

Pinpoint Test J: The Transfer Case Does Not Shift Between 2H And 4H Modes Correctly

Normal Operation

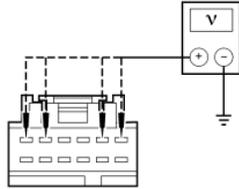
The mode select switch communicates the operator's choice to the 4X4 control module. The 4X4 control module then controls the transfer case motor and pulse vacuum hublocks (PVHs) as necessary. If the vehicle is not responding to the operator's intentions, systematically check the necessary inputs and outputs of the 4X4 control module, components of the transfer case, PVH components and axle shafts. Check all circuits for opens and shorts to power or ground.

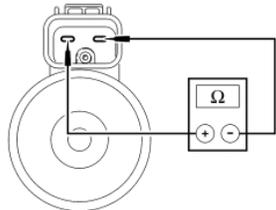
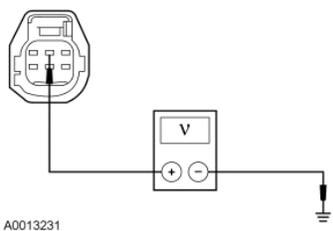
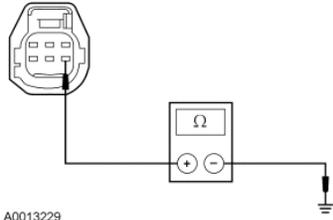
Possible Causes

- Transfer case
- PVH solenoid assembly
- Vacuum leaks
- 4X4 control module
- Front axle assembly
- Mode select switch (MSS)

PINPOINT TEST J: THE TRANSFER CASE DOES NOT SHIFT BETWEEN 2H AND 4H MODES CORRECTLY

NOTICE: Use the Flex Probe Kit for all test connections to prevent damage to the wiring terminals. Do not use standard multimeter probes.

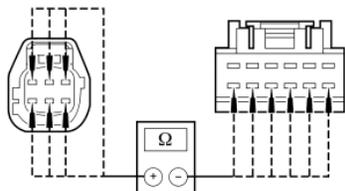
Test Step	Result / Action to Take															
<p>J1 CHECK FOR DTCS</p> <ul style="list-style-type: none"> • Connect the scan tool. • Carry out the 4X4 control module on-demand self test. • Are DTCS are retrieved? 	<p>Yes If DTC B1355, B1359 or B1366, GO to J2 . If DTC P1865, P1866 or P1867, GO to J8 . If DTC C1728 GO to J18 . If DTC P1820, P1828, P1822 or P1830 GO to Pinpoint Test K. If other DTCS, GO to the 4X4 Control Module Diagnostic Trouble Code (DTC) Index.</p> <p>No GO to J2.</p>															
<p>J2 CHECK IGNITION SWITCH STATUS PID</p> <ul style="list-style-type: none"> • Ignition ON. • Monitor the ignition switch status PID. <table border="1"> <thead> <tr> <th>Ignition Switch Position</th> <th>PID</th> <th>Expected Value</th> </tr> </thead> <tbody> <tr> <td>OFF</td> <td>IGN_O/L</td> <td>OFF</td> </tr> <tr> <td>ACCESSORY</td> <td>IGN_ACC</td> <td>ACCY</td> </tr> <tr> <td>RUN</td> <td>IGN_R</td> <td>RUN</td> </tr> <tr> <td>START</td> <td>IGN_S</td> <td>START</td> </tr> </tbody> </table> <ul style="list-style-type: none"> • Do the ignition switch PIDs match the ignition switch positions? 	Ignition Switch Position	PID	Expected Value	OFF	IGN_O/L	OFF	ACCESSORY	IGN_ACC	ACCY	RUN	IGN_R	RUN	START	IGN_S	START	<p>Yes GO to J3.</p> <p>No CHECK the ignition switch. REFER to Section 303-06A for gasoline engines or Section 303-06B for diesel engines. After the fault is repaired, CLEAR the DTC. REPEAT the self-test.</p>
Ignition Switch Position	PID	Expected Value														
OFF	IGN_O/L	OFF														
ACCESSORY	IGN_ACC	ACCY														
RUN	IGN_R	RUN														
START	IGN_S	START														
<p>J3 CHECK FOR VOLTAGE INPUT TO THE 4X4 CONTROL MODULE</p> <ul style="list-style-type: none"> • Disconnect: 4X4 Control Module C281a . • Ignition ON. • Measure the voltage between 4X4 control module C281a and ground as follows: <table border="1"> <thead> <tr> <th>C281a Pin</th> <th>Circuit</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>1306 (PK/WH)</td> </tr> <tr> <td>2</td> <td>1306 (PK/WH)</td> </tr> <tr> <td>5</td> <td>640 (RD/YE)</td> </tr> <tr> <td>6</td> <td>1002 (BK/PK)</td> </tr> </tbody> </table>  <p>N0037613</p> <ul style="list-style-type: none"> • Are the voltages at each pin greater than 9 volts? 	C281a Pin	Circuit	1	1306 (PK/WH)	2	1306 (PK/WH)	5	640 (RD/YE)	6	1002 (BK/PK)	<p>Yes GO to J4.</p> <p>No REPAIR the circuit(s). CLEAR the DTCs. REPEAT the self-test.</p>					
C281a Pin	Circuit															
1	1306 (PK/WH)															
2	1306 (PK/WH)															
5	640 (RD/YE)															
6	1002 (BK/PK)															
<p>J4 CHECK FOR TRANSFER CASE 4H ENGAGEMENT</p> <ul style="list-style-type: none"> • Raise and support the vehicle. Refer to Section 100-02. • Ignition ON. • Switch the MSS to 4H. • Rotate the rear driveshaft. • Observe the front driveshaft. • Did the front driveshaft rotate? 	<p>Yes GO to J5.</p> <p>No GO to J8.</p>															
<p>J5 CHECK FOR PVH ENGAGEMENT</p> <p>NOTE: The engine must be at idle during the following steps to supply vacuum for PVH engagement/disengagement.</p> <ul style="list-style-type: none"> • Start the engine and allow it to idle. • Switch the MSS to 4H. • Rotate the LH front tire one revolution forward and one revolution backward while observing the LH front axle shaft and universal joint. • Rotate the RH front tire one revolution forward and one revolution backward while observing the RH front axle shaft and universal joint. 	<p>Yes GO to J6.</p> <p>No GO to Pinpoint Test I.</p>															

<ul style="list-style-type: none"> • Did the axle shafts rotate? 																									
<p>J6 CHECK FOR TRANSFER CASE 2H DISENGAGEMENT</p>																									
<ul style="list-style-type: none"> • Switch the MSS to 2H. • Rotate the rear driveshaft. • Observe the front driveshaft. • Did the front driveshaft rotate? 	<p>Yes GO to J7.</p> <p>No GO to J8.</p>																								
<p>J7 CHECK FOR PVH DISENGAGEMENT</p>																									
<ul style="list-style-type: none"> • Rotate the LH front tire one revolution forward and one revolution backward while observing the LH front axle shaft and universal joint. • Rotate the RH front tire one revolution forward and one revolution backward while observing the RH front axle shaft and universal joint. • Did either front axle shaft and universal joint rotate? 	<p>Yes CHECK that all driveline fasteners are present and tightened to specification. Section 205-00 for further diagnosis of the front axle.</p> <p>No GO to J8.</p>																								
<p>J8 CHECK THE TRANSFER CASE ENCODER POSITION PIDS</p>																									
<ul style="list-style-type: none"> • Connect the scan tool. • Monitor the shift motor encoder position PID. <table border="1"> <thead> <tr> <th rowspan="2">Mode Select Switch Position</th> <th colspan="4">Shift Motor Encoder Position</th> </tr> <tr> <th>A</th> <th>B</th> <th>C</th> <th>D</th> </tr> </thead> <tbody> <tr> <td>2H</td> <td>OPEN</td> <td>OPEN</td> <td>CLOSED</td> <td>OPEN</td> </tr> <tr> <td>4H</td> <td>CLOSED</td> <td>OPEN</td> <td>CLOSED</td> <td>OPEN</td> </tr> <tr> <td>4L</td> <td>CLOSED</td> <td>CLOSED</td> <td>OPEN</td> <td>OPEN</td> </tr> </tbody> </table> <ul style="list-style-type: none"> • Toggle the MSS from 2H to 4H. • Do the PIDs agree with the shift motor positions? 	Mode Select Switch Position	Shift Motor Encoder Position				A	B	C	D	2H	OPEN	OPEN	CLOSED	OPEN	4H	CLOSED	OPEN	CLOSED	OPEN	4L	CLOSED	CLOSED	OPEN	OPEN	<p>Yes GO to J9.</p> <p>No GO to J12.</p>
Mode Select Switch Position		Shift Motor Encoder Position																							
	A	B	C	D																					
2H	OPEN	OPEN	CLOSED	OPEN																					
4H	CLOSED	OPEN	CLOSED	OPEN																					
4L	CLOSED	CLOSED	OPEN	OPEN																					
<p>J9 CHECK THE SHIFT MOTOR OPERATION</p>																									
<ul style="list-style-type: none"> • Remove the shift motor from the transfer case, leaving the wiring connector connected. • Observe the shift motor and encoder position PIDs while switching the MSS from 2H to 4H. • Does the shift motor rotate from the 2H position to the 4H position? 	<p>Yes GO to J19.</p> <p>No GO to J10.</p>																								
<p>J10 CHECK THE SHIFT MOTOR FOR INTERNAL SHORT</p>																									
<ul style="list-style-type: none"> • Disconnect: Shift Motor C350b . • Measure the resistance between shift motor C350b pins 1 and 2, component side.  <p>N0037662</p> <ul style="list-style-type: none"> • Is the resistance between 0.10 and 20 ohms (nominal 4 ohms)? 	<p>Yes GO to J11.</p> <p>No INSTALL a new shift motor. CLEAR the DTC(s). REPEAT the self-test, then GO to J18 .</p>																								
<p>J11 VERIFY THE SHIFT MOTOR POWER AND GROUND CIRCUITS</p>																									
<ul style="list-style-type: none"> • Connect: 4X4 Control Module C281a . • Ignition ON. • Measure the voltage between shift motor C350a-2, circuit 976 (OG) harness side and ground.  <p>A0013231</p> <ul style="list-style-type: none"> • Measure the resistance between shift motor C350a-4, circuit 3659 (BK/PK) harness side and ground.  <p>A0013229</p> <ul style="list-style-type: none"> • Does circuit 976 (OG) have voltage greater than 9 volts and circuit 3659 (BK/PK) have resistance to ground less than 5 ohms? 	<p>Yes GO to J12.</p> <p>No REPAIR the circuit(s) as necessary.</p>																								
<p>J12 CHECK CIRCUIT 763 (OG/WH), 764 (BN/WH), 770 (WH), 771 (VT/YE), 976 (OG) AND</p>																									

3659 (BK/PK) FOR AN OPEN

- Ignition OFF.
- Disconnect: Transfer Case C350a .
- Disconnect: 4X4 Control Module C281a .
- Measure the resistance of the following circuits between 4X4 control module C281a, harness side and transfer case C350a, harness side:

Circuit	C281a	C350a
763 (OG/WH)	12	1
764 (BN/WH)	10	3
770 (WH)	11	6
771 (VT/YE)	9	5
976 (OG)	7	2
3659 (BK/PK)	8	4



N0037621

- Are the resistances less than 5 ohms?

Yes

GO to [J13](#).

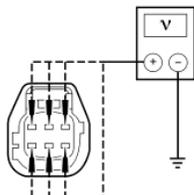
No

REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.

J13 CHECK CIRCUIT 763 (OG/WH), 764 (BN/WH), 770 (WH), 771 (VT/YE), 976 (OG) AND 3659 (BK/PK) FOR A SHORT TO VOLTAGE

- Measure the voltage between the following circuits at the transfer case C350a, harness side and ground:

Circuit	C350a
763 (OG/WH)	1
764 (BN/WH)	3
770 (WH)	6
771 (VT/YE)	5
976 (OG)	2
3659 (BK/PK)	4



N0037619

- Is voltage present?

Yes

REPAIR the circuit. CLEAR the DTC(s). REPEAT the self-test.

No

GO to [J14](#).

J14 CHECK CIRCUIT 763 (OG/WH), 764 (BN/WH), 770 (WH), 771 (VT/YE), 976 (OG) AND 3659 (BK/PK) FOR A SHORT TO GROUND

- Measure the resistance between the following circuits at the transfer case C350a, harness side and ground:

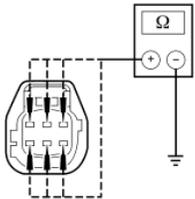
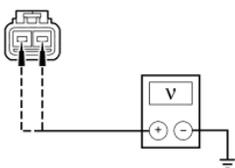
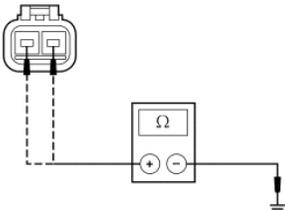
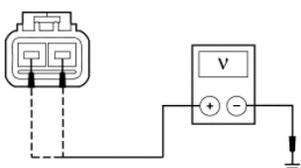
Circuit	C350a
763 (OG/WH)	1
764 (BN/WH)	3
770 (WH)	6
771 (VT/YE)	5
976 (OG)	2
3659 (BK/PK)	4

Yes

GO to [J15](#).

No

REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.

 <p>N0037620</p> <ul style="list-style-type: none"> • Are the resistances greater than 10,000 ohms? 	
<p>J15 CHECK CIRCUIT 777 (YE) AND CIRCUIT 778 (OG) FOR A SHORT TO POWER</p> <ul style="list-style-type: none"> • Ignition ON. • Disconnect: Transfer Case C350b . • Measure the voltage between transfer case C350b-2, circuit 777 (YE), harness side and ground. • Measure the voltage between transfer case C350b-1, circuit 778 (OG), harness side and ground.  <p>GC1788-A</p> <ul style="list-style-type: none"> • Is voltage present? 	<p>Yes REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.</p> <p>No GO to J16.</p>
<p>J16 CHECK CIRCUIT 777 (YE) AND CIRCUIT 778 (OG) FOR A SHORT TO GROUND</p> <ul style="list-style-type: none"> • Ignition OFF. • Disconnect: CW Relay C1129 and CCW Relay C1173 . • Measure the resistance between transfer case C350b-1, circuit 778 (OG), harness side and ground. • Measure the resistance between transfer case C350b-2, circuit 777 (YE), harness side and ground.  <p>A0013228</p> <ul style="list-style-type: none"> • Are the resistances greater than 10,000 ohms? 	<p>Yes GO to J17.</p> <p>No REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.</p>
<p>J17 CHECK CIRCUITS 785 (BK/LG) AND 786 (RD) FOR POWER DURING ACTIVE COMMANDS</p> <ul style="list-style-type: none"> • Connect: 4X4 Control Module C281b . • Enter the active command mode on the diagnostic tool. • Enter the counterclockwise shift motor relay active command ON and OFF and measure the voltage between transfer case C350b-1, circuit 778 (OG) harness side and ground.  <p>A0013242</p> <ul style="list-style-type: none"> • Enter the clockwise shift motor relay active command ON and OFF and measure the voltage between transfer case C350b-2, circuit 777 (YE) harness side and ground. • Are the voltages 9 volts or greater on the circuit being commanded? 	<p>Yes INSTALL a new shift motor. CLEAR the DTC(s). REPEAT the self-test, then GO to J18 .</p> <p>No GO to Pinpoint Test K.</p>
<p>J18 ATTEMPT TO DUPLICATE THE CONCERN</p> <ul style="list-style-type: none"> • Inspect and, if necessary, clean the 4X4 control module and CW/CCW relays and connectors. • Drive the vehicle and attempt to duplicate the concern. • Is the concern still present? 	<p>Yes GO to J19.</p> <p>No CLEAR the DTC(s). REPEAT the self-test.</p>
<p>J19 SHIFT THE TRANSFER CASE TO 4H MANUALLY</p> <ul style="list-style-type: none"> • Remove the shift motor from the transfer case. • Using a suitable wrench, rotate the shift cam to the 4H position. • Rotate the rear driveshaft and observe the front driveshaft. 	<p>Yes GO to J20.</p>

<ul style="list-style-type: none"> • Does the transfer case shift 4H and the front driveshaft rotate? 	<p>No REPAIR the transfer case. REFER to Section 308-07B. TEST the system for normal operation.</p>
<p>J20 CHECK THE TORQUE REQUIRED TO SHIFT THE TRANSFER CASE</p>	
<ul style="list-style-type: none"> • Using a suitable wrench, rotate the shift cam through 4L, N and 4H positions. <ul style="list-style-type: none"> ■ Make sure that the driveshafts rotate freely. ■ Assist the shift by turning the driveshafts. • Measure the torque required to perform the shift. • Is the torque required to shift the transfer case 45 Nm (33 lb-ft) or less? 	<p>Yes GO to J21.</p> <p>No REPAIR the transfer case. REFER to Section 308-07B. TEST the system for normal operation.</p>
<p>J21 SHIFT THE TRANSFER CASE TO 2H MANUALLY</p>	
<ul style="list-style-type: none"> • Using a suitable wrench, rotate the shift cam to the 2H position. • Rotate the rear driveshaft and observe the front driveshaft. • Does the transfer case shift to 2H and the front driveshaft not rotate? 	<p>Yes INSTALL a new transfer case shift motor. REFER to Section 308-07B. TEST the system for normal operation.</p> <p>No REPAIR the transfer case. REFER to Section 308-07B. TEST the system for normal operation.</p>