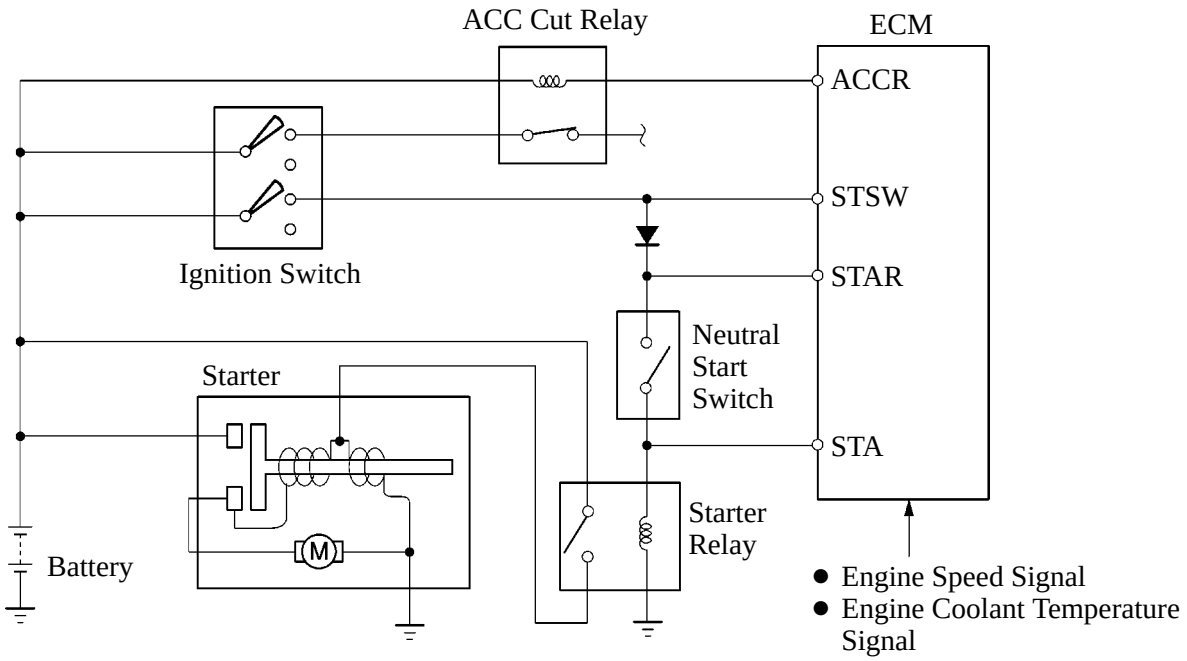
12. Starter Control (Cranking Hold Function)

General

- Once the ignition switch is turned to the START position, this control continues to operate the starter until the engine starts, without holding the ignition switch in the START position. This prevents starting failures.
- When the ECM detects a start signal from the ignition switch, this system monitors the engine speed (NE) signal and continues to operate the starter until it determines that the engine has started.

▶ System Diagram ◀



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Operation

- As indicated in the following timing chart, when the ECM detects a start signal from the ignition switch, it energizes the starter relay to operate the starter. If the engine is already running, the ECM will not energize the starter relay.
- After the starter operates and the engine speed becomes higher than approximately 500 rpm, the ECM determines that the engine has started and stops the operation of the starter.
- If the engine has any failure and does not work, the starter operates as long as its maximum continuous operation time and stops automatically. The maximum continuous operation time is approximately 2 seconds through 25 seconds depending on the engine coolant temperature condition. When the engine coolant temperature is extremely low, it is approximately 25 seconds and when the engine is warmed up sufficiently, it is approximately 2 seconds.
- This system cuts off the current that powers the accessories while the engine is cranking to prevent the accessory illumination from operating intermittently due to the unstable voltage that is associated with the cranking of the engine.
- This system has the following protections.
  - While the engine is running normally, even if the ignition switch is turned to START position, the starter will not operate.
  - In case that the driver keeps holding the ignition switch in START position and the engine successfully started, the ECM will stop the starter operation when the engine speed has become approximately 1,200 rpm or more.
  - In case that the driver keeps holding the ignition switch in START position and the engine will not start, the ECM will stop the starter operation when approximately 30 seconds have passed.
  - In case that the starter begins to operate, but cannot detect the engine speed signal, the ECM will stop the starter operation immediately.

▶ Timing Chart ◀

