General Information

SPECIFICATIONS

STARTER MOTOR

	D4CB
Type Voltage Output	Reduction drive (with planetary gear) 12V 2.2KW
No-load characteristics Terminal voltage Amperage Speed	 11V 130A or below 4,500 RPM
Number of pinion teeth	10

GENERATOR

	D4CB
Type Rated output Voltage regulator type Regulator setting voltage Temperature compensated	Battery voltage sensing 12V / 110A Built in I.C regulator 14.4 ± 0.3 V -10 ± 3 mV / ˚C

BATTERY

	D4CB
Type Ampere hours 5HR Cold cranking [at -17.8˚C (0˚F)] Reverse capacity Specific gravity [at 25˚C (77˚F)]	MF 100 AH 80 AH or more 850 A or more 182 min. 1.280 ± 0.01

NOTICE

COLD CRANKING AMPERAGE is the amperage a battery can deliver for 30 seconds and maintain a terminal voltage of 7.2 or greater at a specified temperature. REVERSE CAPACITY RATING is the amount of time a battery can deliver 25A and maintain a minimum terminal voltage of 10.5 at 26.7˚C (80˚F).

TIGHTENING TORQUE

Items	Nm	Kg·cm	lb·ft
Generator terminal (B+)	5-7	50-70	3.6-5.1
Starter motor terminal (B+)	10-12	100-120	7.3-8.8
Battery terminal	4-6	40-60	2.9-4.3

TROUBLESHOOTING

CHARGING SYSTEM

Trouble symptom	Probable cause	Remedy
Charging warning indicator does not light with ignition switch "ON" and engine off	Fuse blown	Check fuses
	Light burned out	Replace light
	Wiring connection loose	Tighten loose connections
	Electronic voltage regulator faulty	Replace voltage regulator
Charging warning indicator does not go out with engine running (Battery requires frequent recharging)	Drive belt loose or worn	Adjust tension or replace drive belt
	Battery cables loose, corroded or worn	Repair or replace cables
	Fuse blown	Check fuses
	Fusible link blown	Replace fusible link
	Electronic voltage regulator or generator faulty	Test generator
	Wiring faulty	Repair wiring
Engine hesitates/poor acceleration Overcharge	Drive belt loose or worn	Adjust tension or replace drive belt
	Wiring connection loose or open circuit	Tighten loose connection or repair wiring
	Fusible link blown	Replace fusible link
	Poor grounding	Repair
	Electronic voltage regulator or generator faulty	Test generator, if faulty, repair or replace.
	Worn battery	Replace battery
	Electronic voltage regulator faulty	Replace voltage regulator
	Voltage sensing wire faulty	Repair wire

STARTING SYSTEM

Trouble symptom	Probable cause	Remedy
Engine will not crank	Battery charge low	Charge or replace battery
	Battery cables loose, corroded or worn out	Repair or replace cables
	Transaxle range switch faulty (Vehicle with automatic transaxle only)	Adjust or replace switch
	Fusible link blown	Replace fusible link
	Starter motor faulty	Repair starter motor
	Ignition switch faulty	Replace ignition switch
	Ignition lock switch faulty	Replace ignition lock switch

Trouble symptom	Probable cause	Remedy
Engine cranks slowly	Battery charge low	Charge or replace battery
	Battery cables loose, corroded or worn out	Repair or replace cables
	Starter motor faulty	Repair starter motor
Starter keeps running	Starter motor faulty	Repair starter motor
	Ignition switch faulty	Replace ignition switch
Starter spins but engine will not crank	Short in wiring	Repair wiring
	Pinion gear teeth broken or starter motor faulty	Repair starter motor
	Ring gear teeth broken	Replace flywheel ring gear or torque converter

GLOW CONTROL SYSTEM (Diesel)

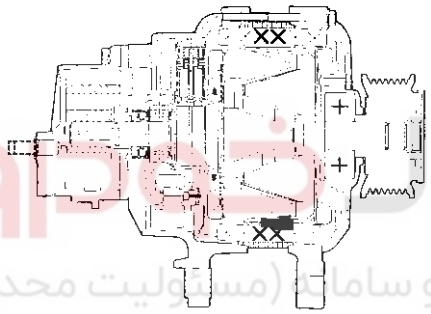
Trouble symptom	Probable cause	Remedy
Engine will not start below 50˚C	Wiring connection loose or bad wiring	Repair or replace wiring
	Water temperature sensor malfunction	Replace
	Water temperature sensor	Glow plug malfunction
	Repair or replace glow plug	ECM failed Replace ECM
After first combustion, engine stall or rough idle below 50˚C	Wiring connection loose or bad wiring	Repair or replace wiring
	Glow plug malfunction	Check the resistance of glow plug and replace, if necessary
	Glow plug relay malfunction	Check the relay and replace, if necessary
	ECM failed	Check ECM and replace, if necessary
Yellow glow lamp will not turn-ON	Open lamp	Replace lamp
	Wiring connection loose or bad wiring	Repair or replace wiring
	Shorted wiring	Repair or replace wiring
	ECM failed	Replace ECM, if necessary

Charging System

GENERAL INFORMATION

The charging system included a battery, an generator with a built-in regulator, and the charging indicator light and wire. The generator has eleven built-in diodes (four positive, four negative and three exciter diodes), each rectifying AC current to DC current. Therefore, DC current appears at generator "B" terminal.

In addition, the charging voltage of this generator is regulated by the battery voltage detection system. The generator is regulated by the battery voltage detection system. The main components of the generator are the rotor, stator, rectifier, capacitor brushes, bearings and V-ribbed belt pulley. The brush holder contains a built-in electronic voltage regulator.

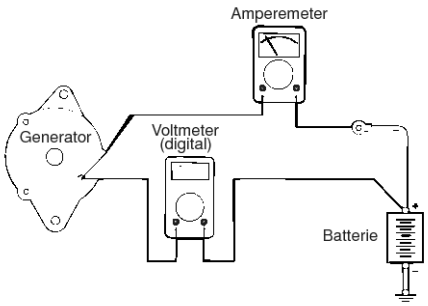


LBAC015A

INSPECTION

GENERATOR OUTPUT LINE VOLTAGE DROP TEST

1. Be sure to check the following before testing:
   - Generator installation and wiring connections
   - Generator drive belt tension
   - Fusible link
   - Abnormal noise from the generator while the engine is running.
2. Turn the ignition switch to the OFF position.
3. Disconnect the negative battery cable.
4. Disconnect the generator output wire from the generator "B" terminal. Connect a DC test ammeter with a range of 0-100A in series between the "B" terminal and the disconnected output wire. (Connect the (+) lead of the ammeter to the "B" terminal. Connect the (-) lead of the ammeter to the disconnected output wire.)



LBAC020C

NOTICE

An inductive-type ammeter which enables measurements to be taken without disconnecting the generator output wire is recommended. Using this equipment will lessen the possibility of a voltage drop caused by a loose "B" terminal connection.

5. Connect a digital-type voltmeter between the generator "B" terminal and the battery (+) terminal. (Connect the (+) lead of the voltmeter to the "B" terminal. Connect the (-) lead of the voltmeter to the battery (+) cable.)
6. Reconnect the negative battery cable.
7. Connect a tachometer or the scan tool.
8. Start the engine.
9. With the engine running at approx. 2500 r/min, turn the headlights and other lights on and off to adjust the generator load on the ammeter slightly above 30A.

NOTICE

When the generator output is high and the value displayed on the ammeter does not decrease to 30A, set the value to 40A. Read the value displayed on the voltmeter. In this case the limit becomes max. 0.4V.

10. If the value displayed on the voltmeter is still above the limit, a malfunction in the generator output wire may exist. Check the wiring between the generator "B" terminal and the battery (+) terminal (including fusible link). If a terminal is not sufficiently tight or if the harness has become discolored due to overheating, repair, the test again.
11. After the test, run the engine at idle.
12. Turn off all lights and turn the ignition switch to the OFF position.
13. Disconnect the tachometer or the scan tool.
14. Disconnect the negative battery cable.

15. Disconnect the ammeter and voltmeter.
16. Connect the generator output wire to the generator "B" terminal.
17. Connect the negative battery cable.

OUTPUT CURRENT TEST

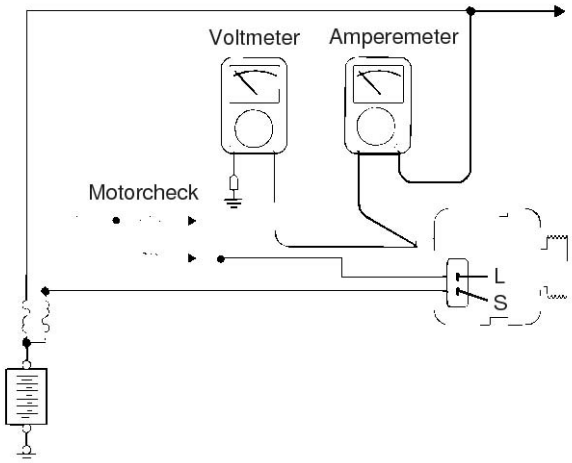
PREPARATION

1. Prior to the test, check the following items and correct as necessary.
   1) Check the battery installed in the vehicle to ensure that it is in good condition. The battery checking method is de scribed in "BATTERY".

      WARNING
      The battery that is used to test the output current should be one that has been partially discharged. With a fully charged battery, the test may not be conducted correctly due to an insufficient load.

   2) Check the tension of the generator drive belt. The belt tension check method is described in the section "COOLING".
2. Turn off the ignition switch.
3. Disconnect the battery ground cable.
4. Disconnect the generator output wire from the generator "B" terminal.
5. Connect a DC ammeter (0 to 100A) in series between the "B" terminal and the disconnected output wire. Be sure to connect the (-) lead wire of the ammeter to the disconnected output wire.

   NOTICE
   Tighten each connection securely, as a heavy current will flow. Do not rely on clips.
6. Connect a voltmeter (0 to 20V) between the "B" terminal and ground. Connect the (+) lead wire to the generator "B" terminal and (-) lead wire to a good ground.
7. Attach an engine tachometer and connect the battery ground cable.
8. Leave the engine hood open.



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TEST

1. Check to see that the voltmeter reads as the same value as the battery voltage. If the voltmeter reads 0V, and the open circuit in the wire between the generator "B" terminal and battery (-) terminal, a blown fusible link or poor grounding is suspected.
2. Start the engine and turn on the headlights.
3. Set the headlights to high beam and the heater blower switch to HIGH, quickly increase the engine speed to 2,500 rpm and read the maximum output current value indicated by the ammeter.

   NOTICE
   After the engine starts up, the charging current quickly drops. Therefore, the above operation must be done quickly to read the maximum current value correctly.

RESULT

1. The ammeter reading must be higher than the limit value. If it is lower but the generator output wire is in good condition, remove the generator from the vehicle and test it.

   Limit value (110A generator) : 77A min.

NOTICE

- *The nominal output current value is shown on the nameplate affixed to the generator body.*
- *The output current value changes with the electrical load and the temperature of the generator itself. Therefore, the nominal output current may not be obtained. If such is the case, keep the headlights on the cause discharge of the battery, or use the lights of another vehicle to increase the electrical load.*

  The nominal output current may not be obtained if the temperature of the generator itself or ambient temperature is too high.

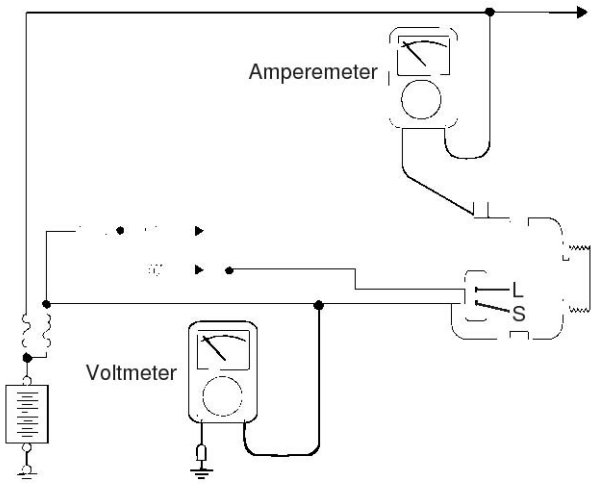
  In such a case, reduce the temperature before testing again.

2. Upon completion of the output current test, lower the engine speed to idle and turn off the ignition switch.
3. Disconnect the battery ground cable.
4. Remove the ammeter and voltmeter and the engine tachometer.
5. Connect the generator output wire to the generator "B" terminal.
6. Connect the battery ground cable.

REGULATED VOLTAGE TEST

PREPARATION

1. Prior to the test, check the following items and correct if necessary.
   1) Check that the battery installed on the vehicle is fully charged. For battery checking method, see "BATTERY."
   2) Check the generator drive belt tension. For belt tension check, see "COOLING" section.
2. Turn ignition switch to "OFF."
3. Disconnect the battery ground cable.
4. Connect a digital voltmeter between the "S(L)" terminal of the generator and ground. Connect the (+) lead of the voltmeter to the "S(L)" terminal of the generator. Connect the (-) lead to good ground or the battery (-) terminal.
5. Disconnect the generator output wire from the generator "B" terminal.
6. Connect a DC ammeter (0 to 100A) in series between the "B" terminal and the disconnected output wire. Connect the (-) lead wire of the ammeter to the disconnected output wire.
7. Attach the engine tachometer and connect the battery ground cable.



LBAC020B

TEST

1. Turn on the ignition switch and check to see that the voltmeter indicates the following value.

   Voltage : Battery voltage
2. Start the engine. Keep all lights and accessories off.
3. Run the engine at a speed of about 2,500 rpm and read the voltmeter when the generator output current drops to 10A or less.

Result

1. If the voltmeter reading agrees with the value listed in the Regulating Voltage Table below, the voltage regulator is functioning correctly. If the reading is other than the standard value, the voltage regulator or the generator is faulty.

Regulating Voltage Table

Voltage regulator ambient temperature ˚C(˚F)	Regulating voltage (V)
-20 (-4)	14.2-15.4
20 (68)	13.8-15.0
60 (140)	13.4-14.6
80 (176)	13.1-14.5

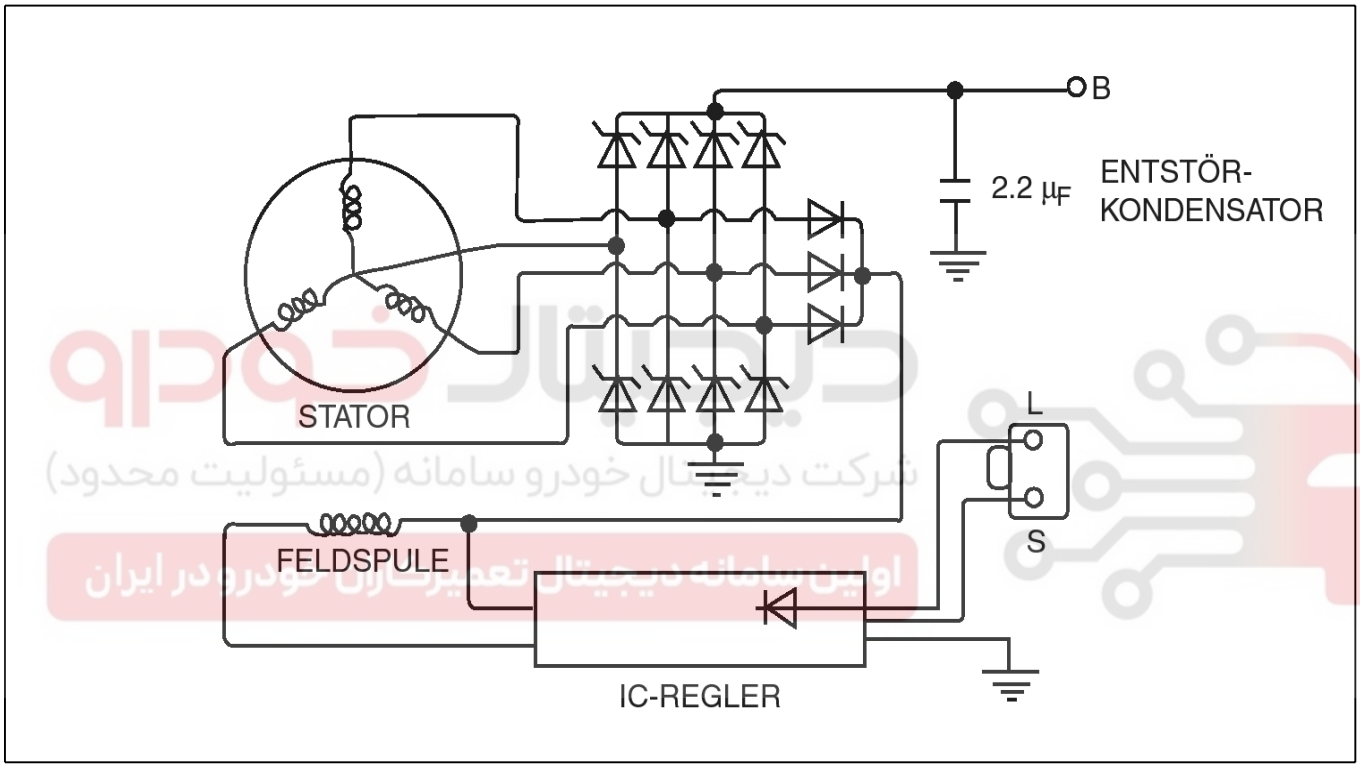
2. Upon completion of the test, reduce the engine speed to idle, and turn off the ignition switch.
3. Disconnect the battery ground cable.
4. Remove the voltmeter and ammeter and the engine tachometer.
5. Connect the generator output wire to the generator "B" terminal.
6. Connect the battery ground cable.

Alternator

GENERATOR (DIESEL)

The conventional internal voltage detection type alternator controls the charging voltage regardless of the battery condition and according to the external load change so that it sometimes causes battery under or overcharging or causes flickering of meters and lamps due to ripples of generated voltage resulting from load fluctuation.

The figure below show the internal circuits of the alternator and voltage regulator.



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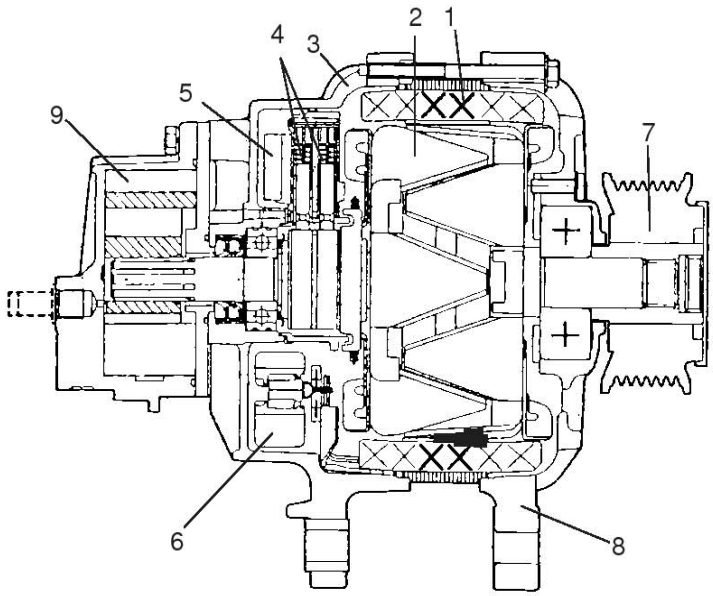
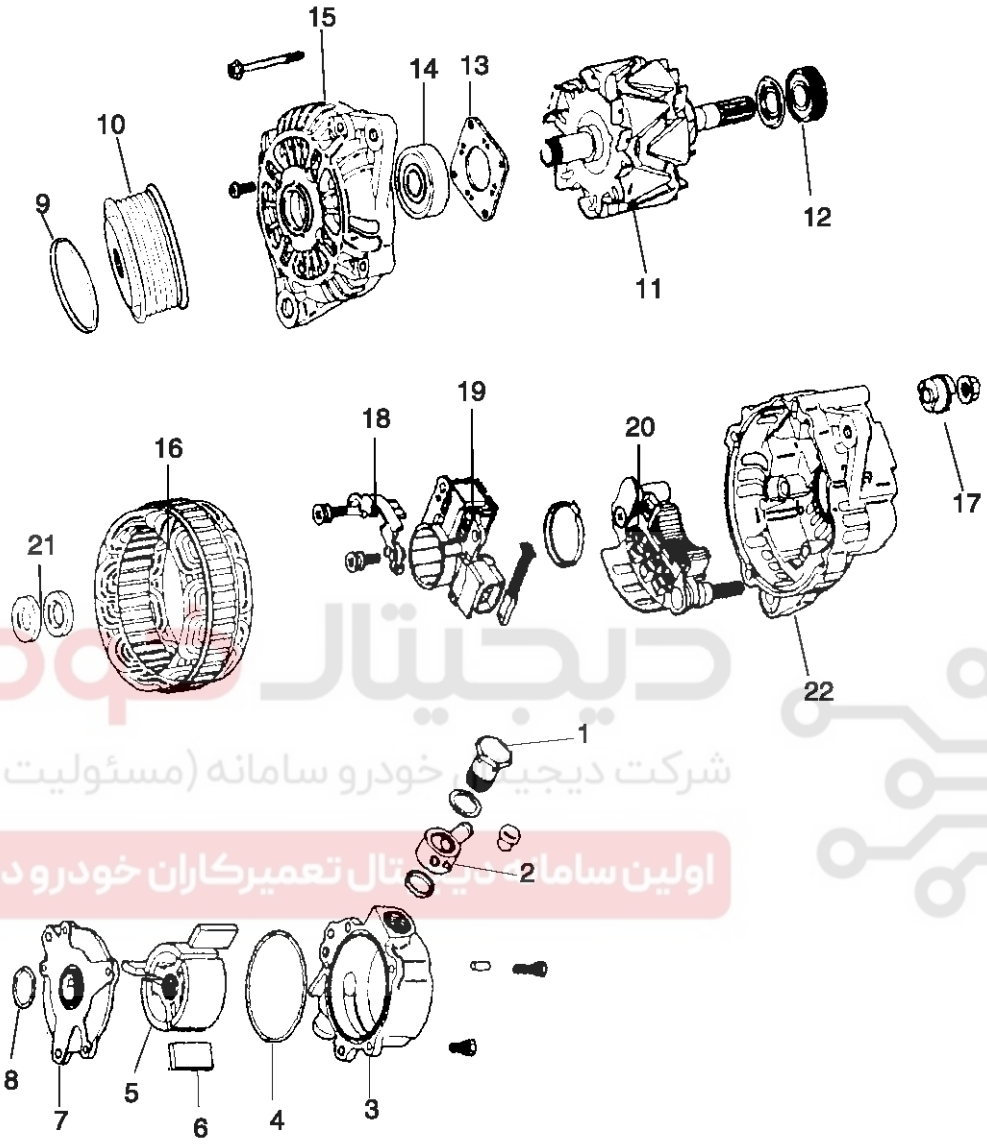


1. Stator
2. Rotor
3. Hintere Gehäusehälfte
4. Bürste
5. Regler
6. Gleichrichter
7. Riemenscheibe
8. Vordere Gehäusehälfte
9. Unterdruckpumpe

LBAC030B

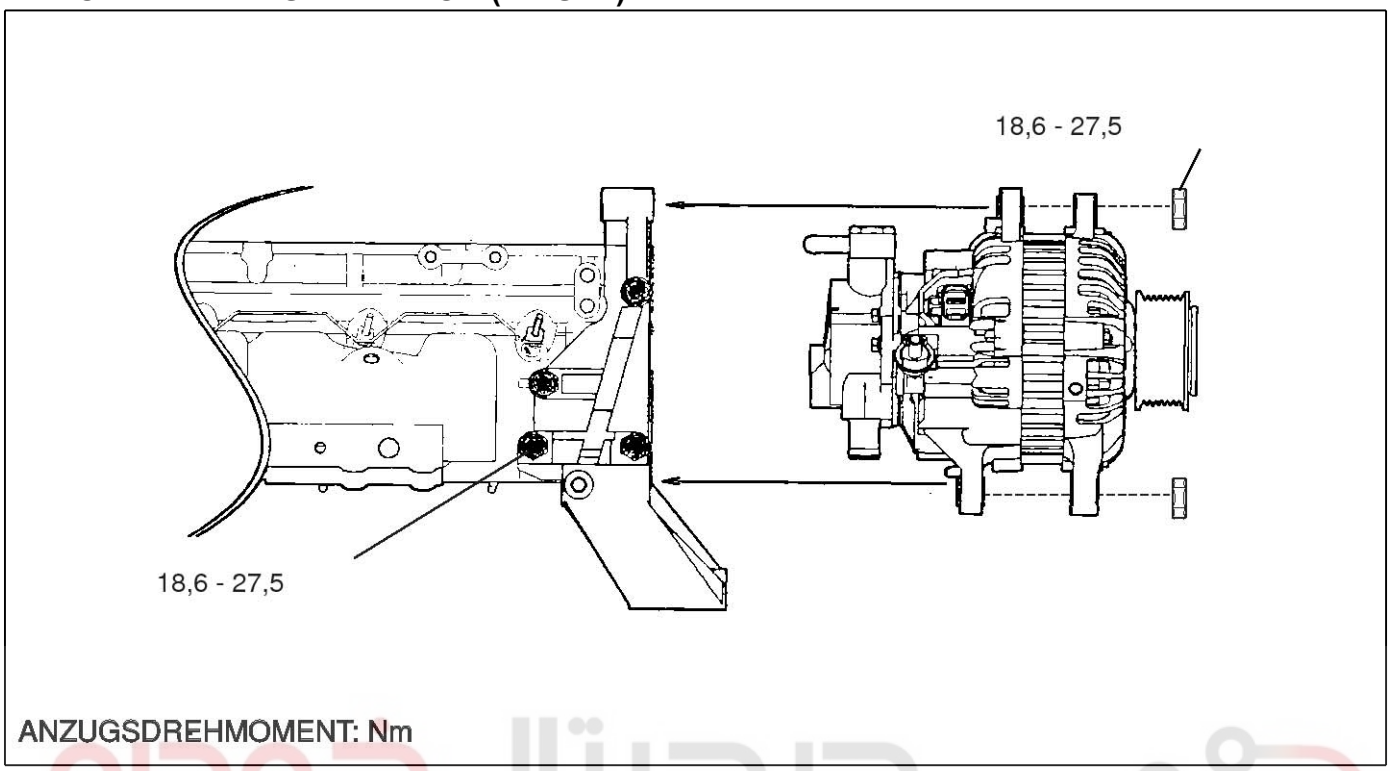
DISASSEMBLY AND REASSEMBLY



1. Rückschlagventil
2. Nippel
3. Gehäuse Unterdruckpumpe
4. O-Ring
5. Rotor
6. Flügel
7. Gehäusedeckel - Unterdruckpumpe
8. O-Ring
9. Schutzkappe
10. Riemenscheibe mit Freilauf
11. Rotor
12. Hinteres Lager
13. Lagerdeckel
14. Vorderes Lager
15. Vordere Gehäusehälfte
16. Stator
17. Anschluss (B+)
18. Bürstenträger
19. Regler
20. Gleichrichter
21. Öldichtring
22. Hintere Gehäuse

LBAC045A

REMOVAL AND INSTALLATION (DIESEL)



LBAC035A

INSTALLATION

ALTERNATIOR ASSEMBLY

For belt tension, refer to Group EM Engine-Service adjustment procedures.

⚠CAUTION

- **Install the oil hose to the alternator in advance.**

  When the alternator is installed, connect the oil hose to the nipple on the oil pan side. Clamp the hose clip at the straight portion of the nipple.
- **When the oil tube is installed, do not take a sharp bend nor bring the tube in contact with the cylinder block.**

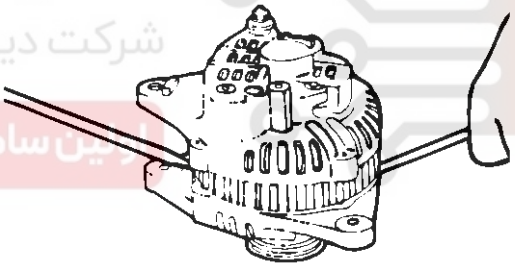
DISASSEMBLY

FRONT BRACKET

1. With a screwdriver blade inserted between the front bracket and stator core, pry it to separate the stator and the front bracket.
2. If they are hard to separate, lightly strike the bracket with a plastic hammer while prying with the screwdriver.

⚠CAUTION

Do not insert the screriver too deep as the stator core could be damaged.



BE9C050A

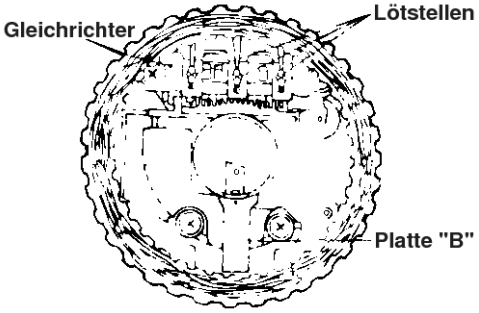
STATOR ASSEMBLY, REGULATOR AND BRUSH HOLDER

⚠CAUTION

- **When soldering or unsoldering, use care not to expose the diode to soldering iron heat for extended time.**

  Complete soldering or unsoldering in as short a time as possible.
- **Do not overstress the diode leads.**

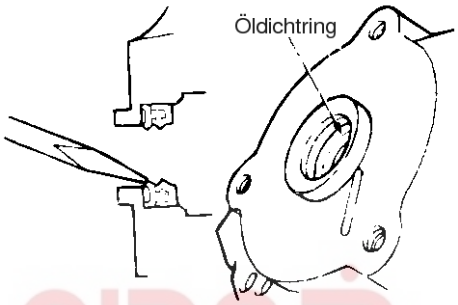
1. When removing the stator, unsolder the three stator leads from the main diodes.
2. When removing the rectifier from the brush holder, unsolder two soldered points.



BE9C050B

OIL SEAL

Push out and remove the oil seal using a screwdriver.

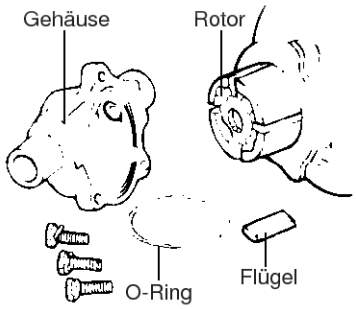


BE9C050C

INSPECTION

VACUUM PUMP

1. Check the rotor ends for streaks and damage.
2. Check the housing surface in contact with the rotor for streaks and damage.
3. Check the vanes for damage and break.



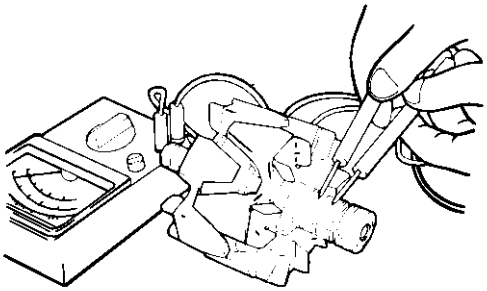
BE9C055A

ROTOR

1. Check the rotor coil continuity. Make sure that there is continuity between slip rings.

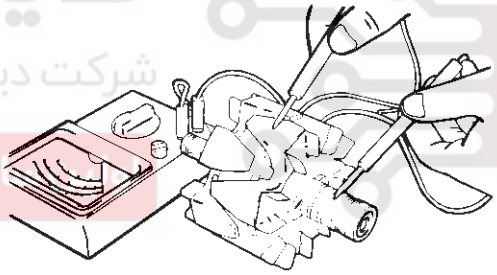
   Measure the rotor resistance. If it is excessively small, it indicates a shorted rotor, If without continuity or shorted, replace the rotor assembly.

   Standard value : 3 - 5 ohms



BE9C055B

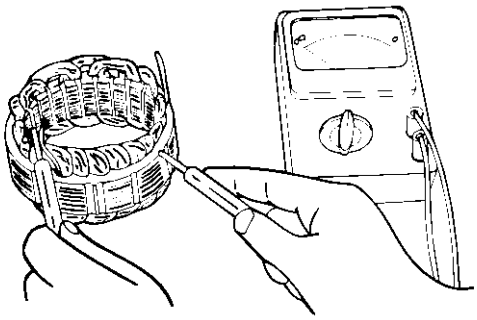
2. Check the rotor coil grounding. Make sure that there is no continuity between the slip ring and core. Replace the rotor assembly if there is continuity.



BE9C055C

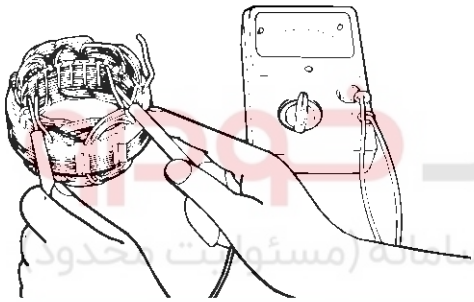
STATOR

1. Check the stator continuity. Make sure that there is continuity between coil leads. Replace the stator assembly if there is no continuity



BE9C055D

2. Check the coil grounding. Make sure that there is no continuity between the coil and core. Replace the stator assembly if there is continuity.

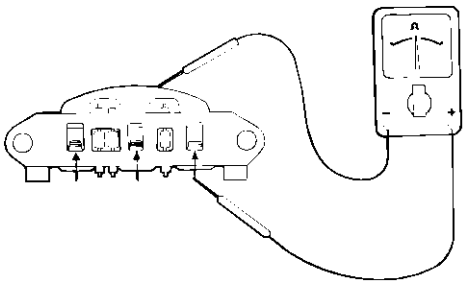


BE9C055E

RECTIFIER

1. Inspection of (+) Heat Sink Assembly

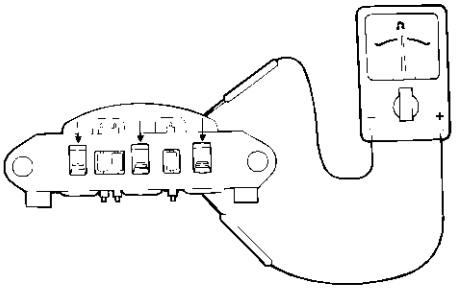
   Using a circuit tester, check continuity between the (+) heat sink and the stator coil lead connection terminals. If there is continuity in both directions, the diode is shorted. Then, replace the rectifier assembly.



BE9C055F

2. Inspection of (-) Heat Sink Assembly

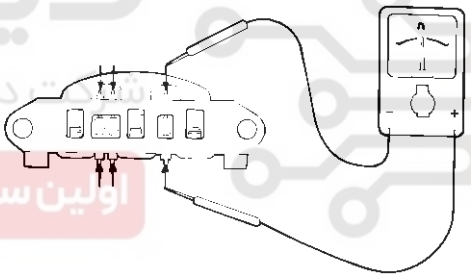
   Check continuity between the (-) heat sink and the stator coil lead connection terminals. If there is continuity in both directions the diode is shorted. Then, replace the rectifier assembly.



BE9C055G

3. Inspection of Diode Trio

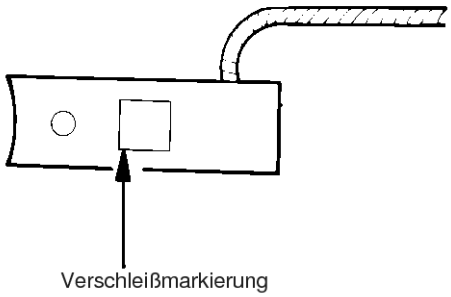
   With a circuit tester connected to both ends of each diode, check continuity of the three diodes. If there is continuity or no continuity in both directions, the diode is damaged. Then, replace the rectifier assembly.



BE9C055H

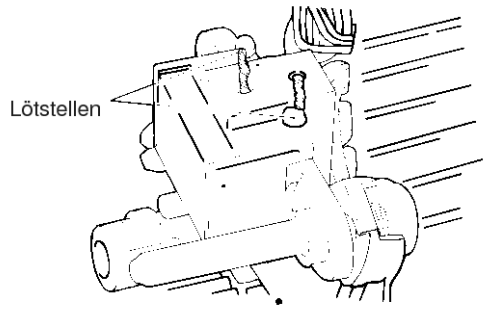
BRUSH

1. The brush must be replaced if worn to the wear limit line.



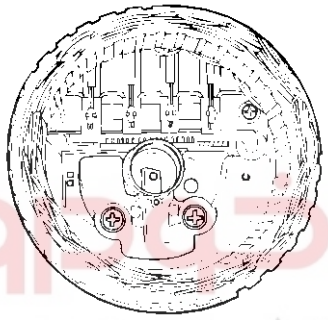
BE9C055I

2. Unsolder the brush lead wires, and the brush and spring will come out.



BE9C055J

3. When installing a new brush, push the brush into the holder as illustrated and solder the leads.

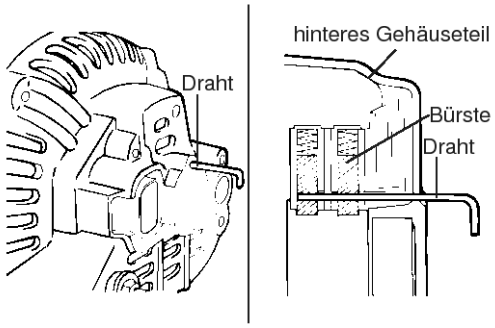


BE9C055K

REASSEMBLY

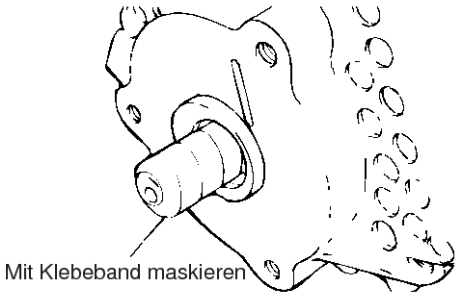
ROTOR ASSEMBLY

1. Before installing the rotor on the rear bracket, thread a steel wire through the small hole provided in the rear bracket to lift up the brush. After rotor installation, remove the steel wire.



BE9C060A

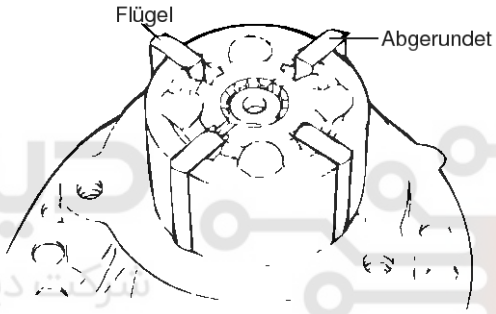
2. When installing the rotor on the alternator rear bracket, wind vinyl tape round the splined shaft to prevent damage to the oil seal



BE9C060B

ROTOR AND VANES

1. Check well the housing, rotor, etc. for chips and foreign matter. Then, apply engine oil and install.
2. Install the vanes with round end facing outward.
3. Apply grease to the O-ring and fit in the housing groove when the bolts are tightened.



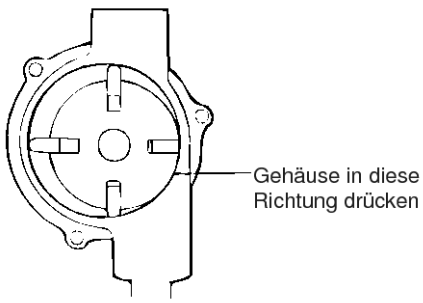
BE9C060C

4. When tightening the housing, lightly push it in the direction of arrow so as to minimize the clearance at "A" and tighten the bolts uniformly.

NOTICE

After the assembly, be sure to conduct the performance test to check to see that the ultimate vacuum is as specified below.

Standard value of ultimate vacuum : 600 mmHg or better at 3,000 rpm

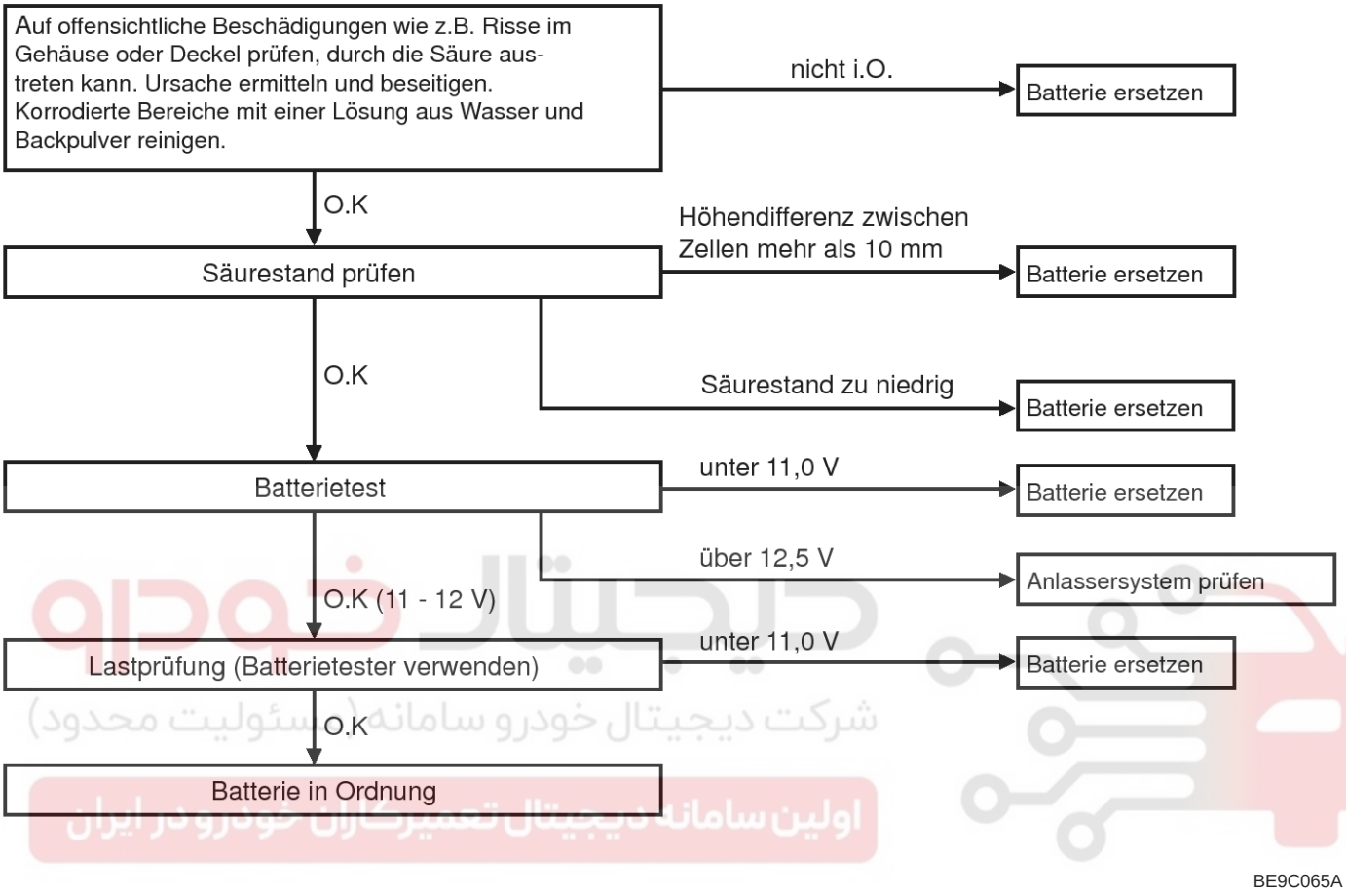


BE9C060D

Battery

BATTERY VISUAL INSPECTION (1)

1. CHECKING FLOW



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2. CHECKING SHEET

Item	Trouble	Cause	Remedy	Responsibility	
				User	Manufacturer
1. Visual inspection	* Battery terminal damage	* Carelessness			
		* Over tightening the battery cable	Replace	O	
	Cover Breakage	* Carelessness	Replace	O	
	* Electrolyte leakage - Cover breakage - Cover leakage	* Carelessness * Bad cover seal	Replace Replace	O	O
2. Electrolyte height inspection	* Electrolyte height between cells is over 10 mm	* Cell shorted electrically	Replace		O
		* Vaporization caused by excessive temperature	Replace	O	
	* Shortage of electrolyte	* Electrolyte loss caused by over-charge	Replace	O	
3. Voltage inspection	1. Battery voltage >13.2V	1. Over charge	Replace * Check the electric system	O	
	2. 12.5V < Battery voltage < 12.9	2. Normal			
	3. 12.0V < Battery voltage < 12.4V (Simple discharge)	1. Insufficient charge	* Battery Load Test (Refer to Load Test below)	O	
	4. 11.0 V	2. Internal failure		O	
	5. Battery voltage : 11.0V or less	1. Charge condition failure	Replace	O	
		2. Battery discharged for a long period		O	
		3. Internal circuit open			O

3. LOAD TEST

1. When discharging the battery during 15 seconds at half currency of Cold Cranking Power (CCP), the voltage of the battery should be as shown below.

Regulating Voltage Table

Ambient Temperature	Voltage
above 20˚C	9.6V
~ 18˚C	9.5V
~ 10˚C	9.4V
~ 4˚C	9.3V
~ -1˚C	9.1V
~ -7˚C	8.9V
~ -12˚C	8.7V

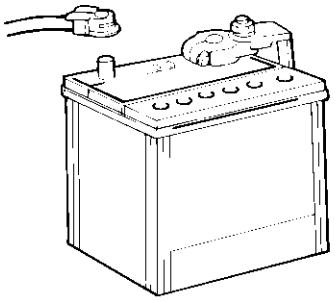
2. When the voltage is not within specification, repeat the load test again, and re-charge.
3. If the battery is left alone for 2 hours after re-charging and its output is over 12.5V, and the voltage after a load test is over the standard value, the battery can be used.

BATTERY VISUAL INSPECTION (2)

1. Make sure the ignition switch and all accessories are in the OFF position.
2. Disconnect the battery cables (negative first).
3. Remove the battery from the vehicle.

⚠CAUTION

Care should be taken in the event the battery case is cracked or leaking, to protect your skin from the electrolyte. Heavy rubber gloves (not the household type) should be worn when removing the battery.



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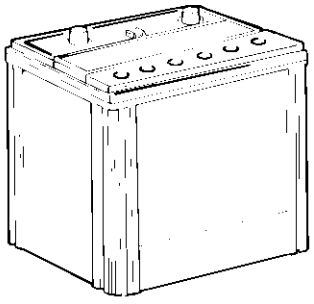
4. Inspect the battery carrier for damage caused by the loss of electrolyte. If acid damage is present, it will be necessary to clean the area with a solution of clean warm water and baking soda. Scrub the area with a stiff brush and wipe off with a cloth moistened with baking soda and water.
5. Clean the top of the battery with the same solution as described in Step(4).
6. Inspect the battery case and cover for cracks. If cracks are present, the battery must be replaced.
7. Clean the battery posts with a suitable battery post tool.
8. Clean the inside surface of the terminal clamps with a suitable battery cleaning tool. Replace damaged or frayed cables and broken terminal clamps.
9. Install the battery in the vehicle.
10. Connect the cable terminals to the battery post, making sure the tops of the terminals are flush with the tops of the posts.
11. Tighten the terminal nuts securely.
12. Coat all connections with light mineral grease after tightening.

⚠CAUTION

When batteries are being charged, an explosive gas forms beneath the cover of each cell. Do not smoke near batteries being charged or which have recently been charged. Do not break live circuits at the terminals of batteries being charged. A spark will occur when the circuit is broken. Keep open flames away from the battery.



BE9C070B

Starting System

Starting System

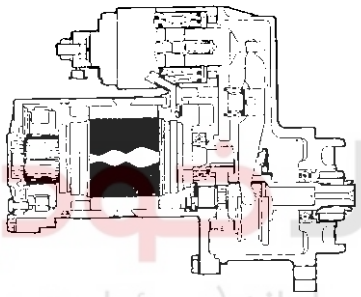
Starter

GENERAL INFORMATION

The starting system includes the battery, starter motor, solenoid switch, ignition switch, inhibitor switch (A/T only), connection wires and the battery cables.

When the ignition key is turned to the start position, current flows and energizes the starter motor's solenoid coil. The solenoid plunger and clutch shift lever are activated, and the clutch pinion engages the ring gear. The contacts close and the starter motor cranks.

In order to prevent damage caused by excessive rotation of the starter armature when the engine starts, the clutch pinion gear overruns.



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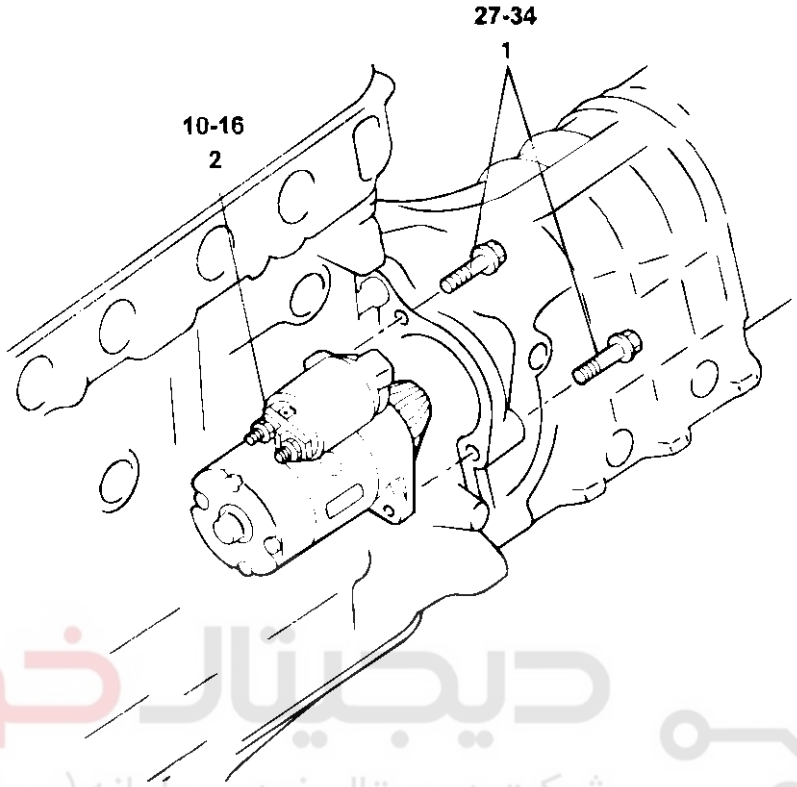
DISASSEMBLY AND REASSEMBLY



ANZUGSDREHMOMENT: Nm

1. Schrauben
2. Anlasser

LBAC080A

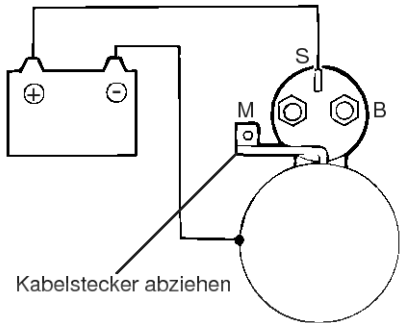
INSPECTION

PINION GAP ADJUSTMENT

1. Disconnect the field coil wire from the terminal M of the magnetic switch.
2. Connect a battery between the terminal S and starting motor body. (Connect the positive terminal of battery to the terminal S.)

NOTICE

This test must be performed quickly within 10 seconds to prevent the switch coil from burning.



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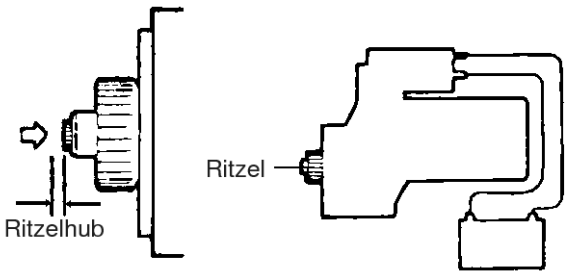
3. When the battery is connected, the pinion moves out. Now, push back the pinion with a finger and measure the pinion stroke (the travel along which the pinion is pushed back).

   This is the pinion gap.
4. If the pinion gap is not up to specification, adjust by adding or removing fiber washers between the magnetic switch and front bracket. Using more washers makes the gap smaller.

Standard value : 0.5 - 2.0 mm



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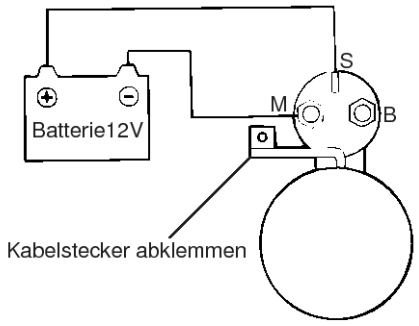
PULL-IN TEST OF MAGNETIC SWITCH

The pull-in coil is in good condition if the plunger is pulled in to cause the pinion to move out when a battery is connected between the terminals S and M of the magnetic switch. If the pinion does not move out, replace the magnetic switch.

NOTICE

The connector must be disconnected from terminal M for this test.

The test must be finished within 10 seconds.



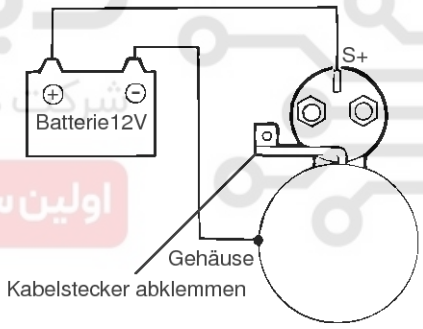
BE9C086A

HOLD-IN TEST OF MAGNETIC SWITCH

With a battery connected between the terminal S and body of magnetic, manually pull the pinion up to the pinion stopper. The hold-in coil is in good condition if the pinion remains out when releasing it.

NOTICE

This test must be completed with 10 seconds.



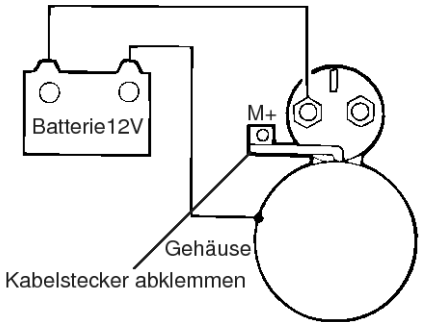
BE9C086B

RETURN TEST OF MAGNETIC SWITCH

With a battery connected between the terminal M and body of the magnetic switch, manually pull the pinion out to the pinion stopper. Body coils are fully operational if the pinion returns immediately when releasing it.

NOTICE

This test must be completed within 10 seconds.



BE9C086C

NO-LOAD TEST

1. Set up a circuit as shown which connects a starter motor, battery, ammeter, voltmeter, and variable resistance.
2. The starting motor should be in good condition if it turns smoothly and steadily when the switch is turned ON with a maximum variable resistance value. Adjust the variable resistor so that the voltmeter reads 11.5V. If the current and rpm are out of specification after this adjustment, troubleshoot according to the table below and take remedial action as required.

Symptom	Possible cause
Large current with low rpm (torque also being small)	Contaminated bearing Armature coil rubbing pole piece Armature and field coil grounding Armature coil shorting
Large current with no rotation	Solenoid switch grounding Armature and field coil grounding Seized bearing
No current flowing with no rotation	Broken armature and field coils Broken brush and pigtail Improper contact between brush and commutator
Small current with low rpm (torque also being small)	Improper field coil connection (Note, however, that open or improperly connected shunt coil only will result in high rpm.)
Large current with high rpm (torque being small)	Shorted field coil

Cruise Control System

DESCRIPTION

CRUISE CONTROL

Cruise control system is engaged by "CRUISE" main switch located on center instrument panel, left of steering wheel. System has the capability to cruise, coast, resume speed, and accelerate, and raise "tap-up" or lower "tap-down" set speed. It also has a safety interrupt, engaged upon depressing brake or shifting select lever.

Cruise control system is a speed control system that maintains a required vehicle speed at normal driving conditions.

The main components of Cruise control system are mode control switches, transaxle range switch, brake switch, vehicle speed sensor, Engine control module.

The Engine control module contains a low speed limit which will prevent system engagement below a minimum speed of 40Km/h (25mph). The operation of the controller is controlled by mode control switches located on steering wheel.

Transaxle range switch and brake switch are provided to disengage the cruise control system. The switches are on brake pedal braket and transaxle. When the brake pedal depressed or select lever shifted, the cruise control system is electrically disengaged and the throttle is returned to the idle position.

Cruise main switch

CC system is engaged by pressing "CRUISE" push button. Releasing "CRUISE" push button release throttle, clears cruise memory speed, and puts vehicle is a non-cruise mode.

Set/Coast switch

SET/COAST switch located on inside of steering wheel has two positions - "Normal"and "Depressed". The set posistion - With SET/COAST switch depressed and then releasely the cruise speed will be set at the speed the vehicle was going when SET/COAST switch was released.

The coast position - With SET/COAST switch fully depressed, driver can lower cruise speed. To decrease cruise speed, Set/Coast switch is held in, disengaging cruise control system. When vehicle has slowed to required cruise speed, releasingSET/COAST switch will re-engage speed at new selecte speed.

The tap down - To lower vehicle speed, cruise must be engaged and operating. Tap down is done by quickly pressing and releasing SET/COAST switch. Do no hold Set/Coast switch in depressed position.

Resume/Accel switch

RESUME/ACCEL switch located on inside of steering wheel has two positions - "Normal" and "Depressed" .

The resume position - With RESUME/ACCEL switch depressed and then release, This switch also returns cruise control operation to last speed (which is temporarily disengaged by Cancel switch or Brake pedal), setting when momentarily operatingRESUME/ACCEL switch by constant acceleration.

The accel position - With RESUME/ACCEL switch depressed and held in, disengaging cruise control system, when vehicle hasaccelerated to required cruise speed, releasing RESUME/ACCEL switch will re-engage speed at new selected speed.

The tap up - To increase vehicle speed, the cruise must be engaged and operating.

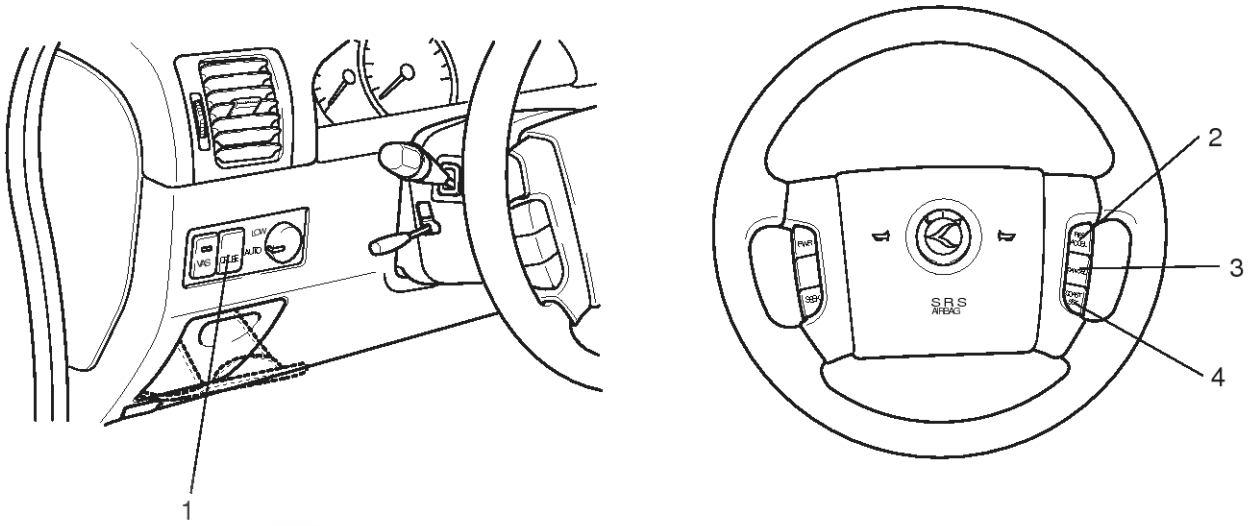
Tap up is done by quickly pressing and releasing RESUME/ACCEL switch less tha 0.75 second. Do not hold RESUME/ACCEL switch is in depressed position.

Cancel switch

CC system is temporarily disengaged by pressing "CANCEL" switch.

Cruise speed canceled by this switch will be recover by RESUME/ACCEL switch.

COMPONENTS LOCATION

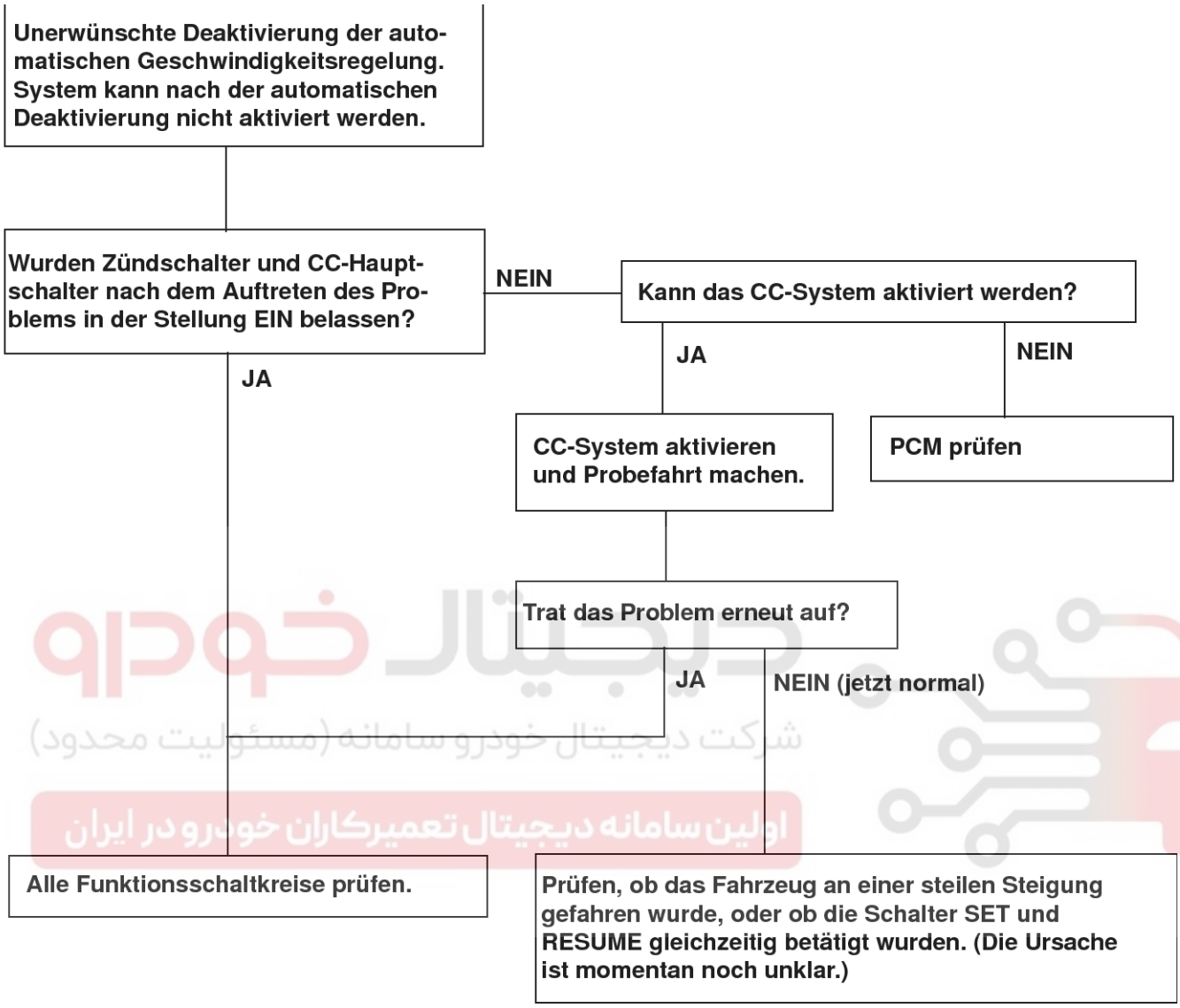


1. Hauptschalter "Cruise"
2. Schalter "Resume/Accel"
3. Abbruchschalter "Cancel"
4. Schalter "Coast/Set"

LBAC150A

TROUBLE SYMPTOM CHARTS

TROUBLE SYMPTOM 1



CC: AUTOMATISCHE GESCHWINDIGKEITSREGELUNG
PCM: MOTORSTEUERGERÄT

LBAC120A

TROUBLE SYMPTOM 2

Trouble symptom	Probable cause	Remedy
The set vehicle speed varies greatly upward or downward	Malfunction of the vehicle speed sensor circuit	Repair the vehicle speed sensor system, or replace the part
"Surging" (repeated alternating acceleration and deceleration) occurs after setting	Malfunction of the speedometer drive gear	
	Malfunction of the ECM	Replace the ECM

TROUBLE SYMPTOM 3

Trouble symptom	Probable cause	Remedy
The CC system is not canceled when the brake (clutch) pedal is depressed	Damaged or disconnected wiring of the brake (clutch) pedal switch	Repair the harness or replace the brake (clutch) pedal switch
	Malfunction of the ECM	Replace ECM

TROUBLE SYMPTOM 4

Trouble symptom	Probable cause	Remedy
The CC system is not canceled when the shift lever is moved to the "N" position (It is canceled, however, when the brake pedal is depressed)	Damaged or disconnected wiring of inhibitor switch input circuit	Repair the harness or repair or replace the inhibitor switch
	Improper adjustment of inhibitor switch	
	Malfunction of the ECM	Replace the ECM

TROUBLE SYMPTOM 5

Trouble symptom	Probable cause	Remedy
Cannot decelerate (coast) by using the SET switch	Temporary damaged or disconnected wiring of SET switch input circuit	Repair the harness or replace the SET switch
	Malfunction of the ECM	Replace the ECM

TROUBLE SYMPTOM 6

Trouble symptom	Probable cause	Remedy
Cannot accelerate or resume speed by using the RESUME switch	Damaged or disconnected wiring, or short circuit, or RESUME switch input circuit	Repair the harness or replace the RESUME switch
	Malfunction of the ECM	Replace the ECM

TROUBLE SYMPTOM 7

Trouble symptom	Probable cause	Remedy
CC system can be set while driving at a vehicle speed of less than 40km/h (25mph), or there is no automatic cancellation at that speed	Malfunction of the vehicle-speed sensor circuit	Repair the vehicle speed sensor system, or replace the part
	Malfunction of the ECM	Replace the ECM

CC : Cruise Control ECM : Engine Control Module

TROUBLE SYMPTOM 8

Trouble symptom	Probable cause	Remedy
The cruise control lamp does not illuminate (But CC system is normal)	Damaged or disconnected bulb of cruise control lamp	Repair the harness or replace the part
	Harness damaged or disconnected	

TROBLE AREA RELATED TO DTC

Fehlercode	CC-Code	BESCHREIBUNG	BEMERKUNGEN
P0500		GESCHWINDIGKEITSSENSOR OHNE FUNKTION	
	C001	Signal unter dem unteren Grenzwert	Stüngen durch andere Bauteile Geschwindigkeitssensor ohne Funktion
	C002	Signal ueber dem oberen Grenzwert	
	C003	Allgemeiner Fehler	
	C004	Plausibilitaetsfehler	Kupplungspedalschalter ohne Funktion Geschwindigkeitssensor ohne Funktion
P0703		BREMSPEDALSCHALTER OHNE FUNKTION	
	C004	Plausibilitaetsfehler	Verkabelung unterbrochen oder kurzgeschlossen Sicherung durchgebrannt Unzureichender Kontakt Schalter ohne Funktion
P0704		KUPPLUNGSPEDALSCHALTER OHNE FUNKTION (MT)	
	C004	Plausibilitaetsfehler	Verkabelung unterbrochen oder kurzgeschlossen Sicherung durchgebrannt Unzureichender Kontakt Schalter ohne Funktion
P1634		CC-LEUCHTE OHNE FUNKTION	
	C018	Kurzschluss	
	C019	Stromkreisunterbrechung	
P1660		CC-SCHALTER OHNE FUNKTION	
	C001	Signal unter dem unteren Grenzwert	
	C002	Signal ueber dem oberen Grenzwert	
	C003	Allgemeiner Fehler	
	C004	Plausibilitaetsfehler	

* MIL: Stoerungsanzeigeleuchte

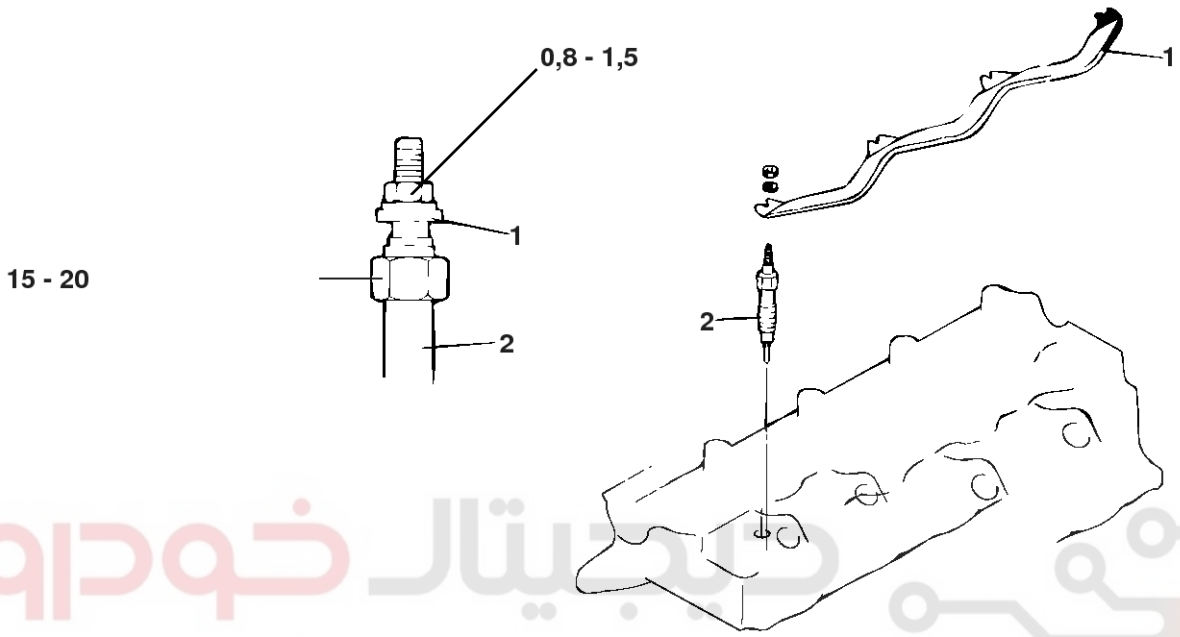
CC: Automatische Geschwindigkeitsregelung

LBAC130A

Preheating System

REMOVAL AND INSTALLATION

COMPONENTS



HINWEIS
Der Einbau erfolgt in der umgekehrten Reihenfolge des Ausbaus.

ANZUGSDREHMOMENT: Nm

1. Stromschiene
2. Glühkerze

LBAC100A

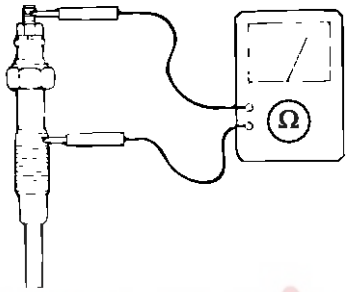
INSPECTION

GLOW PLUG

1. Check the continuity between the terminal and body as illustrated. Replace if discontinuity or with large resistance.

   Standard value : 1.0-1.8Ω

   ⚠CAUTION
   Remove oil from plug before measuring as glow plug resistance is very small.
2. Check for rust on glow plug plate.
3. Check glow plug for damage.



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