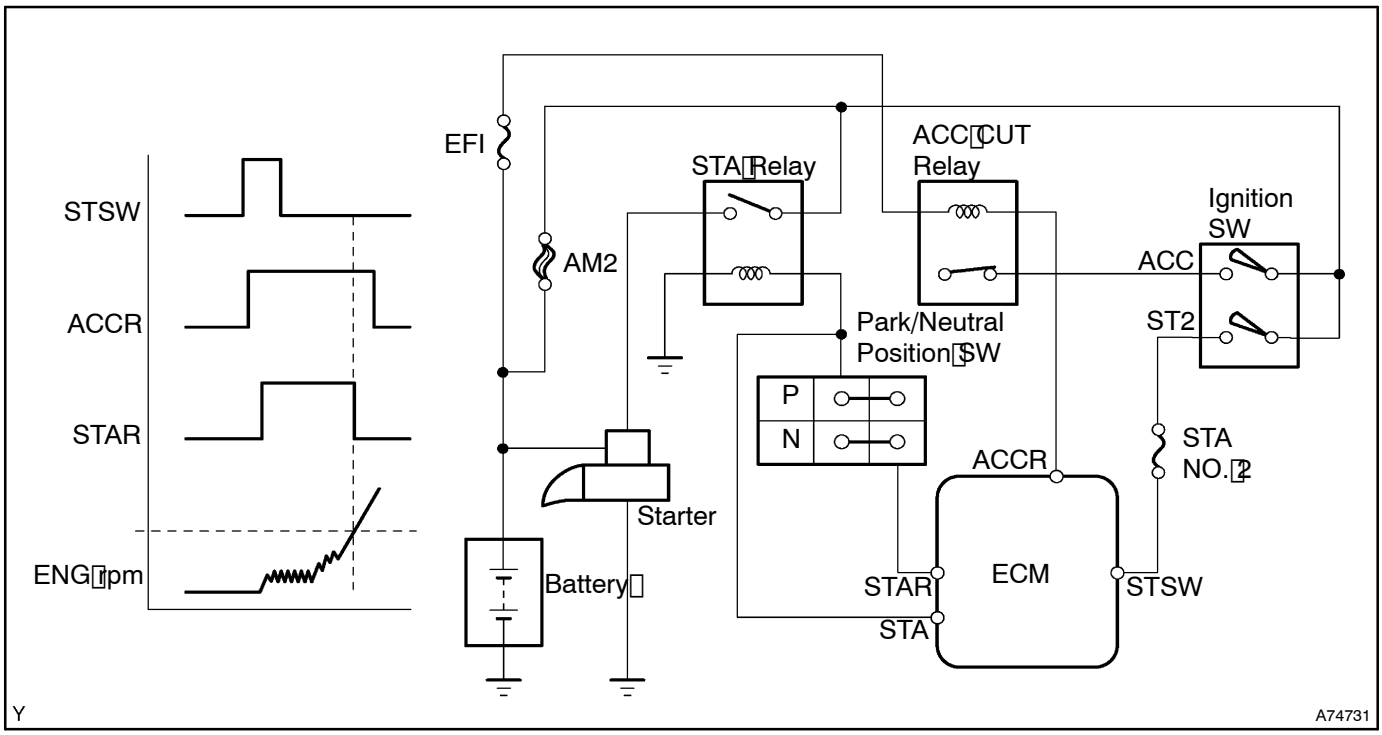
CRANKING HOLDING FUNCTION CIRCUIT

CIRCUIT DESCRIPTION

The system detects the ignition switch's starting signal (STSW signal) and then supplies current to the starter until the ECM judges that the engine has started successfully. The purpose is to reduce the holding time of the ignition key.



WIRING DIAGRAM

Refer to STARTER SIGNAL CIRCUIT on page 05–155.

INSPECTION PROCEDURE

When using hand–held tester:

1	CHECK OPERATION OF ENGINE CRANKING

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

OK: **CHECK FOR INTERMITTENT PROBLEMS (See page 05–7)**

NG

2	READ VALUE OF HAND–HELD TESTER(STA SIGNAL)

(a) Connect the hand–held tester to the DLC3.

(b) Select the item "DIAGNOSIS / OBD/MOBD / DATA LIST / ALL / STARTER SIG" and read its value displayed on the hand–held tester.

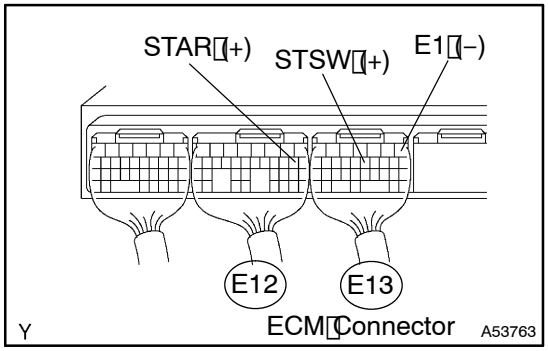
Standard:

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 E12 and E13 ECM connectors, while cranking the engine (ignition switch START position).

Standard:

Symbols (Terminal No.)	Specified condition
STAR (E12–9) – E1 (E13–1)	9 to 14 V
STSW (E13–12) – E1 (E13–1)	9 to 14 V

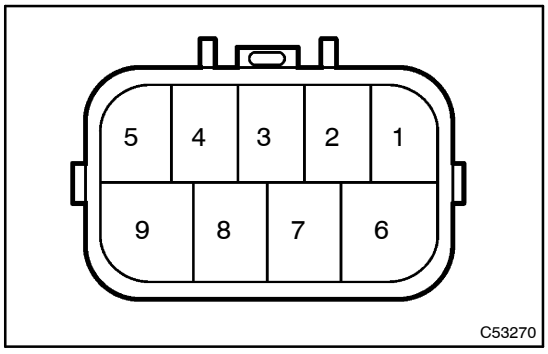
Result:

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:

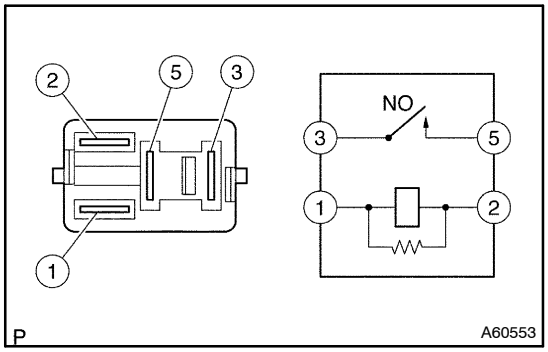
Shift range	Terminal No.	Specified condition
P	1 – 3 6 – 9	Continuity
R	2 – 3	
N	3 – 5 6 – 9	
D	3 – 7	
3	3 – 4	
2, L	3 – 8	

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.

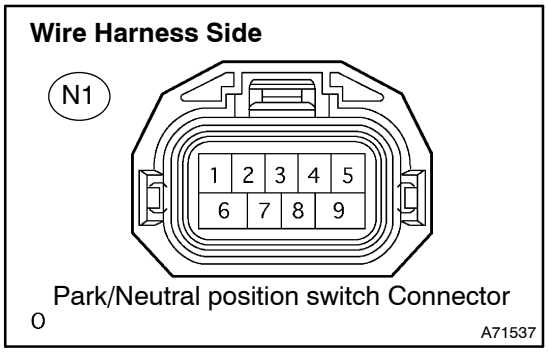
Standard:

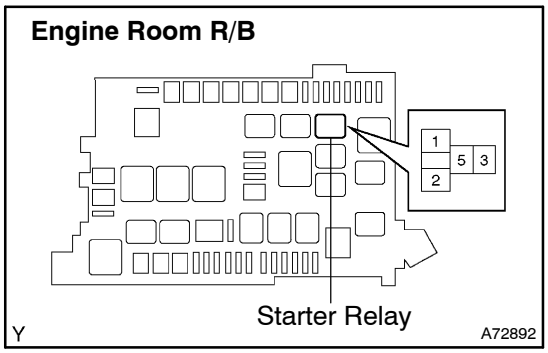
Terminal No.	Specified condition
1 – 2	Continuity
3 – 5	No Continuity
	Continuity (Apply battery voltage terminals 1 and 2)

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 the connector between the park/neutral position switch connector and the 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 (N1–6) – Starter relay (1)	Continuity

Standard (Check for short):

Symbols (Terminal No.)	Specified condition
Park/Neutral position switch (N1–6) or Starter relay (1) – Body ground	No continuity

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

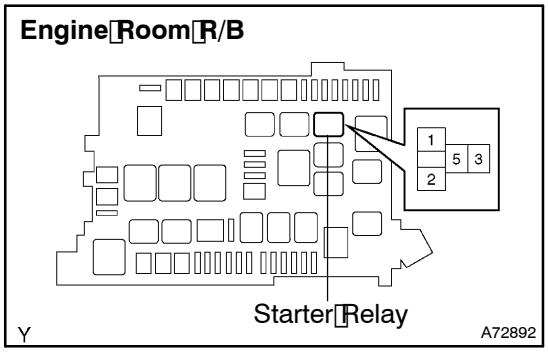
Standard (Check for open):

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 the body ground.

Standard:

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

NG → **CHECK AND REPAIR HARNESS AND CONNECTOR**

OK

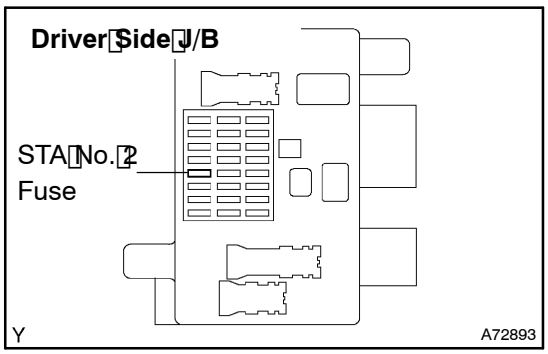
8 INSPECT STARTER ASSY (See page 19–1)

NG → **REPAIR OR REPLACE STARTER ASSY**

OK

CHECK AND REPAIR HARNESS AND CONNECTOR (STARTER RELAY – STARTER, STARTER – BATTERY)

9 CHECK FUSE (STA NO.2)



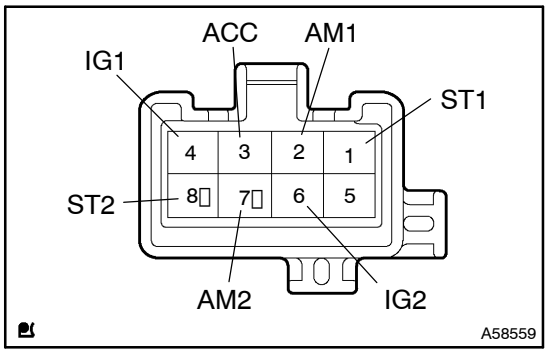
(a) Remove the STA No. 2 fuse from the driver side J/B.
(b) Check for continuity in the STA No. 2 fuse.

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)

When not using hand–held tester:

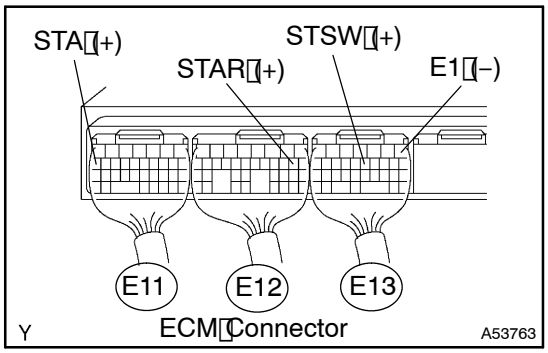
1 CHECK OPERATION OF ENGINE CRANKING

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

OK → CHECK FOR INTERMITTENT PROBLEMS (See page 05–7)

NG

2 INSPECT ECM (STA, STAR AND STSW VOLTAGE)



(a) Measure the voltage between the terminals of the E11, E12 and E13 ECM connectors, while cranking the engine (ignition switch START position).

Standard:

Symbols (Terminal No.)	Specified condition
STA (E11–17) – E1 (E13–1)	9 to 14 V
STAR (E12–9) – E1 (E13–1)	9 to 14 V
STSW (E13–12) – E1 (E13–1)	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

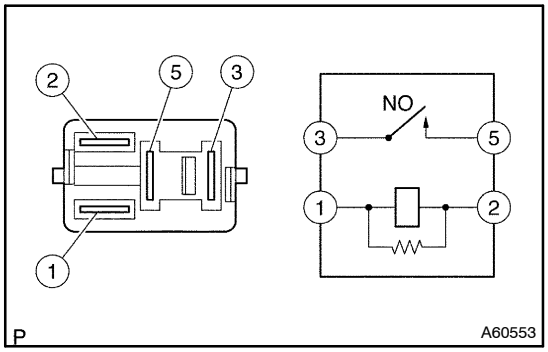
B → Go to step 7

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.

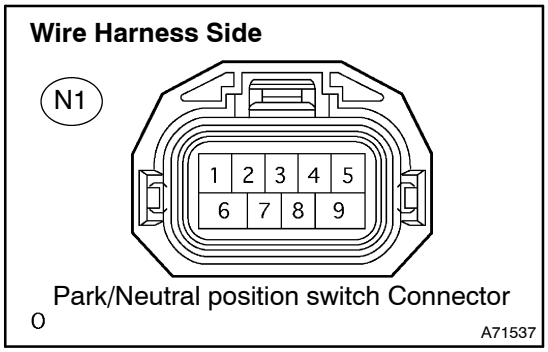
Standard:

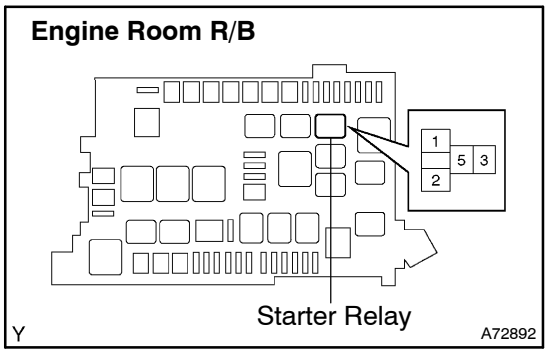
Terminal No.	Specified condition
1 – 2	Continuity
3 – 5	No Continuity
	Continuity (Apply battery voltage terminals 1 and 2)

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 the connector between the park/neutral position switch connector and the 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 (N1–6) – Starter relay (1)	Continuity

Standard (Check for short):

Symbols (Terminal No.)	Specified condition
Park/Neutral position switch (N1–6) or Starter relay (1) – Body ground	No continuity

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

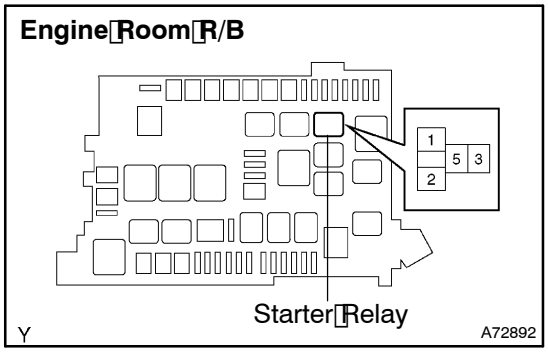
Standard (Check for open):

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 the body ground.

Standard:

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

NG → **CHECK AND REPAIR HARNESS AND CONNECTOR**

OK

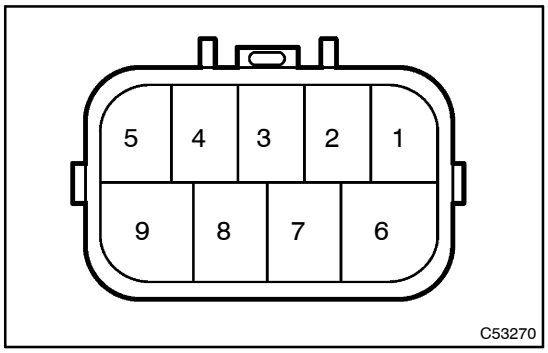
6 INSPECT STARTER ASSY (See page 19–1)

NG → **REPAIR OR REPLACE STARTER ASSY**

OK

CHECK AND REPAIR HARNESS AND CONNECTOR

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:

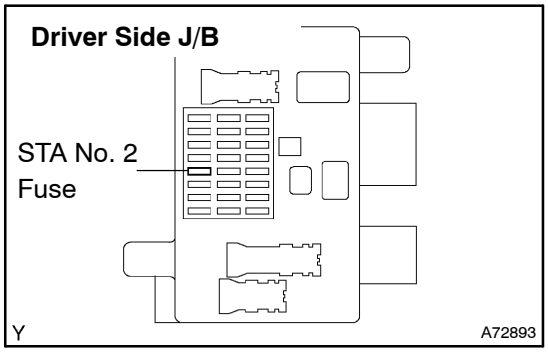
Shift range	Terminal No.	Specified condition
P	1 – 3 6 – 9	Continuity
R	2 – 3	
N	3 – 5 6 – 9	
D	3 – 7	
3	3 – 4	
2, L	3 – 8	

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)

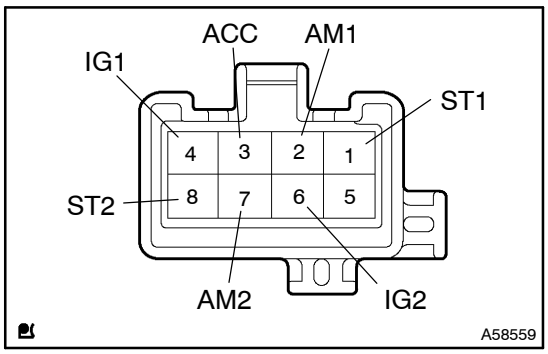


(a) Remove the STA No. 2 fuse from the driver side J/B.
(b) Check for continuity in the STA No. 2 fuse.
Standard: Continuity

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 as 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)