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Model Year: 2010		Model: Prius	Doc ID: RM0000041M1001X
Title: HYBRID / BATTERY CONTROL: HYBRID CONTROL SYSTEM: P082B-575,P082C-576,P082E-571,P082F-572,P181A-596,P181B-595,P182B-577,P182C-578,P182E-573,P182F-574: Gear Lever X Position Circuit Low (2010 Prius)			
DTC	P082B-575	Gear Lever X Position Circuit Low	
DTC	P082C-576	Gear Lever X Position Circuit High	
DTC	P082E-571	Gear Lever Y Position Circuit Low	
DTC	P082F-572	Gear Lever Y Position Circuit High	
DTC	P181A-596	Gear Lever X Position Circuit "A" / "B" Correlation	
DTC	P181B-595	Gear Lever Y Position Circuit "A" / "B" Correlation	
DTC	P182B-577	Gear Lever X Position "B" Circuit Low	
DTC	P182C-578	Gear Lever X Position "B" Circuit High	
DTC	P182E-573	Gear Lever Y Position "B" Circuit Low	
DTC	P182F-574	Gear Lever Y Position "B" Circuit High	

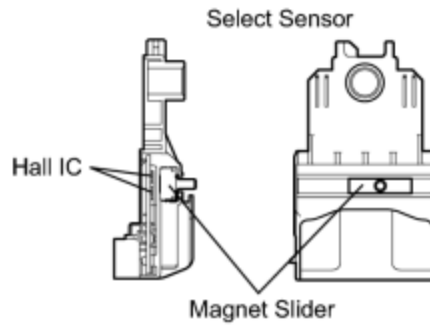
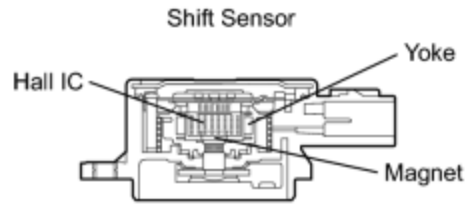
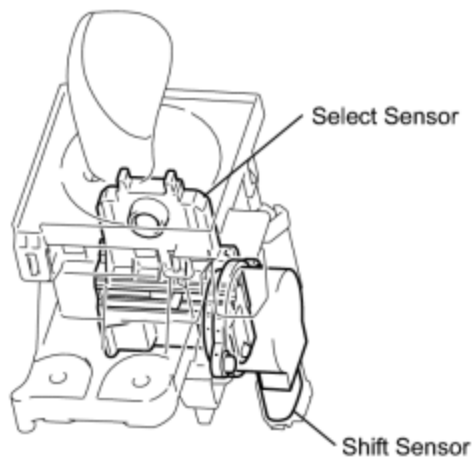
DESCRIPTION

HINT:

- The electronic shift lever system is a linkless type that does not use a shift cable.
- The shift and select sensors are non-contact type sensors.
- The shift lock control unit assembly (selector lever) is a momentary type, which returns to its home position by spring reaction as the driver's hand is released from the selector lever after shifting.

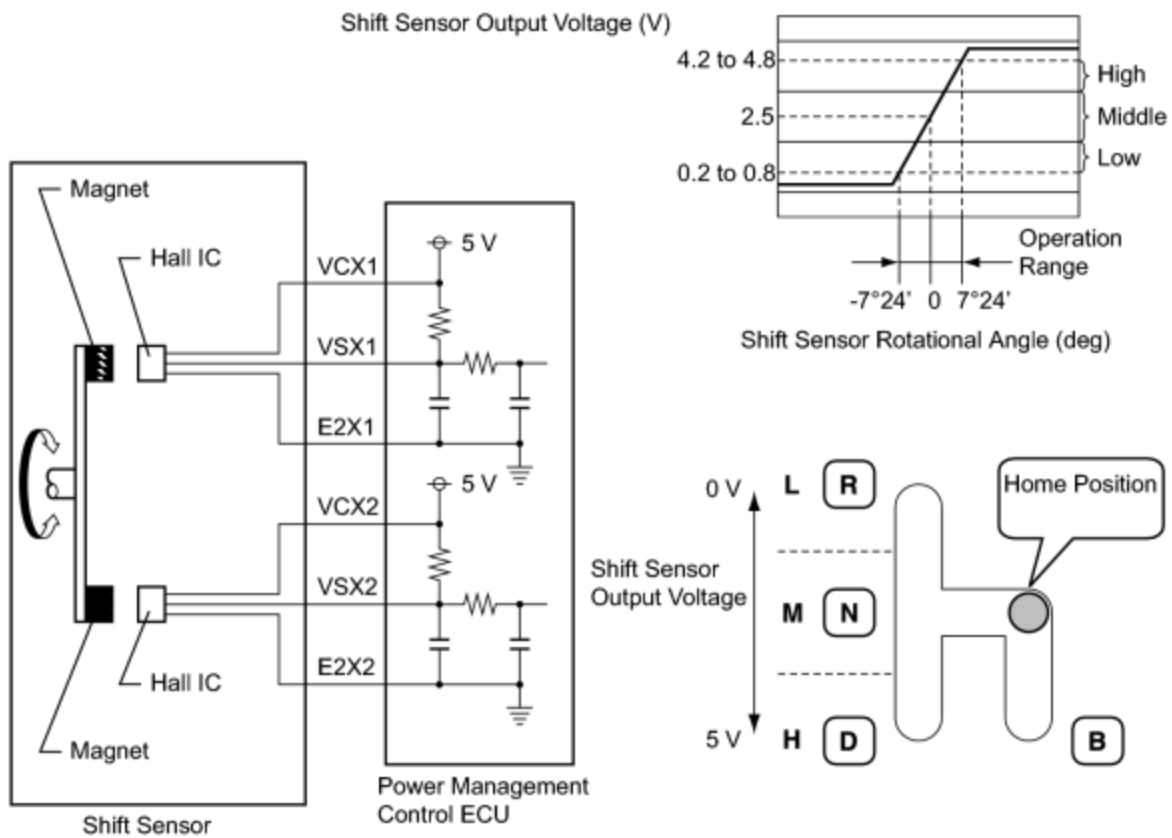
The shift lock control unit assembly (selector lever) contains a shift sensor and a select sensor to detect the selector lever position (R, N, D or B). Because both sensors operate using Hall elements, they can accurately detect shift positions in a reliable manner. Both sensors contain two detection circuits, a main and a sub circuit.

Shift Lock Control Unit Assembly (Selector Lever)



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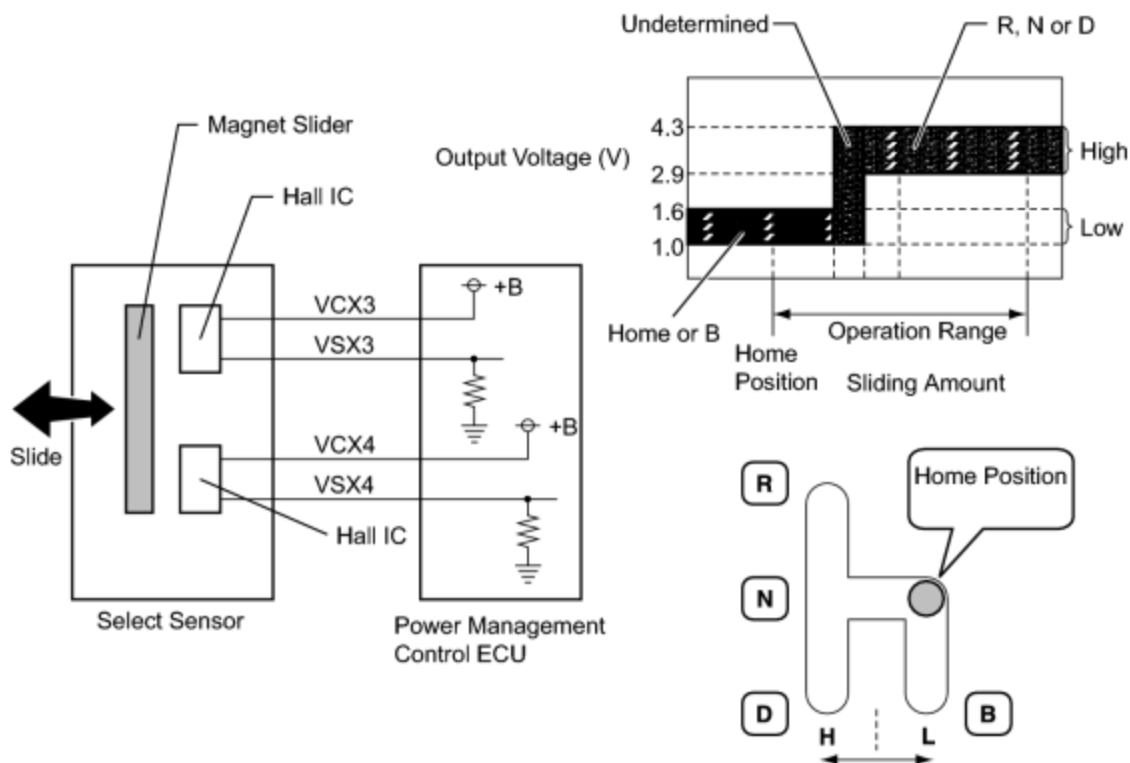
- The shift sensor outputs voltage, which varies between 0 and 5 V in accordance with the vertical movement of the selector lever, to the power management control ECU (HV CPU). The power management control ECU (HV CPU) interprets low level voltage input from the shift sensor as the D or B position, middle level voltage as the home or N position, and high level voltage as the R position.



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- The select sensor outputs voltage, which varies between 0 and 5 V in accordance with the horizontal movement of the selector lever, to the power management control ECU (HV CPU). The power management control ECU (HV CPU) interprets low level voltage input from the select sensor as the home or B position, and high level voltage as the R, N, or D position.

The power management control ECU (HV CPU) determines the position of the selector lever in accordance with the combination of the signals from the shift sensor and select sensor.



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DTC NO.	INF CODE	DTC DETECTION CONDITION	TROUBLE AREA
P082B	575	Open or GND short in select main sensor circuit	<ul style="list-style-type: none"> Wire harness or connector Shift lock control unit assembly Power management control ECU
P082C	576	+B short in select main sensor circuit	
P082E	571	Open or GND short in shift main sensor circuit	
P082F	572	+B short in shift main sensor circuit	
P181A	596	Difference between select main sensor value and select sub sensor value is large	
P181B	595	Difference between shift main sensor value and shift sub sensor value is large	
P182B	577	Open or GND short in select sub sensor circuit	
P182C	578	+B short in select sub sensor circuit	
P182E	573	Open or GND short in shift sub sensor circuit	
P182F	574	+B short in shift sub sensor circuit	

HINT:

When any of DTCs P082E-571, P082F-572, P182E-573 or P182F-574 are output, check shift

sensor main and shift sensor sub voltages using the Techstream.

Shift Sensor Main, Shift Sensor Sub

R POSITION (MAIN)	HOME OR N POSITION (MAIN)	D OR B POSITION (MAIN)	R POSITION (SUB)	HOME OR N POSITION (SUB)	D OR B POSITION (SUB)	TROUBLE AREA
0.3 to 1.8 V	2.0 to 3.0 V	3.2 to 4.8 V	0.3 to 1.8 V	2.0 to 3.0 V	3.2 to 4.8 V	Correct shift sensor voltage
0 to 0.3 V	0 to 0.3 V	0 to 0.3 V	0.3 to 1.8 V	2.0 to 3.0 V	3.2 to 4.8 V	Open in VCX1 circuit GND short in VSX1 circuit
0.3 to 1.8 V	2.0 to 3.0 V	3.2 to 4.8 V	0 to 0.3 V	0 to 0.3 V	0 to 0.3 V	Open in VCX2 circuit GND short in VSX2 circuit
4.8 to 5.0 V	4.8 to 5.0 V	4.8 to 5.0 V	0.3 to 1.8 V	2.0 to 3.0 V	3.2 to 4.8 V	Open in VSX1 circuit Open in E2X1 circuit
0.3 to 1.8 V	2.0 to 3.0 V	3.2 to 4.8 V	4.8 to 5.0 V	4.8 to 5.0 V	4.8 to 5.0 V	Open in VSX2 circuit Open in E2X2 circuit

HINT:

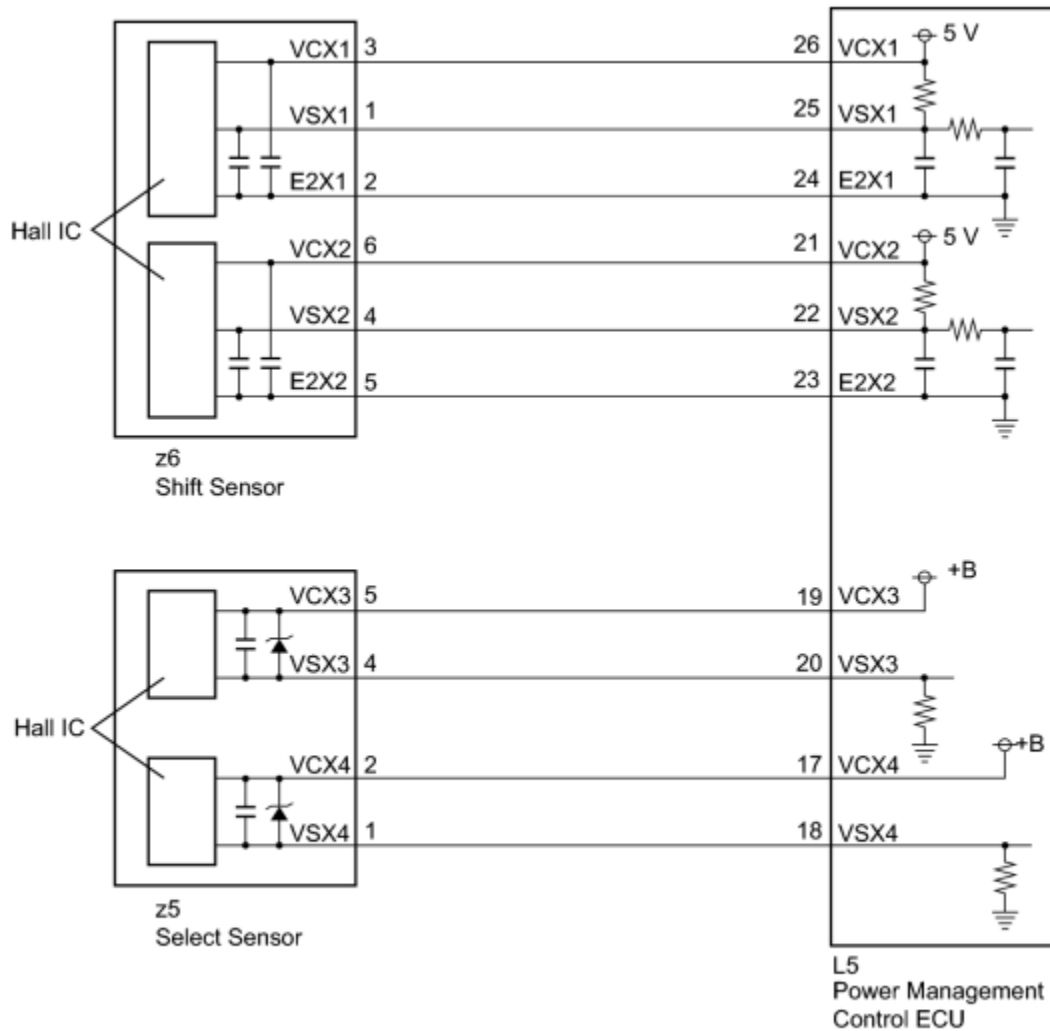
When any of DTCs P082B-575, P082C-576, P182B-577 or P182C-578 are output, check shift sensor select main and shift sensor select sub voltages using the Techstream.

Shift Sensor Select Main, Shift Sensor Select Sub

R, N OR D POSITION (SELECT MAIN)	HOME OR B POSITION (SELECT MAIN)	R, N OR D POSITION (SELECT SUB)	HOME OR B POSITION (SELECT SUB)	TROUBLE AREA
2.9 to 4.3 V	1.0 to 1.6 V	2.9 to 4.3 V	1.0 to 1.6 V	Correct select sensor voltage
0 to 0.5 V	0 to 0.5 V	2.9 to 4.3 V	1.0 to 1.6 V	Open in VCX3 circuit Open or GND short in VSX3 circuit
2.9 to 4.3 V	1.0 to 1.6 V	0 to 0.5 V	0 to 0.5 V	Open in VCX4 circuit Open or GND short in

				VSX4 circuit
4.9 to 5 V	4.9 to 5 V	2.9 to 4.3 V	1.0 to 1.6 V	+B short in VSX3 circuit
2.9 to 4.3 V	1.0 to 1.6 V	4.9 to 5 V	4.9 to 5 V	+B short in VSX4 circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

PROCEDURE

1. READ VALUE USING TECHSTREAM (SHIFT SENSOR MAIN, SHIFT SENSOR SUB)

- (a) Connect the Techstream to the DLC3.
- (b) Turn the power switch on (IG).
- (c) Enter the following menus: Powertrain / Hybrid Control / Data List / Shift Sensor Main, Shift Sensor Sub.
- (d) Read the Data List.

Result:

TESTER DISPLAY	CONDITION	SPECIFIED CONDITION
Shift Sensor Main	R position	0.3 to 1.8 V
	Home or N position	2.0 to 3.0 V
	D or B position	3.2 to 4.8 V
Shift Sensor Sub	R position	0.3 to 1.8 V
	Home or N position	2.0 to 3.0 V
	D or B position	3.2 to 4.8 V

- (e) Turn the power switch off.

NG  **CHECK HARNESS AND CONNECTOR
(POWER MANAGEMENT CONTROL ECU -
SHIFT SENSOR)**

OK



2. READ VALUE USING TECHSTREAM (SHIFT SENSOR SELECT MAIN, SHIFT SENSOR SELECT SUB)

- (a) Connect the Techstream to the DLC3.
- (b) Turn the power switch on (IG).
- (c) Enter the following menus: Powertrain / Hybrid Control / Data List / Shift Sensor Select Main, Shift Sensor Select Sub.
- (d) Read the Data List.

Result:

TESTER DISPLAY	CONDITION	SPECIFIED CONDITION
Shift Sensor Select Main	R, N or D Position	2.9 to 4.3 V

	Home or B Position	1.0 to 1.6 V
Shift Sensor Select Sub	R, N or D Position	2.9 to 4.3 V
	Home or B Position	1.0 to 1.6 V


(e) Turn the power switch off.

NG  **CHECK HARNESS AND CONNECTOR
(POWER MANAGEMENT CONTROL ECU -
SELECT SENSOR)**

OK



3. REPLACE SHIFT LOCK CONTROL UNIT ASSEMBLY

(a) Replace the shift lock control unit assembly .

NEXT



4. CLEAR DTC

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(d) Read and record the DTCs and freeze frame data.

(e) Clear DTCs and freeze frame data.

(f) Turn the power switch off.

NEXT



5. CHECK DTC OUTPUT (HV)

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Perform a road test.

(d) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(e) Check if DTCs are output.

Result:

RESULT	PROCEED TO
No DTCs are output.	A
P082B-575, P082C-576, P082E-571, P082F-572, P181A-596, P181B-595, P182B-577, P182C-578, P182E-573 or P182F-574 is output again.	B

(f) Turn the power switch off.



6.	CHECK HARNESS AND CONNECTOR (POWER MANAGEMENT CONTROL ECU - SHIFT SENSOR)
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(a) Disconnect connector L5 from the power management control ECU.

(b) Disconnect connector z6 from the shift sensor.

(c) Turn the power switch on (IG).

(d) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

TESTER CONNECTION	SWITCH CONDITION	SPECIFIED CONDITION
L5-26 (VCX1) - Body ground	Power switch on (IG)	Below 1 V
L5-25 (VSX1) - Body ground	Power switch on (IG)	Below 1 V
L5-24 (E2X1) - Body ground	Power switch on (IG)	Below 1 V
L5-21 (VCX2) - Body ground	Power switch on (IG)	Below 1 V
L5-22 (VSX2) - Body ground	Power switch on (IG)	Below 1 V
L5-23 (E2X2) - Body ground	Power switch on (IG)	Below 1 V

Text in Illustration

*1

Rear view of wire harness connector:
(to Power Management Control ECU)

*2

Front view of wire harness connector:
(to Shift Sensor)

NOTICE:

Turning the power switch on (IG) with the power management control ECU connectors disconnected causes other DTCs to be stored. Clear the DTCs after performing this inspection.

(e) Turn the power switch off.

(f) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for open):

TESTER CONNECTION	SWITCH CONDITION	SPECIFIED CONDITION
L5-26 (VCX1) - z6-3 (VCX1)	Power switch off	Below 1 Ω
L5-25 (VSX1) - z6-1 (VSX1)	Power switch off	Below 1 Ω
L5-24 (E2X1) - z6-2 (E2X1)	Power switch off	Below 1 Ω
L5-21 (VCX2) - z6-6 (VCX2)	Power switch off	Below 1 Ω
L5-22 (VSX2) - z6-4 (VSX2)	Power switch off	Below 1 Ω
L5-23 (E2X2) - z6-5 (E2X2)	Power switch off	Below 1 Ω

Standard Resistance (Check for short):

TESTER CONNECTION	SWITCH CONDITION	SPECIFIED CONDITION
L5-26 (VCX1) or z6-3 (VCX1) - Body ground and other terminals	Power switch off	10 k Ω or higher
L5-25 (VSX1) or z6-1 (VSX1) - Body ground and other terminals	Power switch off	10 k Ω or higher
L5-24 (E2X1) or z6-2 (E2X1) - Body ground and other terminals	Power switch off	10 k Ω or higher
L5-21 (VCX2) or z6-6 (VCX2) - Body ground and other terminals	Power switch off	10 k Ω or higher
L5-22 (VSX2) or z6-4 (VSX2) - Body ground and other terminals	Power switch off	10 k Ω or higher
L5-23 (E2X2) or z6-5 (E2X2) - Body ground and other terminals	Power switch off	10 k Ω or higher

(g) Connect the shift sensor connector.

(h) Connect the power management control ECU connector.

NG  **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK


7. CHECK POWER MANAGEMENT CONTROL ECU (VCX1, VCX2 VOLTAGE)

- (a) Disconnect connector z6 from the shift sensor.
- (b) Turn the power switch on (IG).
- (c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

TESTER CONNECTION	SWITCH CONDITION	SPECIFIED CONDITION
z6-3 (VCX1) - z6-2 (E2X1)	Power switch on (IG)	4.5 to 5.5 V
z6-6 (VCX2) - z6-5 (E2X2)	Power switch on (IG)	4.5 to 5.5 V

Text in Illustration

*1

Front view of wire harness connector:
(to Shift Sensor)


- (d) Connect the shift sensor connector.

NG

REPLACE POWER MANAGEMENT
CONTROL ECU

OK

8. REPLACE SHIFT LOCK CONTROL UNIT ASSEMBLY

- (a) Replace the shift lock control unit assembly .

NEXT

9. CLEAR DTC

- (a) Connect the Techstream to the DLC3.
- (b) Turn the power switch on (IG).
- (c) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.
- (d) Read and record the DTCs and freeze frame data.
- (e) Clear DTCs and freeze frame data.
- (f) Turn the power switch off.

NEXT



10. CHECK DTC OUTPUT (HV)

- (a) Connect the Techstream to the DLC3.
- (b) Turn the power switch on (IG).
- (c) Perform a road test.
- (d) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.
- (e) Check if DTCs are output.

Result:

RESULT	PROCEED TO
No DTCs are output.	A
P082B-575, P082C-576, P082E-571, P082F-572, P181A-596, P181B-595, P182B-577, P182C-578, P182E-573 or P182F-574 is output again.	B

- (f) Turn the power switch off.



11. CHECK HARNESS AND CONNECTOR (POWER MANAGEMENT CONTROL ECU - SELECT SENSOR)

- (a) Disconnect connector L5 from the power management control ECU.
- (b) Disconnect connector z5 from the select sensor.
- (c) Turn the power switch on (IG).
- (d) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

TESTER CONNECTION	SWITCH CONDITION	SPECIFIED CONDITION
L5-19 (VCX3) - Body ground	Power switch on (IG)	Below 1 V
L5-20 (VSX3) - Body ground	Power switch on (IG)	Below 1 V
L5-17 (VCX4) - Body ground	Power switch on (IG)	Below 1 V

L5-18 (VSX4) - Body ground	Power switch on (IG)	Below 1 V
Text in Illustration		
*1	Rear view of wire harness connector: (to Power Management Control ECU)	
*2	Front view of wire harness connector: (to Select Sensor)	

NOTICE:

Turning the power switch on (IG) with the power management control ECU connectors disconnected causes other DTCs to be stored. Clear the DTCs after performing this inspection.

(e) Turn the power switch off.

(f) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for open):

TESTER CONNECTION	SWITCH CONDITION	SPECIFIED CONDITION
L5-19 (VCX3) - z5-5 (VCX3)	Power switch off	Below 1 Ω
L5-20 (VSX3) - z5-4 (VSX3)	Power switch off	Below 1 Ω
L5-17 (VCX4) - z5-2 (VCX4)	Power switch off	Below 1 Ω
L5-18 (VSX4) - z5-1 (VSX4)	Power switch off	Below 1 Ω

Standard Resistance (Check for short):

TESTER CONNECTION	SWITCH CONDITION	SPECIFIED CONDITION
L5-19 (VCX3) or z5-5 (VCX3) - Body ground and other terminals	Power switch off	10 k Ω or higher
L5-20 (VSX3) or z5-4 (VSX3) - Body ground and other terminals	Power switch off	10 k Ω or higher
L5-17 (VCX4) or z5-2 (VCX4) - Body ground and other terminals	Power switch off	10 k Ω or higher
L5-18 (VSX4) or z5-1 (VSX4) - Body ground and other terminals	Power switch off	10 k Ω or higher

(g) Connect the select sensor connector.

(h) Connect the power management control ECU connector.

NG  **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK



12. CHECK POWER MANAGEMENT CONTROL ECU (VCX3, VCX4 VOLTAGE)

- (a) Disconnect connector z5 from the select sensor.
- (b) Turn the power switch on (IG).
- (c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

TESTER CONNECTION	SWITCH CONDITION	SPECIFIED CONDITION
z5-5 (VCX3) - Body ground	Power switch on (IG)	9 to 14 V
z5-2 (VCX4) - Body ground	Power switch on (IG)	9 to 14 V

Text in Illustration

*1

Front view of wire harness connector:
(to Select Sensor)

- (d) Connect the select sensor connector.

NG



**REPLACE POWER MANAGEMENT
CONTROL ECU**

OK



13. REPLACE SHIFT LOCK CONTROL UNIT ASSEMBLY

- (a) Replace the shift lock control unit assembly



NEXT



14. CLEAR DTC

- (a) Connect the Techstream to the DLC3.
- (b) Turn the power switch on (IG).
- (c) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.
- (d) Read and record the DTCs and freeze frame data.
- (e) Clear DTCs and freeze frame data.

(f) Turn the power switch off.

NEXT



15. CHECK DTC OUTPUT (HV)

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Perform a road test.

(d) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(e) Check if DTCs are output.

Result:

RESULT	PROCEED TO
No DTCs are output.	A
P082B-575, P082C-576, P082E-571, P082F-572, P181A-596, P181B-595, P182B-577, P182C-578, P182E-573 or P182F-574 is output again.	B

(f) Turn the power switch off.

B  **REPLACE POWER MANAGEMENT
CONTROL ECU**

A  **COMPLETED**

