

ALTERNATOR - HITACHI

1986 Isuzu Trooper II

1986 Alternators & Regulators
HITACHI ALTERNATORS

Isuzu

DESCRIPTION

Hitachi alternators are conventional 3-phase, self-rectifying alternators. Three positive and 3 negative diodes are used to rectify current. Most models are equipped with Integrated Circuit (IC) voltage regulators, except Isuzu gasoline engine equipped models.

The IC voltage regulator consists of integrated circuits using transistors. These transistors control current flow to alternator rotor, thus maintaining alternator output voltage at a constant value.

On the charge indicator light circuit, a diode monitors alternating voltage at the stator. When monitored voltage and charging voltage are equal, the charge indicator light is turned off.

ALTERNATOR APPLICATION

Model	Hitachi No.
Isuzu	
I-Mark	(1) 8-94211-350-0
Impulse (2)	(1) 8-94231-307-2
PUP	
Gasoline	(1) 8-94140-595-0
Diesel	(1) 8-94246-957-0
Trooper II	8-94127-186-0

(1) - Vehicle manufacturer's part number.

(2) - With G200Z engine. Impulse with 4ZC1-T engine uses Nippondenso alternator.

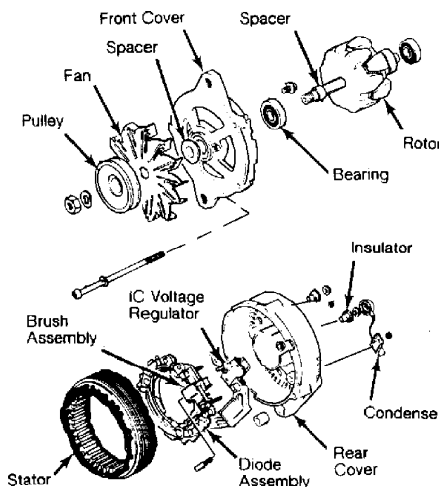


Fig. 1: Exploded View of Typical Hitachi Alternator

TESTING

ISUZU (ON-VEHICLE)

Alternator Test (Without IC Regulator)

1) Disconnect negative battery cable. Disconnect all wiring from alternator. Using ohmmeter, measure rotor resistance between "F" and "E" terminals. Reading must be 4-5 ohms.

2) If resistance is high, there is poor contact between brushes and slip rings. If no continuity exists, problem may be an open rotor winding, sticking brushes or broken lead wire. If resistance is low, rotor winding is shorted or grounded.

3) Connect ohmmeter positive lead to alternator "N" terminal, and negative lead to alternator "A" terminal. If continuity is indicated, one or more positive diodes are shorted.

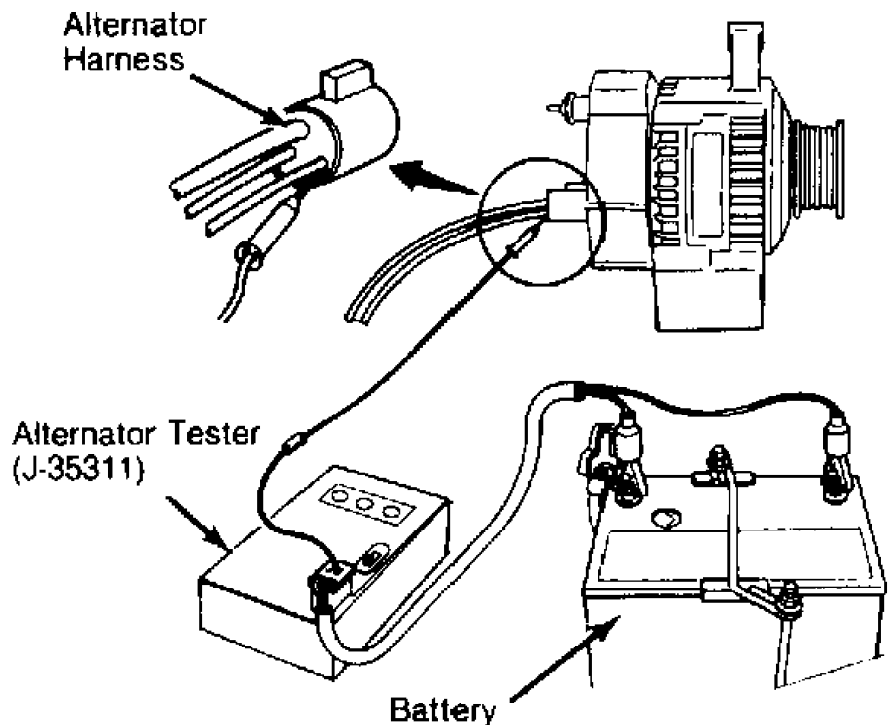
4) Connect ohmmeter positive lead to alternator "E" terminal, and negative lead to alternator "N" terminal. If continuity is indicated, one or more negative diodes are shorted.

NOTE: Alternator test will not indicate if diodes are open. Ohmmeter will indicate continuity regardless of diode conditions.

Alternator Output Test (With IC Voltage Regulator)

1) Check alternator wire harness connections and drive belt tension. Battery must be fully charged prior to test. Set Alternator Tester (J-35311) switch to 12-volt position.

2) Connect alternator harness to tester. See Fig. 2. Connect White/Red wire to alternator harness. Connect harness to alternator "L" wire (White/Red).



29523

Fig. 2: Isuzu Alternator Tester Hookup

3) Connect Black alligator clip to negative battery terminal. Connect Red alligator clip to positive battery terminal. Turn ignition switch on and check instrument panel charge indicator light.

4) Start and run engine at 1500 RPM. Turn headlights on low beam. After 10 seconds, check alternator tester lights. Tester will indicate alternator condition. See Fig. 3.

NOTE: After starting or stopping engine, the Yellow light on tester may come on for about 5 seconds. This condition is normal.

INSTRUMENT PANEL CHARGE INDICATOR LIGHT ON

TESTER LIGHTS			INSTRUMENT PANEL CHARGE INDICATOR LIGHT	CONDITION
RED	YELLOW	GREEN		
OFF	OFF	ON	OFF	Normal.
ON	ON	OFF	ON	Bad positive diode.
ON	ON	OFF	OFF	Bad negative diode.
ON	ON	OFF	DIM LIGHT or OFF	Bad auxiliary diode.
ON	OFF	OFF	ON	Bad rotor coil.
ON	OFF	OFF	OFF	Bad internal (IC) regulator.
ON or OFF	ON	ON	DIM LIGHT or OFF	Bad stator coil.
OFF	ON	ON	DIM LIGHT or OFF	Bad auxiliary diode. Bad stator coil. Bad negative diode.

INSTRUMENT PANEL CHARGE INDICATOR LIGHT OFF

TESTER LIGHTS			INSTRUMENT PANEL CHARGE INDICATOR LIGHT	CONDITION
RED	YELLOW	GREEN		
OFF	OFF	ON	OFF	Bad positive diode. Bad charge indicator light.
ON	OFF	OFF	OFF	Bad rotor coil Bad internal (IC) regulator Poor or no brush contact

29524
Fig. 3: Isuzu Alternator Tester Diagnostic Charts

OVERHAUL

DISASSEMBLY

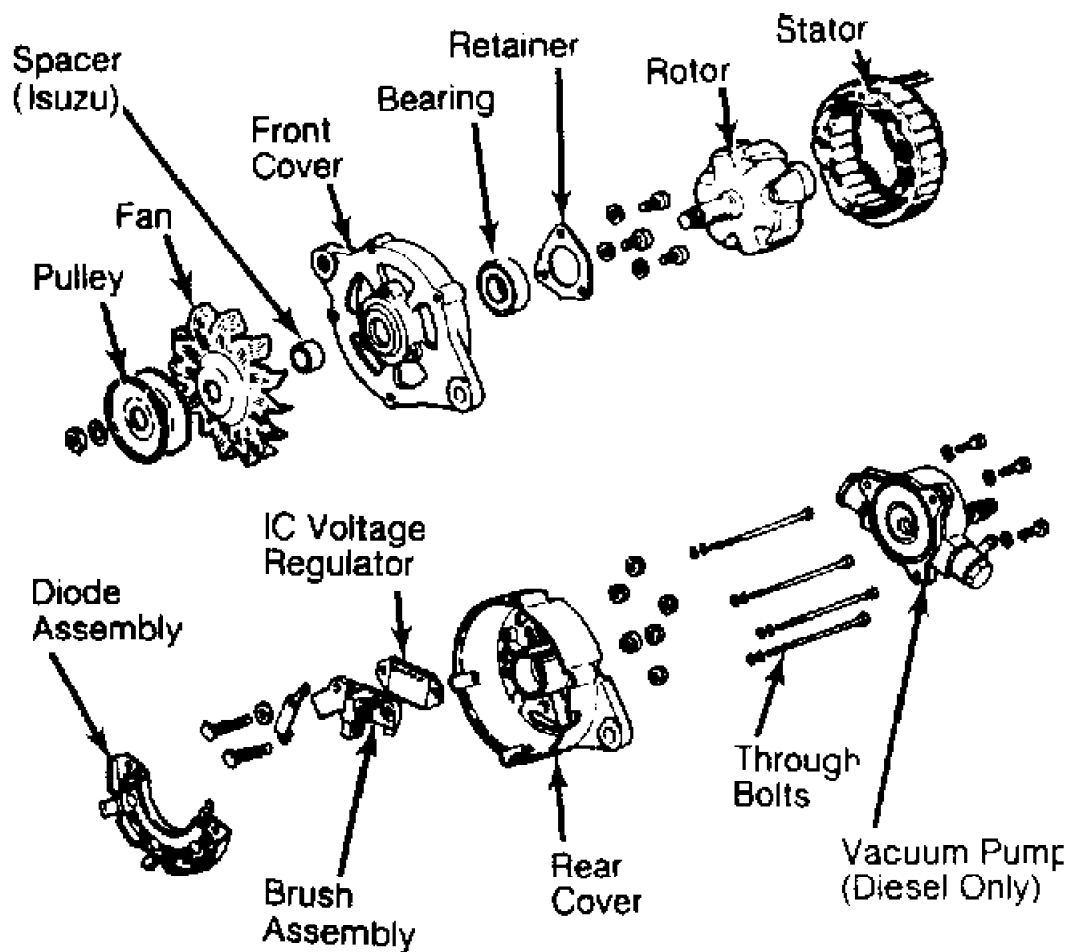
1) Remove vacuum pump (if equipped). Remove brush cover (if equipped). Remove through bolts. Separate front cover from rear cover by lightly tapping on front cover with plastic hammer.

NOTE: To facilitate rear cover removal, heat center of rear cover using a 200-watt soldering iron.

2) Place front cover and rotor assembly in protected vise with pulley nut up. Remove pulley nut, washer, pulley, fan and spacer(s). Press out rotor. Remove screws from front cover. Lift out bearing retainer and bearing.

3) Remove rear cover or condenser (if used), nuts, and insulator(s). Lift stator, diode assembly, and brush assembly from rear cover. On diesel engine alternators, if oil seal is damaged, pry out oil seal from rear cover.

4) Unsolder stator leads from diode assembly. Disconnect diode assembly from IC regulator by removing rivet and unsoldering end terminal. If IC regulator is being replaced, remove 2 bolts. DO NOT remove bolts if regulator is NOT being replaced.



29367

Fig. 4: Exploded View of Typical Hitachi Diesel Engine Alternator

NOTE: Melting of solder should be done as rapidly as possible to prevent damage to diodes and IC regulator.

BENCH TESTING

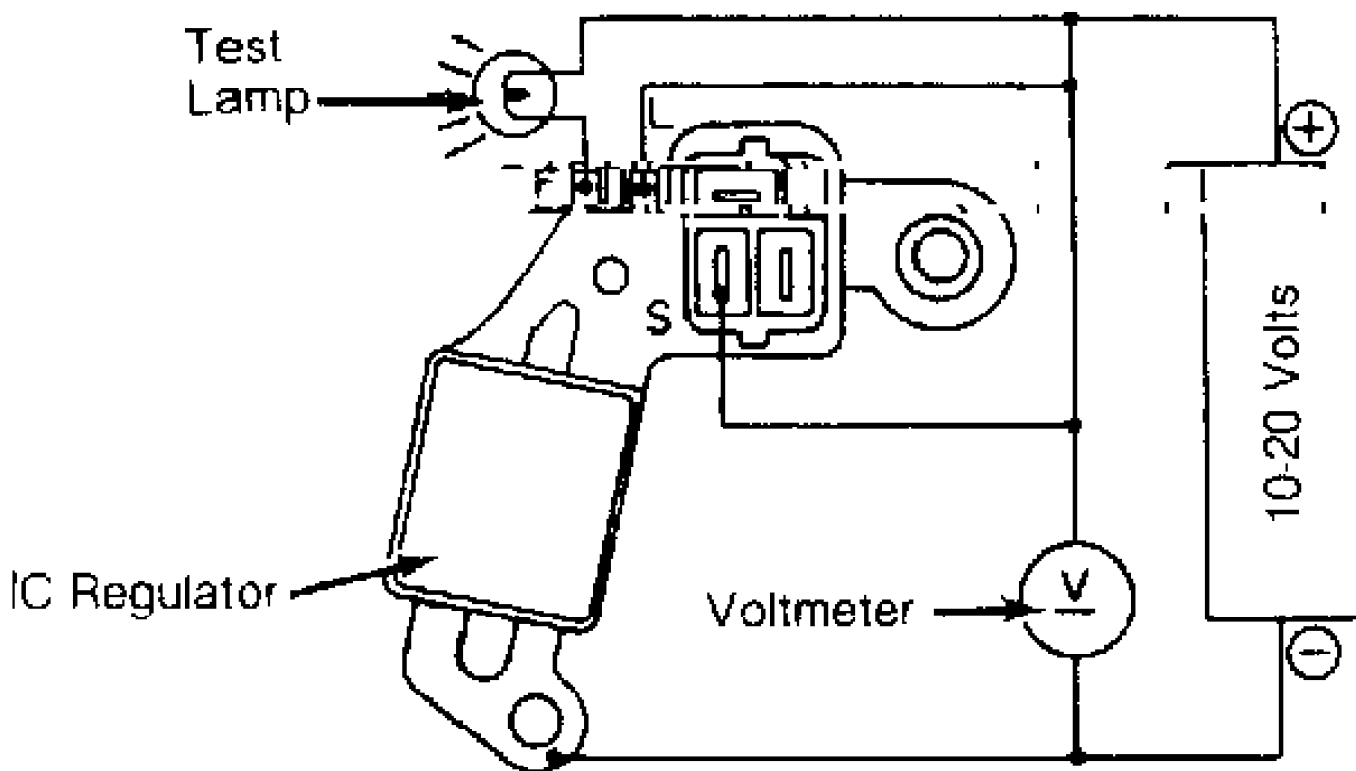
NOTE: Also see GENERAL SERVICING in this section.

IC Voltage Regulator (Isuzu Models Except Impulse)

1) Connect test equipment to IC regulator. See Fig. 4. Use a 10-ohm 3-watt resistor at "R1", a 0-300-ohm 3-watt variable resistor at "Rv", two 12-volt batteries, and a voltmeter.

2) Check voltage "V1". If voltage is not 10-13 volts, charge or replace battery as necessary.

3) Disconnect lead at "S" terminal and check voltage "V2" between terminals "F" and "E". If less than 2.0 volts, regulator is functioning properly. If higher, replace IC regulator.



29444

Fig. 5: Isuzu Impulse IC Regulator Test

4) Measure total voltage of batteries 1 and 2 at "V3". If not 20-26 volts, recharge or replace batteries.

5) Starting at zero, gradually increase variable resistance at "Rv" and check voltage "V2" between terminals "F" and "E". Voltage reading should increase to 10-13 volts to equal "V1" reading, measured in step 2). If variation does not occur in "V2" voltage reading, replace IC regulator.

6) Measure voltage "V4" between center tap of variable resistor "Rv" and terminal "E". With resistance fixed, voltage should be as shown in REGULATED VOLTAGE SPECIFICATIONS table.

REGULATED VOLTAGE SPECIFICATIONS TABLE

Application

Volts

Isuzu	
Diesel	14.0-14-6
Gasoline	13.8-14.8

7) Remove test lead from terminal "S" and connect to terminal "B". Gradually increase voltage with variable resistor "Rv". Measure voltage "V4" between terminals "B" and "E". Voltage should increase to 10-13 volts. If not, IC regulator is defective and should be replaced.

8) Measure voltage "V4" between center tap of variable resistor "Rv" and terminal "E", without moving variable resistor. Voltage should now be .50-2.0 volts higher than regulated voltage. If voltage is incorrect, replace IC regulator.

IC Voltage Regulator (Isuzu Impulse)

Connect test equipment to IC regulator. See Fig. 5. Use a 3.4-watt 12-volt test lamp, a 10 to 20-volt variable power source, and a voltmeter. Gradually increase voltage and check to see if test lamp turns off between 13.8-14.4 volts. If not, replace IC regulator.

NOTE: Ensure "S" terminal is connected before connecting "L" terminal, as damage to regulator may result.

Rotor

Connect ohmmeter to rotor slip rings. If reading is 4-5 ohms (3 ohms on Impulse), rotor continuity is satisfactory. If not, rotor is defective. Connect ohmmeter between one slip ring and rotor core. If continuity exists, replace rotor assembly.

Stator

Using ohmmeter, check continuity between stator core leads. If there is no continuity between leads, replace stator. Connect ohmmeter between stator core and to each stator lead. If there is no continuity, stator is good. If continuity exists, stator is grounded and must be replaced.

Diodes

Using an ohmmeter, check continuity on all diodes in both directions. Current should flow in one direction only. If current flows in both directions, diode is shorted. If current does not flow in either direction, diode is open. If any diode is defective, replace entire diode assembly.

Brushes

1) Inspect brushes for freedom of movement in holder. Clean brush holder if necessary. Check brushes for cracks and wear. Check brush springs for corrosion or damage.

2) On Isuzu Impulse, wear limit is .22" (5.6 mm). On Isuzu diesel engine alternators, wear limit is .55" (14 mm). On all other alternators, replace brush holder assembly if brush wear has reached limit line on brush.

3) Test brush holder to ensure no continuity exists between holder and brush.

REASSEMBLY

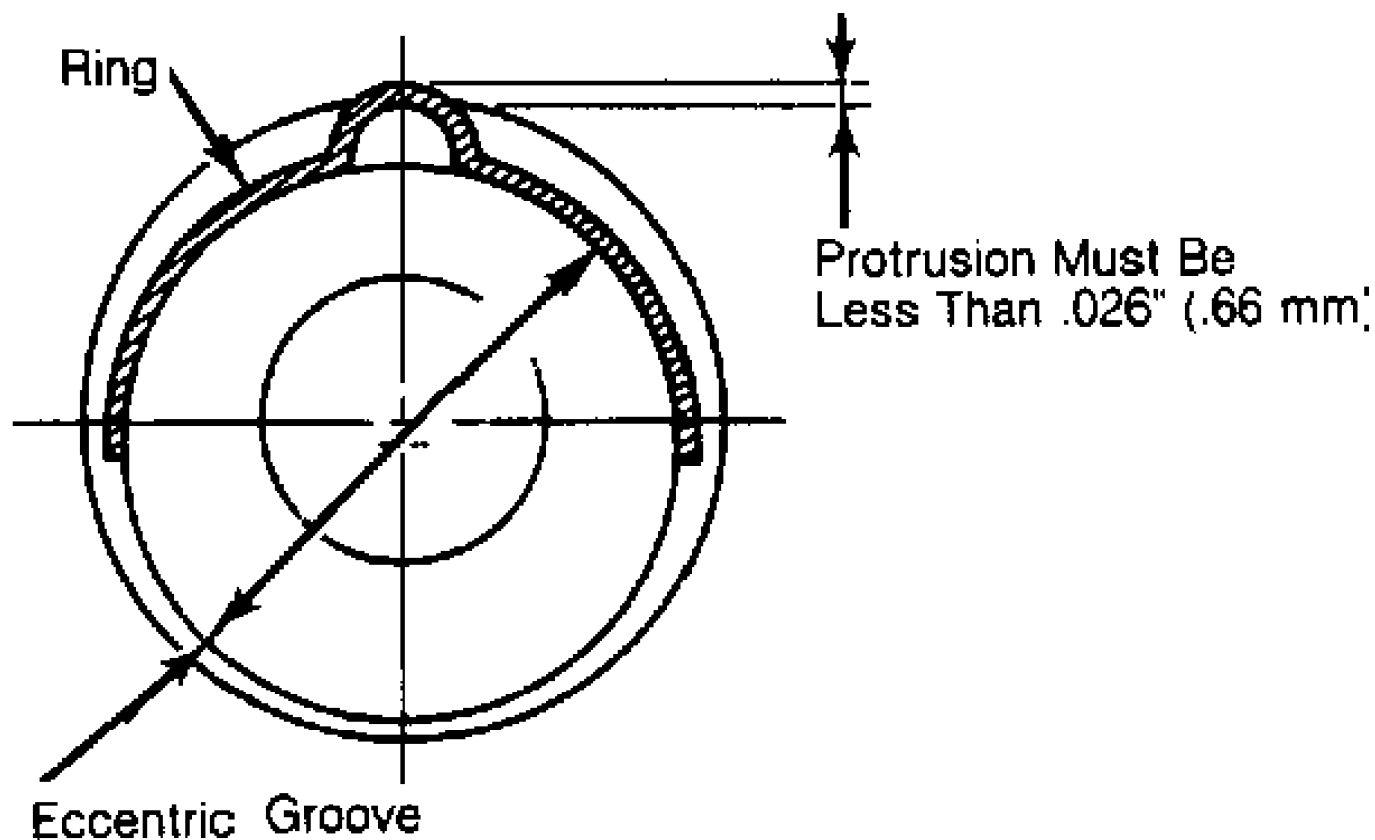
1) To reassemble, reverse disassembly procedure. On diesel engine alternators, install oil seal (if removed). Install IC regulator on brush holder and install bolts. Solder IC regulator terminal to diode assembly and install rivet.

2) Solder stator leads to terminals of diode assembly. Install diode assembly, IC regulator and stator. On most alternators,

push brushes into holder. Retain brushes in position by inserting a wire through hole in alternator.

3) Install bearing, rotor, fan and pulley on front cover. Tighten pulley nut to 29-43 ft. lbs. (39-59 N.m). On some alternators, fit ring into groove of rear bearing. See Fig. 6.

4) Assemble front and rear covers. Insert and tighten through bolts to 24-36 INCH lbs. (3-4 N.m). Remove brush retaining wire. On diesel engine alternators, install brush holder and cover (if equipped). Install vacuum pump. Tighten vacuum pump bolts to 24-36 INCH lbs. (3-4 N.m).



29531

Fig. 6: Installing Rear Bearing Ring