

The components and how they work

- The clutch lever safety switch is a single pole, double throw (SPDT) switch located on the left-side handlebar at the clutch lever. When the clutch lever is in the released (clutch engaged) position, the safety switch is connected to the gear selector safety switch. When the clutch lever is in the pulled-in (clutch disengaged) position, the safety switch is connected to chassis ground.
- The gear selector safety is a single pole, single throw (SPST) switch located behind the drive sprocket cover on the left side of the motorcycle. When the transmission is in neutral, the safety switch closes and completes a circuit to chassis ground (neutral lamp on dash is illuminated). When the transmission is out of neutral (in gear) the safety switch opens and the circuit is not completed.
- The sidestand safety is a single pole, single throw (SPST) switch located at the sidestand pivot bracket on the left side of the motorcycle. When the sidestand is in the up (riding) position, the safety switch closes and completes a circuit to chassis ground. When the sidestand is down (parked) the safety switch opens and the circuit is not completed.
- The starter circuit relay is a single pole, single throw (SPST) relay located in the junction box behind the right side panel. The starter circuit relay is a component of the starter solenoid coil circuit that allows current to pass to the starter solenoid coil when certain safety switch conditions are met.
- The ignition module is located behind the left side panel. The ignition module is responsible for creating the spark at the spark plugs in a timely manner. The ignition module is a component of the safety switch circuits, and will not operate unless certain safety switch conditions are met.

The start circuit

Short version

A bike can be started:

- in neutral with the side stand down and the clutch out
- in neutral, with the side stand up and the clutch out
- in gear, with the side stand down and the clutch in
- in gear, with the side stand up and the clutch in

Starting from the battery, the following conditions must be met:

- 30 Amp fuse in operating condition. Provides 12VDC power to the motorcycle.
- Ignition switch in the ON position. Provides 12VDC power to fuse #3, and enables the ignition module.
- 10 Amp fuse (No. 3) in operating condition. Provides 12VDC power to the run switch, tachometer, neutral lamp, and enables the ignition module.
- Run switch in the RUN position. Provides 12VDC to the start button.
- Start button.
- Gear selector in neutral position -- OR -- Clutch lever in pulled-in position (disengaged). Provides a path to chassis ground for the starter circuit relay, and enables the ignition module.

At this juncture both the ignition module and the starter circuit relay are operational. Pressing the start button at this time will energize the starter circuit relay coil, allowing 12VDC to pass through the starter circuit relay to the starter solenoid.. When the starter solenoid coil is energized, the starter solenoid allows electric current from the battery to pass through to the starter motor, which in turn starts the motorcycle. Success!

The run circuit

However, success is short-lived, as the motorcycle cannot be driven at this time. Up to this point the ignition module connection to ground has been provided by a combination of the clutch lever safety switch position and the gear selector safety switch position.

The problem arises as the clutch lever is pulled in (clutch lever safety switch changes position - connects to ground), the transmission is shifted out of neutral and into gear (gear selector safety switch opens - no connection to ground), and the clutch lever is slowly released (the clutch lever safety switch changes position - connects to the gear selector safety switch), disconnecting the ground connection to the ignition module enable circuit and stopping the engine.

This is where the sidestand comes into play; with the sidestand in the down (parked) position, the sidestand safety switch is open (no connection to ground). When the sidestand is raised to the up (riding) position, the sidestand safety switch closes (connecting to ground) and completes the ignition module enable circuit, allowing the motorcycle to be driven. As the sidestand safety switch is only a component of the run circuit, and not a component of the start circuit, **the position of the sidestand is not relevant when diagnosing starting problems.**

What is a Single Pole Double Throw (SPDT) Switch?



A Single Pole Double Throw (SPDT) switch is a switch that only has a single input and can connect to and switch between 2 outputs. This means it has one input terminal and two output terminals.

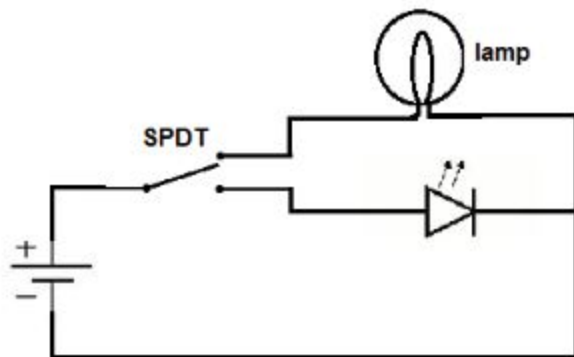
Single Pole Double Throw (SPDT) Switch



A Single Pole Double Throw switch can serve a variety of functions in a circuit. It can serve as an on-off switch, depending on how the circuit is wired. Or it can serve to connect circuits to any 2 various paths that a circuit may need to function in. For example, a SPDT switch can connect to create a Ready Mode and a Standby Mode in a printer.

Single Pole Double Throw (SPDT) Switch Circuit

Below is an example of a circuit which utilizes a single pole double throw switch.



You can see above how a SPDT can be wired up to put a circuit in either one of two modes. When the switch is connected one way, the lamp will turn on, while the LED is off. When connected the other way, the LED then turns on, and the lamp shuts off.

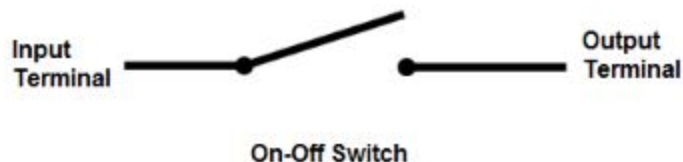
This shows the dynamic 2-mode capacity that SPDT switches allow.

What is a Single Pole Single Throw (SPST) Switch?



A Single Pole Single Throw (SPST) switch is a switch that only has a single input and can connect only to one output. This means it only has one input terminal and only one output terminal.

Single Pole Single Throw Switch

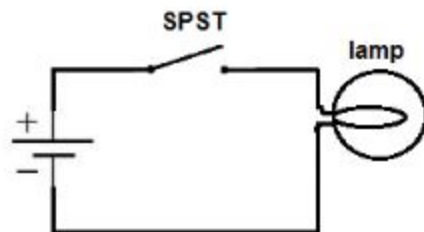


A Single Pole Single Throw switch serves in circuits as on-off switches. When the switch is closed, the circuit is on. When the switch is open, the circuit is off.

SPST switches are, thus, very simple in nature.

Single Pole Single Throw (SPST) Switch Circuit

Below is an example of a circuit which utilizes a single pole single throw switch.



When the SPST is closed, the circuit is closed and light from the lamp switches on. When the SPST is then opened, the light from the lamp goes out and the circuit is off.

This shows the basic nature and function of a SPST.