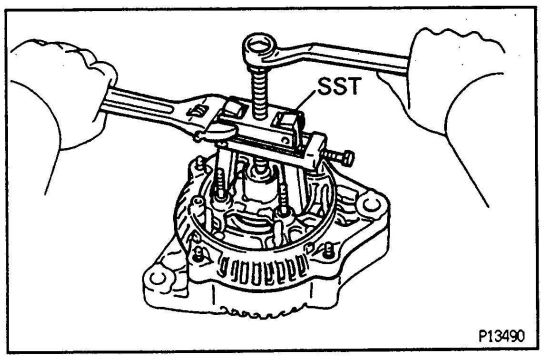
(g) Turn SST (B), and remove SST (A and B).



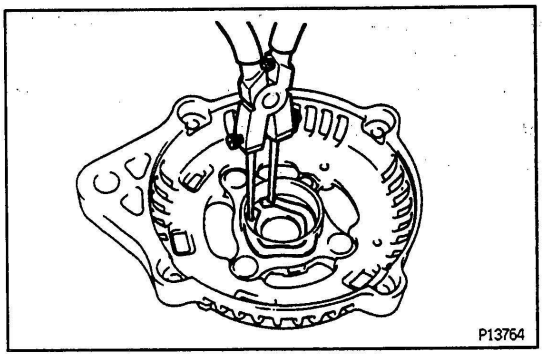
(h) Remove the pulley nut and pulley.



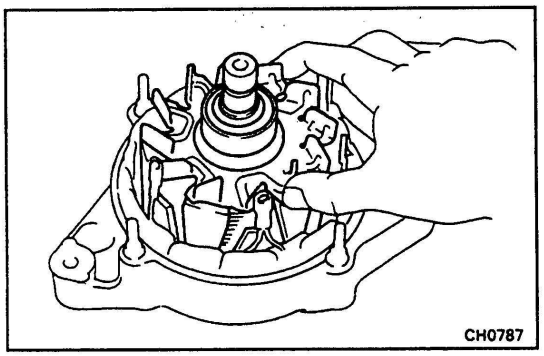
5. REMOVE RECTIFIER END FRAME
(a) Remove the 4 nuts and wire clip.



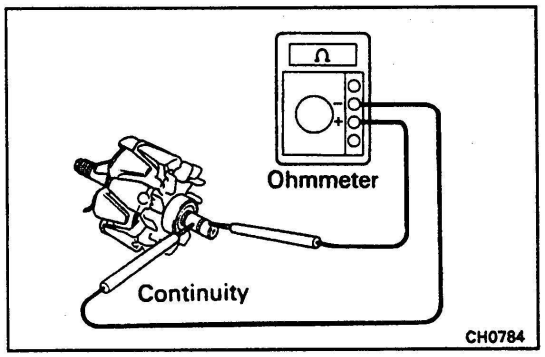
(b) Using SST, remove the rectifier end frame.
SST 09286–46011



(c) Using snap ring pliers, remove the alternator washer from the rectifier end frame.



6. REMOVE ROTOR FROM DRIVE END FRAME



ALTERNATOR INSPECTION AND REPAIR CH08D-02

Rotor

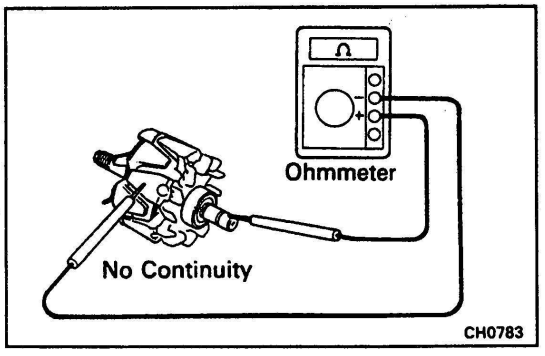
1. INSPECT ROTOR FOR OPEN CIRCUIT

Using an ohmmeter, check that there is continuity between the slip rings.

Standard resistance:

2.8 – 3.0 Ω at 20°C (68°F)

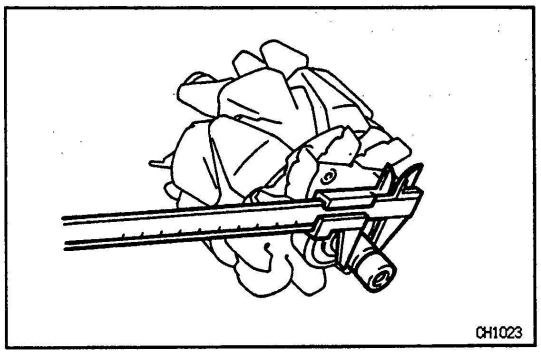
If there is no continuity, replace the rotor.



2. INSPECT ROTOR FOR GROUND

Using an ohmmeter, check that there is no continuity between the slip ring and rotor.

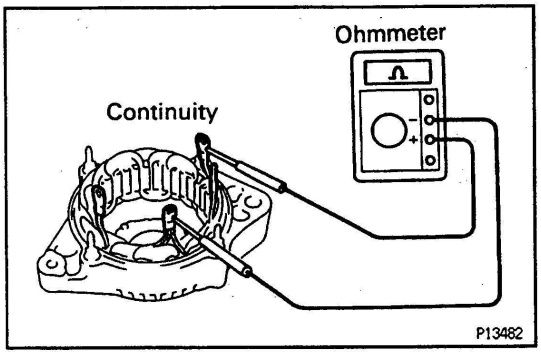
If there is continuity, replace the rotor.



3. INSPECT SLIP RINGS

(a) Check that the slip rings are not rough or scored.
If rough or scored, replace the rotor.

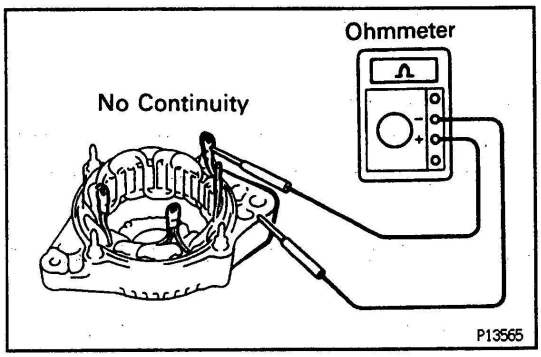
(b) Using a vernier caliper, measure the slip ring diameter.
Standard diameter:
14.2 – 14.4 mm (0.559 – 0.567 in.)
Minimum diameter:
12.8 mm (0.504 in.)
If the diameter is less than minimum, replace the rotor.



Stator (Drive End Frame)

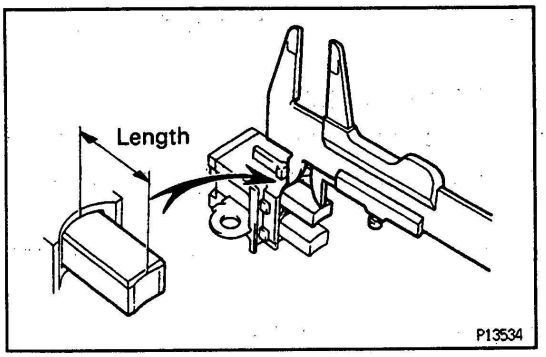
1. INSPECT STATOR FOR OPEN CIRCUIT

Using an ohmmeter, check that there is continuity between the coil leads.
If there is no continuity, replace the drive end frame assembly.



2. INSPECT STATOR FOR GROUND

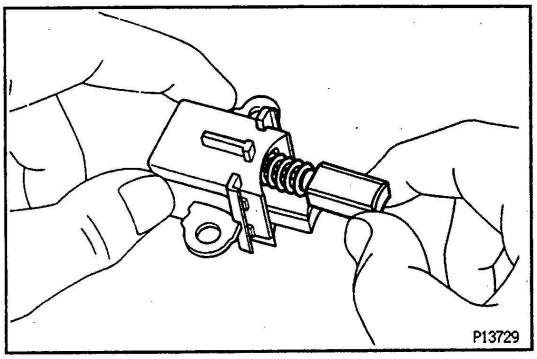
Using an ohmmeter, check that there is no continuity between the coil lead and drive end frame.
If there is continuity, replace the drive end frame assembly.



Brushes

1. INSPECT EXPOSED BRUSH LENGTH

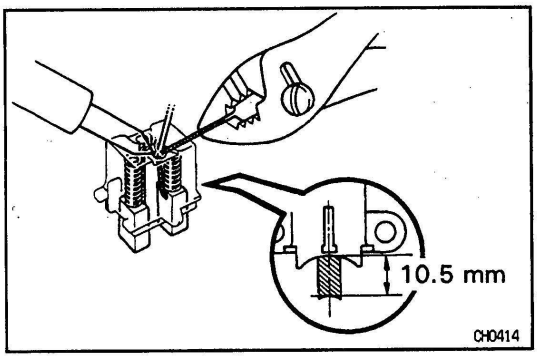
Using vernier calipers, measure the exposed brush length.
Standard exposed length:
10.5 mm (0.413 in.)
Minimum exposed length:
1.5 mm (0.059 in.)
If the exposed length is less than minimum, replace the brushes.



2. IF NECESSARY, REPLACE BRUSHES

(a) Unsolder and remove the brush and spring.

(b) Run the wire of a new brush through the spring and the hole in the brush holder, and insert the spring and brush into the brush holder.



(c) Solder the brush wire to the brush holder at specified exposed length.

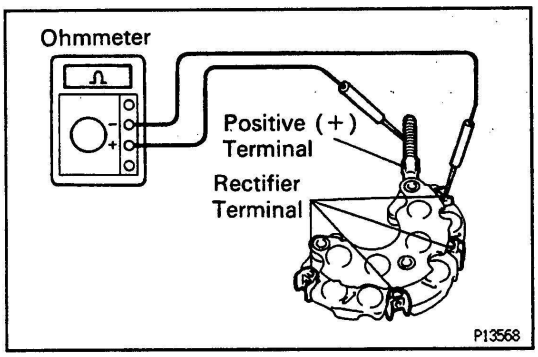
Exposed length:

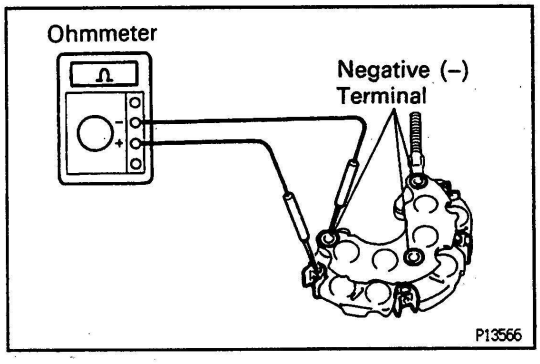
10.5 mm (0.413 in.)

(d) Check that the brush moves smoothly in the brush holder.

(e) Cut off the excess wire.

(f) Apply insulation paint to the soldered area.





Rectifiers (Rectifier Holder)

1. INSPECT POSITIVE RECTIFIER

(a) Using an ohmmeter, connect one tester probe to the positive (+) terminal and the other to each rectifier terminal.

(b) Reverse the polarity of the tester probes and repeat step (a).

(c) Check that one shows continuity and the other shows no continuity.

If continuity is not as specified, replace the rectifier holder.

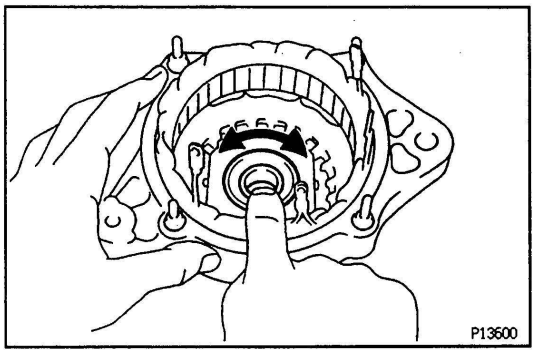
2. INSPECT NEGATIVE RECTIFIER

(a) Using an ohmmeter, connect one tester probe to each negative (–) terminal and the other to each rectifier terminal.

(b) Reverse the polarity of the tester probes and repeat step (a).

(c) Check that one shows continuity and the other shows no continuity.

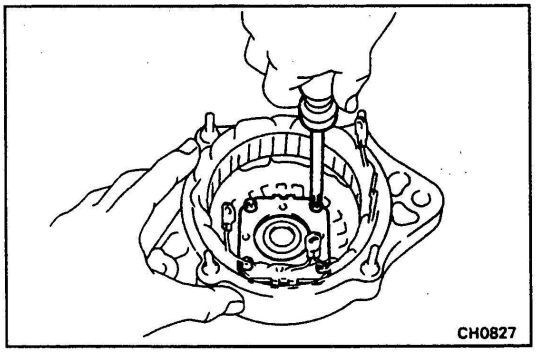
If continuity is not as specified, replace the rectifier holder.



Bearings

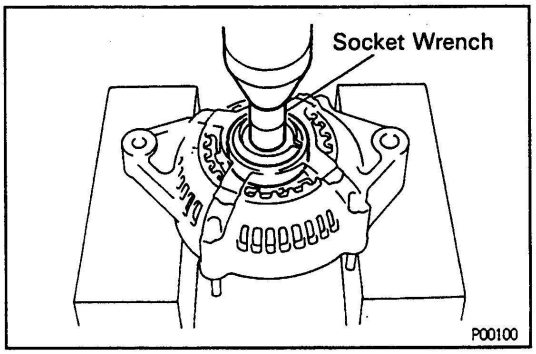
1. INSPECT FRONT BEARING

Check that the bearing is not rough or worn.

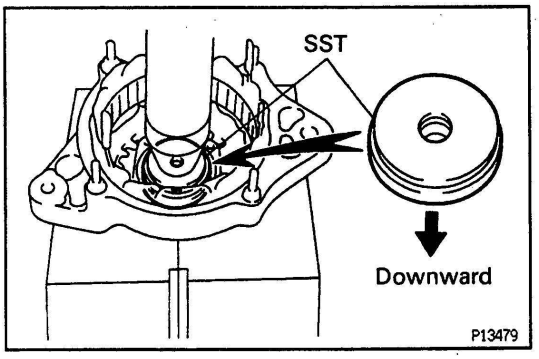


2. IF NECESSARY, REPLACE FRONT BEARING

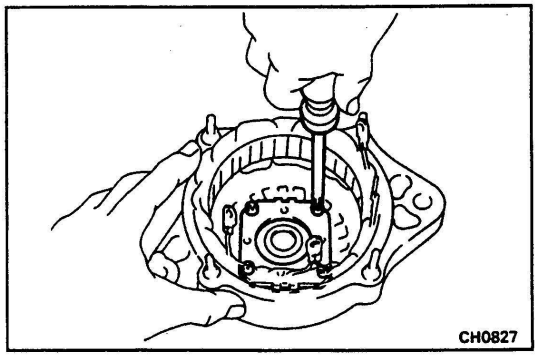
(a) Remove the 4 screws, bearing retainer and bearing.



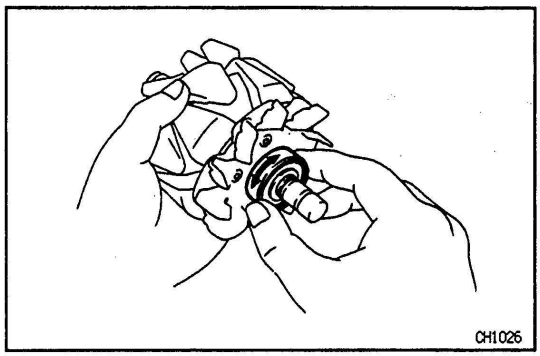
(b) Using a socket wrench and press, press out the bearing.



(c) Using SST and a press, press in a new bearing.
SST 09608–20012 (09608–00030)

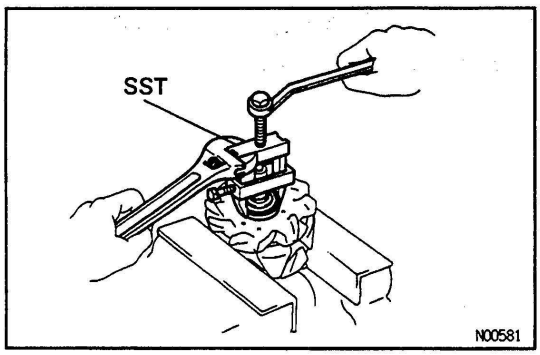


(d) Install the bearing retainer with the 4 screws.
Torque: 2.6 N·m (27 kgf·cm, 23 in.·lbf)



3. INSPECT REAR BEARING

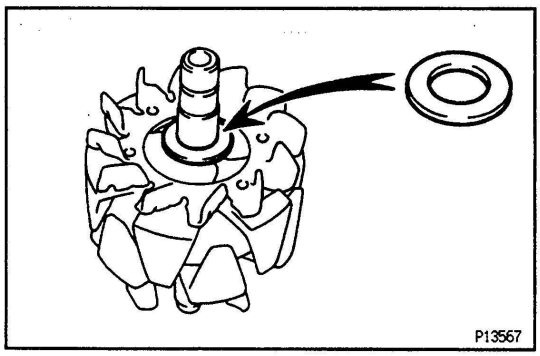
Check that the bearing is not rough or worn.



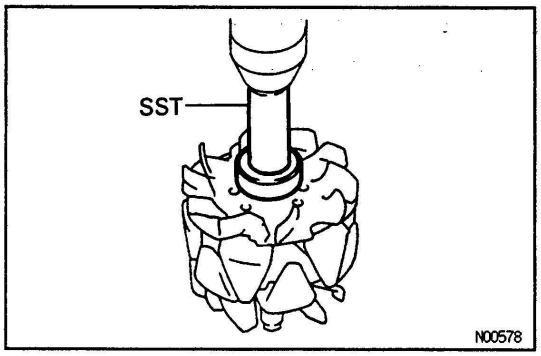
4. IF NECESSARY, REPLACE REAR BEARING

(a) Using SST, remove the bearing cover (outside) and bearing.
SST 09820–00021
NOTICE: Be careful not to damage the fan.

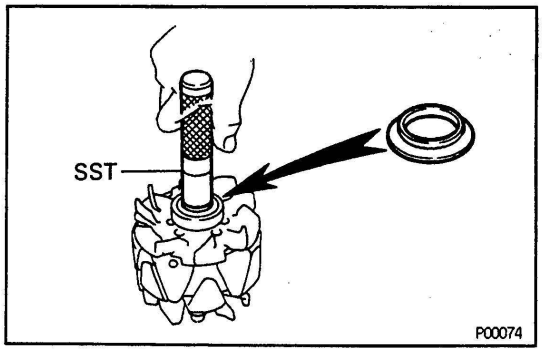
(b) Remove the bearing cover (inside).



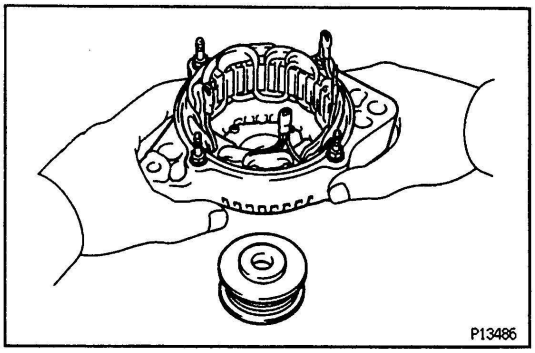
(c) Place the bearing cover (inside) on the rotor.



(d) Using SST and a press, press in a new bearing.
SST 09820–00030



(e) Using SST, push in the bearing cover (outside).
SST 09285–76010

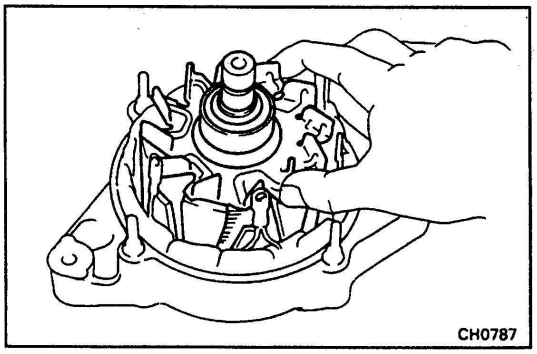


CH06E-02

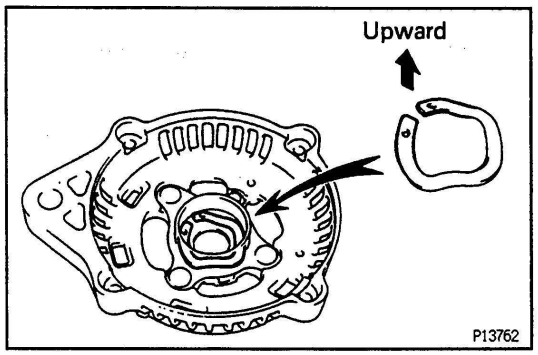
ALTERNATOR ASSEMBLY

(See Components for Disassembly and Assembly)

1. PLACE RECTIFIER END FRAME ON PULLEY



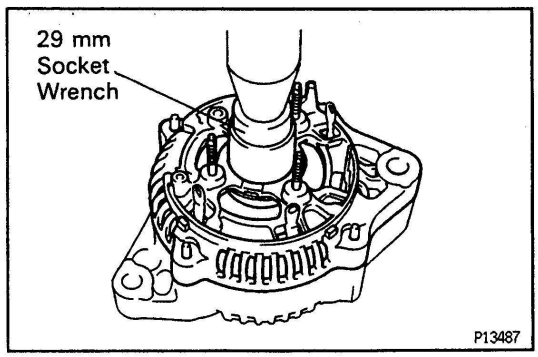
2. INSTALL ROTOR TO DRIVE END FRAME



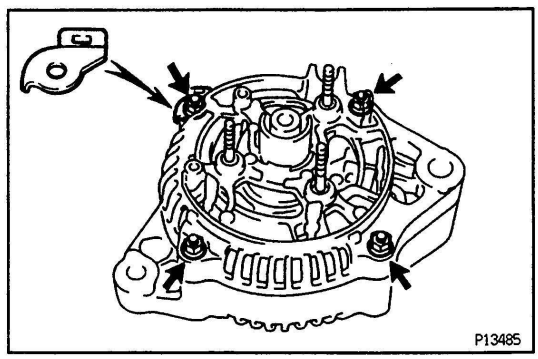
3. INSTALL RECTIFIER END FRAME

(a) Insert the alternator washer into the rectifier end frame.

NOTICE: Be careful of the alternator washer installation direction.

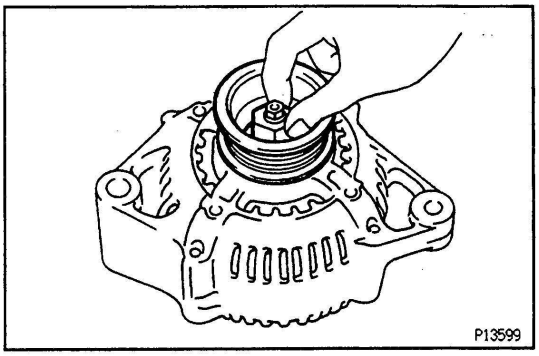


(b) Using a 29 mm socket wrench and press, slowly press in the rectifier end frame.



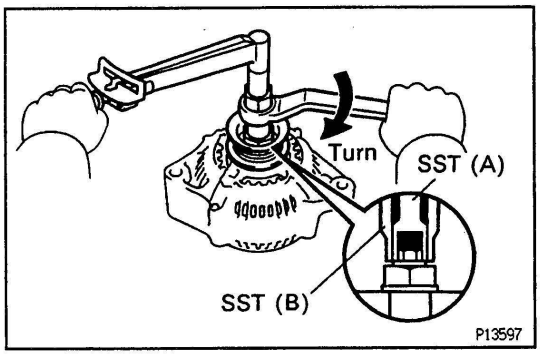
(c) Install the wire clip and 4 nuts.

Torque: 4.5 N·m (46 kgf·cm, 40 in.·lbf)



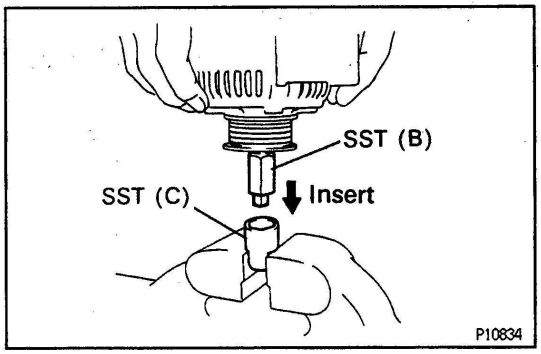
4. INSTALL PULLEY

(a) Install the pulley to the rotor shaft by tightening the pulley nut by hand.



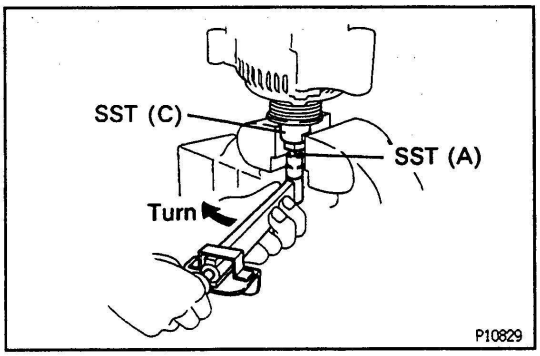
(b) Hold SST (A) with a torque wrench, and tighten SST (B) clockwise to the specified torque.
SST 09820–63010
Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)

(c) Check that SST (A) is secured to the pulley shaft.



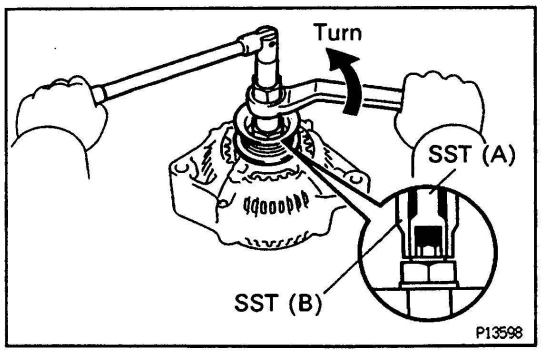
(d) Mount SST (C) in a vise.

(e) Insert SST (B) into SST (C), and attach the pulley nut to SST (C).

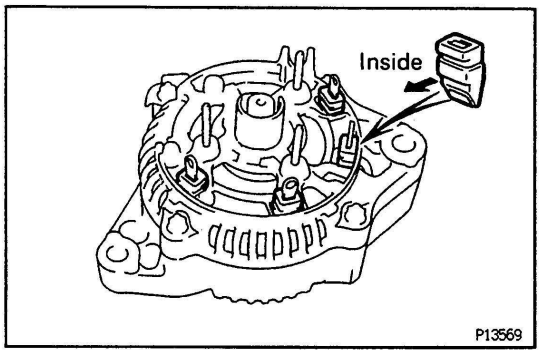


(f) To torque the pulley nut, turn SST (A) in the direction shown in the illustration.
Torque: 110 N·m (1,125 kgf·cm, 81 ft·lbf)

(g) Remove the alternator from SST (C).

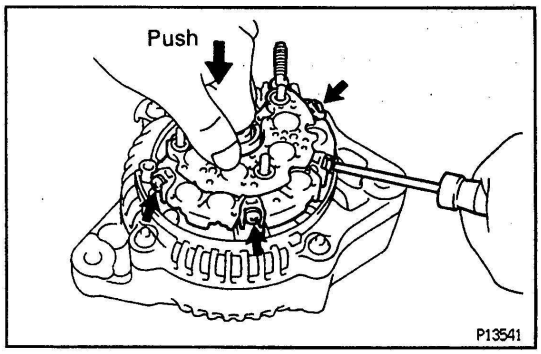


(h) Turn SST (B), and remove SST (A and B).



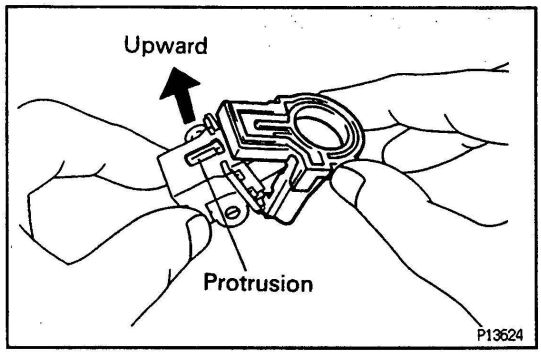
5. INSTALL RECTIFIER HOLDER

(a) Install the 4 rubber insulators on the lead wires.
NOTICE: Be careful of the rubber insulators installation direction.



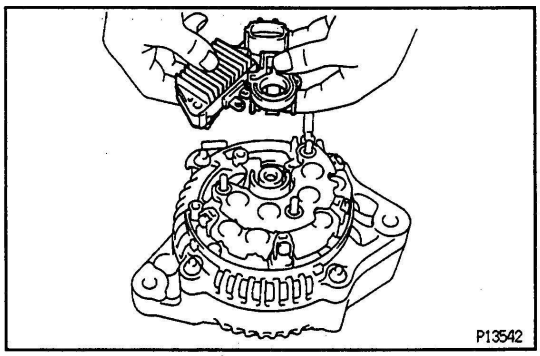
(b) Install the rectifier holder while pushing it with the 4 screws.
Torque: 2.0 N·m (20 kgf·cm, 17 in.·lbf)

CH

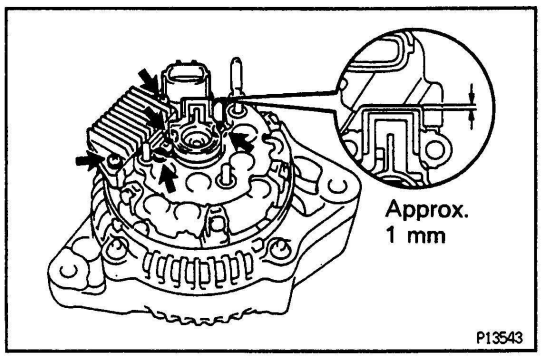


6. INSTALL IC REGULATOR AND BRUSH HOLDER

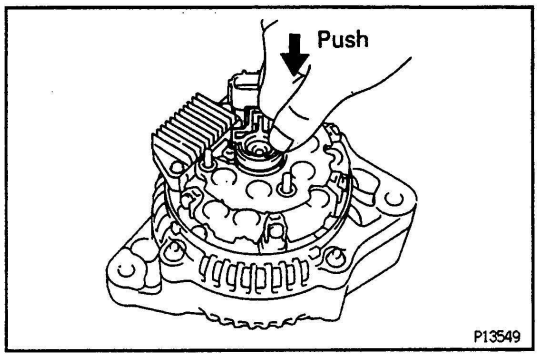
(a) Install the brush holder cover to the brush holder.
NOTICE: Be careful of the holder installation direction.



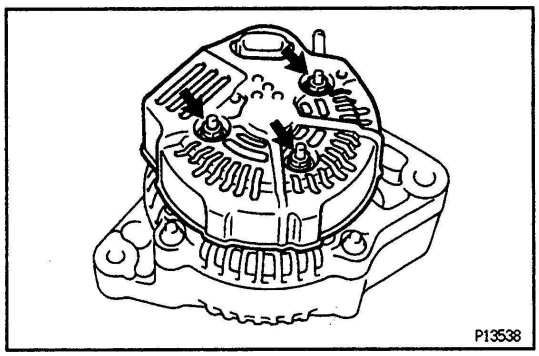
(b) Place the IC regulator together with the brush holder horizontally on the rectifier end frame.



(c) Install the 5 screws until there is a clearance of approx. 1 mm (0.04 in.) between the brush holder and IC regulator.

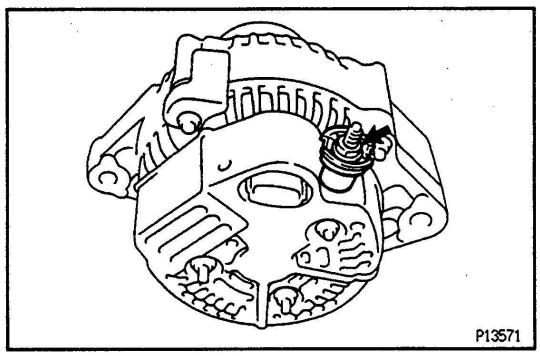


(d) Fit the brush holder cover.

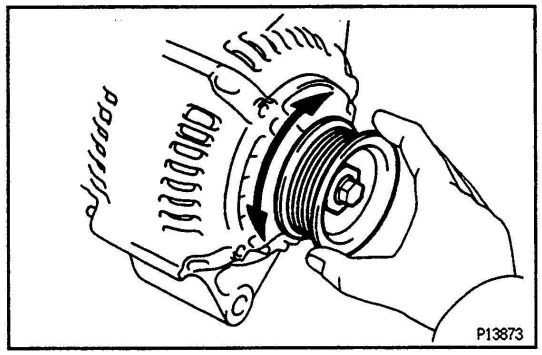


7. INSTALL REAR END COVER

(a) Install the end cover with the 3 nuts.
Torque: 4.5 N·m (46 kgf·cm, 40 in.·lbf)



(b) Install the terminal insulator with the nut.
Torque: 4.1 N·m (42 kgf·cm, 36 in.·lbf)

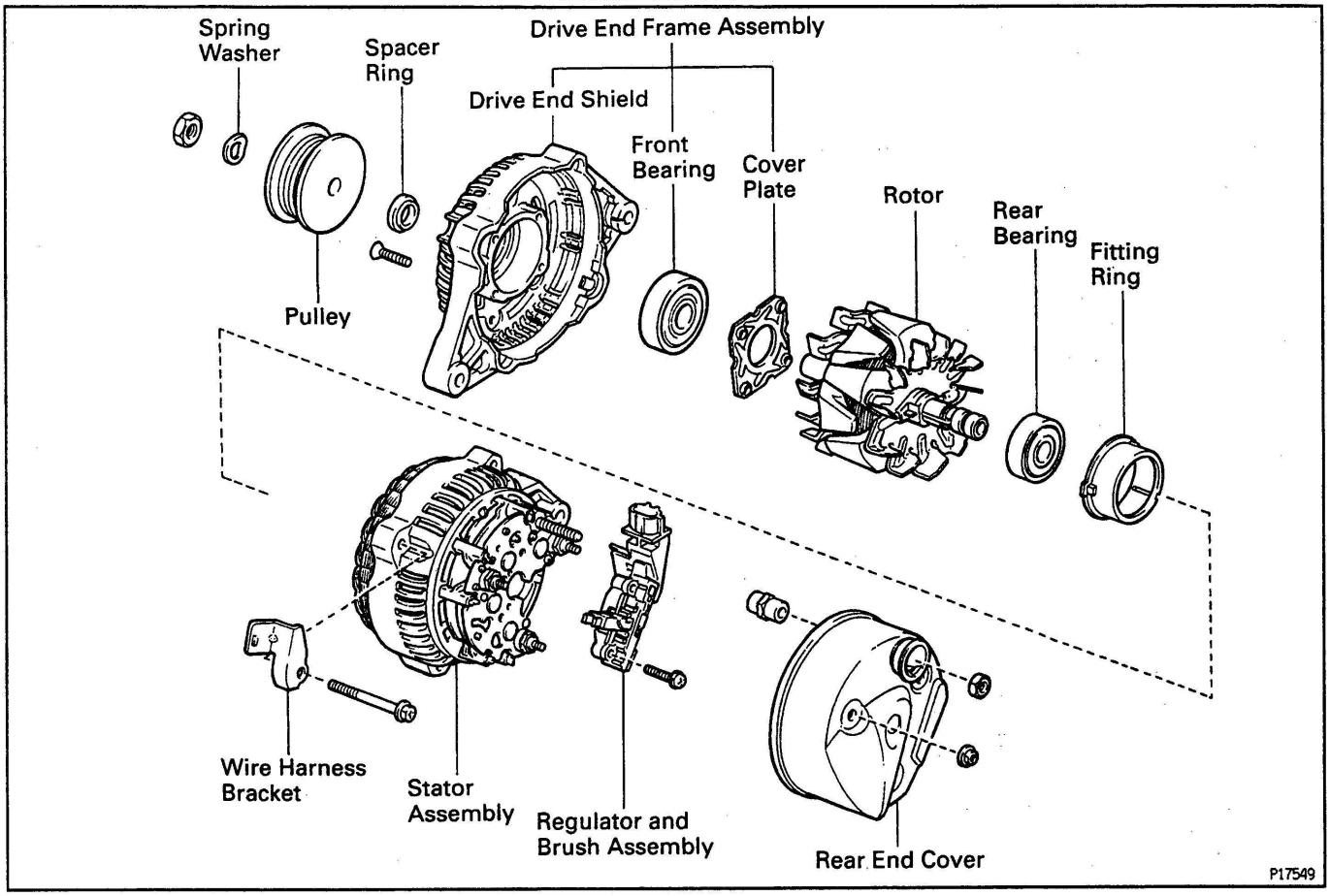


8. CHECK THAT ROTOR ROTATES SMOOTHLY

ALTERNATOR (ST191/BOSCH)

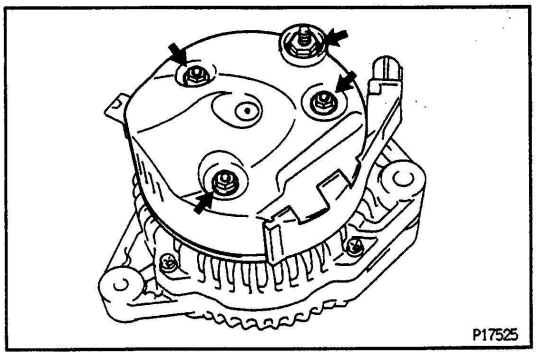
COMPONENTS FOR DISASSEMBLY AND ASSEMBLY

CH010-0N



CH070-01

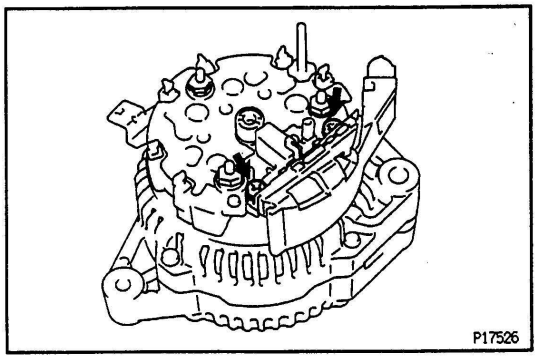
ALTERNATOR DISASSEMBLY



(See Components for Disassembly and Assembly)

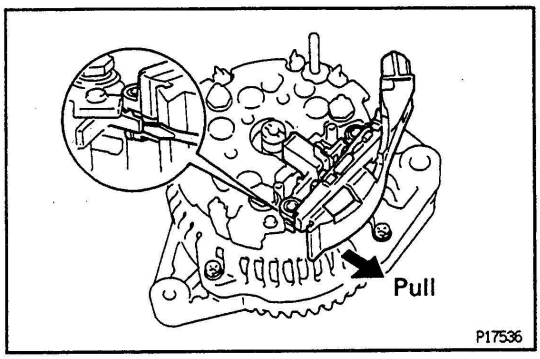
1. REMOVE REAR END COVER

Remove the 4 nuts and rear end cover.

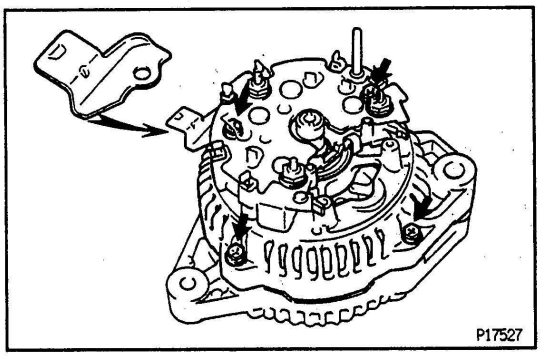


2. REMOVE REGULATOR AND BRUSH ASSEMBLY

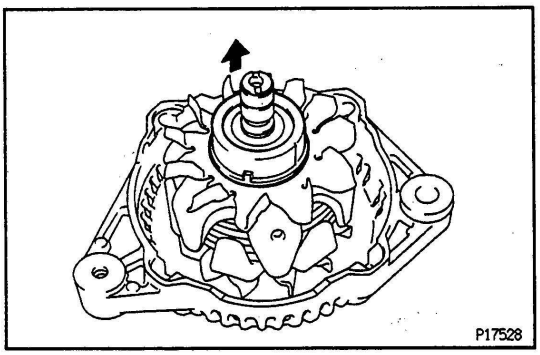
(a) Remove the 2 screws.



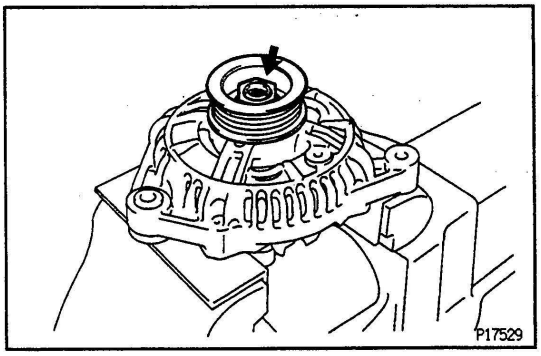
(b) Using a screwdriver, pry the regulator assembly away from the stator assembly as shown.
NOTICE: Pull the regulator assembly away only in the direction shown.



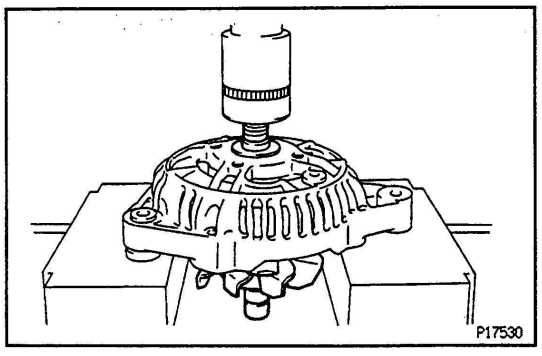
3. REMOVE STATOR ASSEMBLY
Remove the 4 bolts, wire harness bracket and stator assembly.



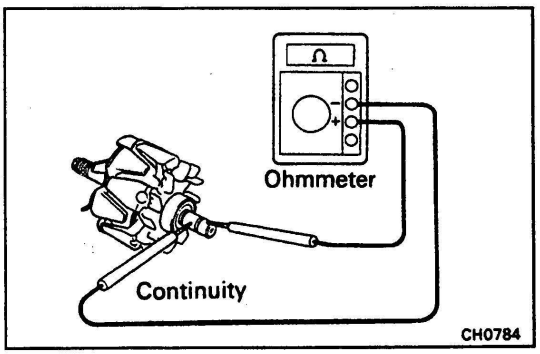
4. REMOVE FITTING RING



5. REMOVE PULLEY
(a) Mount the rotor in a soft jaw vise.
(b) Remove the nut, spring washer and pulley.



6. REMOVE ROTOR
(a) Using a press, press out the rotor.
(b) Remove the spacer ring.



ALTERNATOR INSPECTION AND REPAIR CH071-01

Rotor

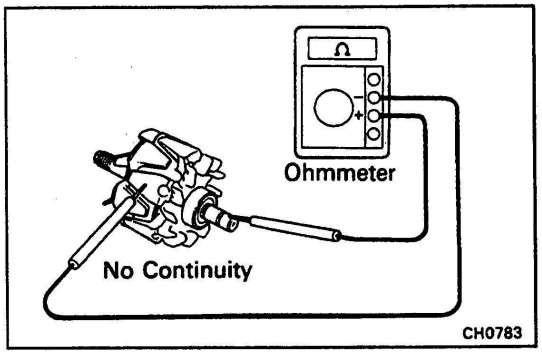
1. INSPECT ROTOR FOR OPEN CIRCUIT

Using an ohmmeter, check that there is continuity between the slip rings.

Standard resistance:

2.3 – 2.9 Ω at 20°C (68°F)

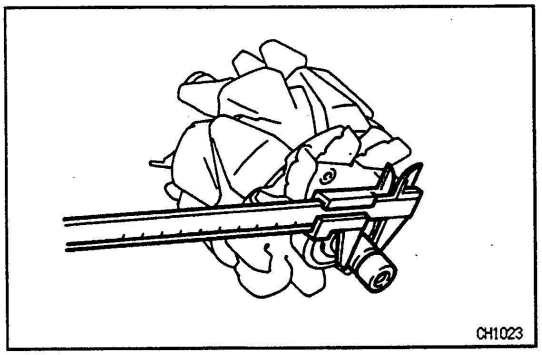
If there is no continuity, replace the rotor.



2. INSPECT ROTOR FOR GROUND

Using an ohmmeter, check that there is no continuity between the slip ring and rotor.

If there is continuity, replace the rotor.



3. INSPECT SLIP RINGS

(a) Check that the slip rings are not rough or scored.

If rough or scored, replace the rotor.

(b) Using a vernier caliper, measure the slip ring diameter.

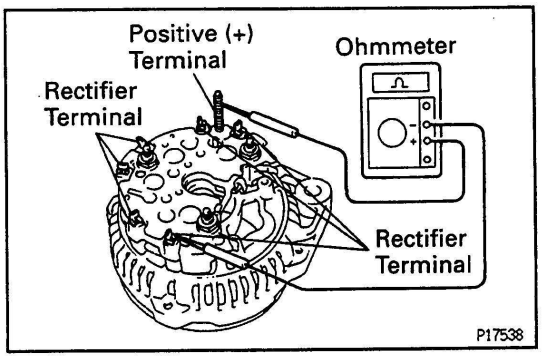
Standard diameter:

12.0 mm (0.472 in.)

Minimum diameter:

10.5 mm (0.413 in.)

If the diameter is less than minimum, replace the rotor.



Stator Assembly

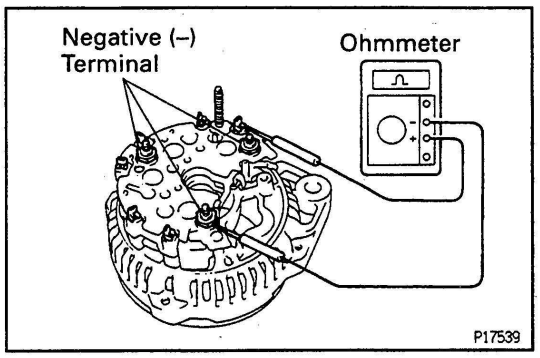
1. INSPECT POSITIVE RECTIFIER

(a) Using an ohmmeter, connect one tester probe to the positive (+) terminal and the other to each rectifier terminal.

(b) Reverse the polarity of the tester probes and repeat step (a).

(c) Check that one shows continuity and the other shows no continuity.

If continuity is not as specified, replace the stator assembly.



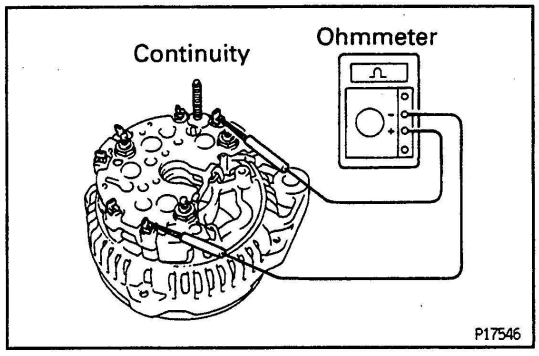
2. INSPECT NEGATIVE RECTIFIER

(a) Using an ohmmeter, connect one tester probe to each negative (–) terminal and the other to each rectifier terminal.

(b) Reverse the polarity of the tester probes and repeat step (a).

(c) Check that one shows continuity and the other shows no continuity.

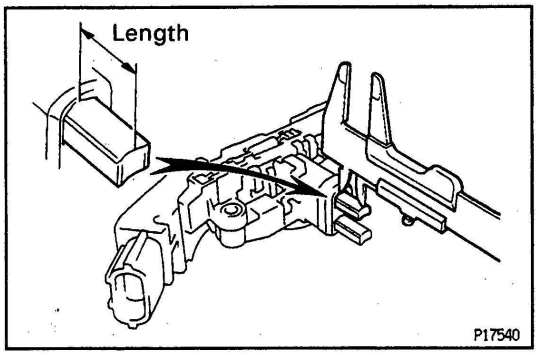
If continuity is not as specified, replace the stator assembly.



3. INSPECT STATOR FOR OPEN CIRCUIT

Using an ohmmeter, check that there is continuity between the rectifier terminals.

If there is no continuity, replace the stator assembly.



Brushes

INSPECT EXPOSED BRUSH LENGTH

Using vernier calipers, measure the exposed brush length.

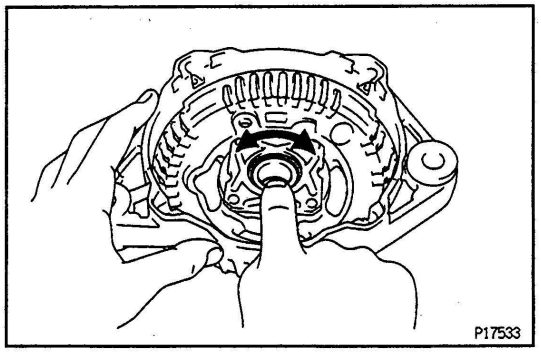
Standard exposed length:

10.0 – 11.0 mm (0.394 – 0.433 in.)

Minimum exposed length:

5.0 mm (0.197 in.)

If the exposed length is less than minimum, replace the regulator and brush assembly.

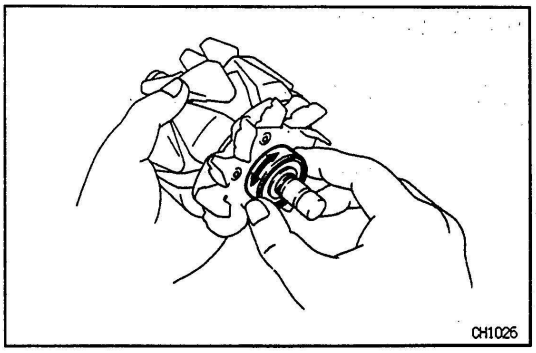


Bearings

1. INSPECT FRONT BEARING

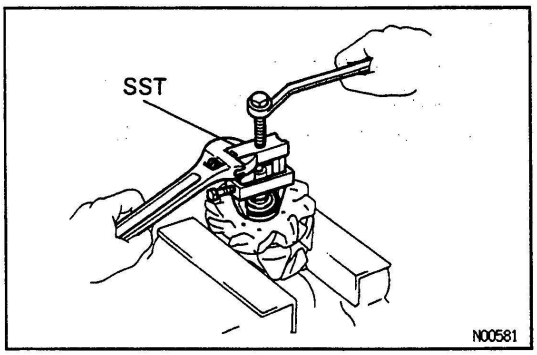
Check that the bearing is not rough or worn.

If necessary, replace the drive end frame assembly.



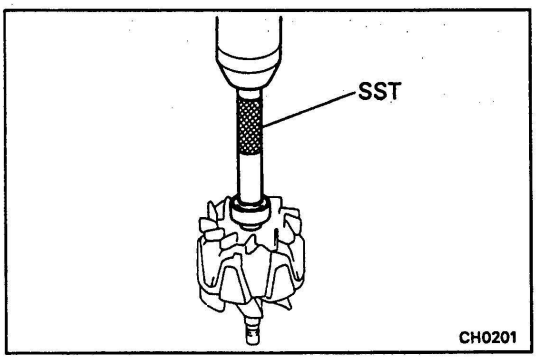
2. INSPECT REAR BEARING

Check that the bearing is not rough or worn.



3. IF NECESSARY, REPLACE REAR BEARING

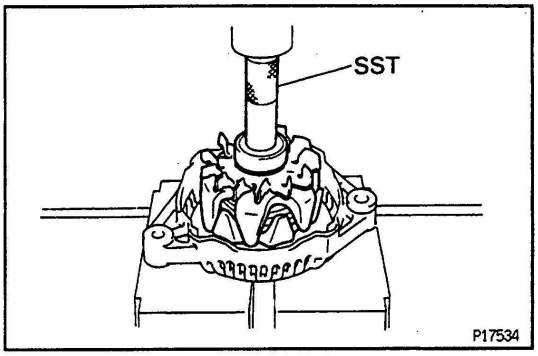
(a) Using SST, remove the bearing.
SST 09820–00021
NOTICE: Be careful not to damage the fan.



(b) Using SST and a press, press in a new bearing.
SST 09285–76010

CH072–02

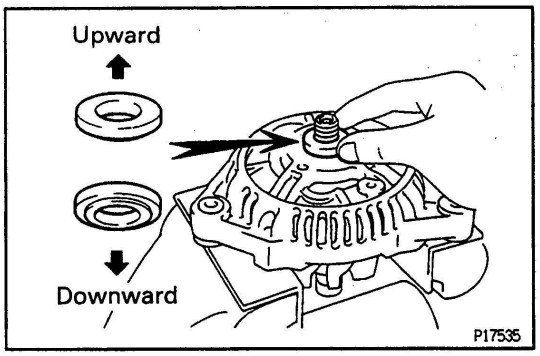
ALTERNATOR ASSEMBLY



(See Components for Disassembly and Assembly)

1. INSTALL ROTOR

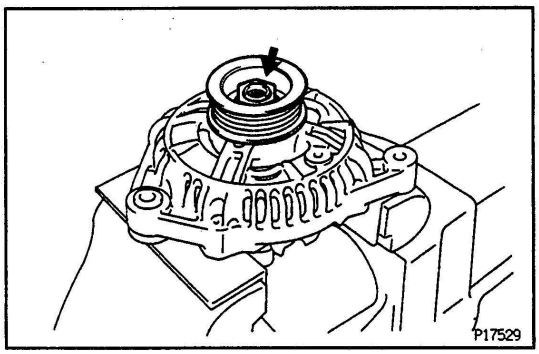
Using SST and a press, press in the rotor.
SST 09285–76010



2. INSTALL PULLEY

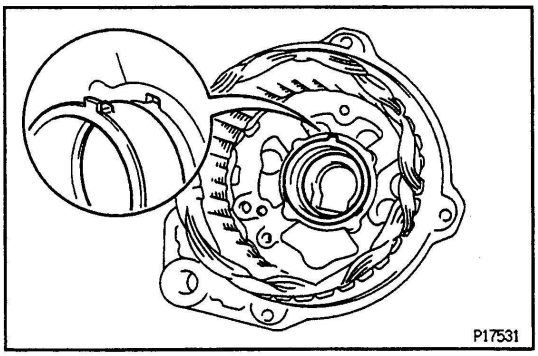
(a) Mount the rotor in a soft jaw vise.

(b) Slide the spacer ring onto the rotor shaft.
NOTICE: Be careful of the spacer ring installation direction.



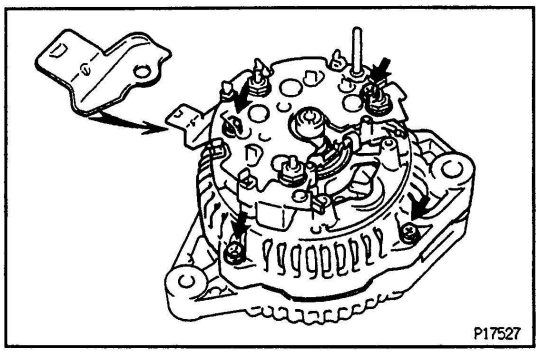
(c) Slide the pulley, spring washer onto the rotor shaft.

(d) Install and torque the nut.
Torque: 65 N·m (663 kgf·cm, 48 ft·lbf)



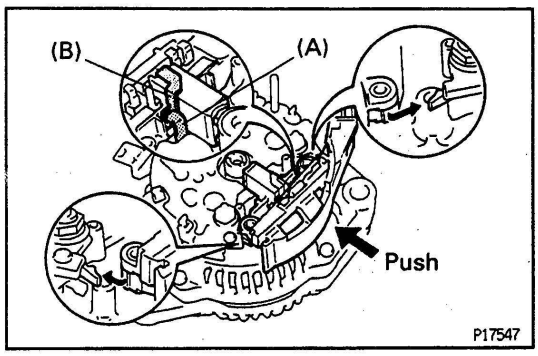
3. INSTALL FITTING RING

Align the protrusion of the fitting ring with the housing groove of the stator assembly, and install the fitting ring.



4. INSTALL STATOR ASSEMBLY

Install the stator assembly and wire harness bracket with the 4 bolts.
Torque: 5.0 N·m (51 kgf·cm, 44 in.·lbf)



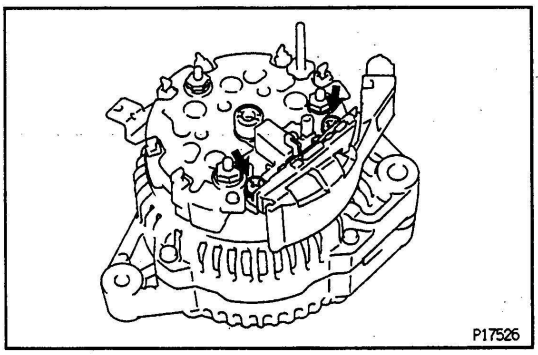
5. INSTALL REGULATOR AND BRUSH ASSEMBLY

(a) Ensure that the 2 claws of the stator assembly have been engaged by the brush assembly shoulders and that the brushes are contacting the shaft.

(b) Install the brush assembly to the stator assembly.

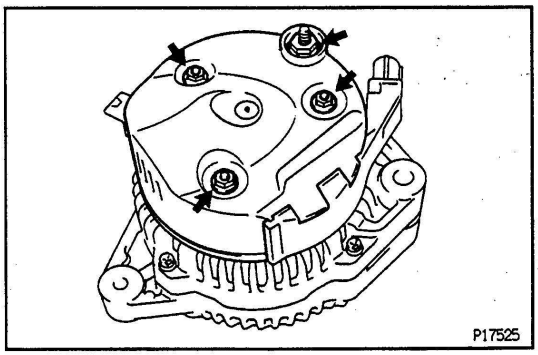
(c) Ensure that terminals (A) and (B) are contacting each other.

NOTICE: Never attempt to install the brush assembly from any other direction than that shown.



(d) Install the 2 screws.

Torque: 2.0 N·m (20 kgf·cm, 18 in.·lbf)

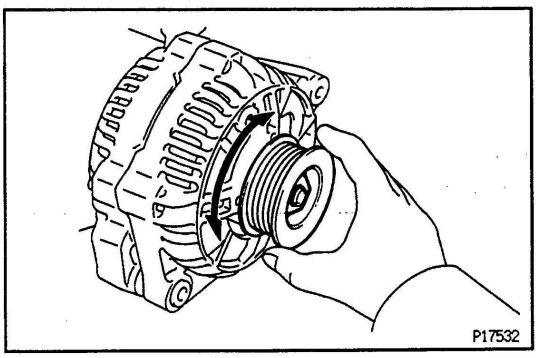


6. INSTALL REAR END COVER

(a) Install the rear end cover with the 3 nuts.

Torque: 4.5 N·m (46 kgf·cm, 40 in.·lbf)

(b) Install the nut to the terminal B.



7. CHECK THAT ROTOR ROTATES SMOOTHLY

SERVICE SPECIFICATIONS

SERVICE DATA

CH01A-0D

Battery	Specific gravity	at 20°C (68°F)	1.25 — 1.27
Drive belt	Deflection	w/ 98 N (10 kgf, 22.0 lbf)	
		w/ A/C New belt	6 — 7 mm (0.24 — 0.35 in.)
		Used belt	9 — 11 mm (0.35 — 0.43 in.)
		w/o A/C New belt	11 — 15 mm (0.43 — 0.59 in.)
		Used belt	13 — 17 mm (0.51 — 0.67 in.)
	Tension (Reference)	w/ A/C New belt	686 — 785 N (70 — 80 kgf)
		Used belt	441 — 539 N (45 — 55 kgf)
		w/o A/C New belt	686 — 785 N (70 — 80 kgf)
		Used belt	196 — 343 N (20 — 35 kgf)
Alternator	NIPPONDENSO:		
	Rated output (ST202)	M/T	12 V 70 A
		A/T	12 V 80 A
	Rated output (ST191)		12 V 70 A
	Rotor coil resistance		2.8 — 3.0 Ω
	Slip ring diameter	STD	14.2 — 14.4 mm (0.559 — 0.567 in.)
		Limit	12.8 mm (0.504 in.)
	Brush exposed length	STD	10.5 mm (0.413 in.)
		Limit	1.5 mm (0.059 in.)
	BOSCH:		
	Rated output		12 V 70 A
	Rotor coil resistance		2.3 — 2.9 Ω
	Slip ring diameter	STD	12.0 mm (0.472 in.)
		Limit	10.5 mm (0.413 in.)
	Brush exposed length	STD	10.0 — 11.0 mm (0.394 — 0.433 in.)
		Limit	5.0 mm (0.197 in.)
Alternator regulator	NIPPONDENSO:		
	Regulating voltage	at 25 °C (77°F)	13.9 — 15.1 V
		at 115°C (239°F)	13.5 — 14.3 V
	BOSCH:		
	Regulating voltage	at 25 °C (77°F)	14.3 — 14.7 V
		at 130°C (266°F)	13.6 — 14.4 V

TORQUE SPECIFICATIONS (NIPPONDENSO)

CH01C–0E

Part tightened		N·m	kgf·cm	ft·lbf
Bearing cover x Drive end frame		2.6	27	23 in.·lbf
Rectifier end frame x Drive end frame		4.5	46	40 in.·lbf
Alternator pulley x Rotor		110	1,125	81
Rectifier holder x Coil lead on rectifier end frame (ST202)	M/T	2.0	20	17 in.·lbf
	A/T	3.1	32	27 in.·lbf
Rectifier holder x Coil lead on rectifier end frame (ST191)		2.0	20	17 in.·lbf
Rear end cover x Rectifier holder		4.5	46	40 in.·lbf
Plate terminal x Rectifier holder (ST202 A/T only)	Nut	4.5	46	40 in.·lbf
	Bolt	3.9	40	35 in.·lbf
Terminal insulator x Rectifier holder		4.1	42	36 in.·lbf

CH

TORQUE SPECIFICATIONS (BOSCH)

CH01C–0G

Part tightened	N·m	kgf·cm	ft·lbf
Alternator pulley x Rotor	65	663	48
Stator assembly x Drive end shield	5.0	51	44 in.·lbf
Regulator and Brush Assembly x Stator Assembly	2.0	20	18 in.·lbf
Rear end cover x Stator assembly	4.5	46	40 in.·lbf

–MEMO–