

# P64

## Micro Steam Engine Sound Multi-Cylinder version



This new and innovative "micro" Steam Engine Sound simulator is built around a tiny eight-pin microcomputer (PIC). It enables models running on just four pence NiCads at 4.8 Volts to have a steam engine sound with a sensible volume level.

Unlike all other engine sound simulators available, it follows the output of the radio control channel being used to control the speed controller (all others connect to the motor). It also has a connector to plug in the speed controller; this saves the use of a 'Y' lead.

It accelerates the puffing rate as you advance through the speeds in forward or reverse. The range is adjustable, as is sound level.

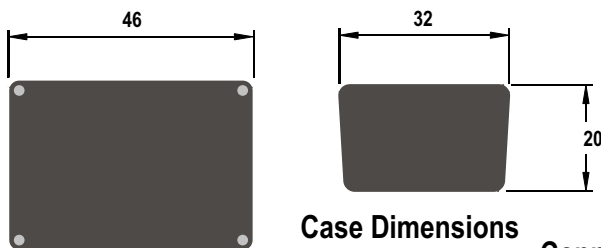
The unit will require a digital proportional radio control system with a 1.5mS centre stick value; this is pretty much industry-standard on all modern radio control. The "micro" Steam Engine Sound is designed to take its power from the receiver to operate very small speakers (1.5" or less), allowing the smallest of models to have sound! The maximum working voltage is 6 Volts and the minimum is 4.5 Volts. Please note that, in common with all ACTION engine sound simulators, this unit is NOT based on a digital recording; the sound is synthesized and would not really be suitable for large models.

### MICROCOMPUTER & IC DESIGN

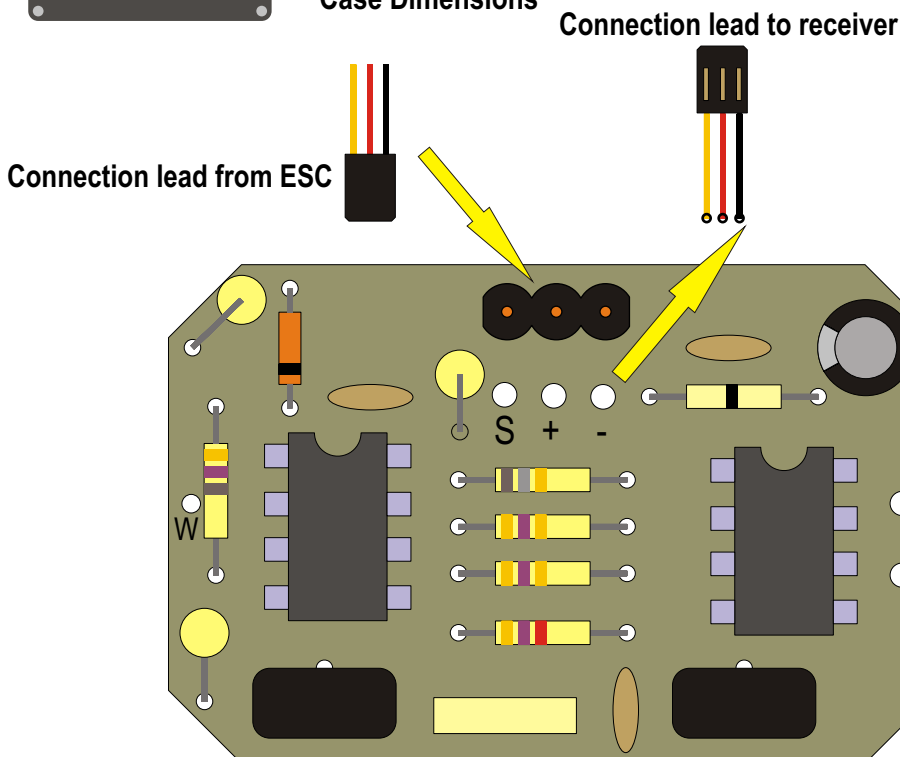
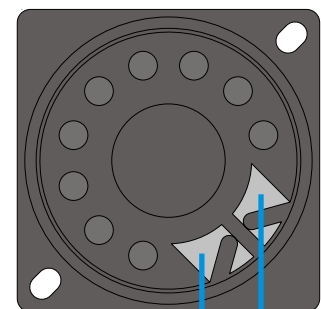
|                              |   |
|------------------------------|---|
| Receiver voltage (see above) | 4.8 volts (Rechargeable) or 6v(Alkaline)* |
| Maximum output (8 ohms only) | 0.5 watts                                 |
| Speaker impedance required   | 8 ohms                                    |
| Speaker size recommended     | 1.5 inch mylar or micro mylar 35mm        |

\*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.

The voltage of the main motor battery is not important.



Micro Speaker



**P64**

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|                              |  |
|------------------------------|--|
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| Maximum output (8 ohms only) | 0.5 watts                                |
| Speaker impedance required   | 8 ohms                                   |
| Speaker size recommended     | 1.5 inch mylar or micro-mylar 40mm x 5mm |
| Case size (external)         | 46mm x 32mm x 20mm                       |

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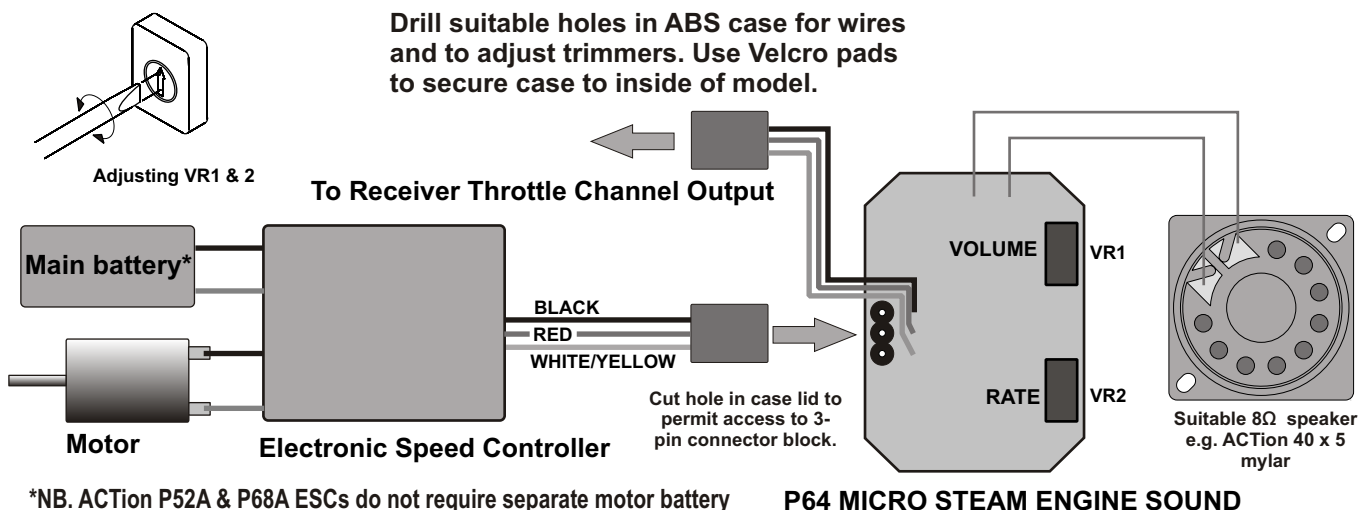
### CONNECTION & TEST(see DRAWING)

1. Ensure your receiver and transmitter are switched OFF before connection is made.
2. Connect the servo lead to your radio receiver speed/direction channel then connect the speed controller to the three pin connector as per drawing.
3. Connect the speaker wires to your speaker.
4. Switch ON your transmitter and receiver.
5. Adjust VR2 to give the max speed puffing rate and VR1 to adjust the volume level. Note small speakers can be easily overloaded. 40mmx 5mm mylar speaker should be at 1/3 volume and 1.5" mylar (1W) at 1/2 volume.

### 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**

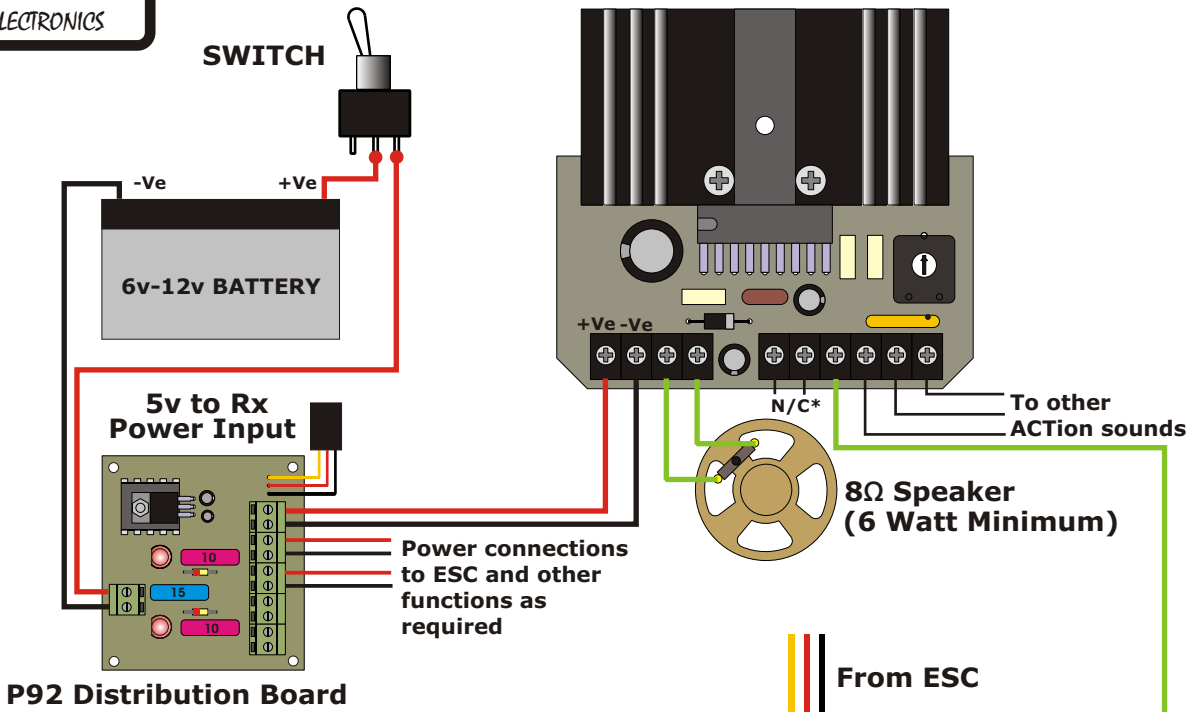


**ACTION units shown are polarity-critical! Take care to connect them correctly!**

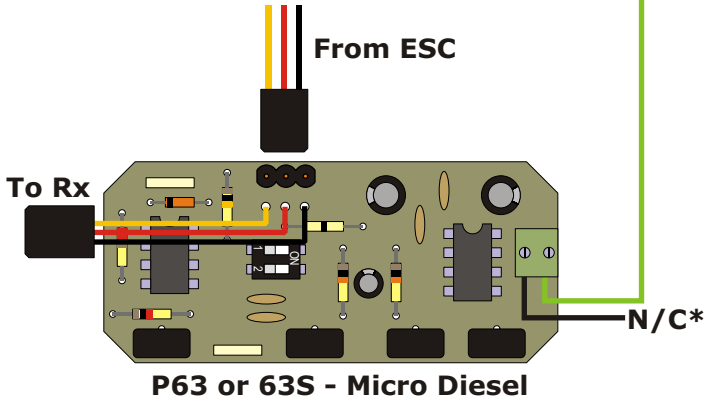
The small print.....

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.

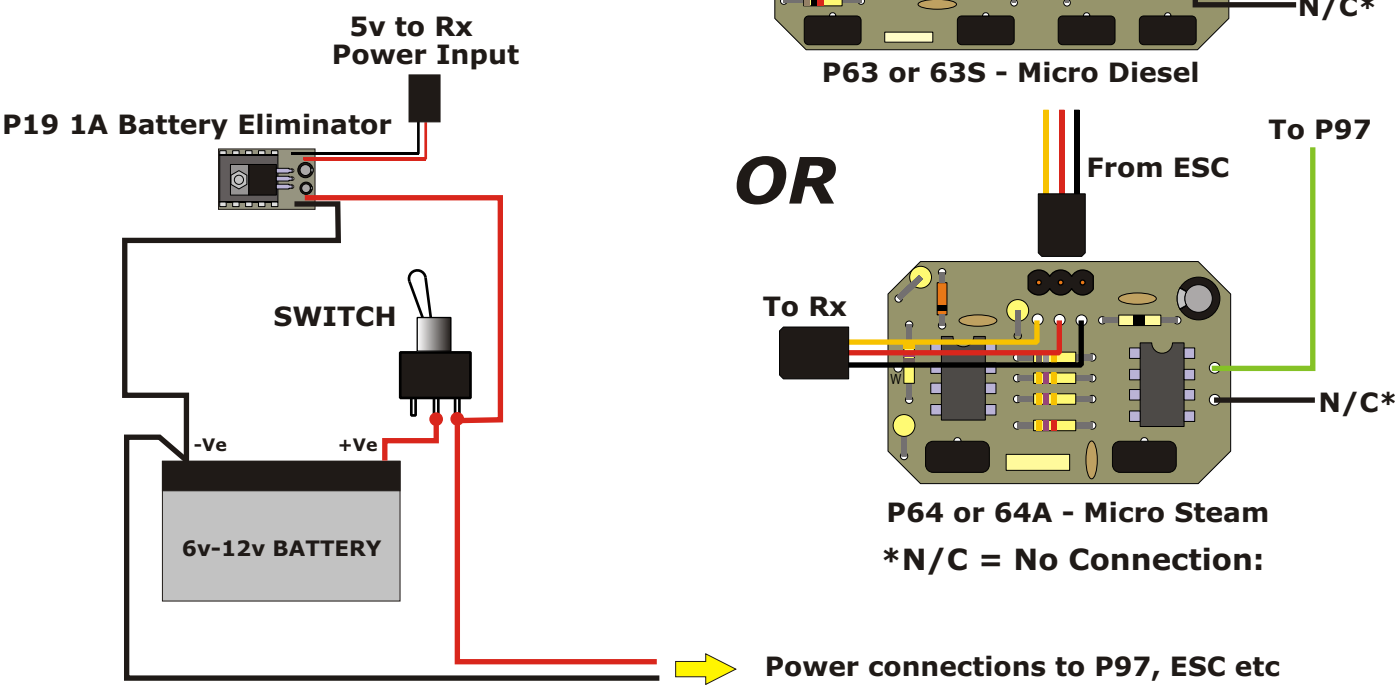
**P97 6W Booster Amplifier**  
(N/C\* = No connection to these terminals)



**OR**



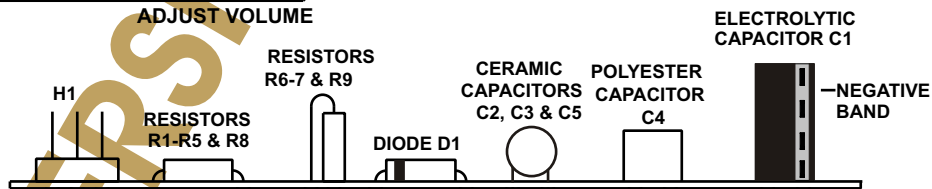
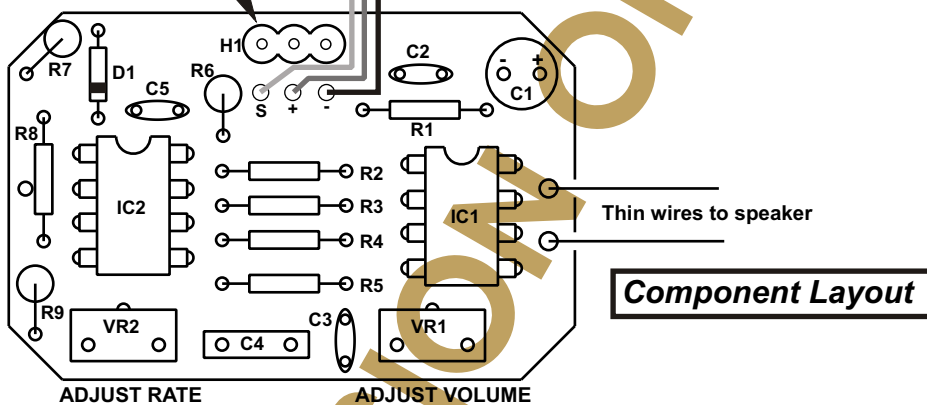
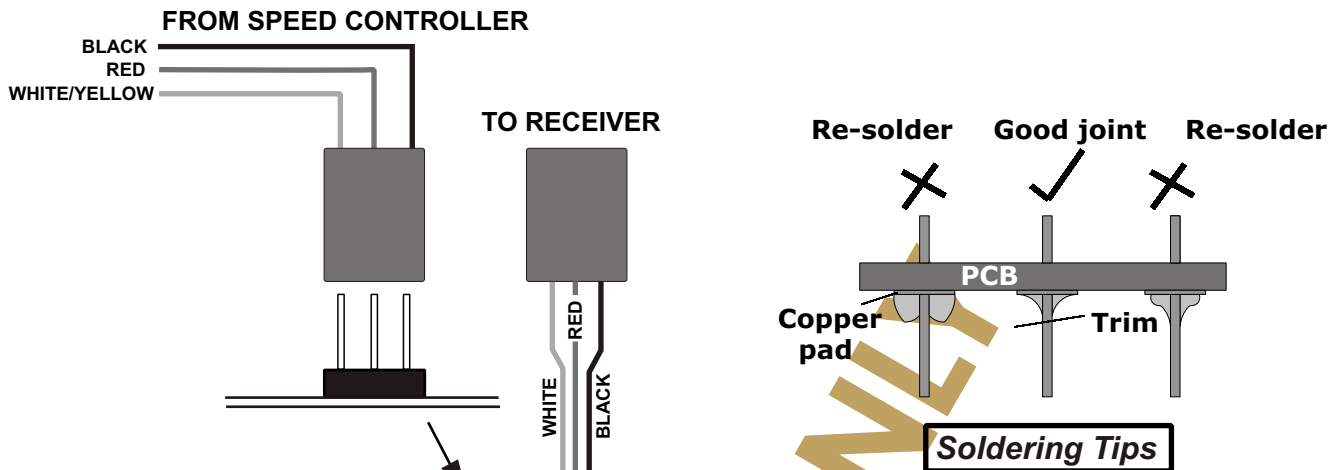
**OR**



When using micro sound units P63, P63S, P64 or P64A with a P97 (or P34) Mixer/Amplifier you **MUST** have a common power supply for both the Rx and the P97, such as a P92 Distribution Board or P19 Battery Eliminator as shown. Note that only **ONE** of the speaker output connections of P63/P64 is connected to P97. The other connection to P97 is made via the existing common negative rail.



**P64 "micro" STEAM ENGINE SOUND**  
Instructions for Kit version



**Resistor colour bands**

**Component mounting details**

**PARTS LIST**

- IC1 TDA7052 IC + 8 PIN IC SOCKET
- IC2 PIC I/C + 8 PIN IC SOCKET (TAKE CARE WHEN HANDLING)
- D1 1N4148 SILICON DIODE (small glass component)
- R1 ZERO OHM RESISTOR (SINGLE BLACK BAND)
- R2 180K 1/4 WATT RESISTOR (BROWN/GREY/YELLOW)
- R3,4 470K 1/4 WATT RESISTOR (YELLOW/MAUVE/YELLOW)
- R5 4.7K 1/4 WATT RESISTOR (YELLOW/MAUVE/RED)
- R6,7 100K 1/4 WATT RESISTOR (BROWN/BLACK/YELLOW)
- R8 470Ω 1/4 WATT RESISTOR (YELLOW/MAUVE/BROWN)
- R9 1K 1/4 WATT RESISTOR (BROWN/BLACK/RED)
- VR1,2 4K7 MINIATURE VERTICAL PRESET (marked 4K7)
- C1 220 uF ELECTROLYTIC CAPACITOR (marked 220 uF)
- C2,5 0.1uF CERAMIC CAPACITOR (marked 104)
- C3 0.01uF CERAMIC CAPACITOR (marked 103)
- C4 0.22uF MINIATURE POLY CAPACITOR (marked .22 K 63)
- PCB TYPE P64
- H1 3 WAY GOLD PLATED HEADER
- CASE TYPE RX2007
- WIRE not supplied with kit - ANY FINE FLEXIBLE WIRE IS SUITABLE FOR SPEAKER
- SERVO LEAD Futaba generic type supplied, with alternative HiTec/JR type plug.
- SPEAKER not supplied with kit - SEE ACTION LISTS

# P64 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 during the operation.

## 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 and, of course, a good level of light.

## PARTS

DO NOT HANDLE ITEMS IN BLACK CONDUCTIVE FOAM UNTIL INSTRUCTED. (MOS DEVICES) THEY ARE SENSITIVE TO STATIC ELECTRICITY FROM YOUR BODY.

- The short bars with colour bands and a wire at each end are resistors. They are colour coded, see the drawing and the Parts List. Only R1 is different. This is one with a single black bar at its centre. It is in fact a zero Ohm which acts as a wire link.
  - 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 signs on it which signifies which leg goes to the negative. The opposite leg of the capacitor, of course, go to the positive. Capacitor polarisations (+ and -) are clearly shown on the drawing.
  - The small monolithic capacitors C2, C3 & C5 (usually coated blue or tan and marked 104 or 103) with two wires, are not polarised and can be fitted either way round. The square white one C4 (marked .22 J 63) also either way round.
  - The tiny glass components with a dark bar and a wire at each end is a diode (D1 1N4148). It must be connected the right way round. The bar (shown as a black line on the drawing) shows which way round to fit it.
  - The three-legged vertical adjustment trimmers (variable resistors VR1 & VR2) with a screwdriver slot at the centre are, as their name suggests, to enable adjustment of the circuit. VR1 and VR2 are marked 4K7.
  - The 8-pin integrated circuits (IC1 & IC2) are marked with a type code. They are delivered in conductive foam and should be left in the foam until you are about to fit them. IC1 (TDA7052) is a fairly robust little device but IC2 (PIC), being a MOS device, can be damaged by static electricity and care must be exercised when handling. Both are supplied with a socket. This will enable the builder to solder in the sockets during construction, then fit the ICs at the end of 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, MOS IC and you are now all at the same potential, i.e. static neutralised.

## CONSTRUCTION

Construction is very straight forward and can be completed with just the layout drawing and the Parts List. For those who would prefer a written building sequence, the following notes should suffice:

- Fit the two-8 pin IC sockets, noting the direction of the 'notch' as per the drawing. The ICs will be fitted into these sockets as a later operation.
  - Fit the resistors in any order, ensuring that the correct value goes into the right position with reference to the drawings and the colour codes in the Parts List. Note that R6, R7 & R9 are mounted vertically and must be bent and fitted as shown.
  - Each component, when fitted and soldered, should have its spare lead length cut off. You may find the Soldering Tips sketch useful.
  - D1 comes next, note the dark bar on the component and that when fitted, it coincides with the dark bar shown on the drawing.
  - C2, C3, C4 & C5 can now be fitted either way round, just ensure that C4 is the .22 square component. Solder in each capacitor then clip off the spare wire.
  - Fit C1, the electrolytic capacitor noting its polarity (see the drawing). Once again, cut off the spare wire after soldering.
  - Fit and solder the three-legged trimmers VR1 & VR2 now; they only fit one way round and are both the same value..
  - 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 servo lead. This servo lead is the speed controller lead which will save you using a 'Y' lead.
  - The speaker wiring comes next. Two thin flexible wires are soldered into the holes marked, and at the opposite end of these wires you require an 8 Ohm speaker. A 1.5" mylar speaker is best for this project (see ACTION Lists)
  - A 3-wire ribbon lead is supplied for the receiver connection. Connect the Positive + lead (Red) and Negative - lead (Black) to the + and - holes as per the drawing. The third lead is the signal lead (White).
  - The final job is to fit the two ICs into their sockets. Observe that the 'notch' or moulded dot is at the correct end.

## CASE

Slots can be made with a small file in the top edge of one end of the case body to take the wires to the speaker, the input servo lead and output connector pins. The case is moulded in ABS and is supplied with four self tapping screws; this is easy to cut with normal modelling tools. Holes can be drilled in the case to enable adjustment of VR1 & VR2 if you wish.

WARNING - DO NOT use the black foam as a packing foam in the finished unit; it is conductive.

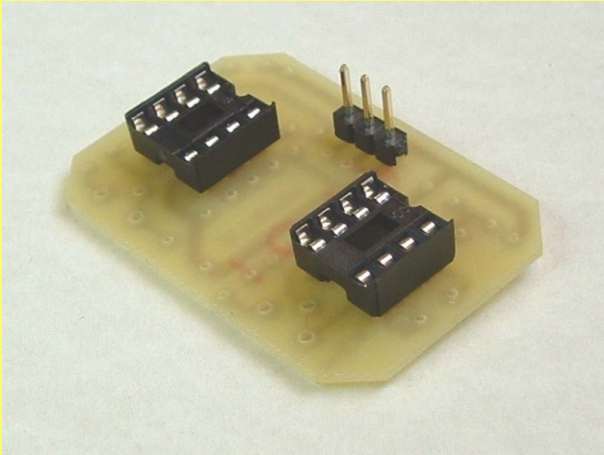
## TESTING

This is extremely simple. Connect the servo lead to the Speed/Direction channel of your receiver, then plug the speed controller lead onto H1 making sure that the colours match wire for wire. Switch on radio then run speed up to full forward and then reverse. Adjust VR2 for speed of puffing. VR1 can be used to set the level of sound volume (high volume uses more current).

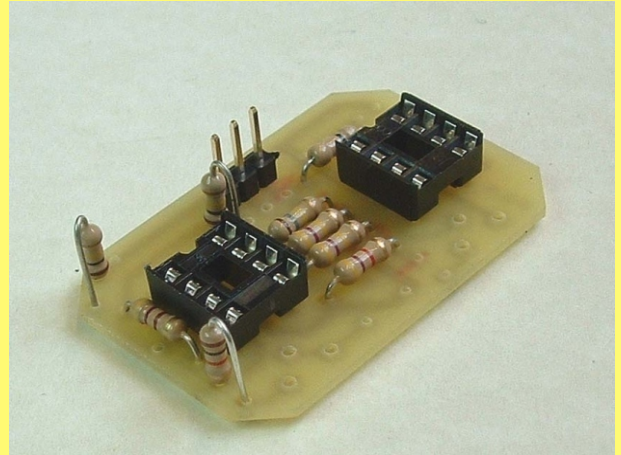
## P64 MICRO STEAM ENGINE SOUND

**NOTE:** Construction of P64A Micro Puffer Steam Engine is identical except for value of some components

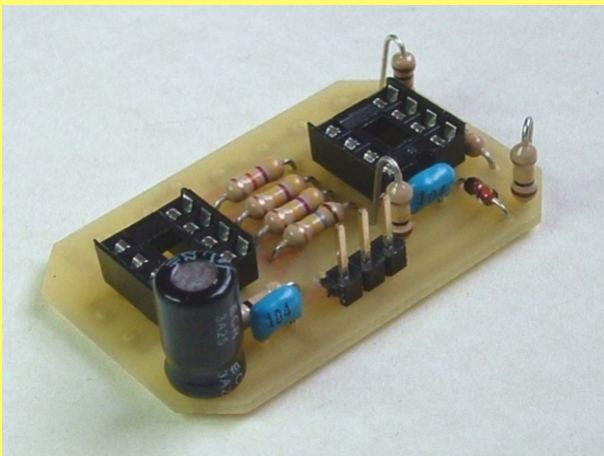
### **PHOTOGRAPHIC BUILD SEQUENCE FOR KIT VERSION ONLY**



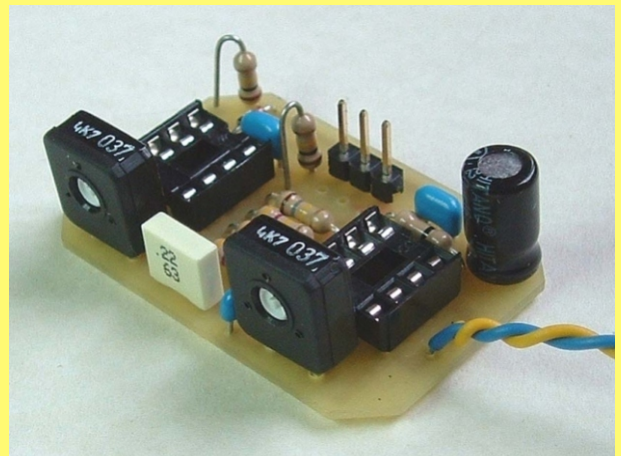
**PICTURE 1:** PCB with I/C sockets and header pins fitted



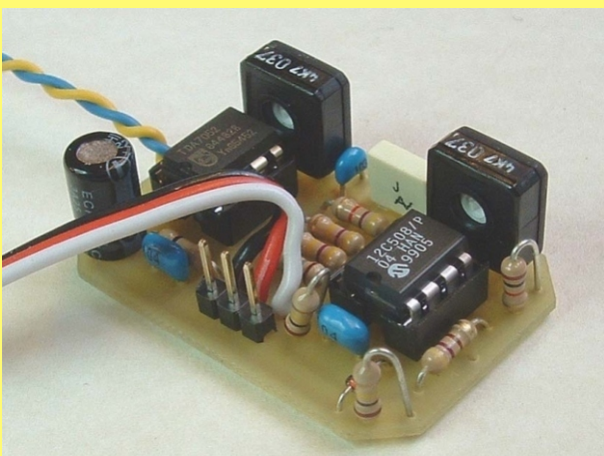
**PICTURE 2:** Resistors added



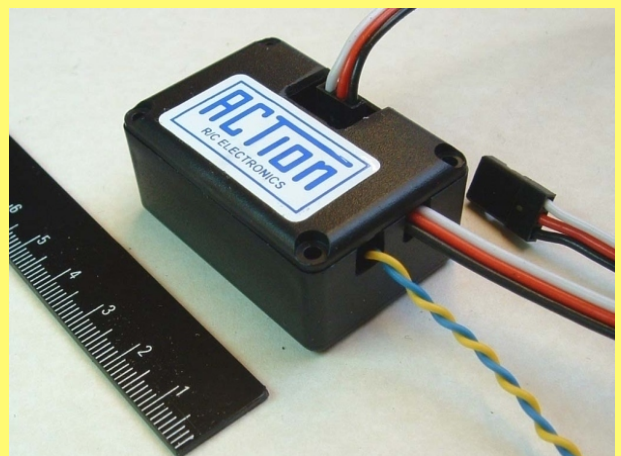
**PICTURE 3:** Capacitors and diode added



**PICTURE 4:** Remaining capacitors and speaker leads fitted



**PICTURE 5:** Solder Rx lead in place. Plug I/C chips into sockets last. **NOTE! ANTI-STATIC PRECAUTIONS REQUIRED**



**PICTURE 6:** File slots in case for leads. Cut away lid as shown to allow connection to ESC.