SERVICE MANUAL

MODEL
L20A, L24 SERIES
ENGINE

NISSAN

NISSAN MOTOR CO., LTD.
TOKYO, JAPAN

SECTION EE

ENGINE ELECTRICAL SYSTEM

EE

STARTING CIRCUIT

The electrical system is a 12 Volt system. This section is subdivided into the following subsections for electrical parts which are required for engine operation.

1. Starting motor 2. Alternator 3. Regulator 4. Ignition coil 5. Spark plugs

Information for body electrical system, such as the lighting circuit, instrument, windshield wipers, etc. are described in section BE.

STARTING MOTOR

CONTENTS

DESCRIPTION

The starting system permits the engine being cranked by setting the ignition switch to "start" While the ignition switch is set to "start", the starting motor continues operation until the engine starts running by its own power. Current to the starting motor is interrupted and the motor is disengaged by setting the ignition switch to "ON". This starting motor is a compound motor, and is equipped with an enclosed over-running clutch. The solenoid switch is built in the yoke.

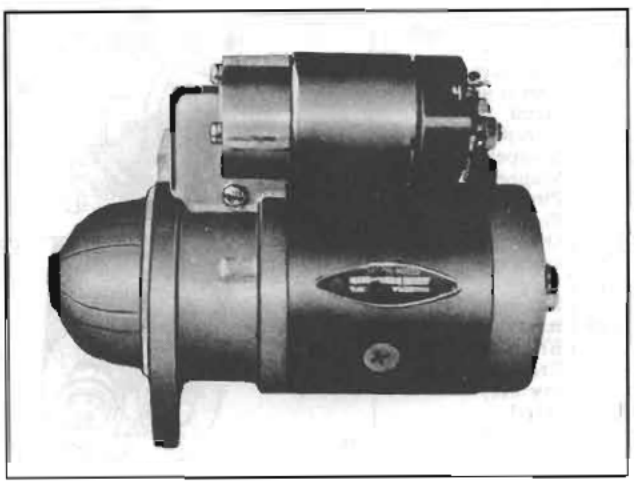

Fig. EE-1 External view

REMOVAL

1. Disconnect the battery ground cable.

Disconnect the black wire with yellow tracer from the magnetic switch terminal, and black battery cable from the battery terminal.

2. Remove two bolts used to secure the starting motor on the clutch housing. Pull the starter assembly forward and remove the starting motor.

DISASSEMBLY

1. Loosen the nut used to secure the connecting plate to the magnetic switch "M" terminal. Remove three screws used to secure the magnetic switch, and remove the magnetic switch assembly.

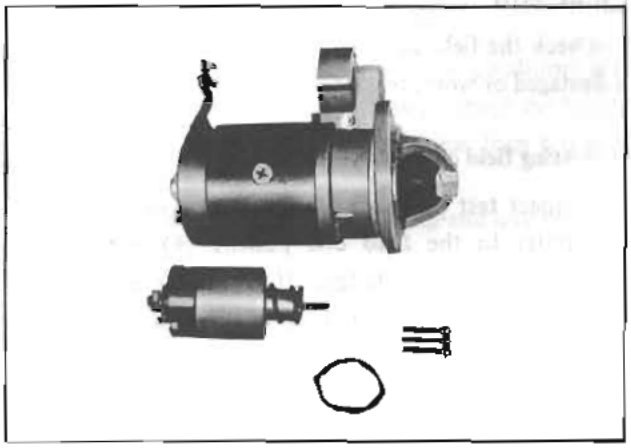

Fig. EE-4 Removing magnetic switch assembly

2. Remove two through bolts and brush cover assembly.

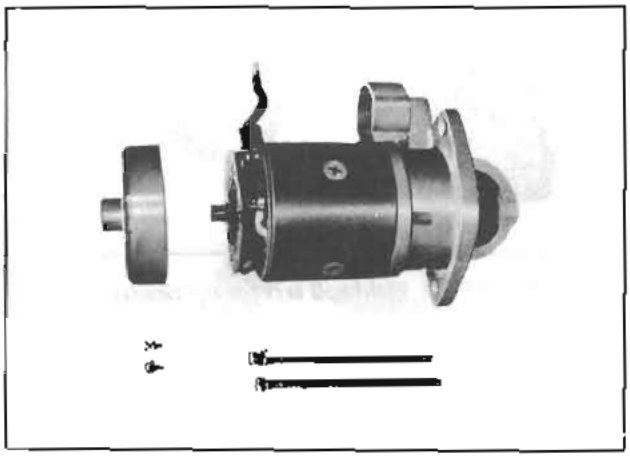

Fig. EE-5 Removing the brush cover

3. Remove the yoke assembly by lightly tapping with a wooden mallet.

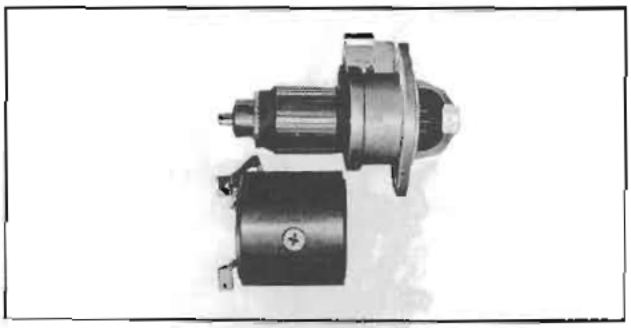

Fig. EE-6 Removing the yoke assembly

4. Withdraw the armature assembly and shift lever.

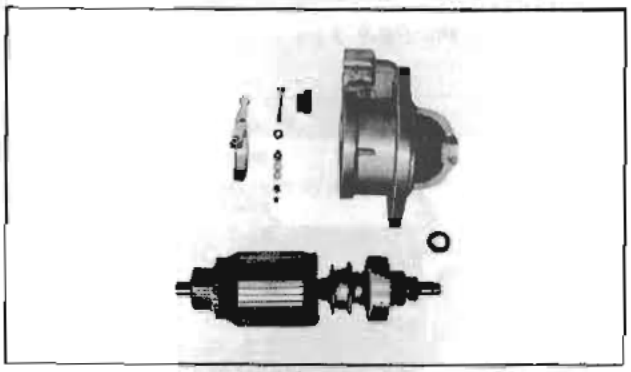

Fig. EE-7 Removing the armature assembly and shift lever

5. Remove the pinion stop ring from the armature shaft end. To remove the stop ring, first, push the stop ring to the clutch side and after removing the snap ring, remove the the stop ring together with the over-running clutch. Withdraw the over-running clutch assembly from the aramture shaft.

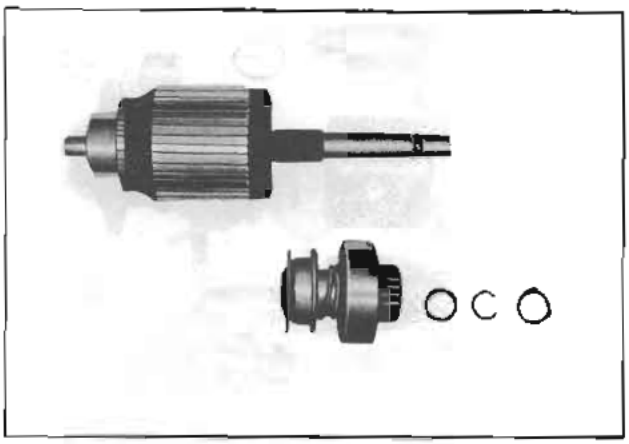

Fig. EE-8 Removal of the over-running clutch assembly

6. Unsolder the brushes with a soldering-iron and remove the brushes.

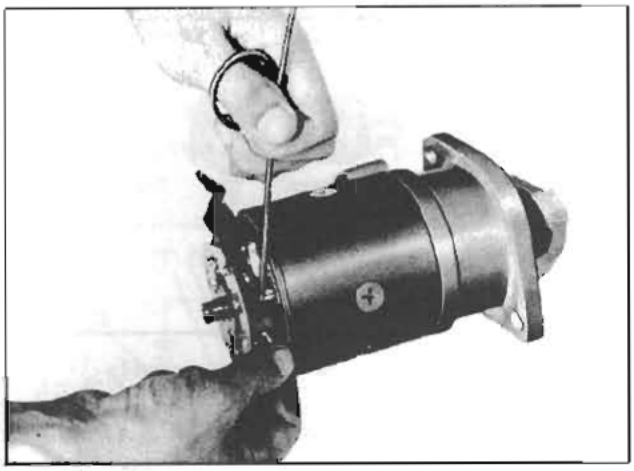

Fig. EE-9 Removing brush

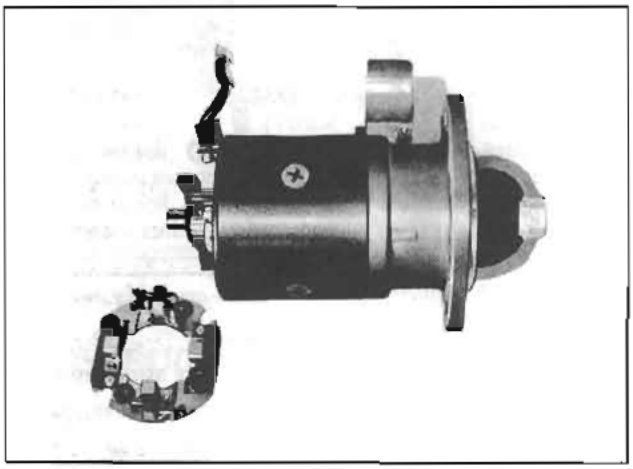

Fig. EE-10 Removing brush holder

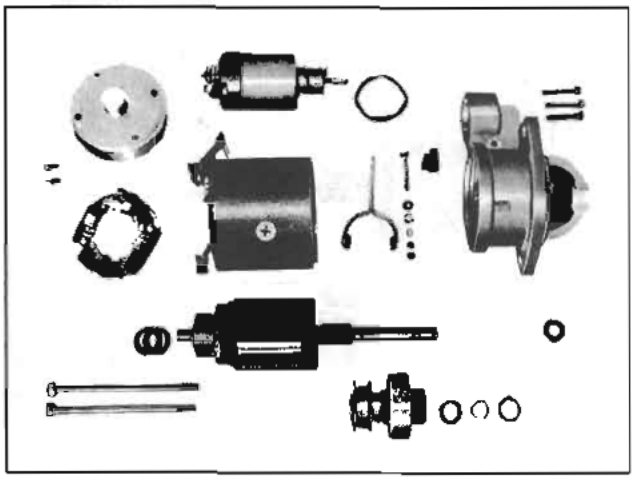

Fig. EE-11 Disassembly

CLEANING AND INSPECTION

Clean all disassembled parts. Be careful not to use grease dissolving solvent for cleaning of the over-running clutch, armature assembly, magnetic switch assembly and field coils since solvent dissolves grease packed in the clutch mechanism and damages the coils or other insulators.

Check them for damage or excessive wear. Replace them as required.

Terminal

Check the terminal for damage and wear, and replace if necessary.

Field coil

Check the field coil for insulation. If the coil insulator is damaged or worn, replace.

Testing field coil for continuity:

Connect test probe of a circuit tester or a resistance counter to the field coil positive (+) terminal and positive (+) brush holder. If the tester indicates no continuity, the field circuit or coil is open.

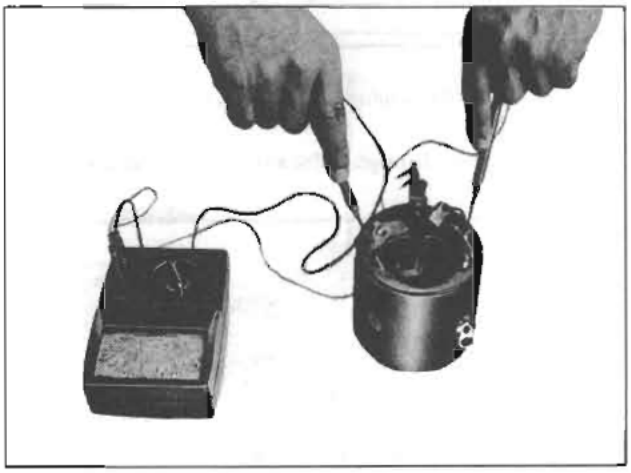

Fig. EE-12 Field coil test for continuity

Testing field coil for ground:

Place one probe of a circuit tester onto the yoke and the other on to the field coil positive (+) terminal. If resistance is read, the field coils are grounded.

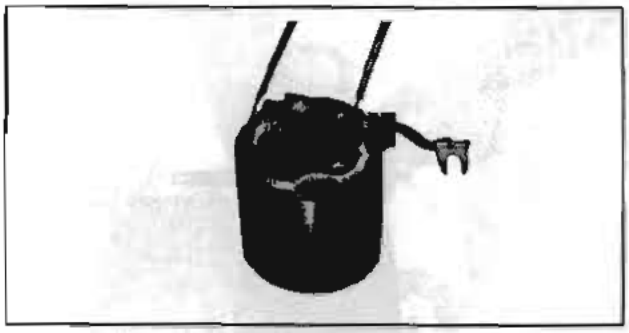

Fig. EE-13 Field coils test for ground

Field coil test for short-circuit

Unsolder the connected section of each coil and check the circuit with a tester in the same manner as described above.

When the coil is defective, replace the coil.

Brushes and brush lead wire

Check the brush contact for surface condition and wear. When the brush contact is loose, replace the brush.

If the brush is worn and height is less than 6.0 mm (0.2362 in), replace it.

Check the connection of the lead clip and lead wire for conditions.

Check brush holders and spring clip to ensure that they are not deformed or bent and properly hold brushes against the commutator.

If the brushes or brush holders are dirty, clean.

Brush spring tension

Measure the brush spring tension by the use of a spring scale as shown in Figure EE-14. The reading should be 0.8 kg (1.76 lb). Replace the spring if the tension is lower than 0.7 kg (1.54 lb).

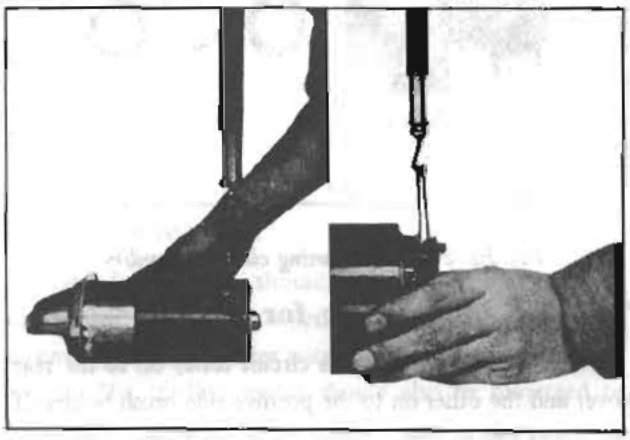

Fig. EE-14 Inspection of brush spring tension

Armature assembly

Check external appearance of the armature and the commutator.

1. Measure the armature shaft for bend by the use a dial gauge. Replace the armature shaft if the bend exceeds 0.08 mm (0.0031 in).

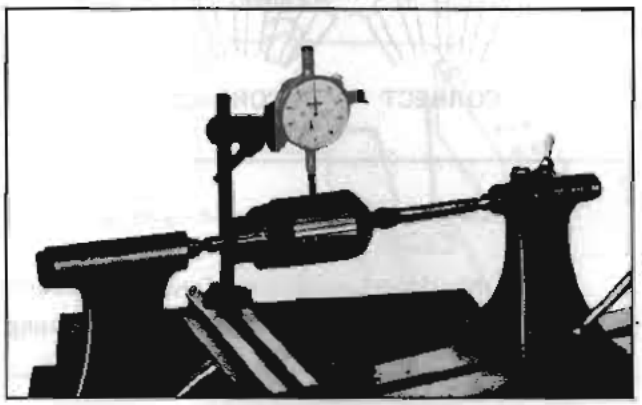

Fig. EE-15 Inspection of armature shaft for bend

2. Inspect the commutator. If the surface of the commutator is rough, smooth it lightly with a No. 500 emery paper. Check the commutator also for out-of-round. If the out-of-round is more than 0.2 mm (0.0079 in), or insulating mica depth is less than 0.2 mm (0.0079 in) from the commutator surface, turn the commutator (armature) in a lathe, so that the out-of-round is less than 0.05 mm (0.0020 in). Insulating mica should also be under-cut so that the depth is from 0.5 to 0.8 mm (0.0197 to 0.0315 in).

The wear limit of the commutator diameter is 2 mm (0.0787 in). If the commutator is worn excessively, repair or replace it.

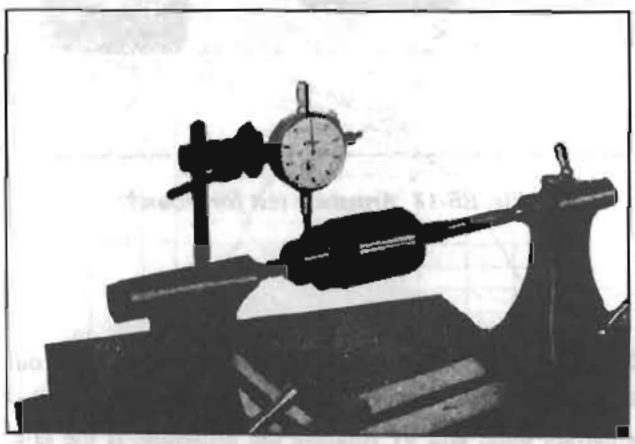

Fig. EE-16 Inspection of commutator

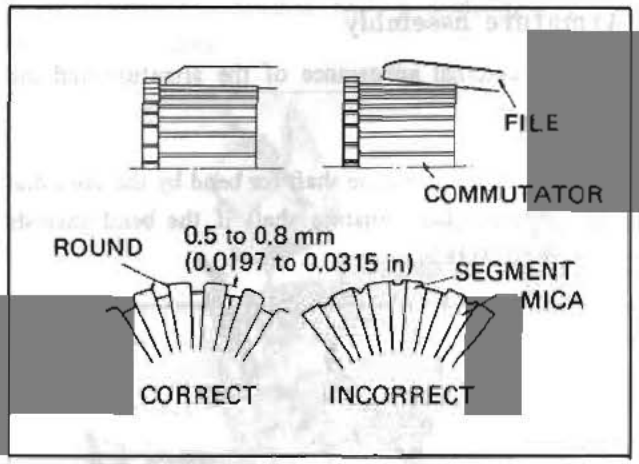

Fig. EE-17 Undercutting insulating mica

3. Inspect the soldered connection of armature lead and commutator. If loose connection is found, resolder (using rosin flux).

4. Testing armature for ground

Place one test probe of a circuit tester, on to armature shaft and the other on to each commutator bar.

If the tester shows continuity, armature is grounded. Replace the armature with new one.

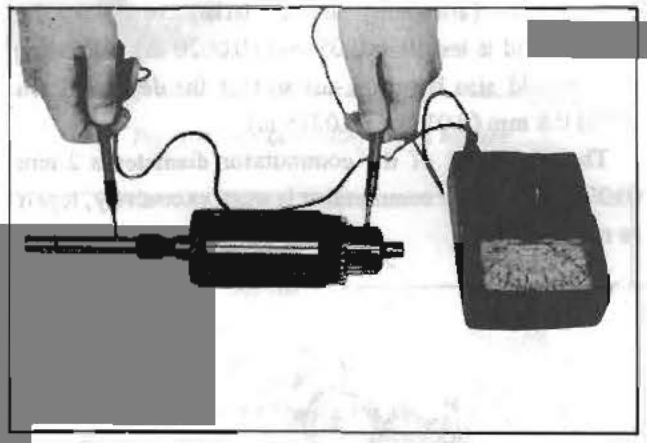

Fig. EE-18 Armature test for ground

5. Check the armature for short-circuit by placing it on an armature tester placing a hack-saw blade over the armature core, and by rotating the armature. If the saw blade vibrates, armature is short-circuited.

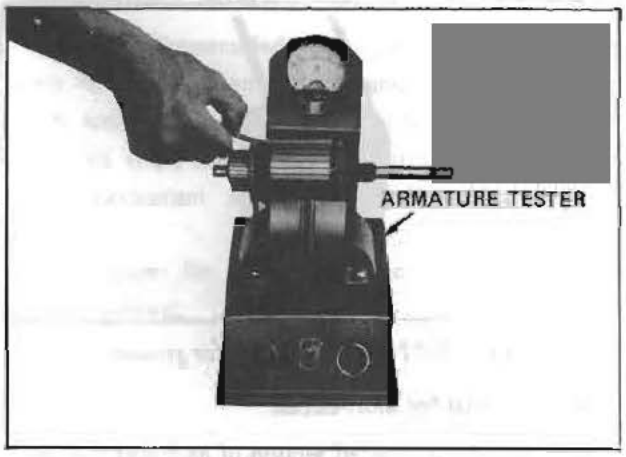

Fig. EE-19 Armature test for shaft

6. Check the armature for continuity by placing probes of a tester on two segments side by side. If the tester shows no conduction, the circuit is open.

Over-running clutch assembly

Inspect the pinion assembly and sleeve. Sleeve must slide freely along the armature shaft spline. If damages are found or there is a resistance while sliding, replace. Inspect the pinion teeth for excessive rubbing, and replace as required. Check the flywheel ring gear also for damage and wear.

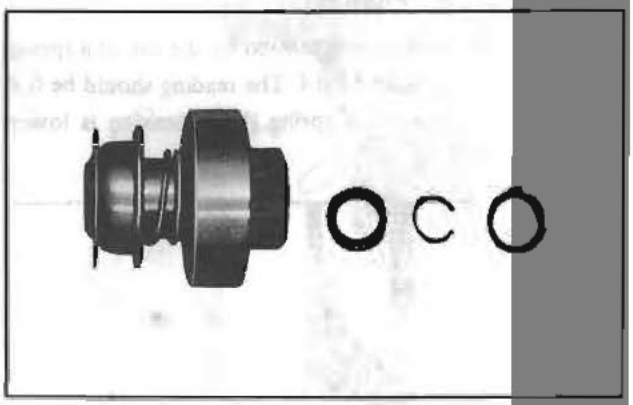

Fig. EE-20 Over-running clutch assembly

Testing brush holder for ground

Place one test probe of a circuit tester on to the rear cover and the other on to the positive side brush holder. If the tester shows conduction, the brush holder is shorted to ground. Replace the insulator or brush holder.

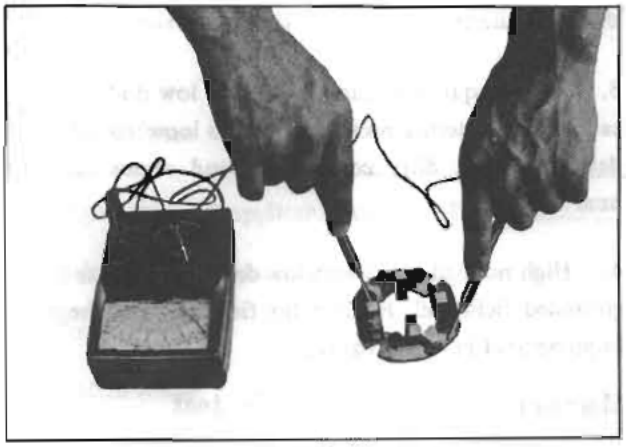

Fig. EE-21 Brush holder test for ground

Pinion case bearing metal

Inspect the bearing metal for wear and side play. If the clearance between the bearing metal and the armature shaft is more than 0.2 mm (0.0079 in), replace the metal. Install a new bearing and adjust the clearance to 0.03 to 0.10 mm (0.0012 to 0.0039 in). Install the bearing metal so that the end of the bearing metal is flush with gear case end plane.

Magnetic switch assembly

Inspect the magnetic switch contacts. If the contact surface is rough, replace.

REASSEMBLY

Reassemble the starting motor in reverse sequence of disassembly.

When assembling, be sure to fill the rear case with grease and apply oil to the rear cover bearing metal and pinion slightly.

TEST

Performance test

The starting motor should be subjected to "no-load" and "lock-torque" tests whenever it has been overhauled to ensure that it operates correctly when installed on the engine. The starting motor should also be subjected to these tests when finding cause of abnormal operation. These tests are summarized as follows.

No-load test

Connect the starting motor in series with the specified battery (12 volts) and an ammeter capable of indicating 1,000 amperes.

Specified current draw and revolution in these test are shown in "specification"

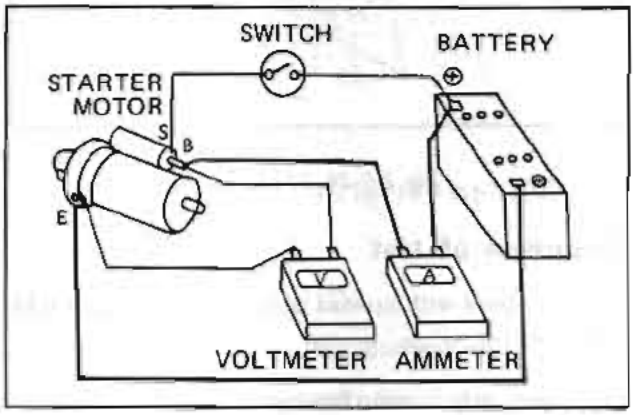

Fig. EE-22 No-load test

Torque test

Torque testing equipment should be used to measure the torque the motor will develop. A high current carrying variable resistance should be connected to the circuit so that the specified voltage at the starting motor may be obtained, since a small variation in the voltage will produce a marked difference in the torque development.

Specified power, voltage and torque are shown in Figures EE-23 and EE-24.

≪ Characteristic curve ≫

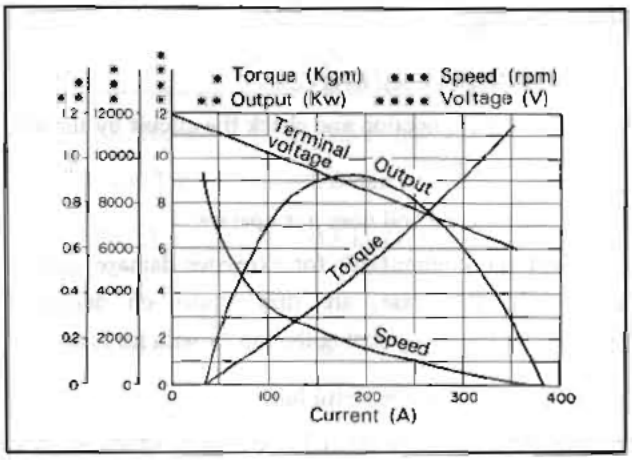

Fig. EE-23 S114-121

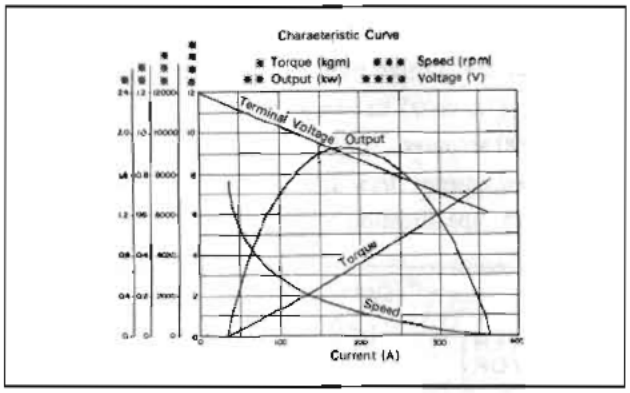

Fig. EE-24 S114-122

Diagnoses of test

1. Low speed with no-load and high current draw may result from followings.

(1) Tight, dirty or worn bearings

(2) Bent armature shaft or loosen field probe

(3) Shorted armature;

Check armature further.

(4) Grounded armature or field;

Remove copper connector. Remove negative side brush and insulate it from the commutator before inspection. Using a circuit tester, place one probe on the insulated terminal and the other on the rear cover. If the tester indicates conduction, remove other two brushes and check field and armature separately to determine whether the field is grounded or armature.

2. Failure to operate with high current draw may result from followings.

(1) Grounded or open field coil:

Inspect the connection and check the circuit by the use of a circuit tester.

(2) The armature coil does not operate:

Inspect the commutator for excessive damage due to burning. In this case, arc may occur on defective commutator during operating the motor with no-load.

(3) Burned out commutator bar:

Weak brush spring tension, broken brush spring, rubber brush, thrust out of mica in the commutator or a loose contact brush and commutator would cause burning of the commutator bar.

3. Low torque, low current draw or low no-load speed causes high internal resistance due to loose connections, defective leads, dirty commutator and causes listed on item 2-(3).

4. High no-load speed with low developed torque causes grounded field coil. Replace the field coil and check for improvement in performance.

Magnetic switch assembly test

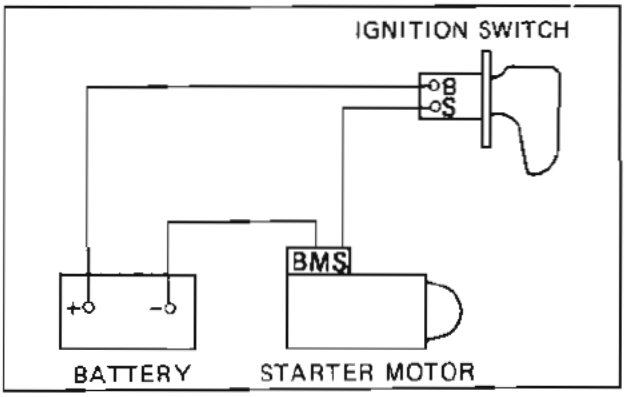

Fig. EE-25 Circuit of magnetic switch assembly test

When the starting motor is checked completely, check the magnetic switch assembly. Connect jumper cables between the "negative" battery terminal and the starting motor "M" terminal, the "positive" battery terminal and the starting motor "S" terminal connecting ignition switch in series as shown in Figure EE-25.

With the ignition switch on, measure the gap "ℓ" between the pinion front edge and the pinion stopper, and adjust by changing the length of the magnetic switch shaft if necessary.

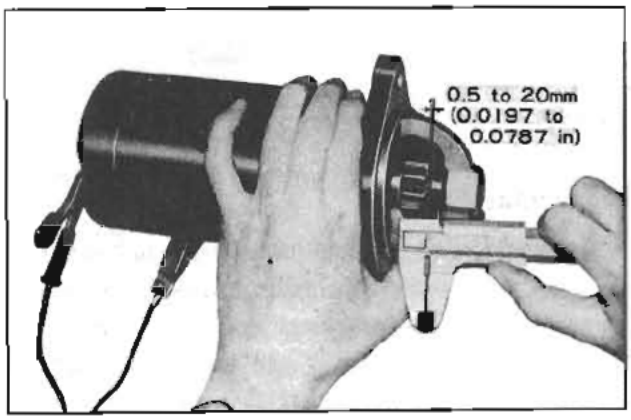

Fig. EE-26 Measurement of gap "ℓ"

SPECIFICATIONS AND SERVICE DATA

Specifications

Engine to which applicable (car model)	L24 (S30, G130)	L20A (H130)
Make and type	HITACHI S114-122	HITACHI S114-121
Nominal output	1.0 kw	1.0 kw
System voltage	12V	12V
Weight	6.0 kg (13.2 lb)	5.3 kg (11.7 lb)
No load		
Terminal voltage	12V	12V
Current	less than 60A	less than 60A
Revolution	more than 5,000 rpm	more than 7,000 rpm
Load		
Terminal voltage	6V	6V
Current	less than 460A	less than 460A
Torque	more than 1.4 kg-m (10.1 ft-lb)	more than 1.15 kg-m (8.3 ft-lb)
Pinion drive out voltage	less than 8V	less than 8V
Magnetic switch		
Series coil resistance	0.31Ω	0.31Ω
Shunt coil resistance	0.93Ω	0.93Ω

Service data

Brush length	18.5 mm (0.7283 in)	18.5 mm (0.7283 in)
Wear limit	6.0 mm (0.2362 in)	6.0 mm (0.2362 in)
Brush spring tension	0.8 kg (1.76 lb)	0.8 kg (1.76 lb)
Commutator		
Outer diameter	35.0 mm (1.378 in)	35.0 mm (1.378 in)
Wear limit	2.0 mm (0.0787 in)	2.0 mm (0.0787 in)
Taper limit	0.4 mm (0.0157 in)	0.4 mm (0.0157 in)
Depth of mica	0.5 to 0.8 mm (0.0197 to 0.0315 in)	0.5 to 0.8 mm (0.0197 to 0.0315 in)

Wear limit	0.2 mm (0.0079 in)	0.2 mm (0.0079 in)
Clearance between armature shaft and bushing	0.03 to 0.1 mm (0.0012 to 0.0040 in)	0.03 to 0.1 mm (0.0012 to 0.0040 in)
Wear limit	0.2 mm (0.0079 in)	0.2 mm (0.0079 in)
Armature shaft diameter		
Pinion side	11.0 mm (0.433 in)	11.0 mm (0.433 in)
Rear end	11.5 mm (0.453 in)	11.5 mm (0.453 in)
Wear limit	0.1 mm (0.0039 in)	0.1 mm (0.0039 in)
Bend limit	0.08 mm (0.0031 in)	0.08 mm (0.0031 in)

TROUBLE DIAGNOSES AND CORRECTIONS

Troubles	Possible causes	Corrective action
Starting motor does not operate.	Discharged battery	Charge or replace the battery.
	Defective solenoid switch	Repair or replace the solenoid switch.
	Loose terminal connection	Clean and retighten the terminal.
	Defective brush	Replace the brush.
	Defective starting motor	Dismount the starting motor and conduct testing.
Noisy starting motor.	Loose securing bolt	Retighten the bolt.
	Worn pinion gear	Replace the pinion gear.
	Poor lubrication	Lubricate.
	Worn commutator	Overhaul.
	Worn brush	Replace the brush.
Starting motor cranks slowly.	Discharged battery	Charge or replace the battery.
	Loose terminal connection	Clean and retighten the terminal.
	Worn brush	Replace the brush.
	Locked brush	Check the brush spring for tension or brush holder, and repair or replace as required.
	Dirty or worn commutator	Clean and repair.
	The armature rubs the field coil.	Overhaul.

	Defective solenoid switch	Repair or replace the switch.
Starting motor operates but does not crank the engine.	Worn pinion	Replace the pinion.
	Locked pinion guide	Repair the pinion guide.
	Worn ring gear	Replace the ring gear.
Starting motor does not disengage when the ignition switch is turned off.	Defective solenoid switch	Repair or replace the solenoid switch.
	Defective gear teeth	Replace the defective gear.

CHARGING CIRCUIT

The charging circuit includes the battery, alternator, regulator and necessary wiring to connect these parts. The purpose of this system is to convert mechanical energy from the engine into electrical energy which is used to operate all electrically operated units and to keep the battery fully charged.

When the ignition switch is set to "on", current flows from the battery to ground through the ignition switch, voltage regulator IG terminal, primary side contact point "P1", movable contact point "P2", voltage regulator "F" terminal, alternator "F" terminal, field coil and alternator "E" terminal, as shown in Figure EE-27 by fall line arrow marks. Then the rotor in the alternator is exited. On the other hand, current flows from the battery to ground through the ignition switch, warning lamp, voltage regulator "L" terminal, lamp side contact point "P4", movable contact point "P5", and voltage regulator "E" terminal, as shown by dotted line arrow marks. Then, the warning lamp lights.

When the alternator begins to operate, three-phase alternating current is induced in the armature. This alternating current is rectified by the positive and negative silicon diodes. The rectified direct current output reaches the alternator "A" and "E" terminals. (Figure EE-27).

On the other hand, the neutral point voltage reaches "N" and "E" terminals (nearly a half of the output voltage), and current flows from voltage regulator "N" terminal to "E" terminal or ground through the coil "VC1" as shown by the dotted line arrow marks. Then, the coil "VC1" is excited, and the movable contact point "P5" comes in to contact with voltage winding side contact point "P6". This action causes to turn off the warning lamp and complete the voltage winding circuit, as shown by the full line arrow marks.

When the alternator speed is incrased or the voltage starts to rise excessively, the movable contact point "P2" is separated from the primary side contact "P1" by the magnetic force of coil "VC2". Therefore, register "R1" is applied in to the field circuit and output voltage is decreased. As the output voltage is decreased, the movable contact point "P2" and primary side contact "P1" comes in to contact once again, and the alternator voltage increases. Thus, the rapid vibration of the movable contact point "P2", or applying and removing the registance in the alternator field circuit maintains an alternator output voltage to constant.

When the alternator speed is further increased or the voltage starts to rise excessively the movable contact point "P2" comes into contact with secondary side contact point finally. Then, the field current is shut off and alternator output voltage is decreased immediately. This action causes to separate movable contact "P2" from secondary contact "P3". Thus, the rapid vibration of the movable contact point "P2" or breaking and completing the field circuit maintains an alternator output voltage to constant.

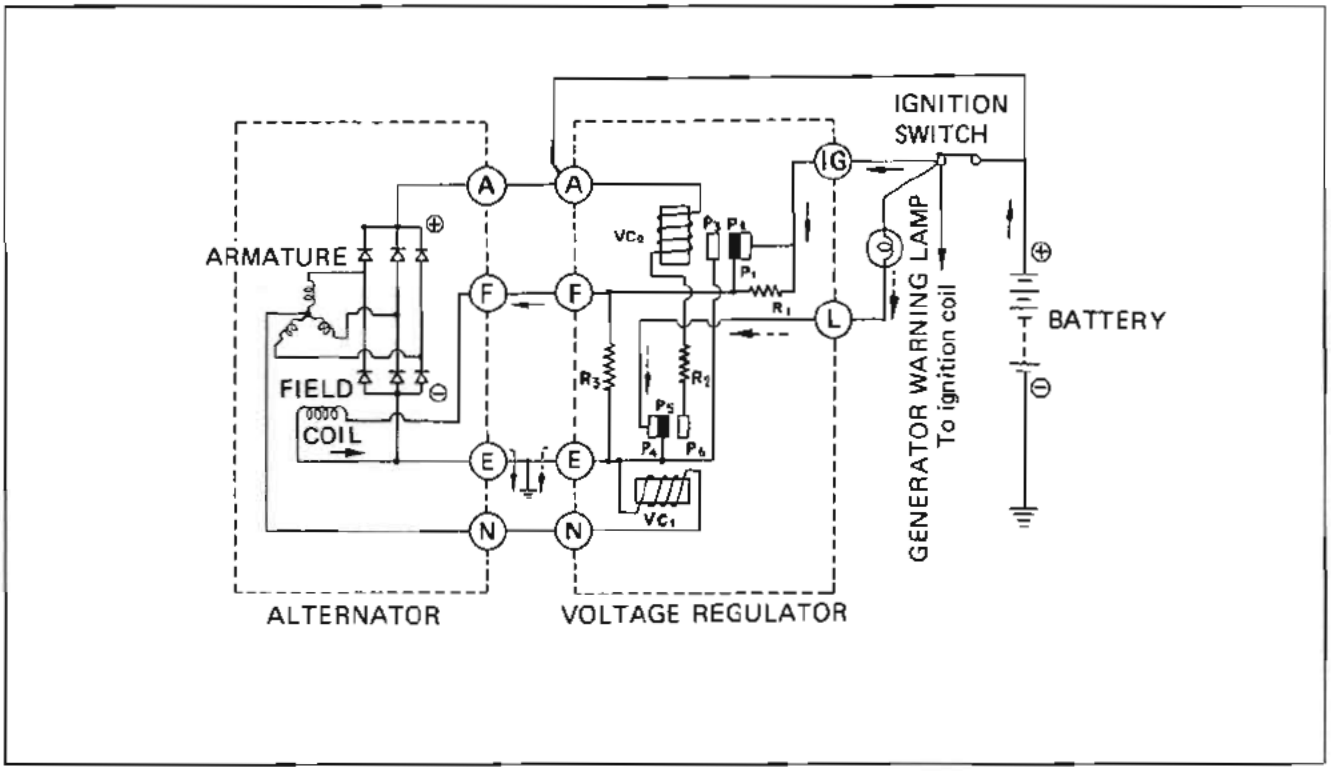

Fig. EE-27 Charging circuit (I)

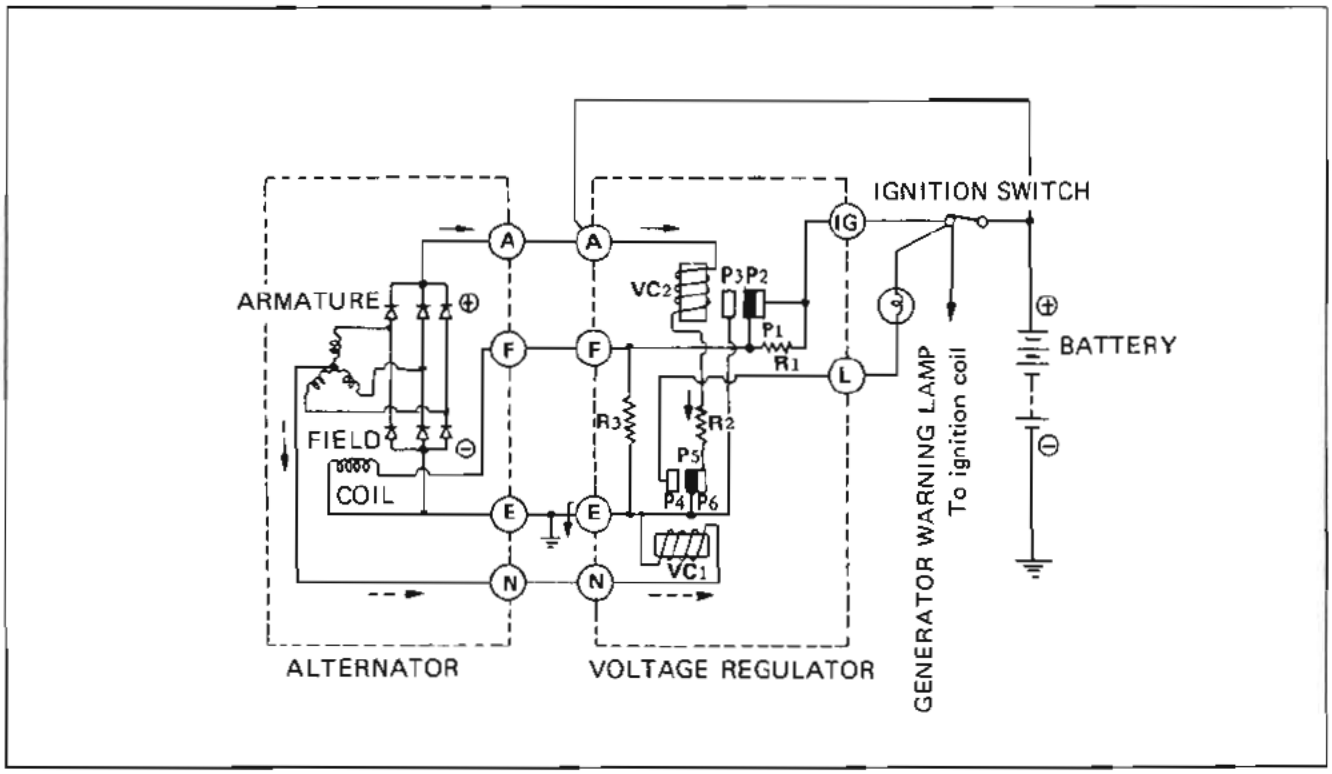

Fig. EE-28 Charging circuit (II)

ALTERNATOR

CONTENTS

DESCRIPTION

The alternator differs from the DC generator, wherein, the alternator turns the magnetic pole and fixes the armature. In the alternator, a magnetic field is produced by the rotor which consists of alternator shaft, field coil, pole pieces, and slip rings. The slip rings pressed in the shaft conduct only a small field current. Output current is generated in the armature coils located in the stator. The stator has three windings and generates three-phase alternating current. Silicon diodes act like a one-way valve for electricity so that charging current passes easily but reverse current is shut out. In this alternator, six diodes are used (three negatives and three positives), and three each diodes are installed in positive and negative heat sinks. Voltage control system is basically same as that of the D.C. system.

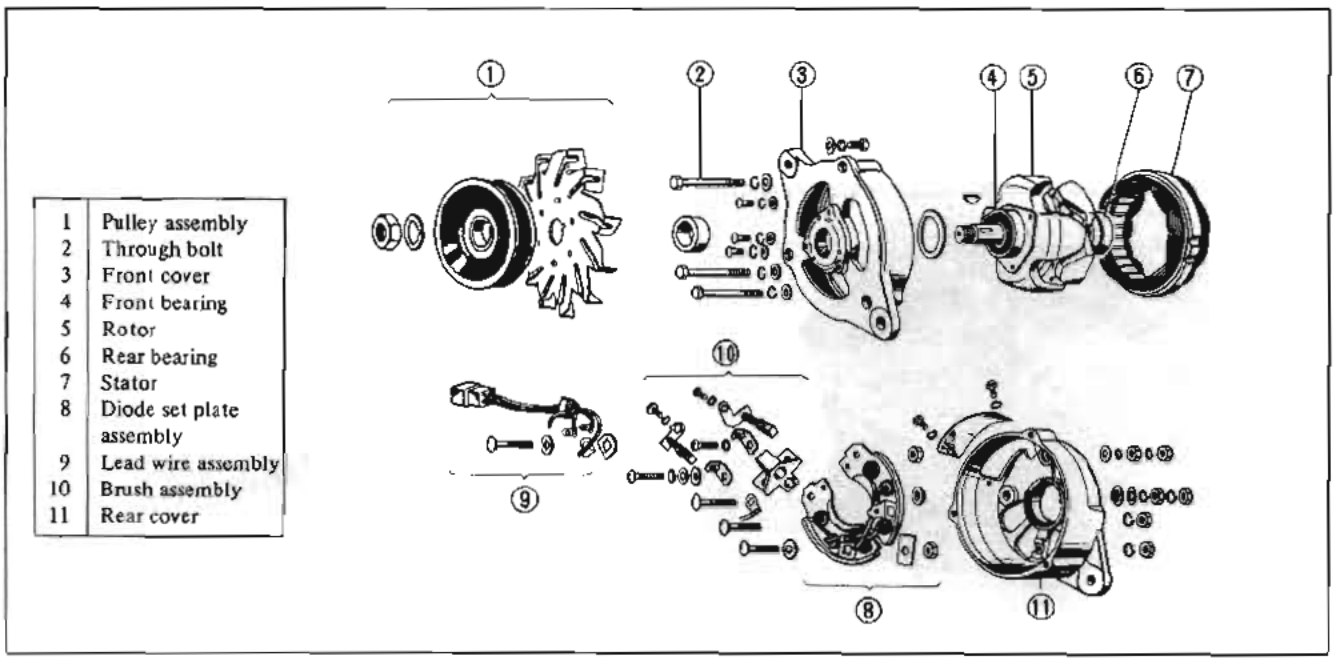

Fig. EE-29 Exploded view of alternator

REMOVAL

1. Disconnect the negative battery terminal.

2. Disconnect two lead wires from the generator and connector.

3. Loosen the adjusting bolt.

4. Remove the generator drive belt.

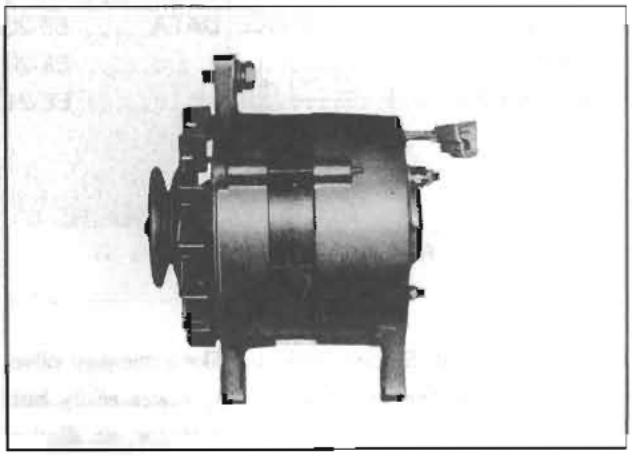

Fig. EE-30 External view

5. Remove the generator installation.

6. Dismount the generator from the vehicle.

DISASSEMBLY

1. Unscrew the through bolts.

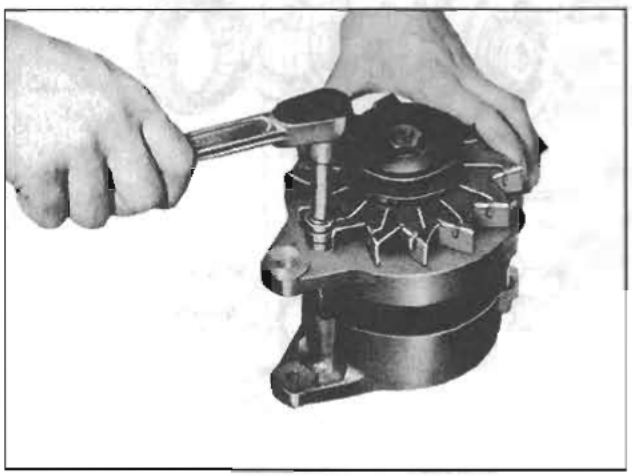

Fig. EE-31 Removal of through bolt

2. Separate the diode end housing from the drive end housing assembly by tapping the front bracket lightly with a wooden mallet.

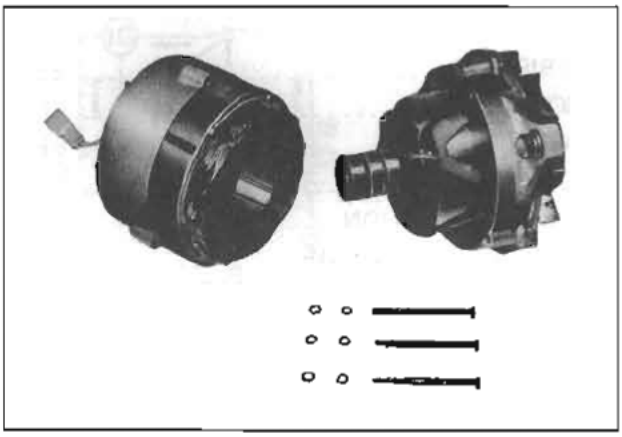

Fig. EE-32 Drive end housing and diode end housing separated

3. Secure the rotor of the drive end housing assembly in a vise carefully so that the rotor is not damaged.

Remove the pulley nut, pulley rim, fan and the spacer.

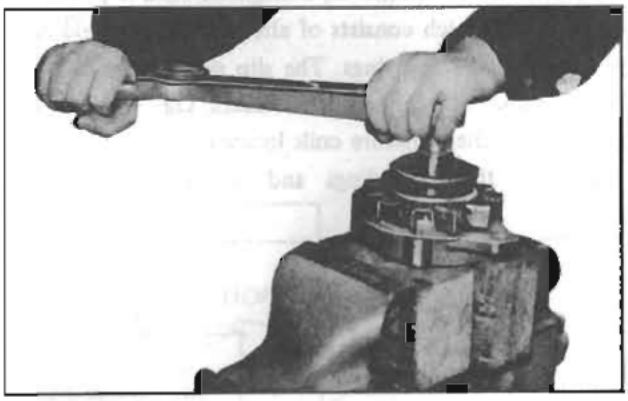

Fig. EE-33 Disassembling the rotor

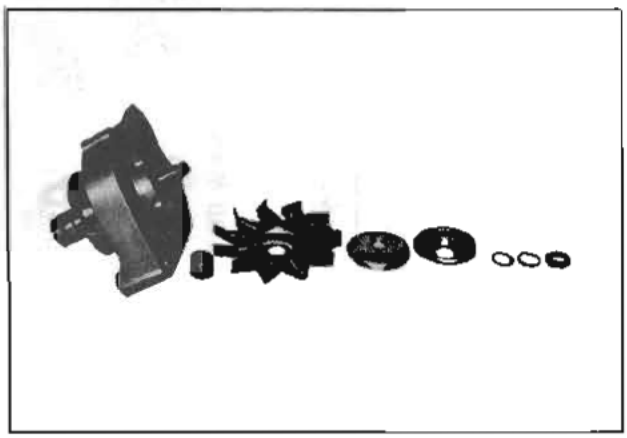

Fig. EE-34 Removal of pulley

4. Remove the rotor from the drive end housing assembly by tapping the drive end housing lightly with a mallet.

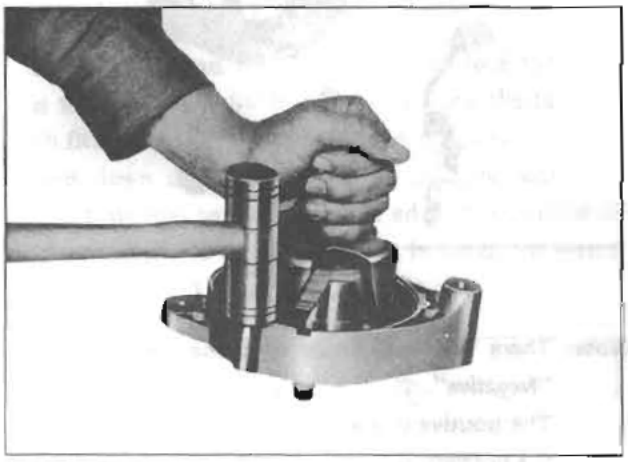

Fig. EE-35 Removal of rotor

5. Remove the bearing retainer by unscrewing three set screws and remove the bearing with a press.

Fig. EE-36 Removal of bearing retainer

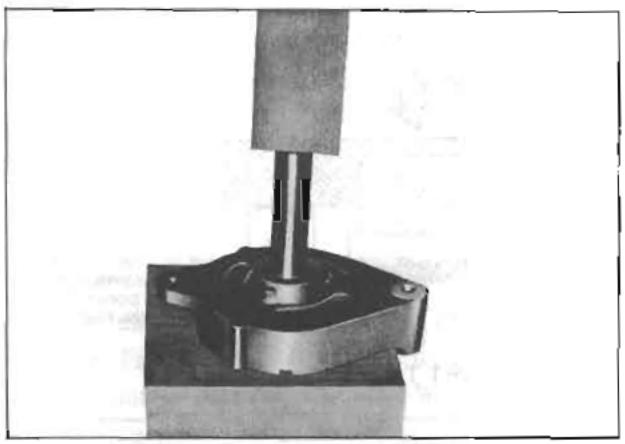

Fig. EE-37 Pulling out of bearing

6. Pull out the rear bearing from the rotor assembly with a press or bearing puller.

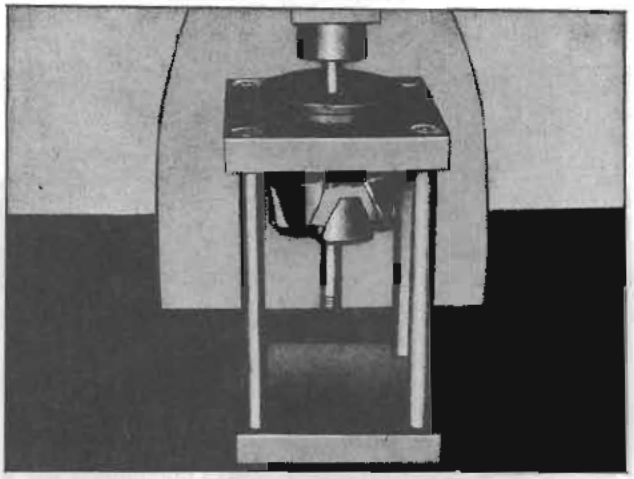

Fig. EE-38 Pulling out of rear bearing (I)

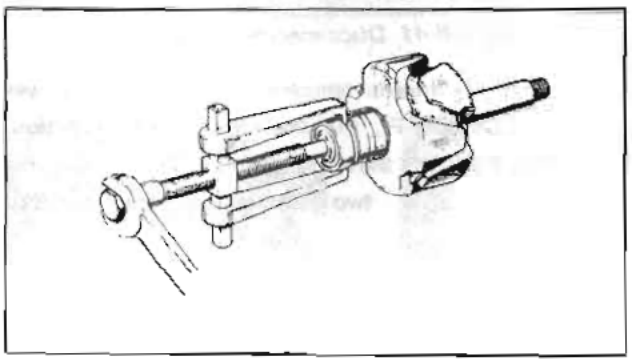

Fig. EE-39 Pulling out of rear bearing (II)

7. Disconnect the negative three diodes from three coil lead wires and each lead wire between diodes by unsoldering with a soldering iron, and separate the stator from the diode end housing assembly.

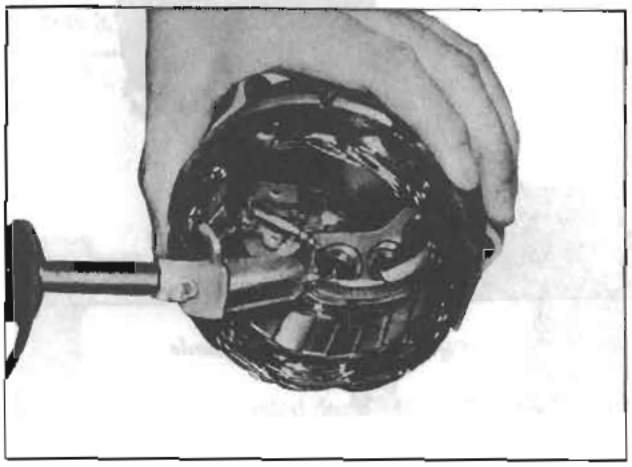

Fig. EE-40 Removing stator

8. Remove the brush cover by unscrewing each set screw.

Unsolder and disconnect "N" terminal lead wire. The diode end and the stator can be separated.

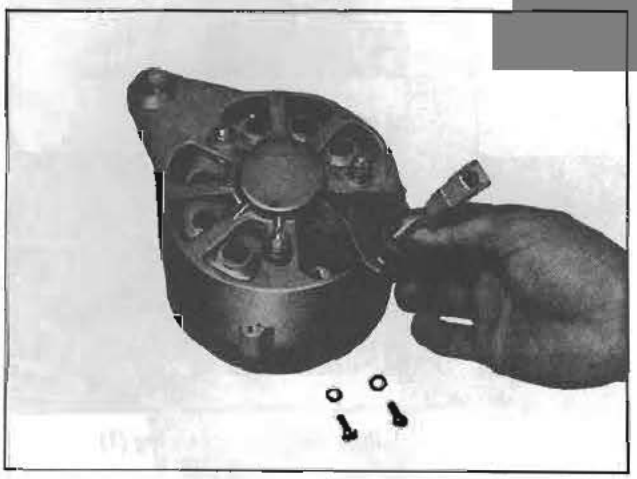

Fig. EE-41 Disconnecting N terminal

Note: When the internal temperature of a diode rises over 150°C (300°F), the diode will lose its function. Therefore, use the electric iron, 100W to 200W, for approximately two seconds at the soldered portions.

9. Remove the heat sink and the brush holder from the rear cover by unscrewing each set screw. Be careful not to lose small parts such as screws, washers and bushings.

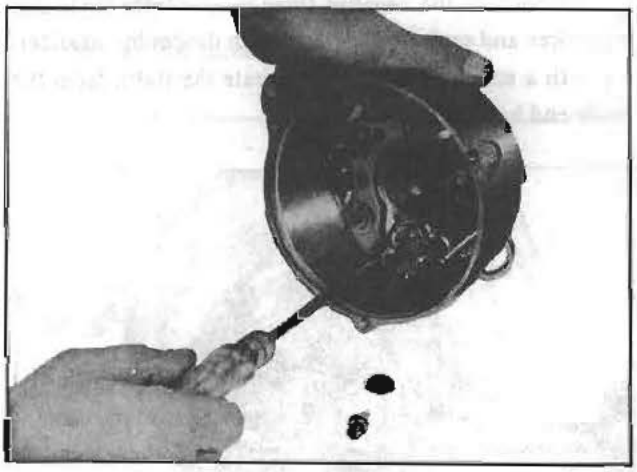

Fig. EE-42 Remvoing diode

10. Disassembling the brush holer

Unsolder lead wire F (white · black), and the brush holder wires (negative and positive) with a soldering iron.

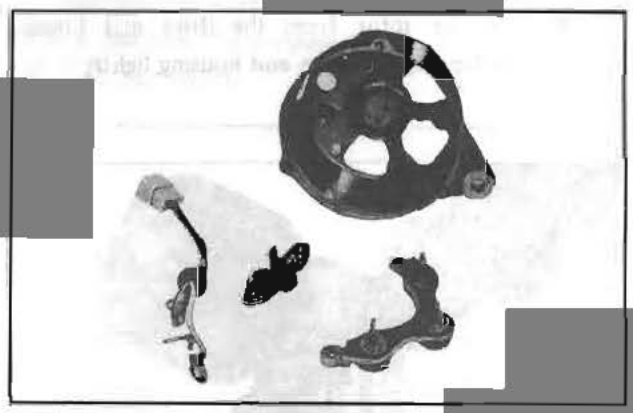

Fig. EE-43 LT140-53

Note: There are two kinds of diode, "Positive" and "Negative".

The positive diode is marked with "red figure" on the bottom of the diode and the negative diode is marked with "black figure" in the same manner as shown in Figure EE-44.

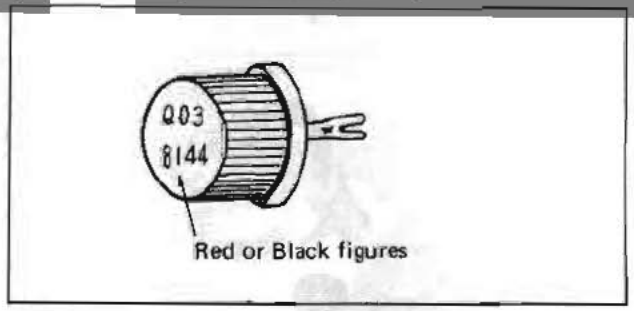

Fig. EE-44 Diode identification

DIODE REMOVAL

To remove a diode, use a suitable tool to support the heat sink, and remove the diode by the use of an arbor press as shown in Figure EE-45.

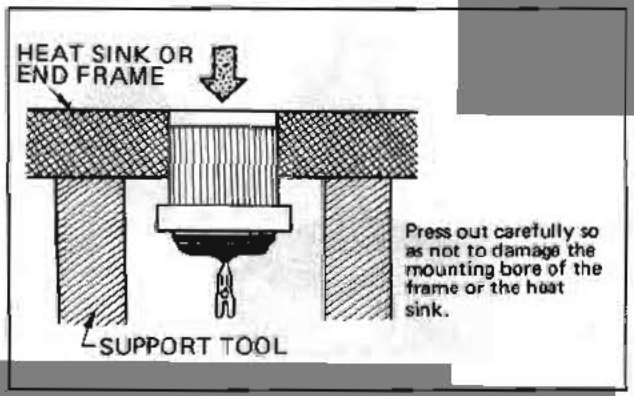

Fig. EE-45 Removal of the diode

Note: Do not strike the diode, as the shock may damage the other diodes.

DIODE INSTALLATION

Support the head sink with a suitable tool and then press the diode into the heat sinks by using the tool Ⓐ which fits over the outer diode edge (A portion).

Press down the diode completely into the mounting bore of C portion toward the lower edge of B portion of the diode. Replaced diode should not be taken out with a force smaller than 15 kg (33 lb).

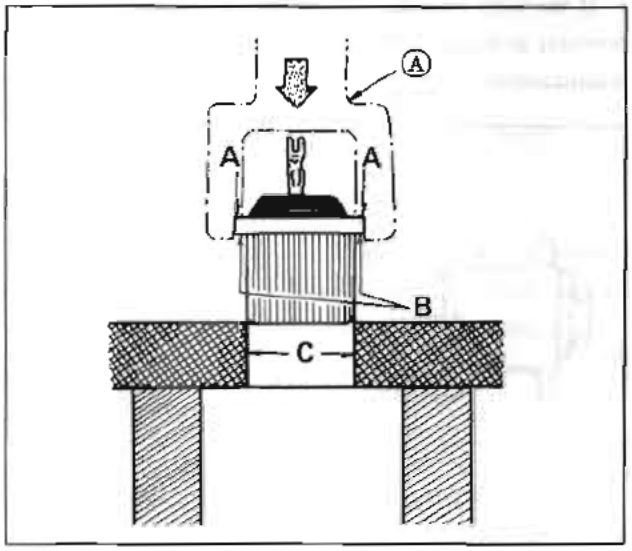

Fig. EE-46 Installation of the diode

INSPECTION AND REPAIR

Remove the alternator from the vehicle and apply the tester between the lead wire F (black-white color) and the lead wire E (black color). When the resistance is approximately 5 to 6Ω, the condition is satisfactory.

Rotor inspection

1. Conduction test of field coil

Apply the tester between the slip rings of rotor as shown in Figure EE-51. If there is no conduction, the disconnection of field coil may exist. When the resistance is approximately 4.47Ω at normal ambient temperature, the condition is satisfactory.

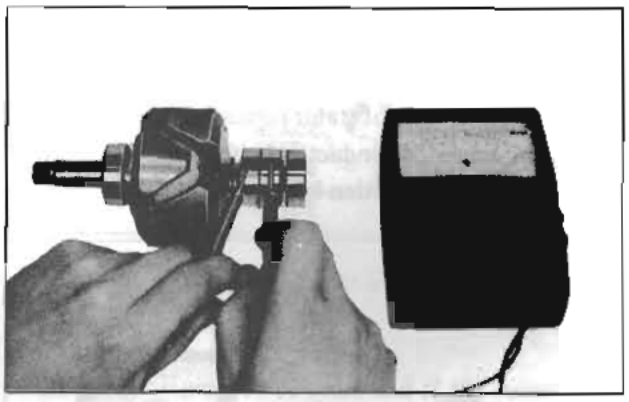

Fig. EE-47 Conduction test of field coil

2. Ground test of field coil

Check the conduction between slip ring and rotor core. If the conduction exists, replace rotor assembly, because field coil or slip ring must be grounded.

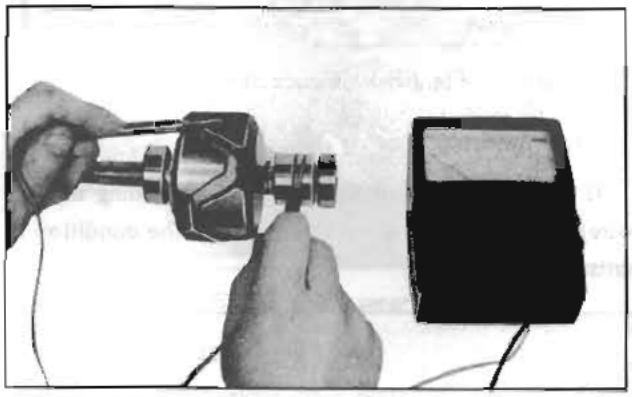

Fig. EE-48 Ground test of field coil

3. Inspection of rotor eccentricity

Check the eccentricity of rotor as shown in Figure EE-49, with a dial gauge.

Repair or replace if the eccentricity is over 0.10 mm (0.0039 in).

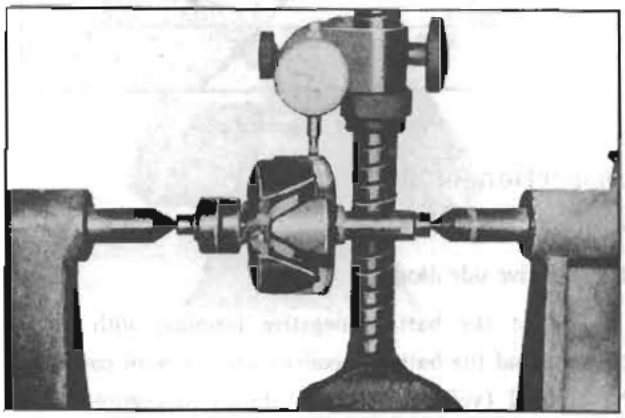

Fig. EE-49 Inspection of rotor eccentricity

Inspection of stator

1. Conduction test

If the neutral wire of stator connected to the lead wire N (yellow color) is conductive with each lead wire of armature coil, the condition is satisfactory.

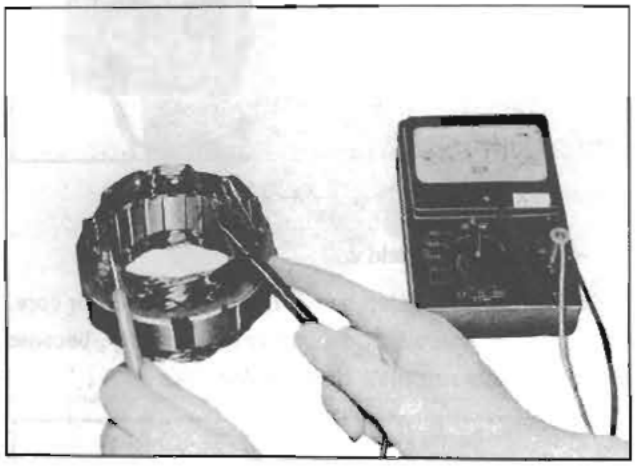

Fig. EE-50 Conduction test

2. Ground test

If each lead wire of armature coil (including neutral wire) is not conductive with stator core, the condition is satisfactory.

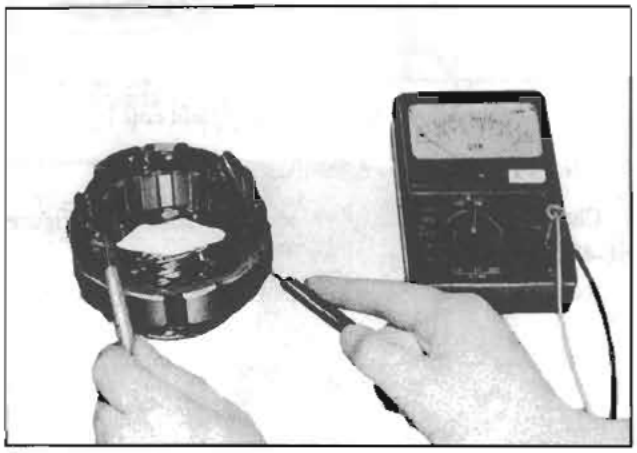

Fig. EE-51 Ground test

Inspection of diode

(Using lamp and battery)

1. Positive side diode

Connect the battery negative terminal with the A terminal and the battery positive terminal with connector N terminal (yellow color) as shown in Figure EE-52. Lamp in the circuit will light.

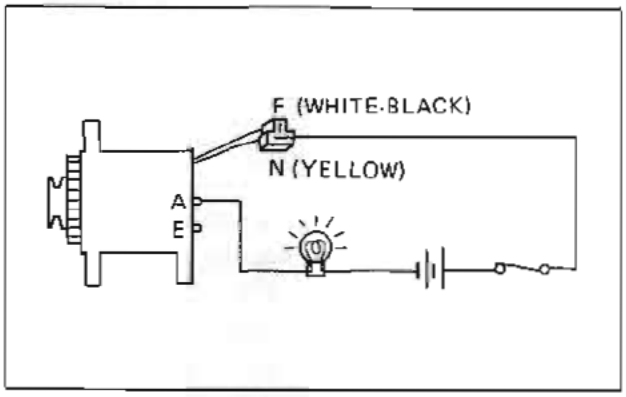

Fig. EE-52 Inspection of positive side diode

If the lamp does not light when the connection is made reversely as shown in Figure EE-53, the positive side diode is satisfactory.

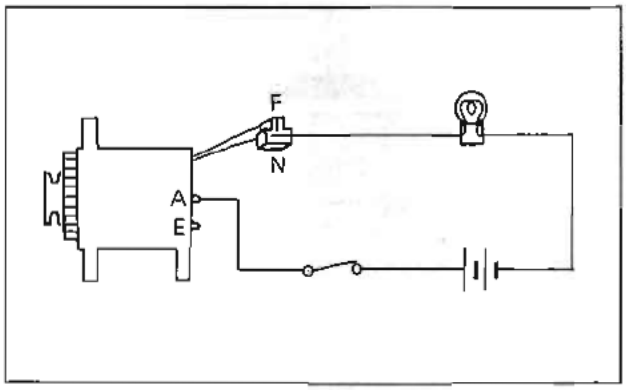

Fig. EE-53 Inspection of positive side diode

2. Negative side diode

Connect the battery negative terminal with connector N terminal (yellow color) and the battery positive terminal with E terminal as shown in Figure EE-54. Lamp in the circuit will light.

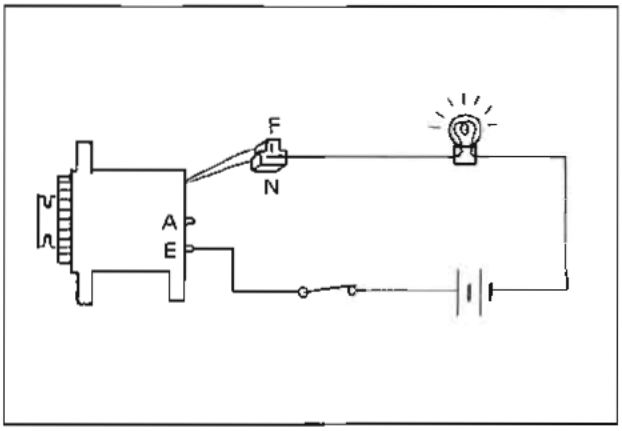

Fig. EE-54 Inspection of negative side diode

If the lamp does not light when the connection is made reversely as shown in Figure EE-55, the negative side diode is satisfactory.

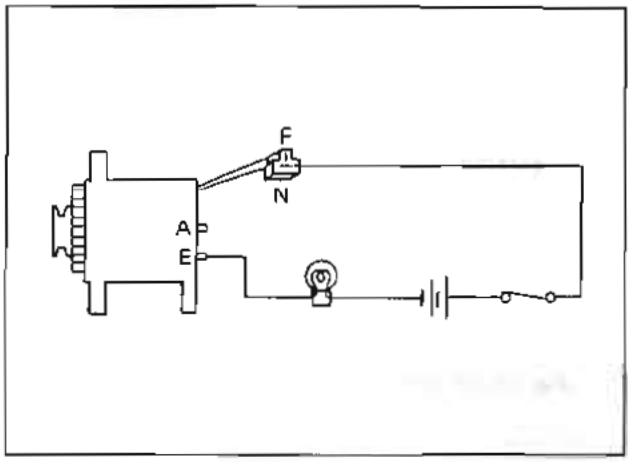

Fig. EE-55 Inspection of negative side diode

Inspection of diode with tester

There are two kinds of diodes as shown in Figure EE-56. Each diode can be discriminated its polarity by the color of the printed figures on each diode as shown below.

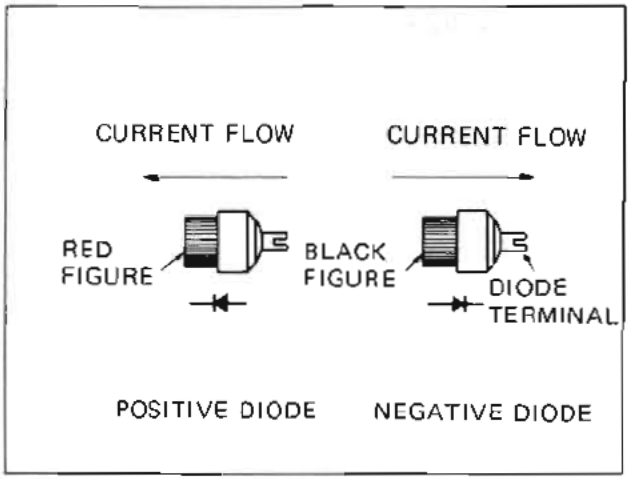

Fig. EE-56 Diode

Check diode resistance, using a tester, in a current flow direction and a reverse direction.

When one side shows low resistance and the other shows high resistance, the diode is satisfactory.

If both sides are low, there will be a short circuit and if both sides are high, there will be a open circuit. In both cases, replace diode.

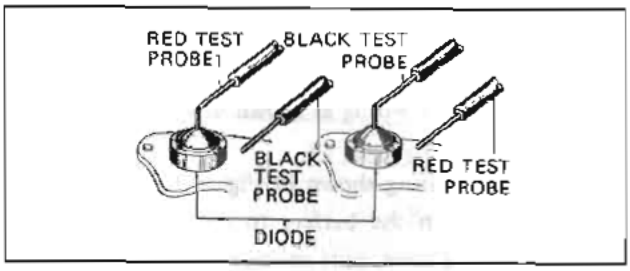

Fig. EE-57 Diode test

Inspection of brush

Check the movement of brush and if the movement is unsmooth, check brush holder and clean it.

If brush worn more than 7 mm (0.2755 in), replace the brush with new one.

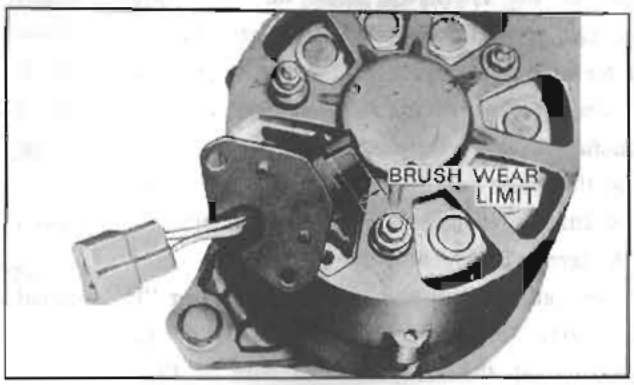

Fig. EE-58 Brush wear limit

Spring pressure test

Place a suitable block on a platform scale and press down brush holder with brush and spring on the block until brush sinks in the holder to 1 mm (0.0394 in) height from the holder. The reading subtracted the block weight shows the spring pressure. The spring pressure should be 0.35 kg (0.77 lb). If the pressure is less than 0.2 kg (0.44 lb), replace it.

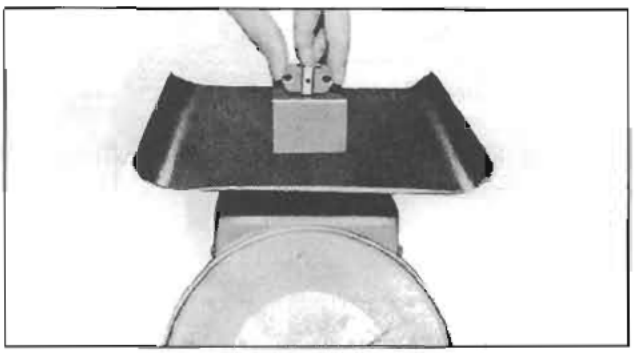

Fig. EE-59 Spring pressure test

Inspection of out put

For output inspection, remove the alternator from the vehicle and connect wiring as shown in Figure EE-60 and drive it with motor.

Through the wiring shown in Figure EE-60 magnetic current flows from the battery to the field coil of the alternator. In this state, raise revolution of the alternator gradually up to the speed where there is no reverse flow (approximately 2A) to the field coil and read the revolution. Correct revolution is approximately 1,000 rpm without load.

Next, increase load resistance to the maximum so as to reduce load current to the minimum, and turn off the switch. Raise the load current slowly to increase revolution of the alternator. Make sure that output current increase as revolution of the alternator increases. If there is no large difference from the specification, it is correct.

Disregarding whether the battery is over-charged or discharged, when the charging current is small, first, check the alternator and the relay for the performance. Inspect the charging current by inserting an ammeter between "A" terminal of relay and the battery.

Disconnect wire between the alternator "F" terminal and relay "F" terminal at the relay "F" terminal and short-circuit the removed lead wire at the relay "A" terminal. If the charging current highly increases, the relay is in disorder.

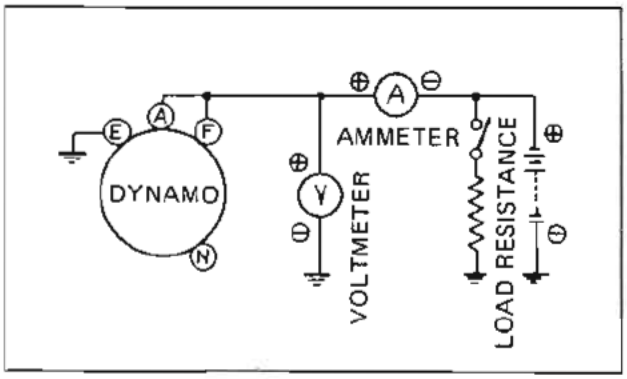

Fig. EE-60 Circuit for the output inspection

Note: Use the battery charged in full up to the normal capacity.

REASSEMBLY

Assemble the generator in reverse sequence of disassembly. Always make sure that the polarity of alternator diode is aligned correctly. Refer to Figure EE-60 Diode.

SPECIFICATIONS AND SERVICE DATA

Specifications

Engine to which applicable	L24	L20A
Make and Type	HITACHI LT145-35	HITACHI LT140-53
Nominal output	12V - 45A	12V - 40A
Pole	Negative ground	Negative ground
Revolution	10,000 to 13,500 rpm	10,000 to 13,500 rpm
No-load minimum revolution	Less than 1,000 rpm	Less than 1,000 rpm
Output current	More than 34A (14V 2,500 rpm) More than 45A (14V 5,000 rpm)	More than 30A (14V 2,500 rpm) More than 40A (14V 5,000 rpm)
Weight	5.1 kg (11.2 lb)	5.0 kg (11.0 lb)
Applied regulator	TL1Z-37	TL1Z-37

Service data

Type	LT145-35	LT140-53
Stator coil resistance per phase	0.09 Ω [20°C (68°F)]	0.11 Ω [20°C (68°F)]
Rotor coil resistance	4.1 Ω	4.1 Ω
Standard brush spring pressure	0.3 kg (0.7 lb)	0.3 kg (0.7 lb)
Standard brush height	14.5 mm (0.571 in)	14.5 mm (0.571 in)
Wear limit of brush	7 mm (0.276 in)	7 mm (0.276 in)
Standard front shaft size	15 mm dia. (0.591 in dia.)	15 mm dia. (0.591 in dia.)
Standard rear shaft size	12 mm dia. (0.472 in dia.)	12 mm dia. (0.472 in dia.)

REGULATOR

CONTENTS

DESCRIPTION

The regulator, consisting of a voltage regulator and charge relay, features;

(1) Compact and light

(2) Adjustment can be made easily because adjust screw is used for voltage adjustment.

(3) Installation of the stationary contact is improved and gap adjustment is thereby eased.

(4) The coil is secured on the base by means of caulking, the yoke and armature are installed by means of welding, and thus, the construction has been simplified.

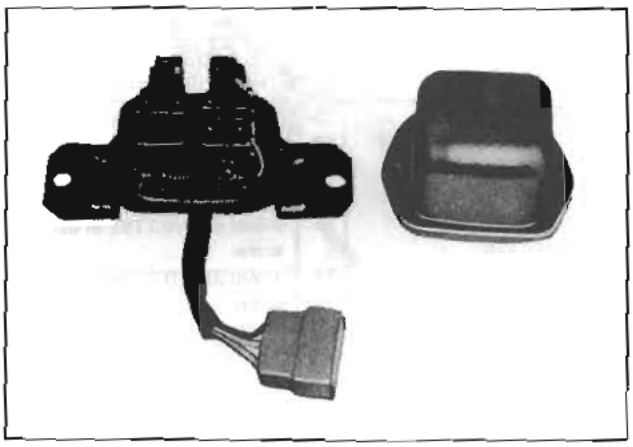

Fig. EE-61 Remove the cover view