

Switch Definitions and Terms

1. **BCD**: BCD stands for Binary-Coded-Decimal. This is a four-bit system used to represent the ten (10) decimal digits 0-9. As with Logic Drivers, this is a solid state interface that allows the user to control the switch with a low current, high impedance logic signal. This allows a user to conveniently control 10 positions through 4 control lines. Each individual position is selected with a unique BCD code.
2. **BREAK-BEFORE-MAKE**: Disconnecting the RF power from the current RF circuit position before selecting a different position. All **DUCOMMUN TECHNOLOGIES** switches are break-before-make designs.
3. **DC ACTUATION**: This type of actuation requires direct current (DC) be applied to each of the switch actuator inputs. It is simple but requires a DC switching device and interface that can handle the current requirements of the switch.
4. **DIODES**: A diode allows current to flow in one direction and prevents it from flowing in the other.

A switch with diodes has a polarity associated with its operation. This polarity is established by the way the diode is situated within the circuitry. Diodes are also used to protect any equipment that the switch is connected to from voltage spikes. In this case the diodes are referred to as suppression diodes.

5. **FAILSAFE**: The Failsafe position is a Normally Closed contact that does not require actuator power to remain closed. It is only closed when no other switch position is selected. When an alternate position is selected by applying current to the appropriate actuator, the Failsafe contact opens and does not close again until current is removed from the selected position.

This feature directs signals to a specified path should a failure occur and the system loses power. Another application is one where the user wants one position selected most frequently than other positions. In this scenario the Failsafe position would be assigned to the frequently used position. This is beneficial because the most frequently used state requires no actuator power.

6. **INDICATORS**: Indicators enable an operator or computer to know which RF position is selected.
7. **INSERTION LOSS**: Is a measure of signal loss in the switch RF section. It is a measure of how much power the switch will dissipate internally. The higher the frequency the more Insertion Loss. A device with less Insertion Loss is preferred.
8. **ISOLATION**: Isolation is a measure of RF leakage (crosstalk) between an open position and closed position. A device with higher Isolation is preferred.
9. **LATCHING**: The switch maintains the selected position magnetically without current draw.
 - a. **LATCHING SELF CUT-OFF**: Current is required to change positions. Current is required only during the switching phase and an internal current cut-off circuit is used to produce a pulse.
 - b. **PULSE LATCHING**: If the user can provide an external source of a current pulse, no cut-off circuit is required. A DC pulse between 20-50 mSecs is required to actuate a position. The user provides current cut-off.

The main use of latching switches is in systems that do not have the power available to supply constant actuator current. The magnetic latching feature enables these switches to withstand high shock and vibration environments. Latching switches generate less heat than non-latching switches because of the internal current cut-off design and customer provided cut-off in pulse latching switches.

10. **LOGIC DRIVER:** This is a solid state interface that allows the user to control the switch with a low current, high impedance logic signal. For users that employ logic circuits in conjunction with switching requirements, Logic level signals are readily available. In this environment it is often a convenient way to control the relays. Other benefits include easily available control networks and low current interfacing. **DUCOMMUN TECHNOLOGIES** offers both high and low level Logic controls as well as BCD controls.
11. **MULTI-POSITION:** Usually reserved for switches with 3 or more throws or positions. **DUCOMMUN TECHNOLOGIES** currently manufactures 3 through 10 positions switches.
12. **NORMALLY OPEN:** All switch paths are open until a position is selected. Continuous current is required to maintain the selected path. This configuration represents the simplest and most common type of switch. Most users are able to supply the constant current required by these devices and the design is quite rugged and reliable.
13. **NON-TERMINATED OR REFLECTIVE:** This configuration directs all unselected inputs to an open circuit load. The only source that sees a 50 ohm load is the one associated with the selected position. It is less complicated and less expensive than a terminated switch. If the sources can tolerate an open circuit load, this is the configuration to use.
14. **RETURN LOSS:** Return Loss is a measure of reflected power. A device with a lower Return Loss value is preferred.
15. **SINGLE POLE DOUBLE THROW:** One input directed to either of two outputs or conversely, either of two inputs directed to a single output. SPDT can also be utilized as a terminated SPST switch.
16. **TERMINATED:** This configuration directs all unselected inputs to a 50 ohm load located within the switch body. This is used in systems where the RF sources cannot tolerate an open circuit load condition. When a position is selected the internal 50 ohm load is disconnected from the source and the load becomes the 50 ohm load associated with the instrument connected to the switch Common port. In this type of switch a 50 ohm load is always seen by the RF sources.
17. **TRANSFER:** A four port device with two inputs toggled between two outputs. As an example consider a four port device with connections numbered 1, 2, 3, and 4. In position #1 we have ports 1-3 and 2-4 connected, in position #2 we have ports 1-2 and 3-4 connected. As can be seen, ports 1 and 4 toggled connections with ports 2 and 3.

This configuration is normally used when you want to toggle 2 sources and 2 loads. An example, would be toggling two antennas A1 and A2 and two transmitters T1 and T2. One state would be A1-T1 and A2-T2; the other would be A1-T2 and A2-T1.
18. **VSWR:** VSWR or Voltage Standing Wave Ratio is another way of measuring the amount of reflected power. A device with lower VSWR is preferred.