

P97 6 WATT AUDIO MIXER/BOOSTER FOR ACTION SOUNDS

A unit for mixing together up to four ACTION sound units into one speaker and/or boosting the power output from the on-board amplifiers to 6 Watts for increased volume. The P97 has a power distribution board connection which will drive up to four sound units, or you can use a P92 Distribution Board. The unit will need to be switched on all of the time the model is operational, while the individual sound simulators can be switched on by radio control as and when required. All current ACTION sound units except P63/P64 can be run on 6 to 12 volts. The Steam Engine Sound P56 can be 6 volts or 12 volts. Two diesel engine sounds can be mixed but will give a very poor resultant sound. The Instruction Leaflet also shows details of how to connect ACTION engine sound units and use a P92 Power Distribution Board to simplify and neaten installations.

The P97 will operate with P63 and P64 micro Engine Sounds BUT you will need to run the receiver from the same battery as the sound system e.g. via a BEC or from the 5v output of a P92. Ring for further information.

IC DESIGN

Voltage requirement

Volume

Connections for power and inputs

Case size

Speaker

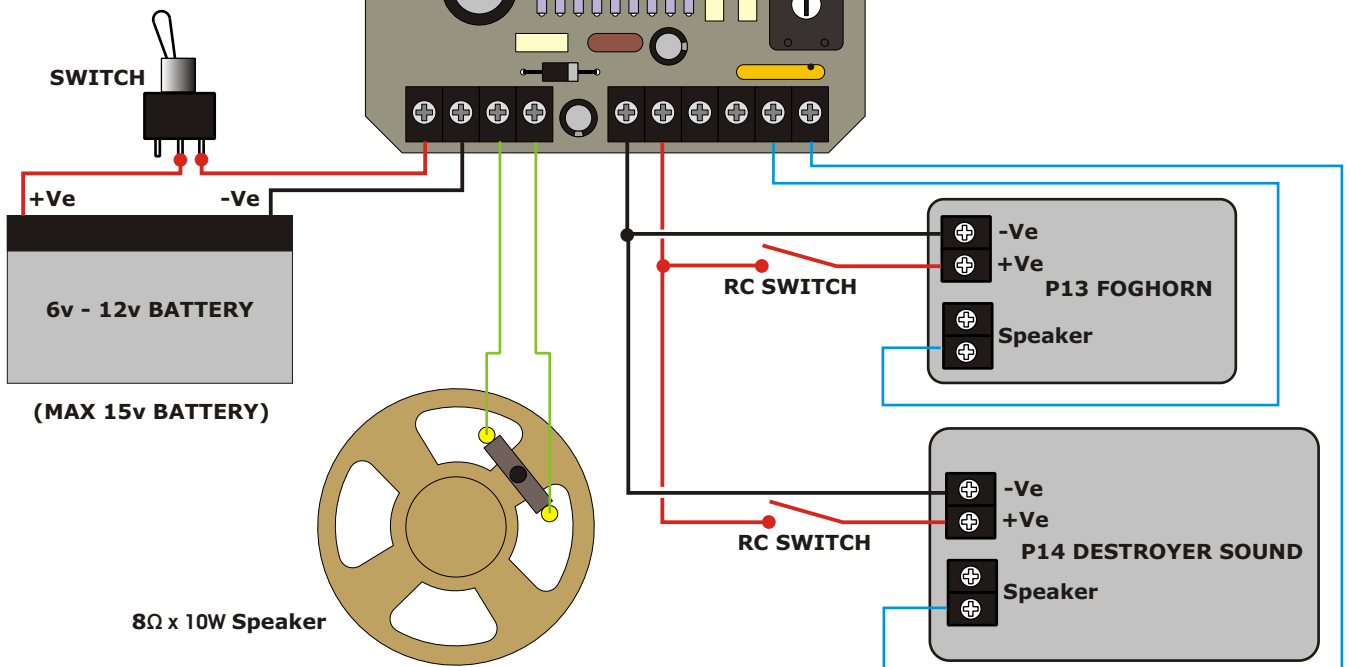
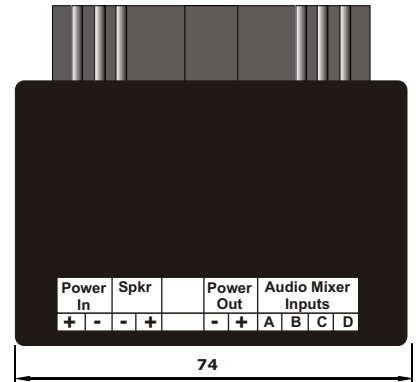
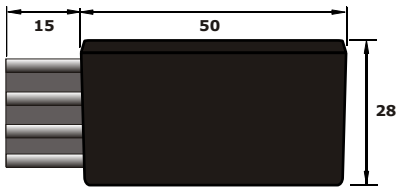
6 volts to 12 volts (15 volts Max)

Adjustable

Screw connection

73mm x 50mm (plus heatsink) x 28mm

8 ohm impedance (not supplied)



P97

6 Watt MIXER/BOOSTER AMP FOR SOUND UNITS

A unit for mixing together up to four ACTION sound units into one speaker and/or boosting the power output from the on-board amplifiers to 6 Watts for increased volume. The P97 has a power distribution connection which will drive up to four sound units, or you can use a P92 Distribution Board. The unit will need to be switched on all of the time the model is operational, while the individual sound simulators can be switched on by radio control as and when required. All current ACTION sound units can be run on 6 to 12 volts. The Steam Engine Sound P56 can be 6 volts or 12 volts. Two diesel engine sounds can be mixed but will give a very poor resultant sound.

IC DESIGN

| | |
|----------------------------------|------------------------------------|
| Voltage requirement | 6 volts to 12 volts (15 volts Max) |
| Volume | Adjustable |
| Connections for power and inputs | Screw connection |
| Case size | 73mm x 50mm (plus heatsink) x 28mm |
| Speaker | 8 ohm impedance (not supplied) |
| Speaker size | As large as possible(See below). |

CASE - The case is supplied uncut so you will need to remove most of one side of the case and drill/file two long slots in the other side for the connecting wires. All dimensions are given on the drawings. In operation the heatsink can get hot so make sure you install the unit with the heatsink clear of any loose wiring and at least 1cm from any part of the structure of the model.

CONNECTION AND USE - Up to a maximum of four sound simulators should be connected as follows:

1/ Each sound unit should have one speaker output screw terminal (which one is not important, either will do) connected to one of the audio input connections of the P97 (Connector Block J2 Terminals 3 to 6).

ONLY ONE SPEAKER TERMINAL ON EACH SOUND SIMULATOR SHOULD BE CONNECTED TO THE P97. THE OTHER TERMINAL MUST NOT BE CONNECTED.

2/ A positive lead for each sound unit should be connected to the mixer/amplifier connector block J2 (Terminal 2) or to a +ve output terminal of your P92 D/B - See Drawing. You can fit a manual switch, a relay switcher or a servo-driven microswitch into these positive leads to operate the sound sims individually.

3/ A negative lead for each sound sim should be connected to the mixer/amplifier connector block J2 (Terminal 1) or to a -ve output terminal of the P92 - See Drawing. These are common lines and must not be switched.

4/ Connect your speaker to the mixer/amplifier connector J1 (Terminals 3 & 4). The speaker should be capable of handling at least six Watts of power and must be 8 Ohm impedance. In practical terms you will be fitting the unit into a reasonably-sized model so a minimum of a 4" speaker should be used.

5/ The positive (+) and negative (-) power inputs (connector block J1 Terminals 1 & 2) on the mixer/amplifier should be connected via an on/off switch to your main battery or to a P92 D/B, ensuring that the polarity is correct. **ALWAYS CHECK TWICE AND CONNECT ONCE.** If using the same battery for the motor and sound units it is good practice to run separate wires right back to the battery or distribution board to prevent noise generated by the motor from interfering with the sound circuits.

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

Internet: www.action-electronics.co.uk

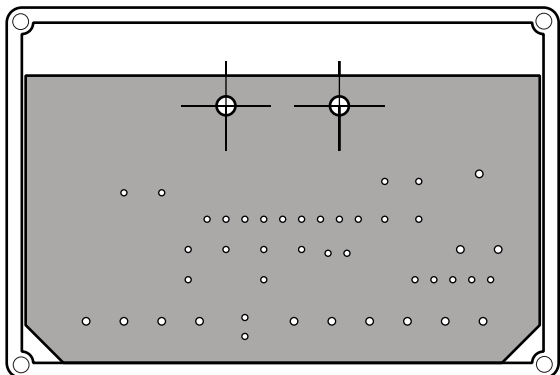


The small print.....

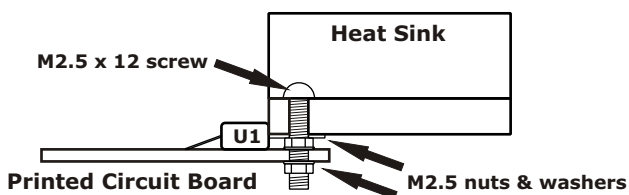
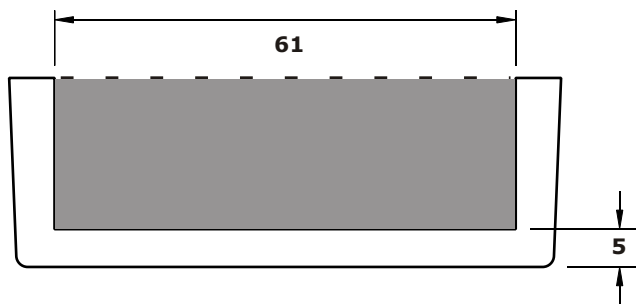
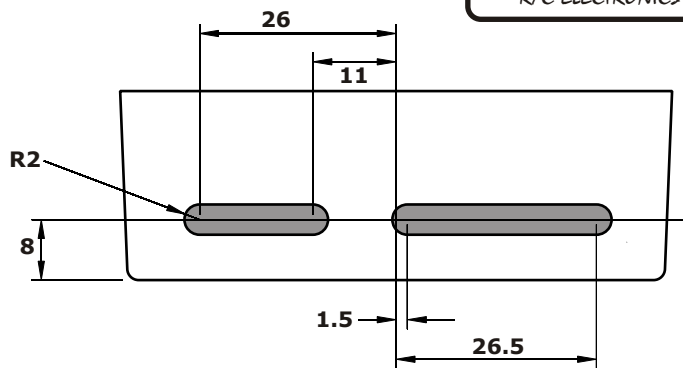
ACTION R/C Electronics guarantee all products to be free from manufacturing defects for 12 months from date of purchase. This does not cover suitability for specific applications; components worn or damaged by use, tampering or incorrect connection; alteration to original components; damage to batteries 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.

0843 2898528 or 0782 5511877 (Mobile)

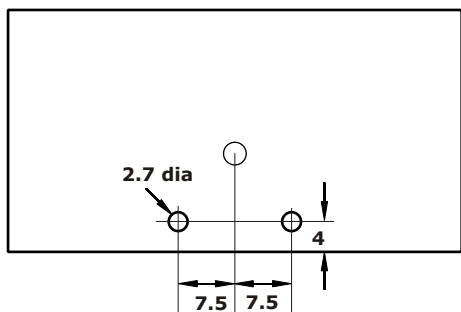
P97 6Watt Audio Mixer/Booster



Use PCB as template to mark position of two holes in bottom of case; drill 6mm dia to clear M2.5 nuts and screws.



Assemble heat-sink to circuit board thus:



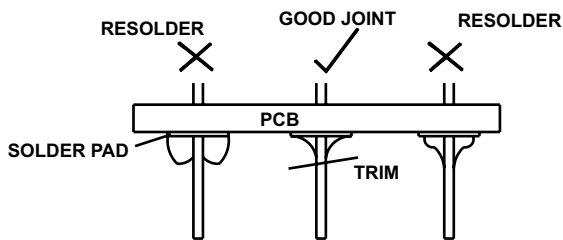
Drill holes in heat sink thus:

Completed circuit board fits into the (deep) base of the case, with the two M2.5 nuts which secure the heat-sink fitting into the 6mm holes in the base. Drill and file two long slots in one side of the case for connections to the battery, speaker etc. Remove a large rectangular section of the opposite side of the case to clear the heat-sink.

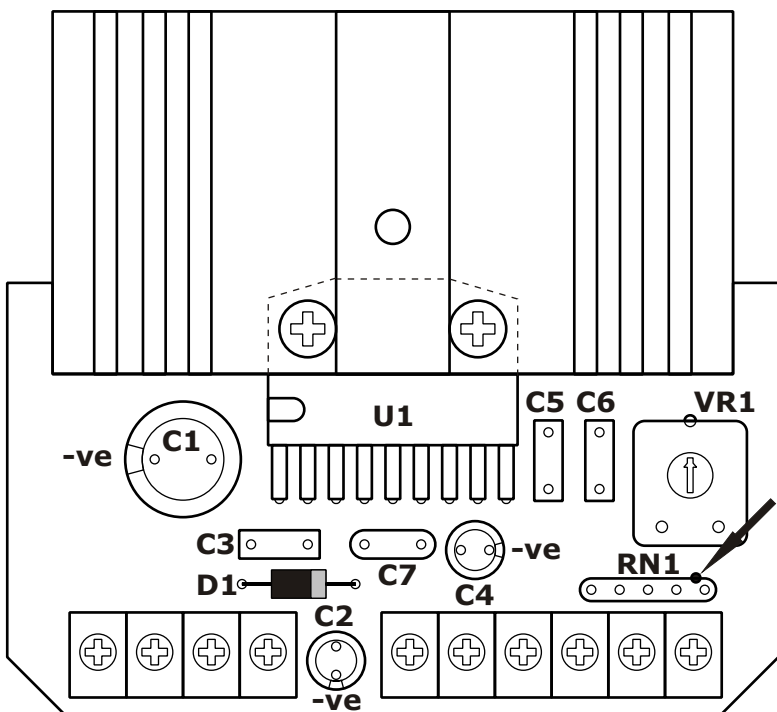
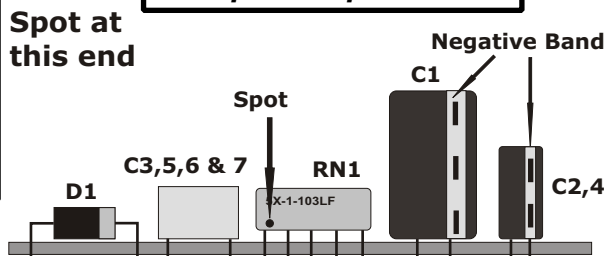
Resistor colour bands



Soldering tips



Component placement

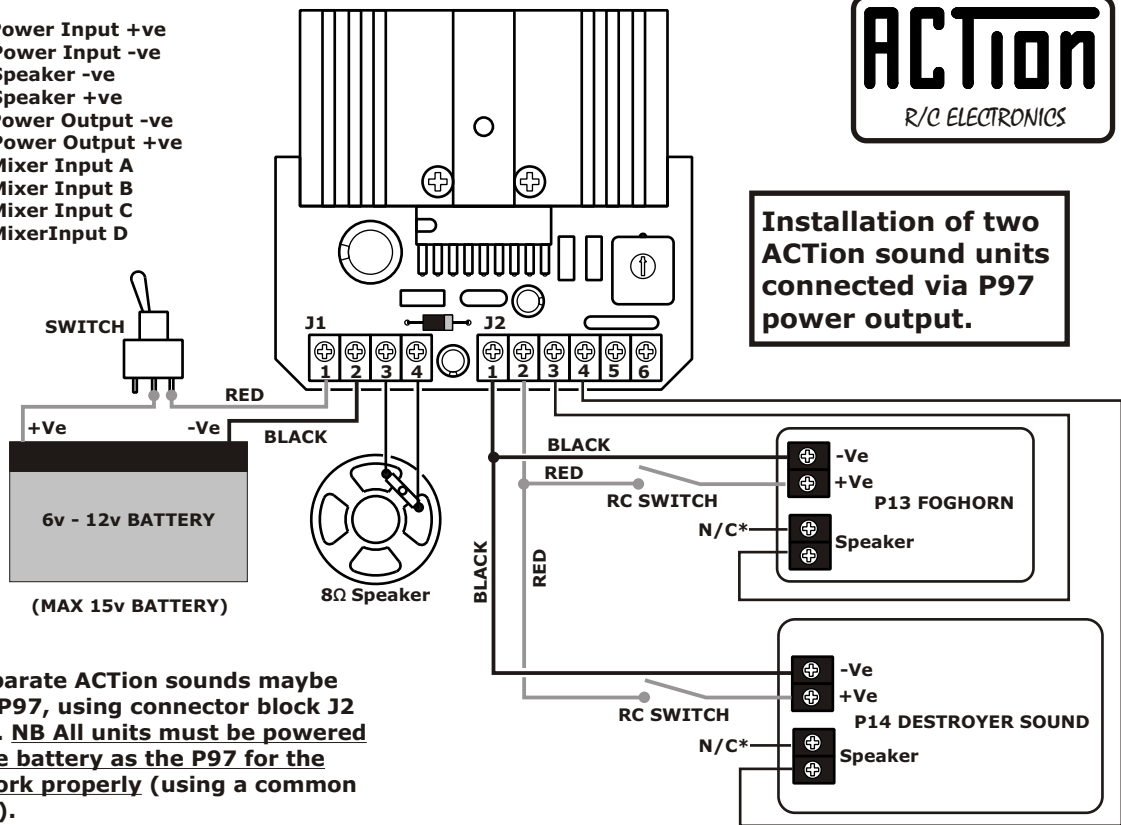




CONNECTIONS;

- J1 Terminal 1 - Power Input +ve
- Terminal 2 - Power Input -ve
- Terminal 3 - Speaker -ve
- Terminal 4 - Speaker +ve
- J2 Terminal 1 - Power Output -ve
- Terminal 2 - Power Output +ve
- Terminal 3 - Mixer Input A
- Terminal 4 - Mixer Input B
- Terminal 5 - Mixer Input C
- Terminal 6 - Mixer Input D

P97 6Watt Audio Mixer/Booster

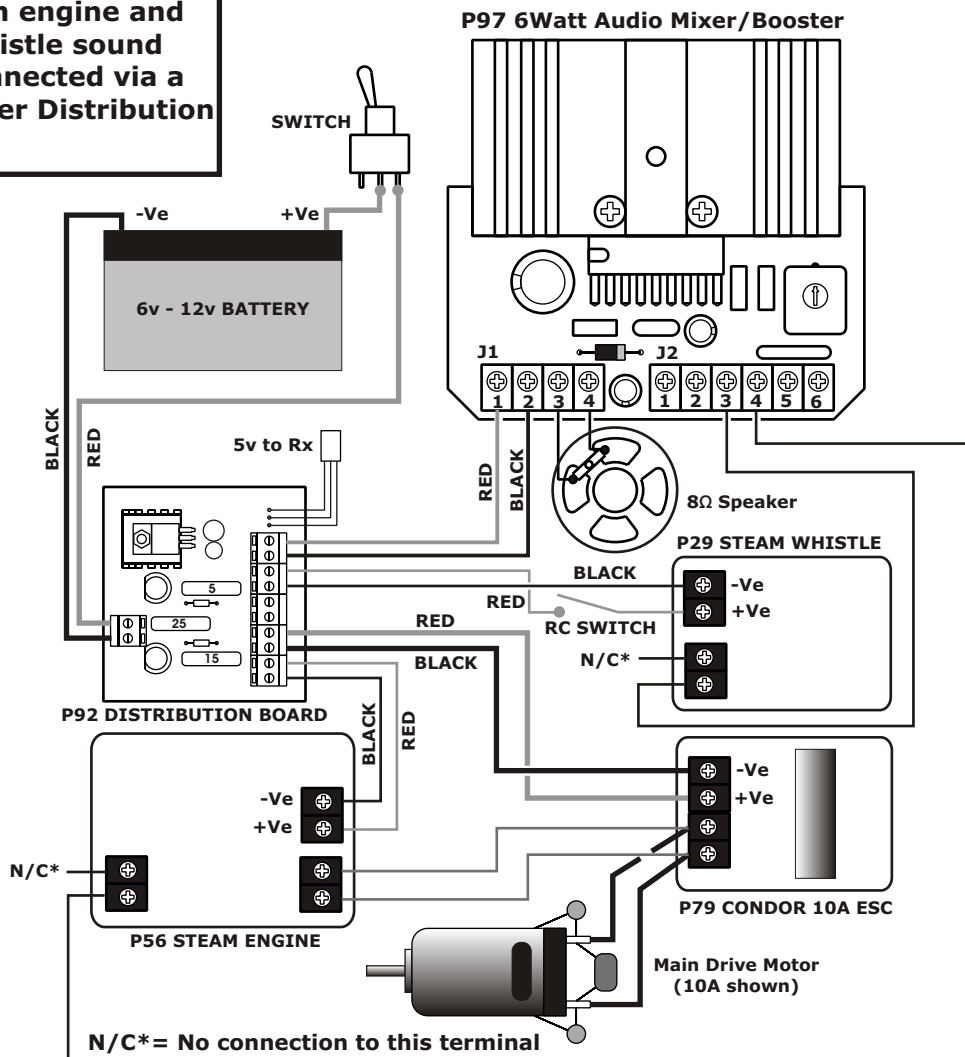


Installation of two ACTION sound units connected via P97 power output.

Up to four separate ACTION sounds maybe connected to P97, using connector block J2 terminals 3-6. NB All units must be powered from the same battery as the P97 for the network to work properly (using a common negative loop).

N/C* = No connection to this terminal

Example of installation of ACTION engine and horn/whistle sound units connected via a P92 Power Distribution Board.



N/C* = No connection to this terminal

P97 Kit Instructions

REQUIREMENTS

This Sound Project is suitable for use with a 6 to 12 Volt power source (15v Max i.e. a fully-charged 12v lead-acid "gel cell" battery). It will allow up to four sound simulators from the ACTION range to be mixed into one speaker. As well as mixing the sounds, it distributes the power to the sound simulators. It will drive any size speaker as long as it is an 8 Ohm device and can accept 6W of power. See Speakers section in ACTION lists. It can be switched on and off with a small switch in the positive power lead; this will switch on the power available to all the sound simulators used. Each individual simulator will then require its own R/C switcher. See ACTION lists for Switchers.

[There is a photographic sequence on our website which shows the stages involved in building this unit just click over the coloured graphic of the P97 and the full Instructions, Datasheet, Wiring Diagrams and Kit Assembly Sequence will open.](#)

PCB

The PCB for this project is manufactured from high grade Glass Fibre Board. On the initial batch of PCBs the holes for the two M2.5 screws have been placed a little too close to the edge of the board. We decided that it would be wasteful and expensive to throw them away so you will need to elongate the holes inwards by approx 1.5mm with a small round needle-file in order to have enough length in the pins of U1 to be bent round and soldered through the PCB. (If I remember when I pack your kit then I'll do this for you, but no promises!! Dave M).

TOOLS

For construction you will require a 15W 25W soldering iron and flux-cored solder (22SWG is best); a small pair of wire cutters; a small screwdriver for adjustment and connections plus, as always in electronics construction, a good level of light. A pointed bit in the iron will be best for the small solder pads. Note that some solder pads are designed to bridge across to the main area of copper (which is the Ground connection) while others are not. Check first before you apply the solder!

PARTS

All the parts for the kit should be laid out on a clean surface so that they can be correctly identified. The Drawing will help with identification and polarisation (+ & - connections) .

The small black plastic diode D1 has a silver bar printed round one end; this band is clearly marked on the drawing. If bent and fitted as per Component Placement, it will be correctly polarised.

The electrolytic capacitors C1, C2 & C4 are marked with their value and working voltage and a vertical bar with Negative signs on it which signifies which leg goes to the negative. The opposite leg of the capacitor, of course, goes to the positive. All capacitor polarisations are shown on Component Placement.

The small capacitors C3, 5, 6 & 7 are non-polarised and can be fitted either way round. C7 is a rounded, deep tan-coloured component while the other three are rectangular and either cream or scarlet in colour.

The resistors are made in a single 'network' package which has five pins. There is some printed text and a small black spot on one face. The component must be fitted with the text facing VR1 and the black spot towards the edge of the PCB See drawing.

The amplifier U1 is a long, rectangular component, black in colour, with nine pins on one side and a metal tab on the other. It also has a small notch on one end; this identifies which way round the chip should be soldered in - See the Component Placement.

The square black moulding with a screwdriver slot at the centre and three legs is an adjustable trimmer (VR1). Leave this in its central position for testing.

The screw connector blocks are easy to identify as the name describes them. The plastic mouldings can be interlocked; the two 2-way blocks form J1 and the two 3-way blocks form J2.

CONSTRUCTION

1. Place the printed circuit board in the bottom of the deep half of the case, with its chamfered edge touching the inside edge of the case. Mark and drill 6mm the two holes for the heat-sink securing screws and nuts. HINT it helps when marking out the black ABS case to stick some low-tack masking tape to it first.
2. Now mark out and carefully drill the two 2.7dia holes in the heatsink for the tab of the amplifier chip. If you're careful to avoid any static discharge then you could use the actual chip itself as a template, but make absolutely sure that the holes are central or the unit won't fit properly inside the case.
3. Fit the amplifier to the heatsink with two M2.5 screws and nuts. The printing on the chip should be on the same side as the fins of the heatsink (i.e. uppermost when the unit is fitted in the case). Carefully push the pins of the amplifier into their holes in the PCB and bend the unit until the screws fit into the holes in the PCB. DO NOT SOLDER THE AMP YET! Fit washers and further nuts to the screws and tighten

the whole assembly up. NOW you can carefully solder the pins of the amplifier to the PCB, noting that Pin 9 the one closest to C5 has no connection to the rest of the circuit.

4. Fit the small capacitors C3, C5, C6 and C7, and the resistor network RN1 make sure this latter is fitted the right way round.
5. Now add diode D1 and the capacitors C4 and C2, followed by the connector blocks J1 and J2; the preset VR1 and finally the big capacitor C1. Ensure that the wires can be inserted into the connector blocks from the outside edge of the PCB.
6. The rear of the board can now be cleaned with something like an old toothbrush and some spirit cleaner. We use a proprietary brand of PCB cleaner but Isopropyl Alcohol is good and even meths is OK. Then check all over the soldered side of the board for good joints and no solder bridges between tracks.

TESTING

Having built the unit it's simply a matter of connecting your speaker and power wires (from whatever battery pack you are using). You don't need a switch to test it initially; it can be connected to its battery and a quiet "hum" will be heard from the speaker. Do note that only one speaker connection from each sound simulator should be connected; the return wire is via the negative connection which is now common to all sound simulators.

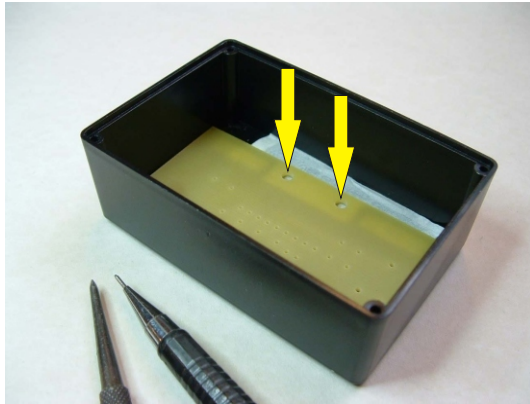
The volume controls on the sound simulators being mixed with this unit will now become pre-amplifier level controls. VR1 in the P97 is now the Master Volume Control for your sound system.

We hope that you enjoyed building your ACTION P97 kit and that it gives a long working life and adds simplicity to the wiring and speaker installation in your model.

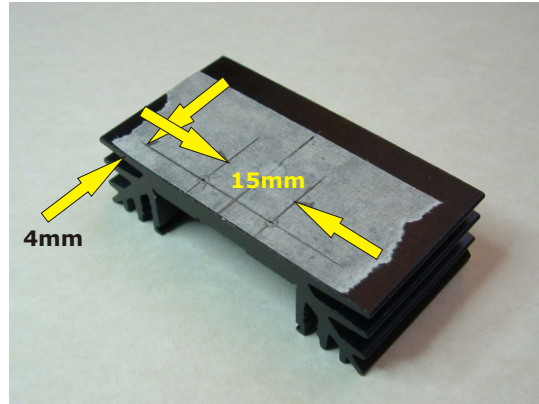
PARTS LIST

| | |
|----------|--|
| U1 | TDA8943SF I/C |
| D1 | 1 AMP DIODE 1N4001 (BLACK PLASTIC/PRINTED BAR) |
| RN1 | 4 x 10K RESISTOR NETWORK (YELLOW 5 PINS) |
| VR1 | 10K MIN ENCLOSED HORIZONTAL PRESET |
| C1, | 1000uF X 16V RADIAL ELECTROLYTIC CAPACITOR |
| C2 | 100uF MIN RADIAL ELECTROLYIC CAPACITOR |
| C3,5,6 | 0.1uF POLYESTER CAPACITOR (Marked .1J63) |
| C4 | 10uF MIN RADIAL ELECTROLYIC CAPACITOR |
| C7 | 2n2 uF RESIN-DIPPED POLYESTER CAPACITOR (Marked 222J) |
| J1 | 2 X TWIN SCREW CONNECTOR BLOCKS |
| J2 | 2 X TRIPLE SCREW CONNECTOR BLOCKS |
| HEATSINK | ANODISED MULTI-FINDED ALUMINIUM WITH M2.5 SCREWS, NUTS & WASHERS |
| CASE | TYPE RX2010 WITH SCREWS AND ACTION STICKER |
| PCB | TYPE P97 |

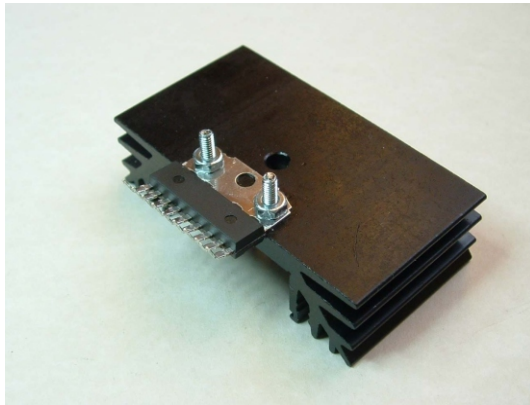
P97 6 WATT AUDIO MIXER/BOOSTER AMPLIFIER



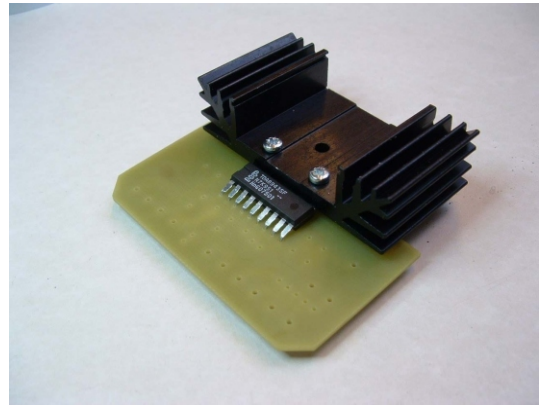
Picture 1: Use PCB to mark out two 6mm holes for clearing M2.5 heat-sink screws and nuts.



Picture 2: Mark out and drill two x 2,7mm holes for heat-sink screws.



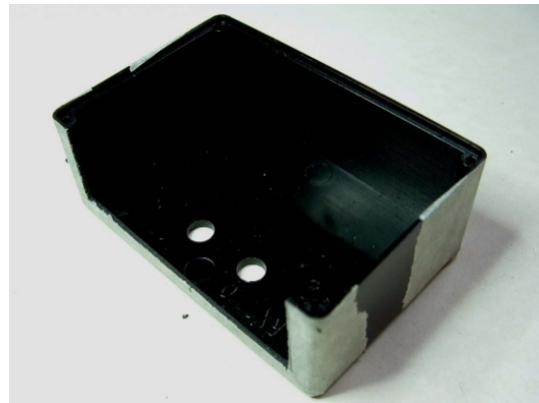
Picture 3: Fit heat-sink to U1 amplifier chip with M2,5 screws and nuts.



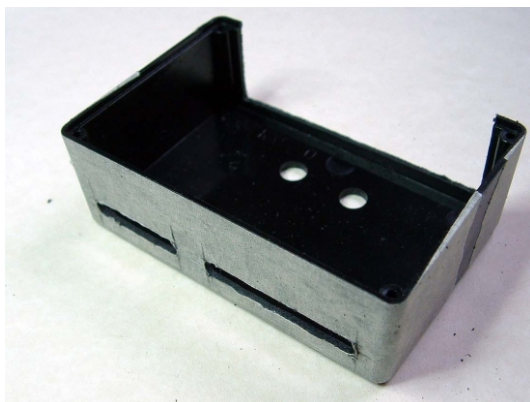
Picture 4: Push pins of amplifier chip through PCB and fix to PCB with washers and nuts. DO NOT SOLDER PINS until heat-sink is firmly fitted in place.



Picture 5: Shows all other PCB components soldered in place.



Picture 6: Mark out and cut away side of case for heat-sink.



Picture 7: Mark out and cut long slots for power, speaker and unit mixer-connecting wires.



Picture 8: Shows finished unit in case with self-adhesive logo and connections legend.