User Notes

Timpdon Electronics

RadioSwitch Model *RSW12*

RadioSwitch Model ***RSW12*** is a microprocessor controlled digital **on / off / on** changeover switch for the control of switched auxiliaries, such as vehicle head and tail lights, 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 ***RSW12*** is a new improved version pf the original ***RSW2***, which it replaces.

Features

- Digital radio controlled solid state switch.
- Single pole changeover **on / off / on** switch, with centre **off** position.
- Advanced microprocessor controlled circuit.
- Small size – 40mm x 18mm x 13mm.
- Control power supplied by RC receiver
- Screw terminal connections to output loads.
- Servo plug connection to RC receiver.
- 1 A maximum continuous load current on each output, 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.
- Four output states, when used on a proportional RC channel:

  Switch 1 ON
  Switch 2 ON
  Both switches OFF
  No Change

- Retains last valid output state if RC transmitter turned off.

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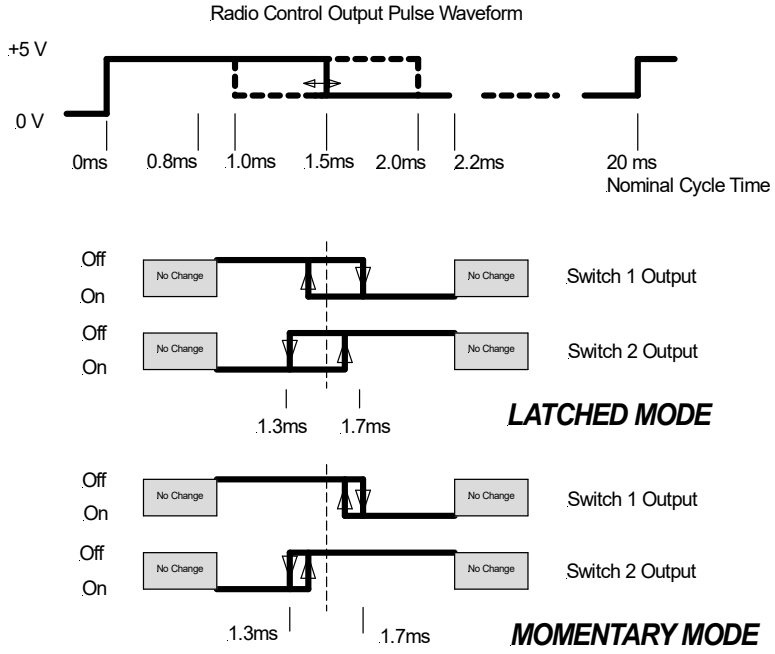
Radio Control Principles

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 energise one of the two load outputs at any one time and is ideal for the operation of, for example, vehicle head and tail lights, where two separate circuits are required, only one of which is energised.

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 and RC receiver.

2 Set the transmitter control lever to the **centre off** position.

3 Then **turn on** the radio receiver and ***RadioSwitch***.

4 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.

Note

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.

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One of the two outputs only will turn **on** as the RC pulse width moves away from the centre **off** position towards the **maximum** or **minimum** pulse width setting.

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

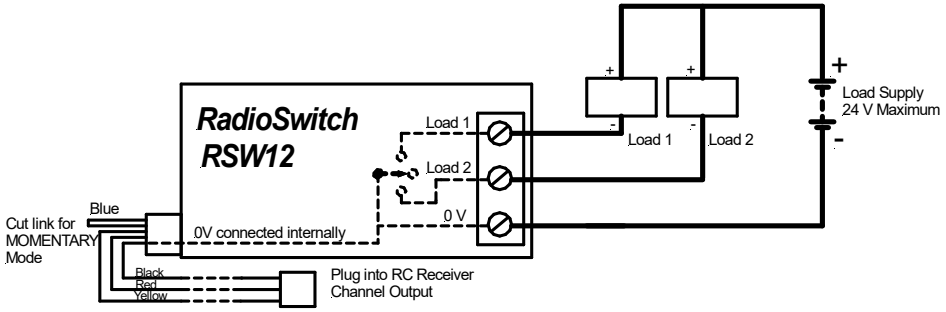
In **latched** mode, each **off** pulse width setting is set on the opposite side of the centre **off** position to that which turned the output **on**, to permit the ***RadioSwitch*** to remember the last setting when used on a proportional RC channel. In the centre off position, no change is made to the last valid switch setting.

In **momentary** mode, each **off** pulse width setting is on the same side of the centre **off** position to that which turned the output **on**. In this case, the output will be switched **off** when the control lever is returned to the centre **off** position.

When used on a digital RC channel, one of the two output switches will always be **on**.

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 two **loads** between the **Load 1** and **Load 2** terminals and the **Load Supply Battery Positive** terminal. If the loads are polarity sensitive, make sure that the **positive** load connections are made to the **positive** supply.

2 Connect the **0V** terminal to the **Load Supply Battery Negative** terminal. Note that the **0V** terminal is internally connected within the ***RSW12*** to the **0V** connection of the RC receiver.

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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	+5 V 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 which 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 installation and wiring 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.

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