

P43

SINGLE RELAY SWITCH



This miniature single switcher will allow a single proportional stick movement to switch items on and off on radio controlled models. The drawing shows it connected to a sound unit, but it can also be used to switch bulbs, mini-horns and whistles etc. It has a non-latching relay output which enables a wide range of voltage operation. The relay output will handle 1 amp. It requires a 1 to 2 millisecond positive input. As this is standard on most radio control, it will work well with most.

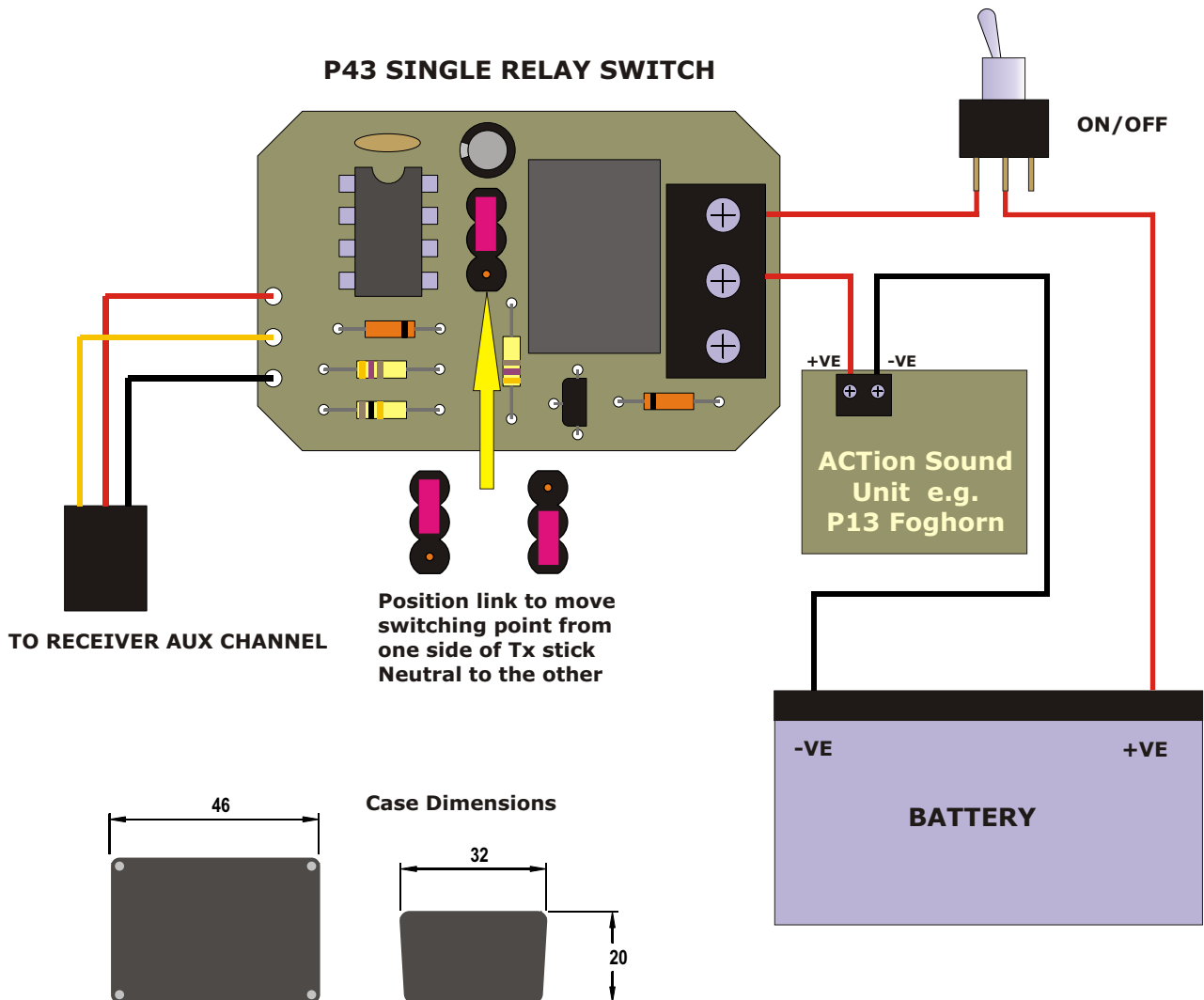
This unit can also be operated on a channel which is controlled by a two-way toggle switch on the transmitter e.g. Often labelled as "Retract" or "Flaps" switches

MICROCOMPUTER & MOSFET DESIGN

Number of switch functions
Radio control channels required
Switching points
Receiver voltage range
Maximum load current
Output connections

1 (Non-latching)
1
Moveable link
4.8 volts to 6 volts*
1 amp
Screw connectors

*Do NOT use a 5-cell rechargeable pack or 6v Lead-acid battery to power the receiver *directly*; it will fatally damage the unit. Power *via* a regulated 5v supply such as a BEC-equipped speed controller or ACTION power board will be fine.



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Number of switch functions	1
Radio control channels required	1
Switching points	Moveable links
Receiver voltage range	4.8 volts to 6 volts*
Maximum load current	1 Amp
Output connections	Screw connectors
Case size (external)	46mm x 32mm x 20mm

*Do NOT use a 5-cell rechargeable pack or 6v Lead-acid battery to power the receiver *directly*; it will fatally damage the unit.

Power *via* a regulated 5v supply such as a BEC-equipped speed controller or ACTION power board will be fine.

INSTALLATION

The adjustment of the link will depend on what type of transmitter control you are using. Simply move the link from position 'a' to 'b' to observe the change of switching point and select the most suitable position for your application, the type of load and the use. Examples of two types of load are shown on the diagram. Drill holes in the ABS case in a suitable position to allow the wires to pass into the screw terminal connectors without undue kinking, and use Velcro tabs to secure the case to the inside of the model.

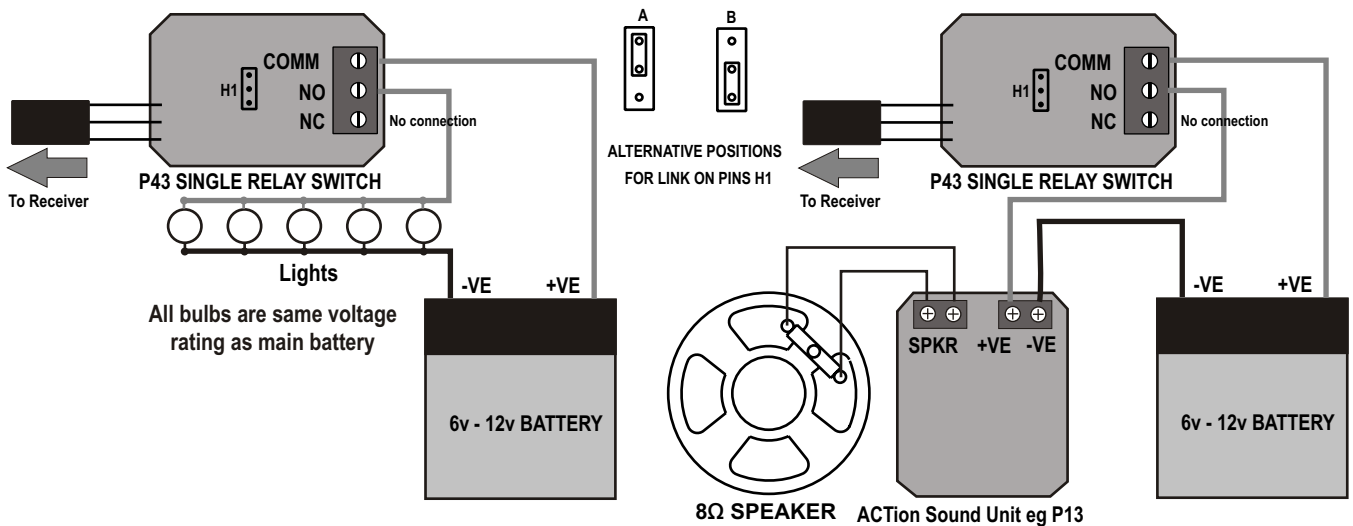
1. Plug lead into a spare R/C channel (i.e. Not steering or speed)
2. Switch on transmitter then receiver, in that order.
3. Moving the stick up and down (or left and right); you will hear the relay clicking.
4. Switch off receiver and transmitter
5. Connect to whatever load you wish to drive.

RECOVERY SERVICE

A recovery or repairs service ensures that you will not be left with a dead unit for any reason. The Service Charge for this item is £13.00 including parts (Post free within the UK).

All returns should include full Credit Card details (Name & Address of cardholder, Card number, Expiry date and 3-digit Card Security Number)

ACTION R/C ELECTRONICS, 1 Llwyn Bleddyn, Llanllechid, Bangor LL57 3EF, United Kingdom



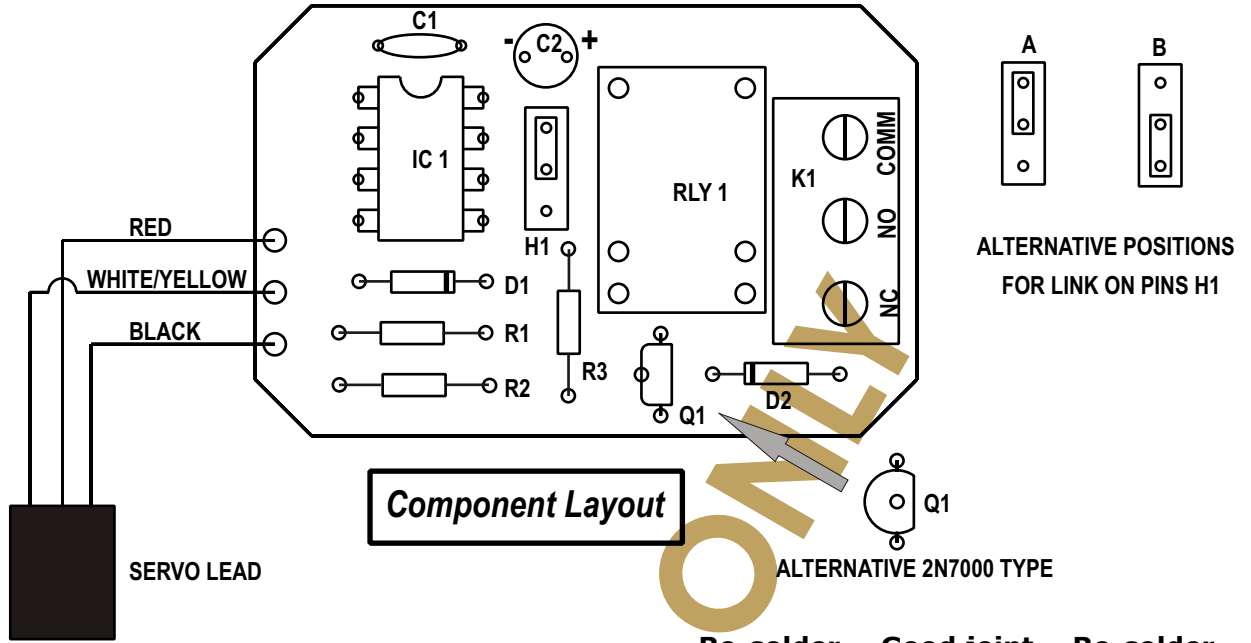
Sound units are polarity-critical! Take care to connect the battery correctly!

The small print.....

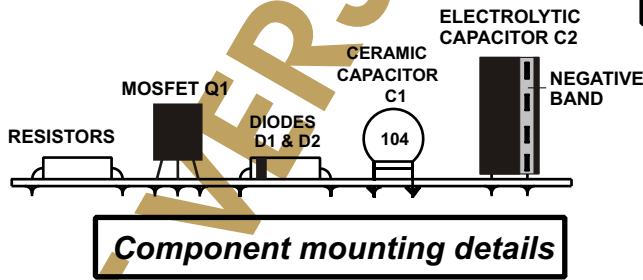
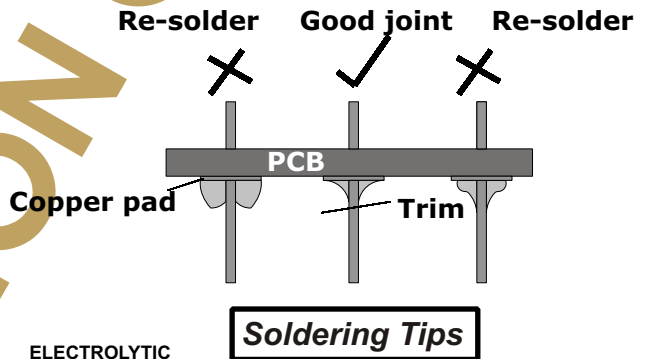
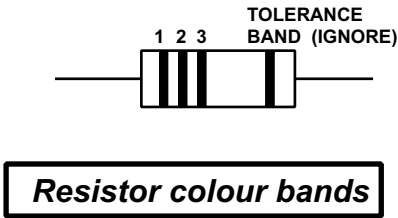
ACTION R/C Electronics guarantee all products to be free from manufacturing defects for 12 months from date of purchase. This does not cover suitability for specific applications; components worn or damaged by use, tampering or incorrect connection; alteration to original components; damage to batteries or other equipment through use; misuse, or shipping damage. Where goods are found to be faulty, the customer shall return them to ACTION R/C Electronics in their original condition and with their original instructions, packaging etc. Our liability is limited to repairing or replacing goods to their original specification and will not exceed the cost of the goods. By using the product the user accepts all liability. Where a fixed repair charge is applicable, ACTION R/C Electronics shall undertake repairs to the extent that they are judged economically viable. Where such is not the case then the customer will be offered the option of crediting the repair charge towards the cost of a new unit or having the faulty unit returned and the charge refunded (less the cost of return carriage). We reserve the right to modify this guarantee without notice.



P43 SINGLE RELAY SWITCH
Instructions for kit version



Component Layout



PARTS LIST

- IC1, 12C508 (programmed) MICROCONTROLLER IC (TAKE CARE WHEN HANDLING)
- Q1, BS170P OR 2N7000 FET (TAKE CARE WHEN HANDLING)
- D1,2, 1N4148 SIGNAL DIODE (NOTE DARK BAR)
- R1,3, 470 OHMS 1/4 WATT RESISTOR (YELLOW/MAUVE/BROWN)
- R2, 100K 1/4 WATT RESISTOR (BROWN/BLACK/YELLOW)
- C1, 0.1 uF CERAMIC CAPACITOR (marked 104)
- C2, 2.2 uF ELECROLYTIC CAPACITOR (marked 2.2 uF)
- H1, 3 PIN HEADER with shorting link
- RELAY1, 5 VOLT COIL ,1A CONTACTS; SPCO TYPE
- PCB, TYPE P43
- K1, 3 WAY SCREW CONNECTOR BLOCK
- CASE, Type RX2007 supplied with 4 self tapping screws
- SERVO LEAD, JR/HITEC generic type supplied; alternative FUTABA-type plug shell also included.
- WIRE, Not supplied with kit. Type will depend upon the item to be switched.

P43 KIT INSTRUCTIONS

TOOLS

For construction you will require a soldering iron (anything between 15 to 30 Watts with a thin pointed bit) and flux cored solder (22 SWG recommended). A small screwdriver, for screw connectors, a small pair of wire cutters to trim wires and a small file to work on the case covers all the tool requirements, plus a good level of lighting.

PCB

The PCB for this project is fully prepared and requires no further work.

PARTS

DO NOT HANDLE ITEMS IN BLACK CONDUCTIVE FOAM UNTIL INSTRUCTED. (MOS DEVICES)

- The PCB has an insulated (Component Side) and a tinned track side. Components are mounted on the insulated side and soldered on the track side.
 - The resistors are the two-wire items with colour bands. R1, & R3 are the same value (470 Ohms) and R2 is 100K in this kit. The colour code can be read with reference to the PARTS LIST. The drawing shows the order in which the colour codes are read. The layout drawing shows the mounting positions and orientation.
 - The 8-pin integrated circuit IC1, has its type code printed on it. The black moulded 8-pin IC socket supplied with the kit enables the builder to mount the IC by soldering in the socket then fitting the IC as the last operation in construction. Both the IC and the IC socket have a notch moulded in to determine which way round they are fitted.
 - The IC is a CMOS device, supplied mounted on conductive foam (together with Q1, which is a MOSFET). These components should be left attached to the foam for protection against static electricity until they are required at the end of construction.
 - The tiny glass diodes D1 & D2 have a dark bar at one end, shown on the layout drawing as a black band.
 - The tiny component with two wires from one end (normally blue in colour) and marked 104 is a ceramic capacitor.
 - The cylindrical electrolytic capacitor C2 has a band marked down one side with a (-) negative or minus sign on it; this signifies the negative (-) lead. The long lead is the positive (+). The + & - signs are marked on the Component Mounting Details and Layout drawings.
 - The 3-pin header H1 is a short piece of plastic with 3 gold pins protruding each side. The short pin side is soldered to the PCB and the long pin side is where the little shorting links fit. The shorting link is a small square of plastic with twin sockets moulded in. They are supplied in various colours but all do the same job.
 - The small block components with 6 short solder pins is a relay RL1.
 - The 3-pin Screw Connector Block is easy to figure out for yourself; the name says it all.
 - FET device Q1 (marked BS170P or 2N7000) has three legs; the shape of the case is the key as to which way round it is fitted; the flat side of either type facing towards diode D2. The drawing shows this shape clearly.

CONSTRUCTION

Construction is very straight forward, the components being easy to fit in any order. For those who would prefer an order of building, the following should help.

- Fit and solder the 8 pin IC socket, noting the direction of the notch. The IC will be inserted into this socket as a later operation.
 - Fit the resistors in any order, into the right position with reference to the layout drawing. Each component when fitted and soldered, should have its spare lead length cut off.
 - Solder in diodes D1 and D2 ensuring that the dark bars are as per the layout. Clip off spare wire.
 - The 3-pin header H1 can now be fitted. Make sure that the short ends are soldered, leaving the long ends of the pins to take the shorting link which was supplied with the headers.
 - C1, the small ceramic capacitor marked 104, can now be soldered on to the PCB; cutting off the spare wire when completed.
 - The electrolytic capacitor C2 can be fitted and soldered now, ensuring that + and - are correct in accordance with the layout drawing. After soldering, clip off the spare wire.
 - Solder in the Relay at this point; it only fits one way round.
 - The 3-way screw connector block comes next. Ensure that the holes for the wires face the outside edge of the PCB. This point is mentioned because of a problem that an earlier constructor had when he reported that it was difficult to connect to them; he had fitted them back to front.
 - NOTES ON CMOS DEVICE HANDLING. USE A SHEET OF ALUMINIUM, COOKING METAL FOIL WILL DO.
 - Place it on the work surface. Place the PCB, solder side down on it. Place the BLACK CONDUCTIVE FOAM on it and rest your hands on it, holding them there while you read through this part of the instructions. The PCB, MOS ICs and YOU are now all at the same potential, i.e. any static voltage difference is now neutralised.
 - Fit and solder the MOSFET transistor Q1, cutting off the spare lead. The IC is the last part to fit. Insert into the IC socket which you fitted earlier, noting that the notch on the IC is as per the drawing. Push it down well to ensure that it is correctly seated.

WARNING - DO NOT use the black foam as a packing foam in the finished unit. It is CONDUCTIVE.

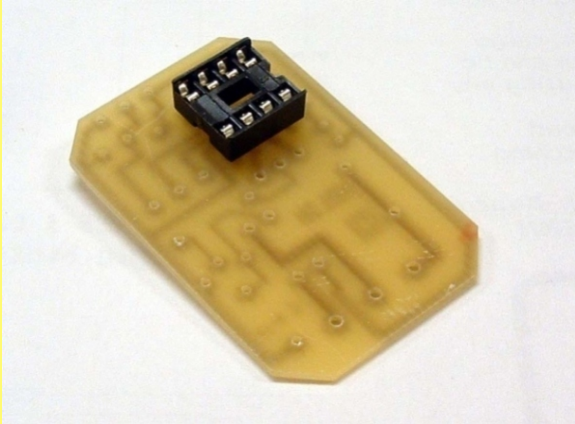
TESTING (Listen for the Clicks)

The output is what is termed a single pole double throw contact (SPDT). When a relay is off, the (COM) common connection is connected to the (NC) Normally Closed connection. When the relay is on, the (COM) common is connected to the (NO) Normally Open. The COM and NO contacts then become a simple switch and can be wired as such. Wiring to switch a sound unit and bulb (bulbs) is shown in the drawing.

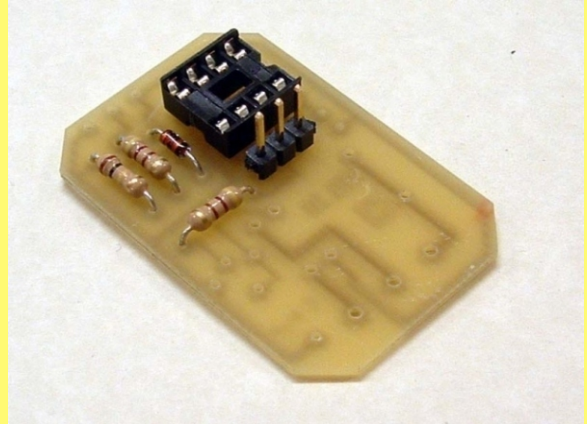
The shorting link described earlier can be fitted in either A or B position. A and B positions will move the switching point from one side to the other of a proportional switch channel. The unit can be tested for relay 'CLICK' even when no outputs are connected as the relay coil get its voltage from the receiver battery. If the servo lead on the input is connected to your radio receiver and your receiver and transmitter are switched on, the unit will be heard to click as you reach the switching points at one side or the other of neutral (centre stick). Probably the best test load would be a small bulb. If you do use a bulb, ensure that the battery voltage and the bulb voltage are the same. **NOTE THAT THE MAXIMUM LOAD CURRENT IS 1 AMP.**

P43 SINGLE RELAY SWITCHER

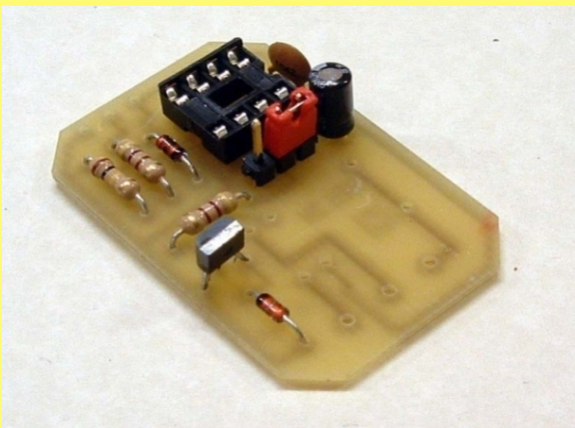
PHOTOGRAPHIC BUILD SEQUENCE FOR KIT VERSION ONLY



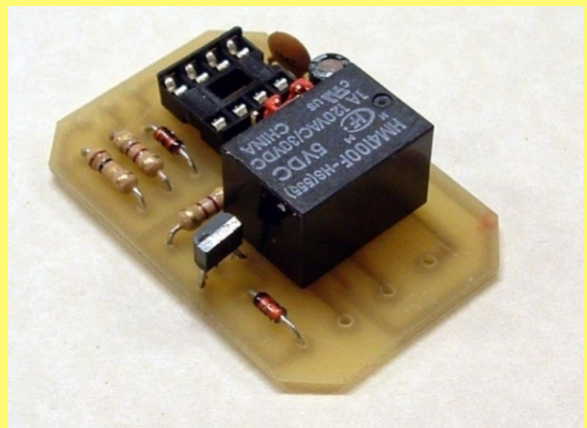
Picture 1 - IC socket fitted



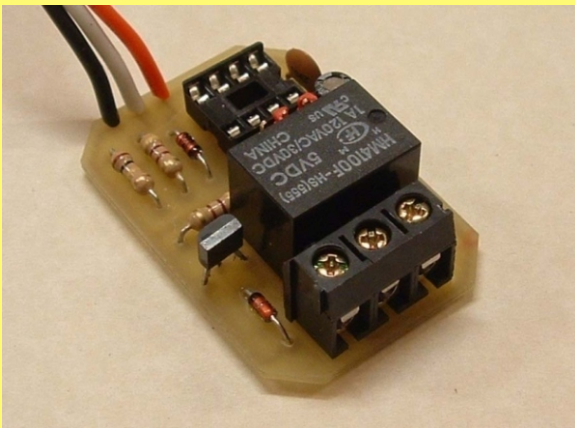
Picture 2 - Resistors, diode D1 & header



Picture 3 - Capacitors, MOSFET and diode D2



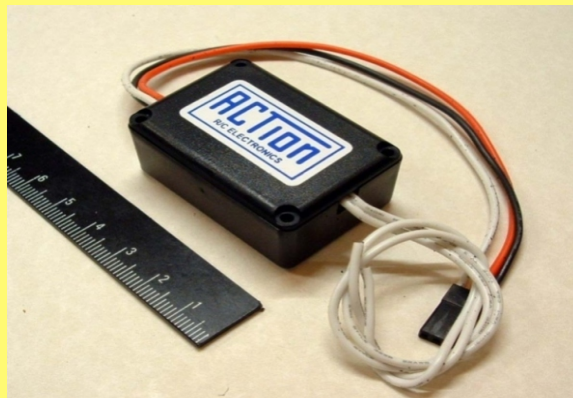
Picture 4 - Fitting Relay



Picture 5 - Fitting screw terminal block & servo lead



Picture 6 - Fit PIC chip; ANTI-STATIC PRECAUTIONS REQUIRED! File slots in case for cables



Picture 7 - Finished unit in case with sticker