

# “FOCUS ON”

## SWITCHES EXPLAINED!

### Nick Duxfield takes a look at our range of switches...

Gaugemaster list sixteen different types of switch and it is easy to be confused by the sheer variety.

#### TECHNICAL DEFINITIONS:

- **Pole** - number of switch contact sets.
- **Throw** - number of conducting positions, single or double.
- **Way** - number of conducting positions, three or more.
- **Momentary (non latching)** - switch returns to its normal position when released.
- **Open** - off position, contacts not conducting.
- **Closed** - on position, contacts conducting, there may be several on positions.

#### SLIDES, TOGGLES, ROTARIES & PUSH SWITCHES

With **Slide Switches** the switching movement is in a linear to and fro fashion. They cost little, the range is limited and they mount discreetly, (Gaugemaster Controllers use these for direction switching).



**Toggle Switches** have a to and fro switching movement but through an arc. They cost more than 'sliders' but the bigger range will cover almost any switching situation. They are easy to install and look good on a track diagram or switchboard.

**Rotary Switches**, needless to say, have a rotary switching movement. They will be needed when the number of circuits that need to be changed simultaneously exceeds the capacity of a toggle or slide switch.



**Push Switches** can be either latching or momentary (non-latching). Usually a simple on-off switch.

#### POLES AND THROWS

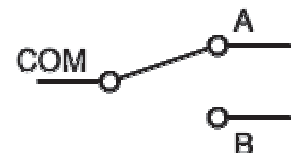
**SPST or Single Pole Single Throw** – Simple on-off switch, this means there is only one circuit through the switch and one on position. Used to interrupt current for a single pole of a circuit.



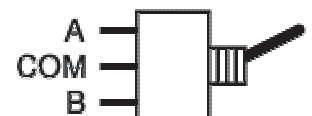
**DPST or Double Pole Single Throw** - there are two circuits through the switch; a pair of on-off switches which operate together (shown by the dotted line in the circuit symbol). This switch could isolate both live and neutral poles or one could use it for switching two different circuits simultaneously.



**SPDT or Single Pole, Double Throw (ON-ON)** - This switch can be on in both positions, switching on a separate device in each case. It is often called a **changeover switch**. For example, a SPDT switch can be used to switch on a red lamp in one position and a green lamp in the other position.

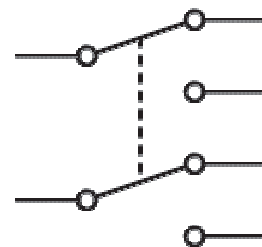


A SPDT toggle switch may be used as a simple on-off switch by connecting to COM and one of the A or B terminals shown in the diagram. A and B are interchangeable.



**SPDT Centre Off - ON-OFF-ON** - A special version of the standard SPDT switch. It has a third switching position in the centre which is off. Momentary (ON)-OFF-(ON) versions are also available where the switch returns to the central off position when released.

**DPDT or Double Pole Double Throw - Dual ON-ON** - A pair of on-on switches which operate together (shown by the dotted line in the circuit symbol).

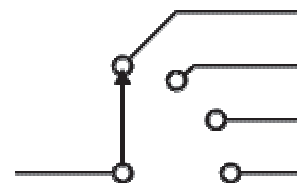


A **DPDT** switch can be wired up as a **reversing switch** for a motor as shown in the diagram under [GM501](#) below.

**DPDT or Double Pole Double Throw Centre-Off** - These can be very useful for motor control because you have forward, off and reverse positions. **Momentary (ON)-OFF-(ON)** versions are also available where the switch returns to the central off position when released.

**Rotary (Multi-way) Switches** have many conducting positions. They may have several poles (contact sets). They are available with a range of contact arrangements from 1-pole 12-way to 4-pole 3-way.

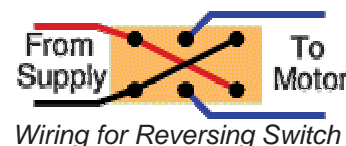
For different variants of the rotary switch, the number of **'ways'** (switch positions) are reduced with a different 'stop' under the fixing nut, limiting the movement where there are more poles to be served.



## THE SWITCHES WE OFFER:

**GM501** - a double pole double throw ( **DPDT**) slide switch. Power connected to the centre pair of terminals can be switched in turn to either of the two other pairs of terminals.

Much more usefully, connect together the outer pairs of terminals but with the connecting wires crossing over. In other words connect the terminal in one corner to the corner terminal which is diagonally opposite and repeat on the other side. The wires from the middle pair of terminals are the output and the pair of terminals at the end of the switch - it doesn't matter which end - are the input.



*Wiring for Reversing Switch*

When an A1 switch wired in this way is operated the polarity of the output will be reversed. This offers a solution to the polarity conflict on return loops.

The switch will also work two aspect colour light signals fitted with light emitting diodes because these devices only light up when a DC current passes in the right direction through them. Reversing the polarity of the feed to the LED's will change the aspect from green to red or vice versa.

**GM502** - a double pole double throw ( **DPDT**) centre-off, slide switch. Exactly the same as the **GM501** except that it has a **centre-off** position.

Power connected to the centre pair of terminals can be switched in turn to either of the two remaining pairs. In the off position both of these pairs of terminals are isolated from the power source.

A more versatile arrangement is to have independent power sources connected to each of the outer pairs of terminals which can then be switched in turn to the centre pair. When the switch is off the centre terminals are isolated from the outer ones.

If a controller is connected to one of the outer pairs of terminals and another controller connected to the remaining pair of outer terminals with the centre pair connected to a section of track then one or the other of the controllers can in turn drive a locomotion on that section. The section can also be completely isolated from both controllers by turning the switch off. This complete isolation is vital if the controllers are taking their 16vAC supply from a single transformer winding.

The Gaugemaster **'Model D'** Twin Track controller has two transformer windings to provide output to the tracks so there will be no risk of short circuits/overloads if one terminal of each of the outputs is connected through one wire directly to one rail of the section of track. The remaining rail is connected via the switch to the two remaining controller outputs. This will leave three terminals on the switch free - they can be used for tasks such as signalling or track occupancy.

**GM503** - a single pole single throw (**SPST**) **standard** toggle switch. This is a simple 'on/off' switch that will make or break one circuit.

**GM504** - a double pole double throw (**DPDT**) **standard** toggle switch that does the same job as the GM501 slide switch.

**GM505** - a double pole double throw ( **DPDT**) centre off, **miniature** toggle switch that does the same job as the GM502 slide switch.

**GM506** - a double pole double throw (**DPDT**) **miniature** toggle switch that does the same job as the GM501 slide switch.

**GM507** - a single pole single throw (**SPST**) **miniature** toggle switch that does the same job as the GM503 slide switch.

**GM508** - a single pole, double throw, miniature toggle switch. Power connected to the centre terminal can be switched in turn to either of the other two terminals.

This switch can be used for operating two-aspect colour light signals fitted with grain of wheat bulbs.

**GM509** - a single pole double throw centre-off, **miniature** toggle switch. Exactly the same as the GM508 except that it has a **centre-off** position.

Power connected to the centre terminal can be switched in turn to one or other of the remaining two terminals.

This switch can be used for so-called '**cab control**'. If the track is divided into convenient sections, each connected via this switch, to a twin track controller then up to two trains can be driven simultaneously from the two controller outputs to anywhere on the layout. Needless to say, routes must be set up that will not bring the trains into conflict!

If using this switch for Cab Control the controllers used *must* take their power from separate, isolated transformer windings, for example the Gaugemaster '**Model D**'.

The switch is wired in a similar way to that already described for the GM502 except that only one wire from each output on the controller passes through the switch. The remaining two output terminals are connected together and wired directly to one rail of the section being supplied by the switch. This rail is called the 'Common Return' and, apart from gaps at points and crossings, the Common Return rail of each section is joined with a metal fishplate.

**GM510** - a single pole double throw ( **SPDT**) centre off momentary, **miniature** toggle switch but with an important extra feature. The toggle self-centres to the **off** position as it moves against a spring to either of the **on** positions - this is perfect for operating point motor solenoids.

**GM513-518** - 'push to make' switches. Pushing the spring-loaded button (available in six different colours) momentarily passes current through a circuit, ideal for point-operation on a track diagram.

**GM512** - a single pole 'push to break' switch. Current is free to flow through the switch until the spring-loaded button is pushed and the current flow interrupted.

**GM519, 520, 521 & 522 ROTARY SWITCHES** – will cover multiple switching roles where more than two circuits need to be simultaneously switched - for example if three or four track controllers are being used for 'cab control'. This switch can be used to unlatch relays by momentarily interrupting the power supply to the actuating coil.

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If this explanation of switches has only further deepened the mists of confusion then the booklet '**MODEL RAILWAY ELECTRICS**' - "A guide to wiring your layout for the novice and the expert" - will be like a little ray of sunshine!