Technobots Ltd
Robotics, Models &
Technology Supplies

DUAL RC RELAY

3400-042 TYPE A

INSTALLATION INSTRUCTIONS

Designed and manufactured in the UK by
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INTRODUCTION

This unit allows the signal from a standard radio control receiver to independently activate a pair of relays, each capable of switching up to 10amps at 30volts for the control of lamps, motors, bilge pumps, solenoids, sound effects etc..

This is an alternative method to that often used of fitting a servo with a cam to operate a microswitch at some point on its travel. A further benefit is that this unit's software allows the user to optionally configure the switching action to be latching or non-latching (momentary). Latching action is mainly used for circuits intended to stay ON the majority of the time (lights, smoke generators etc..) whereas non-latching is mainly used for circuits that will only be switched ON briefly (sound effects, bow thrusters etc..).

As this is a dual switch unit, it is intended for use with a (spare) proportional channel of the receiver to allow the user to operate the relays independently i.e. moving the transmitter joystick in either direction from centre operates the appropriate relay.

If used on a switched digital channel of the receiver, both relays operate simultaneously and in opposition (ie one ON and the other OFF, then vice versa). This is not recommended.

A dual switch unit, like this one, can be wired up to give simple forward/reverse/stop control of a motor – be it a robot buggy, a bow-thruster in a model boat or the head on your R2D2. A wiring diagram for this application is included later in this guide.

SPECIFICATION

Receiver voltage range:	(servo socket) 4.4 to 6v
Receiver Channel:	A single proportional channel allows independent operation of each relay (1.5mSec neutral assumed) Use of a single switched channel will result in simultaneous operation of the relays in opposition
Relay Contacts:	Two single pole changeover relays rated 10amp, 30volt. Beware that inductive loads can draw far more current at switch on that its nominal rating which should be taken into account

Operating it current: 130mA max (both relays energised)

Operating Modes: Each switching channel may be configured for latching or non-latching operation by its jumper link

Loss of / Invalid Signal: Both relays turn OFF and twenty consecutive 'good' pulses (less than 0.5 sec in total) must be received before normal operation resumes

Switch-on Delay: At power-up, both relays are held in the OFF state for a period of 4 seconds. This is to allow time for RC receivers (particularly 2.4GHz and PCM types) to stabilise/lock-in, to prevent inadvertent operation of the attached loads at power up

RELAY INFORMATION

Each relay has a single pole changeover (SPCO) set of contacts. These are completely isolated from the receiver circuit and may be wired up in exactly the manner that an ordinary switch would be.

The label on the unit identifies the two sets of relay contacts RL1 and RL2, accessible through the milled slots in the case at the screw terminal blocks. They are labelled as NC (normally closed), COM (common) and NO (normally open). When a relay is OFF, the COM contact is connected to the NC contact. When a relay is ON, the COM contact is connected to the NO contact – the latter are the pair of contacts most frequently used to simulate an ordinary switch.

The switched loads may be wired as desired using the main battery in the system or indeed other batteries of different voltage(s) to suit the load(s). Conventionally, loads are connected to ground (0v) and their 'hot' side is connected to the appropriate power source via the relay contacts.

OPERATION

Trip Points

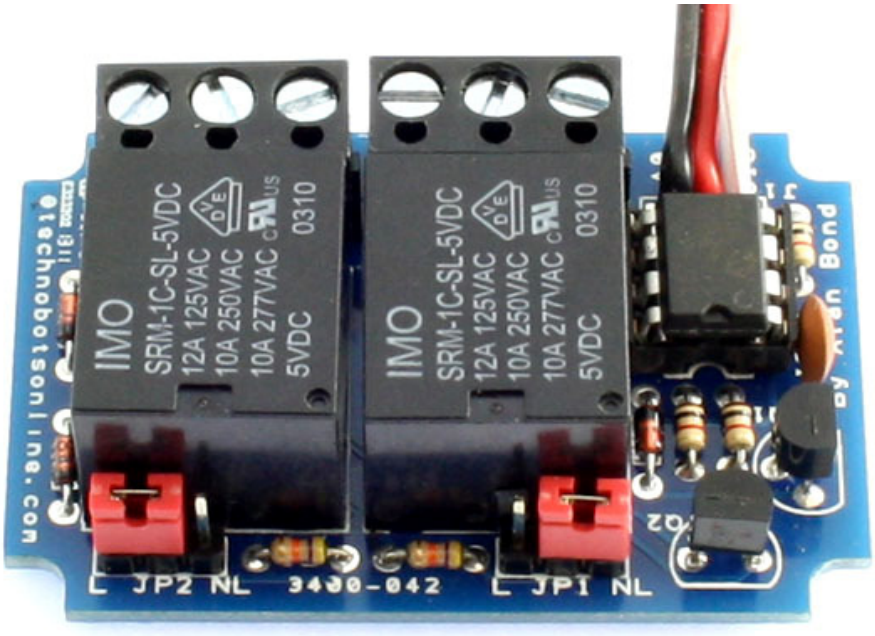
The trip points (for operation of the switches) are set to be at about 40% of the joystick's travel (from centre) such that adjusting the other channel sharing the same joystick is unlikely to cause unintended operation of the switches. The span and offset on individual transmitters may serve to vary the trip points a little.

An amount of hysteresis or 'dead-band' has been applied to the trip points. This prevents relay chatter if the stick is held at the trip point and receiver noise varies the pulse width slightly – so for example in the non-latching mode of operation the relay turns ON at about 40% of stick travel (from centre) but doesn't turn OFF until below about 20% of stick travel.

Latching Mode
Moving the joystick to the trip point turns the relay ON. The joystick can then be returned below the trip point (usually to centre) and the relay remains ON. Now moving the joystick back in the same direction past the trip point causes the relay to turn OFF.

Non-Latching Mode
Also referred to as 'momentary' operation. Moving the joystick to the trip point turns the relay ON but it only remains ON until the joystick is released back to its central position. i.e the relay only operates whilst the joystick is held away from its centre position.

Mode Selection
Each relay may be set for LATCHING or NON-LATCHING operation by moving the red jumper link adjacent to that relay into the position marked “L” or “NL” on the printed circuit board. In the image below, the right hand relay RL1 is shown set (by JP1) to NON-LATCHING and the left hand relay RL2 to LATCHING by JP2.



To gain access to the jumper links, the case of the unit requires to be opened by removing the 4 screws on the underside.

Though it anticipated that the mode of each switch will set prior to installation, it is not necessary to remove power from the unit to adjust the mode(s) when required - the link positions are read immediately they are changed and the relays behave accordingly.

WIRING

Receiver

The unit takes its control signal and (5v) operating power for the micro-controller and relay coils via the white/red/black lead which is plugged into the chosen channel of the receiver. If using a BEC (battery eliminator circuit that may be integral with a motor speed controller or an external model) is capable of supplying the 130mA required + what ever other loads you have including the radio receiver.

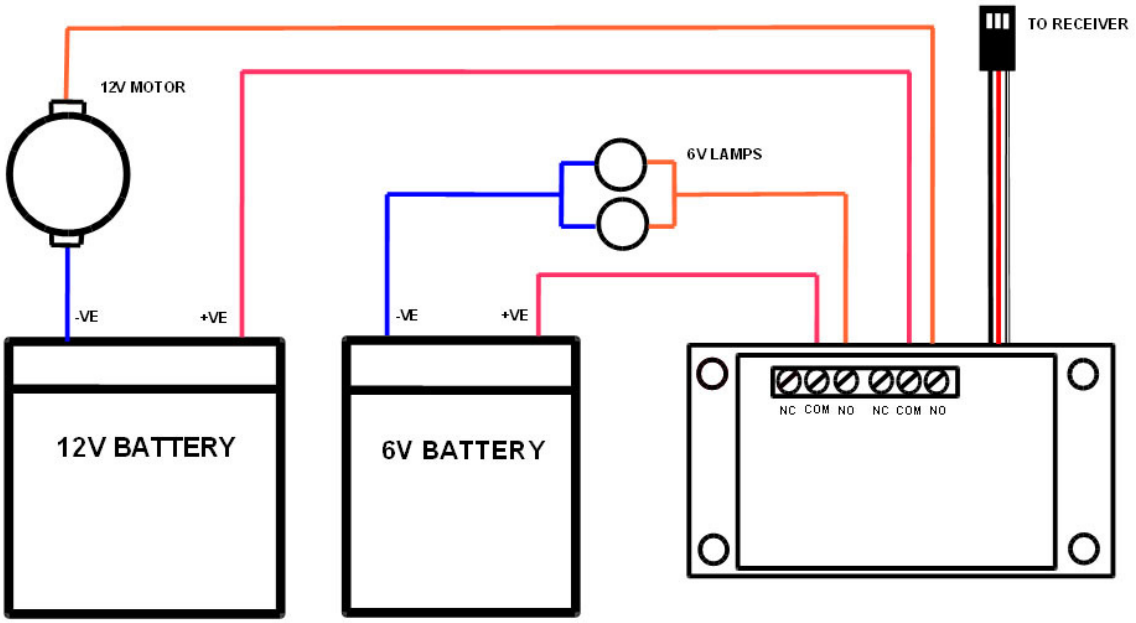
The assignment of the colours to functions of this cable is as follows:-

white = signal
red = receiver +ve (5v)
black = receiver -ve (0v)

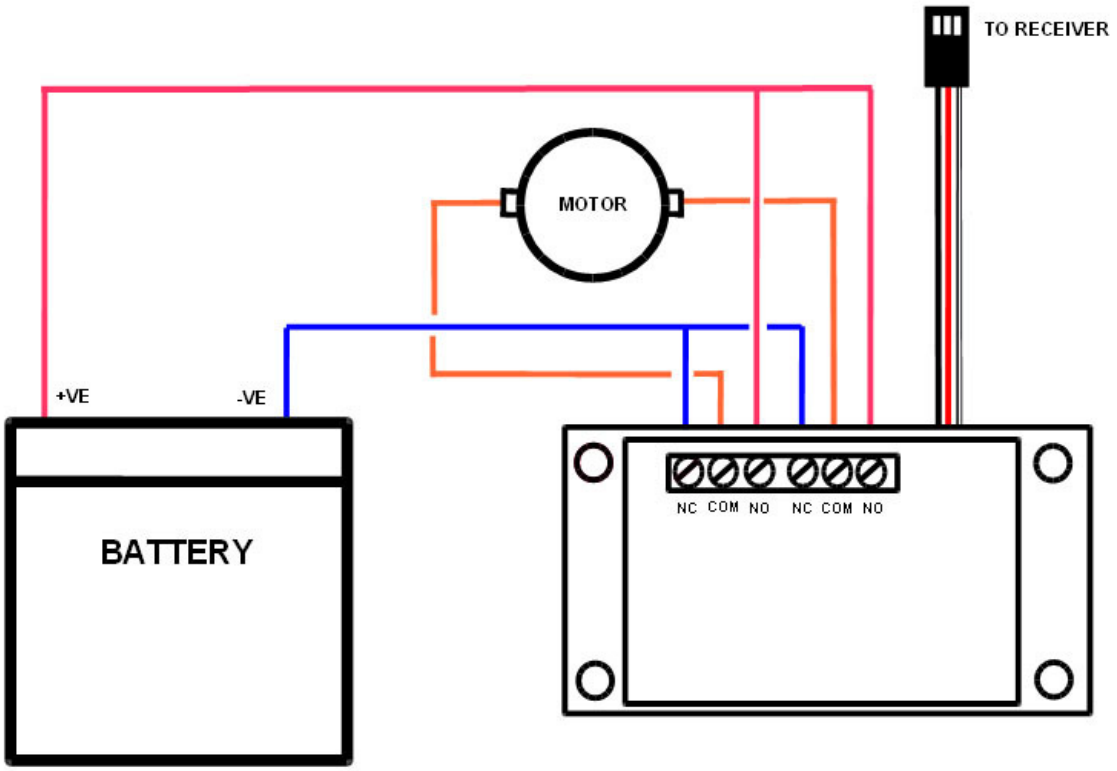
Adjacent to the white wire on the plug is a polarising flange which may need to be cut off in order for the plug to fit it into certain makes of receivers. *If so, extra care must be taken when inserting the plug into the receiver not to reverse the supply between the receiver and the switch unit as this will cause damage to one or possibly both units.*

Loads

The first diagram overleaf shows an example of how two different loads requiring different voltages can be wired to the unit.



The following diagram illustrates how the unit may be connected up to give simple bi-directional control of a motor, including stop. Both switches should be configured in non-latching (momentary) mode for this application.



TESTING AND SETTING UP

Before testing the unit, the latching / non-latching mode jumpers should be set to the desired state for each channel. As supplied the factory default setting is non-latching.

Initially, connect the unit to the receiver alone. Switch on the transmitter first, then power the receiver. Allow at least four seconds (switch-on delay period) for the unit to become active before operating the receiver.

Then move the joystick of the chosen channel and see if the relays operate in the expected positions described earlier. The relays will be heard to gently click when they pull in and drop out. This click may be easier to hear if the unit is firmly pressed onto a table or work surface which serves to amplify the sound.

Now the unit may be wired to the chosen loads in the chosen configuration and the function test repeated.

NOTES

If controlling motors in the forward/reverse/stop configuration, it should be noted that in the stop position the relay contacts short the motor terminals together. Thus with a motor running at high speed and especially if it is driving a high inertia load, shorting its terminals will cause it to stop extremely quickly (the so-called 'suicide' braking method) which could cause mechanical damage to the motor, its gearbox and/or load – quite apart from causing very high currents to flow from the motor through the relay contacts, again possibly damaging or reducing the life of either or both. In the same way, instantaneous reversing gives both the motor and the relay contacts a hard time.

In practice this is only an issue with heavy vehicles with excellent traction, which are more likely to be controlled by an ESC rather than this unit. In proving tests of the prototype unit both the relays and a selection of various motors/motor-gearboxes survived thousands of starts followed by further thousands of reversals without any failures.

Typically in marine applications water flow over a (suddenly) stopped propeller doesn't cause back-driving of the motor and the high currents associated with shorted dynamo action.

If the motor is wired up for unidirectional control through a single set of NO (normally open) contacts, then none of the foregoing applies.

FURTHER INFORMATION AND SUPPORT

As with all Technobots products, the RC Relay carries a 1 year warranty against manufacturing defects. Warranty does not include for failures caused by operating the RC relay outside of the specification.

For further product support please visit the technobotsonline.com website where you can view / ask questions on this RC Relay using the Q & A tab alongside the product description.