

Spring 3-27-2009

The New Ignition Switches

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Recommended Citation

Trinidad, Omar and Dixon, Matthew, "The New Ignition Switches" (2009). *Presentations*. Paper 8.
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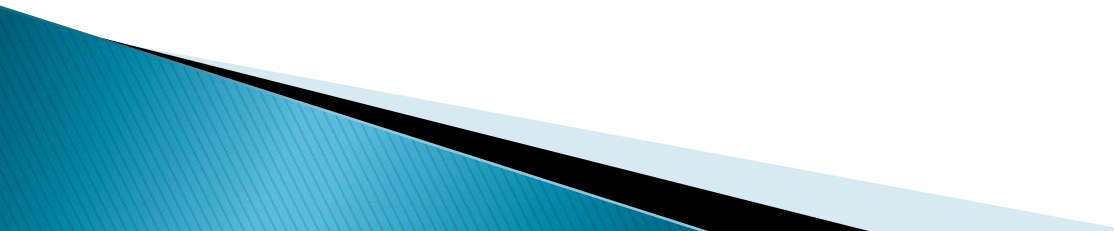
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05 Toyota Avalon Smart Key Ignition Switch

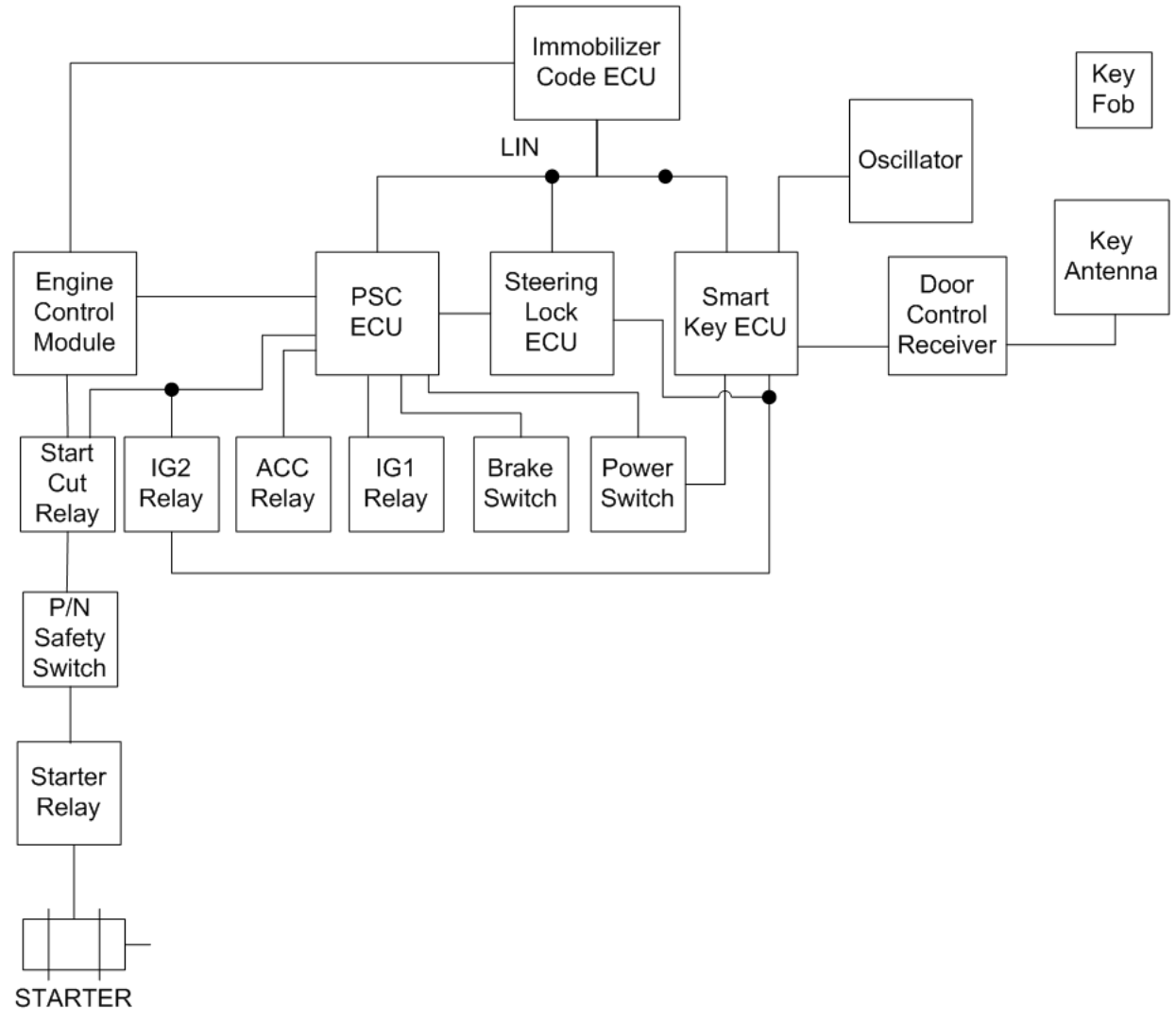
By Omar Trinidad

Southern Illinois University Carbondale

Ignition/Engine Start/Stop Switch

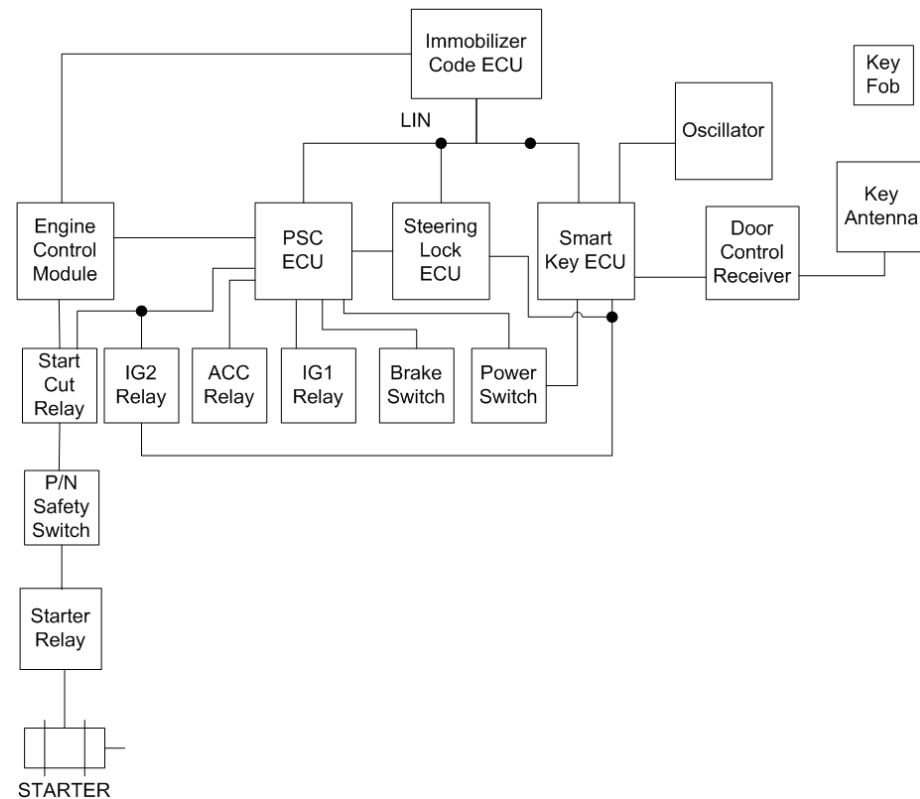
- ▶ System Overview
 - ▶ Components
 - ▶ System Operation
 - ▶ Ignition/Power Switch Positions
 - Accessory
 - ON
 - START
 - OFF
- 

System Overview



Components

- ▶ Smart Key/Key Fob
- ▶ Key Antenna
- ▶ Oscillators
- ▶ Door Control Receiver
- ▶ 4 ECU's
 - Immobilizer Code
 - Smart Key
 - Steering Lock
 - Power Source Control
- ▶ Engine Control Module



Smart Key/ Key Fob



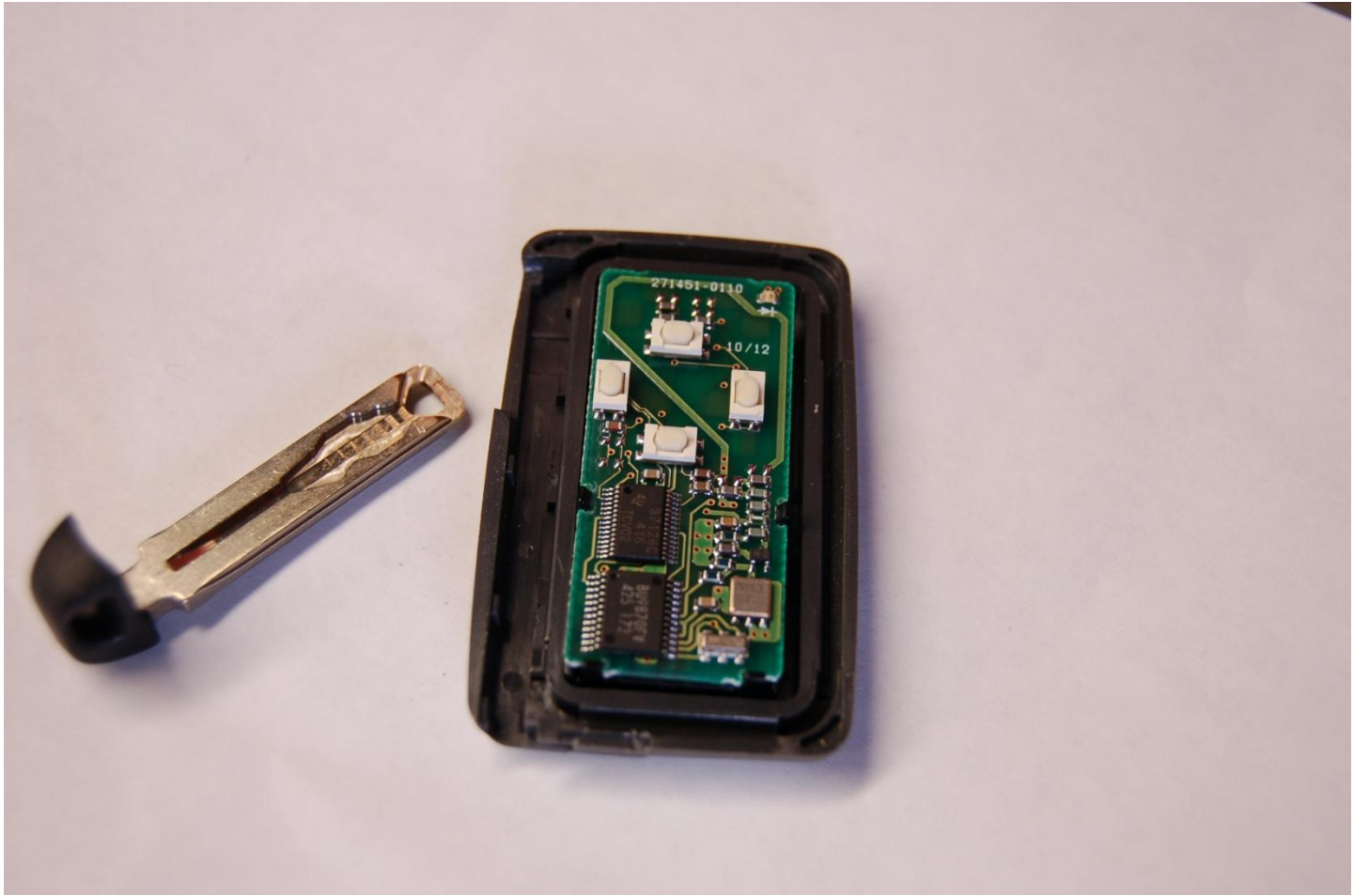
Smart Key/ Key Fob



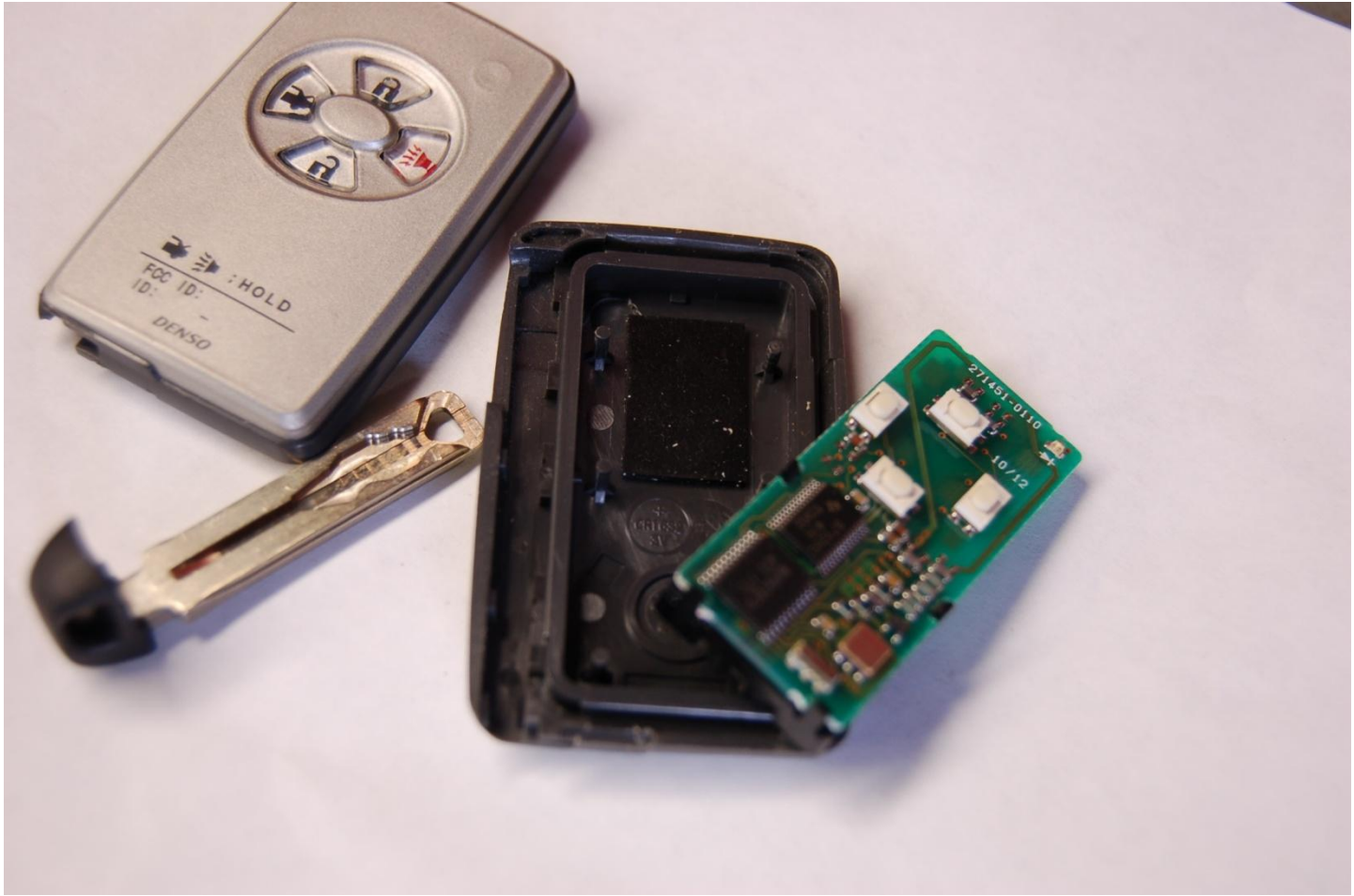
Smart Key/ Key Fob



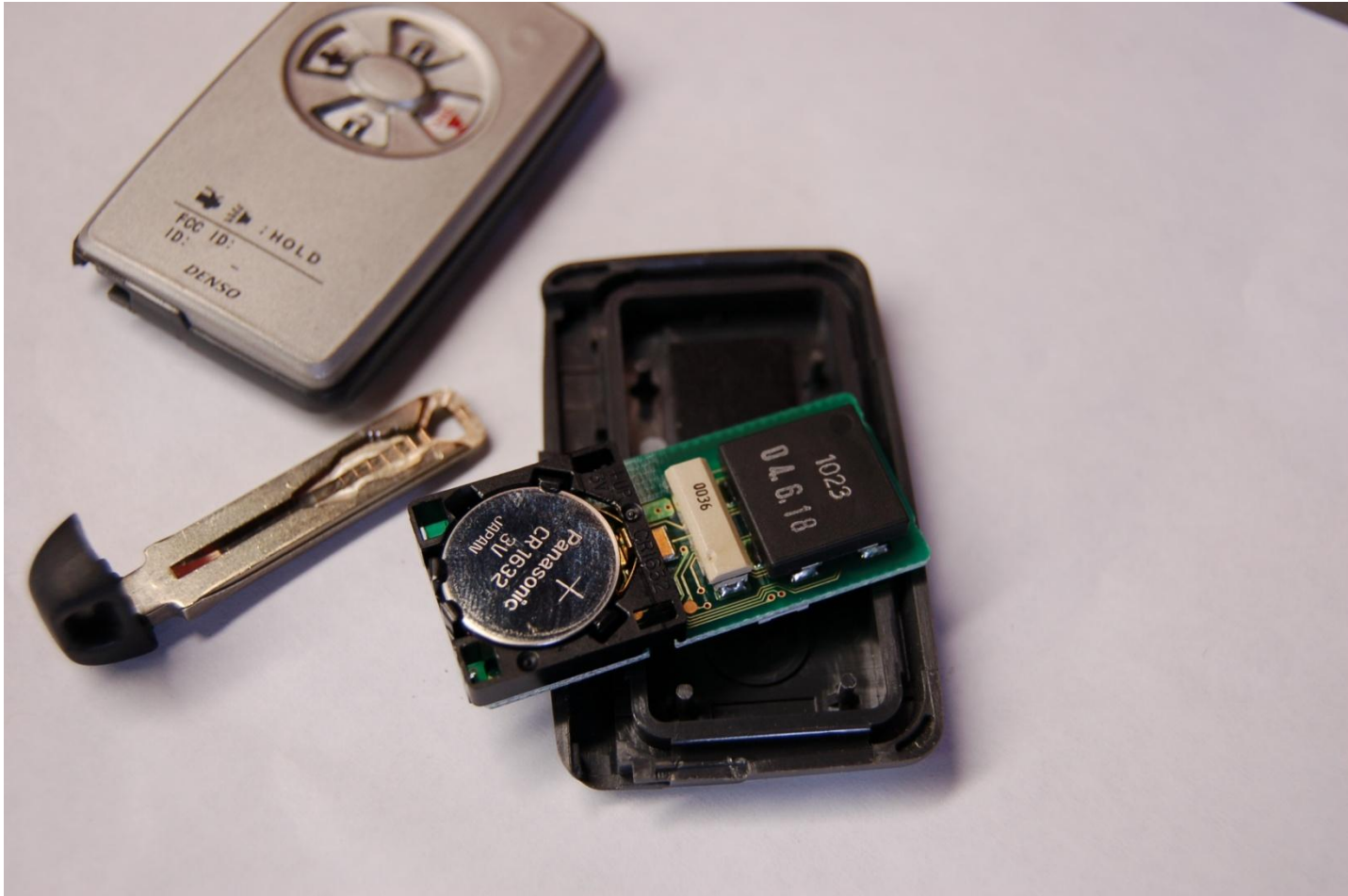
Smart Key/ Key Fob



Smart Key/ Key Fob



Smart Key/ Key Fob



Center Console Oscillator



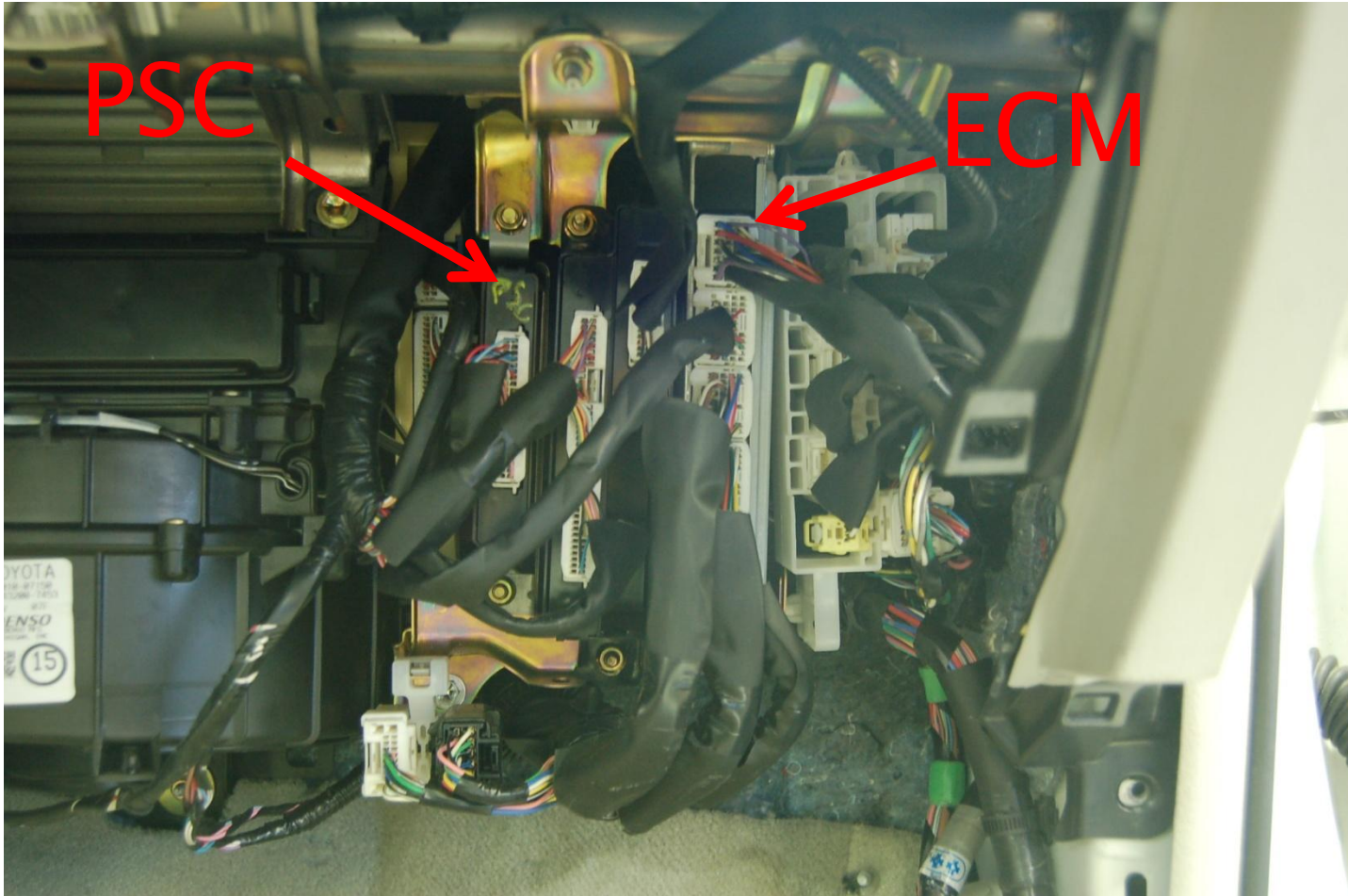
Trunk Oscillator



Door Control Receiver

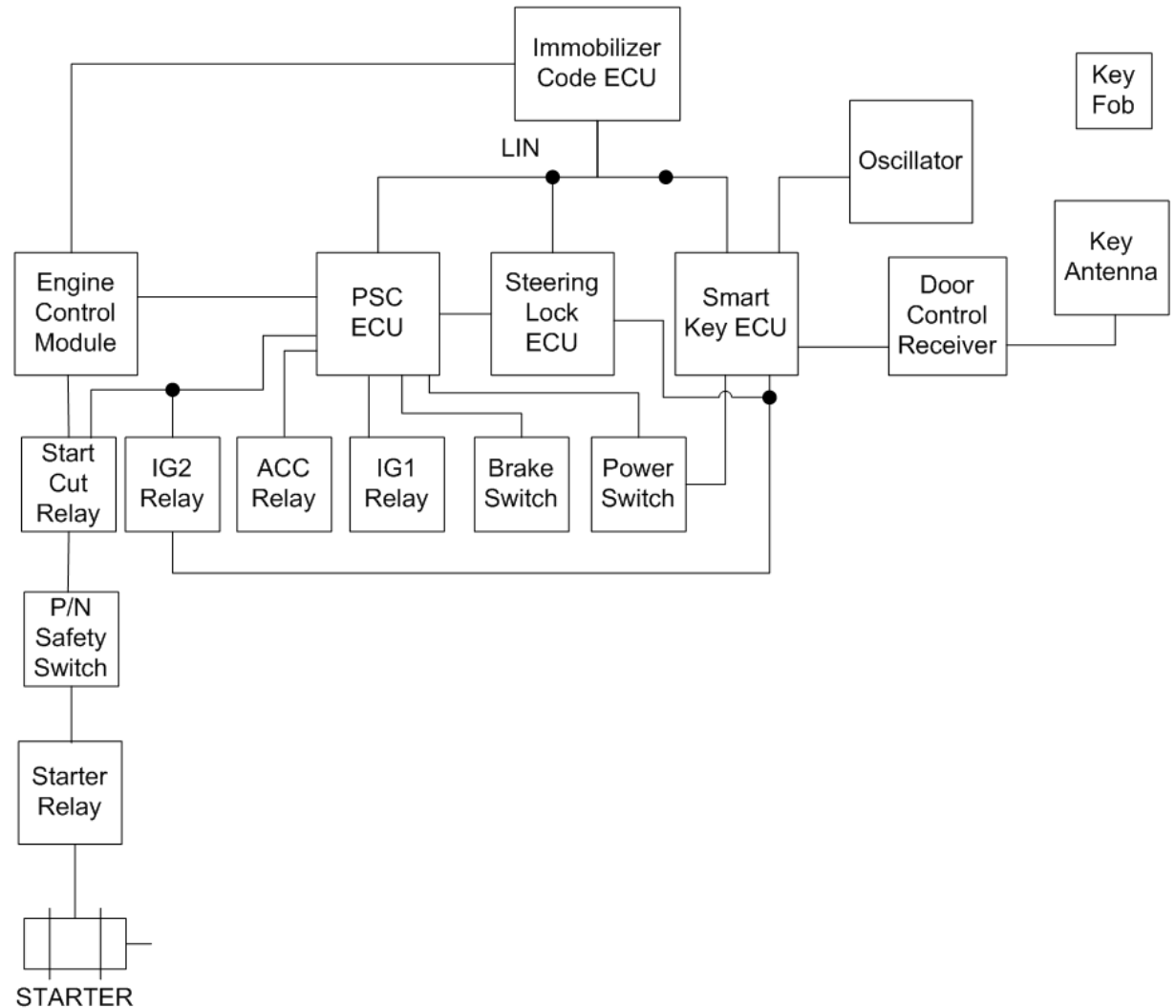


Modules



Components Cont.

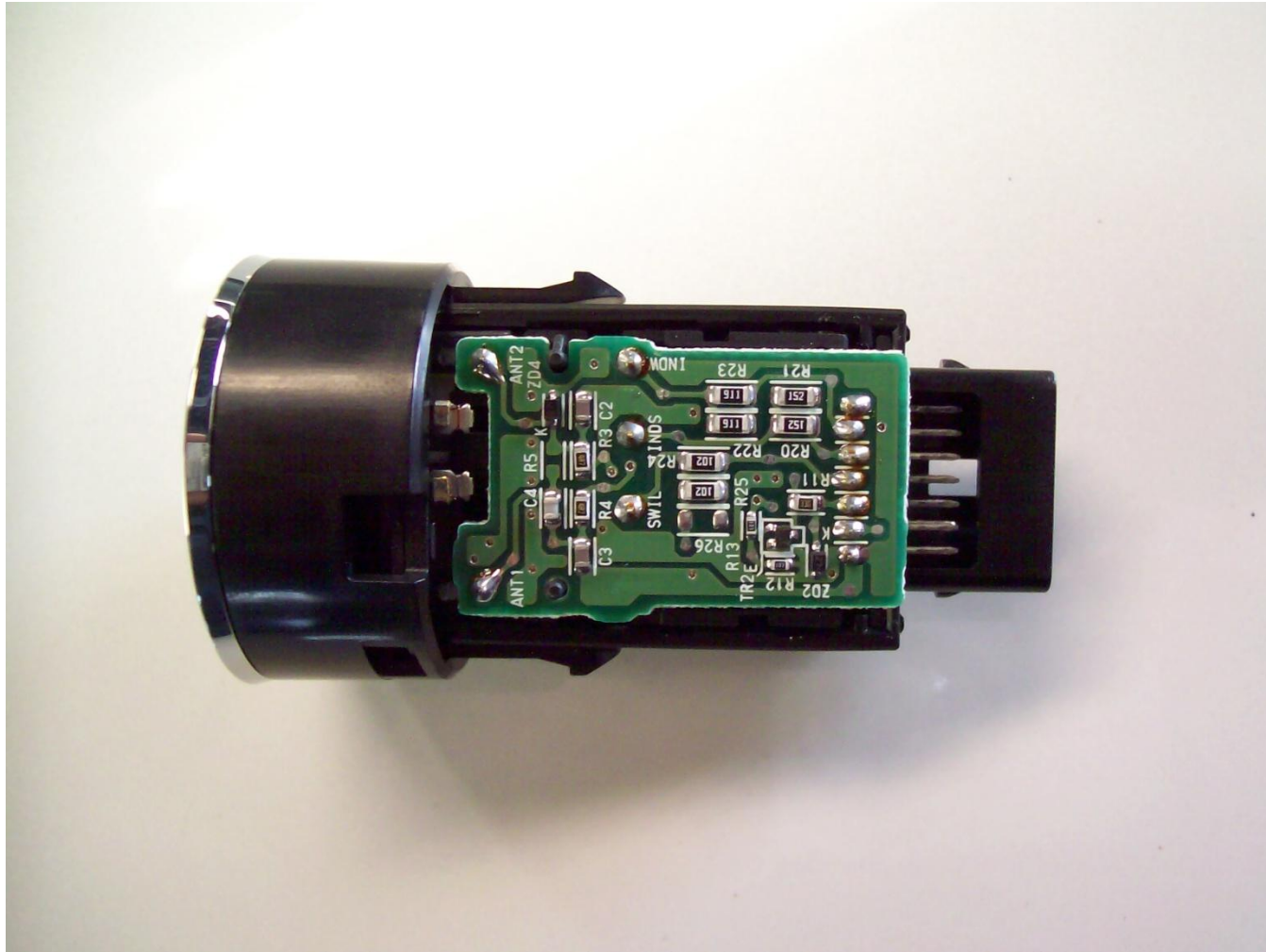
- ▶ 5 Relays
 - Start Cut
 - Starter
 - IG1
 - IG2
 - Accessory
- ▶ 3 Switches
 - Brake
 - Power
 - P/N Safety



Power Switch/Start Stop Switch



Power Switch/Start Stop Switch



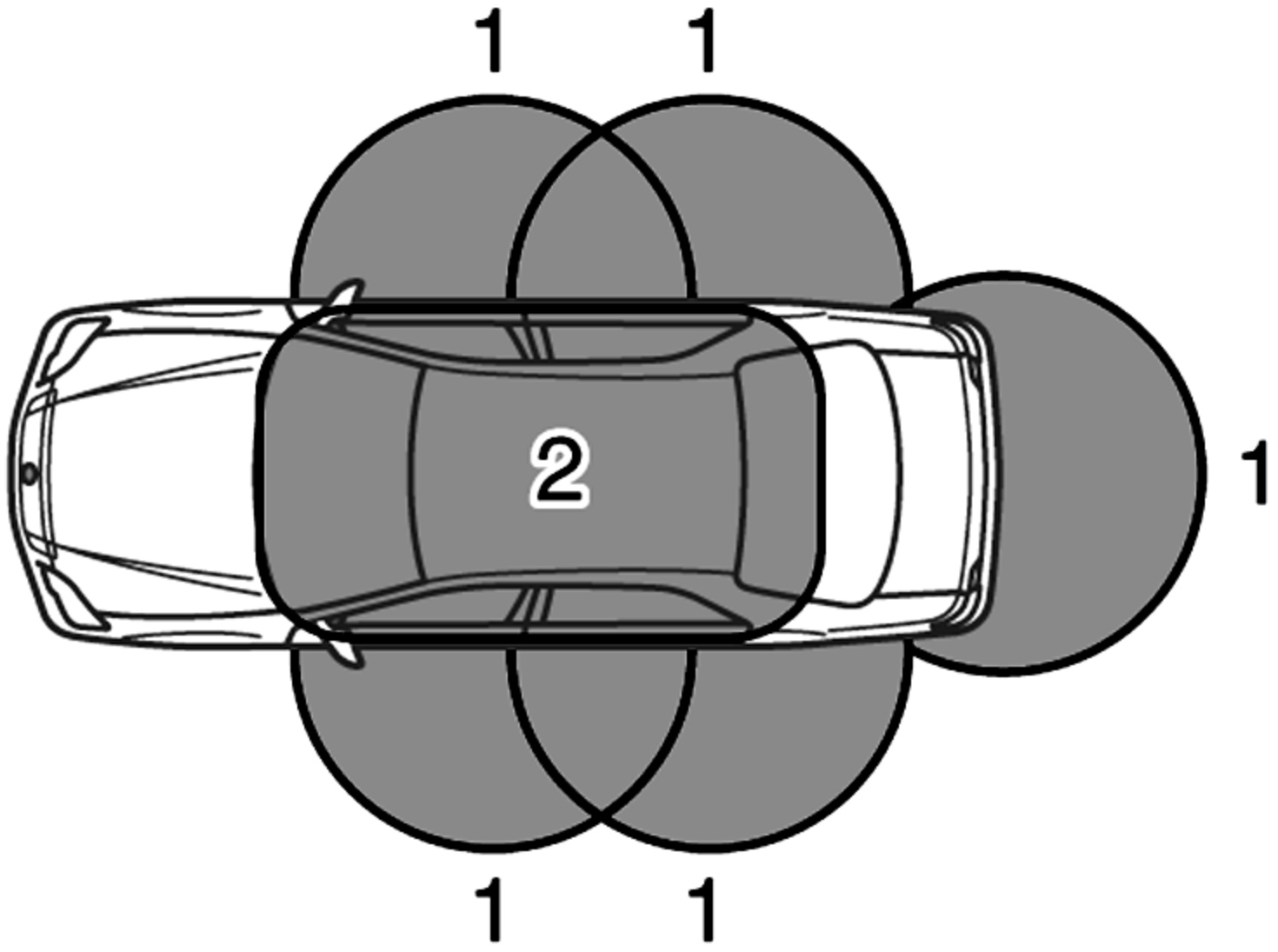
Power Switch/Start Stop Switch

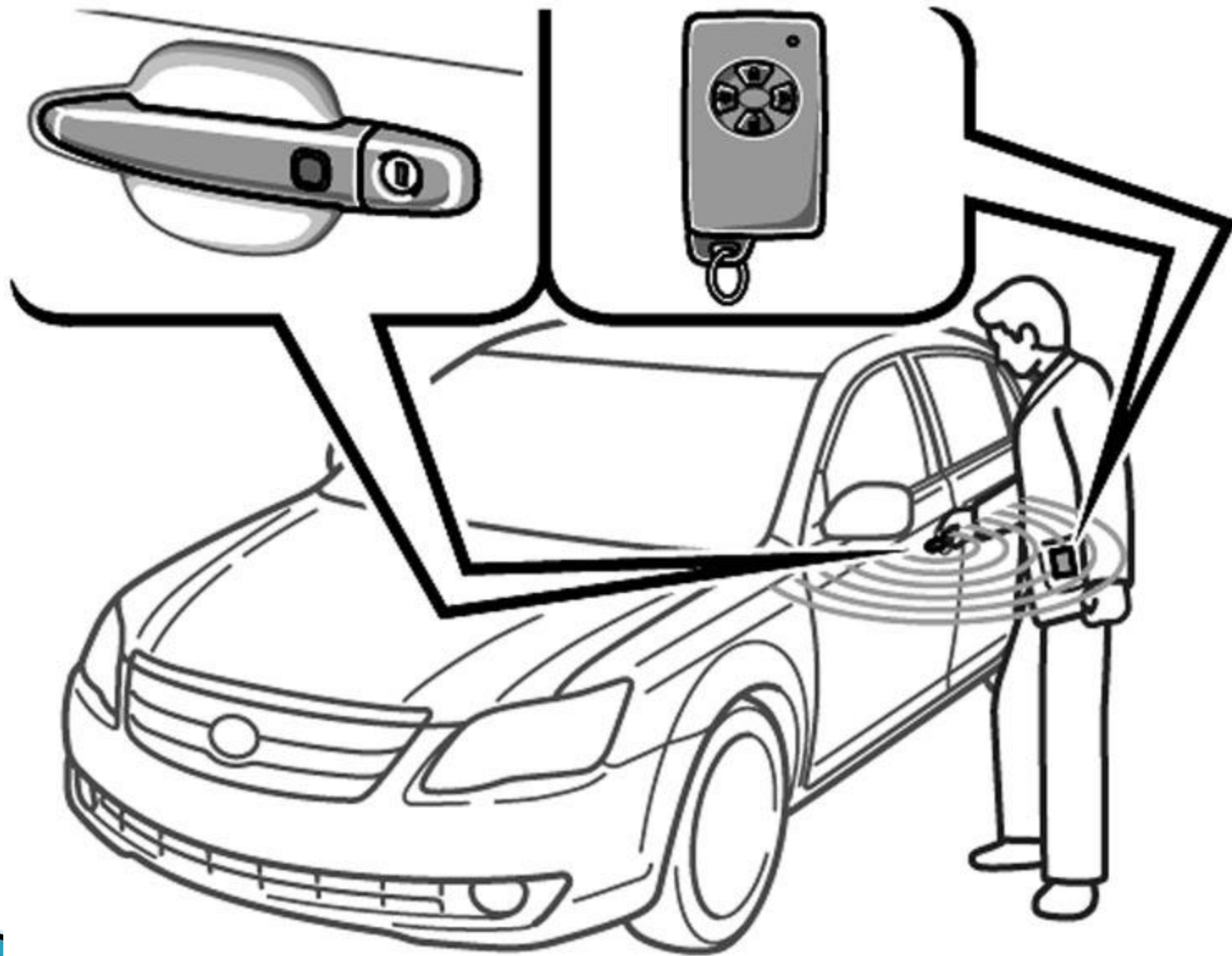


Entering the Vehicle

- ▶ With the Key Fob in close proximity
 - The vehicle can be unlocked using the door handle
 - The vehicle can be turned on and started







Entering the Vehicle



Sensor Operating with Metal



Sensor with Paper around Metal



Entering the Vehicle

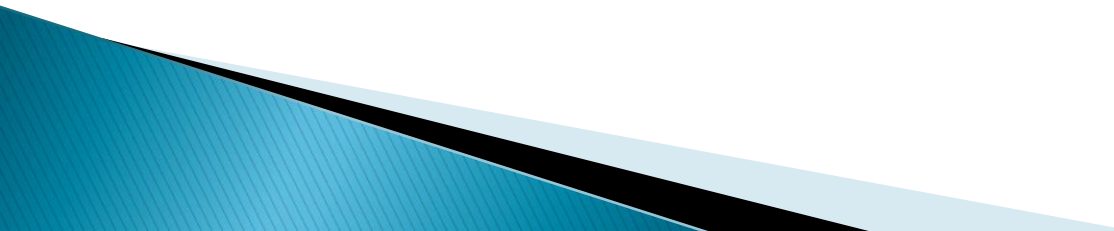
- ▶ Without the right Key Fob or with too much distance
 - The vehicle cannot be unlocked using the door handle



Power Switch Operation

- ▶ Indicator light
 - No Light=vehicle is OFF
 - Red Light= power switch is in the On
 - Green Light= Ready to Start
 - Amber Light= System Fault

Power Switch Operation

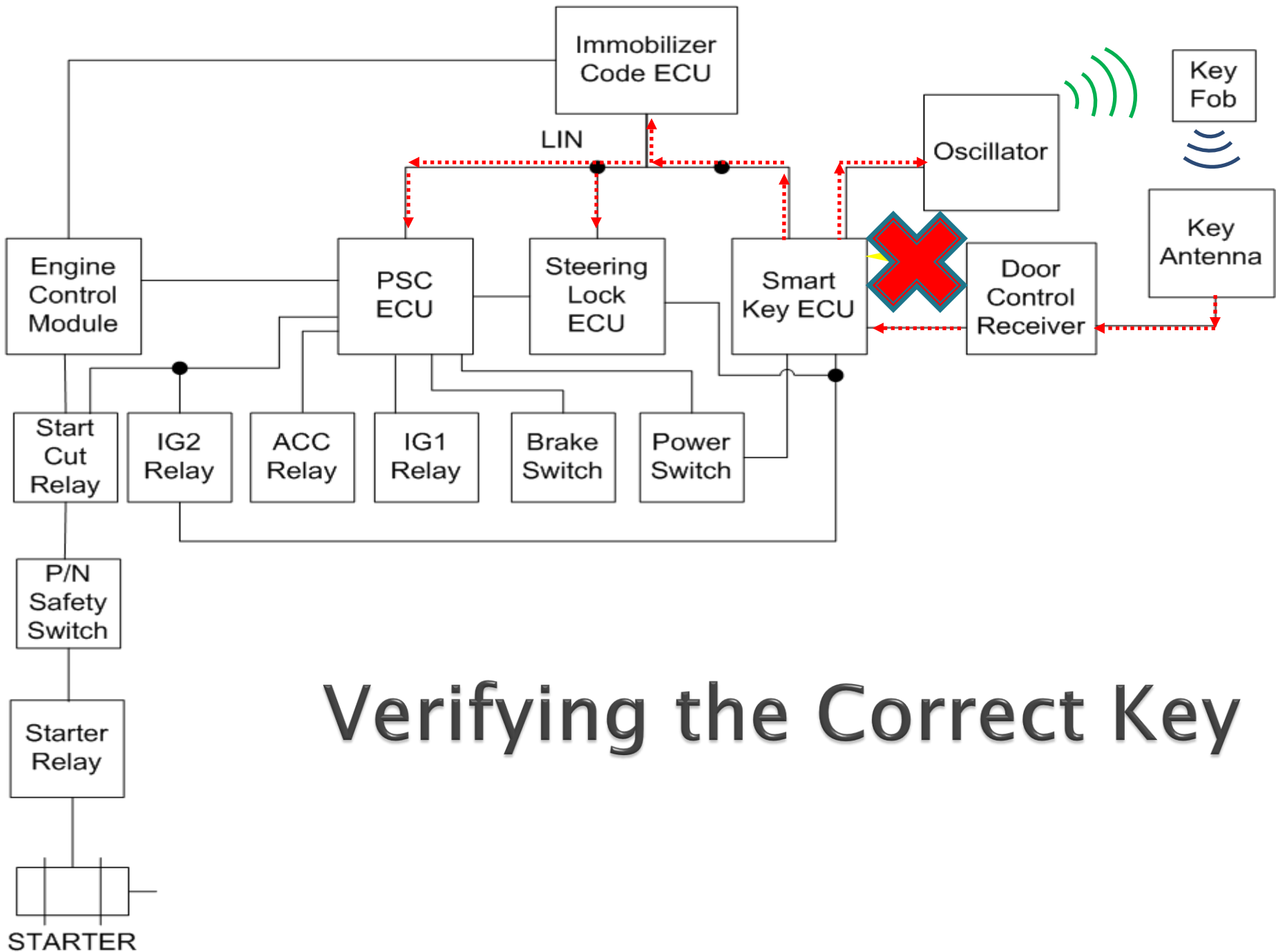
- ▶ Press Once= ACC
 - ▶ Press Twice= IG-ON
 - ▶ Press Three times= OFF
 - ▶ Press and hold w/ brake pedal=START
- 

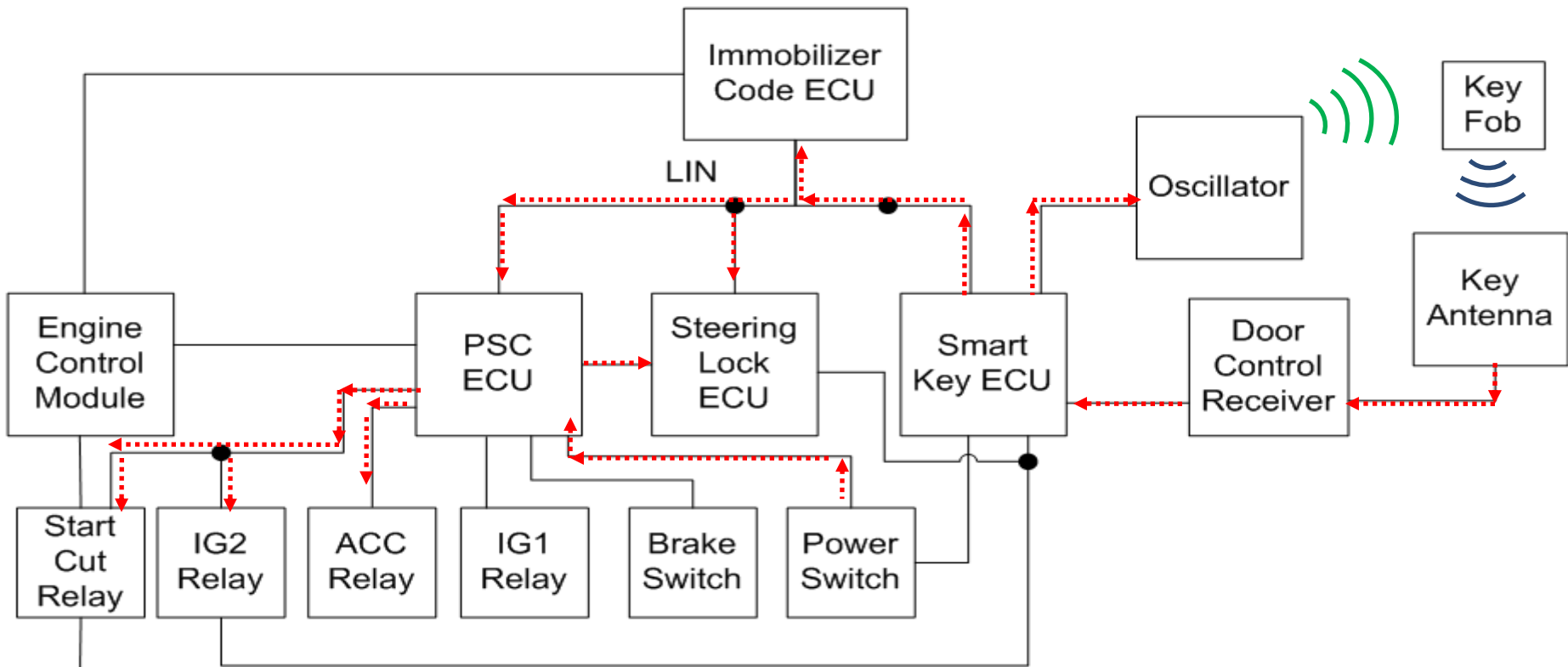
Power Switch Operation

- ▶ If the Key Fob battery has failed
 - The Key Fob can be placed close to the power switch and the power switch will be able to access the key code within a certain proximity.

Key Fob Battery Failure Senario







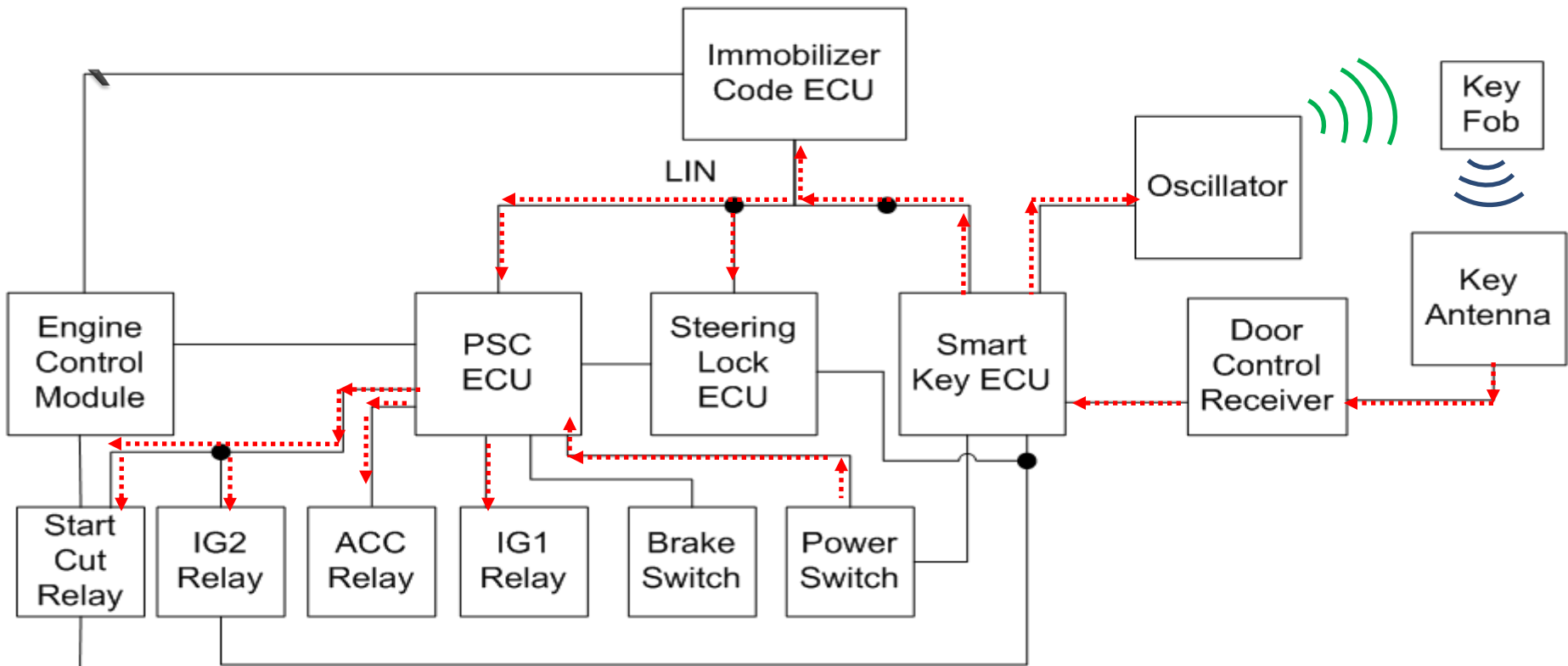
ACC = First Push

- Turns on Start Cut, IG2, and ACC relays
 - Accessories
- Disengage the Steering Lock
- Push button indicator will turn Red



Accessory Position = First Push





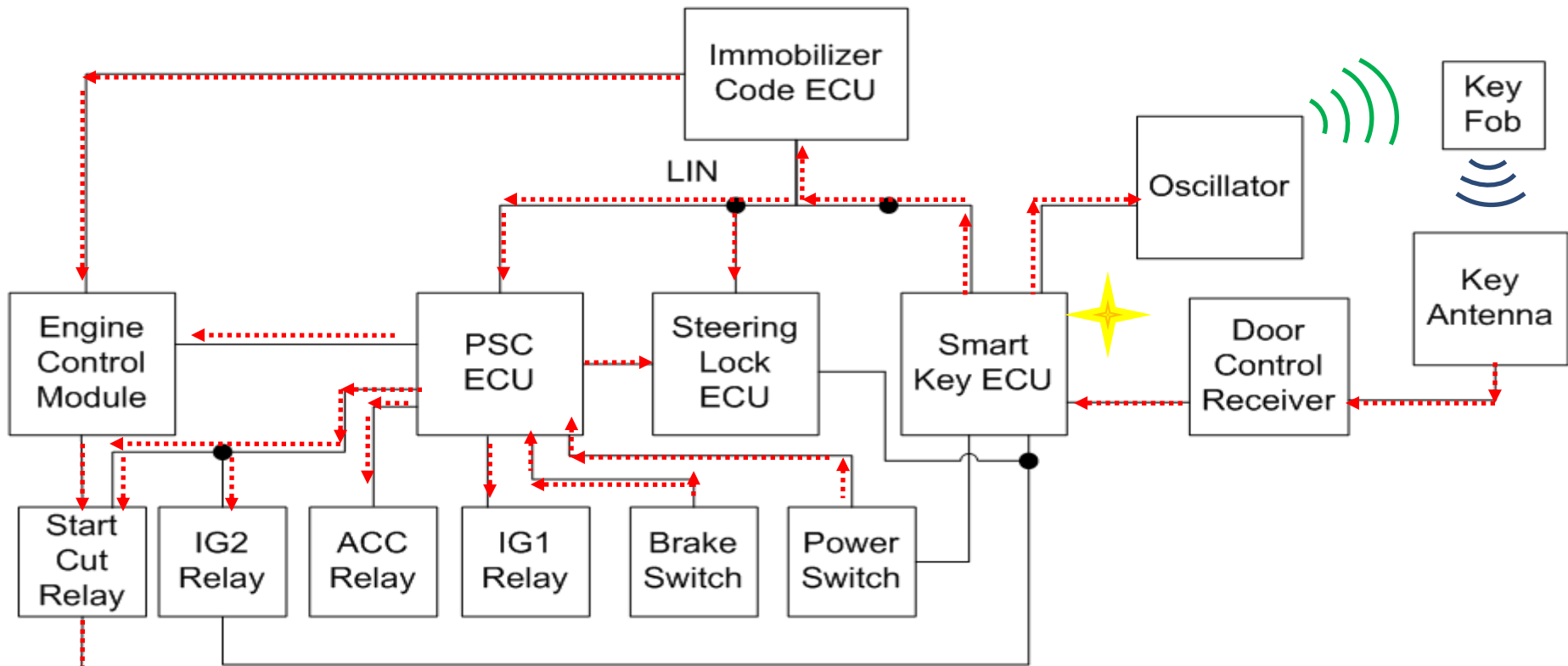
On-IG= Second Push

- Turns on IG1 Relay
 - Gauges and Climate Control
 - Push button indicator will remain Red



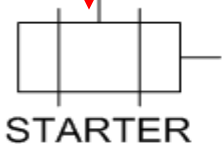
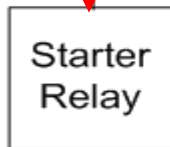
Second Push of the Button





Starting the Vehicle

- Brake Switch engaged
- P/N Safety Switch engaged
- Push button lamp will turn Green



Button Lamp with Brake Pedal

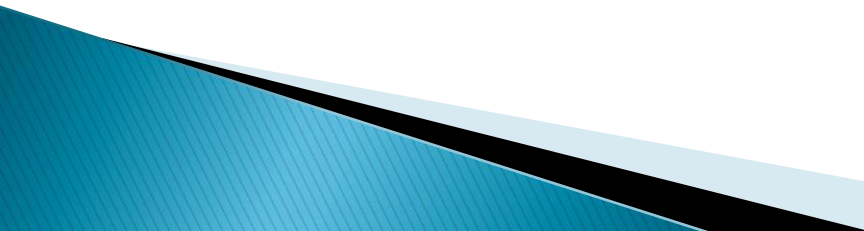


Starting the Vehicle



Review

- ▶ Press once=ACC
 - ▶ Press twice=ON
 - ▶ Press three times=OFF
 - ▶ Hold down with brake pedal depressed=START

 - ▶ Switch is more than just a switch
 - ▶ Simple task complicated system
- 

Questions?

