

DENSO STARTER CONDITION DIAGNOSIS

STARTER DIAGNOSIS / TESTING

The starting system on most vehicles or engine applications requires very little maintenance. As recommended by most vehicle manufacturers (see factory service manual), a charged battery and properly maintained electrical connections can provide years of trouble-free starter service.

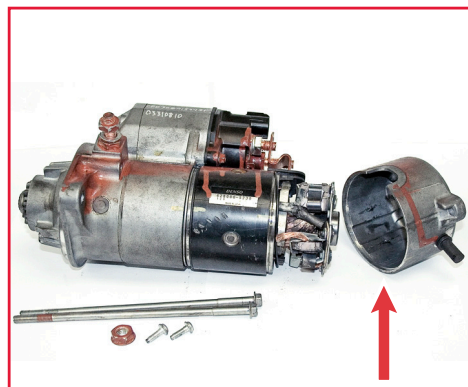
Starting Circuit Basic Inspection

- Inspect and/or test battery condition
- Inspect battery terminals and cables
- Inspect and/or test ignition switch, relay, start switches, etc.
- Inspect starter motor for damaged wiring, loose connections, missing bolts, etc.

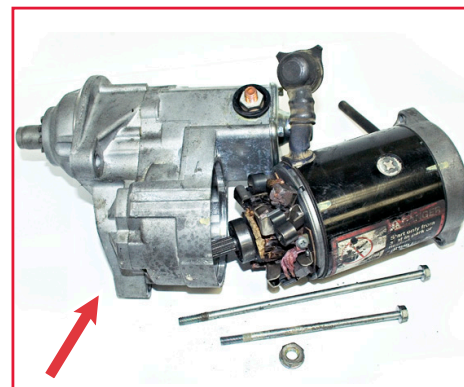
NOTICE - ALLOWABLE DISASSEMBLY FOR INSPECTION

To inspect for signs of damage, **ONLY** the following components may be removed:

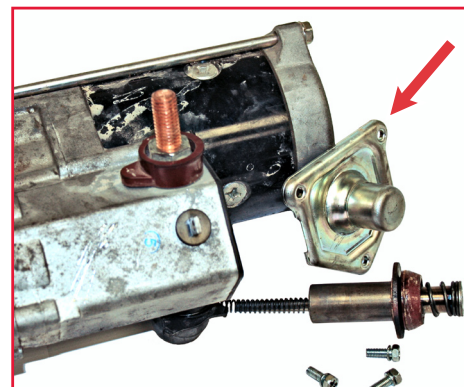
- End cap
- Switch assembly/housing
- Solenoid cover



End cap removal.



Switch assembly/housing (reduction type starter).



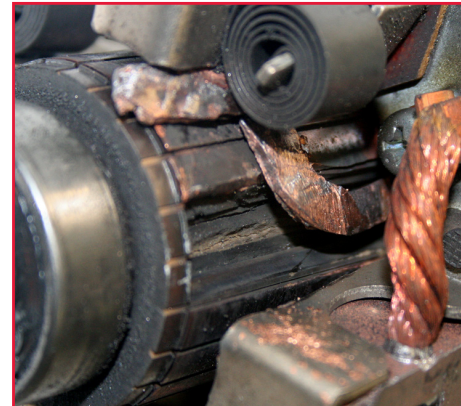
Solenoid cover.

Always follow the procedures in the applicable factory service manual(s) when inspecting or testing is required on any vehicle, engine or related component part.

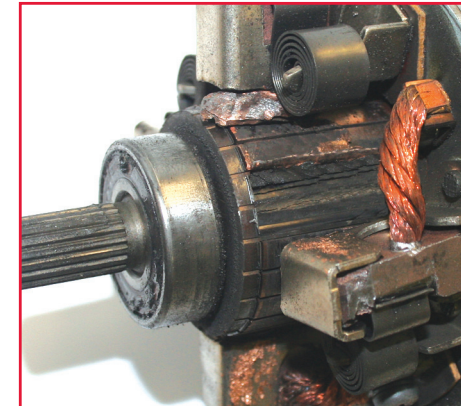
The following examples are considered non-warrantable conditions by DENSO.

EXAMPLE 1 - CONTINUOUS CRANKING / OVERHEATED

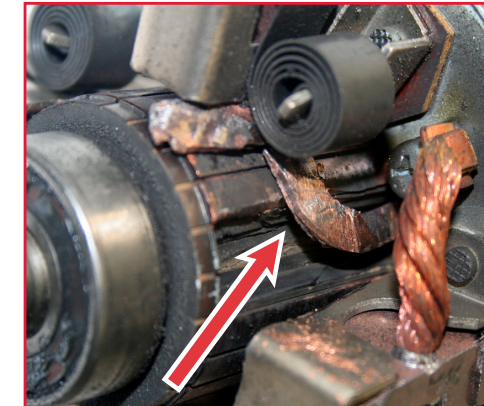
- Low battery voltage resulting in excessive current to starter motor
- Starter commutator overheated, bars on commutator lift from insulator
- Damage to brushes and/or brush holder assembly



- Commutator surface is glazed.
- Commutator segment bars bent.



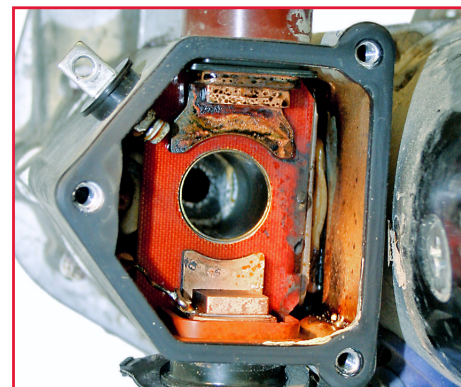
- Commutator surface is burnt.
- Commutator segment bars missing.



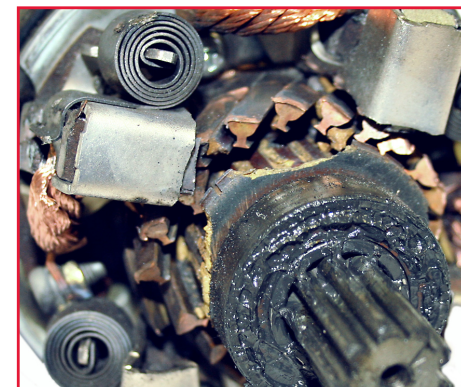
- Commutator segment bar has separated, raised and bent (distorted).

EXAMPLE 2 - OVERRUN / DAMAGED COMMUTATOR / BURNT SOLENOID

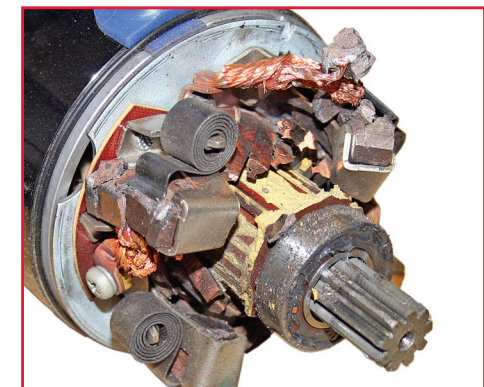
- Relay remains engaged (key switch held excessively in “start” position)
- Starter pinion turns at flywheel speed (engine speed)
- Commutator bars separate causing damage to brushes, brush holder assembly, and commutator



- Melted wire coating and case discoloration. Burnt odor.



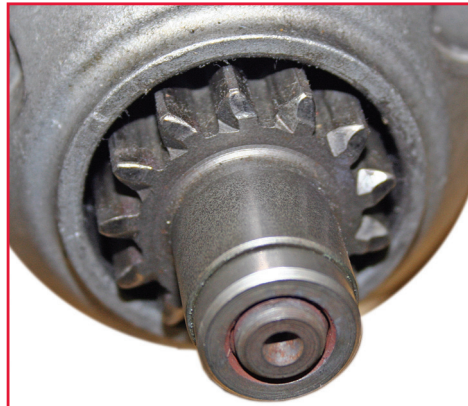
- Separated commutator segments.



- Damage to commutator, brushes, and brush holder assembly.

EXAMPLE 3 - RE-ENGAGEMENT / PINION TEETH MESHING PROBLEM

- Starter pinion teeth and flywheel do not mesh properly
- Starter pinion gear has excessive wear
- Operator error (engagement of the key switch while the engine is operating)
- Mechanical problem (ignition switch or relay contacts stuck closed)



A.) Minor case of re-engagement (will cause flywheel damage and have difficulty engaging into flywheel).



B.) Moderate case of pinion re-engagement.



C.) Extreme case of pinion re-engagement.

EXAMPLE 5 - SIGNS OF STARTER ABUSE OR PHYSICAL DAMAGE



Solenoid cover has been struck repeatedly with a hammer or some other foreign object.



Damage to the terminal could cause ground contact with housing.



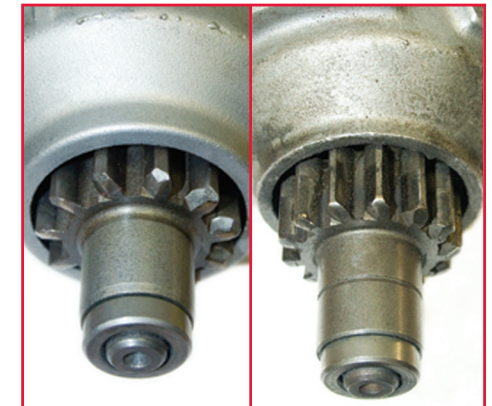
Starter to engine mounting bolt hole broken off due to mishandling, improper installation, or over-torquing of the engine bolt.



ID tag has been overheated and has shrunk. This is a sign of excessive heat.



Melted insulation on the starter end housing thru bolts. This is a sign of starter abuse (overheated).



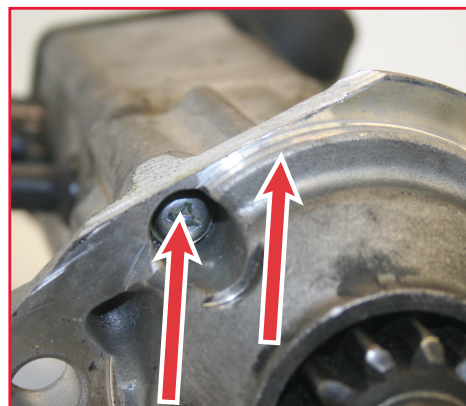
Normal starter (left), pinion gear fully retracted. Overheated (right), pinion gear not fully retracted. Overheating affects tension in the return spring.

EXAMPLE 4 - MODIFIED STARTER - ALTERED FROM ORIGINAL ASSEMBLY

The photos below are examples of starters that have been modified or altered from original.



Epoxy has been added to a damaged key switch terminal insulator in an attempt to prevent accidental grounding.



This starter housing has been modified possibly to fit another application.



Grease applied to the solenoid contacts. This acts as an insulator and prevents current flow.

BASIC STARTER DIAGNOSIS

SYMPTOM	POSSIBLE CAUSE
Engine will not crank	<ul style="list-style-type: none"> • Battery (low voltage or defective) • Loose battery terminals or defective cables • Defective ignition switch, solenoid, relay, or cut switch • Vehicle engine problem (mechanical)
Noise heard during cranking	<ul style="list-style-type: none"> • Worn bushing or bearing • Worn pinion ring gear or flywheel teeth
Engine cranks slow	<ul style="list-style-type: none"> • Battery (low voltage or defective) • Loose or corroded battery terminals, cables, or vehicle wiring • Vehicle engine problem (mechanical) • Faulty starter motor
Starter spins freely, but will not crank engine	<ul style="list-style-type: none"> • Faulty starter clutch • Defective or worn pinion gear, ring gear or flywheel