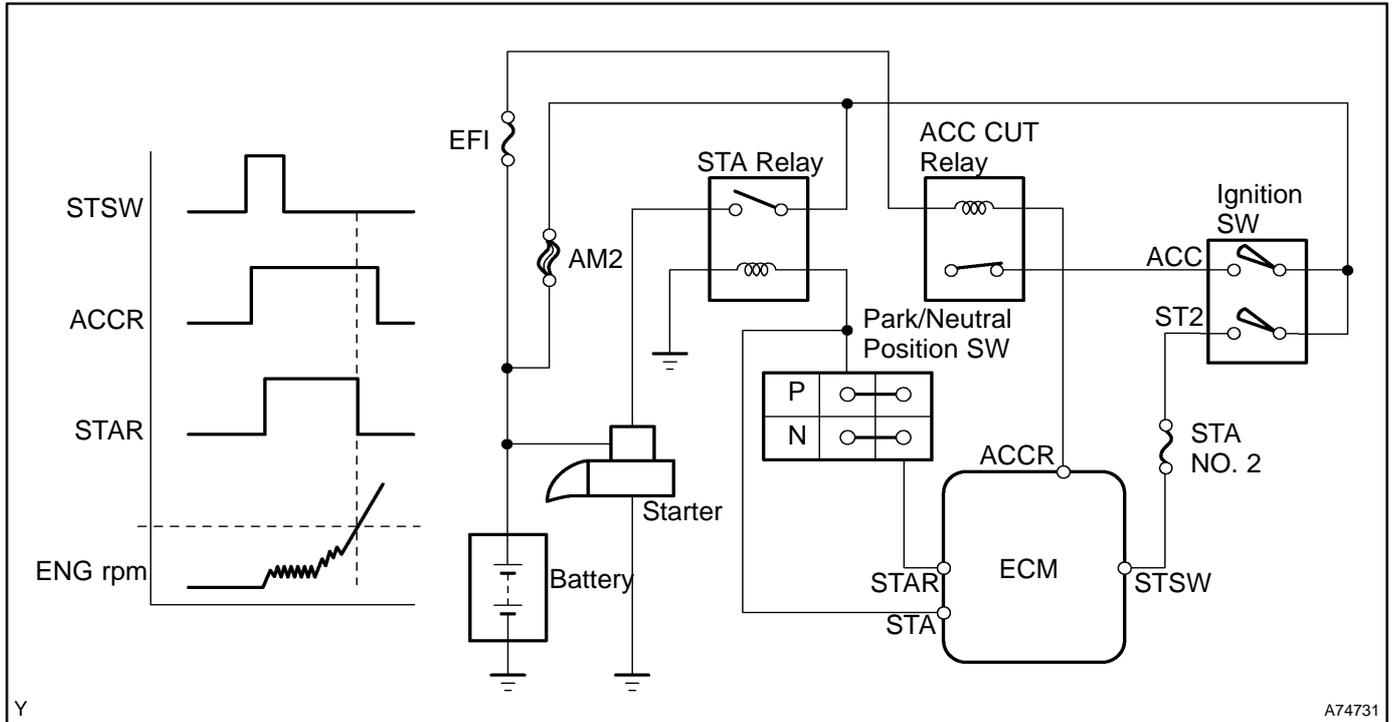


CRANKING HOLDING FUNCTION CIRCUIT

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 05-178 .

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

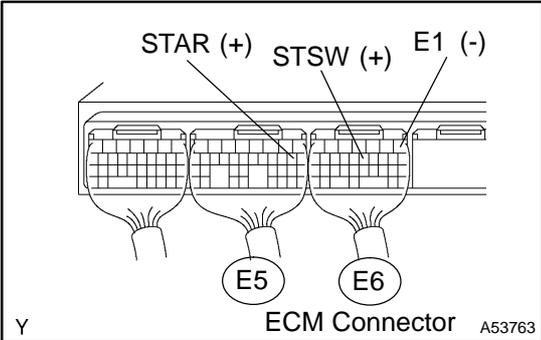
Standard:

| | | |
|--------------------------|-----|-------|
| 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 - 14 V |
| STSW (E6-12) ↔ E1 (E6-1) | 9 - 14 V |

Result:

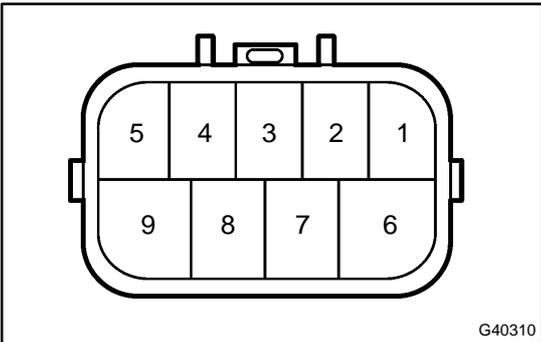
| Terminal STAR | Terminal STSW | Proceed to |
|---------------|---------------|------------|
| 9 - 14 V | 9 - 14 V | A |
| 0 V | 9 - 14 V | B |
| 0 V | 0 V | C |

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 continuity between each terminal shown below when the shift lever is moved to each range.

Standard:

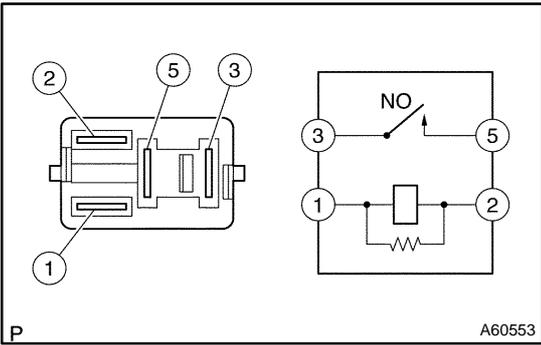
| Shift range | Terminal No. | Specified condition |
|-------------|--------------|---------------------|
| P | 1 ↔ 3 | Continuity |
| | 6 ↔ 9 | |
| R | 2 ↔ 3 | |
| N | 3 ↔ 5 | |
| | 6 ↔ 9 | |
| D, 4 | 3 ↔ 7 | |
| 3 | 3 ↔ 4 | |
| 2, L | 3 ↔ 8 | |

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.

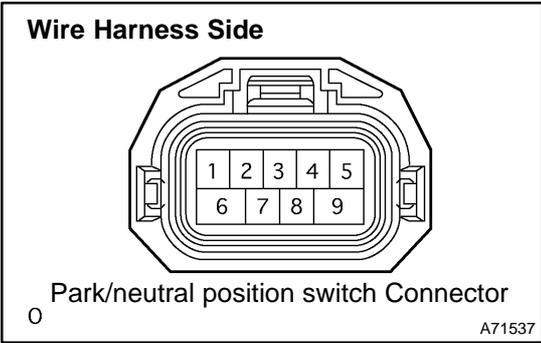
Standard:

| Terminal No. | Condition | Specified condition |
|--------------|------------------------------------|---------------------|
| 1 ↔ 2 | Constant | Continuity |
| 3 ↔ 5 | Usually | No Continuity |
| | Apply B+ between Terminals 1 and 2 | Continuity |

NG → **REPLACE STARTER RELAY ASSY**

OK

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



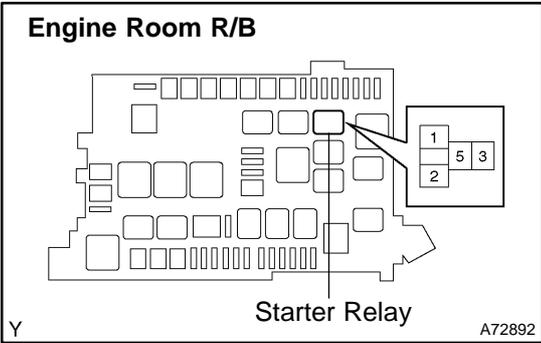
- (a) Check the harness and connector between the park/neutral position switch connector and starter relay.
 - (1) Disconnect the park/neutral position switch connector.
 - (2) Remove the starter relay from the engine room R/B.
 - (3) Check the continuity between the wire harness side connectors.

Standard (Check for open):

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

Standard (Check for short):

| Symbols (Terminal No.) | Specified condition |
|---|---------------------|
| Park/neutral position switch (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 the continuity between the starter relay and body ground.

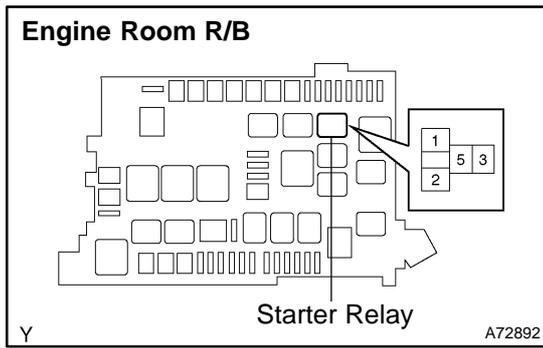
Standard (Check for open):

| 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 - 14 V |

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

OK

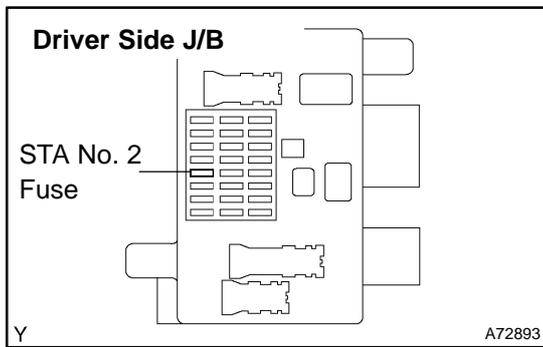
8 INSPECT STARTER ASSY (See page 19-1)

NG → **REPAIR OR REPLACE STARTER ASSY**

OK

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

9 CHECK FUSE(STA NO.2)



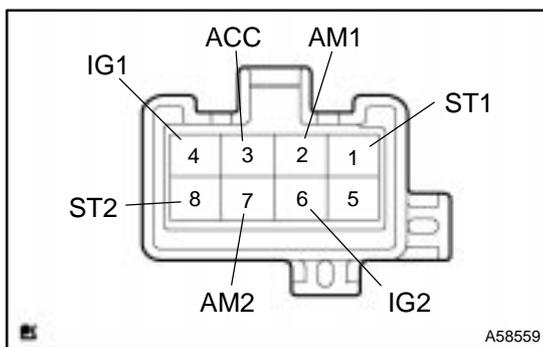
- (a) Remove the STA No. 2 fuse from the driver side J/B.
- (b) Check the continuity of STA No. 2 fuse.

Standard: Continuity

NG → **CHECK FOR SHORT IN ALL HARNESS AND COPONENTS CONNECTED STA NO.2 FUSE**

OK

10 INSPECT IGNITION OR STARTER SWITCH ASSY



- (a) Check 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 ↔ 4 6 ↔ 7 | Continuity |
| START | 1 ↔ 2 ↔ 4 6 ↔ 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):

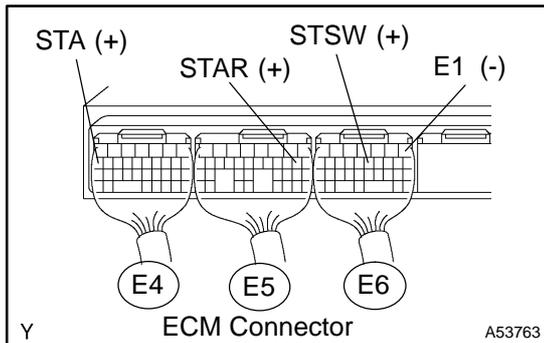
1 | CHECK OPERATION OF ENGINE CRANKING

(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 - 14 V |
| STAR (E5-9) ⇔ E1 (E6-1) | 9 - 14 V |
| STSW (E6-12) ⇔ E1 (E6-1) | 9 - 14 V |

Result:

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

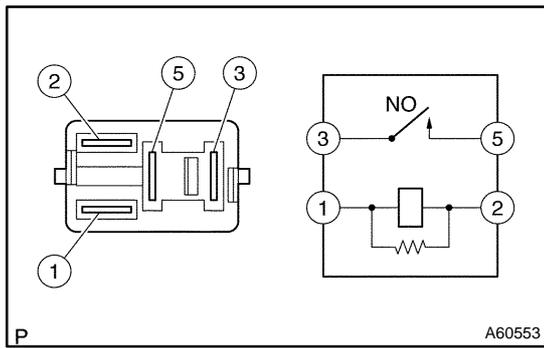
B → **Go to step 7**

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.

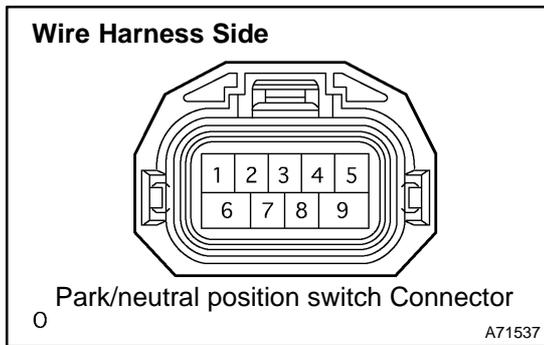
Standard:

| Terminal No. | Condition | Specified condition |
|--------------|------------------------------------|---------------------|
| 1 ↔ 2 | Constant | Continuity |
| 3 ↔ 5 | Usually | No Continuity |
| | Apply B+ between Terminals 1 and 2 | Continuity |

NG → **REPLACE STARTER RELAY ASSY**

OK

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



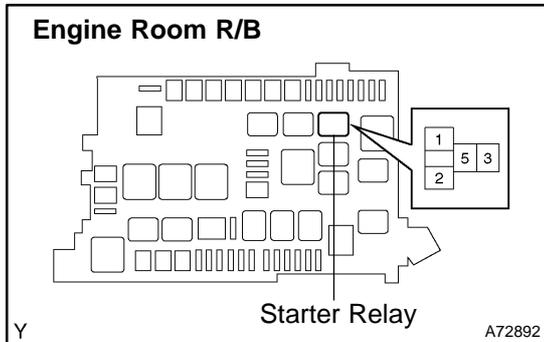
- (a) Check the harness and connector between the park/neutral position switch connector and starter relay.
 - (1) Disconnect the park/neutral position switch connector.
 - (2) Remove the starter relay from the engine room R/B.
 - (3) Check the continuity between the wire harness side connectors.

Standard (Check for open):

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

Standard (Check for short):

| Symbols (Terminal No.) | Specified condition |
|---|---------------------|
| Park/neutral position switch (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 the continuity between the starter relay and body ground.

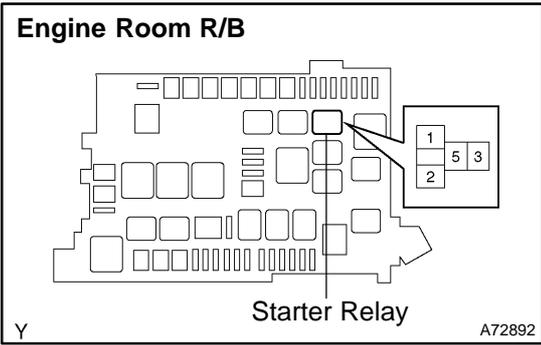
Standard (Check for open):

| 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 - 14 V |

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

OK

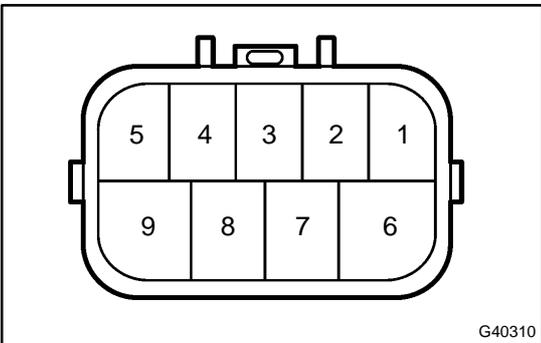
6 INSPECT STARTER ASSY (See page 19-1)

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 continuity between each terminal shown below when the shift lever is moved to each range.

Standard:

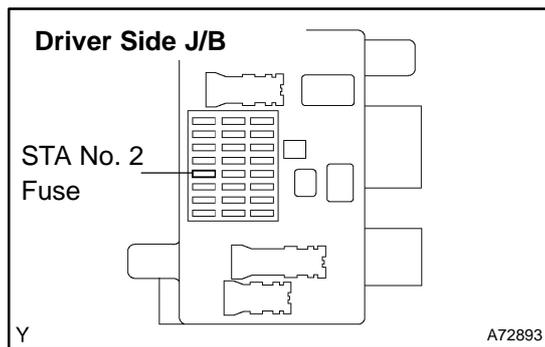
| Shift range | Terminal No. | Specified condition |
|-------------|--------------|---------------------|
| P | 1 ↔ 3 | Continuity |
| | 6 ↔ 9 | |
| R | 2 ↔ 3 | |
| N | 3 ↔ 5 | |
| | 6 ↔ 9 | |
| D, 4 | 3 ↔ 7 | |
| 3 | 3 ↔ 4 | |
| 2, L | 3 ↔ 8 | |

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)

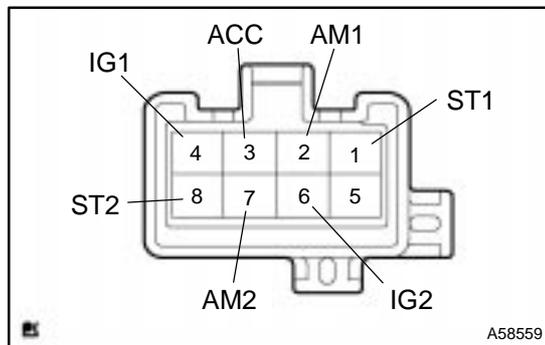


- (a) Remove the STA No. 2 fuse from the driver side J/B.
 - (b) Check the continuity of STA No. 2 fuse.
- Standard: Continuity**

NG CHECK FOR SHORT IN ALL HARNESS AND COPONENTS CONNECTED STA NO.2 FUSE

OK

9 INSPECT IGNITION OR STARTER SWITCH ASSY



- (a) Check 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 ↔ 4 6 ↔ 7 | Continuity |
| START | 1 ↔ 2 ↔ 4 6 ↔ 7 ↔ 8 | Continuity |

NG REPLACE IGNITION OR STARTER SWITCH ASSY

OK

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