

CHARGING SYSTEM

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11-2 CHARGING SYSTEM – Charging System Circuit

CHARGING SYSTEM CIRCUIT

Fig. 11-1

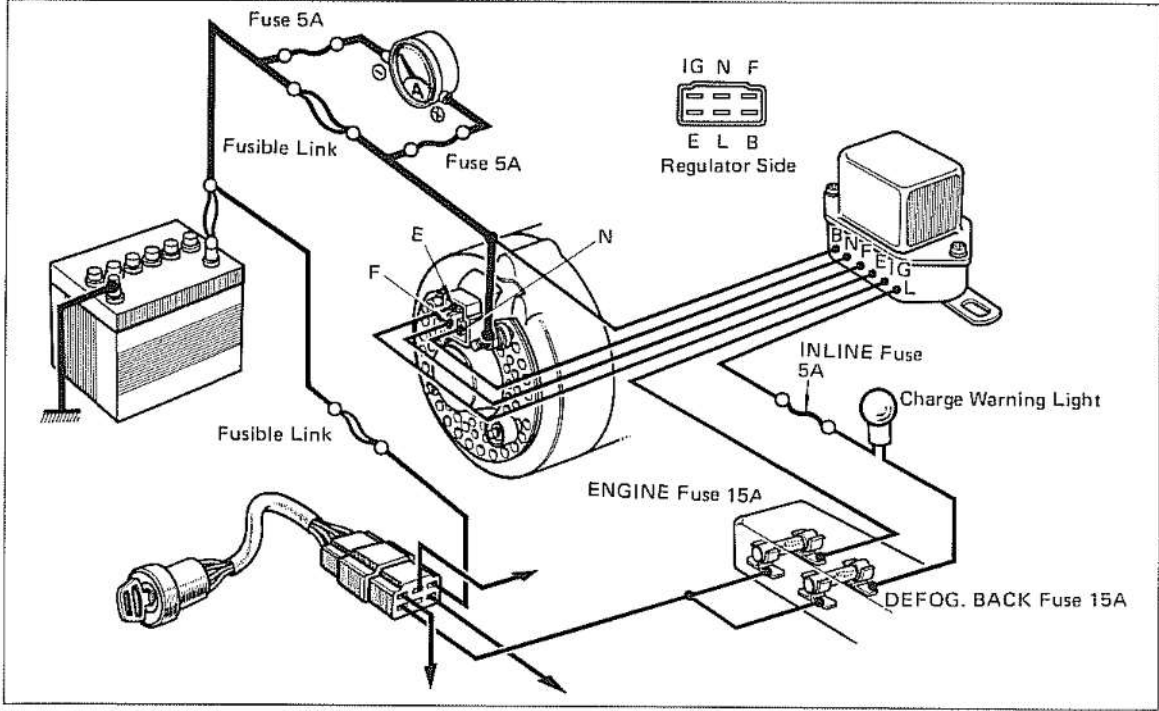
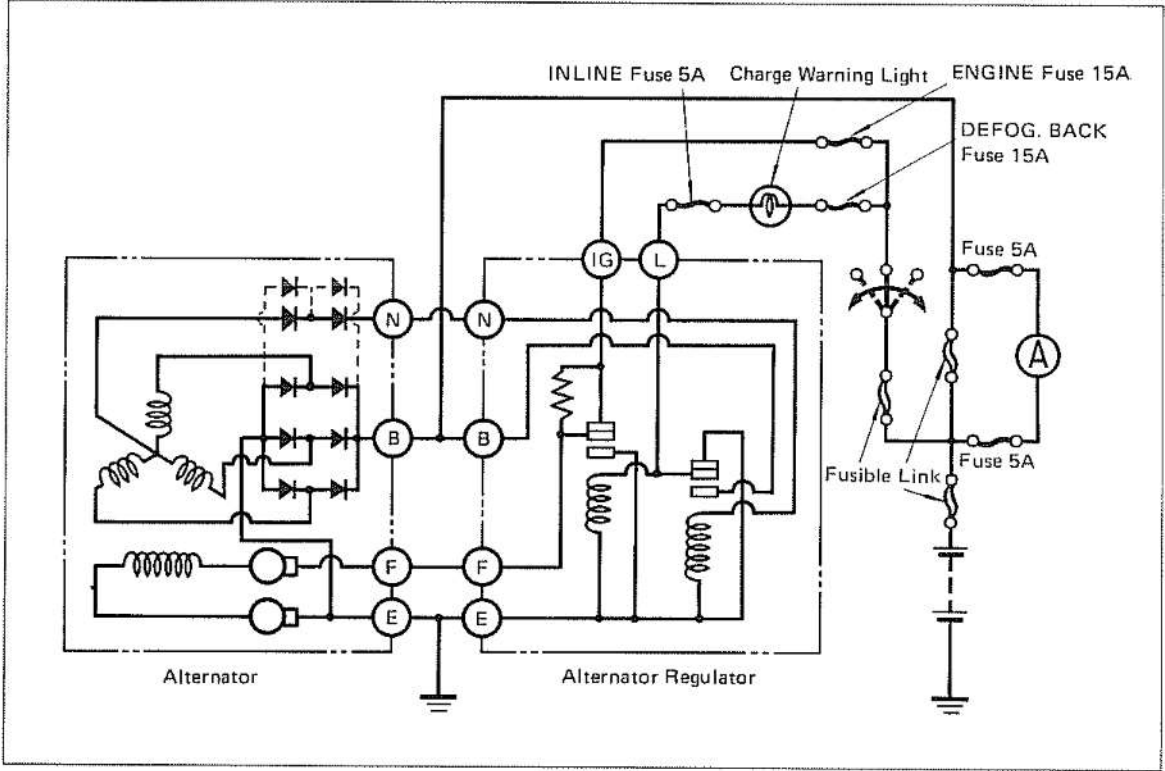


Fig. 11-2



FOR ALTERNATOR WITH IC REGULATOR

Fig. 11-3

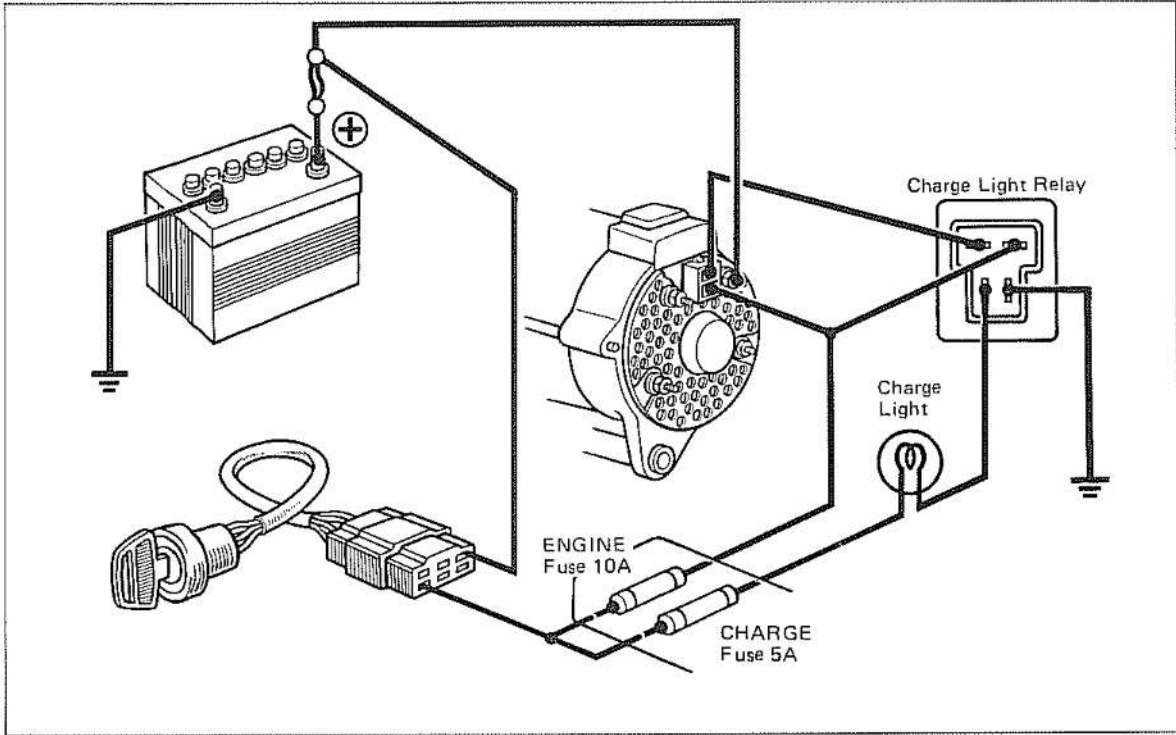
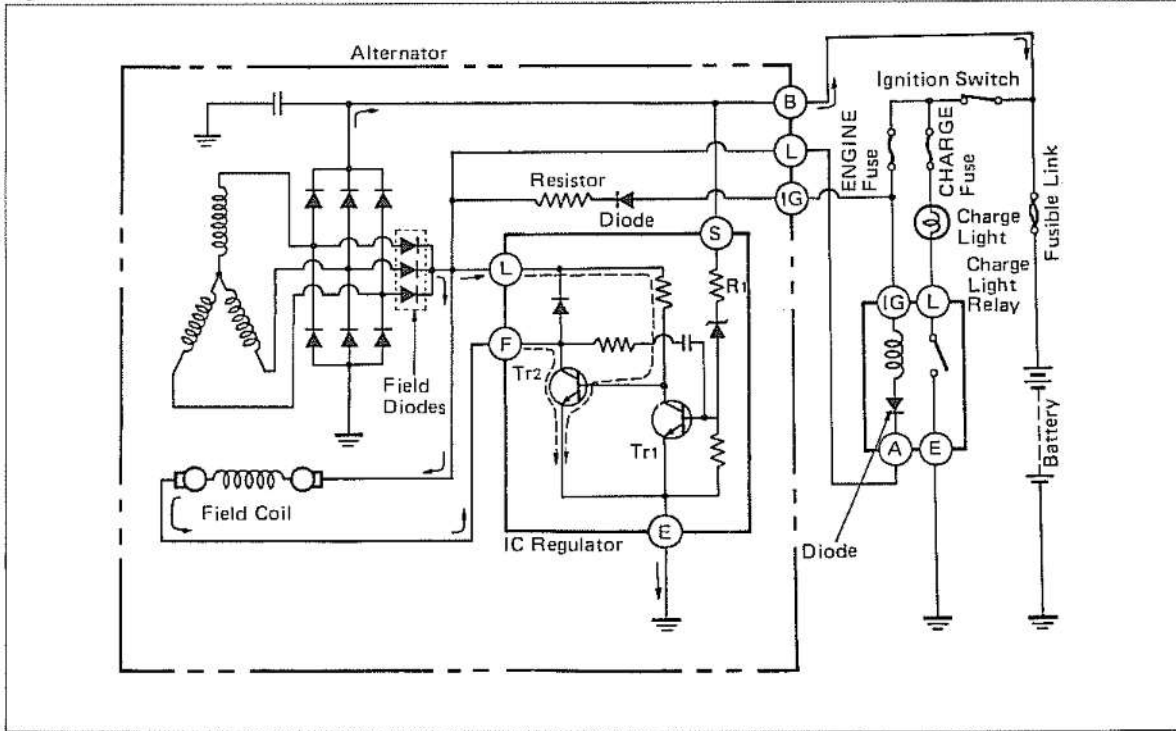
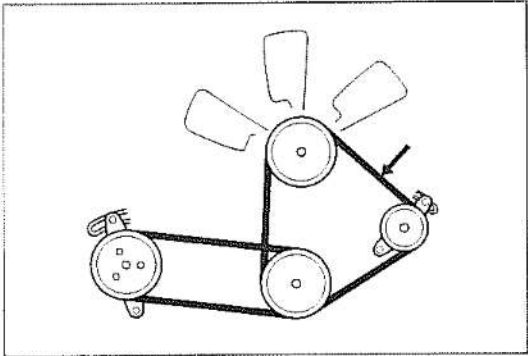


Fig. 11-4



11-4 CHARGING SYSTEM — On-Vehicle Inspection

Fig. 11-5

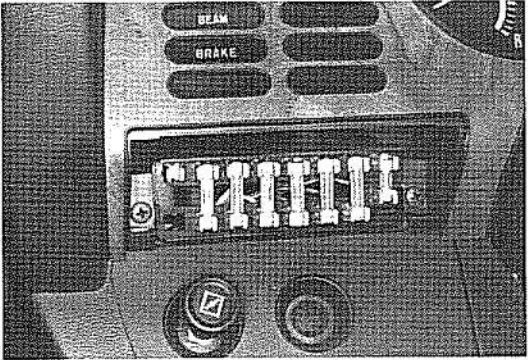


ON-VEHICLE INSPECTION



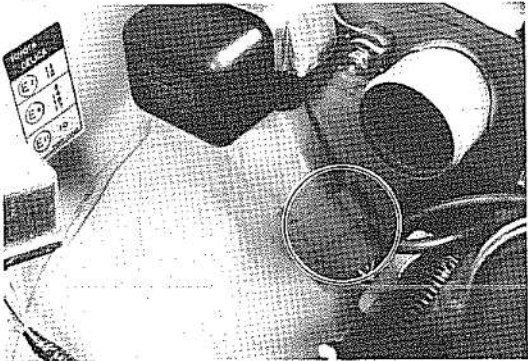
- 1. Inspect the following system components:
Drive belt tension at 10 kg (22 lb):
8 – 12 mm
(0.3 – 0.5 in.)

Fig. 11-6



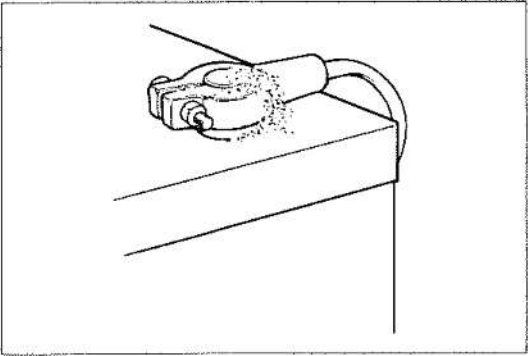
- 2. Fuses
ENGINE fuse 15A
GAUGE fuse 15A

Fig. 11-7



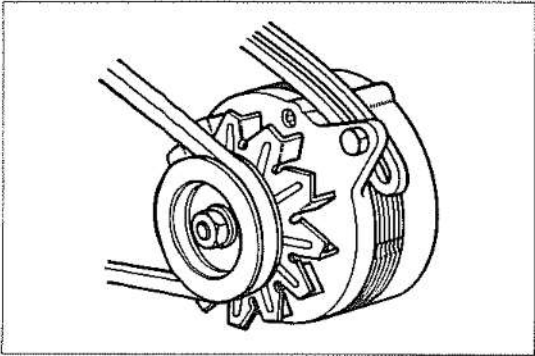
- 3. Installed condition of wiring for alternator and regulator.

Fig. 11-8



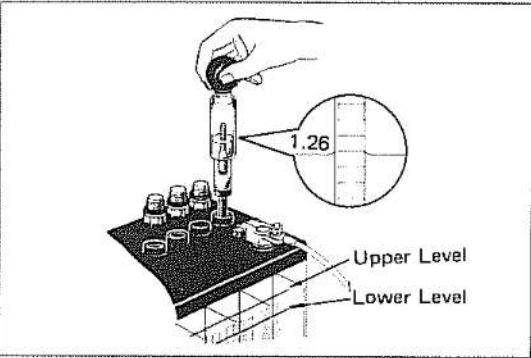
- 4. Battery terminal and fusible link
Loose
Corroded
Burnt

Fig. 11-9



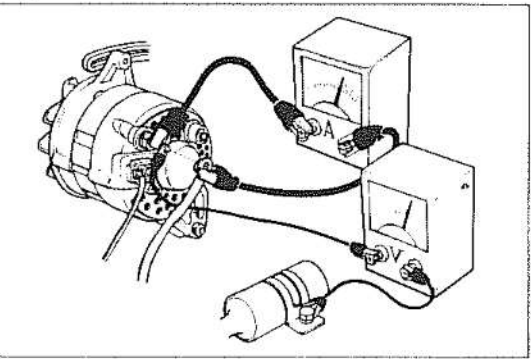
5. Alternator on-vehicle condition
Abnormal noise from alternator when engine is running.

Fig. 11-10



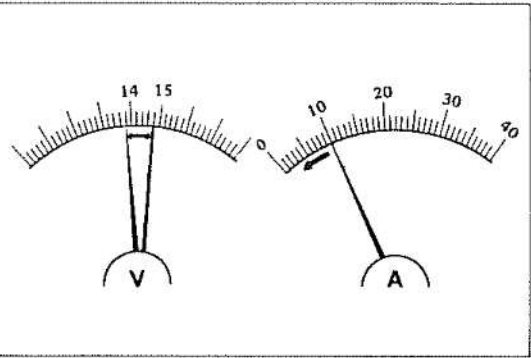
6. Specific gravity 1.25 – 1.27
Connect the voltmeter and ammeter as shown in the figure.

Fig. 11-11



- PERFORMANCE TEST USING VOLT-METER & AMMETER**
1. Disconnect the wire from terminal B of the alternator and connect the wire to the negative terminal of the ammeter.
 2. Connect the test lead from the positive terminal of the ammeter to terminal B of the alternator.
 3. Connect the positive lead of the voltmeter to terminal B of the alternator.
 4. Connect the negative lead of the voltmeter to ground.

Fig. 11-12

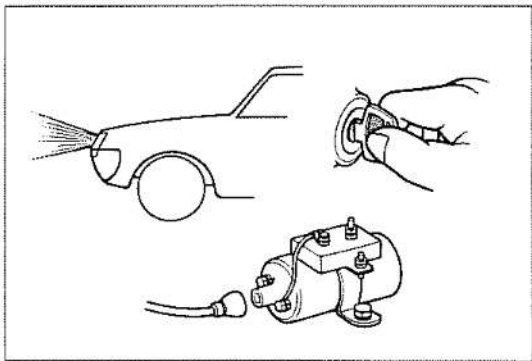


– Note –
Be careful not to cause a short.

No-load Performance Test
Regulated voltage: 13.8 – 14.8V
Current: Less than 10A
Engine speed: Idling to 2,000 rpm

11-6 CHARGING SYSTEM – On-Vehicle Inspection

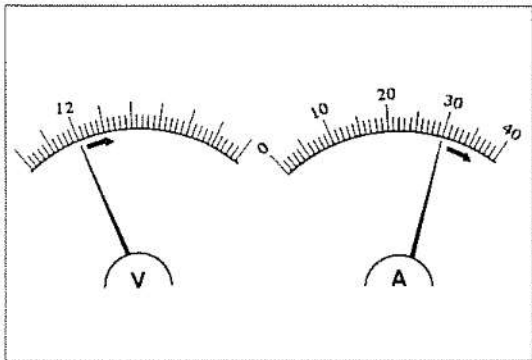
Fig. 11-13



Load Performance Test

- 1. Crank the engine with ignition coil high tension cord disconnected for about 5 to 10 seconds.
- 2. Turn on headlights and accessories.

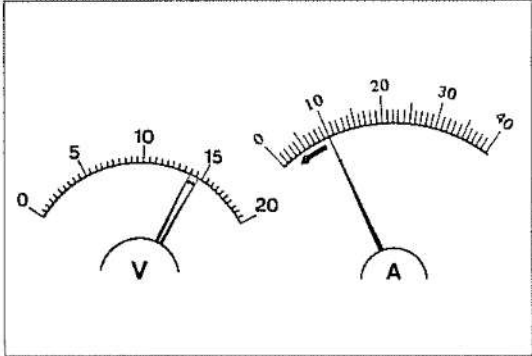
Fig. 11-14



- 3. Start engine, and run it at approximately 2,000 rpm.

Regulated voltage: 12V
Current: More than 30A

Fig. 11-15

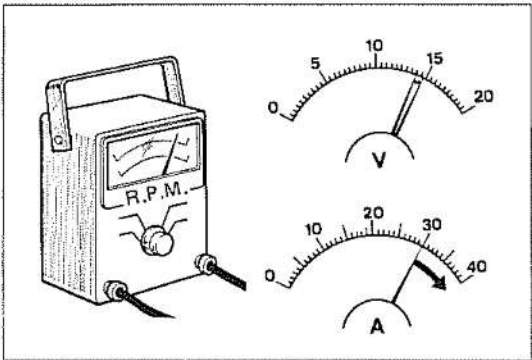


WITH IC REGURATOR TYPE

No-load Performance Test

Regulated voltage: 14.0 – 14.7V
Current: Less than 10A
Engine speed: Idling to 2,000 rpm

Fig. 11-16



Load Performance Test

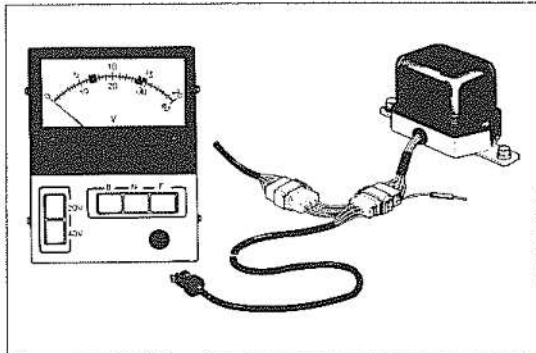
- 1. Run engine at 2,000 rpm.
- 2. Turn on headlights and all accessories.

Regulated voltage: 14.0 – 14.7V
Current: More than 30 A

CHARGING SYSTEM — On-Vehicle Inspection

11-7

Fig. 11-17

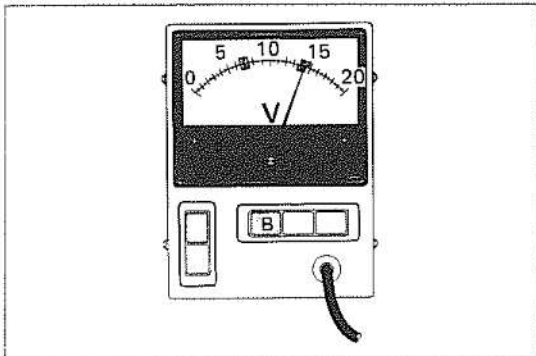


PERFORMANCE TEST BY ALTERNATOR CHECKER

SST [09081-00011]

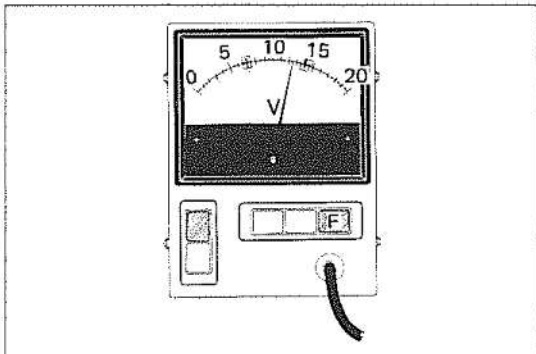
1. Unplug the alternator regulator connector and plug in the checker connector.
Push 20V switch.

Fig. 11-18



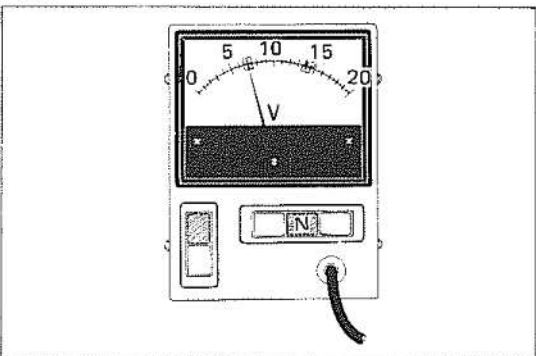
2. Check B terminal voltage.
Push B switch.
Raise engine speed from idling to 2,000 rpm.
Standard voltage: 13.8 – 14.8V
If not within standard, probable cause is the alternator regulator.

Fig. 11-19



3. Check F terminal voltage.
Push F switch.
Gradually raise engine speed. The checker reading should gradually decrease from 12 to 3 volts.
If decrease is not registered, probable cause is alternator regulator.

Fig. 11-20

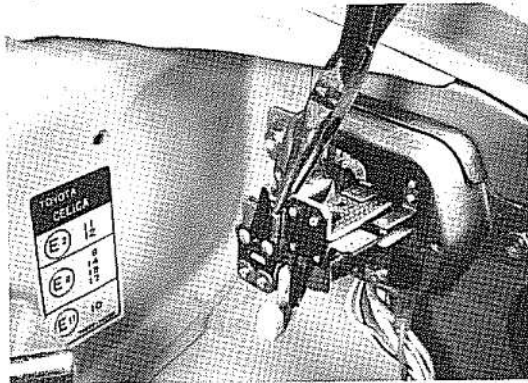


4. Check N terminal voltage.
Push N switch.
Maintain engine speed at approximately 1,500 rpm. The pointer should be at a half of B terminal voltage.
Standard voltage: 6.9 – 7.4V
If the voltage is higher, the cause will be (+) rectifier.
If the voltage is lower, the cause will be (–) rectifier.

11-8

CHARGING SYSTEM – On-Vehicle Inspection

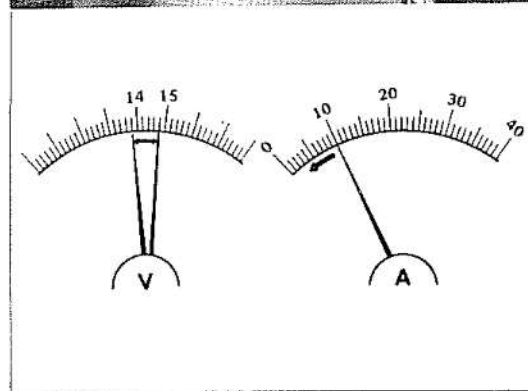
Fig. 11-21

**ADJUST OUTPUT VOLTAGE**

If not within the output voltage, adjust by bending the adjusting arm.

Voltage: 13.8 – 14.8V

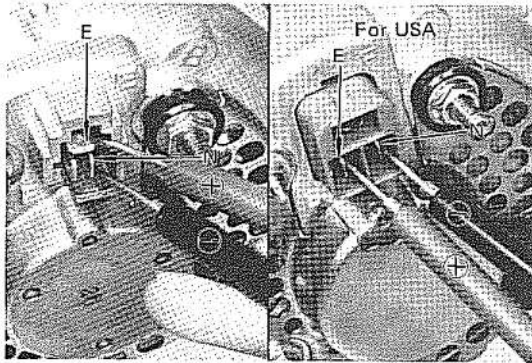
Engine speed: Idling to 2,000 rpm



CHARGING SYSTEM – On-Vehicle Inspection

11-9

Fig. 11-22



ALTERNATOR INSPECTION

1. Negative side rectifier short test.
Connect an ohmmeter (–) lead to N terminal and (+) lead to E terminal.
Meter should indicate infinity.

Fig. 11-23



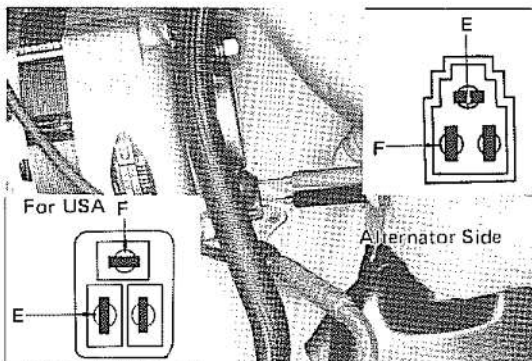
2. Positive side rectifier short test.
Connect an ohmmeter (–) lead to B terminal and (+) lead to N terminal.
Meter should indicate infinity.

Fig. 11-24



3. Check rotor coil resistance.
Resistance: 5 – 9 Ω

Fig. 11-25



4. Turn the ignition switch to ON position, and check to see if there is battery voltage at F terminal. If not, check the ENGINE fuse.

11-10 CHARGING SYSTEM – Alternator

ALTERNATOR
CUTAWAY VIEW

Fig. 11-26

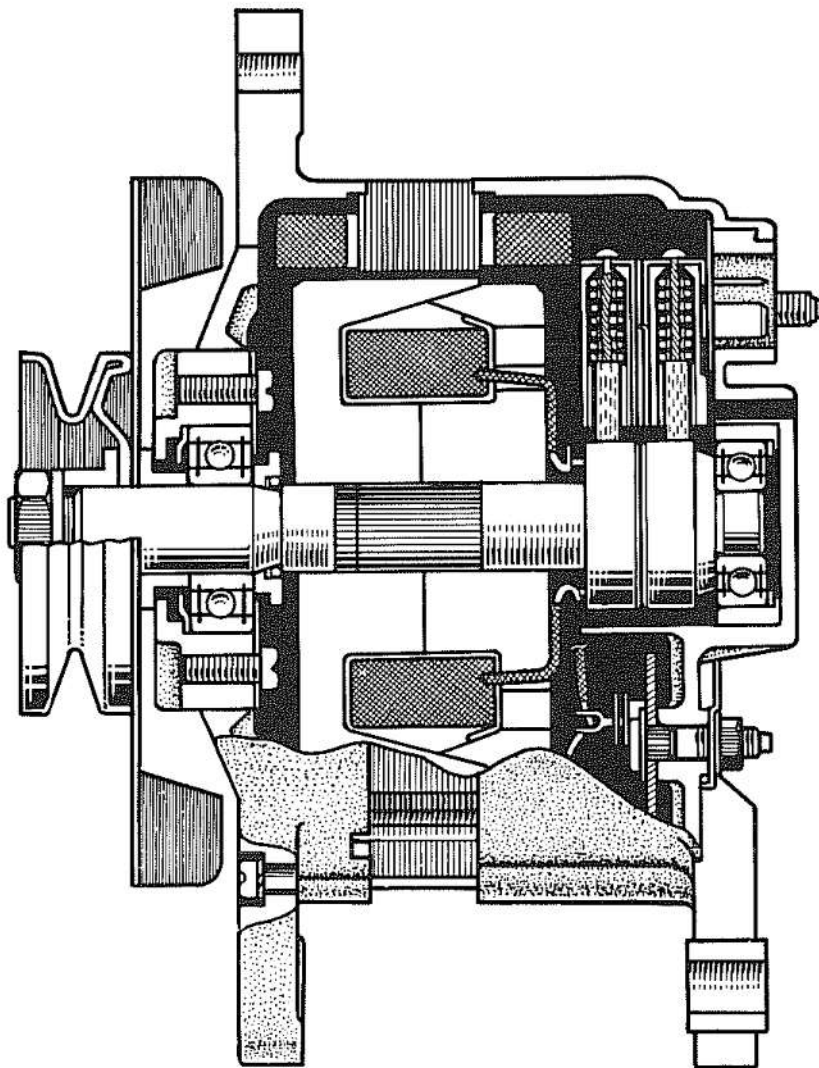
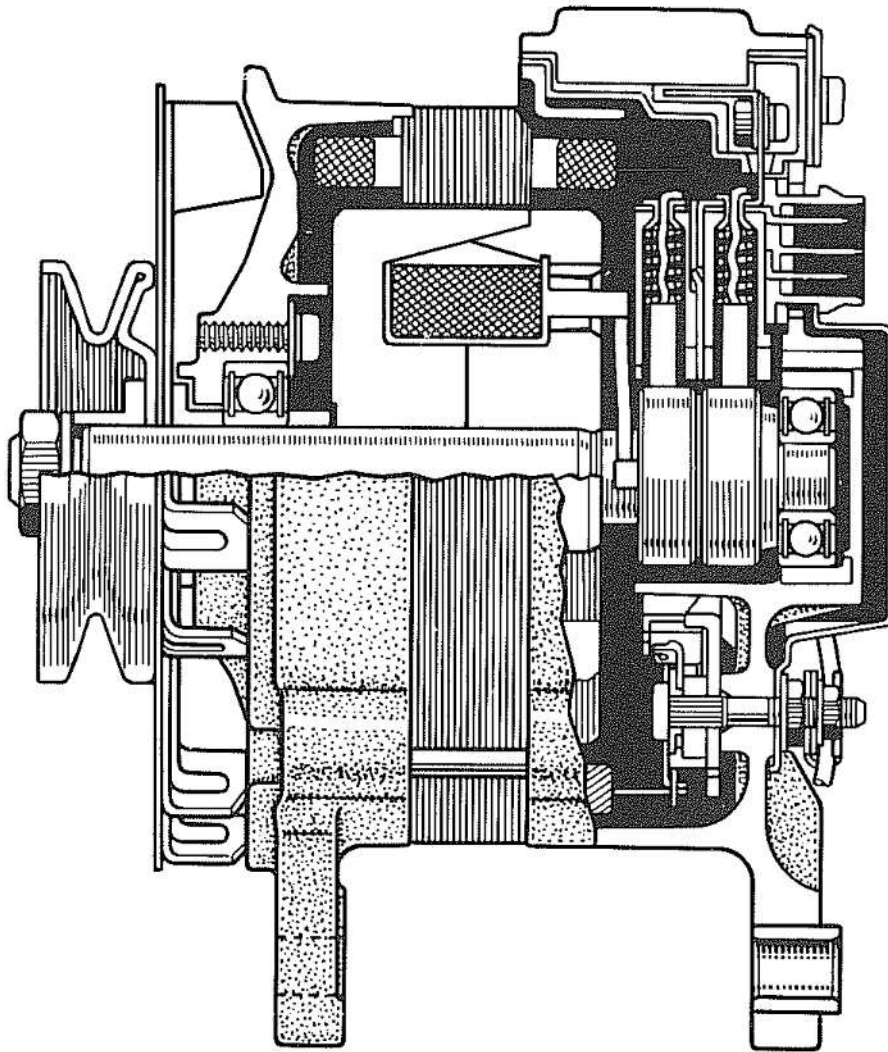


Fig. 11-27

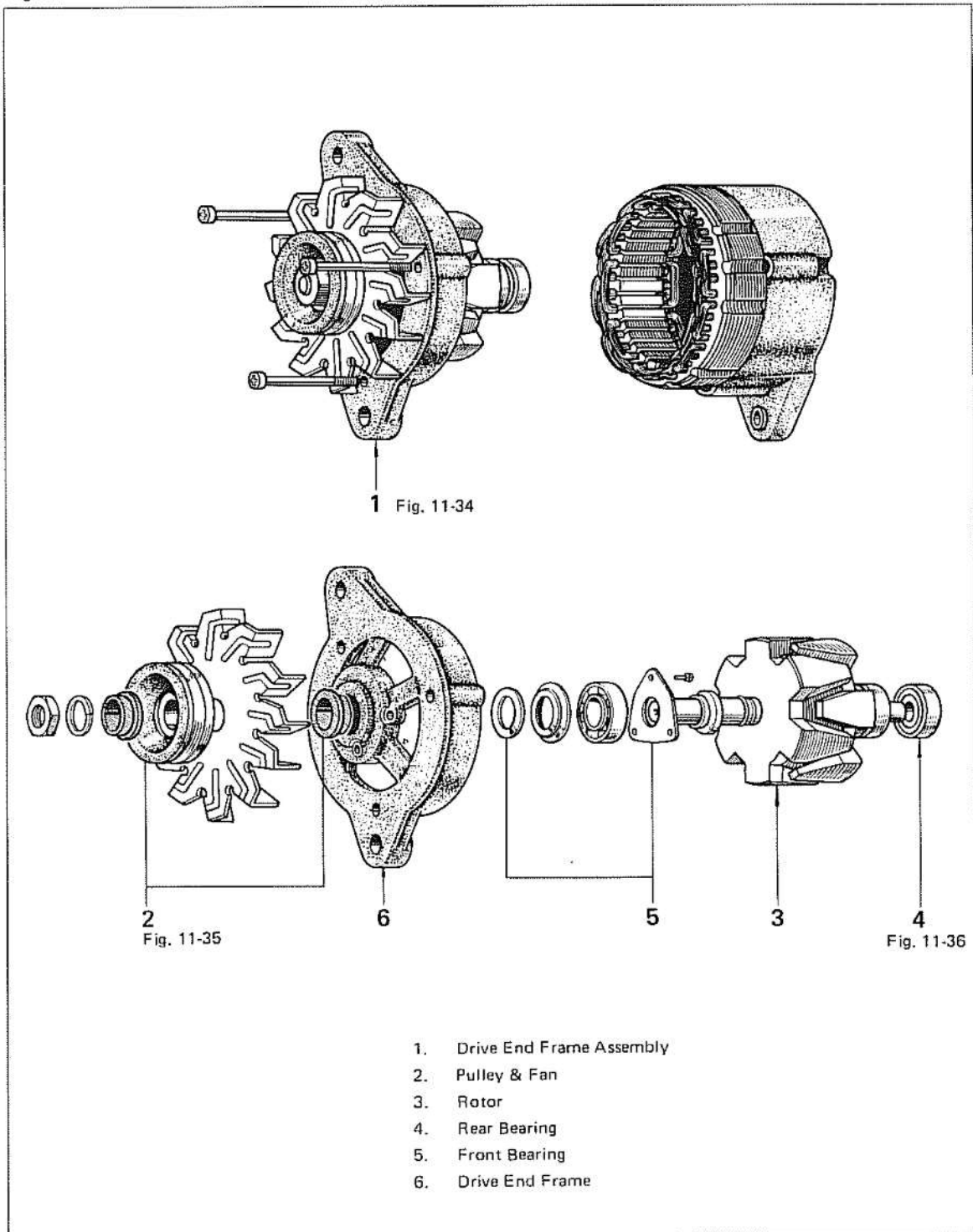
For ALTERNATOR WITH IC REGULATOR



11-12

CHARGING SYSTEM – Alternator**DISASSEMBLY**

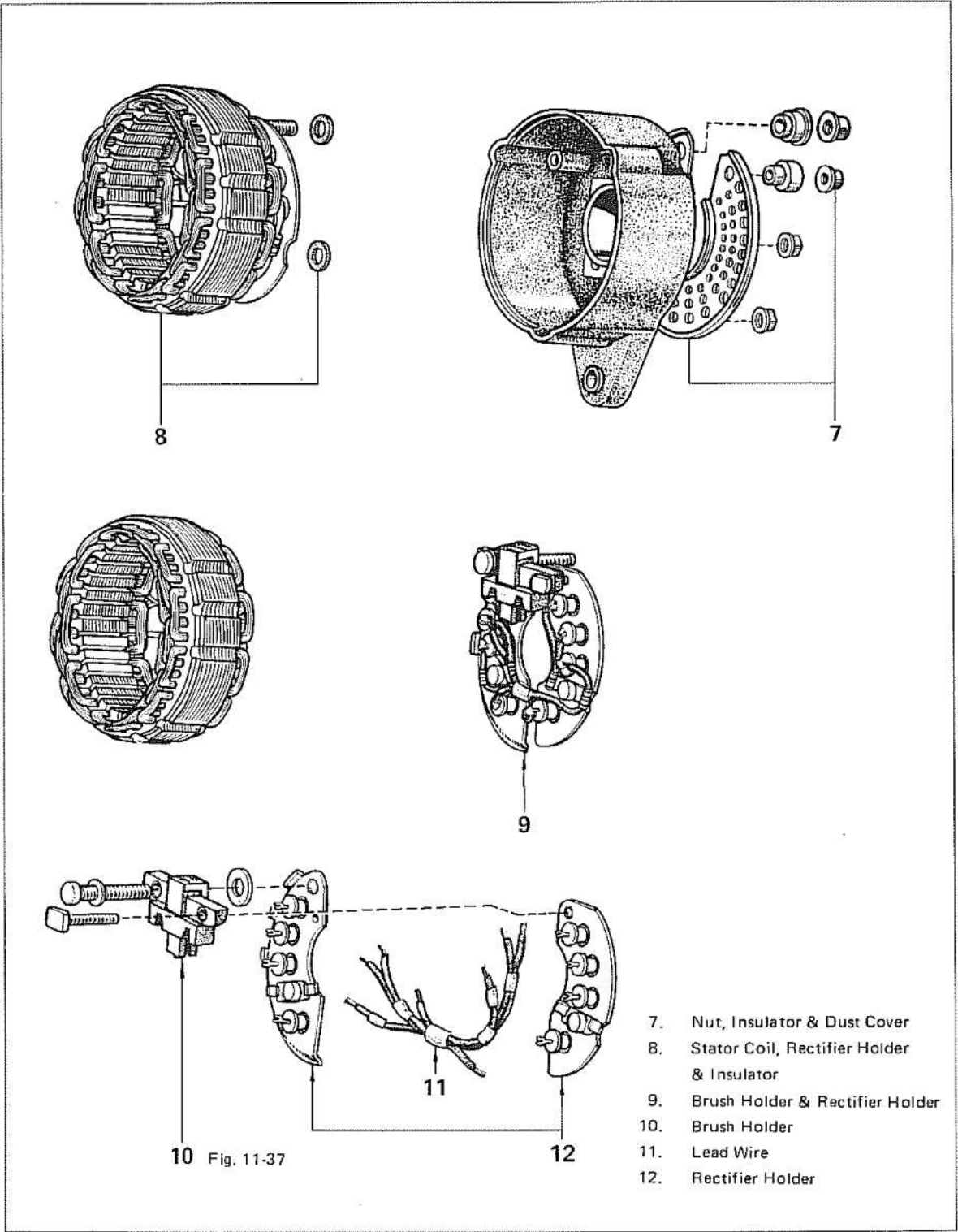
Disassemble the parts in the numerical order shown in the figure.

Fig. 11-28

CHARGING SYSTEM – Alternator 11–13

Disassemble the parts in the numerical order shown in the figure.

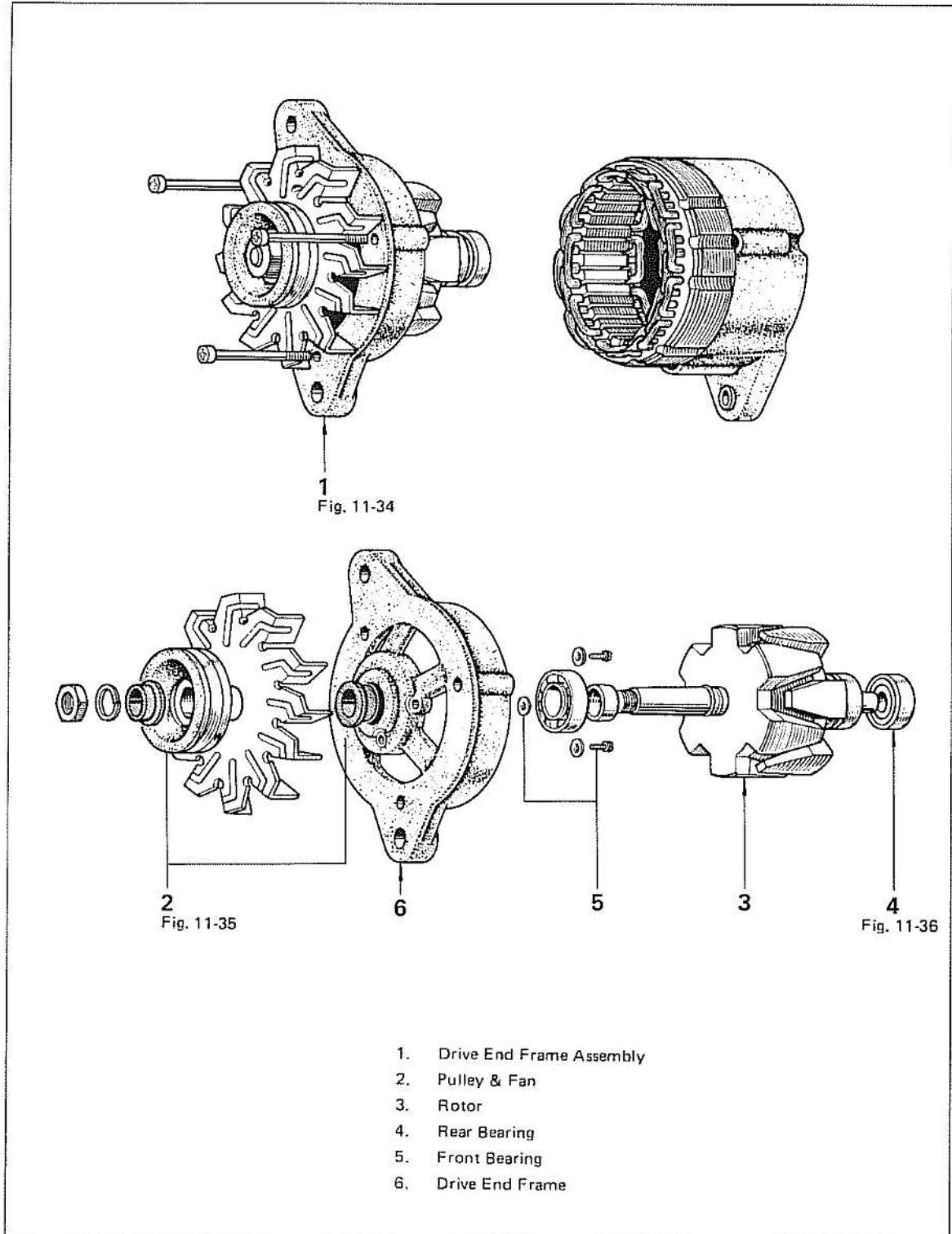
Fig. 11-29



11-14 CHARGING SYSTEM – Alternator

Disassemble the parts in the numerical order shown in the figure.

Fig. 11-30

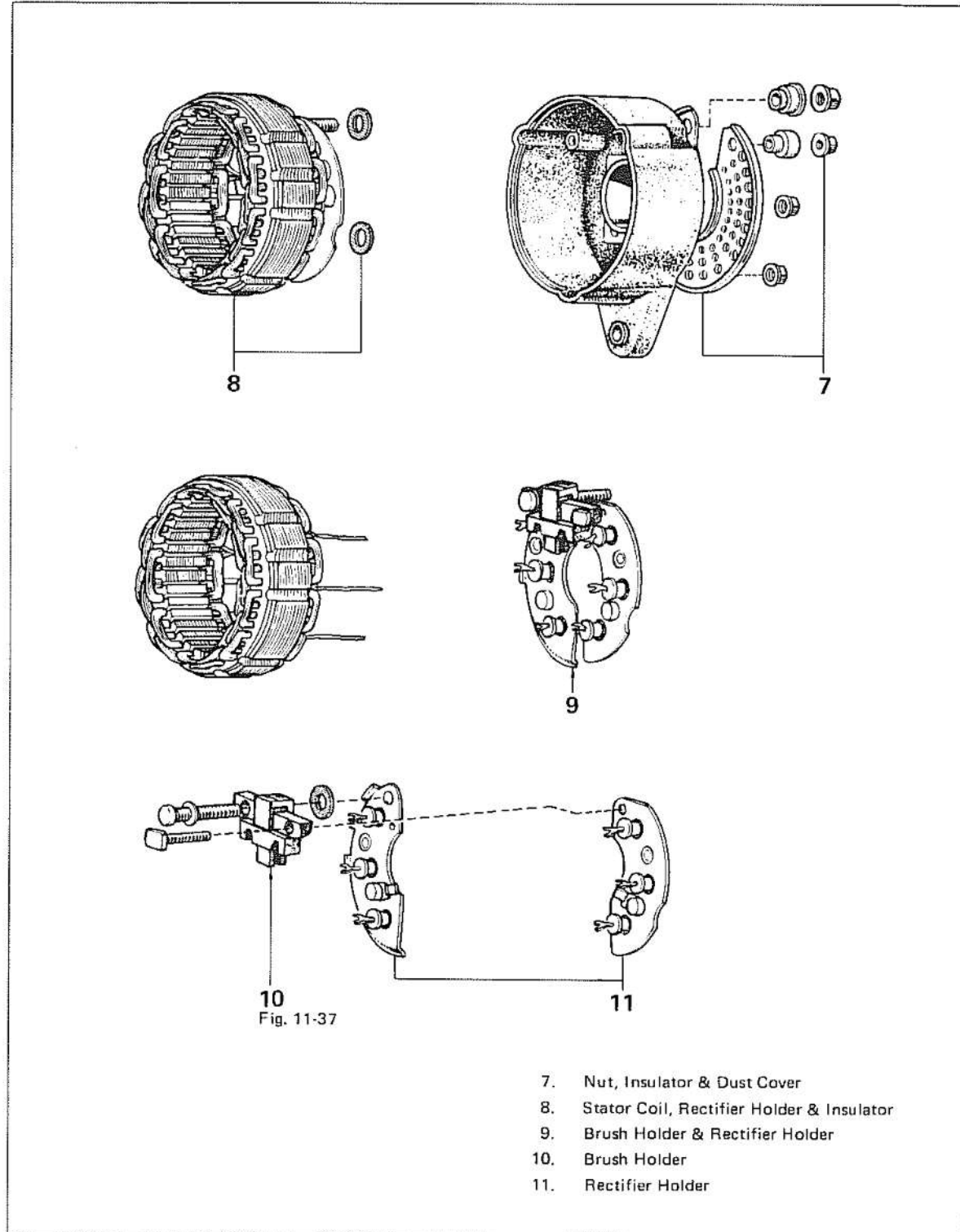


CHARGING SYSTEM – Alternator

11-15

Disassemble the parts in the numerical order shown in the figure.

Fig. 11-31

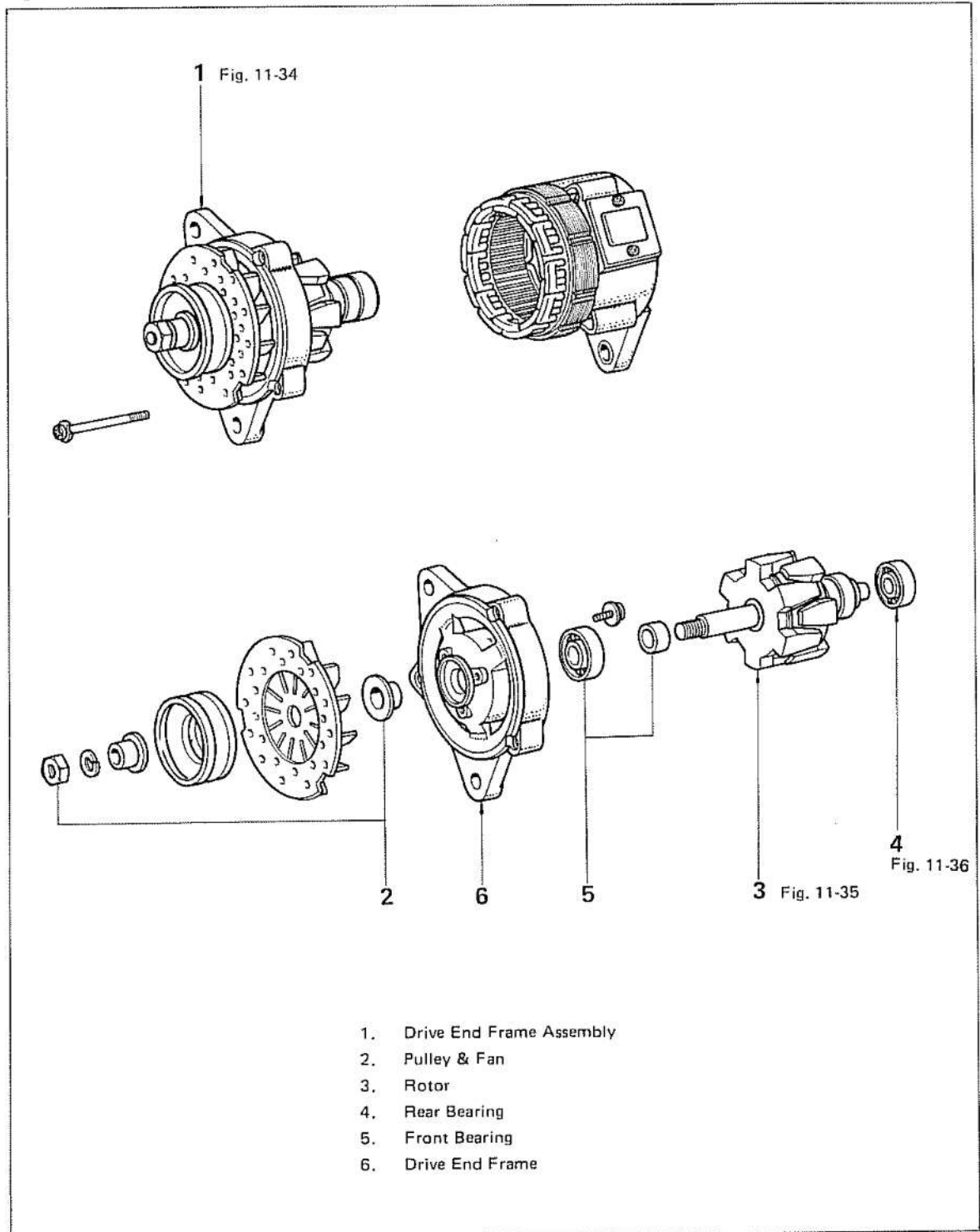


11-16 CHARGING SYSTEM – Alternator

For Alternator with IC Regulator

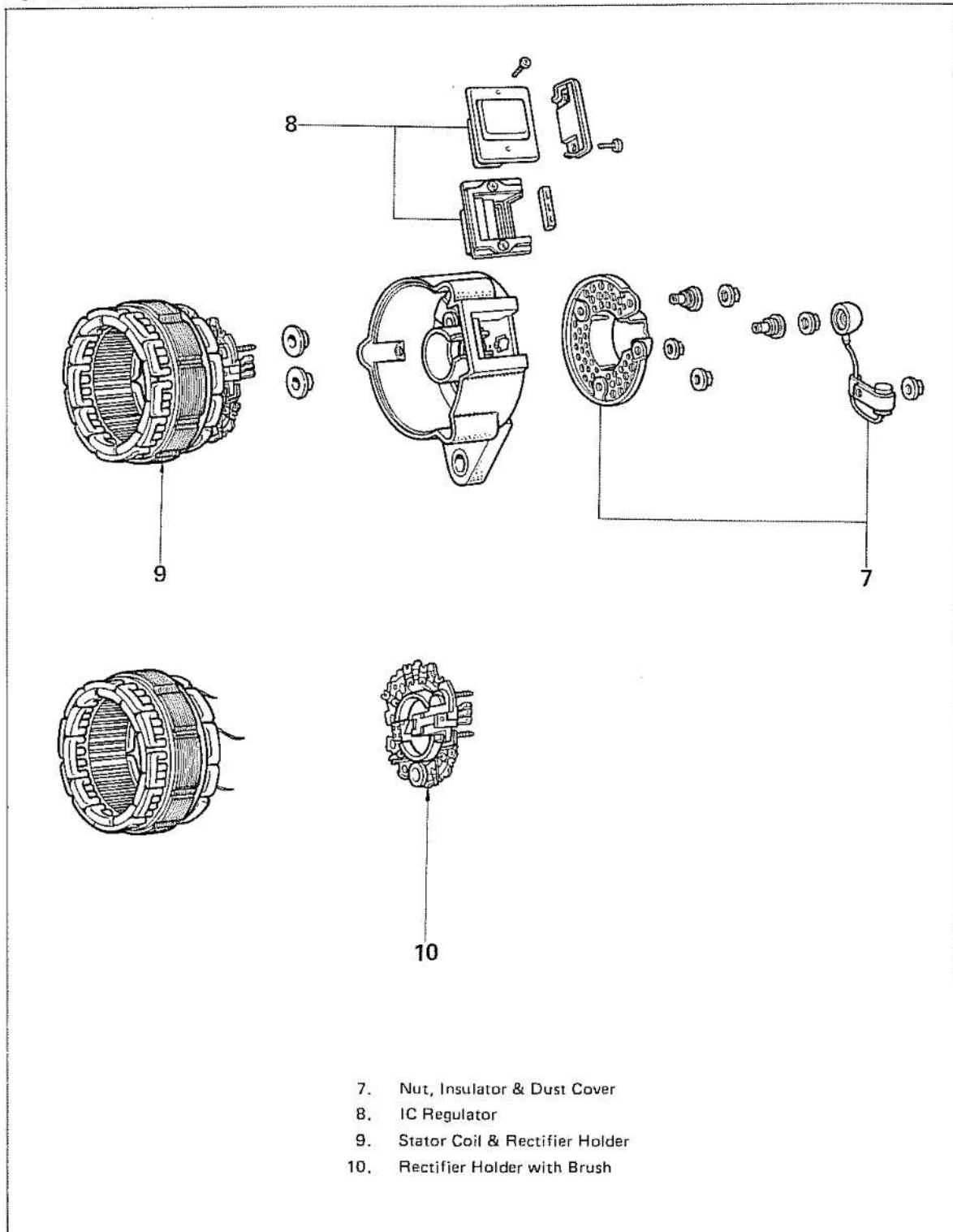
Disassemble the parts in the numerical order shown in the figure.

Fig. 11-32



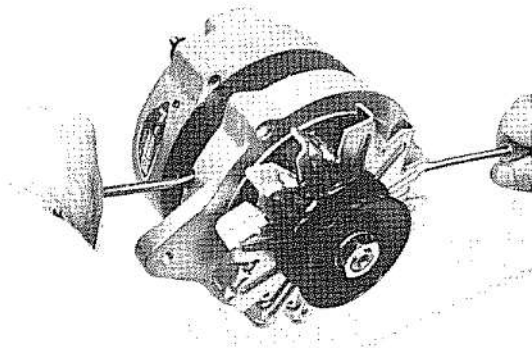
CHARGING SYSTEM – Alternator**11-17**

Disassemble the parts in the numerical order shown in the figure.

Fig. 11-33

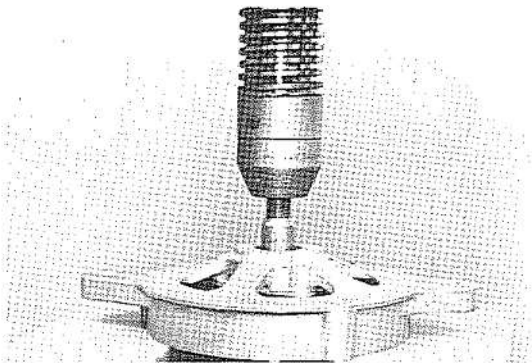
11-18 **CHARGING SYSTEM – Alternator**

Fig. 11-34



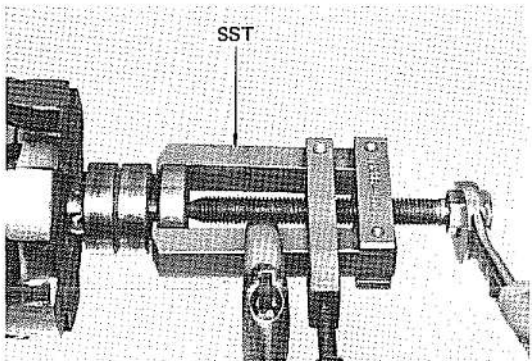
Pry the drive end frame from the stator and tap it off.

Fig. 11-35



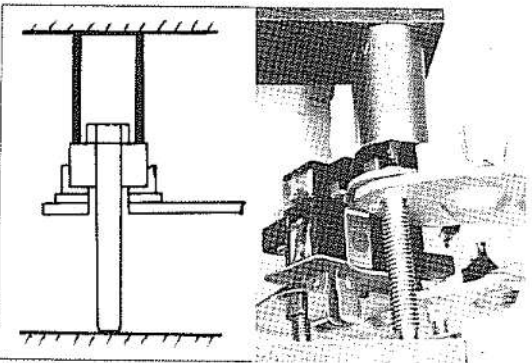
Remove the rotor from the drive end frame with a press.

Fig. 11-36



Remove the rotor shaft rear bearing with SST, SST [09286-46011]

Fig. 11-37

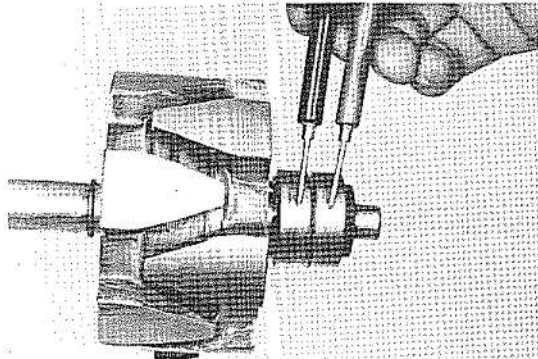


Remove the brush holder assembly with a 10 mm socket wrench and vise.

CHARGING SYSTEM – Alternator

11-19

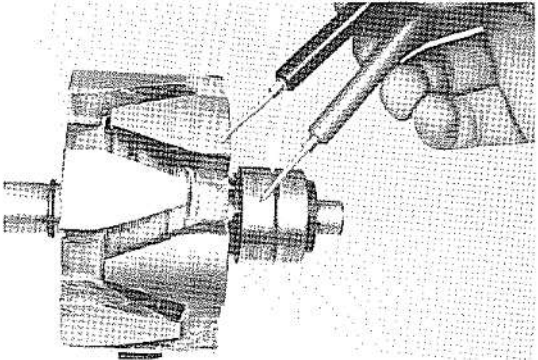
Fig. 11-38

**INSPECTION & REPAIR****Rotor**

1. Open circuit test

Standard resistance: 4.1 – 4.3 Ω

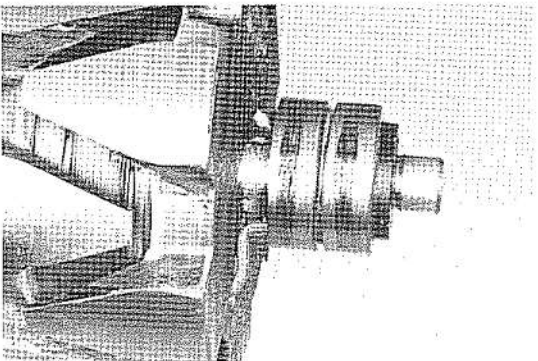
Fig. 11-39



2. Ground test

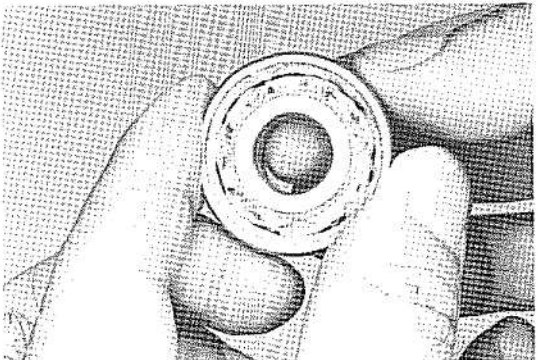
Meter should indicate infinity.

Fig. 11-40



3. Check slip ring for being dirt or burn.

Fig. 11-41

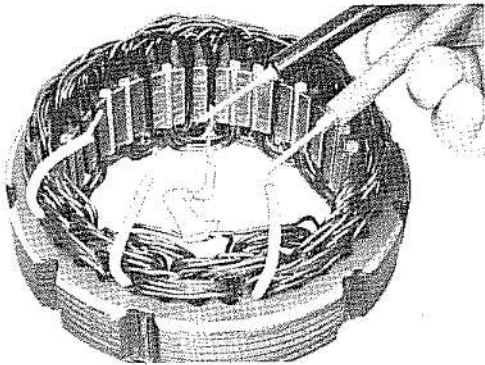
**Bearing**

Check bearing for wear or roughness.

11-20

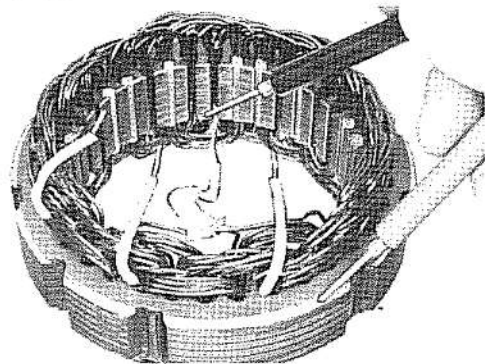
CHARGING SYSTEM – Alternator

Fig. 11-42

**Stator**

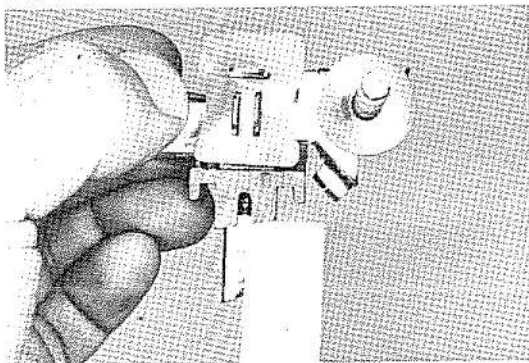
1. Open circuit test
Test all four leads for continuity.

Fig. 11-43



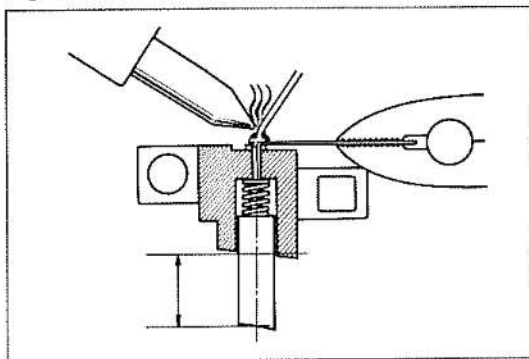
2. Ground test
Meter should indicate infinity.

Fig. 11-44

**Brush & Brush Holder**

1. Check the exposed brush length.
Minimum exposed length: 5.5 mm (0.22 in.)

Fig. 11-45



2. When replacing the brushes, assemble them as shown in the figure.

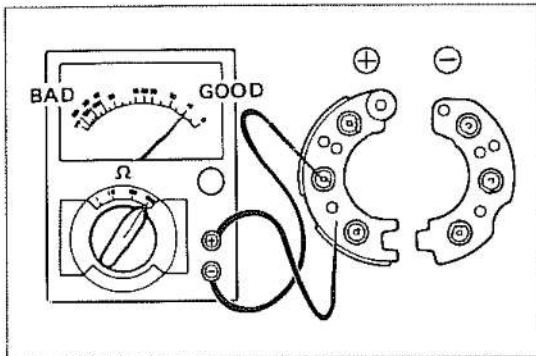
Exposed length: 12.5 mm (0.49 in.)

**with IC regulator
16.5 mm (0.65 in.)**

CHARGING SYSTEM – Alternator

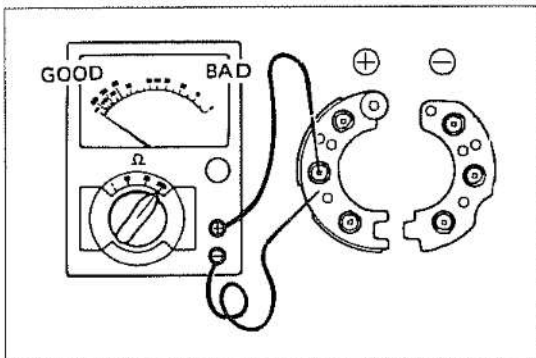
11-21

Fig. 11-46

**Rectifier**

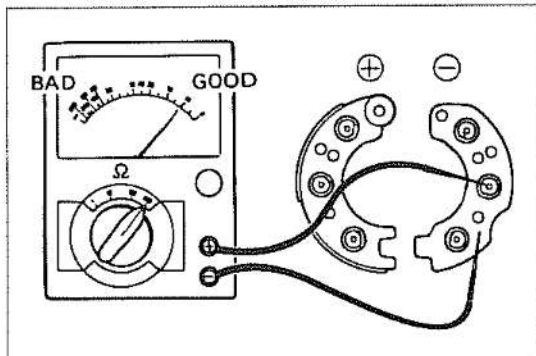
1. Rectifier holder positive side
Connect an ohmmeter (+) lead to the rectifier holder, and the (-) lead of the meter to the rectifier terminal. If there is no continuity, rectifier assembly must be replaced.

Fig. 11-47



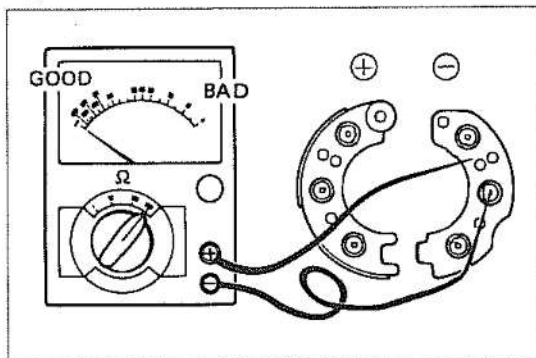
2. Reverse polarity of test leads and check again. If there is continuity, rectifier assembly must be replaced.

Fig. 11-48



3. Rectifier holder negative side
Connect an ohmmeter (+) lead to the rectifier terminal, and the (-) lead of the meter to the rectifier holder. If there is no continuity, rectifier assembly must be replaced.

Fig. 11-49

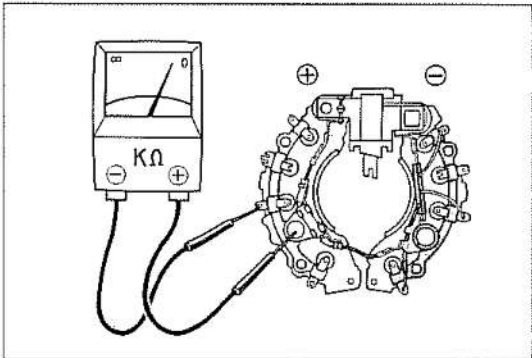


4. Reverse polarity of test leads and check again. If there is continuity, rectifier assembly must be replaced.

11-22

CHARGING SYSTEM – Alternator

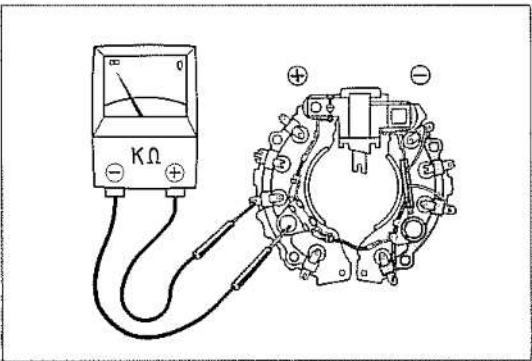
Fig. 11-50



Rectifier (for Alternator with IC Regulator)

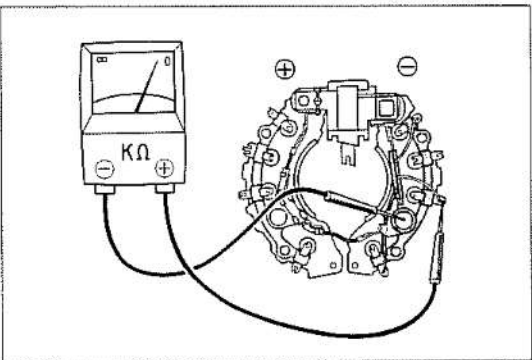
1. Rectifier holder positive side
Connect an ohmmeter (+) lead to the rectifier holder, and the (-) lead of the meter to the rectifier terminal. If there is no continuity, rectifier assembly must be replaced.

Fig. 11-51



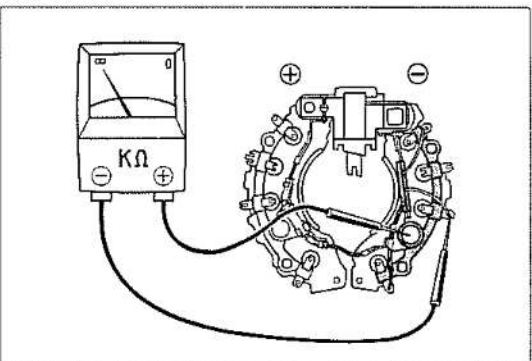
2. Reverse polarity of test leads and check again. If there is continuity, rectifier assembly must be replaced.

Fig. 11-52



3. Rectifier holder negative side
Connect an ohmmeter (+) lead to the rectifier terminal, and the (-) lead of the meter to the rectifier holder. If there is non continuity, rectifier assembly must be replaced.

Fig. 11-53

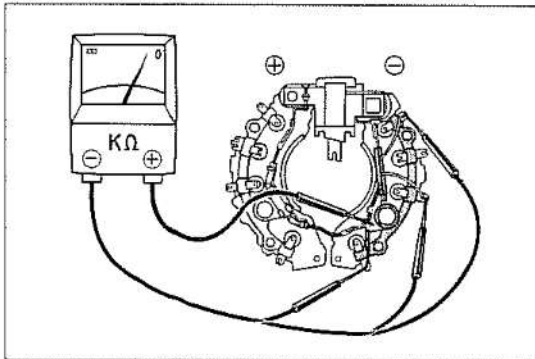


4. Reverse polarity of test leads and check again. If there is continuity, rectifier assembly must be replaced.

CHARGING SYSTEM – Alternator

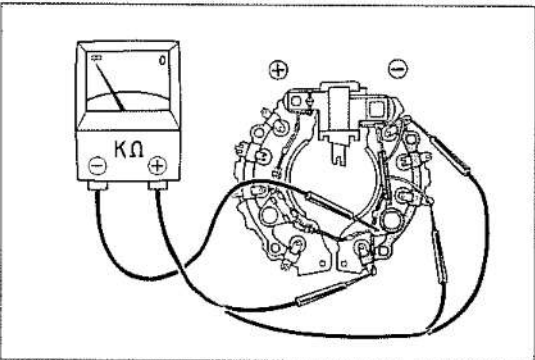
11-23

Fig. 11-54

**Field Diodes (for Alternator with IC Regulator)**

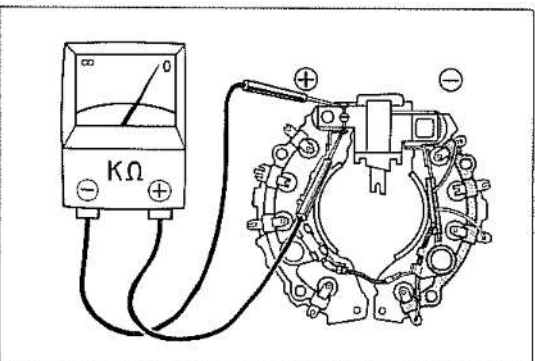
1. Connect an ohmmeter (+) lead to the rectifier holder, and the (-) lead of the meter to the field diode terminal. If there is no continuity, rectifier assembly must be replaced.

Fig. 11-55



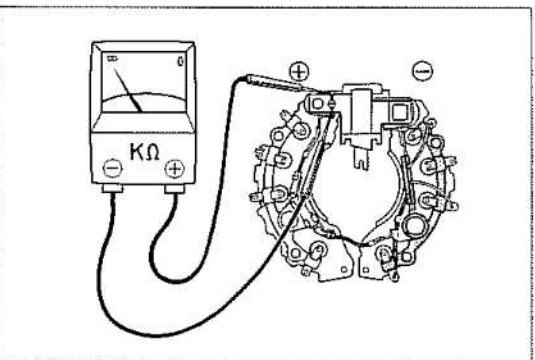
2. Reverse polarity of test leads and check again. If there is continuity, rectifier assembly must be replaced.

Fig. 11-56

**Diode (for Alternator with IC Regulator)**

1. Connect an ohmmeter (+) lead to the resistor side, and the (-) lead of the meter to the diode other side. If there is no continuity, rectifier assembly must be replaced.

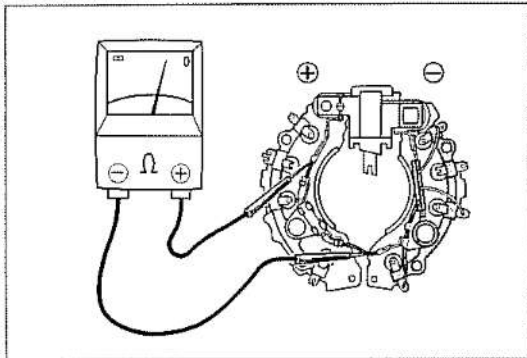
Fig. 11-57



2. Reverse polarity of test leads and check again. If there is continuity, rectifier assembly must be replaced.

11-24 CHARGING SYSTEM – Alternator

Fig. 11-58

**Resistor (for Alternator with IC Regulator)**

Connect an ohmmeter (+) lead to the diode side, and the (-) lead of the meter to the (-) rectifier side. If there is no continuity, rectifier assembly must be replaced.

Resistance: 2.8 – 3.0 Ω

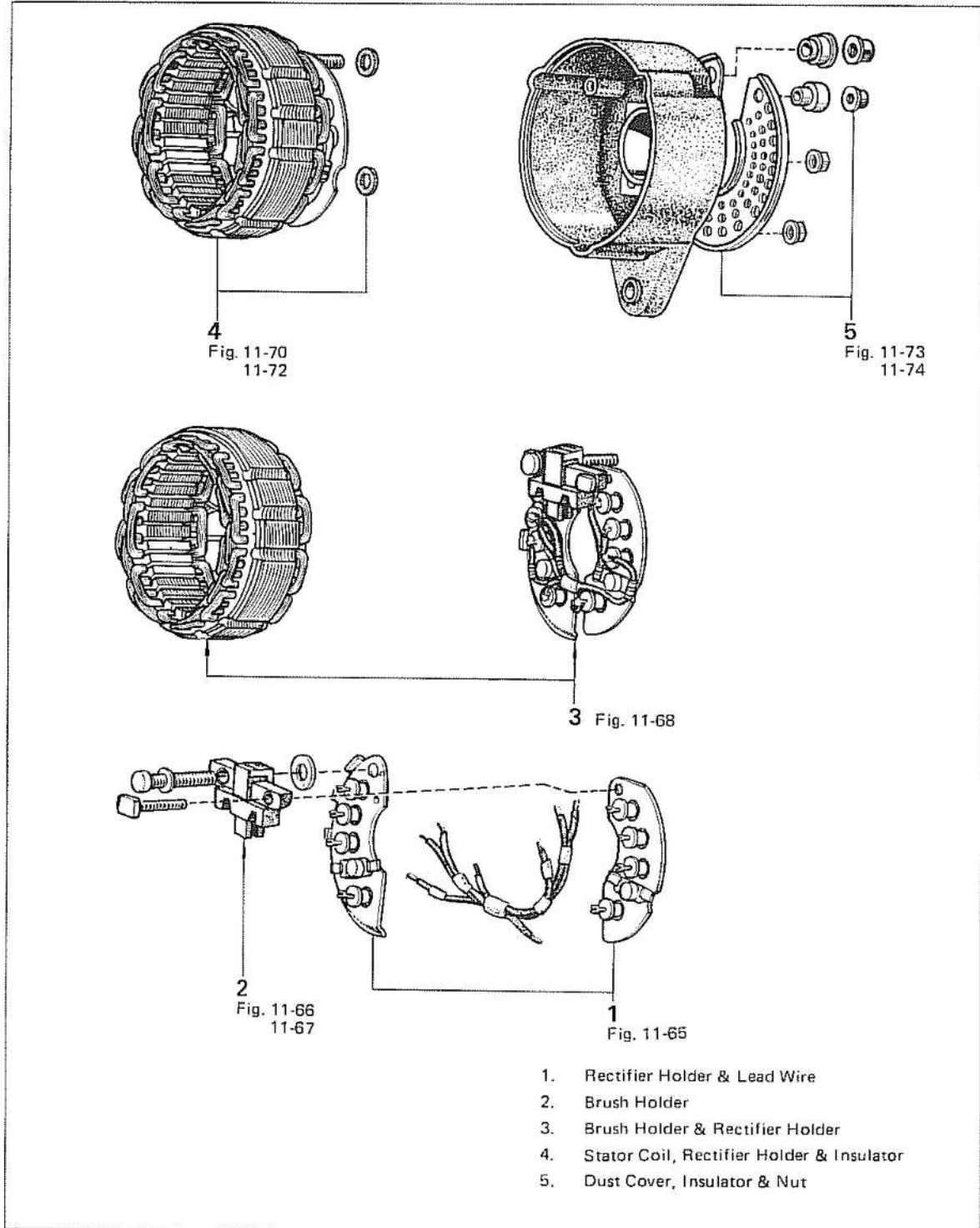
CHARGING SYSTEM — Alternator

11-25

ASSEMBLY

Assemble the parts in the numerical order shown in the figure.

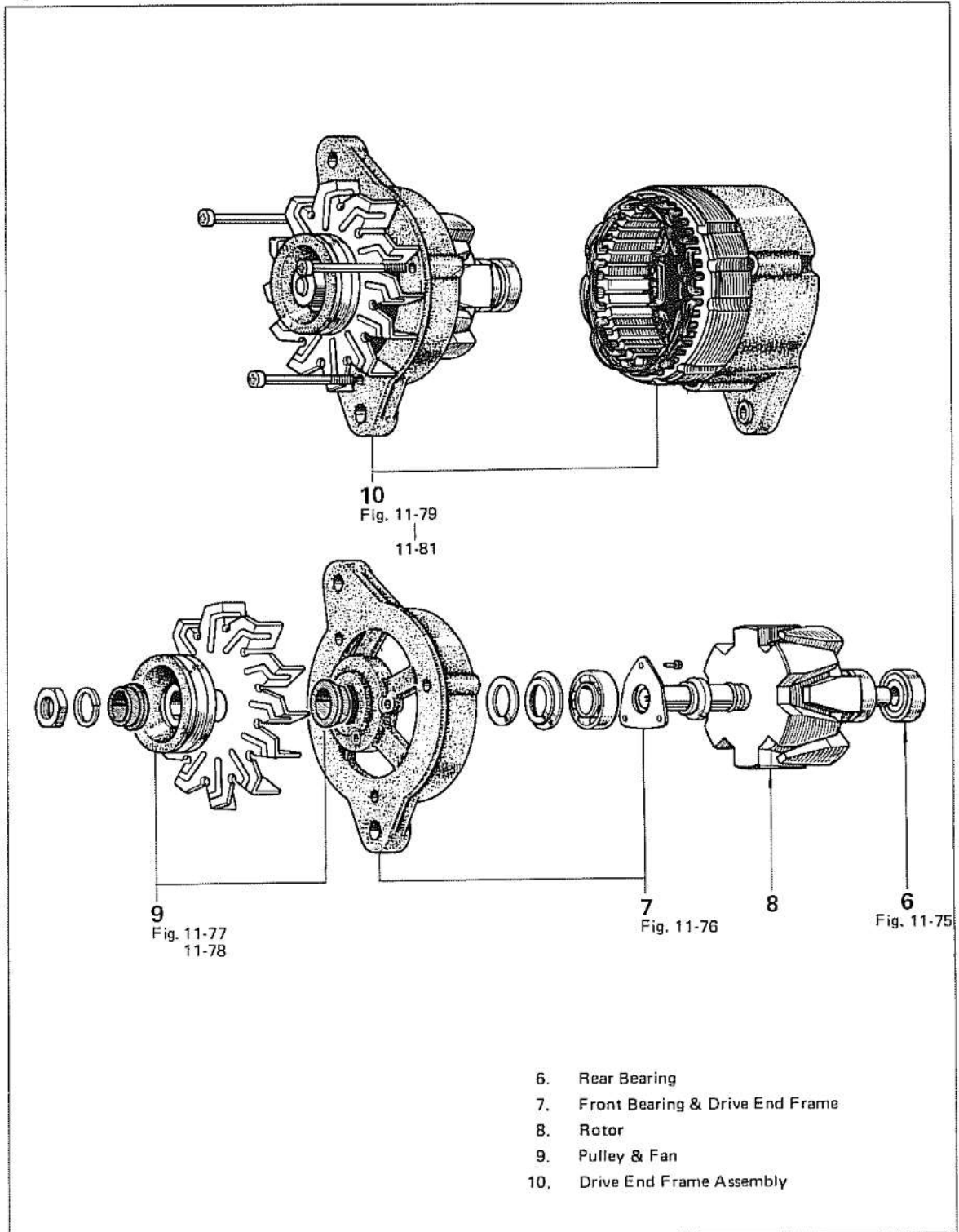
Fig. 11-59



11-26

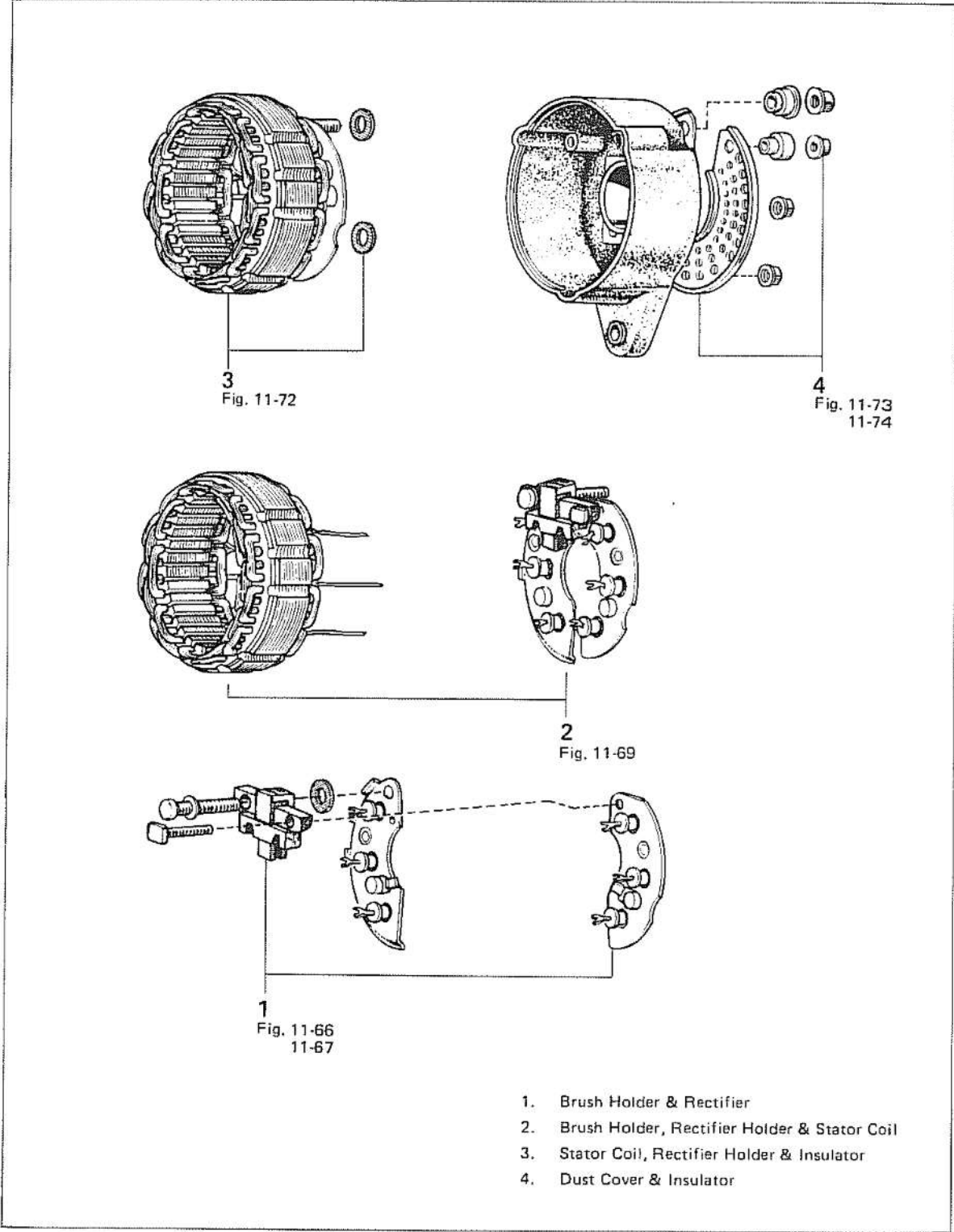
CHARGING SYSTEM – Alternator

Assemble the parts in the numerical order shown in the figure.

Fig. 11-60

Assemble the parts in the numerical order shown in the figure.

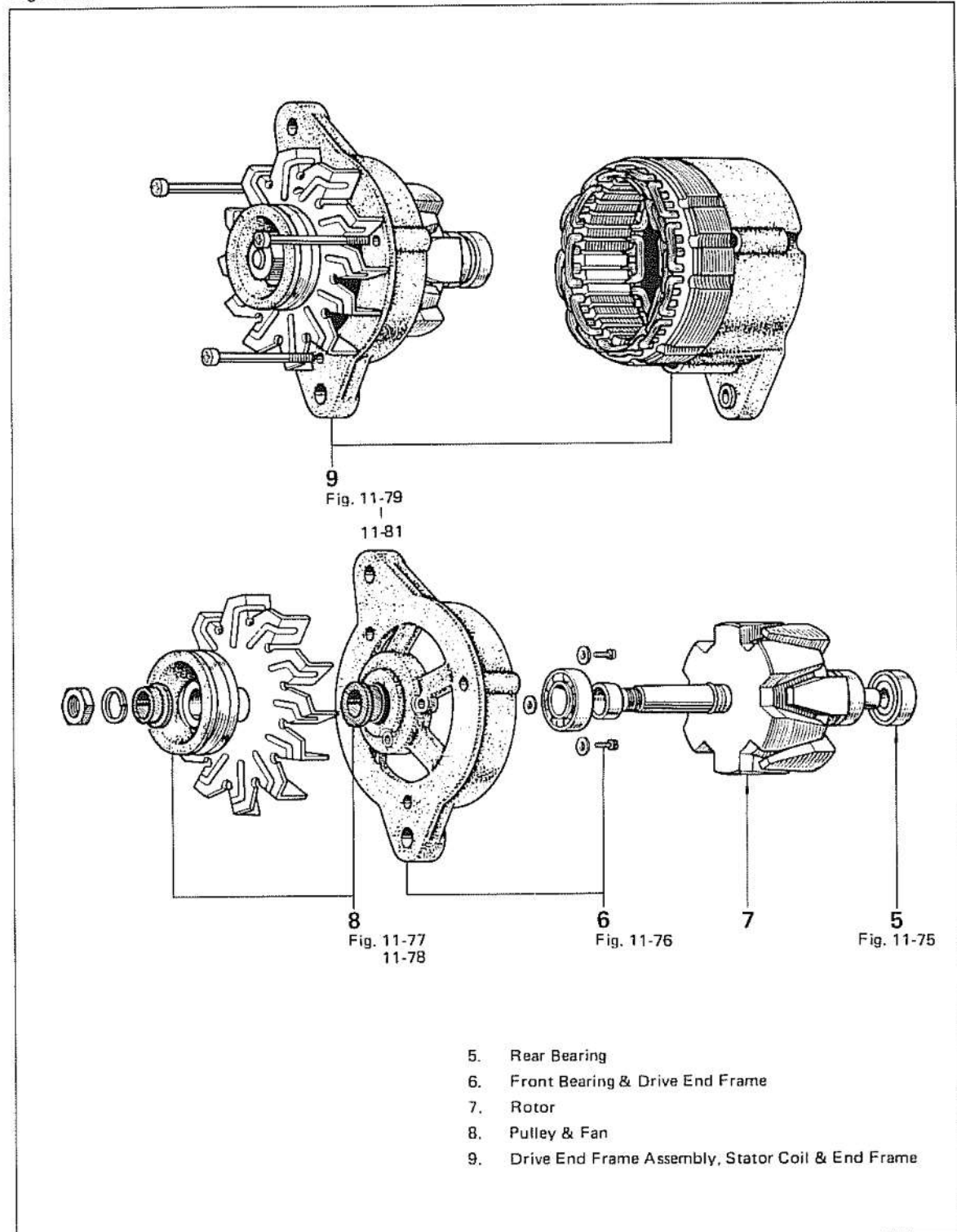
Fig. 11-61



11-28 CHARGING SYSTEM – Alternator

Assemble the parts in the numerical order shown in the figure.

Fig. 11-62

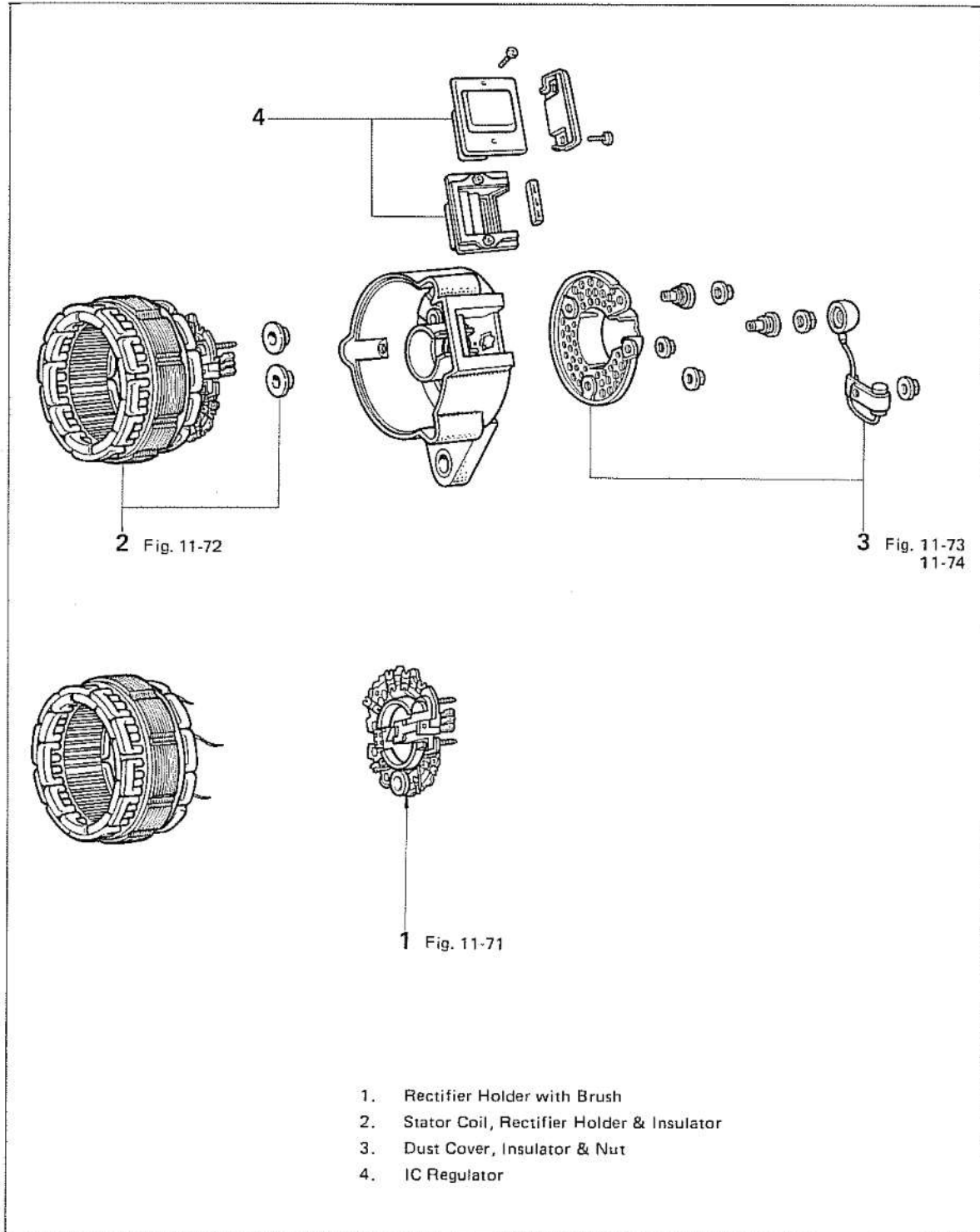


CHARGING SYSTEM – Alternator

11-29

For Alternator with IC Regulator

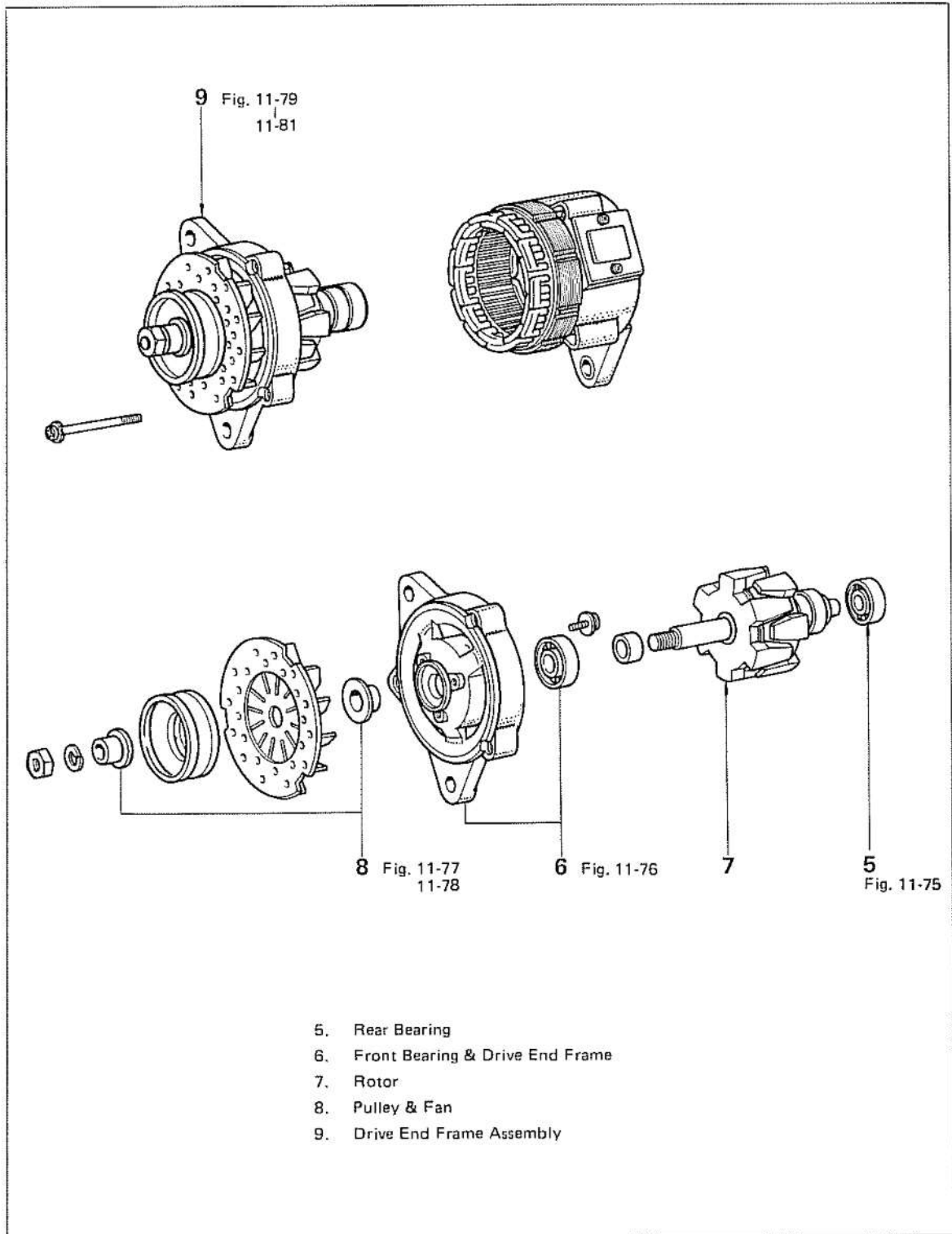
Assemble the parts in the numerical order shown in the figure.

Fig. 11-63

11-30

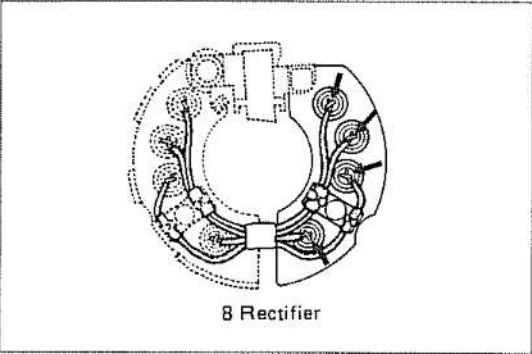
CHARGING SYSTEM – Alternator

Assemble the parts in the numerical order shown in the figure.

Fig. 11-64

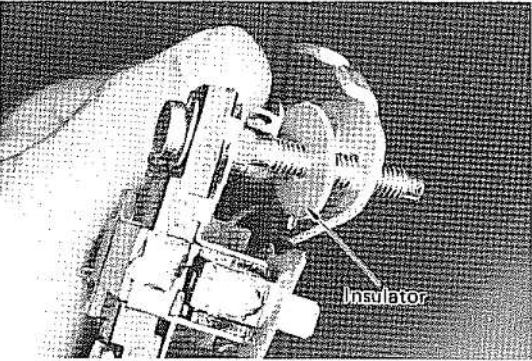
5. Rear Bearing
6. Front Bearing & Drive End Frame
7. Rotor
8. Pulley & Fan
9. Drive End Frame Assembly

Fig. 11-65



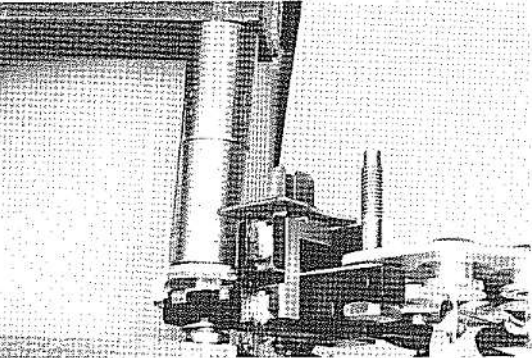
[With 8 rectifier]
Solder negative side rectifiers.

Fig. 11-66



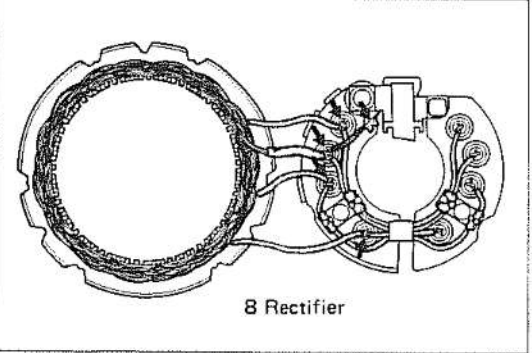
Insert insulator between the positive rectifier holder and brush holder.

Fig. 11-67



Install the brush holder onto the rectifier holder with a socket wrench and vise.

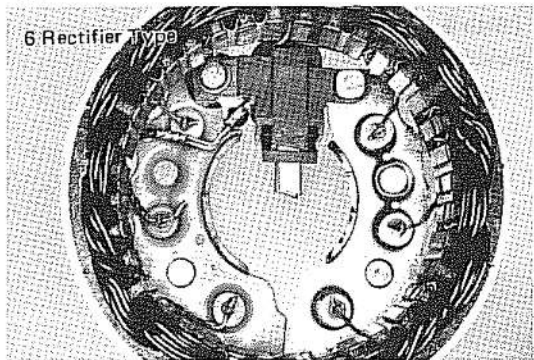
Fig. 11-68



[With 8 rectifier]
Connect stator coil N lead onto (+) rectifier terminal and brush holder terminal.

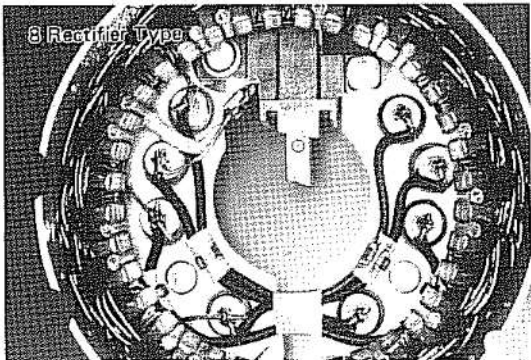
11-32 CHARGING SYSTEM – Alternator

Fig. 11-69



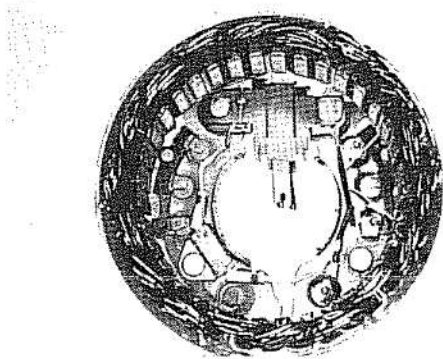
[With 6 rectifier]
Solder each lead wire onto rectifier or terminal as shown in the figure.

Fig. 11-70



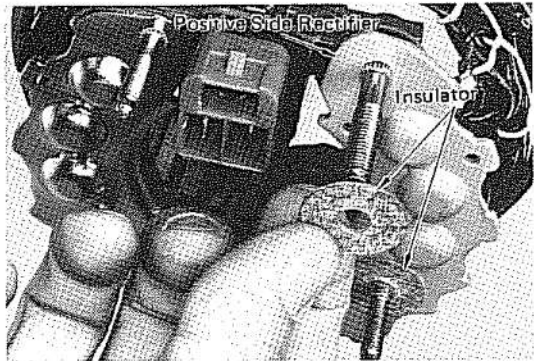
[With 8 rectifier]
Solder each lead wire onto rectifier or terminal as is shown in the figure.

Fig. 11-71



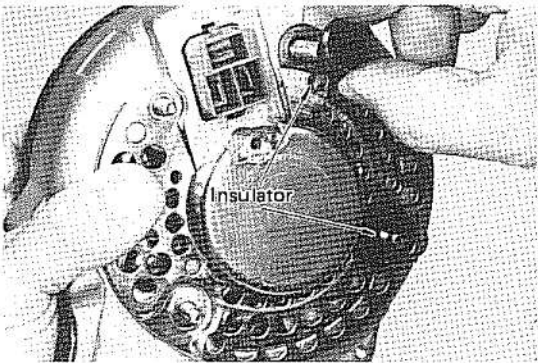
[with IC regulator]
Solder each lead wire onto rectifier or terminal as is shown in the figure.

Fig. 11-72



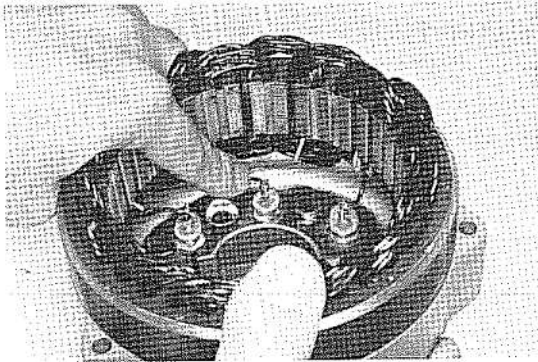
Assemble the rear end frame and rectifier holder with insulators.

Fig. 11-73



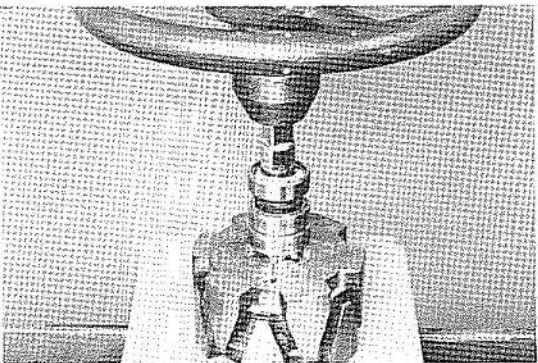
Assemble the rear end cover with the insulators.

Fig. 11-74



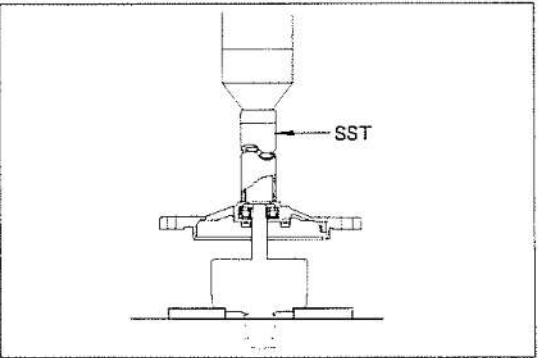
If there is danger of the stator coil terminal wiring contacting the frame or rotor, correct by bending the wiring.

Fig. 11-75



Press the rear bearing onto the rotor shaft, with a press.

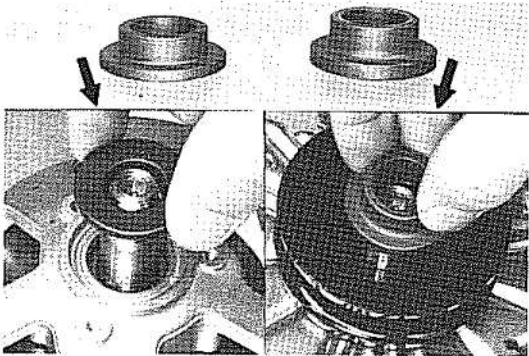
Fig. 11-76



Press and drive the end frame assembly onto the rotor shaft with SST.
SST[09612-22010]

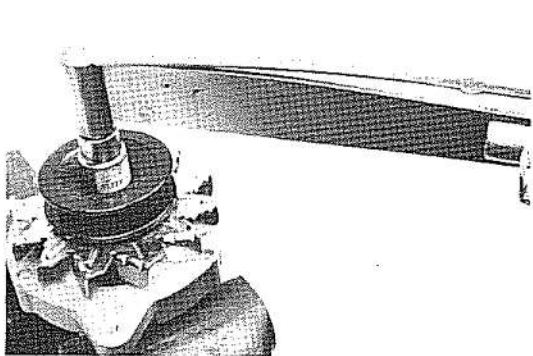
11-34 CHARGING SYSTEM – Alternator

Fig. 11-77



Install the collars as shown in the figure.

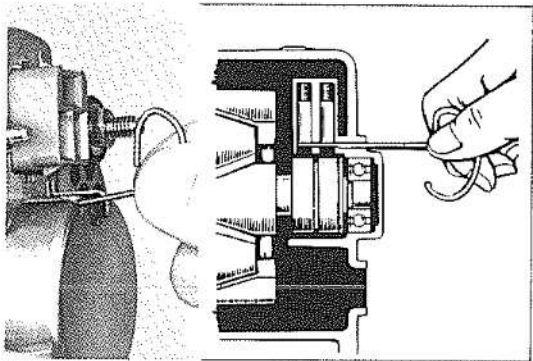
Fig. 11-78



Tighten the nut to specified torque.

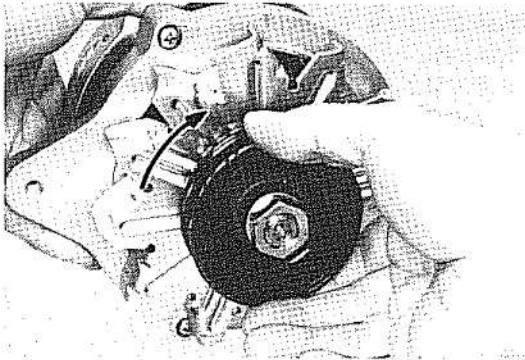
Tightening torque: 5.0 – 6.5 kg-m
(37 – 47 ft-lb)

Fig. 11-79



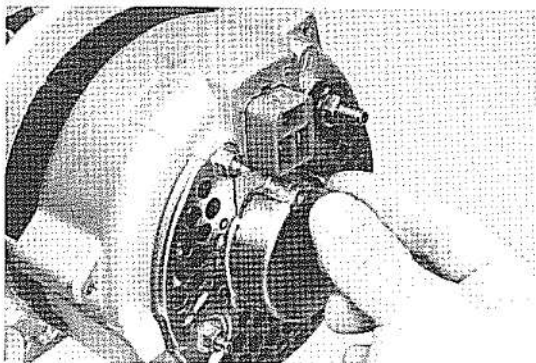
Push in brushes and temporarily lock them in place with a wire inserted through the access hole in end frame.
Position lead wires to clear rotor.

Fig. 11-80



Remove locking wire form the rear end frame and make sure the rotor rotates smoothly.

Fig. 11-81



Seal the brush service hole.

ALTERNATOR REGULATOR

Fig. 11-82

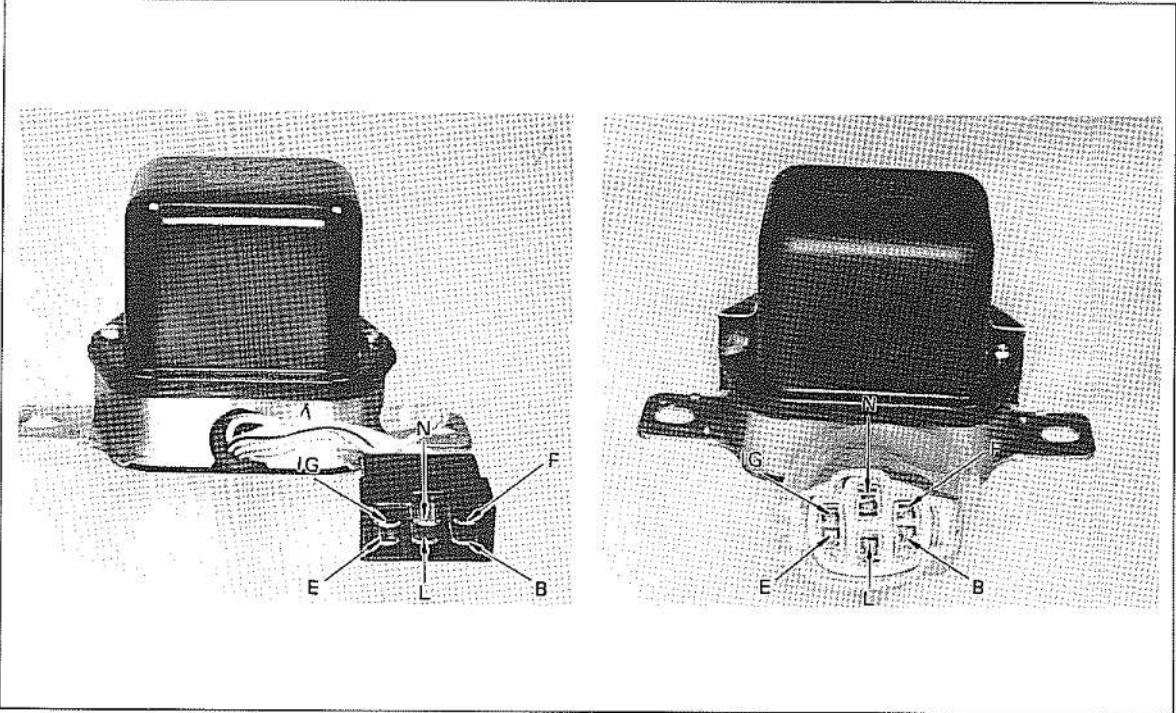
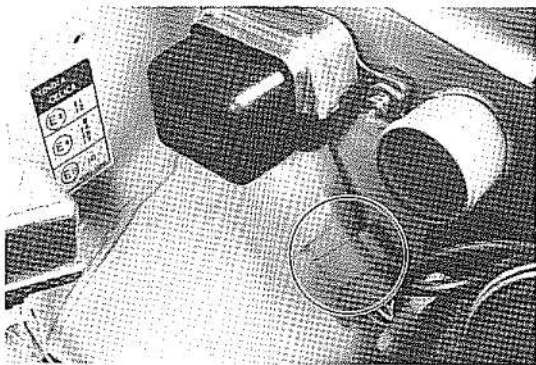


Fig. 11-83



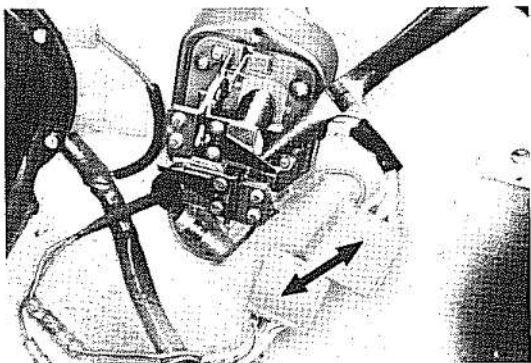
INSPECTION & ADJUSTMENT



Check the connector fitting condition before inspecting the regulator.

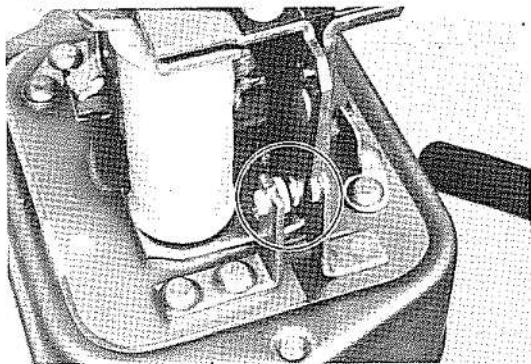
11-36 CHARGING SYSTEM – Alternator Regulator

Fig. 11-84



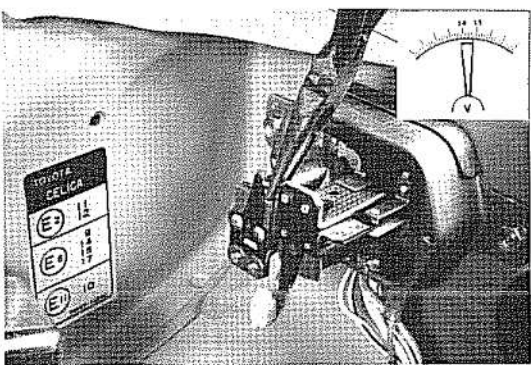
Always be sure to have the regulator connector pulled out when inspecting and adjusting.

Fig. 11-85



Inspect each point surface for burn or excessive damage. Replace if defective.

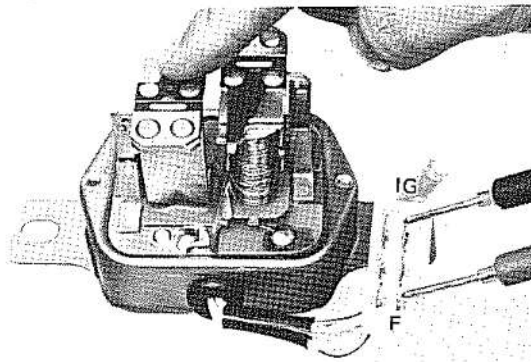
Fig. 11-86



Voltage adjustment
To adjust, bend the voltage regulator adjusting arm.

Regulated voltage: 13.8 – 14.8V

Fig. 11-87

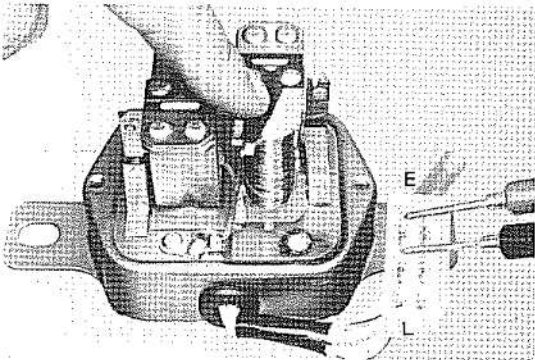


Resistance measurement between terminals.

IG – F

Voltage regulator	At rest	0 Ω
	Pulled in approx.	11 Ω

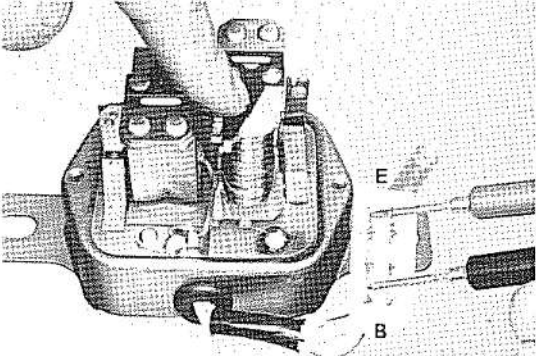
Fig. 11-88



L – E

Voltage relay	At rest	0 Ω
	Pulled in approx.	100 Ω

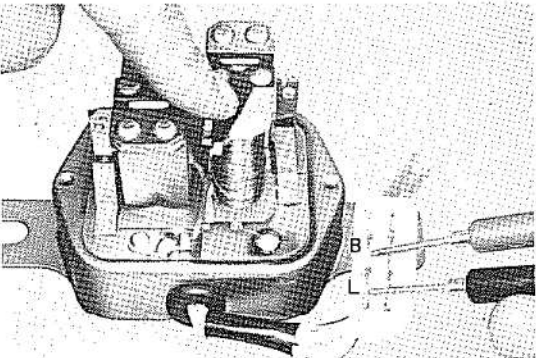
Fig. 11-89



B – E

Voltage relay	At rest	infinity
	Pulled in approx.	100 Ω

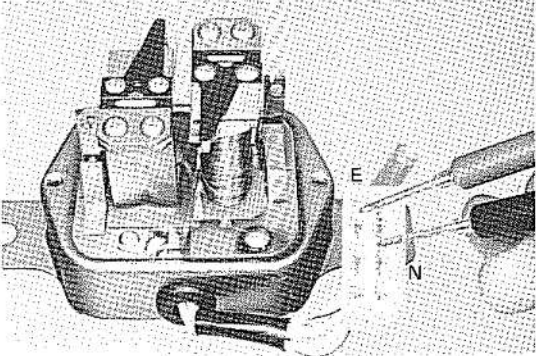
Fig. 11-90



B – L

Voltage relay	At rest	infinity
	Pulled in	0 Ω

Fig. 11-91



N – E

Approx. 25 Ω

MEMO
