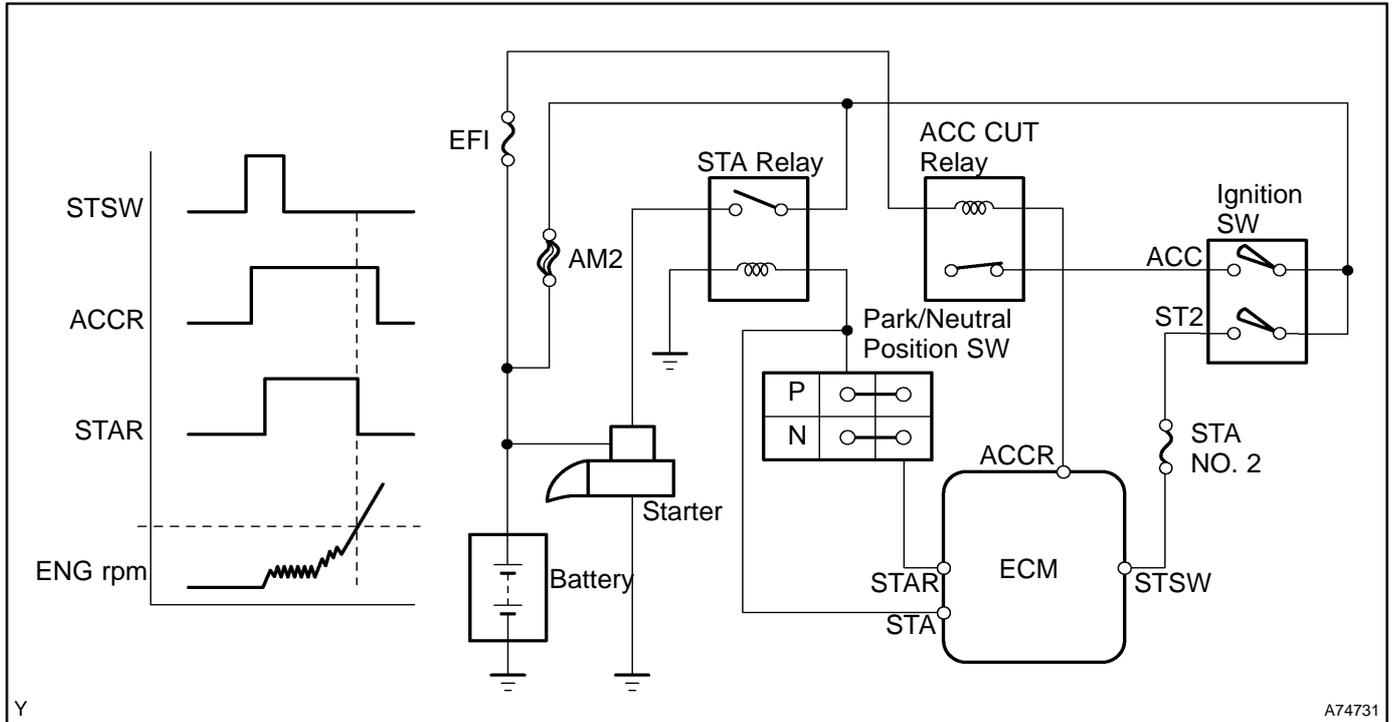


# CRANKING HOLDING FUNCTION CIRCUIT

## CIRCUIT DESCRIPTION

When the ECM detects a start signal from the ignition switch, this system monitors the engine rpm and continues to operate the starter until it has determined that the engine has started (engine speed reaches approximately 500 rpm). Furthermore, even if the ECM detects a start signal from the ignition switch, it will not operate the starter if it has determined that the engine has already started.



## WIRING DIAGRAM

Refer to DTC P0617 on page 05-171 .

## INSPECTION PROCEDURE

Hand-held tester:

### 1 CHECK OPERATION OF ENGINE CRANKING

(a) When turning the ignition switch to the ST position, check whether the starter motor starts.

OK → CHECK FOR INTERMITTENT PROBLEMS (See page 05-5)

NG

### 2 READ VALUE OF HAND-HELD TESTER(STA SIGNAL)

- (a) Connect the hand-held tester to the DLC3.
- (b) Select the item "DIAGNOSIS/ENHANCED OBD II/DATA LIST/ALL/STARTER SIG" and read its value displayed on the hand-held tester.

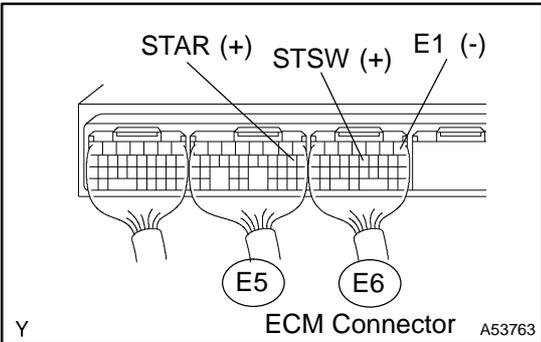
Standard:

Ignition Switch Position	ON	START
STARTER SIG	OFF	ON

**OK** → Go to step 5

**NG**

**3 INSPECT ECM(STAR AND STSW VOLTAGE)**



(a) Measure the voltage between the terminals of the E5 and E6 ECM connectors, while cranking the engine (ignition switch START position).

**Standard:**

Symbols (Terminal No.)	Specified condition
STAR (E5-9) - E1 (E6-1)	9 to 14 V
STSW (E6-12) - E1 (E6-1)	9 to 14 V

**Result:**

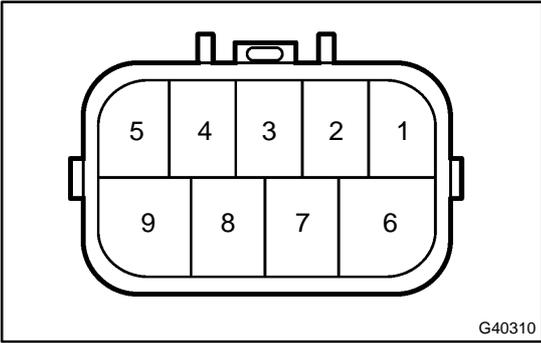
Terminal STAR	Terminal STSW	Proceed to
9 to 14 V	9 to 14 V	A
0 V	9 to 14 V	B
0 V	0 V	C

**B** → CHECK AND REPLACE ECM (See page 01-35)

**C** → Go to step 9

**A**

**4 INSPECT PARK/NEUTRAL POSITION SWITCH ASSY**



(a) Disconnect the park/neutral position switch connector.  
 (b) Check for continuity between each terminal shown below when the shift lever is moved to each range.

**Standard:**

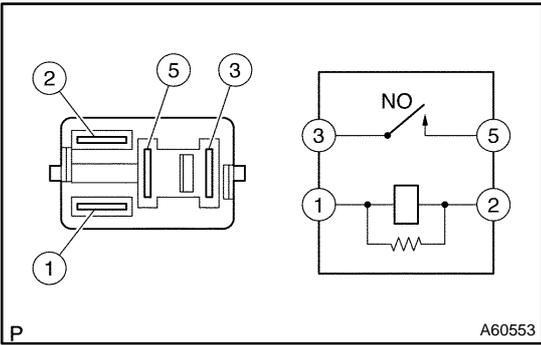
Shift range	Terminal No.	Specified condition
P	1 - 3	Continuity
	6 - 9	
R	2 - 3	
N	3 - 5	
	6 - 9	
D	3 - 7	
3	3 - 4	
2, L	3 - 8	

**NG** → REPLACE PARK/NEUTRAL POSITION SWITCH ASSY

**OK**

**CHECK AND REPAIR HARNESS AND CONNECTOR (PARK/NEUTRAL POSITION SWITCH - ECM)**

**5 INSPECT STARTER RELAY ASSY**



- (a) Remove the starter relay from the engine room R/B.
- (b) Inspect the starter relay.

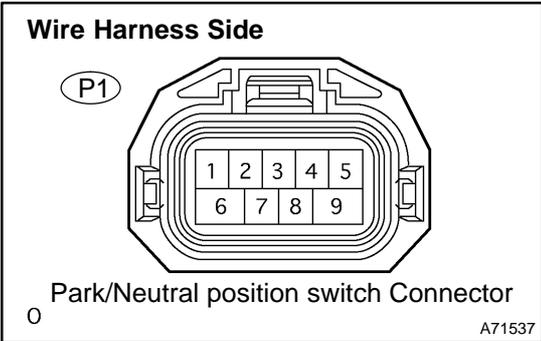
**Standard:**

Terminal No.	Specified condition
1 - 2	Continuity
3 - 5	No Continuity
	Continuity (Apply battery voltage terminals 1 and 2)

**NG** → **REPLACE STARTER RELAY ASSY**

**OK**

**6 CHECK HARNESS AND CONNECTOR(PARK/NEUTRAL POSITION SWITCH - STARTER RELAY, STARTER RELAY - BODY GROUND)**



- (a) Check the harness and connector between the park/neutral position switch connector and starter relay.
  - (1) Disconnect the park/neutral position switch connector.
  - (2) Remove the starter relay from the engine room R/B.
  - (3) Check for continuity between the wire harness side connectors.

**Standard (Check for open):**

Symbols (Terminal No.)	Specified condition
Park/neutral position switch (P1-6) - Starter relay (1)	Continuity

**Standard (Check for short):**

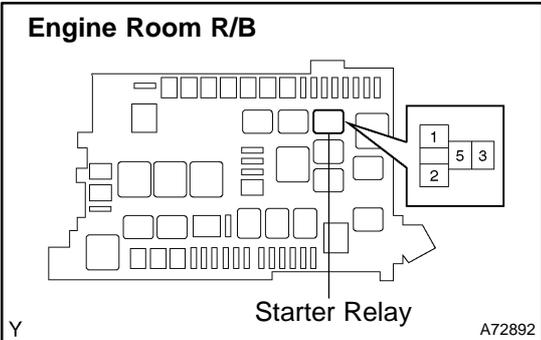
Symbols (Terminal No.)	Specified condition
Park/neutral position switch (P1-6) or Starter relay (1) - Body ground	No continuity

- (b) Check the harness and connector between the starter relay and body ground.
  - (1) Remove the starter relay from the engine room R/B.
  - (2) Check for continuity between the starter relay and body ground.

**Standard (Check for open):**

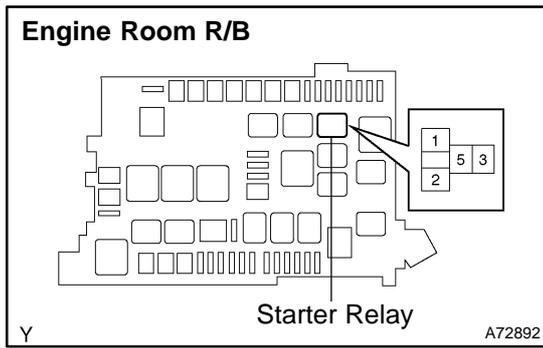
Symbols (Terminal No.)	Specified condition
Starter relay (2) - Body ground	Continuity

**NG** → **REPAIR OR REPLACE HARNESS OR CONNECTOR**



**OK**

**7 INSPECT ENGINE ROOM RELAY BLOCK(STARTER RELAY VOLTAGE)**



- (a) Remove the starter relay from the engine room R/B.
- (b) Measure the voltage between the terminal of the engine room R/B and body ground.

**Standard:**

Symbols (Terminal No.)	Specified condition
Starter relay (5) - Body ground	9 to 14 V

**NG** → **CHECK AND REPAIR HARNESS AND CONNECTOR (STARTER RELAY - BATTERY)**

**OK**

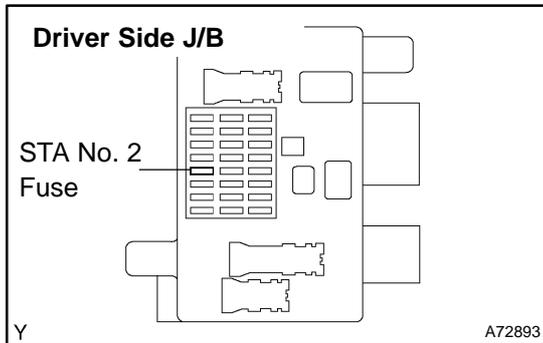
**8 INSPECT STARTER ASSY (See page 19-1 )**

**NG** → **REPAIR OR REPLACE STARTER ASSY**

**OK**

**CHECK AND REPAIR HARNESS AND CONNECTOR (STARTER RELAY - STARTER, STARTER - BATTERY)**

**9 CHECK FUSE(STA NO.2)**



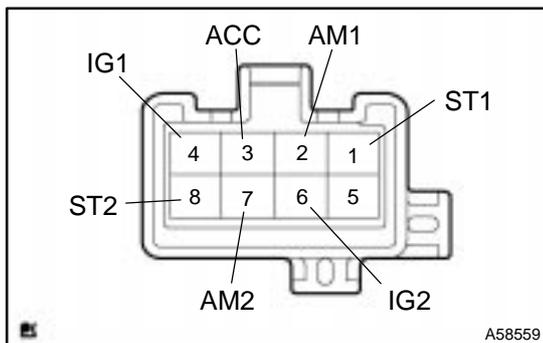
- (a) Remove the STA No. 2 fuse from the driver side J/B.
- (b) Check for continuity in the STA No. 2 fuse.

**Standard: Continuity**

**NG** → **CHECK FOR SHORT IN ALL HARNESSES AND COMPONENTS CONNECTED FUSE**

**OK**

**10 INSPECT IGNITION OR STARTER SWITCH ASSY**



- (a) Check for continuity between the connector terminals shown in the chart below.

**Standard:**

Switch position	Terminal No.	Specified condition
LOCK	All terminal to terminal	No continuity
ACC	2 - 3	Continuity
ON	2 - 3, 2 - 4, 3 - 4, 6 - 7	Continuity
START	1 - 2, 1 - 4, 2 - 4, 6 - 7, 6 - 8, 7 - 8	Continuity

**NG** → **REPLACE IGNITION OR STARTER SWITCH ASSY**

**OK**

**CHECK AND REPAIR HARNESS AND CONNECTOR (ECM - IGNITION SWITCH, IGNITION SWITCH - BATTERY)**

**OBD II scan tool (excluding hand-held tester):**

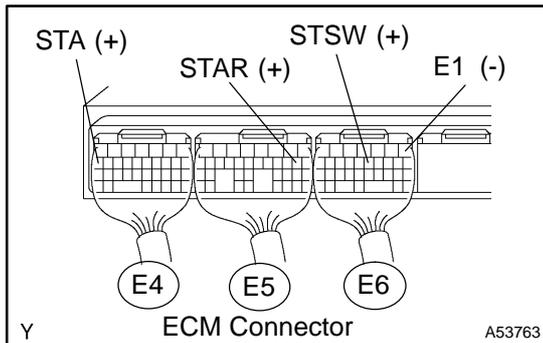
**1 | CHECK OPERATION OF ENGINE CRANKING**

(a) When turning the ignition switch to the ST position, check whether the starter motor starts.

**OK** → **CHECK FOR INTERMITTENT PROBLEMS (See page 05-5)**

**NG**

**2 | INSPECT ECM(STA, STAR AND STSW VOLTAGE)**



(a) Measure the voltage between the terminals of the E4, E5 and E6 ECM connectors, while cranking the engine (ignition switch START position).

**Standard:**

Symbols (Terminal No.)	Specified condition
STA (E4-17) - E1 (E6-1)	9 to 14 V
STAR (E5-9) - E1 (E6-1)	9 to 14 V
STSW (E6-12) - E1 (E6-1)	9 to 14 V

**Result:**

Terminal STA	Terminal STAR	Terminal STSW	Proceed to
9 to 14 V	9 to 14 V	9 to 14 V	A
0 V	9 to 14 V	9 to 14 V	B
0 V	0 V	9 to 14 V	C
0 V	0 V	0 V	D

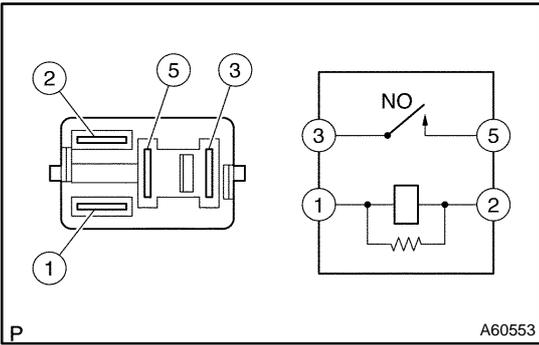
**B** → **Go to step 7**

**C** → **CHECK AND REPLACE ECM (See page 01-35)**

**D** → **Go to step 8**

**A**

**3 INSPECT STARTER RELAY ASSY**



- (a) Remove the starter relay from the engine room R/B.
- (b) Inspect the starter relay.

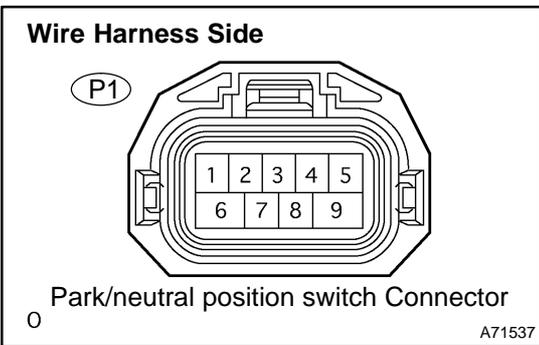
**Standard:**

Terminal No.	Specified condition
1 - 2	Continuity
3 - 5	No Continuity
	Continuity (Apply battery voltage terminals 1 and 2)

**NG** → **REPLACE STARTER RELAY ASSY**

**OK**

**4 CHECK HARNESS AND CONNECTOR(PARK/NEUTRAL POSITION SWITCH - STARTER RELAY, STARTER RELAY - BODY GROUND)**



- (a) Check the harness and connector between the park/neutral position switch connector and starter relay.
  - (1) Disconnect the park/neutral position switch connector.
  - (2) Remove the starter relay from the engine room R/B.
  - (3) Check for continuity between the wire harness side connectors.

**Standard (Check for open):**

Symbols (Terminal No.)	Specified condition
Park/neutral position switch (P1-6) - Starter relay (1)	Continuity

**Standard (Check for short):**

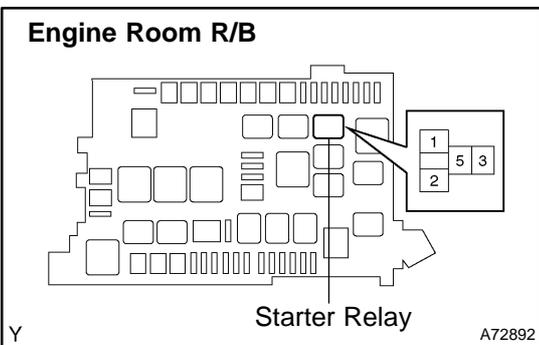
Symbols (Terminal No.)	Specified condition
Park/neutral position switch (P1-6) or Starter relay (1) - Body ground	No continuity

- (b) Check the harness and connector between the starter relay and body ground.
  - (1) Remove the starter relay from the engine room R/B.
  - (2) Check for continuity between the starter relay and body ground.

**Standard (Check for open):**

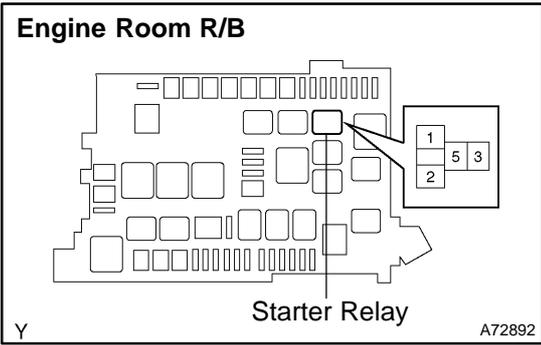
Symbols (Terminal No.)	Specified condition
Starter relay (2) - Body ground	Continuity

**NG** → **REPAIR OR REPLACE HARNESS OR CONNECTOR**



**OK**

**5 INSPECT ENGINE ROOM RELAY BLOCK(STARTER RELAY VOLTAGE)**



- (a) Remove the starter relay from the engine room R/B.
- (b) Measure the voltage between the terminal of the engine room R/B and body ground.

**Standard:**

Symbols (Terminal No.)	Specified condition
Starter relay (5) - Body ground	9 to 14 V

**NG** CHECK AND REPAIR HARNESS AND CONNECTOR (STARTER RELAY - BATTERY)

**OK**

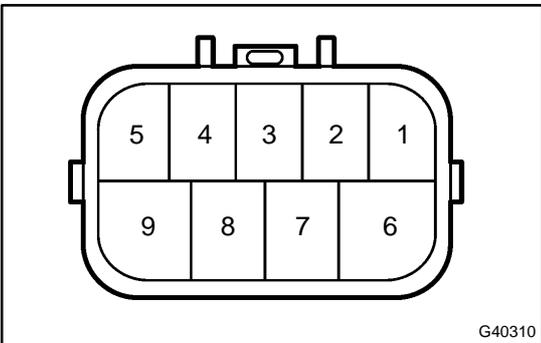
**6 INSPECT STARTER ASSY (See page 19-1)**

**NG** REPAIR OR REPLACE STARTER ASSY

**OK**

**CHECK AND REPAIR HARNESS AND CONNECTOR (STARTER RELAY - STARTER, STARTER - BATTERY)**

**7 INSPECT PARK/NEUTRAL POSITION SWITCH ASSY**



- (a) Disconnect the park/neutral position switch connector.
- (b) Check for continuity between each terminal shown below when the shift lever is moved to each range.

**Standard:**

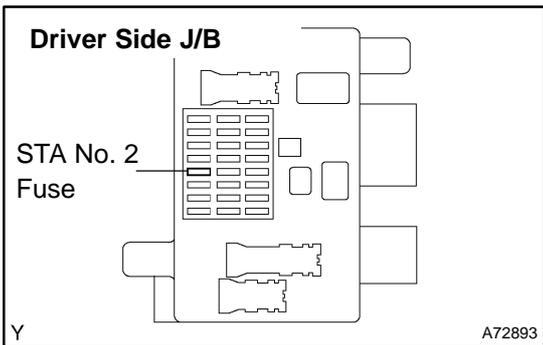
Shift range	Terminal No.	Specified condition
P	1 - 3	Continuity
	6 - 9	
R	2 - 3	
N	3 - 5	
	6 - 9	
D	3 - 7	
3	3 - 4	
2, L	3 - 8	

**NG** REPLACE PARK/NEUTRAL POSITION SWITCH ASSY

**OK**

**CHECK AND REPAIR HARNESS AND CONNECTOR (PARK/NEUTRAL POSITION SWITCH - ECM)**

**8 CHECK FUSE(STA NO.2)**

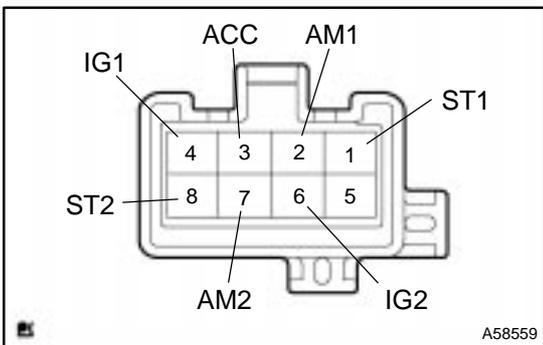


- (a) Remove the STA No. 2 fuse from the driver side J/B.
  - (b) Check for continuity in the STA No. 2 fuse.
- Standard: Continuity**

**NG** CHECK FOR SHORT IN ALL HARNESSES AND COMPONENTS CONNECTED FUSE

**OK**

**9 INSPECT IGNITION OR STARTER SWITCH ASSY**



- (a) Check for continuity between the connector terminals shown in the chart below.
- Standard:**

Switch position	Terminal No.	Specified condition
LOCK	All terminal to terminal	No continuity
ACC	2 - 3	Continuity
ON	2 - 3, 2 - 4, 3 - 4, 6 - 7	Continuity
START	1 - 2, 1 - 4, 2 - 4, 6 - 7, 6 - 8, 7 - 8	Continuity

**NG** REPLACE IGNITION OR STARTER SWITCH ASSY

**OK**

**CHECK AND REPAIR HARNESS AND CONNECTOR (ECM - IGNITION SWITCH, IGNITION SWITCH - BATTERY)**