Starting System: Pinpoint Tests

Test A: The Engine Does Not Crank

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Test Step		Result / Action to Take
A1	CHECK THE BATTERY	
	• Check the battery condition and charge. Refer to Charging System. • **Is the battery OK?**	**Yes** GO to **A2**. **No** CHARGE or INSTALL a new battery. TEST the system for normal operation.
A2	CHECK FOR POWERTRAIN CONTROL MODULE (PCM) DTCs	**Yes**
	• **NOTE:** The PATS system DTCs are the only DTCs of concern in this step. Only repair retrieved non-PATS DTCs if a customer concern is reported. Carry out the powertrain control module (PCM) self-test. Refer to Computers and Control Systems. • **Were any PATS DTCs retrieved?**	GO to Antitheft and Alarm Systems to repair the PATS system DTCs before proceeding with this test. **No** GO to **A3**.

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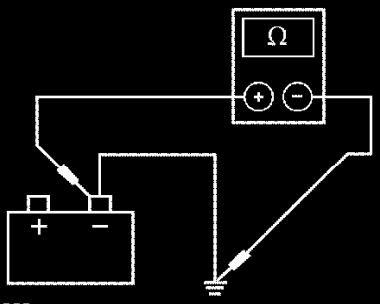
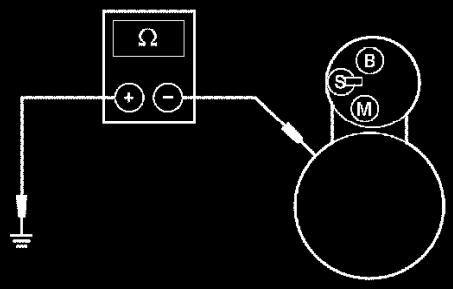
PINPOINT TEST A: THE ENGINE DOES NOT CRANK (Continued)

Test Step		Result / Action to Take
A3	CHECK TRANSMISSION RANGE SENSOR OPERATION	**Yes** GO to **A4**. **No** GO to Transmission Control Systems to diagnose the transmission range sensor.
	• Enter the following diagnostic mode on the scan tool: PCM Transmission Range Sensor PID. • While observing the PCM Transmission Range Sensor PID, place the vehicle in PARK and then NEUTRAL. • **Does the PID match the gear selection?**	
A4	CHECK THE BATTERY GROUND CABLE	
	• Measure the resistance between the negative battery post and the battery ground cable connection on the engine.  A0011069 • **Is the resistance greater than 5 ohms?**	**No** GO to **A5**. **Yes** INSTALL a new battery ground cable. TEST the system for normal operation.
A5	CHECK THE STARTER MOTOR GROUND	
	• Measure the resistance between the starter motor case and ground.  A0011103 • **Is the resistance greater than 5 ohms?**	**No** GO to **A6**. **Yes** CLEAN the starter motor mounting flange and make sure the starter motor is correctly mounted. TEST the system for normal operation.

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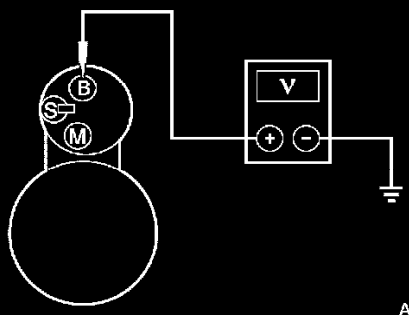
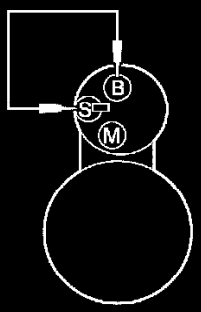
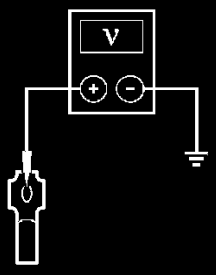
PINPOINT TEST A: THE ENGINE DOES NOT CRANK (Continued)

Test Step		Result / Action to Take
A6	CHECK THE POWER SUPPLY TO THE STARTER MOTOR	
	• Measure the voltage between starter motor B-terminal and ground.  AJ0278-A • **Is the voltage greater than 10 volts?**	**Yes** GO to **A7**. **No** INSTALL a new positive battery cable. TEST the system for normal operation.
A7	CHECK THE STARTER MOTOR SOLENOID OPERATION	
	• Connect a fused jumper wire to the B-terminal of the starter motor. Momentarily connect the other lead of the fused jumper wire to the starter motor S-terminal.  AJ0279-A • **Did the starter motor engage and the engine crank?**	**Yes** GO to **A8**. **No** INSTALL a new starter motor. TEST the system for normal operation.
A8	CHECK THE START INPUT TO THE STARTER MOTOR	
	• Disconnect: Starter Motor S-Terminal. • Measure the voltage between starter motor S-terminal connector C197a, circuit 33 (WH/PK), and ground, while holding the ignition switch in the START position.  AJ0443-A • **Is the voltage greater than 10 volts in START?**	**Yes** CLEAN the starter motor S-terminal and connector. CHECK the wiring and the starter motor for a loose connection. TEST the system for normal operation. **No** GO to **A9**.

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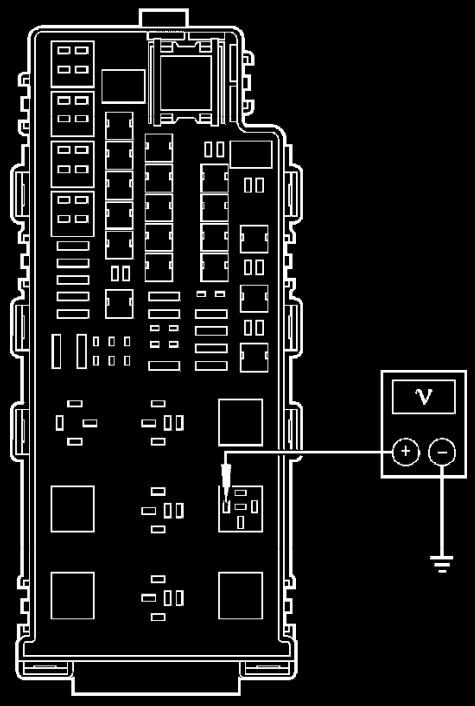
PINPOINT TEST A: THE ENGINE DOES NOT CRANK (Continued)

Test Step		Result / Action to Take
A9	CHECK THE START INPUT TO THE STARTER RELAY	
• Disconnect: Starter Relay. • Measure the voltage between battery junction box (BJB) starter relay C1017-85, circuit 1785 (LG/VT) and ground, while holding the ignition switch in the START position.  N0047680 • **Is the voltage greater than 10 volts?**		**Yes** GO to **A10**. **No** GO to **A14**.

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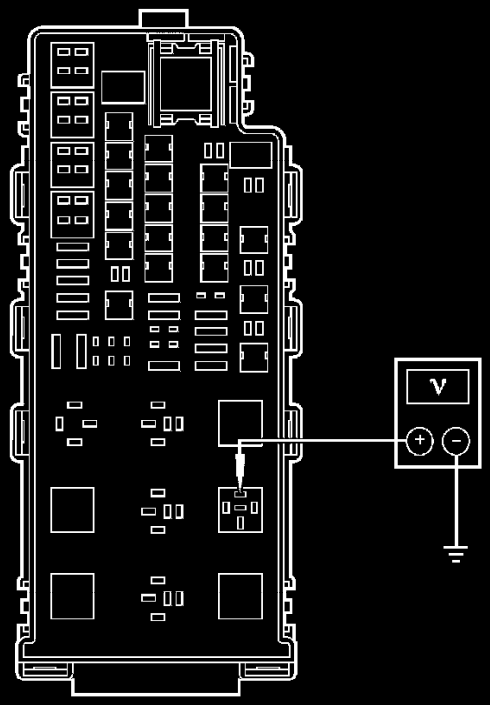
PINPOINT TEST A: THE ENGINE DOES NOT CRANK (Continued)

Test Step		Result / Action to Take
A10	CHECK THE BATTERY SUPPLY TO THE STARTER RELAY	
• Measure the voltage between BJB starter relay C1017-87, circuit 1786 (BN/PK) and ground.  N0047681 • **Is the voltage greater than 10 volts?**		**Yes** GO to **A11**. **No** REPAIR circuit 1786 (BN/PK) for an open. TEST the system for normal operation.

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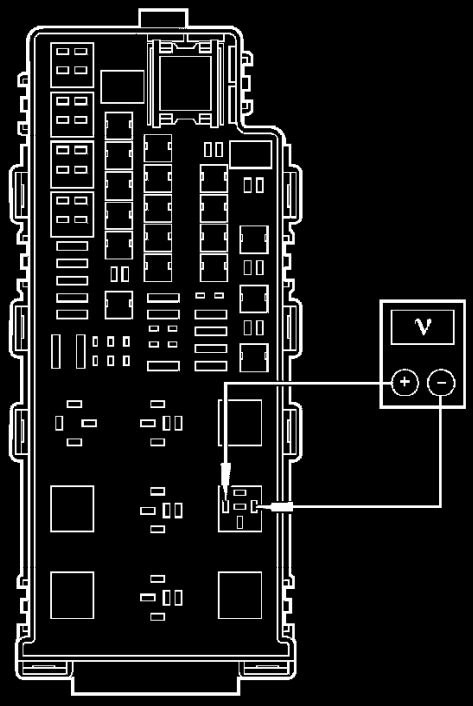
PINPOINT TEST A: THE ENGINE DOES NOT CRANK (Continued)

Test Step		Result / Action to Take
A11	CHECK THE GROUND SIGNAL TO THE STARTER RELAY	
	• Measure the voltage between BJB starter relay C1017-85, circuit 1785 (LG/VT), and starter relay C1017-86, circuit 329 (PK), while holding the ignition switch in the START position.  N0047677 • **Is the voltage greater than 10 volts?**	**Yes** GO to **A13**. **No** GO to **A12**.
A12	CHECK CIRCUIT 329 (PK) FOR AN OPEN	
	• Disconnect: PCM C175.	

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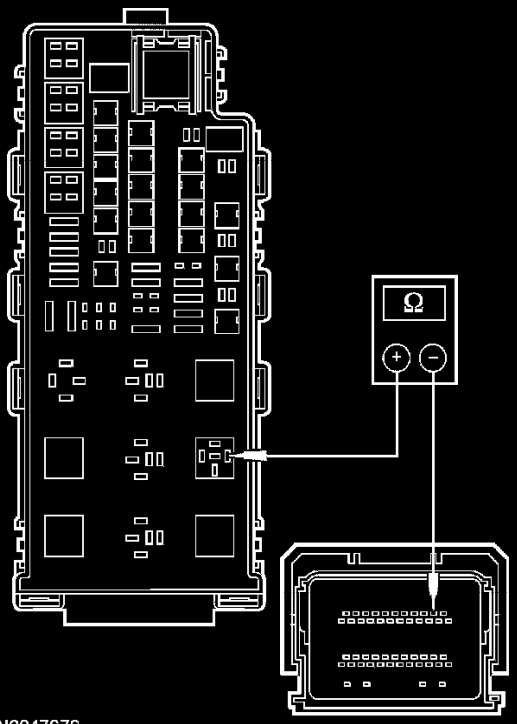
PINPOINT TEST A: THE ENGINE DOES NOT CRANK (Continued)

Test Step		Result / Action to Take
A12	CHECK CIRCUIT 329 (PK) FOR AN OPEN (Continued)	
• Measure the resistance between BJB starter relay C1017-86, circuit 329 (PK) and PCM C175-2, circuit 329 (PK).  N0047678 • **Is the resistance less than 5 ohms?**		**Yes** INSTALL a new PCM. TEST the system for normal operation. **No** REPAIR circuit 329 (PK) for an open. TEST the system for normal operation.
A13	CHECK CIRCUIT 33 (WH/PK) FOR AN OPEN	
• Disconnect: Starter Motor C197a.		

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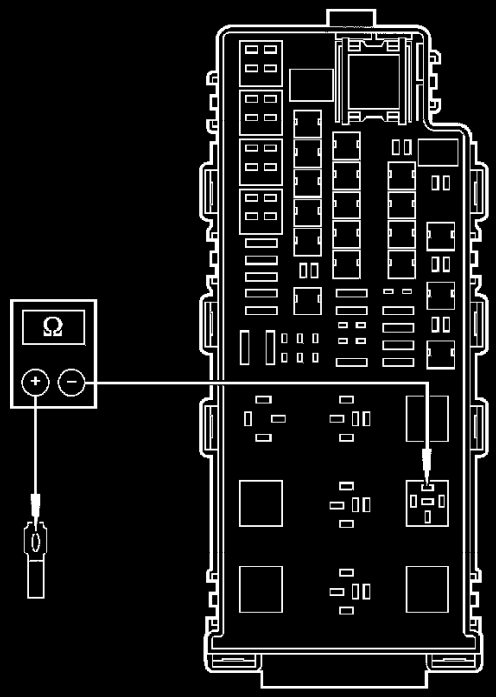
PINPOINT TEST A: THE ENGINE DOES NOT CRANK (Continued)

Test Step		Result / Action to Take
A13	**CHECK CIRCUIT 33 (WH/PK) FOR AN OPEN (Continued)**	
	• Measure the resistance between BJB starter relay C1017-87, circuit 33 (WH/PK), harness side and starter motor S-terminal, circuit 33 (WH/PK).  N0047679 • **Is the resistance less than 5 ohms?**	**Yes** INSTALL a new starter relay. TEST the system for normal operation. **No** REPAIR circuit 33 (WH/PK) for an open. TEST the system for normal operation.
A14	**CHECK START INPUT TO SMART JUNCTION BOX (SJB) FUSE 14 (7.5A)**	
	• Disconnect: SJB Fuse 14 (7.5A). • Measure the voltage between SJB fuse 14 (7.5A), circuit 1522 (DG) input cavity and ground, while holding the ignition switch in the START position. • **Is the voltage greater than 10 volts?**	**Yes** REPAIR circuit 1785 (LG/VT) for an open. TEST the system for normal operation. **No** GO to **A15.**
A15	**CHECK THE POWER SUPPLY TO THE IGNITION SWITCH**	
	• Disconnect: Ignition Switch C250.	

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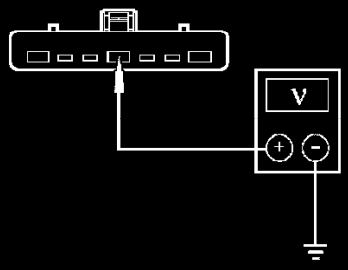
PINPOINT TEST A: THE ENGINE DOES NOT CRANK (Continued)

Test Step		Result / Action to Take
A15	CHECK THE POWER SUPPLY TO THE IGNITION SWITCH (Continued)	
	• Measure the voltage between ignition switch C250-4, circuit 1715 (RD) and ground.  A0050523 • **Is the voltage greater than 10 volts?**	**Yes** GO to **A16**. **No** REPAIR circuit 1715 (RD) for an open. TEST the system for normal operation.
A16	CHECK THE IGNITION SWITCH	
	• Carry out the ignition switch component test. Refer to Vehicle/Diagrams. • **Did the ignition switch pass the component test?**	**Yes** REPAIR circuit 1522 (DG). TEST the system for normal operation. **No** INSTALL a new ignition switch. TEST the system for normal operation.

A15-A16

Normal Operation

Under normal operation, voltage is supplied to the ignition switch through circuit 1715 (RD). When the ignition switch is turned to the START position, voltage is sent to the smart junction box (SJB) fuse through circuit 1522 (DG). From the fuse in the SJB, voltage is sent to the starter relay coil through circuit 1785 (LG/VT). Ground for the starter relay coil is provided from the PCM through circuit 329 (PK). Voltage is supplied to the starter relay switch through circuit 1786 (BN/PK). When the relay is energized, voltage is sent to the starter motor through circuit 33 (WH/PK).

Possible Causes

- Fuse(s)
- An open in circuit 1715 (RD), 1522 (DG), 1785 (LG/VT), 329 (PK), 1786 (BN/PK) or 33 (WH/PK)
- Starter motor
- Starter relay
- Battery