

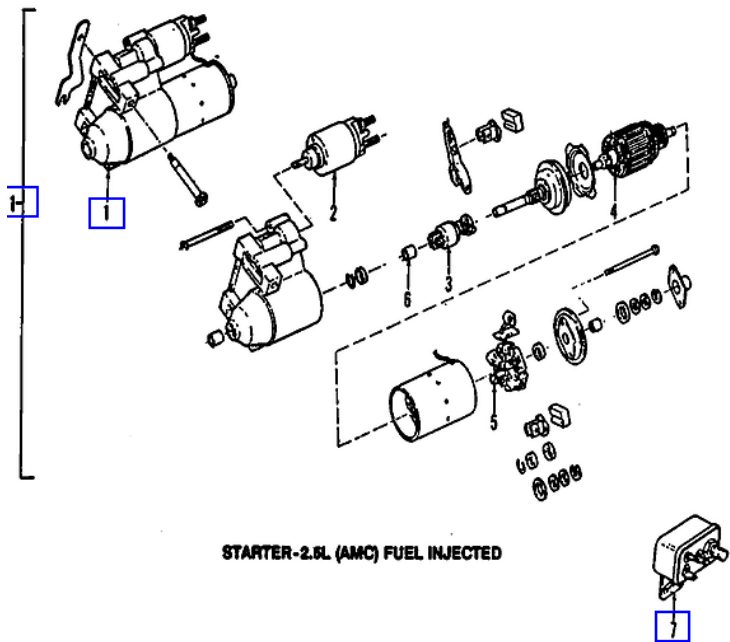
Component Procedures: Starting System

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Component Procedures: Starting System

Exploded Parts Diagram (itype_83)



Parts and Labor (itype_189)

Labor

Operation	Qualifier Path	Skill	Std Hrs	Wty Hrs
Inspect	Circuit, Inspect	B	0.5	0.0
Diagnose/Test	Starter Draw, Test	B	0.3	0.0

Components (itype_392)

DESCRIPTION

An electrically operated engine starting system

is standard factory-installed equipment on this model. The starting system is designed to provide the vehicle operator with a convenient, efficient and reliable means of cranking and starting the internal combustion engine used to power the vehicle and all of its accessory systems from within the safe and secure confines of the passenger compartment. See the owner's manual in the vehicle glove box for more information and instructions on the recommended use and operation of the factory-installed starting system.

The starting system consists of the following components:

-
- Battery
- Starter relay
- Starter motor
(including an integral starter solenoid)
-)
- Ignition switch
- Clutch pedal position switch
(manual transmission)
- Park/
neutral position switch
(automatic transmission)
- Wire harnesses and connections (including the battery cables).

Complete service information for the other starting system components can be located as follows:

- Refer to Battery for complete service information for the battery.

- Refer to

Ignition Sw

itch and Key

Lock Cylinder

in the Starting System for complete service information for the ignition switch.

- Refer to Clutch Pedal Position Switch for complete service information for the clutch pedal position switch.

- Refer to Park/Neutral Position Switch

However, when attempting to diagnose any of these systems, it is important that you keep their interdependency in mind.

The battery, starting, and

charging system

s in the vehicle operate with one another, and must be tested as a complete system. In order for the vehicle to start and charge properly, all of the components that are used in these systems must perform within specifications.

The diagnostic procedures used include the most basic conventional diagnostic methods, to the more sophisticated On-Board Diagnostics

(OBD)

built into the Powertrain Control Module

(PCM)

. Use of an induction-type milliampere ammeter, volt/ohmmeter, battery charger, carbon pile rheostat (load tester), and

12-volt

test lamp may be required.

All OBD-sensed systems are monitored by the PCM. Each monitored circuit is assigned a Diagnostic Trouble Code (DTC)

. The PCM will store a DTC in electronic memory for any failure it detects. Refer to On-Board Diagnostic Test For Charging System in the Diagnosis and Testing of Charging System for more information.

OPERATION

The starting system components form two separate circuits. A high-amperage feed circuit that feeds the starter

motor between

150 and 350 amperes

, and a low-amperage control circuit that operates on less than

20 amperes

. The high-amperage feed circuit components include the battery, the battery cables, the contact disc portion of the starter solenoid, and the starter motor. The low-amperage control circuit components include the ignition switch, the clutch pedal position switch (manual transmission), the park/neutral position switch (automatic transmission), the starter relay, the electromagnetic windings of the starter solenoid, and the connecting wire harness components.

If the vehicle is equipped with a manual transmission, it has a clutch pedal position switch installed in series between the ignition switch and the coil battery terminal of the starter relay. This normally open switch prevents the starter relay from being energized when the ignition switch is turned to the momentary Start position, unless the clutch pedal is depressed. This feature prevents starter motor operation while the clutch disc and the flywheel are engaged. The starter relay coil

ground

terminal is always grounded on vehicles with a manual transmission. If the vehicle is equipped with an automatic transmission, battery voltage is supplied through the low-amperage control circuit to the coil battery terminal of the starter relay when the ignition switch is turned to the momentary Start position. The park/neutral position switch is installed in series between the starter relay coil ground terminal and ground. This normally open switch prevents the starter relay from being energized and the starter motor from operating unless the automatic transmission gear selector is in the Neutral or Park positions.

When the starter relay coil is energized, the normally open relay contacts close. The relay contacts connect the relay common feed terminal to the relay normally open terminal. The closed relay contacts energize the starter solenoid coil windings.

The energized solenoid pull-in coil pulls in the solenoid plunger. The solenoid plunger pulls the shift lever in the starter motor. This engages the

starter overrunning clutch

and pinion gear with the starter ring gear on the manual transmission flywheel or on the automatic

transmission torque converter drive plate.

As the solenoid plunger reaches the end of its travel, the solenoid contact disc completes the high-amperage starter feed circuit and energizes the solenoid plunger hold-in coil. Current now flows between the solenoid battery terminal and the starter motor, energizing the starter.

Once the engine starts, the

overrunning clutch

protects the starter motor from damage by allowing the

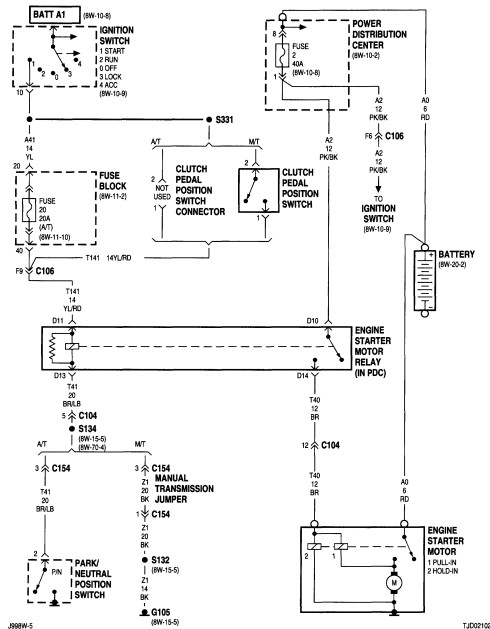
starter pinion

gear to spin faster than the pinion shaft. When the driver releases the ignition switch to the On position,

the starter relay coil is de-energized. This causes the relay contacts to open. When the relay contacts open, the starter solenoid plunger hold-in coil is de-energized.

When the solenoid plunger hold-in coil is de-energized, the solenoid plunger return spring returns the plunger to its relaxed position. This causes the contact disc to open the starter feed circuit, and the shift lever to disengage the overrunning clutch and pinion gear from the starter ring gear.

Electrical (OE) (itype_21)



Technician Safety Information (itype_15)

WARNING: ON VEHICLES EQUIPPED WITH AIR-BAGS, PASSIVE RESTRAINT SYSTEMS BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIR-BAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY

Non-Trouble Code Diagnostic Procedures (Article 2085581)

Non Standards

- No Start Testing (2085582)
- Cold Cranking Test (2085583)
- Control Circuit Test (2085584)
- Feed Circuit Test (2085585)

Initial Inspection and Diagnostic Overview (itype_377)

The battery, starting, and charging system

operate with one another, and must be tested as a complete system. In order for the vehicle to start and charge properly, all of the components involved in these systems must perform within specifications.

However, when attempting to diagnose any of these systems, it is important that you keep their interdependency

in mind.

The diagnostic procedures used include the most basic conventional diagnostic methods, to the more sophisticated On-Board Diagnostics (OBD) built into the Powertrain Control Module (PCM). Use of an induction-type milliampere ammeter, volt/ohmmeter, battery charger, carbon pile rheostat (load tester), and 12-volt

test lamp may be required.

All OBD-sensed systems are monitored by the PCM. Each monitored circuit is assigned a Diagnostic Trouble Code (DTC). The PCM will store a DTC in electronic memory for any failure it detects. Refer to On-Board Diagnostic Test For Charging System in the Diagnosis and Testing of Charging System for more information.

Inspection

Before removing any unit from the starting system

for repair or diagnosis, perform the following inspections:

WARNING: ON VEHICLES EQUIPPED WITH AIR-BAGS, PASSIVE RESTRAINT SYSTEMS BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIR-BAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY

- Battery - Visually inspect the battery for indications of physical damage and loose or corroded cable connections. Determine the state-of-charge and cranking capacity of the battery. Charge or replace the battery, if required. Refer to Battery for complete service information for the battery.

Ignition Switch

- Visually inspect the ignition switch

for indications of physical damage and loose or corroded wire harness connections. Refer to Ignition Switch and Key

Lock Cylinder

of Starting System for complete service information for the ignition switch.

Clutch pedal Position Switch

- If the vehicle is equipped with a manual transmission, visually inspect the clutch pedal position switch for indications of physical damage and loose or corroded wire harness connections.

- Park/

Neutral Position Switch

- Visually inspect the park/neutral position switch for indications of physical damage and loose or corroded wire harness connections.

Starter Relay

starter

relay for indications of physical damage and loose or corroded wire harness connections.

Starter Motor

- Visually inspect the starter motor for indications of physical damage and loose or corroded wire harness connections.

Starter Solenoid

- Visually inspect the starter solenoid for indications of physical damage and loose or corroded wire harness connections.

- Wiring - Visually inspect the wire harnesses for damage. Repair or replace any faulty wiring, as required.

Symptom Related Diagnostic Procedures (itype_381)

Starting System Diagnosis		
CONDITION	POSSIBLE CAUSE	CORRECTION
STARTER FAILS TO OPERATE.	<ol style="list-style-type: none"> 1. Battery discharged or faulty. 2. Starting circuit wiring faulty. 3. Starter relay faulty. 4. Ignition switch faulty. 5. Clutch pedal position switch faulty. 6. Park/Neutral position switch faulty or misadjusted. 7. Starter solenoid faulty. 8. Starter motor faulty. 	<ol style="list-style-type: none"> 1. Refer to Battery in the Diagnosis and Testing of Battery. Charge or replace the battery; if required. 2. Test and repair the starter feed and/or control circuits, if required. 3. Refer to Starter Relay in the Diagnosis and Testing. Replace the starter relay, if required. 4. Refer to Ignition Switch and Key Lock Cylinder in the Diagnosis and Testing of Ignition System. Replace the ignition switch, if required. 5. Refer to Starter Motor in the Diagnosis and Testing. Replace the starter motor assembly, if required. 6. If all other starting system components and circuits test OK, replace the starter motor assembly.
STARTER ENGAGES, FAILS TO TURN ENGINE.	<ol style="list-style-type: none"> 1. Battery discharged or faulty. 2. Starting circuit wiring faulty. 3. Starter motor faulty. 4. Engine seized. 	<ol style="list-style-type: none"> 1. Refer to Battery in the Diagnosis and Testing of Battery. Charge or replace the battery, if required. 2. Test and repair the starter feed and/or control circuits, if required. 3. If all other starting system components and circuits test OK, replace the starter motor assembly.
STARTER ENGAGES, SPINS OUT BEFORE ENGINE STARTS.	<ol style="list-style-type: none"> 1. Starter ring gear faulty. 2. Starter motor faulty. 	<ol style="list-style-type: none"> 1. Refer to Starter Motor in the Removal and Installation. Remove the starter motor to inspect the starter ring gear. Replace the starter ring gear, if required. 2. If all other starting system components and circuits test OK, replace the starter motor assembly.
STARTER DOES NOT DISENGAGE.	<ol style="list-style-type: none"> 1. Starter motor improperly installed. 2. Starter relay faulty. 3. Ignition switch faulty. 4. Starter motor faulty. 	<ol style="list-style-type: none"> 1. Refer to Starter Motor in the Removal and Installation. Tighten the starter mounting hardware to the correct tightness specifications. 2. Refer to Starter Relay in the Diagnosis and Testing. Replace the starter relay, if required. 3. Refer to Ignition Switch and Key Lock Cylinder in the Diagnosis and Testing of Ignition System. Replace the ignition switch, if required. 4. If all other starting system components and circuits test OK, replace the starter motor assembly.