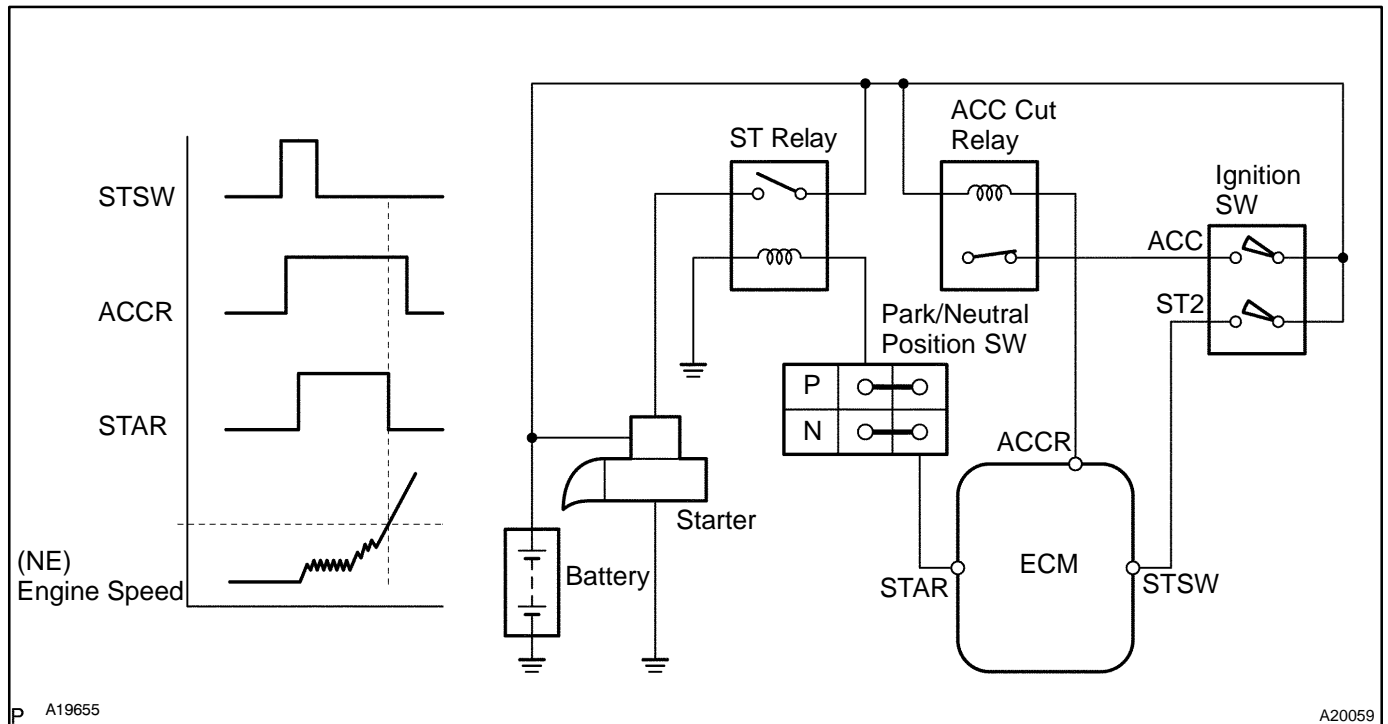


## Cranking Hold Function Circuit

### CIRCUIT DESCRIPTION

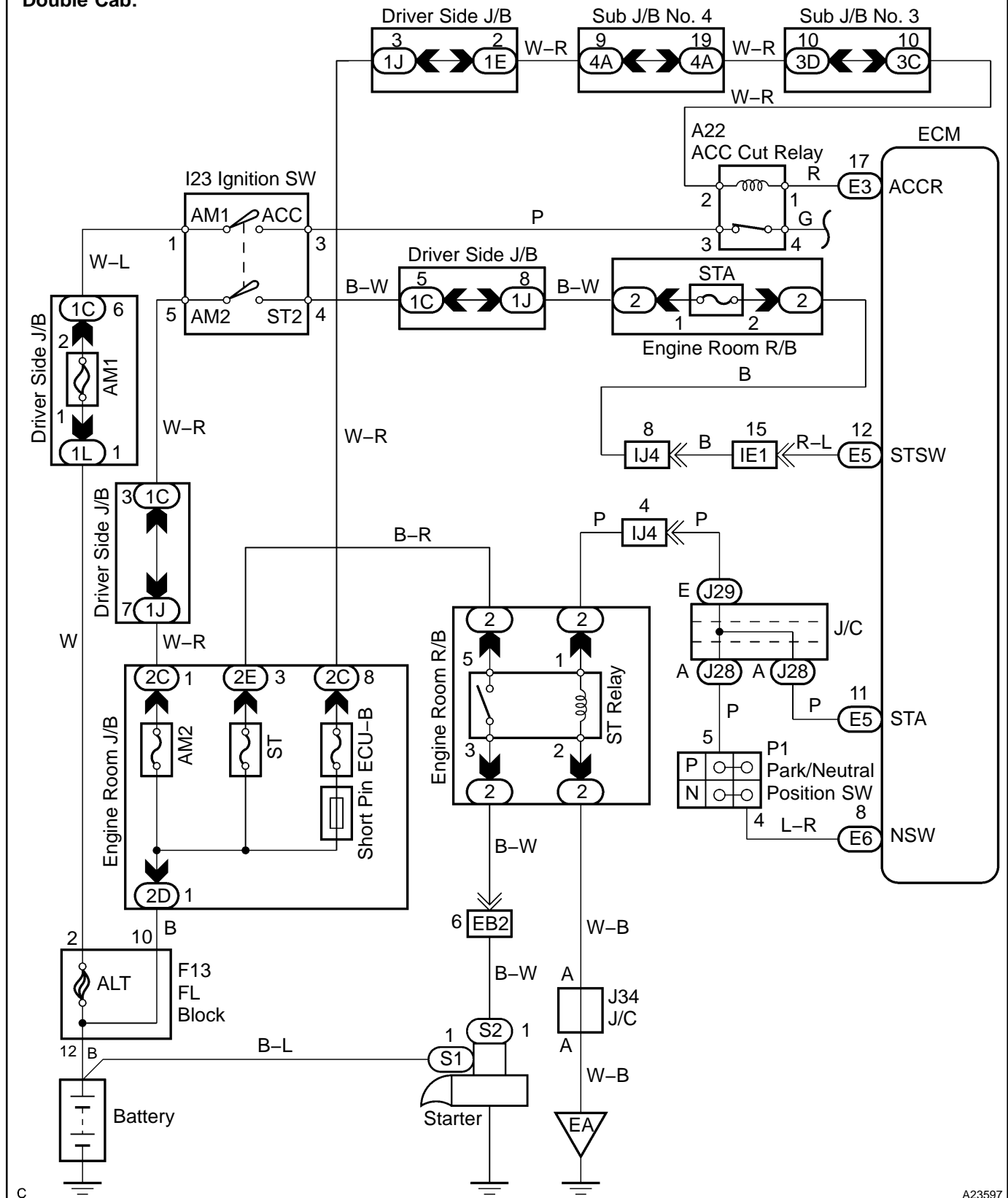
The starter is controlled by the ECM, when the ECM detects a start signal (STSW) from the ignition switch, this system monitors the engine speed (NE) and continues to operate the starter until it has determined that the engine has started (engine speed reaches approximately 500 rpm). If the engine is already running and the ignition switch is turned to START, the ECM will not operate the starter.



**Access Cab, Standard Cab:**



## Double Cab:



**INSPECTION PROCEDURE****Hand-held tester:**

1	<b>Check operation of engine cranking.</b>
---	--

**CHECK:**

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

**OK:**

**Starter motor starts.**

**OK**

**Check for intermittent problems  
(See page [DI-430](#)).**

**NG**

2	<b>Connect hand-held tester, and check STA signal.</b>
---	--

**PREPARATION:**

- (a) Connect the hand-held tester to the DLC3.
- (b) Turn the ignition switch ON, and push the hand-held tester main switch ON.
- (c) Enter the following menu: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / STARTER SIG.

**CHECK:**

Read the STA signal on the hand-held tester while the starter operates.

**OK:**

Ignition Switch Position	ON	START
STARTER SIG	OFF	ON

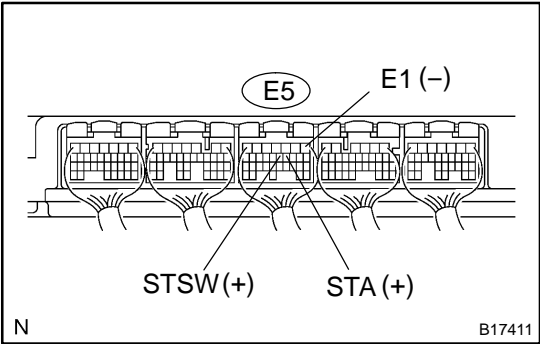
**NG**

**Go to step 5.**

**OK**

3

Check voltage between terminal STAR, STSW and E1 of ECM connector.



**CHECK:**  
Measure the voltage between the terminals of the E5 ECM connectors, while cranking the engine (ignition switch START position).

**OK:**  
**Standard:**

Tester Connection	Specified Condition
STA (E5-11) – E1 (E5-1)	9 to 14 V
STSW (E5-12) – E1 (E5-1)	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

Replace ECM (See page [SF-82](#)).

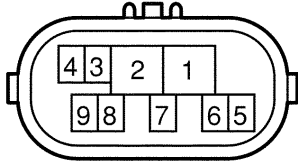
C

Go to step 9.

A

#### 4 Check park/neutral position switch.

##### Component Side:



P

D14154

##### PREPARATION:

Remove the P1 park/neutral position switch connector.

##### CHECK:

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

Shift range	Terminal No. to continuity	
P	1 – 3	6 – 9
R	2 – 3	–
N	3 – 5	6 – 9
D	3 – 7	–
2	3 – 4	–
L	3 – 8	–

##### OK:

Below 1  $\Omega$

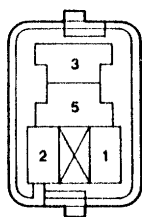
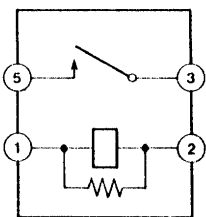
NG

Replace the park/neutral position switch.

OK

Check and repair harness and connector between park/neutral position switch and ECM.

#### 5 Check starter relay.



A19288

- Remove the starter relay from the engine room R/B.
- Inspect the starter relay.

##### Standard:

Tester Connection	Specified Condition
3 – 5	10 k $\Omega$ or higher
3 – 5	Below 1 $\Omega$ (Apply battery voltage to terminals 1 and 2)

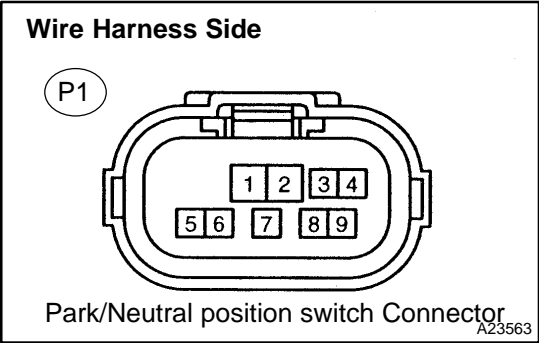
NG

Replace starter relay.

OK

6

Check for open and short in harness and connector between park/neutral position switch and starter relay.



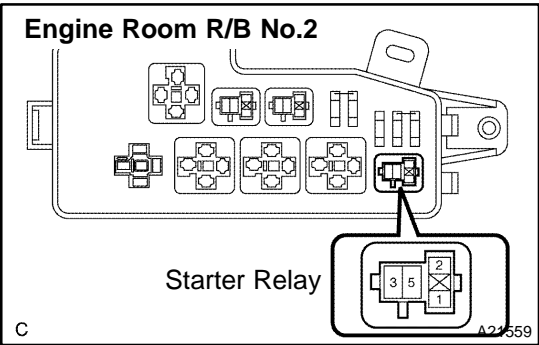
- (a) Check the harness and the connector between the park/neutral position switch connector and the starter relay.
- (1) Disconnect the park/neutral position switch connector.
  - (2) Remove the starter relay from the engine room R/B.
  - (3) Check for resistance between the wire harness side connectors.

Standard (Check for open):

Symbols (Terminal No.)	Specified condition
Park/Neutral position switch (P1-6) – Starter relay (1)	Below 1 Ω

Standard (Check for short):

Symbols (Terminal No.)	Specified condition
Park/Neutral position switch (P1-6) or Starter relay (1) – Body ground	10 kΩ or higher



- (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 resistance between the starter relay and the body ground.

Standard (Check for open):

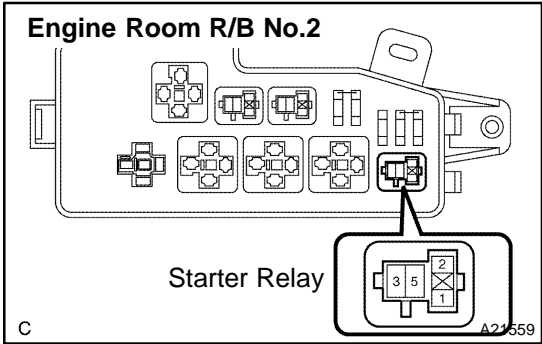
Symbols (Terminal No.)	Specified condition
Starter relay (2) – Body ground	Below 1 Ω

NG

Repair or replace harness or connector.

OK

**7 Check engine room R/B No.2 (Starter relay voltage).**



**PREPARATION:**

Remove the starter relay from the engine room R/B No.2.

**CHECK:**

Measure the voltage between the terminal of the engine room R/B and body ground.

**OK:**

**Standard:**

Tester Connection	Specified Condition
Starter relay (5) – Body ground	9 to 14 V

**NG**

**Check and repair harness and connector between starter relay and battery.**

**OK**

**8 Check starter (See page [ST-18](#)).**

**NG**

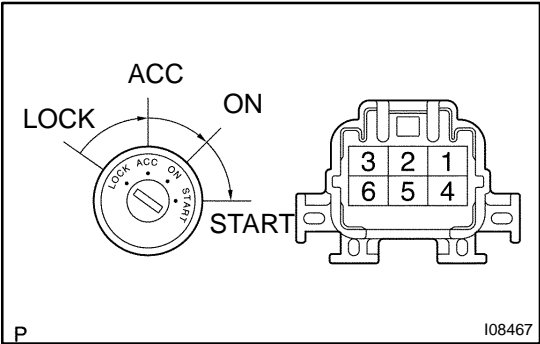
**Repair or replace starter.**

**OK**



9

Check ignition switch.



**PREPARATION:**

- (a) Remove the lower finish panel.
- (b) Disconnect the ignition switch connector.

**CHECK:**

Check resistance between terminals.

**OK:**

**Standard:**

Switch Position	Terminal Condition	Specified Condition
LOCK	Always	10 kΩ or more
ACC	1 – 3	Below 1 Ω
ON	1 – 2 – 3 5 – 6	Below 1 Ω
START	1 – 2 4 – 5 – 6	Below 1 Ω

NG

Replace ignition switch.

OK

Check for open in harness and connector between ECM and ignition switch, ignition switch and battery (See page [IN-30](#)).