

RadioSwitch Model **RSW11** is a microprocessor controlled digital single pole **on / off** switch for the control of switched auxiliaries on a radio controlled model railway vehicle using standard 27 MHz, 40 MHz or 2,4 GHz RC equipment.

It is designed to plug directly into any channel output of a radio control receiver, in place of the more usual servo.

The **RSW11** replaces the original **RadioSwitch**, Model **RSW1**.

Features

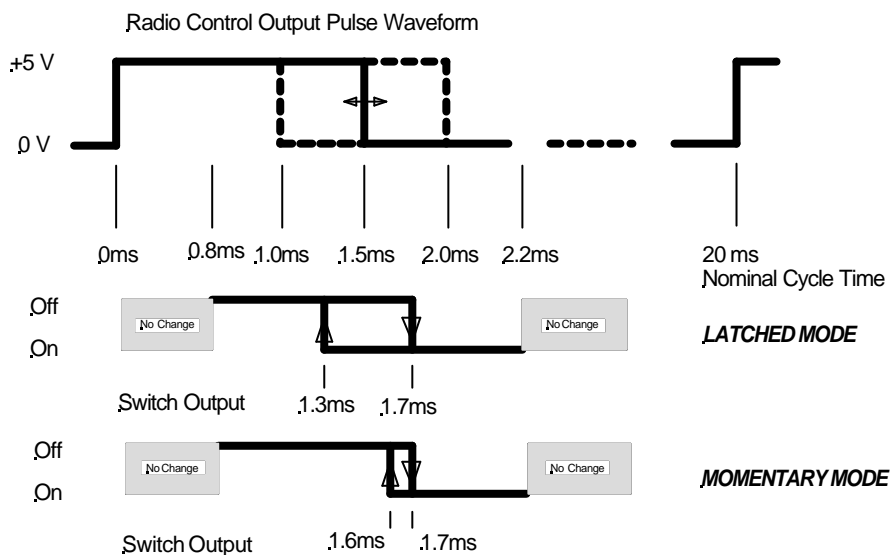
- Digital radio controlled solid state switch.
- Single pole **on / off** switch.
- Advanced microprocessor controlled circuit.
- Small size – 35mm x 14mm x 14mm.
- Control power supplied by RC receiver.
- Screw terminal connections to output load.
- Servo plug connection to RC receiver.
- 1 A maximum continuous output load current, at up to 24 V maximum supply voltage.
- Automatic calibration of RC transmitter centre off setting to eliminate need for transmitter adjustment.
- Automatic rejection of transient RC receiver noise to eliminate output glitches.
- Two link selectable operating modes, LATCHED and MOMENTARY.
- Three output states in LATCHED mode, when used on a proportional RC channel:
 - Switch ON
 - Switch OFF
 - No Change
- Retains last valid output state if RC transmitter turned off.

Radio Control Principles

The nominal output of each proportional RC receiver channel to its servo is a variable width pulse of between 1.0 ms and 2.0 ms, repeated at intervals of 20 ms. A pulse width of 1.0 ms corresponds to the minimum setting of the transmitter control lever and a pulse width of 2.0 ms corresponds to maximum. The pulse width varies smoothly between minimum and maximum settings. On a proportional transmitter channel with a centre detent **off** position, this corresponds to a pulse width of 1.5 ms.

On a digital channel, only two pulse widths are transmitted, 1.0 ms or 2.0 ms, corresponding to **off** and **on** conditions, or vice versa.

RadioSwitch Operation



This **RadioSwitch** model is designed to switch a single load output.

The output will turn **on** only as the RC pulse width moves away from the centre **off** position towards the **maximum** pulse width setting.

The pulse width setting at which the output is turned **off** depends on the operating mode, **latched** or **momentary**, which is link selectable – see below.

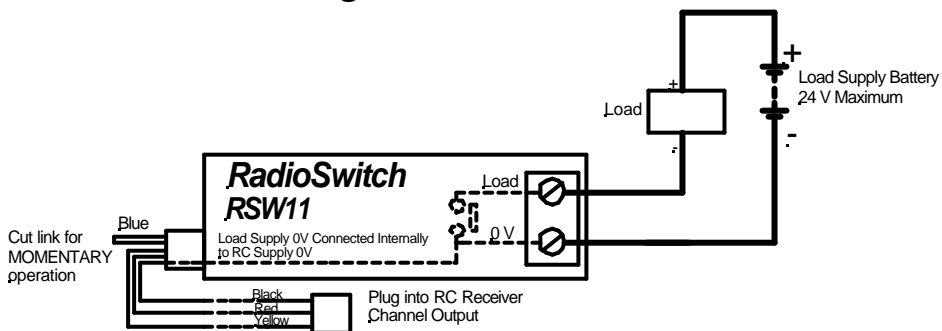
In **latched** mode, the **off** pulse width setting is set below the centre **off** position, to permit the **RadioSwitch** to remember the last setting when used on a proportional RC channel. In the centre **off** position no change is made to the last valid switch setting.

In **momentary** mode, the **off** pulse setting is set above the centre **off** position of a proportional RC channel, so that the output is turned off when the control lever is returned to the centre **off** position.

The **RadioSwitch** may also be used with a digital RC channel. In this case, there is no difference in operation between **latched** and **momentary** modes. The output will turn **on** when the transmitter output is set to **maximum** pulse width, and **off** when set to **minimum** pulse width.

For both proportional and digital RC channels, no switch setting change is made if the RC pulse width is outside the range 0.8 ms to 2.2 ms. This permits the RC transmitter to be switched off without affecting the last valid switch setting.

Installation and Wiring



Notes

- 1 Connect the **load** between the **Load** terminal and the **Load Supply Battery Positive** terminal. If the load is polarity sensitive, make sure that the **positive** load connection is made to the **V+** terminal.
- 2 Connect the **0V** terminal to the **Load Supply Battery Negative** terminal. Note that the **0V** terminal is internally connected within the **RSW11** to the **0V** connection of the RC receiver.

- 3 Plug the RC servo connector directly into the required channel output of your radio receiver. If the plug supplied does not match the socket on your RC receiver, wiring colours for a replacement are as follows:

Red	+5V supply
Yellow	RC Servo Pulse Output
Black	0 V supply

Operating Modes

As described above, the **RadioSwitch** has two operating modes, **latched** and **momentary**. The **latched** mode is intended for use with output loads which may be energised permanently, such as lamps. The **momentary** mode is intended for use with loads which are normally energised only transiently, such as horns.

The **RadioSwitch** is shipped with the **latched** mode enabled. To convert to **momentary** mode, **cut the blue wire link** shown in the connection diagram.

Automatic Transmitter Calibration

The **RadioSwitch** includes provision for automatic centre **off** position calibration to match any RC transmitter, when used with a proportional RC channel, thus avoiding the need for manual adjustment of the transmitter control lever settings.

On power up, the **RadioSwitch** will wait for four seconds before responding to any pulse from the transmitter, to ensure that the receiver has had time to bind to the transmitter.

If, thereafter, the **RadioSwitch** immediately detects an RC pulse with a pulse length of between 1.30 ms and 1.70 ms, it will take that pulse length as the centre **off** condition, and calibrate itself accordingly. This calibration will be saved in permanent non-volatile memory within the **RadioSwitch** and will be retained even after the **RadioSwitch** is turned off.

If, subsequently, the **RadioSwitch** is powered up without RC communications present, this saved centre **off** setting will be restored.

You will normally only need to perform a re-calibration if you change your transmitter, or make other adjustments, such as a gain or trim change, to its settings.

On a digital RC channel, where the transmitter output must correspond to either maximum or minimum pulse width settings, no automatic calibration can be performed, and the system calibration will be automatically set using nominal pulse width settings.

To Perform an Automatic Calibration on a Proportional RC Channel

- 1 **Turn on** the RC Transmitter.
- 3 Set the transmitter control lever to the **centre off** position.
- 4 Then **turn on** the radio receiver and **RadioSwitch**.
- 5 The **RadioSwitch** will wait for four seconds to ensure that the receiver has had time to lock to the transmitter, and then perform an automatic zero calibration, setting the current RC transmitter control lever position to correspond to **centre off**. The calibration will be stored in permanent memory. Normal operation will then be established automatically.

Notes

If you make any transmitter adjustments such as changes to gain or trim controls, you may need to perform a re-calibration.

Receiver Noise Suppression

To eliminate output glitches caused by transient noise on the RC receiver, the **RadioSwitch** is fitted with an advanced glitch suppression system. A new output switch setting will be made only if **all** of the following conditions are true:

- 1 The received RC pulse width is between 0.8 and 2.2 ms.
- 2 The interval between successive RC pulses is between 15 and 25 ms.
- 3 Three consecutive RC pulse widths correspond to the same RC transmitter control lever setting.