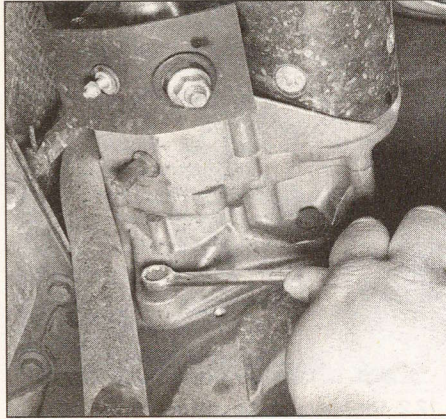


Chapter 5 Engine electrical systems



the electrical connectors
the starter solenoid (diesel
engine shown)



15.3 Starter motor installation details on
the V10 engine

ers - they will be stamped into
r printed on a tag attached to
Make sure the numbers are the
alternators.

w/rebuilt alternators do not have
led, so you may have to switch
n the old unit to the new/rebuilt
ying an alternator, find out the
regarding pulleys; some shops
is service free of charge.

on is the reverse of removal.
alternator is installed, install the
Chapter 1).

he charging voltage to verify
ation of the alternator (see

g system - general ation and precautions

ter motor assembly installed on
es uses a planetary gear
drive. This starter/solenoid
made by Nippondenso and
er rotational speeds for starting.
er/solenoid assemblies are
a complete unit. If either
ails, then the entire assembly
aced. This unit is sold strictly as
assembly. Check with your local
department before disassembly.
function of the starting system
er the engine quickly enough to
rt.

rting system consists of the
starter motor, the starter solenoid
connecting them. The solenoid
irectly on the starter motor.

enoid/starter motor assembly is
he lower part of the engine, next
ission bellhousing.

he ignition key is turned to the
tion, the starter solenoid is

actuated through the starter control circuit
which includes a starter relay located in the
Power Distribution Center. The starter
solenoid then connects the battery to the
starter. The battery supplies the electrical
energy to the starter motor, which does the
actual work of cranking the engine.

Always observe the following precau-
tions when working on the starting system:

- a) *Excessive cranking of the starter motor can overheat it and cause serious damage. Never operate the starter motor for more than 15 seconds at a time without pausing to allow it to cool for at least two minutes.*
- b) *The starter is connected directly to the battery and could arc or cause a fire if mishandled, overloaded or shorted out.*
- c) *Always detach the cable from the negative terminal of the battery before working on the starting system.*

14 Starter motor - in-vehicle check

Note: Before diagnosing starter problems,
make sure the battery is fully charged.

1 If the starter motor does not turn at all
when the switch is operated, make sure the
shift lever is in Neutral or Park (automatic
transmission) or the clutch pedal is
depressed (manual transmission).

2 Make sure the battery is charged and all
cables, both at the battery and starter
solenoid terminals, are clean and secure.

3 If the starter motor spins but the engine
is not cranking, the overrunning clutch in the
starter motor is slipping and the starter motor
must be replaced. Also, the ring gear on the
flywheel or driveplate may be worn.

4 If, when the switch is actuated, the
starter motor does not operate at all but the
solenoid clicks, the problem lies with either

the battery, the main solenoid contacts or the
starter motor itself (or the engine is seized).

5 If the solenoid plunger cannot be heard
when the switch is actuated, the battery is
bad, the fusible link is burned (the circuit is
open) or the solenoid itself is defective.

6 To check the solenoid, connect a
jumper lead between the battery and the
ignition switch wire terminal (the small
terminal) on the solenoid. If the starter motor
now operates, the solenoid is OK and the
problem is in the ignition switch, neutral start
switch, starter relay or the wiring.

7 Locate the starter relay in the power
distribution center under the hood. Remove
the relay and perform the identical tests as
for the Automatic Shutdown Relay (ASD) and
the fuel pump relay in Chapter 4A, Section 3.

8 If the starter motor still does not
operate, remove the starter/solenoid
assembly for exchange at a dealer parts
department or other qualified parts store.

9 If the starter motor cranks the engine at
an abnormally slow speed, first make sure
that the battery is charged and that all
terminal connections are tight. If the engine is
partially seized or has the wrong viscosity oil
in it, it will crank slowly.

10 Run the engine until normal operating
temperature is reached, then disconnect the
coil wire from the distributor cap and ground
it on the engine (V8), disconnect the ignition
coil packs (V10) or disconnect the fuel
shutdown solenoid (diesel).

11 Connect a voltmeter positive lead to the
positive battery post and connect the
negative lead to the negative post.

12 Crank the engine and take the voltmeter
readings as soon as a steady figure is
indicated. Do not allow the starter motor to
turn for more than 15 seconds at a time. A
reading of nine volts or more, with the starter
motor turning at normal cranking speed, is
normal. If the reading is nine volts or more
but the cranking speed is slow, the motor,
solenoid contacts or circuit connections are
faulty. If the reading is less than nine volts
and the cranking speed is slow, the starter
motor is probably bad.

15 Starter motor - removal and installation

Refer to illustration 15.2 and 15.3

1 Detach the cable from the negative
terminal of the battery.

2 Clearly label, then disconnect the wires
from the terminals on the starter motor
solenoid (**see illustration**). Disconnect any
clips securing the wiring to the starter.

3 Remove the mounting bolts (**see illus-
tration**) and detach the starter.

4 Installation is the reverse of removal.

Chapter 6 Emission

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Camshaft sensor retaining
EGR tube mounting nuts ...
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