

2002 STARTING & CHARGING SYSTEMS

Starters - Sedona

DESCRIPTION & OPERATION

STARTER CIRCUIT

The starting system includes the battery, starter motor, solenoid switch, ignition switch, inhibitor switch, connection wires and the battery cables. Battery voltage is applied to terminal "B" of starter solenoid at all times. See **Fig. 1** . When the ignition is turned to START position, battery voltage is sent through either a clutch pedal position switch (M/T) or transmission range switch (A/T) to terminal "S" of starter solenoid. This energizes the solenoid, applying voltage to starter motor, engaging starter drive gear to flywheel and cranking engine.

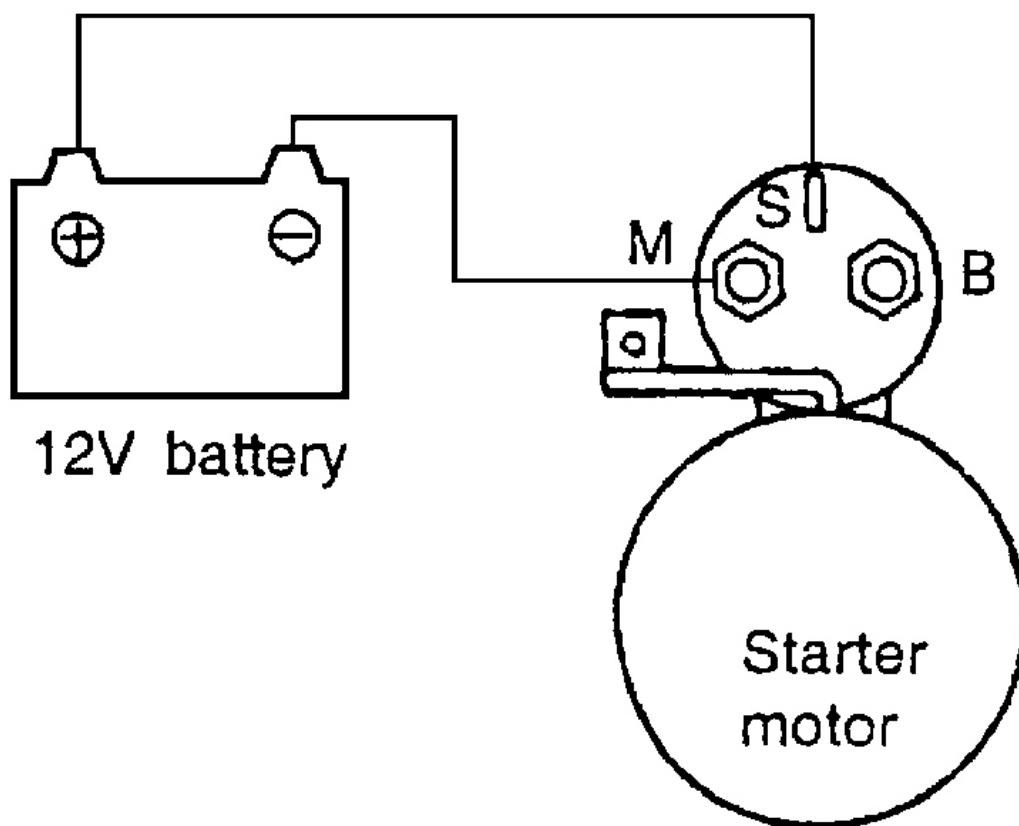
Models equipped with DOHC engine and A/T use a gear reduction starter.

ADJUSTMENTS

PINION GAP

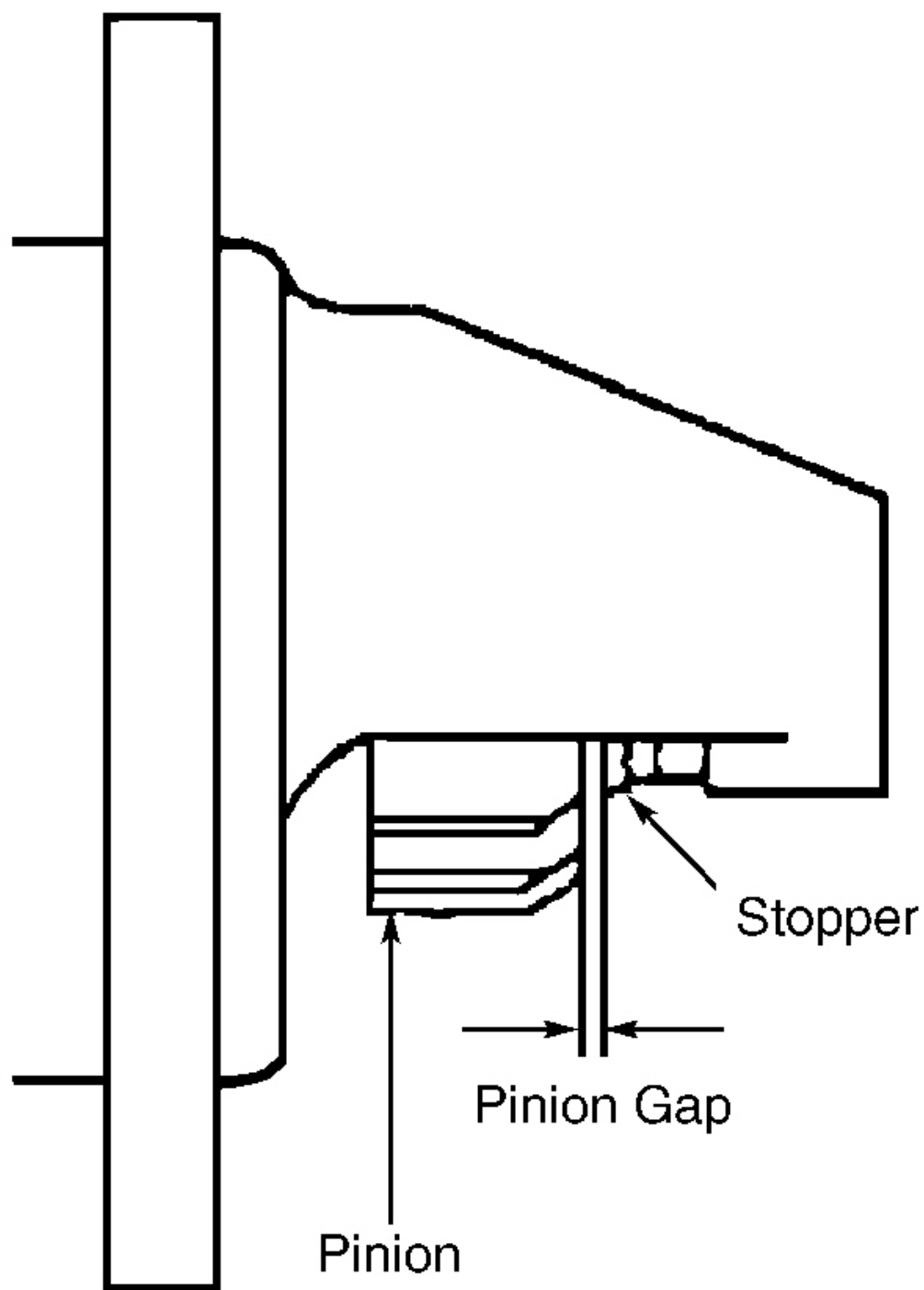
NOTE: **To prevent coil from burning. DO NOT apply voltage to starter assembly for more than 10 seconds.**

1. With starter on a bench, disconnect the field coil wire from the "M" terminal of the solenoid. See **Fig. 1** .
2. Connect a 12V battery between "S" terminal and "M" terminal. Pinion will eject.
3. Check the gap between pinion and stopper with a feeler gauge. See **STARTER SPECIFICATIONS** . See **Fig. 2**
4. If pinion gap is not within specification, make adjustment by increasing or decreasing number of gaskets between solenoid and drive housing. Gap will decrease as number of gaskets is increased.



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Fig. 1: Identifying Starter Terminals
Courtesy of KIA MOTORS AMERICA, INC.



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TROUBLE SHOOTING

NOTE: See **STARTER - GENERAL TROUBLE SHOOTING** article in **GENERAL INFORMATION**.

ON-VEHICLE TESTING

NOTE: Before testing, ensure battery is fully charged, battery cables and terminals are clean and tight, and engine grounds are okay.

CIRCUIT TEST

1. If starter does not operate, check voltage at starter solenoid "S" terminal with ignition switch in START position, transmission in Park or Neutral (A/T) or clutch depressed (M/T). See **Fig. 1** . If battery voltage is present, replace starter. If battery voltage is not present, check ignition switch, transmission range switch (A/T), clutch pedal position switch (M/T) and wiring.
2. If starter motor runs and engine does not crank, remove starter for visual inspection and testing. Inspect flywheel and ring gear for damaged or missing teeth.

BENCH TESTING

ARMATURE TEST

1. Using ohmmeter, check continuity between commutator and core. If continuity exists, replace armature. Check for continuity between commutator and shaft. If continuity exists, replace armature.
2. Place armature on "V" blocks. Using a dial indicator, measure runout at commutator. If runout is not within specification, resurface commutator or replace armature.
3. Wipe commutator clean. Measure commutator outer diameter. See **STARTER SPECIFICATIONS** . If commutator is at, or less than limit, replace armature. Check depth of mold between commutator segments. Replace armature if depth of mold is at, or less than minimum.

BRUSH & BRUSH HOLDER TEST

Brush

Measure brush length. See **STARTER SPECIFICATIONS** . If a brush is worn to, or beyond, wear limit, replace all brushes.

Brush Holder

Using ohmmeter, check continuity between each insulated brush and plate. See **Fig. 3** If continuity exists, replace brush holder.

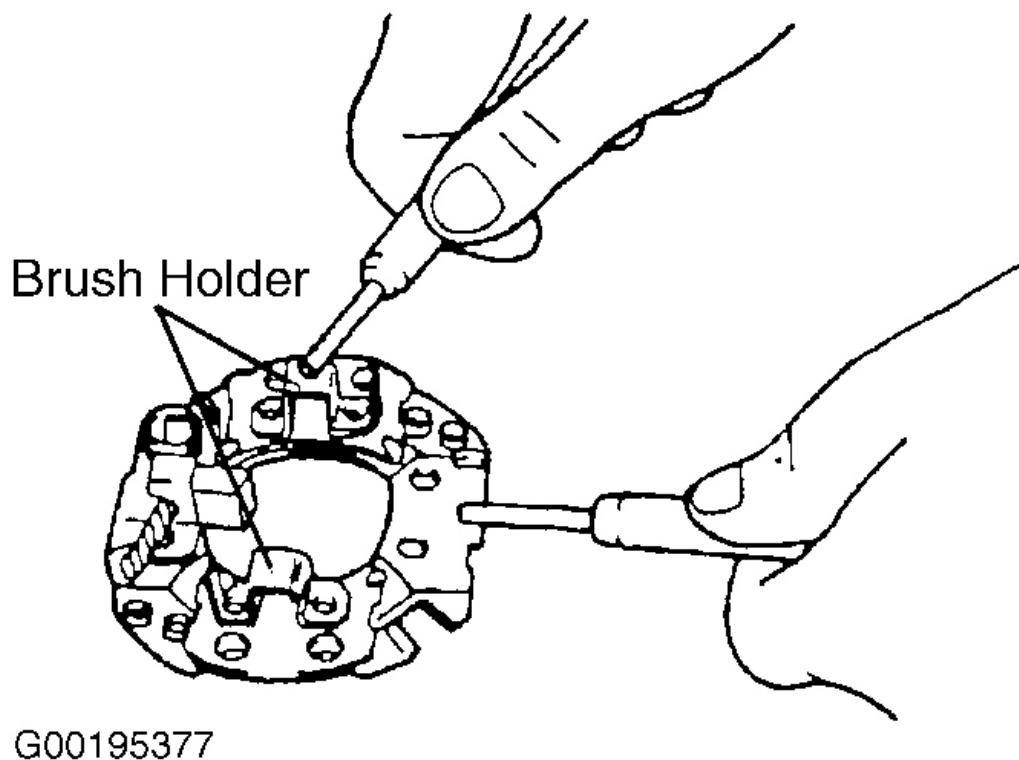


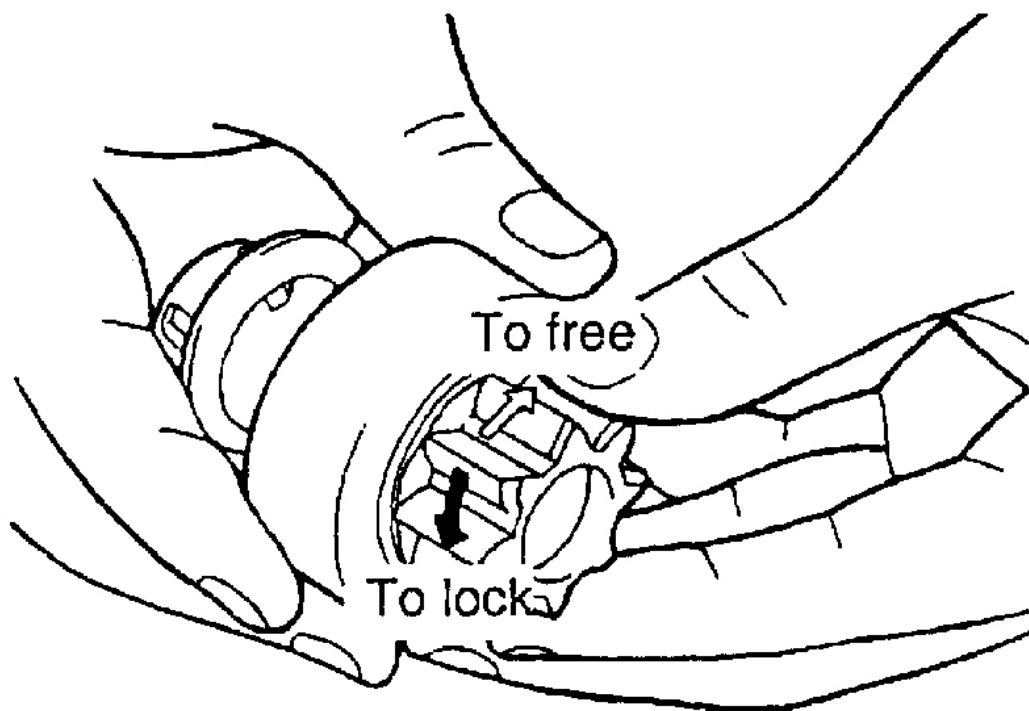
Fig. 3: Checking Brush Holder & Plate Continuity
Courtesy of KIA MOTORS AMERICA, INC.

FIELD COIL TEST

Using ohmmeter, check for continuity between starter solenoid "M" terminal wire and brushes. If continuity does not exist, replace field coil assembly. Check for continuity between "M" terminal wire and field coil. If continuity exists, replace field coil assembly. Check field coil for looseness. If field coil is loose, replace field coil assembly.

OVERRUNNING CLUTCH

1. While holding clutch housing, rotate the pinion. Drive pinion should rotate smoothly in one direction, but should not rotate in opposite direction. See **Fig. 4** . If clutch does not function properly, replace overrunning clutch assembly.
2. Inspect pinion for wear or burrs. If pinion is worn or burred, replace overrunning clutch assembly. If pinion is damaged, also inspect ring gear for wear or burrs.



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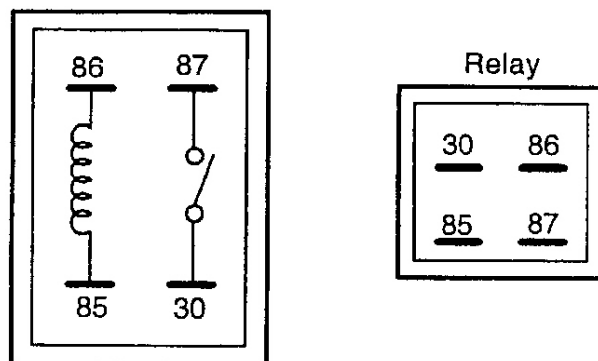
Fig. 4: Checking Overrunning Clutch
Courtesy of KIA MOTORS AMERICA, INC.

SOLENOID TEST

Using ohmmeter, check for continuity between starter solenoid "S" and "M" terminals. See **Fig. 1** . Check for continuity between "S" terminal and solenoid body. If continuity does not exist, replace solenoid. Check for continuity between "M" and "B" terminals. If continuity exists, replace solenoid.

STARTER RELAY

Remove the starter relay and check continuity between the terminals. See **Fig. 5** . If the continuity is not as specified, replace the relay.



Terminal No.	85	86	87	30
Condition				
When de-energized	○ ——— ○			
When energized	○ ——— ○		○ ——— ○	

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Fig. 5: Checking Starter Relay
 Courtesy of KIA MOTORS AMERICA, INC.

REMOVAL & INSTALLATION

NOTE: Any time battery cables are disconnected from battery and then reconnected, theft deterrent system will be activated (horn will sound and emergency lights will flash about 3 minutes). To disarm theft deterrent system, insert ignition key and turn it to ACC position.

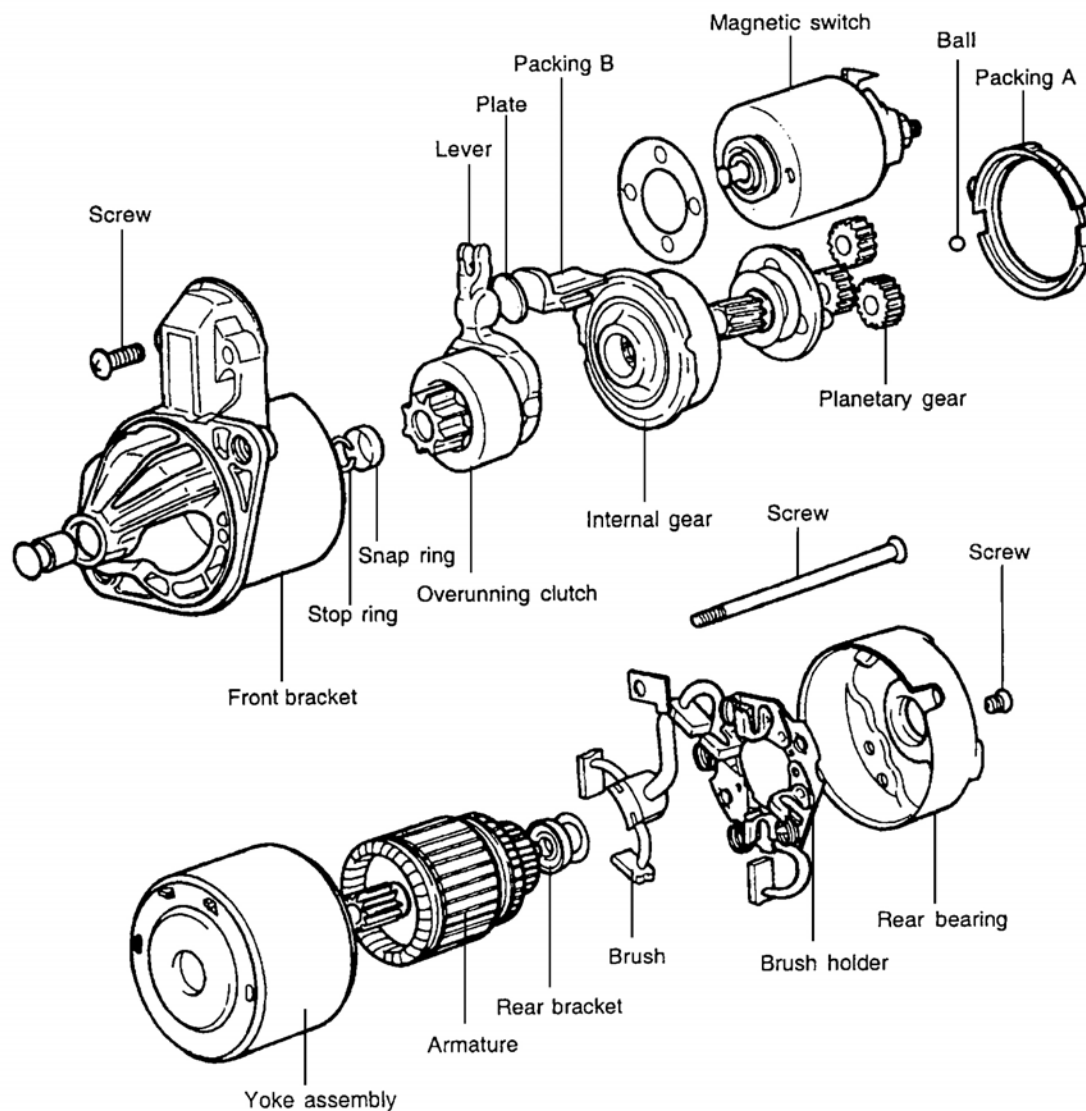
STARTER

Removal & Installation

1. Disconnect negative battery cable. Remove 2 upper bolts from intake manifold bracket. Raise and support vehicle. On M/T, remove clutch slave cylinder and push it aside.
2. On all models, remove lower intake manifold bracket bolts and bracket. Remove 2 upper starter bolts and a lower bolt. Pull starter from clutch (M/T) or converter (A/T) housing and prop in place. From above, disconnect starter solenoid "S" and "B" terminal connectors. From below, push transmission harness aside and remove starter.
3. To install, reverse removal procedure. Rotate starter to provide proper clearance. Tighten all nuts and bolts to specification. See **TORQUE SPECIFICATIONS**.

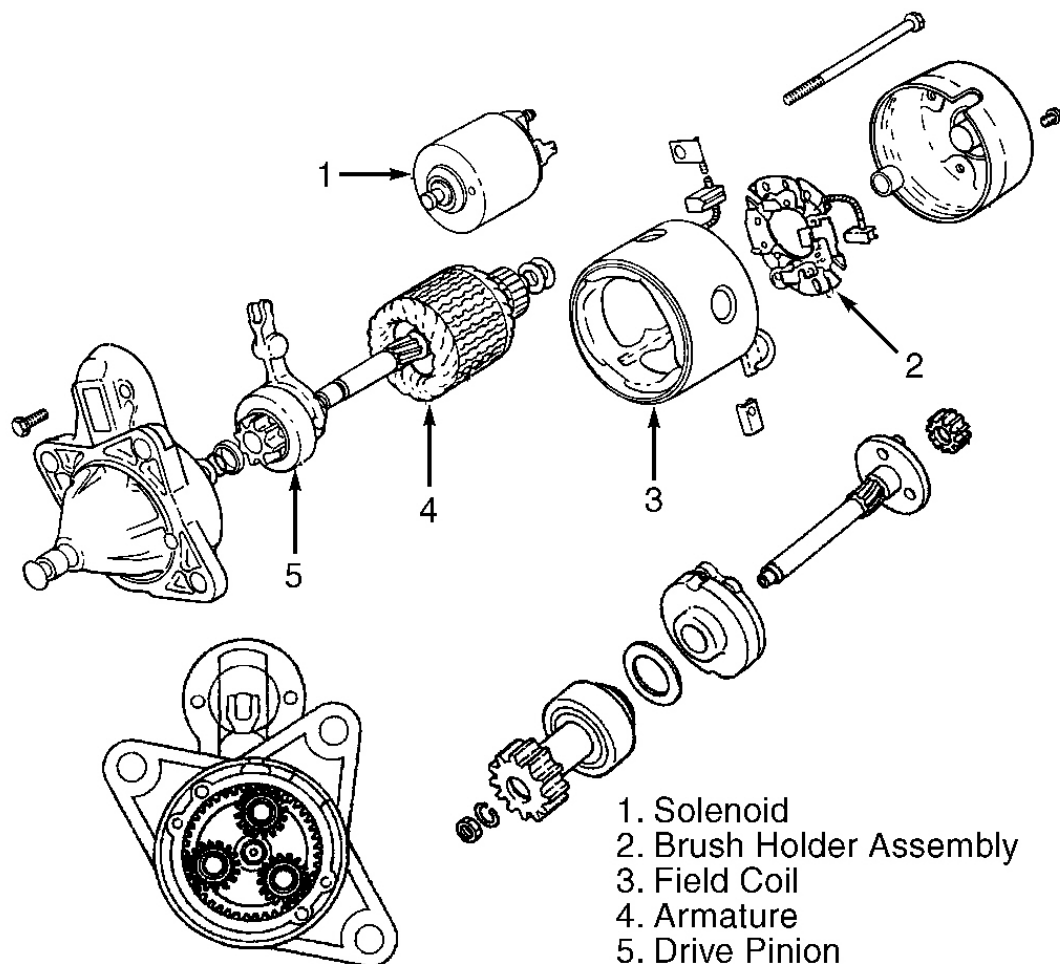
OVERHAUL

To assist in overhaul use illustration. See **Fig. 6****Fig. 7** .



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Fig. 6: Exploded View Of Non-Gear Reduction Starter
Courtesy of KIA MOTORS AMERICA, INC.



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Fig. 7: Exploded View Of Gear Reduction Starter
Courtesy of KIA MOTORS AMERICA, INC.

STARTER SPECIFICATIONS

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Application	Specifications
Armature	
Commutator Runout	
Standard	.002" (0.05 mm)
Limit	.0039" (0.1 mm)
Commutator Diameter	
Limit	1.118" (28.4mm)

Commutator Undercut (Mica) Depth	
Standard	0.020" (0.5 mm)
Limit	0.008" (0.2 mm)
Brush Length	(1)
Pinion Gap	.02-.08" (.5-2.0 mm)
(1) Information is not available from manufacturer.	

TORQUE SPECIFICATIONS

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Application	Ft. Lbs. (N.m)
Intake Manifold Bracket Bolts	(1)
Starter Cable Nut	9-12 (12-16)
Starter Mounting Bolts	9-12 (12-16)
INCH Lbs. (N.m)	
Starter Brush Plate Bolts	(1)
Starter Rear Cover Bolts	(1)
Starter Solenoid Bolts	(1)
Transmission Range (TR) Switch Bolt	(1)
(1) Information is not available from manufacturer	

WIRING DIAGRAMS

For starter wiring see **STARTING/CHARGING** in WIRING DIAGRAMS article in ELECTRICAL.