



The *Timpdon Electronics* range of **Radio MultiSwitches**, Model **MRMS**.. permits up to four on/off switch outputs to be controlled from a single RC channel.

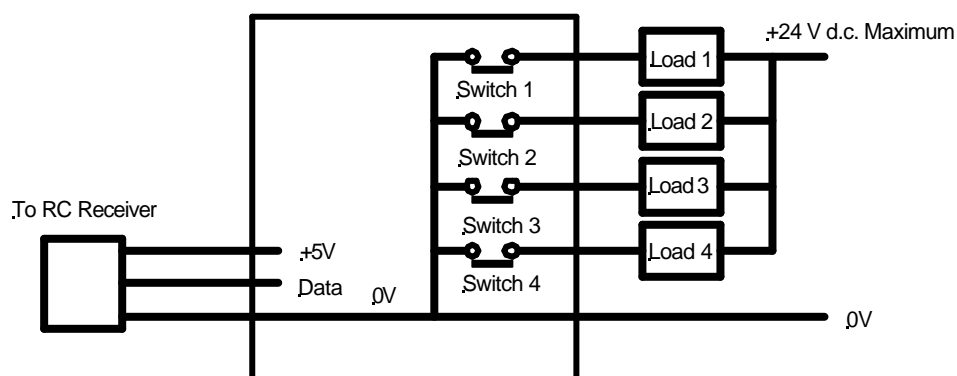
All **MultiSwitches** use the same physical hardware, controlled using a digital microcontroller, and their switching functions and method of operation are defined in software.

In addition to a standard range of **MultiSwitches**, *Timpdon Electronics* also offers a low cost bespoke design service for users who require a particular set of switching operations to meet their special needs.

This Technical Note offers advice to potential users of this design service on both the possibilities and limitations of this service.

Switched Outputs

Each of the four switched outputs is provided by a solid state switch, using an open drain FET, rated for a maximum load current of 2 A, continuous. The maximum load voltage permitted is 24 V d.c. All switches have a common 0 V connection, and output loads are connected between the other switch terminal and a positive supply voltage. The 0 V output connection is commoned with the 0 V connection from the RC receiver, which also supplies power for the microcontroller within the **MultiSwitch**.



With four outputs switches, there are sixteen possible binary switch combinations, ranging from all switches **off** [0000] to all switches **on** [1111]. All combinations are available, subject only to limitations of selection of the required combination state using only a single transmitter joystick, as described below.

Switch Control

The **MultiSwitch** is designed to operate from a single analogue RC transmitter channel, equipped with a spring loaded centre neutral joystick.

There are two possible joystick movements which can be detected by the **MultiSwitch**:

- 1 Neutral to Maximum
- 2 Neutral to Minimum

In addition, the **MultiSwitch** can count the number of consecutive action sequences for the following switch movements:

- 1 Neutral – Maximum – Neutral
- 2 Neutral – Minimum – Neutral

In each case, each action sequence must be performed within 1 second of the previous sequence. Counting stops if more than one second elapses between sequences, or if the joystick direction is changed.

From this, it can be seen that there are two possible ways of controlling switching sequences:

Individual Switch Combination Selection

Count Action Sequences, and set switches according to the number counted, and the sequence type detected. The maximum count possible for each of the two action sequences is 16, but it is unlikely that such a count is viable in practice, owing to the time taken to perform the switching action and the need to remember which output switch combination corresponds to which number. We consider that the practical limit for individual switch combination selection is about six.

For each individual switch combination selection, any combination of switch **On / Off** states may be specified, either latched or momentary.

This method of switch selection is used in standard **MultiSwitches** Models **MRMS1** and **MRMS2**, to which reference may be made for more information.

Sequential Switch Combination Selection

Each successive joystick movement selects the next output switch combination. The maximum number of successive combinations is 16. After the last available, the sequence reverts to the first.

For each successive step, any combination of switch **On / Off** states may be specified, and each state latches until changed by a subsequent step.

This method of switch selection is used in standard **MultiSwitches** Models **MRMS3** and **MRMS4**, to which reference may be made for more information.

Before Ordering a Bespoke MultiSwitch

- 1 Work out how many switches you want to control, and the different switch combinations you require.
- 2 Then decide what joystick actions you would like to use to achieve each of these switch combinations. Remember that you can use either **individual** or **sequential** control and that both **Neutral-Maximum** and **Neutral-Minimum** joystick operations are available.
- 3 Then Email *Timpdon Electronics* with a detailed list of your requirements to

electronics@timpdon.co.uk

If possible, include a telephone number so that we can contact you.

We will examine your requirements and let you know whether what you want is possible to achieve before you actually place an order.

Cost

There is a standard once only charge for designing a bespoke **MultiSwitch**.

At present [June 2011] this is **£20.00**.

This charge is in addition to the cost of each **MultiSwitch** ordered which, at June 2011, is **£25.00**.

We will inform you of the current charges before you place your order.