Anti-Theft

Special Tool(s)

 ST1137-A	73III Automotive Meter 105-R0057 or equivalent
 ST2834-A	Vehicle Communication Module (VCM) and Integrated Diagnostic System (IDS) software with appropriate hardware, or equivalent scan tool
 ST2574-A	Flex Probe Kit 105-R025C or equivalent

Principles of Operation

Anti-Theft Indicator

NOTE: Replacement of the Passive Anti-Theft System (PATS) transceiver does not require the PATS keys to be programmed into the PCM again.

NOTE: A minimum of 2 PATS keys must be programmed into the PCM before the vehicle will start.

NOTE: Make sure any aftermarket remote start systems have been removed from the vehicle before any PATS -related no-start concerns are investigated. If the remote start system is a Power Code system, make certain it is not the cause of the no-start. Removal of the system may be necessary.

NOTE: The Smart Junction Box (SJB) is also known as the Generic Electronic Module (GEM).

PATS uses a visual anti-theft indicator located in the Instrument Cluster (IC). The anti-theft indicator proves out for 3 seconds when the ignition key is in the ON or START position under normal operation. If there is a PATS concern, this anti-theft indicator either flashes rapidly or glows steadily when the ignition key is turned to the ON or START position. PATS also flashes the anti-theft indicator every 2 seconds when the ignition key is in the OFF position to act as a visual theft deterrent.

Encoded Passive Anti-Theft System (PATS) Keys

PATS uses a special ignition key that is larger than a conventional ignition key because it contains a permanently installed electronic device called a transponder. Each transponder contains a unique encrypted identification code which is one of a very large number of combinations. The addition of this transponder to the key makes it an "encoded" key. The PATS key does not require batteries and should last the lifetime of the vehicle. Each PATS key must be programmed into the PCM before it can be used to start the vehicle. There are special general procedures described in this section that must be carried out if a new PATS key is necessary. Refer to Key Programming Using Diagnostic Equipment or Key Programming Using Two Programmed Keys in this section.

Passive Anti-Theft System (PATS) Transceiver

The PATS transceiver is located under the steering column shroud and communicates with the encoded ignition key. During each vehicle start sequence, the PATS transceiver reads the encoded ignition key identification code and sends data to the PCM. The PCM validates the code, and if it is the correct code, will ground the starter relay solenoid coil and will also allow the fuel injectors to operate.

Passive Anti-Theft System (PATS) Operation

The PATS function is controlled by the PCM. When the ignition key is turned to the ON or START position, the PCM initiates the key interrogation sequence by sending a voltage signal to the PATS transceiver. The transceiver then uses its antenna to communicate with the transponder in the PATS key. This process "reads" the PATS key identification code and sends the key identification code back to the PCM, which interprets it and determines if it matches one of the stored key codes. If it does match one of the stored key codes, the PCM grounds the starter relay solenoid coil and allows fuel injector operation. If it does not match one of the stored key codes, or it is only a partial key read or no key read, the PCM will not ground the starter relay solenoid coil and will not allow fuel injector operation. The anti-theft indicator in the IC will flash (or may glow steadily) and the PCM will store one or more DTCs. All elements of PATS must be functional before the vehicle will start. If any of the components are not working correctly, the vehicle will not start. If the PCM must be replaced for any reason (PATS concerns or driveability concerns), the PATS keys must be programmed into the new PCM. Refer to Key Programming Using Diagnostic Equipment in this section.

PATS is active only for a few seconds when the vehicle is starting. It is not a PATS concern if the vehicle stalls after it has been running for a minimum of 3 seconds. PATS will not disable a running vehicle. PATS may cause a vehicle no start due to either the fuel injectors not operating or the starter not operating (starter relay does not close) or both. Always check for PATS DTCs from the PCM when a no-crank or no-start condition exists. A low state of charge in the vehicle battery may cause the PATS to allow starter operation, but prevent the fuel injectors from operating. If the anti-theft indicator does not prove out (it may be either flashing or glowing steadily) and one (or both) of the previous conditions (fuel injectors and/or starter inoperative) are present, it may be due to a PATS issue. If the anti-theft indicator proves out, it may not be a PATS issue. If the anti-theft indicator does not illuminate at all, it may be an IC issue. Refer to DTC Charts in this section for additional diagnostic direction.

The PATS disables the vehicle from starting if there is:

- a damaged PATS key.
- an unprogrammed PATS key.
- a non- PATS key (a conventional key or a key that does not have any electronics).
- damaged wiring.
- a damaged transceiver.
- a damaged PCM.

Passive Anti-Theft System (PATS) PIDs

Monitoring the PATS PIDs can be very useful in determining which diagnostic steps to follow. Viewing the MASTERKEY (verifies if the key is programmed) PID (with both keys) will determine if the key is a programmed key and will also prove out the transceiver, circuitry and the PCM. A master key is any key that is programmed into the PCM. Viewing the MIN_KEY (minimum number of keys) PID (this PID does not change) determines the minimum number of keys that must be programmed into the PCM. There must be at least 2 keys programmed into the PCM in this system. Viewing the N_KEYCODE (number of keys programmed) PID will determine if the minimum number of keys have been programmed into the PCM. If the N_KEYCODE PID reads 0 or 1, additional key(s) will need to be programmed into the PCM in order to meet the minimum of 2 keys. If the N_KEYCODE PID reads 0 or 1, and the MASTERKEY PID reads NOTPREST, that particular key must be programmed into the PCM. If the N_KEYCODE PID reads 1 (or more), and the MASTERKEY PID reads PRESNT, that particular key is already programmed into the PCM.

The SPAREKEY (spare key) PID is defaulted to ENABLE. With the SPAREKEY PID displaying ENABLE, the PCM will accept more than 2 keys (up to a maximum of 8) being programmed into the PCM. It can be toggled to DISABLE if the customer does not want any more than 2 keys programmed into the PCM using the Key Programming Using Two Programmed Keys procedure. Refer to Key Programming Switch State Control in this section to change the state of the SPAREKEY PID.

Unlimited Key Mode

This system contains a feature named unlimited key mode (UNL_KEY PID). This feature allows a customer to program more than 8 keys to their vehicle if they request it. Each vehicle in unlimited key mode is set up with a special unlimited transponder security key code. This allows all the customer vehicles to share the same mechanically cut keys, but no other keys from outside can be used to operate the vehicle(s). Any randomly selected security key that has been previously mechanically cut and electronically programmed to the vehicle is acceptable. Refer to Spare Key Programming — Unlimited Key Mode in this section.

Inspection and Verification

1. Verify the customer concern.

2. Visually inspect for obvious signs of mechanical or electrical damage.

Visual Inspection Chart

Mechanical	Electrical
• Large metallic objects or electronic devices on the key ring that can be used to purchase gasoline or similar items • Ignition lock cylinder • Passive Anti-Theft System (PATS) key • Use of a non- PATS key or incorrect PATS key • More than one PATS key on key ring • Remote start system installed	• Bussed Electrical Center (BEC) fuse 68 (20A) • Smart Junction Box (SJB) fuse 19 (5A) • SJB • Wiring, terminals or connectors • Ignition switch • PATS transceiver • PCM

3. If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.

4. **NOTE:** Make sure to use the latest scan tool software release.

   If the cause is not visually evident, connect the scan tool to the Data Link Connector (DLC).

5. **NOTE:** The Vehicle Communication Module (VCM) LED prove-out confirms power and ground from the DLC are provided to the VCM.

   If the scan tool does not communicate with the VCM:
   - Check the VCM connection to the vehicle.
   - Check the scan tool connection to the VCM.
   - Refer to Section 418-00, No Power To The Scan Tool, to diagnose no communication with the scan tool.

6. If the scan tool does not communicate with the vehicle:
   - Verify the ignition key is in the ON position.
   - Verify the scan tool operation with a known good vehicle.
   - Refer to Section 418-00 to diagnose no response from the PCM.

7. Carry out the network test.
   - If the scan tool responds with no communication for one or more modules, refer to Section 418-00.
   - If the network test passes, retrieve and record the continuous memory DTCs.

8. Clear the continuous DTCs and carry out the self-test diagnostics for the PCM.

9. If the DTCs retrieved are related to the concern, go to DTC Charts. For all other DTCs, refer to the Powertrain Control/Emissions Diagnosis (PC/ED) manual.

10. If no DTCs related to the concern are retrieved, GO to Symptom Chart.

DTC Charts

PCM DTC Chart

DTC	Description	Action
B1213	Anti-Theft Number of Programmed Keys is Below Minimum	If DTCs B1600, B1601, B1602, B1681 or B2103 are present, they must be addressed first. If DTC B1213 is the only DTC present, PROGRAM additional keys. REFER to Key Programming Using Diagnostic Equipment in this section. CLEAR the DTCs. CYCLE the ignition. REPEAT the self-test.
B1342	ECU is Faulted	CLEAR the DTCs. REPEAT the self-test. If DTC B1342 is retrieved again, INSTALL a new PCM. REFER to Section 303-14. CYCLE the ignition. REPEAT the self-test.
B1600	PATS Ignition Key Transponder Signal Is Not Received	No PATS key has been read by the PCM. GO to Pinpoint Test B.
B1601	PATS Received Incorrect Key-Code From Ignition Key Transponder	There is an unprogrammed PATS key. GO to Pinpoint Test C.
B1602	PATS Received Invalid Format of Key-Code From Ignition Key Transponder	Only a partial PATS key was read. GO to Pinpoint Test D.
B1681	PATS Transceiver Module Signal Is Not Received	The PCM did not receive the PATS transceiver signal. GO to Pinpoint Test E.
B2103	Antenna Not Connected	There has been a PATS transceiver antenna failure. GO to Pinpoint Test A.
B2431	Transponder Programming Failed	The ignition key was not programmed. PROGRAM the key. REFER to Spare Key Programming — Using Diagnostic Equipment in this section. CLEAR the DTCs. CYCLE the ignition. REPEAT the self-test.
P1260	Theft Detected, Vehicle Immobilized	If there are any PATS DTCs present, ADDRESS them first. If DTC P1260 is the only DTC present, there may be a power or ground concern with the PCM. REFER to the Powertrain Control/Emissions Diagnosis (PC/ED) manual.
All other DTCs	—	REFER to the Powertrain Control/Emissions Diagnosis (PC/ED) manual.

Symptom Chart

Symptom Chart

Condition	Possible Sources	Action
• No communication with the PCM	• Fuse • Wiring, terminals or connectors • PCM	• REFER to Section 418-00.
• The anti-theft indicator is always/never on	• Instrument Cluster (IC) • PCM	• REFER to Section 413-01.

• The vehicle does not start	• Wiring, terminals or connectors • Starter relay • PCM	• CYCLE the ignition. CARRY OUT the PCM self-test. If PATS DTCs are present, GO to DTC Charts in this section. If no PATS DTCs are present, REFER to the Powertrain Control/Emissions Diagnosis (PC/ED) manual.

Pinpoint Tests

Pinpoint Test A: DTC B2103

Normal Operation

The Passive Anti-Theft System (PATS) transceiver reads the PATS key when the key is turned to the START or ON position.

- DTC B2103 (Antenna Not Connected) — an on-demand DTC that sets when the PCM detects a PATS transceiver antenna failure. The PATS transceiver may need to be replaced.

This pinpoint test is intended to diagnose the following:

- PATS transceiver
- PCM

PINPOINT TEST A: DTC B2103

Test Step	Result / Action to Take
A1 INSPECT THE PATS TRANSCEIVER FOR CORRECT INSTALLATION **NOTE:** Replacement of the PATS transceiver does not require the PATS keys to be programmed into the PCM again. • Ignition OFF. • Verify the PATS transceiver is correctly installed. Refer to Passive Anti-Theft System (PATS) Transceiver in this section. • Ignition ON. • Clear the PCM DTCs. • Ignition OFF. • Ignition ON. • Retrieve the PCM DTCs. • **Is DTC B2103 retrieved?**	**Yes** INSTALL a new PATS transceiver. REFER to Passive Anti-Theft System (PATS) Transceiver in this section. CLEAR the DTCs. CYCLE the ignition. REPEAT the self-test. If the concern is still present, GO to A2. **No** The system is OK.

A2 CHECK FOR CORRECT PCM OPERATION
NOTE: When a new PCM is installed, the PATS keys must be programmed into the PCM.
• Disconnect all the PCM connectors.
• Check for:
  ▪ corrosion
  ▪ damaged pins
  ▪ pushed-out pins
• Connect all the PCM connectors and
	Yes
	INSTALL a new PCM. REFER to Section 303-14. PROGRAM the PATS keys into the PCM. REFER to Key Programming Using Diagnostic Equipment in this section. REPEAT the self-test.
	
	No
	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. CLEAR the DTCs. CYCLE the ignition.

make sure they seat correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	REPEAT the self-test.

Pinpoint Test B: DTC B1600

Normal Operation

During each vehicle start sequence, the Passive Anti-Theft System (PATS) transceiver reads the PATS key identification code and sends the data to the PCM.

- DTC B1600 (PATS Ignition Key Transponder Signal Is Not Received) — an on-demand DTC that sets when no PATS key has been read by the PCM.

This pinpoint test is intended to diagnose the following:

- PATS key
- PATS transceiver
- PCM

PINPOINT TEST B: DTC B1600

NOTE: Large metallic objects, electronic devices on the key ring that can be used to purchase gasoline or similar items, or a second key on the same key ring as the PATS key may cause a vehicle starting concern and record DTCs under certain conditions. If a fault cannot be identified, examine the customer key ring for such objects or devices. If present, inform the customer that they need to keep these objects from touching the PATS key while starting the engine. These objects and devices cannot damage the PATS key, but can cause a momentary concern if they are too close to the key during engine start. If a concern occurs, turn the key off and restart the engine with all other objects on the key ring held away from the ignition key. Check to make sure the PATS key used by the customer is an approved Ford PATS key. (PATS keys from Ford, Rotunda, Strattec, or HUF are approved Ford PATS keys.)

Test Step	Result / Action to Take
B1 RETRIEVE THE DTCs	
• Ignition ON. • Clear the PCM DTCs. • Ignition OFF. • Ignition ON. • Retrieve the PCM DTCs. • **Is DTC B1600 retrieved?**	**Yes** GO to B2 . **No** If DTCs other than PATS PCM DTCs are retrieved, REFER to the Powertrain Control/Emissions Diagnosis (PC/ED) manual. If no PATS DTCs are retrieved, the system is OK. The concern may have been caused by interference from another object.
B2 CHECK BOTH PATS KEYS	
NOTE: Check to make sure the new PATS keys are approved Ford encoded PATS keys. Unapproved PATS keys do not always operate correctly over various temperature ranges. (PATS keys from Ford, Rotunda, Strattec, or HUF are approved Ford PATS keys.) • Obtain both PATS keys from the customer and follow the procedure using one PATS key, then the other. If the customer only has one PATS key, it will be necessary to cut a	**Yes** If DTC B1600 was present for both existing keys and the new key, GO to B3 . If DTC B1600 was not present with the new key, the original key may be damaged and should be replaced. CUT a new key to replace the damaged key. PROGRAM the new PATS key. REFER to Key Programming Using Diagnostic Equipment in this section. CLEAR the DTCs. REPEAT the self-test. **No**

new PATS key. • If it is necessary to cut a new PATS key, program the new PATS key. Refer to Key Programming Using Diagnostic Equipment in this section. • Ignition ON. • Clear the PCM DTCs. • Ignition OFF. • Ignition ON. • Retrieve the PCM DTCs. • **Using either existing key and the new key (if applicable), is DTC B1600 present?**	If DTCs other than PATS PCM DTCs are retrieved, REFER to the Powertrain Control/Emissions Diagnosis (PC/ED) manual. If no PATS DTCs are retrieved, the system is OK. The concern may have been caused by interference from another object.
B3 INSTALL A NEW PATS TRANSCEIVER **NOTE:** Replacement of the PATS transceiver does not require the PATS keys to be programmed into the PCM again. **NOTE:** Do not use the PATS key that may have been programmed in Step B2. • Ignition OFF. • Install a new PATS transceiver. Refer to Passive Anti-Theft System (PATS) Transceiver in this section. • Ignition ON. • Clear the PCM DTCs. • Ignition OFF. • Ignition ON. • Retrieve the PCM DTCs. • **Is DTC B1600 retrieved?**	**Yes** GO to B4. **No** The system is OK.
B4 CHECK FOR CORRECT PCM OPERATION **NOTE:** When a new PCM is installed, the PATS keys must be programmed into the PCM. • Disconnect all the PCM connectors. • Check for: ▪ corrosion ▪ damaged pins ▪ pushed-out pins • Connect all the PCM connectors and make sure they seat correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** INSTALL a new PCM. REFER to Section 303-14. PROGRAM the PATS keys into the PCM. REFER to Key Programming Using Diagnostic Equipment in this section. REPEAT the self-test. **No** The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. CLEAR the DTCs. CYCLE the ignition. REPEAT the self-test.

Pinpoint Test C: DTC B1601

Normal Operation

During each vehicle start sequence, the Passive Anti-Theft System (PATS) transceiver reads the PATS key identification code and sends the data to the PCM.

- DTC B1601 (PATS Received Incorrect Key-Code From Ignition Key Transponder) — an on-demand DTC that sets when there is an unprogrammed PATS key. There is no issue with the PATS key itself, but the key must be programmed into the PATS memory (unless the maximum number of keys are already programmed).

This pinpoint test is intended to diagnose the following:

- PATS key
- PCM

PINPOINT TEST C: DTC B1601

NOTE: Large metallic objects, electronic devices on the key ring that can be used to purchase gasoline or similar items, or a second key on the same key ring as the PATS key may cause a vehicle starting concern and record DTCs under certain conditions. If a fault cannot be identified, examine the customer key ring for such objects or devices. If present, inform the customer that they need to keep these objects from touching the PATS key while starting the engine. These objects and devices cannot damage the PATS key, but can cause a momentary concern if they are too close to the key during engine start. If a concern occurs, turn the ignition switch off and restart the engine with all other objects on the key ring held away from the ignition key. Check to make sure the PATS key used by the customer is an approved Ford PATS key. (PATS keys from Ford, Rotunda, Strattec, or HUF are approved Ford PATS keys.)

NOTE: Only 8 PATS keys can be programmed into the PCM using the Key Programming Using Diagnostic Equipment procedure unless the unlimited key mode is active. If the N_KEYCODE (number of keys programmed) PID reads more than 2, the concern may be the PATS key being used is an unprogrammed key. Verify this by also viewing the MASTERKEY (verifies if the key is programmed) PID. It must read PRESNT for the key to be valid.

Test Step	Result / Action to Take
C1 RETRIEVE THE DTCs • **NOTE:** Follow this procedure using both PATS keys (using one at a time). • If only one key is available, cut a new key and program the keys. Refer to Key Programming Using Diagnostic Equipment in this section. • If both keys are available, program the keys. Refer to Key Programming Using Diagnostic Equipment in this section. • Ignition ON. • Clear the PCM DTCs. • Ignition OFF. • Ignition ON. • Retrieve the PCM DTCs. • **Is DTC B1601 retrieved for one or both PATS keys?**	**Yes** If DTC B1601 is retrieved for one PATS key, REPLACE that key and PROGRAM all the keys. REFER to Key Programming Using Diagnostic Equipment in this section. CLEAR the DTCs. CYCLE the ignition. REPEAT the self-test. If DTC B1601 is retrieved for both PATS keys, GO to C2 . **No** The system is OK. CHECK all the customer PATS keys by attempting to start the vehicle with each key to VERIFY all the other PATS keys are programmed.

C2 CHECK FOR CORRECT PCM OPERATION
NOTE: When a new PCM is installed, the PATS keys must be programmed into the PCM.
• Disconnect all the PCM connectors.
• Check for:
  ▪ corrosion
  ▪ damaged pins
  ▪ pushed-out pins
• Connect all the PCM connectors and make sure they seat correctly.
• Operate the system and verify the concern is still present.
• **Is the concern still present?**
	Yes
	INSTALL a new PCM. REFER to Section 303-14 . PROGRAM the PATS keys into the PCM. REFER to Key Programming Using Diagnostic Equipment in this section. REPEAT the self-test.
	
	No
	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. CLEAR the DTCs. CYCLE the ignition. REPEAT the self-test.

Pinpoint Test D: DTC B1602

Normal Operation

During each vehicle start sequence, the Passive Anti-Theft System (PATS) transceiver reads the PATS key identification code and sends the data to the PCM.

- DTC B1602 (PATS Received Invalid Format of Key-Code From Ignition Key Transponder) — an on-demand DTC that sets when only a partial PATS key was read. Remote starter equipment can also cause

this DTC.

This pinpoint test is intended to diagnose the following:

- PATS key
- PATS transceiver
- PCM

PINPOINT TEST D: DTC B1602

NOTE: Large metallic objects, electronic devices on the key ring that can be used to purchase gasoline or similar items, or a second key on the same key ring as the PATS key may cause a vehicle starting concern and record DTCs under certain conditions. If a fault cannot be identified, examine the customer key ring for such objects or devices. If present, inform the customer that they need to keep these objects from touching the PATS key while starting the engine. These objects and devices cannot damage the PATS key, but can cause a momentary concern if they are too close to the key during engine start. If a concern occurs, turn the ignition off and restart the engine with all other objects on the key ring held away from the ignition key. Check to make sure the PATS key used by the customer is an approved Ford PATS key. (PATS keys from Ford, Rotunda, Strattec, or HUF are approved Ford PATS keys.)

NOTE: Only 8 PATS keys can be programmed into the PCM using the Key Programming Using Diagnostic Equipment procedure unless the unlimited key mode is active. If the N_KEYCODE (number of keys programmed) PID reads more than 2, the concern may be the PATS key being used is an unprogrammed key. Verify this by also viewing the MASTERKEY (verifies if the key is programmed) PID. It must read PRESNT for the key to be valid.

Test Step	Result / Action to Take
D1 RETRIEVE THE DTCs • **NOTE:** Follow this procedure using both PATS keys (using one at a time). • If only one key is available, cut a new key and program the keys. Refer to Key Programming Using Diagnostic Equipment in this section. • Ignition ON. • Clear the PCM DTCs. • Ignition OFF. • Ignition ON. • Retrieve the PCM DTCs. • **Is DTC B1602 retrieved for one or both PATS keys?**	**Yes** If DTC B1602 is retrieved for one key, REPLACE that key and PROGRAM the new key. REFER to Spare Key Programming — Using Diagnostic Equipment in this section. CLEAR the DTCs. CYCLE the ignition. REPEAT the self-test. If DTC B1602 is retrieved for both PATS keys, GO to D2 . **No** The system is OK. CHECK all the customer PATS keys by attempting to start the vehicle with each key to VERIFY all the other PATS keys are programmed. The concern may have been caused by interference from another object.
D2 INSTALL A NEW PATS TRANSCEIVER **NOTE:** Replacement of the PATS transceiver does not require the PATS keys to be programmed into the PCM again. • Ignition OFF. • Install a new PATS transceiver. Refer to Passive Anti-Theft System (PATS) Transceiver in this section. • Ignition ON. • Clear the PCM DTCs. • Ignition OFF. • Ignition ON. • Retrieve the PCM DTCs. • **Are any PATS DTCs retrieved?**	**Yes** GO to D3 . **No** The system is OK. CHECK all the customer PATS keys by attempting to start the vehicle with each key to VERIFY all the other PATS keys are programmed.
D3 CHECK FOR CORRECT PCM	

OPERATION	

NOTE: When a new PCM is installed, the PATS keys must be programmed into the PCM.
• Disconnect all the PCM connectors.
• Check for:
  ▪ corrosion
  ▪ damaged pins
  ▪ pushed-out pins
• Connect all the PCM connectors and make sure they seat correctly.
• Operate the system and verify the concern is still present.
• **Is the concern still present?**
	Yes
	INSTALL a new PCM. REFER to Section 303-14 . PROGRAM the PATS keys into the PCM. REFER to Key Programming Using Diagnostic Equipment in this section. REPEAT the self-test.
	
	No
	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. CLEAR the DTCs. CYCLE the ignition. REPEAT the self-test.

Pinpoint Test E: DTC B1681

Refer to Wiring Diagrams Cell 112 , Passive Anti-Theft System for schematic and connector information.

Normal Operation

The Passive Anti-Theft System (PATS) transceiver receives voltage from the Smart Junction Box (SJB) fuse 19 (5A) on circuit 1266 (RD/YE) and is grounded on circuit 1205 (BK). The PATS transceiver and the PCM communicate on circuits 1215 (WH/LG) and 1216 (GY/OG). The PCM compares the key code stored in memory and enables the starter if the key code is correct.

- DTC B1681 (PATS Transceiver Module Signal Is Not Received) — an on-demand DTC that sets when the PATS transceiver signal is not received by the PCM. This DTC can be caused by circuits to the PATS transceiver, circuits between the PATS transceiver and the PCM, the PATS transceiver or the PCM. This can also be caused by using the incorrect PATS transceiver part number.

This pinpoint test is intended to diagnose the following:

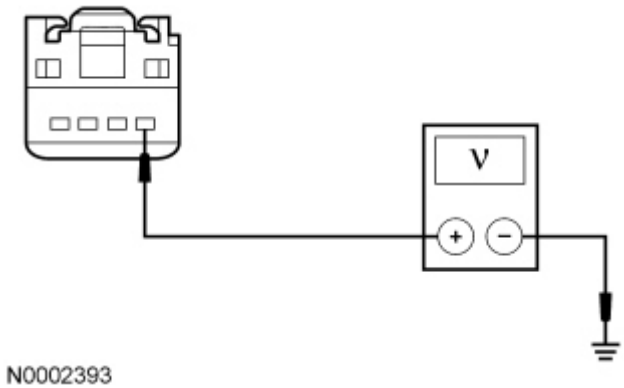
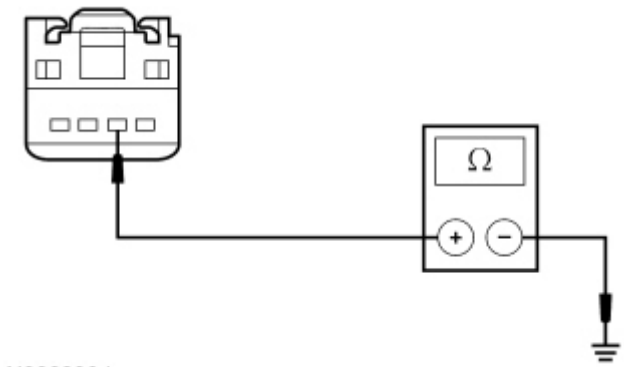
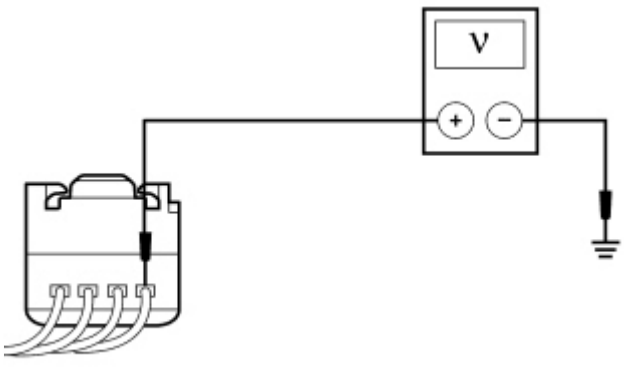
- Fuse
- Wiring, terminals or connectors
- PATS transceiver
- PCM

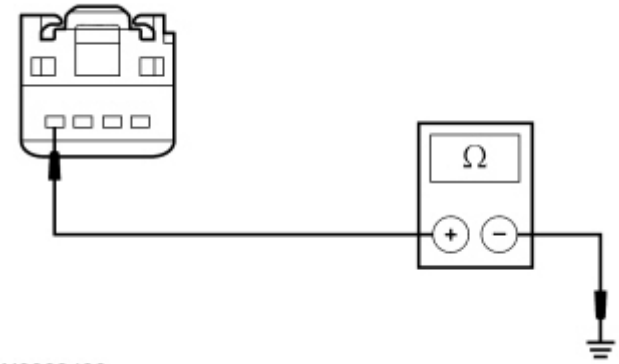
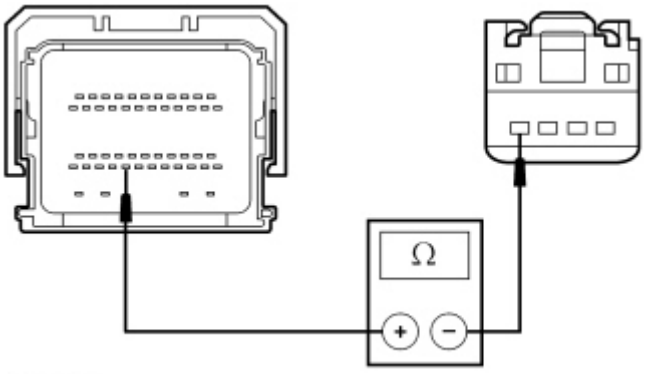
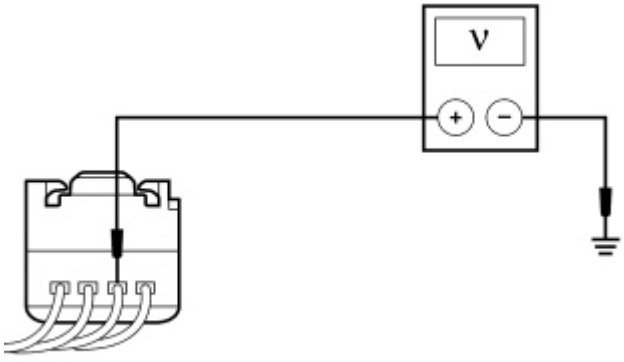
PINPOINT TEST E: DTC B1681

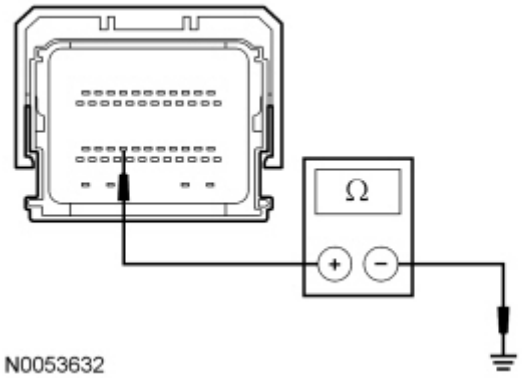
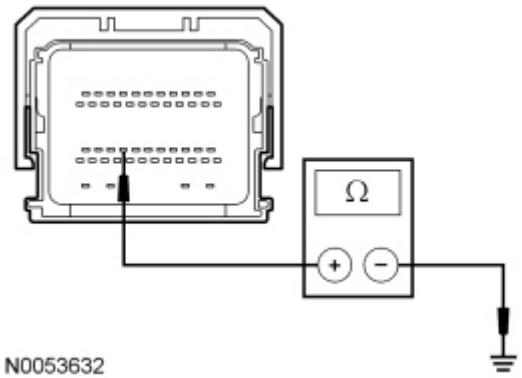
NOTICE: **Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may damage the connector.**

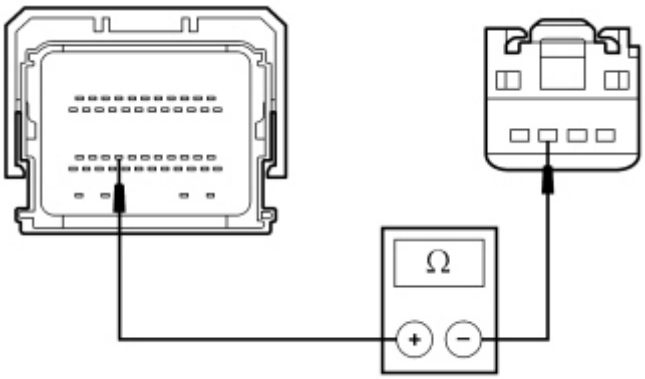
NOTE: Failure to disconnect the battery when instructed will result in false resistance readings. Refer to Section 414-01 .

Test Step	Result / Action to Take
E1 CHECK THE PATS TRANSCEIVER POWER CIRCUIT 1266 (RD/YE) FOR VOLTAGE	
• Ignition OFF. • Disconnect: PATS Transceiver C2007. • Ignition ON. • Measure the voltage between the PATS transceiver C2007-1, circuit 1266 (RD/YE), harness side and ground.	**Yes** GO to E2 . **No** VERIFY the SJB fuse 19 (5A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the Wiring Diagrams Manual to identify the possible causes of the short

 N0002393 • **Is the voltage greater than 10 volts?**	circuit. CLEAR the DTCs. CYCLE the ignition. REPEAT the self-test.
E2 CHECK THE PATS TRANSCEIVER GROUND CIRCUIT 1205 (BK) FOR AN OPEN	
• Ignition OFF. • Disconnect: Negative Battery Cable. • Measure the resistance between the PATS transceiver C2007-2, circuit 1205 (BK), harness side and ground.  N0002394 • **Is the resistance less than 5 ohms?**	**Yes** GO to E3 . **No** REPAIR the circuit. CLEAR the DTCs. CYCLE the ignition. REPEAT the self-test.
E3 CHECK THE PATS TRANSCEIVER RECEIVE CIRCUIT 1216 (GY/OG) FOR VOLTAGE	
• Connect: PATS Transceiver C2007. • Connect: Negative Battery Cable. • Ignition ON. • Measure the voltage by backprobing between the PATS transceiver C2007-4, circuit 1216 (GY/OG), harness side and ground.  N0002398 • **Is the voltage greater than 8 volts?**	**Yes** GO to E6 . **No** GO to E4 .
E4 CHECK THE PATS TRANSCEIVER RECEIVE CIRCUIT 1216 (GY/OG) FOR A SHORT TO GROUND	
• Ignition OFF.	**Yes**

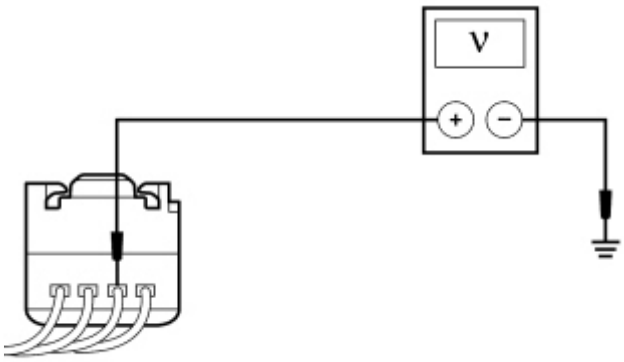
• Disconnect: PCM C175b. • Disconnect: PATS Transceiver C2007. • Measure the resistance between the PATS transceiver C2007-4, circuit 1216 (GY/OG), harness side and ground.  N0002400 • **Is the resistance greater than 10,000 ohms?**	GO to E5. **No** REPAIR the circuit. CLEAR the DTCs. CYCLE the ignition. REPEAT the self-test. If DTC B1681 is retrieved again, GO to E12.
E5 CHECK THE PATS TRANSCEIVER RECEIVE CIRCUIT 1216 (GY/OG) FOR AN OPEN	
• Measure the resistance between the PCM C175b-42, circuit 1216 (GY/OG), harness side, and the PATS transceiver C2007-4, circuit 1216 (GY/OG), harness side.  N0009251 • **Is the resistance less than 5 ohms?**	**Yes** GO to E12. **No** REPAIR the circuit. CLEAR the DTCs. CYCLE the ignition. REPEAT the self-test.
E6 CHECK THE PATS TRANSCEIVER TRANSMIT CIRCUIT 1215 (WH/LG) FOR VOLTAGE	
NOTE: Replacement of the PATS transceiver does not require the PATS keys to be programmed into the PCM again. • Measure the voltage by backprobing between the PATS transceiver C2007-3, circuit 1215 (WH/LG), harness side and ground.  N0002395 • **Is the voltage greater than 8 volts?**	**Yes** INSTALL a new PATS transceiver. REFER to Passive Anti-Theft System (PATS) Transceiver in this section. CLEAR the DTCs. CYCLE the ignition. REPEAT the self-test. If DTC B1681 is retrieved again, GO to E12. **No** GO to E7.

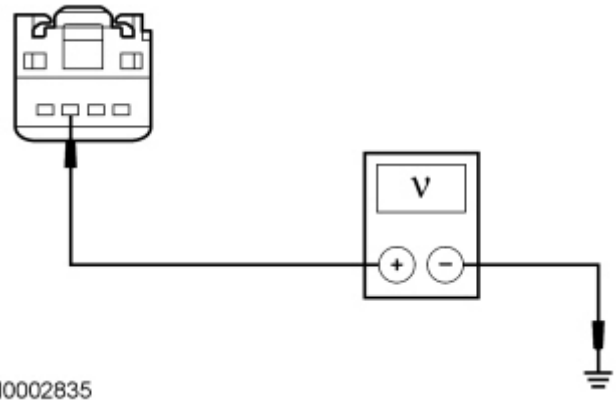
E7 CHECK THE PATS TRANSCEIVER TRANSMIT CIRCUIT 1215 (WH/LG) FOR A SHORT TO GROUND WITH THE PATS TRANSCEIVER CONNECTED	
• Ignition OFF. • Disconnect: PCM C175b. • Measure the resistance between the PCM C175b-31, circuit 1215 (WH/LG), harness side and ground.  N0053632 • **Is the resistance greater than 10,000 ohms?**	**Yes** GO to E9 . **No** GO to E8 .
E8 CHECK THE PATS TRANSCEIVER TRANSMIT CIRCUIT 1215 (WH/LG) FOR A SHORT TO GROUND WITH THE PATS TRANSCEIVER DISCONNECTED	
NOTE: Replacement of the PATS transceiver does not require the PATS keys to be programmed into the PCM again. • Disconnect: PATS Transceiver C2007. • Measure the resistance between the PCM C175b-31, circuit 1215 (WH/LG), harness side and ground.  N0053632 • **Is the resistance greater than 10,000 ohms?**	**Yes** INSTALL a new PATS transceiver. REFER to Passive Anti-Theft System (PATS) Transceiver in this section. CLEAR the DTCs. CYCLE the ignition. REPEAT the self-test. **No** REPAIR the circuit. CLEAR the DTCs. CYCLE the ignition. REPEAT the self-test.
E9 CHECK THE PATS TRANSCEIVER TRANSMIT CIRCUIT 1215 (WH/LG) FOR AN OPEN	
• Disconnect: PATS Transceiver C2007. • Measure the resistance between the PCM C175b-31, circuit 1215 (WH/LG), harness side and the PATS transceiver C2007-3, circuit 1215 (WH/LG), harness side.	**Yes** GO to E10 . **No** REPAIR the circuit. CLEAR the DTCs. CYCLE the ignition. REPEAT the self-test.



N0002397

- **Is the resistance less than 5 ohms?**

E10 CHECK THE PATS TRANSCEIVER TRANSMIT CIRCUIT 1215 (WH/LG) FOR VOLTAGE	
NOTE: Replacement of the PATS transceiver does not require the PATS keys to be programmed into the PCM again. • Connect: PATS Transceiver C2007. • Connect: PCM C175b. • Ignition ON. • Enter the following diagnostic mode on the scan tool: PCM DataLogger. • Trigger the active command TRANSMIT to ON. • Measure the voltage by backprobing between the PATS transceiver C2007-3, circuit 1215 (WH/LG), harness side and ground.  N0002395 • **Is the voltage less than 5 volts?**	**Yes** INSTALL a new PATS transceiver. REFER to Passive Anti-Theft System (PATS) Transceiver in this section. CLEAR the DTCs. CYCLE the ignition. REPEAT the self-test. **No** GO to E11.
E11 CHECK THE PATS TRANSCEIVER TRANSMIT CIRCUIT 1215 (WH/LG) FOR A SHORT TO VOLTAGE	
• Ignition OFF. • Disconnect: PCM C175b. • Disconnect: PATS Transceiver C2007. • Ignition ON. • Measure the voltage between the PATS transceiver C2007-3, circuit 1215 (WH/LG), harness side and ground.	**Yes** REPAIR the circuit. CLEAR the DTCs. CYCLE the ignition. REPEAT the self-test. **No** GO to E12.



N0002835

- **Is any voltage indicated?**

E12 CHECK FOR CORRECT PCM OPERATION
 	
NOTE: When a new PCM is installed, the PATS keys must be programmed into the PCM.
• Disconnect all the PCM connectors.
• Check for:
  ▪ corrosion
  ▪ damaged pins
  ▪ pushed-out pins
• Connect all the PCM connectors and make sure they seat correctly.
• Operate the system and verify the concern is still present.
• **Is the concern still present?**
	Yes
	INSTALL a new PCM. REFER to Section 303-14 . PROGRAM the PATS keys into the PCM. REFER to Key Programming Using Diagnostic Equipment in this section. REPEAT the self-test.
	
	No
	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. CLEAR the DTCs. CYCLE the ignition. REPEAT the self-test.