P90

TWIN FLICKER

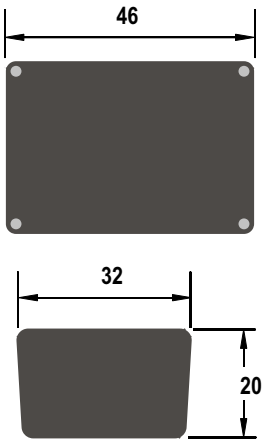
Lighting effects unit

ACTion R/C ELECTRONICS

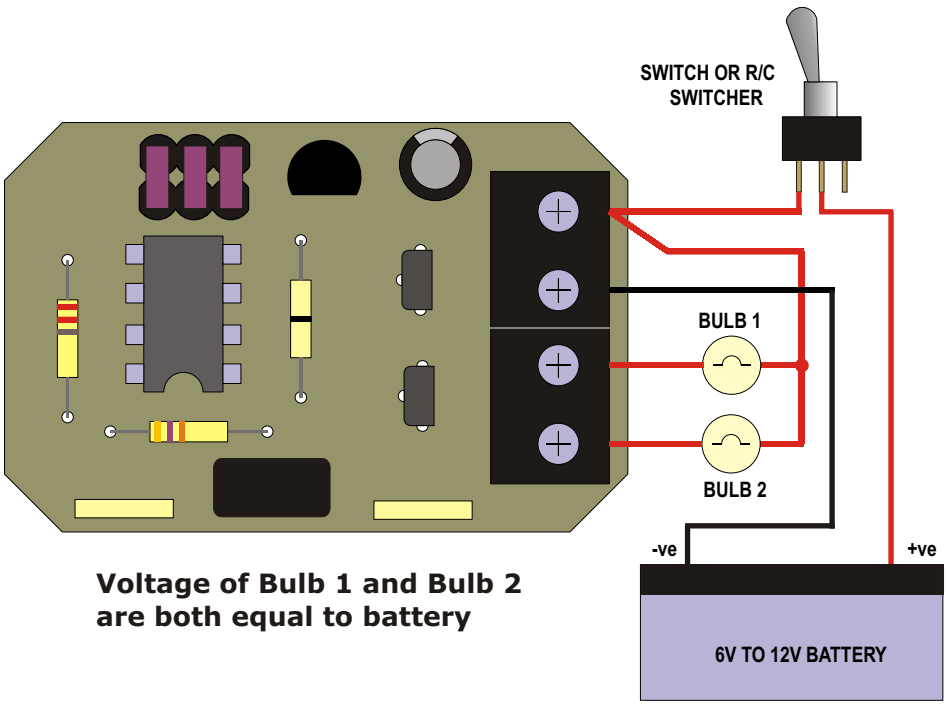
This microcomputer-driven unit can simulate such lighting effects as candlelight, oil lamps, fires, and arc welding. The versatility of the unit should ensure that it will be useful in a wide range of models including boats, caravans, doll's house fireplaces etc. It has two independent bulb drive outputs (separate random flicker on each) You can, of course, fit more than one bulb as long as the current load does not exceed 1/4 AMP (250mA); this equates to three Grain of Wheat bulbs on each output, or six bulbs in all. It requires a 6V to 12V power source and, of course, the bulbs must be right for the voltage you use. There is a rate adjuster on the PCB and a series of links to effect the change of function.

LINK 1	LINK 2	VR1	EFFECT
Yes	Yes	Adjust as required	Oil lamp (white lights)
Yes	No	"	Open fire (use red & yellow lights)
No	Yes	"	Arc welding (blue/white lights)
No	No	"	Candle (white light)

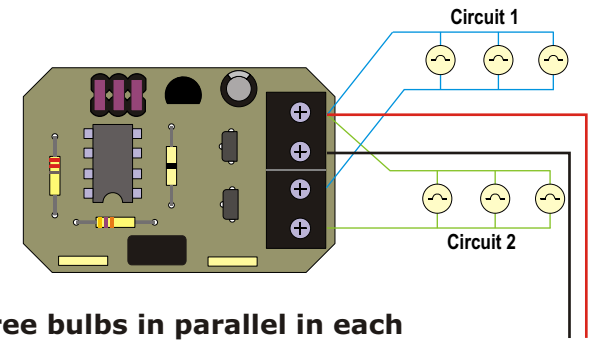
Link 3 effects the depth of flicker, or the depth of dimming of the bulbs if you like.



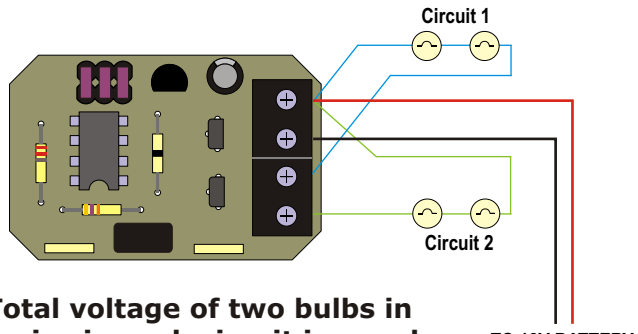
Case Dimensions



Voltage of Bulb 1 and Bulb 2 are both equal to battery



Three bulbs in parallel in each circuit are all equal to battery voltage e.g. All are 6v bulbs if battery is 6v



Total voltage of two bulbs in series in each circuit is equal to battery voltage e.g. All are 6v bulbs if battery is 12v

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SETTING UP AND INSTALLATION

Connect bulbs as shown on the wiring diagram. The power supply should be between 6v and 12v. Note that one wire of each bulb goes to the Positive + power terminal and the other wire goes to the outputs 1 & 2. Take care to get the polarity of the battery connections correct or you will fatally damage the unit. Drill suitable holes in the ABS case to enable the wires to reach the screw terminal connector blocks without kinks, and use Velcro pads to secure the case to the inside of the model.

LINK 1	LINK 2	VR1	EFFECT
Yes	Yes	Adjust as required	Oil lamp (white lights)
Yes	No	"	Open fire (use red & yellow lights)
No	Yes	"	Arc welding (blue/white lights)
No	No	"	Candle (white light)

Link 3 effects the depth of flicker, or the 'depth of dimming' of the bulbs if you like.

These links can be removed or fitted when the unit is running and their effects noted. Experiment with different combinations to get whatever effect you are looking for. VR1 can be adjusted to select the flicker rate that is suitable for your application. Use a fine screwdriver in the slot of VR1 as shown.

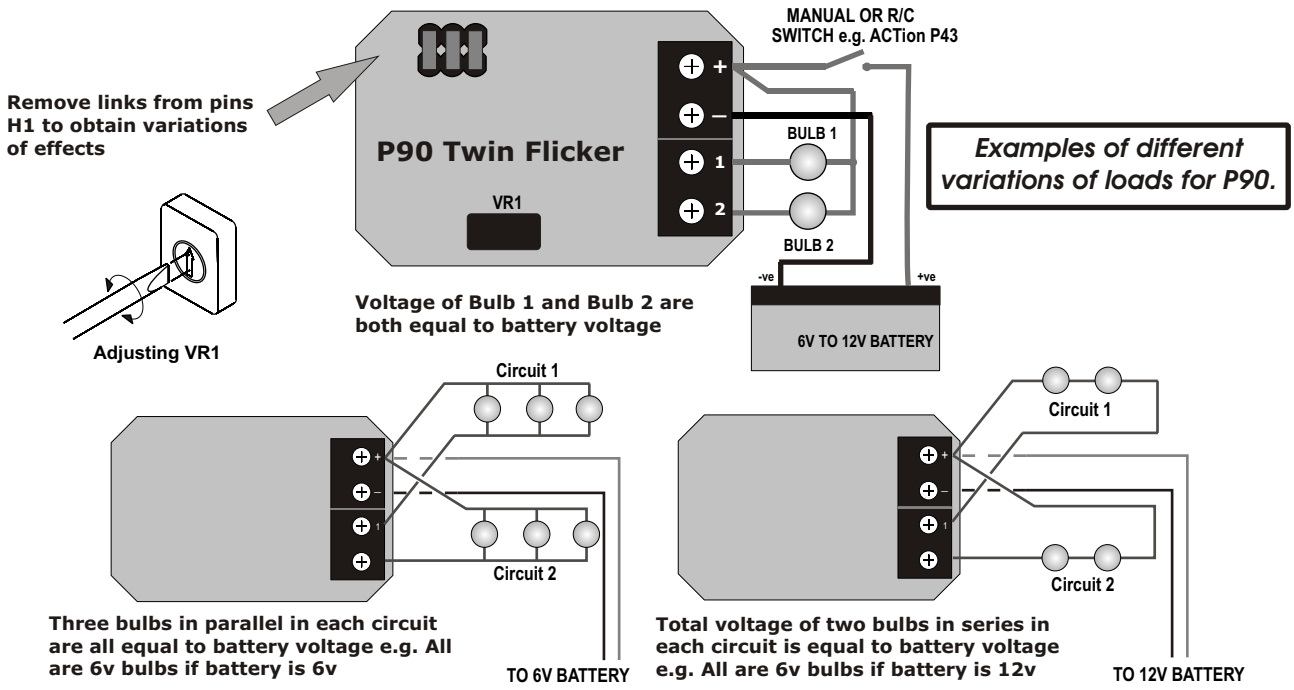
With the battery connected and all links fitted on 1,2 & 3 , your unit should be flickering like a pair of oil lamps.

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 kit is £13.00 including parts (including return shipping cost IN UK).

All returns should include full Credit Card details (Name & Address of cardholder, Card Number, Expiry Date and Card Security Number)

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

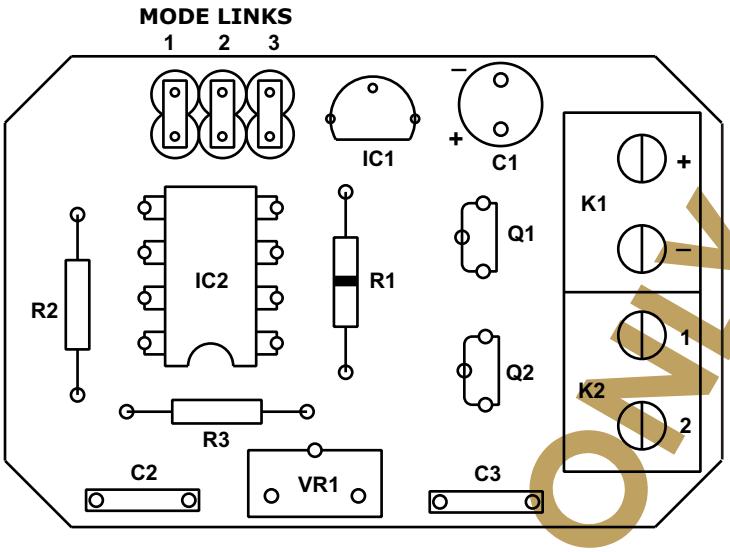


Units are polarity-critical! Take care to connect the battery correctly!

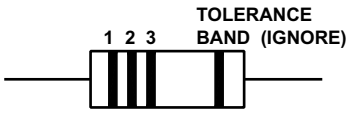
ACTion R/C ELECTRONICS

P90 TWIN FLICKER UNIT

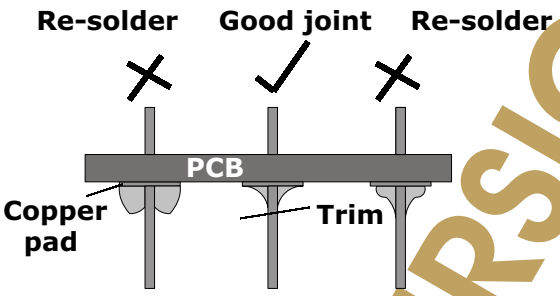
Instructions for Kit version



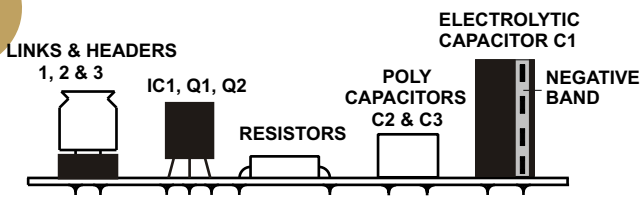
Component Layout



Resistor colour bands



Soldering Tips



Component mounting details

PARTS LIST

IC1	5v low-dropout regulator (various numbers from different manufacturers)
IC2	PIC12C508/04 (programmed) IC + 8 pin IC socket (see notes on handling)
Q1,2	MOSFET transistors (marked ZN2106A)
R1	Zero ohm resistor (one central black band)
R2	220 ohm resistor 1/4 watt (RED/RED/BROWN)
R3	47k ohm 1/4 watt (YELLOW/MAUVE/ORANGE)
VR1	1M miniature trimmer (adjuster)
C1	10uf min radial electrolytic capacitor
C2	0.1uf poly capacitor (marked .1 J 63)
c3	0.22uf poly capacitor (marked .22 J 63)
1,2,3	2 x 3-pin headers and 3 x links.
K1,2	2 x 2-way screw connector blocks (interlocking)
Case	Type RX2007
PCB	Type P90
Wire	Not supplied with kit - any fine flexible wire is suitable for bulb current

P90 KIT INSTRUCTIONS

PCB
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 PCB for this Project is fully prepared and requires no additional work. Look carefully at the area of the PCB you are working on when soldering to ensure that you do not apply an extra connection with a splash of solder

TOOLS
For construction you will require a soldering iron with a fine pointed bit and flux cored solder (22 SWG recommended); a small pair of wire cutters, a screwdriver to make connections and, of course, a good level of light.

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

- The short bars with colour bands and a wire at each end are resistors R1, R2, & R3. R2 is 220 Ohms (RED/RED/BROWN) and R3 is 47K Ohms (YELLOW/MAUVE/ORANGE) The third one with a single black band is a Zero Ohm resistor R1. The drawing shows the order to read the colours.
- The tubular electrolytic capacitor (C1) is marked with the value and working voltage; it also has a band down one side of the plastic sleeve with (-) Negative sign on it which signifies which leg goes to the negative. Capacitor polarisations (+ and -) are clearly shown on the drawing.
- The square white components with two wires on one face are poly capacitors. C2 (marked .1 J 63) is 0.1uF and C3 (marked .22 J 63) is a 0.22uF. They can be fitted either way round.
- The 3 legged black plastic moulded part with a half-moon shape looks like a transistor but is in fact an IC. It ensures a stable voltage for the microcomputer when running on any voltage from 6V to 12V. Note the curved side of it and fit as per the drawing. Although not an MOS device, care should be exercised when handling and fitting it.
- The 8-pin integrated circuit (IC1) is marked with its type code; see the drawing together with the Parts list. It is delivered in conductive foam and should be left in the foam until you are about to fit it. Being a MOS device, it can be damaged by static electricity and care must be exercised when handling. It is supplied with a socket. This will enable the builder to solder in the socket during construction, then fit the IC at the end of construction.
- The MOSFET transistors (ZN2106A) have three legs and a black plastic body with a silver printed side which is also slightly rounded at each side. These are MOS devices and care must be taken in handling. They must also be fitted as shown. Note the slightly-rounded corners on the component and ensure that they are fitted as in the drawing.
- The three-pin mouldings with long gold-plated pins one side and shorter extensions the other side are known as headers. The short-pin end goes through the PCB for soldering, leaving the long-pin ends sticking up. These are the pins to which you will fit the links. The link is the tiny moulding (normally red) with a metal strap inside it which shorts out the two pins when fitted. The three links are used to select the different characteristics of flicker being simulated.
- The square black moulding with a white circle in the middle and three pins is VR1; a variable resistor for flicker rate adjustments.
- The two 2-way screw connectors (K1 & K2) interlock to form a 4-way connector.

CONSTRUCTION
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, touch the metal with the soldering iron tip and then rest your hands on it, holding them there while you read through this part of the instructions. The PCB, any tools, the MOS IC and you are now all at the same potential, i.e. static-neutralised.
As few parts are used in the construction of the 'TWIN FLICKER', full construction notes aren't needed, just a few pointers:

- I would suggest that you fit the socket for IC2 first, it will help to give you your bearings as to what goes where. Note the small notch at one end of the plastic moulding and ensure that it is fitted as shown in the drawing, soldering all pins carefully.
- Resistors can be fitted any way round, as can C2 and C3, but C1 (10 uF electrolytic) must be fitted with care. The negative marked on the sleeve of it faces the outside edge of the PCB. When fitting and soldering the connectors K1, K2 note that the face with the holes for the wires must face the outer edge of the PCB so you can fit wires to them. That may seem obvious but it has been known to be done wrong!
- The adjuster VR1 will only fit one way round. You will have to press down firmly to ensure that it is flush with the PCB where the pins are a bit wider. When you fit IC1, note the curved side on the moulding of the component and make sure it matches the curve on the drawing to ensure that it is fitted the right way round.
- Fit the MOSFETS (ZN2106A) next. Note also the curved side of the MOSFETS on the drawing and ensure in each case that they go the right way round.
- The 8-pin IC should be plugged into the IC socket as the last operation of construction.

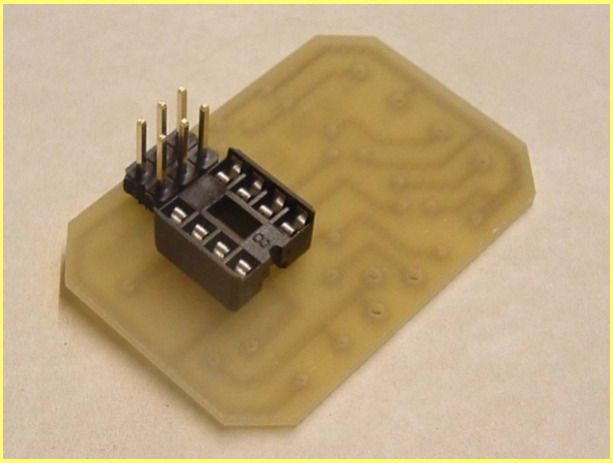
WIRING
Connect the bulbs as shown, one wire to an output and the other to Positive (+) screw terminal connection. When connecting the unit to the battery do make sure that you get the polarity correct. It takes only a moment to destroy this unit by getting this wrong, so check twice before connecting once.

The rear of the board can now be cleaned with something like an old toothbrush and some spirit cleaner. Meths will do but Isopropyl is very much better. Then check all over the soldered side of the board for good joints and no solder bridges between tracks or round pads. That's the PCB construction completed.

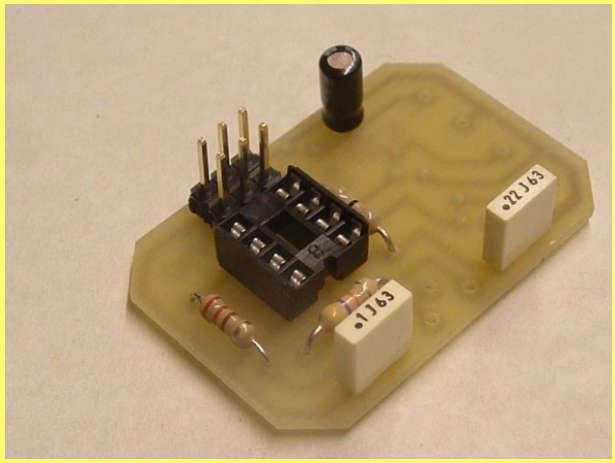
WARNING - DO NOT use the black foam as packing in the finished unit, it is CONDUCTIVE.

P90 TWIN FLICKER UNIT

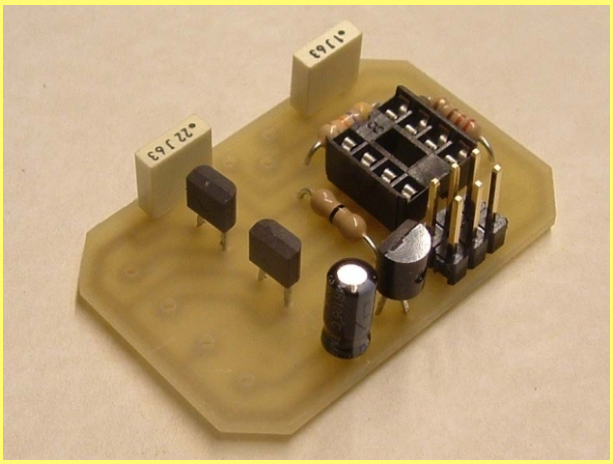
PHOTOGRAPHIC BUILD SEQUENCE FOR KIT VERSION ONLY



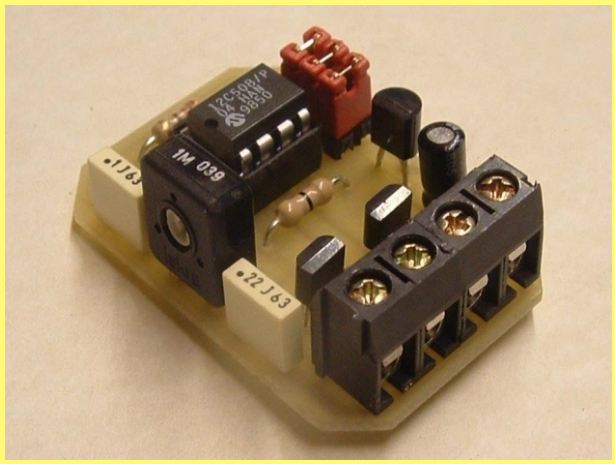
PICTURE 1: PCB with I/C socket & headers fitted



PICTURE 2: Resistors and capacitors added



PICTURE 3: Semiconductors fitted



PICTURE 4: Preset, screw terminals and PIC chip fitted NB ANTI-STATIC PRECAUTIONS ARE REQUIRED

PICTURE 5: File slots in case for leads. Fit lid and sticker