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| **Last Modified:** 03-12-2013 | 6.4 F | **Doc ID:** NM1000000004HC3 |
| **Model Year:** 2013 | **Model:** RAV4 | **Prod Date Range:** [12/2012 - ] |
| **Title:** 2AR-FE ENGINE CONTROL: SFI SYSTEM: STARTER CONTROL (CRANKING HOLD FUNCTION); 2013 MY RAV4 [12/2012 - ] | | |

# STARTER CONTROL (CRANKING HOLD FUNCTION)

## 1. OPERATION

(a) When the driver pushes the engine switch once and the certification ECU (smart key ECU assembly) detects a start signal, the certification ECU (smart key ECU assembly) outputs ACCD and STAR signals and begins cranking. Also, the driver can continue cranking for up to 30 seconds by pushing and holding the engine switch.

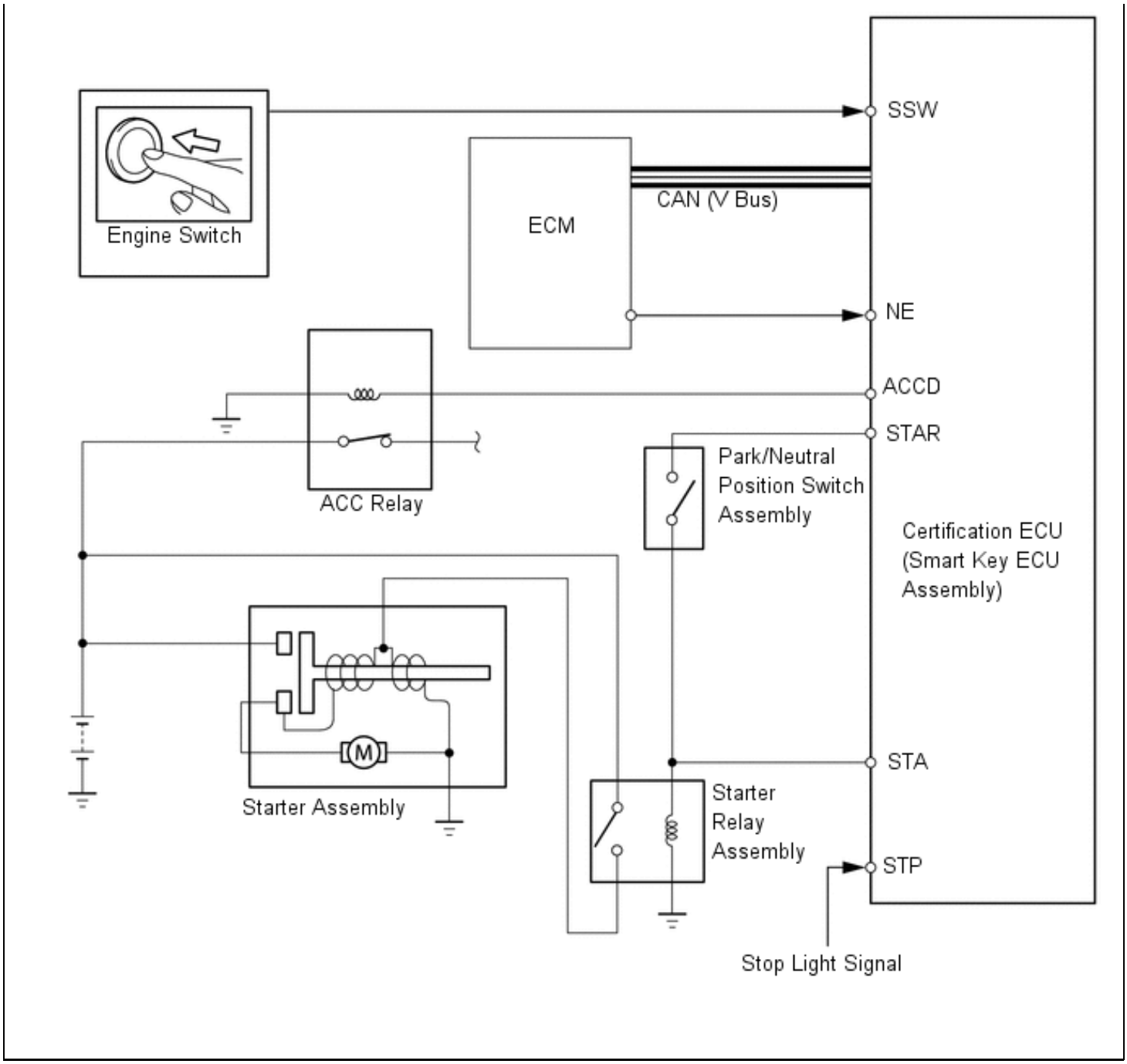
(b) If the engine speed reaches approximately 500 rpm, the ECM will judge that the engine has started and will send a signal to the certification ECU (smart key ECU assembly) using CAN communication. The certification ECU (smart key ECU assembly) will then stop the operation of the starter.

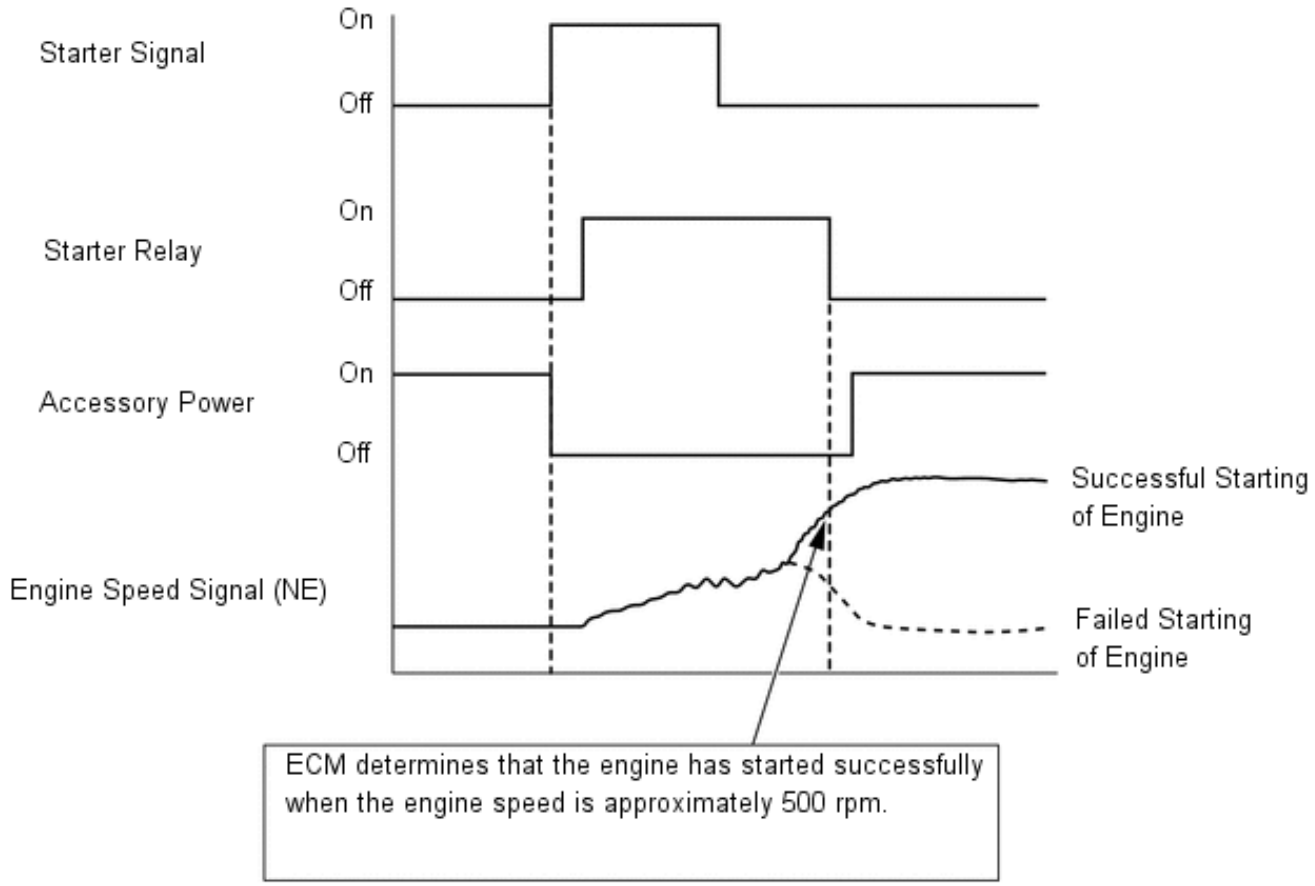
(c) If CAN communication is cut between the certification ECU (smart key ECU assembly) and the ECM, the certification ECU (smart key ECU assembly) will receive an engine speed signal (NE) directly from the ECM and will stop the operation of the starter.

(d) This system cuts off the power current which activates the accessories while the engine is being cranked. This prevents the intermittent blinking of the accessory lights caused by the voltage instability that occurs during engine cranking.

(e) This system has the following protections:

- The starter does not operate when the engine is operating normally.
- If the engine switch is pushed and held, cranking will stop once the engine speed reaches a pre-determined level. This prevents the starter from over-revving.
- If the engine does not start even after approximately 6 seconds of starter operation, the certification ECU (smart key ECU assembly) will cancel the starter relay output. Furthermore, if the engine does not start after the engine switch has been pushed and held and cranking has continued for 30 seconds, cranking will be canceled in order to protect the starter.
- It will not be possible to operate the starter for 2 seconds after engine starting has failed and cranking has been canceled. This helps to protect the starter.


SSW
Engine Switch
ECM
CAN (V Bus)
NE
ACCD
STAR
ACC Relay
Park/Neutral
Position Switch
Assembly
Certification ECU
(Smart Key ECU
Assembly)
M
Starter Assembly
STA
Starter
Relay
Assembly
STP
Stop Light Signal


Starter Signal
On
Off
Starter Relay
On
Off
Accessory Power
On
Off
Engine Speed Signal (NE)
Successful Starting of Engine
Failed Starting of Engine
ECM determines that the engine has started successfully when the engine speed is approximately 500 rpm.