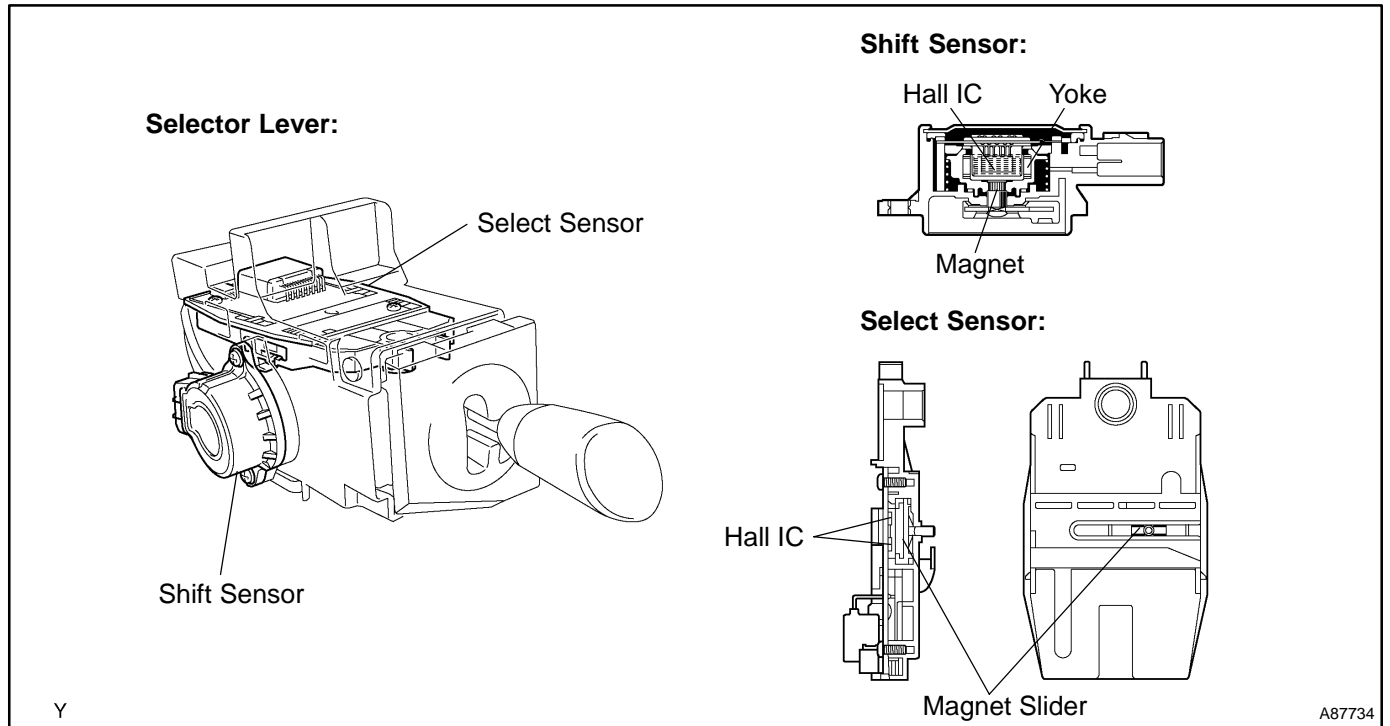


DTC	P0705/571	TRANSMISSION RANGE SENSOR CIRCUIT
DTC	P0705/572	TRANSMISSION RANGE SENSOR CIRCUIT
DTC	P0705/573	TRANSMISSION RANGE SENSOR CIRCUIT
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DTC	P0705/576	TRANSMISSION RANGE SENSOR CIRCUIT
DTC	P0705/577	TRANSMISSION RANGE SENSOR CIRCUIT
DTC	P0705/578	TRANSMISSION RANGE SENSOR CIRCUIT
DTC	P0705/595	TRANSMISSION RANGE SENSOR CIRCUIT
DTC	P0705/596	TRANSMISSION RANGE SENSOR CIRCUIT

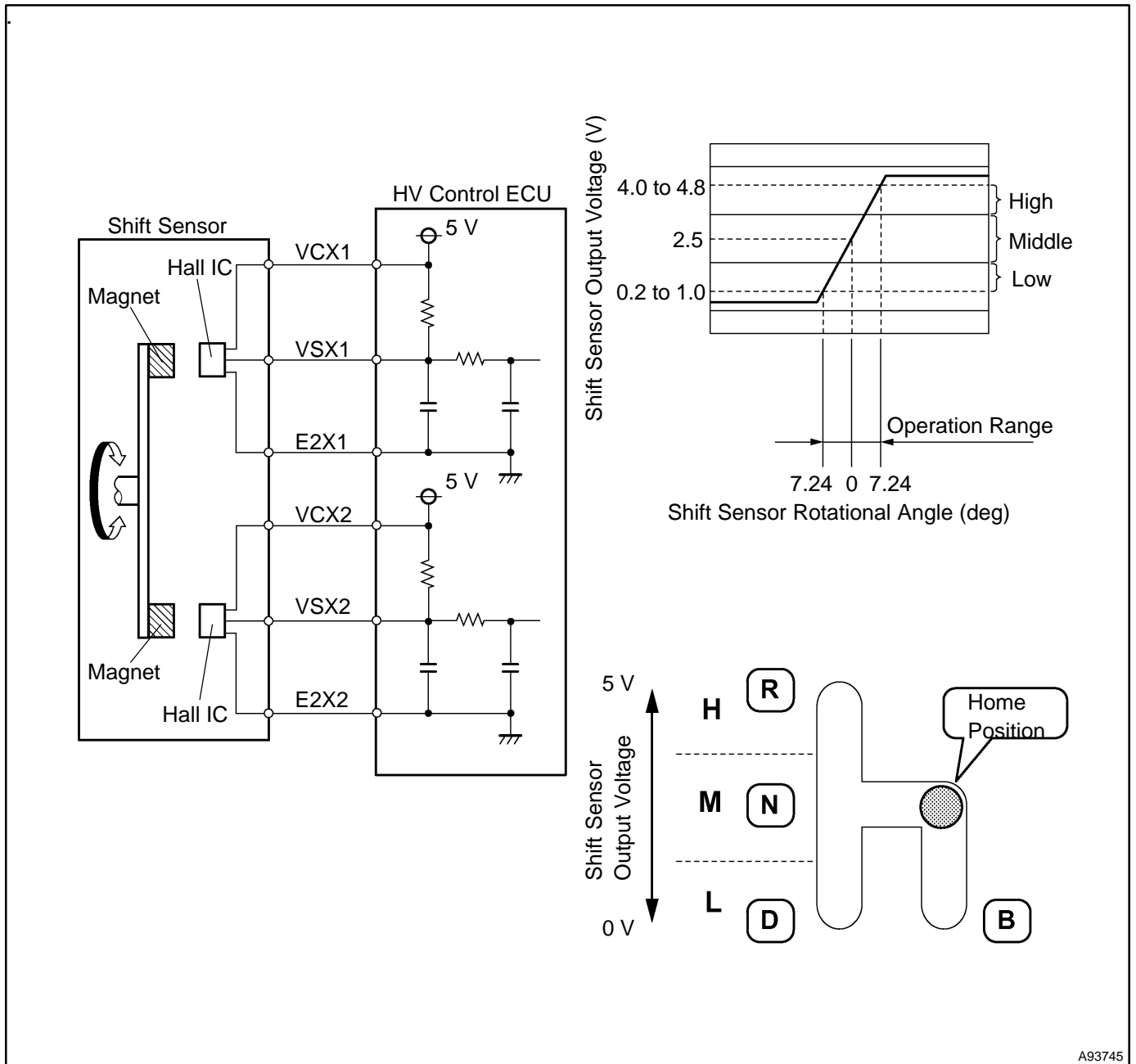
HINT:

- The shift control system is a linkless type that does not use a shift cable.
- The shift and select sensors are non-contact type.

The 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 selector lever contains a shift sensor and a select sensor to detect the selector lever position (R, N, D or B). Because both sensors are controlled electrically by Hall elements, they can accurately detect shift positions in a reliable manner. Both sensors contain two systems of detection circuits, main and sub.



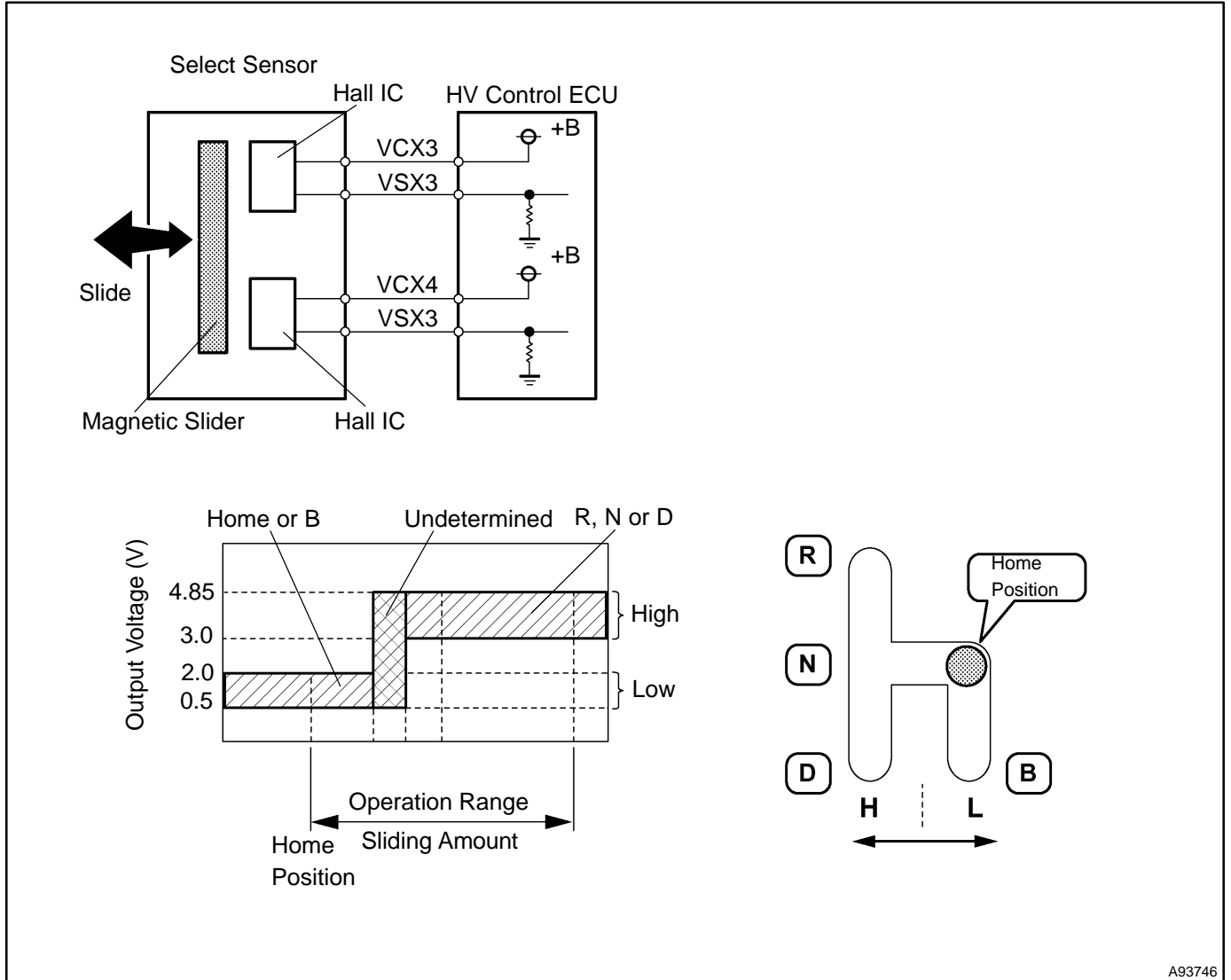
The shift sensor outputs voltage, which varies between 0 and 5 V in accordance with the vertical movement of the selector lever, to the HV control ECU. The HV control ECU interprets low level voltage input from the shift sensor as the D or B position, middle level voltage as the home or N position, and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



A93745

The select sensor outputs voltage, which varies between 0 and 5 V in accordance with the horizontal movement of the selector lever, to the HV control ECU. The HV control ECU 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 HV control ECU determines the position of the selector lever in accordance with the combination of the signals from the shift sensor and select sensor.



A93746

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0705	571	Open or GND short in shift main sensor circuit	<ul style="list-style-type: none"> • Wire harness or connector • Selector lever • HV control ECU
P0705	572	+B short in shift main sensor circuit	<ul style="list-style-type: none"> • Wire harness or connector • Selector lever • HV control ECU
P0705	573	Open or GND short in shift sub sensor circuit	<ul style="list-style-type: none"> • Wire harness or connector • Selector lever • HV control ECU
P0705	574	+B short in shift sub sensor circuit	<ul style="list-style-type: none"> • Wire harness or connector • Selector lever • HV control ECU
P0705	575	Open or GND short in select main sensor circuit	<ul style="list-style-type: none"> • Wire harness or connector • Selector lever • HV control ECU
P0705	576	+B short in select main sensor circuit	<ul style="list-style-type: none"> • Wire harness or connector • Selector lever • HV control ECU
P0705	577	Open or GND short in select sub sensor circuit	<ul style="list-style-type: none"> • Wire harness or connector • Selector lever • HV control ECU
P0705	578	+B short in select sub sensor circuit	<ul style="list-style-type: none"> • Wire harness or connector • Selector lever • HV control ECU
P0705	595	Difference between shift main sensor value and shift sub sensor value is large	<ul style="list-style-type: none"> • Wire harness or connector • Selector lever • HV control ECU
P0705	596	Difference between select main sensor value and select sub sensor value is large	<ul style="list-style-type: none"> • Wire harness or connector • Selector lever • HV control ECU

HINT:

After confirming DTC P0705 (INF 571, 572, 573, or 574), confirm M and S SHIFT SENSOR voltages using the hand-held tester.

M and S SHIFT SENSOR

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 to 0.2 V	0 to 0.2 V	0 to 0.2 V	4.0 to 4.8 V	2.0 to 3.0 V	0.2 to 1.0 V	Open in VCX1 circuit
4.0 to 4.8 V	2.0 to 3.0 V	0.2 to 1.0 V	0 to 0.2 V	0 to 0.2 V	0 to 0.2 V	Open in VCX2 circuit
0 to 0.2 V	0 to 0.2 V	0 to 0.2 V	4.0 to 4.8 V	2.0 to 3.0 V	0.2 to 1.0 V	Open or short in VSX1 circuit
4.0 to 4.8 V	2.0 to 3.0 V	0.2 to 1.0 V	0 to 0.2 V	0 to 0.2 V	0 to 0.2 V	Open or short in VSX2 circuit
4.8 to 5.0 V	4.8 to 5.0 V	4.8 to 5.0 V	4.0 to 4.8 V	2.0 to 3.0 V	0.2 to 1.0 V	Open in E2X1 circuit
4.0 to 4.8 V	2.0 to 3.0 V	0.2 to 1.0 V	4.8 to 5.0 V	4.8 to 5.0 V	4.8 to 5.0 V	Open in E2X2 circuit

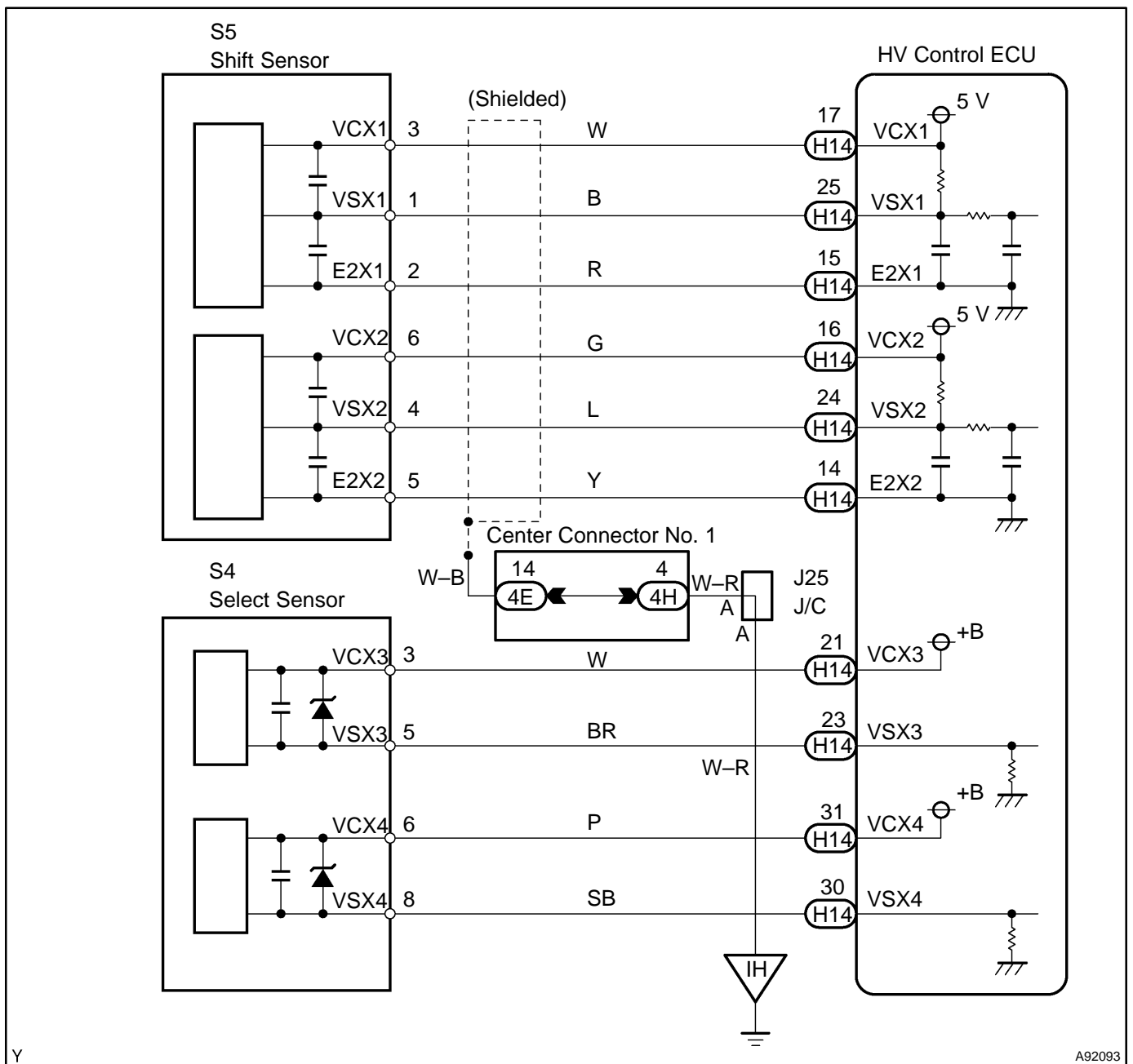
HINT:

After confirming DTC P0705 (INF 575, 576, 577, or 578), confirm SM and SS SHIFT SENSOR voltages using the hand-held tester.

SM and SS SHIFT SENSOR

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
0 to 0.5 V	0 to 0.5 V	3.0 to 4.85 V	0.5 to 2.0 V	Open or GND short in VCX3 or VSX3 circuit
3.0 to 4.85 V	0.5 to 2.0 V	0 to 0.5 V	0 to 0.5 V	Open or GND short in VCX4 or VSX4 circuit

WIRING DIAGRAM



Y

A92093

INSPECTION PROCEDURE

1 READ VALUE OF HAND-HELD TESTER(M AND S SHIFT SENSOR)

- (a) Connect the hand-held tester to the DLC3.
- (b) Turn the power switch ON (IG).
- (c) Turn the hand-held tester ON.
- (d) On the hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / HV ECU / DATA LIST.
- (e) Read the M and S SHIFT SENSOR voltage values on the hand-held tester.

Result:

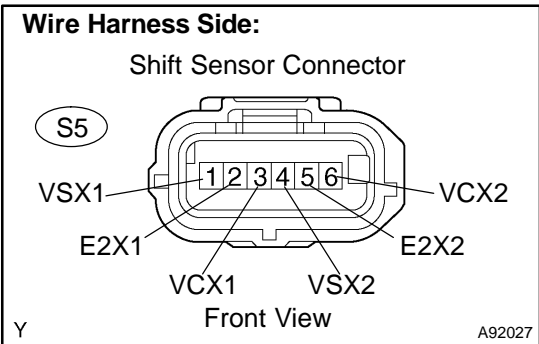
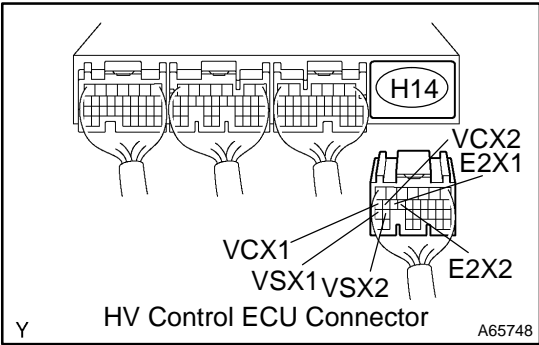
Shift Position	M Shift Sensor	S Shift Sensor
R position	4.0 to 4.8 V	4.0 to 4.8 V
Home or N position	2.0 to 3.0 V	2.0 to 3.0 V
D or B position	0.2 to 1.0 V	0.2 to 1.0 V

OK

Go to step 4

NG

2 CHECK HARNESS AND CONNECTOR(HYBRID VEHICLE CONTROL ECU - SHIFT SENSOR)



- (a) Disconnect the H14 HV control ECU connector.
- (b) Disconnect the S5 shift sensor connector.
- (c) Turn the power switch ON (IG).
- (d) Measure the voltage between the terminals of the HV control ECU connector and body ground.

Standard:

Tester Connection	Specified Condition
VXC1 (H14-17) - Body ground	Below 1 V
VSX1 (H14-25) - Body ground	Below 1 V
E2X1 (H14-15) - Body ground	Below 1 V
VXC2 (H14-16) - Body ground	Below 1 V
VSX2 (H14-24) - Body ground	Below 1 V
E2X2 (H14-14) - Body ground	Below 1 V

- (e) Turn the power switch OFF.
- (f) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
VXC1 (H14-17) - VXC1 (S5-3)	Below 1 Ω
VSX1 (H14-25) - VSX1 (S5-1)	Below 1 Ω
E2X1 (H14-15) - E2X1 (S5-2)	Below 1 Ω
VXC2 (H14-16) - VXC2 (S5-6)	Below 1 Ω
VSX2 (H14-24) - VSX2 (S5-4)	Below 1 Ω
E2X2 (H14-14) - E2X2 (S5-5)	Below 1 Ω

Standard (Check for short):

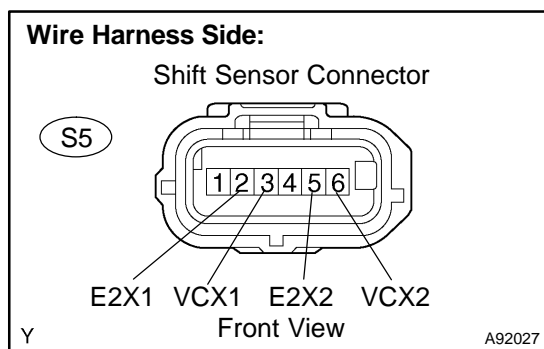
Tester Connection	Specified Condition
VXC1 (H14-17) or VXC1 (S5-3) - Body ground	10 kΩ or higher
VSX1 (H14-25) or VSX1 (S5-1) - Body ground	10 kΩ or higher
E2X1 (H14-15) or E2X1 (S5-2) - Body ground	10 kΩ or higher
VXC2 (H14-16) or VXC2 (S5-6) - Body ground	10 kΩ or higher
VSX2 (H14-24) or VSX2 (S5-4) - Body ground	10 kΩ or higher
E2X2 (H14-14) or E2X2 (S5-5) - Body ground	10 kΩ or higher

- (g) Reconnect the shift sensor connector.
- (h) Reconnect the HV control ECU connector.

NG REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

3 INSPECT HYBRID VEHICLE CONTROL ECU(VCX1 AND VCX2 VOLTAGE)



- (a) Disconnect the S5 shift sensor connector.
- (b) Turn the power switch ON (IG).
- (c) Measure the voltage between the terminals of the shift sensor connector.

Standard:

Tester Connection	Specified Condition
VCX1 (S5-3) – E2X1 (S5-2)	4.5 to 5.5 V
VCX2 (S5-6) – E2X2 (S5-5)	4.5 to 5.5 V

- (d) Reconnect the shift sensor connector.

OK → **Go to step 7**

NG

REPLACE HYBRID VEHICLE CONTROL ECU (See page 21-124)

4 READ VALUE OF HAND-HELD TESTER(SM AND SS SHIFT SENSOR)

- (a) Connect the hand-held tester to the DLC3.
- (b) Turn the power switch ON (IG).
- (c) Turn the hand-held tester ON.
- (d) On the hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / HV ECU / DATA LIST.
- (e) Read the SM and SS SHIFT SENSOR voltage values on the hand-held tester.

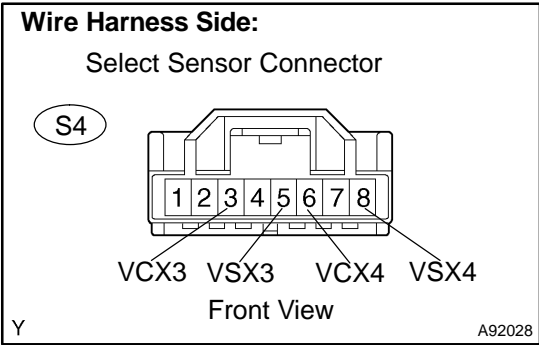
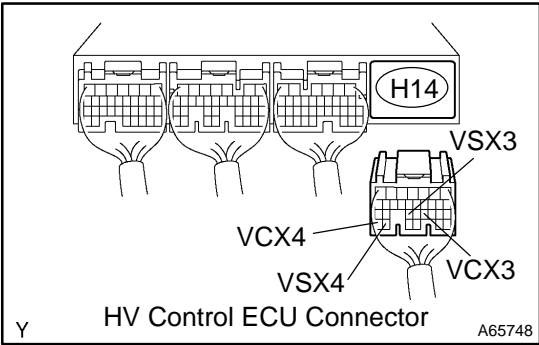
Result:

Shift Position	SM Shift Sensor	SS Shift Sensor
R, N or D position	3.0 to 4.85 V	3.0 to 4.85 V
Home or B position	0.5 to 2.0 V	0.5 to 2.0 V

OK → **Go to step 7**

NG

5 CHECK HARNESS AND CONNECTOR(HYBRID VEHICLE CONTROL ECU - SELECT SENSOR)



- (a) Disconnect the H14 HV control ECU connector.
- (b) Disconnect the S4 select sensor connector.
- (c) Turn the power switch ON (IG).
- (d) Measure the voltage between the terminals of the HV control ECU connector and body ground.

Standard:

Tester Connection	Specified Condition
VXC3 (H14-21) – Body ground	Below 1 V
VSX3 (H14-23) – Body ground	Below 1 V
VXC4 (H14-31) – Body ground	Below 1 V
VSX4 (H14-30) – Body ground	Below 1 V

- (e) Turn the power switch OFF.
- (f) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
VXC3 (H14-21) – VXC3 (S4-3)	Below 1 Ω
VSX3 (H14-23) – VSX3 (S4-5)	Below 1 Ω
VXC4 (H14-31) – VXC4 (S4-6)	Below 1 Ω
VSX4 (H14-30) – VSX4 (S4-8)	Below 1 Ω

Standard (Check for short):

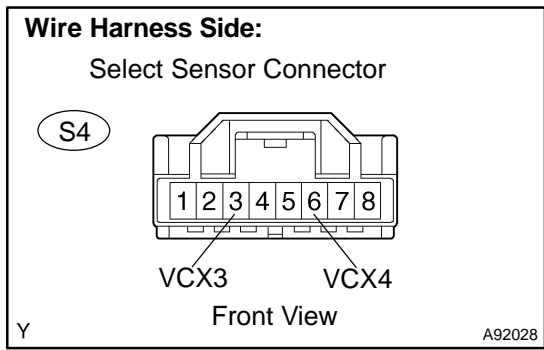
Tester Connection	Specified Condition
VXC3 (H14-21) or VXC3 (S4-3) – Body ground	10 kΩ or higher
VSX3 (H14-23) or VSX3 (S4-5) – Body ground	10 kΩ or higher
VXC4 (H14-31) or VXC4 (S4-6) – Body ground	10 kΩ or higher
VSX4 (H14-30) or VSX4 (S4-8) – Body ground	10 kΩ or higher

- (g) Reconnect the select sensor connector.
- (h) Reconnect the HV control ECU connector.

NG REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

6 INSPECT HYBRID VEHICLE CONTROL ECU(VCX3 AND VCX4 VOLTAGE)



- (a) Disconnect the S4 select sensor connector.
- (b) Turn the power switch ON (IG).
- (c) Measure the voltage between the terminals of the select sensor connector and body ground.

Standard:

Tester Connection	Specified Condition
VCX3 (S4-3) – Body ground	9 to 14 V
VCX4 (S4-6) – Body ground	9 to 14 V

- (d) Reconnect the select sensor connector.

NG → **REPLACE HYBRID VEHICLE CONTROL ECU (See page 21-124)**

OK

7 REPLACE SELECTOR LEVER

GO

8 READ OUTPUT DTC(DTC P0705 IS NOT OUTPUT AGAIN)

- (a) Connect the hand-held tester to the DLC3.
- (b) Turn the power switch ON (IG).
- (c) Turn the hand-held tester ON.
- (d) On the hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / HV ECU / DTC INFO / CLEAR CODES.
- (e) Perform a simulation test.
- (f) On the hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / HV ECU / DTC INFO / TROUBLE CODES.
- (g) Read DTCs.

Result: DTC P0705 is not output again

YES → **SYSTEM OK**

NO

REPLACE HYBRID VEHICLE CONTROL ECU (See page 21-124)