

# P101 15 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 15 Watts for increased volume. The P101 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 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 P101 to a P92 Power Distribution Board to simplify and neaten installations.

The P101 has been specifically developed to provide the modeller with the ideal amplifier for our P100 Noisy Thing digital sound playback module. With an input of a maximum 18v it can supply 15watts of power into a suitable 8Ω speaker. Output @12v is approx 7 watts.

## IC DESIGN

Voltage requirement

Volume

Connections for power and inputs

Case size

Speaker

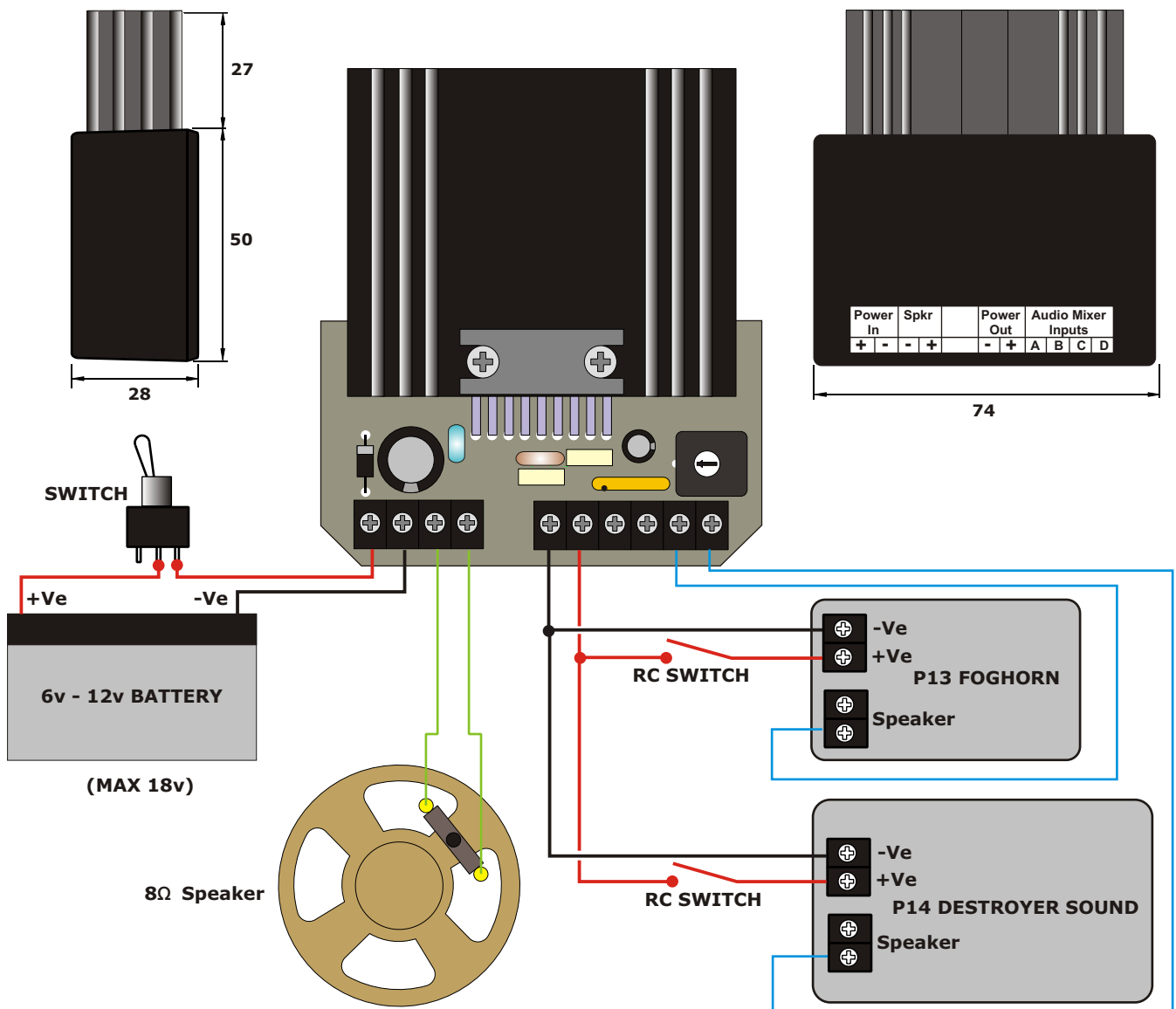
6 volts to 12 volts (18 volts Max)

Adjustable

Screw connection

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

8 ohm impedance (not supplied)



**P101**

## 15 Watt Audio Mixer/Amplifier



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 15 Watts (@18v) for increased volume. Power output @ 12 volts is approx 7 Watts. The P101 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 (18 volts Max)
Volume	Adjustable
Connections for power and inputs	Screw connection
Case size	73mm x 50mm (plus heatsink) x 28mm
Speaker	8 ohm impedance x 10W Min (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 -

See the separate drawing and text for connections to P100 'Noisy Thing' digital sound playback unit. The following refers to all other ACTION sound simulators:

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 P101 (Connector Block J2 Terminals 3 to 6).

**ONLY ONE SPEAKER TERMINAL ON EACH SOUND SIMULATOR SHOULD BE CONNECTED TO THE P101. 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; use the COM and N/O terminals of the relay or microswitch.

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 ten 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.

6/ The volume controls on the sound simulators being mixed with this unit will now become pre-amplifier level controls. Trimmer pot R2 on the P101 is now the Master Volume Control for your sound system.

### 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 £17.00 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)

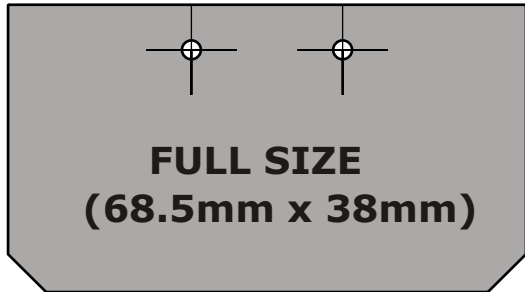
**ACTION R/C ELECTRONICS, 1 Llwyn Bleddyn, Llanllechid, Bangor LL57 3EF, United Kingdom**

#### The small print.....

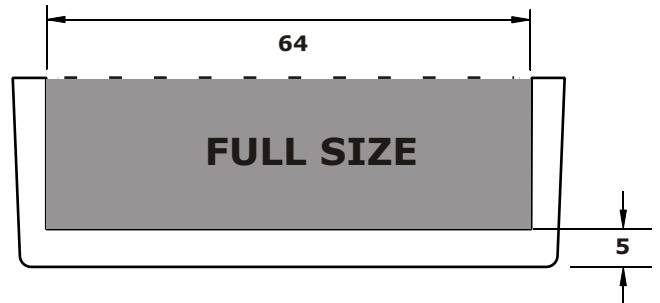
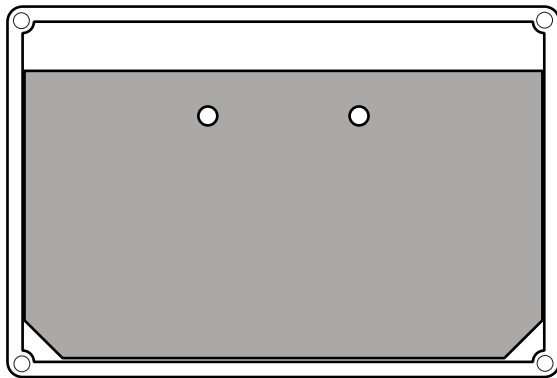
ACTION R/C Electronics guarantee all products to be free from manufacturing defects for 12 months from date of purchase. This does not cover suitability for specific applications; components worn or damaged by use, tampering or incorrect connection; alteration to original components; damage to batteries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

**P101 15Watt Audio Mixer/Amplifier**

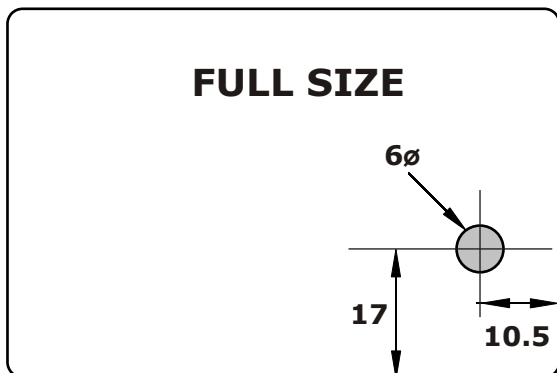
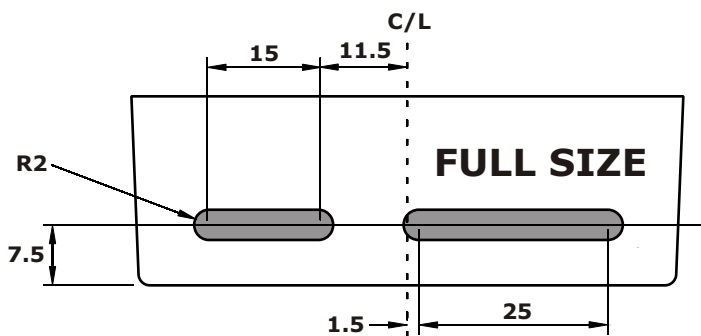
Trace templates or copy and cut out. Paste to thin card and punch holes through for centres where necessary. Cover the uncut case with masking tape; mark with fine pencil; drill/cut to suit and finally remove tape. File or scrape edges smooth.



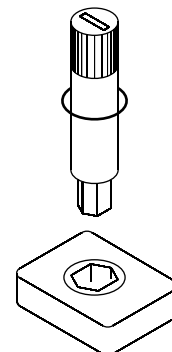
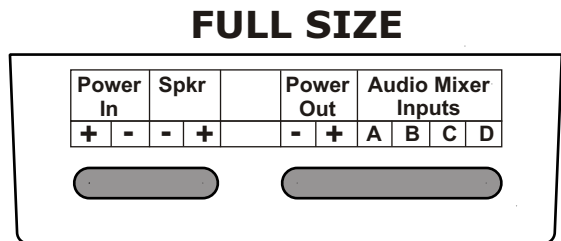
Use template to mark position of two holes in bottom of case; drill 6mm dia to clear the heads of the M3 screws.



The completed circuit board fits into the (deep) base of the case, with the heads of the two M3 screws 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. Remove the backing paper from the self-adhesive label and fix the label to case, above cut-outs for screw terminals or on the case lid.



Template for drilling hole for spindle in case lid.

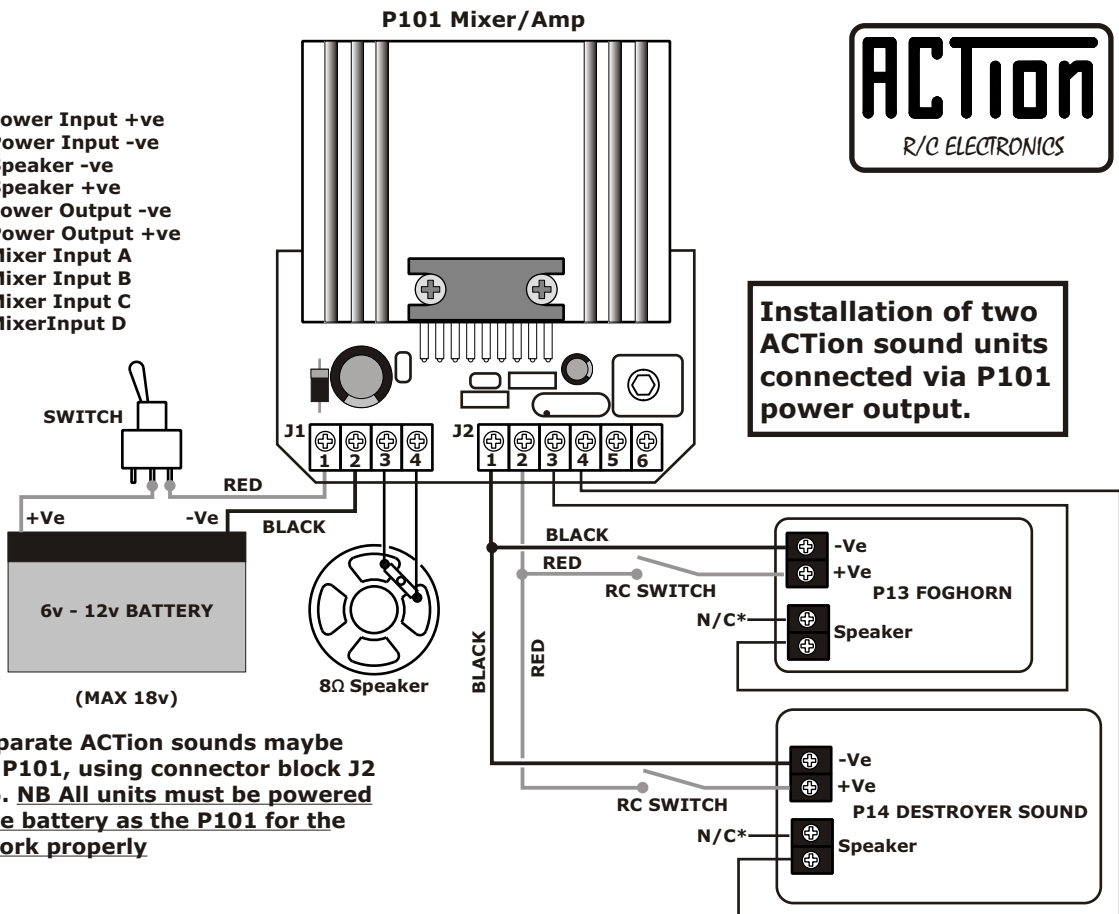


Insert spindle into R2 through hole in case lid



**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

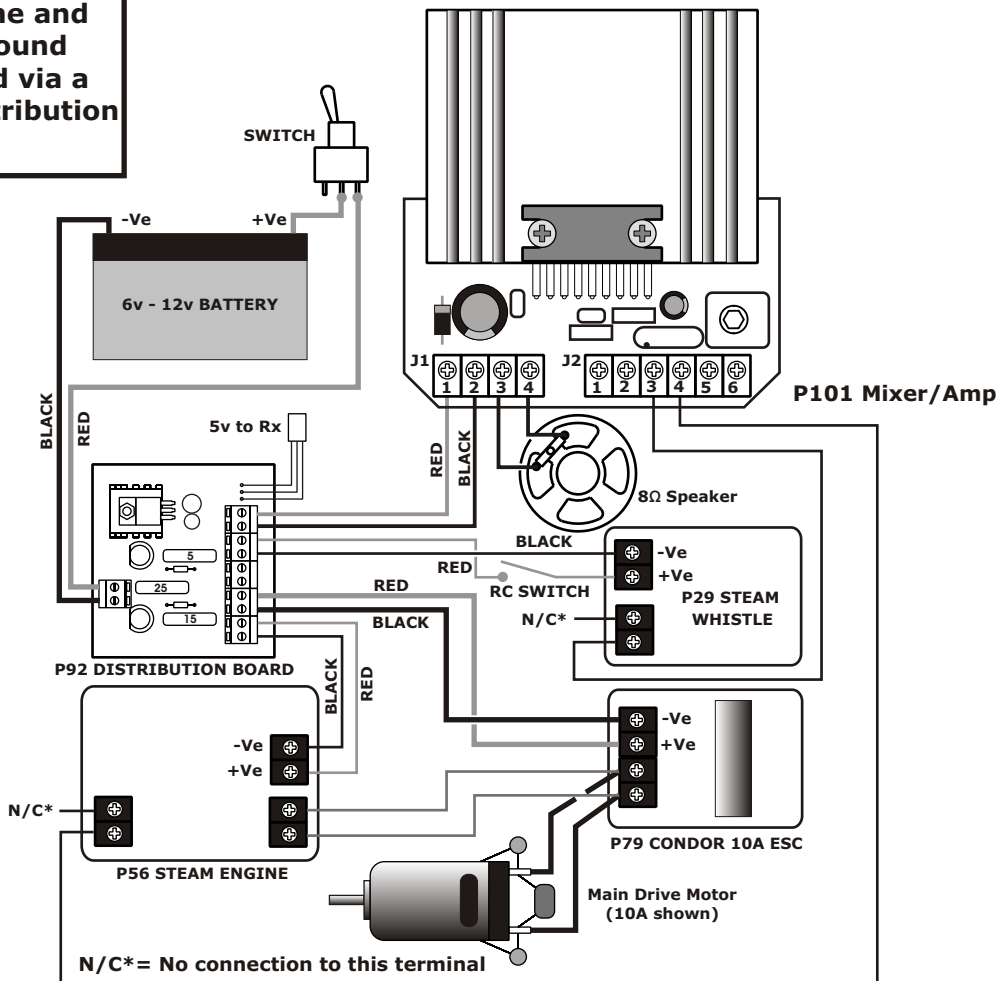


**Installation of two ACTION sound units connected via P101 power output.**

Up to four separate ACTION sounds maybe connected to P101, using connector block J2 terminals 3-6. **NB All units must be powered from the same battery as the P101 for the network to work properly**

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.**

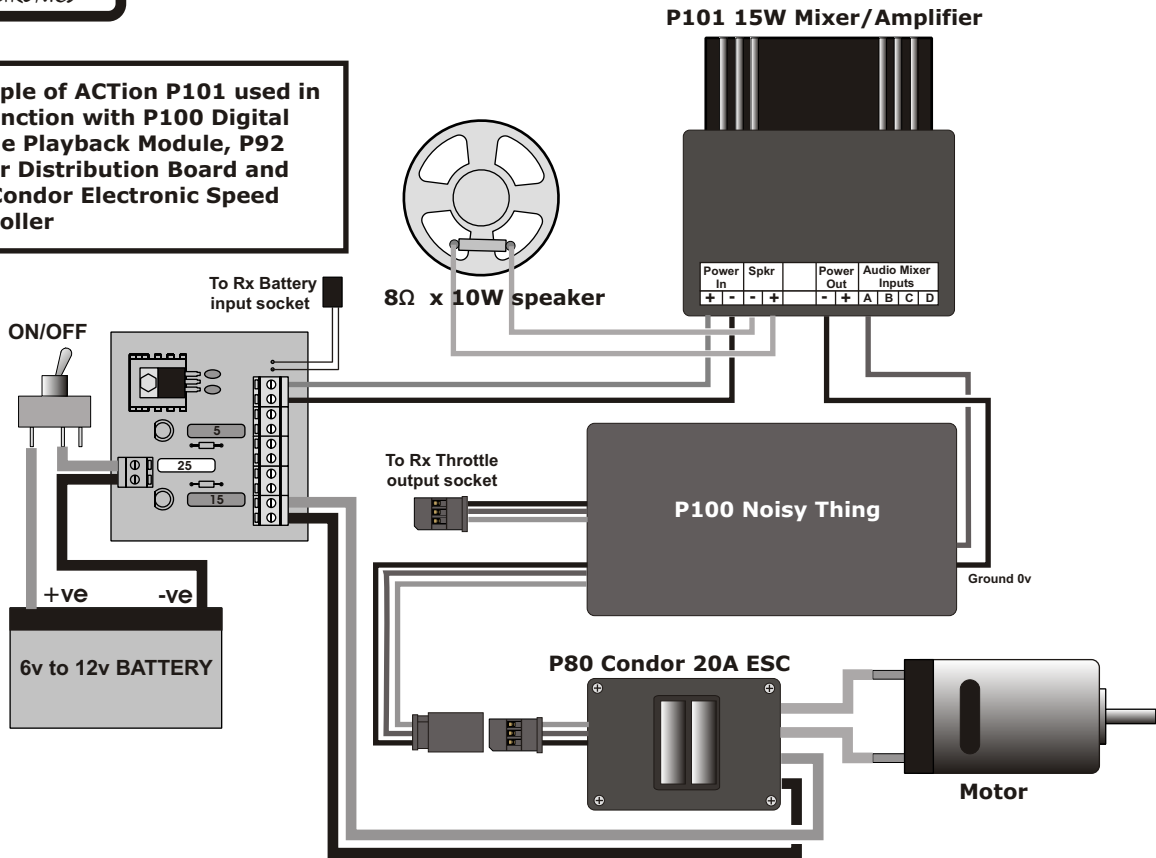


N/C\* = No connection to this terminal

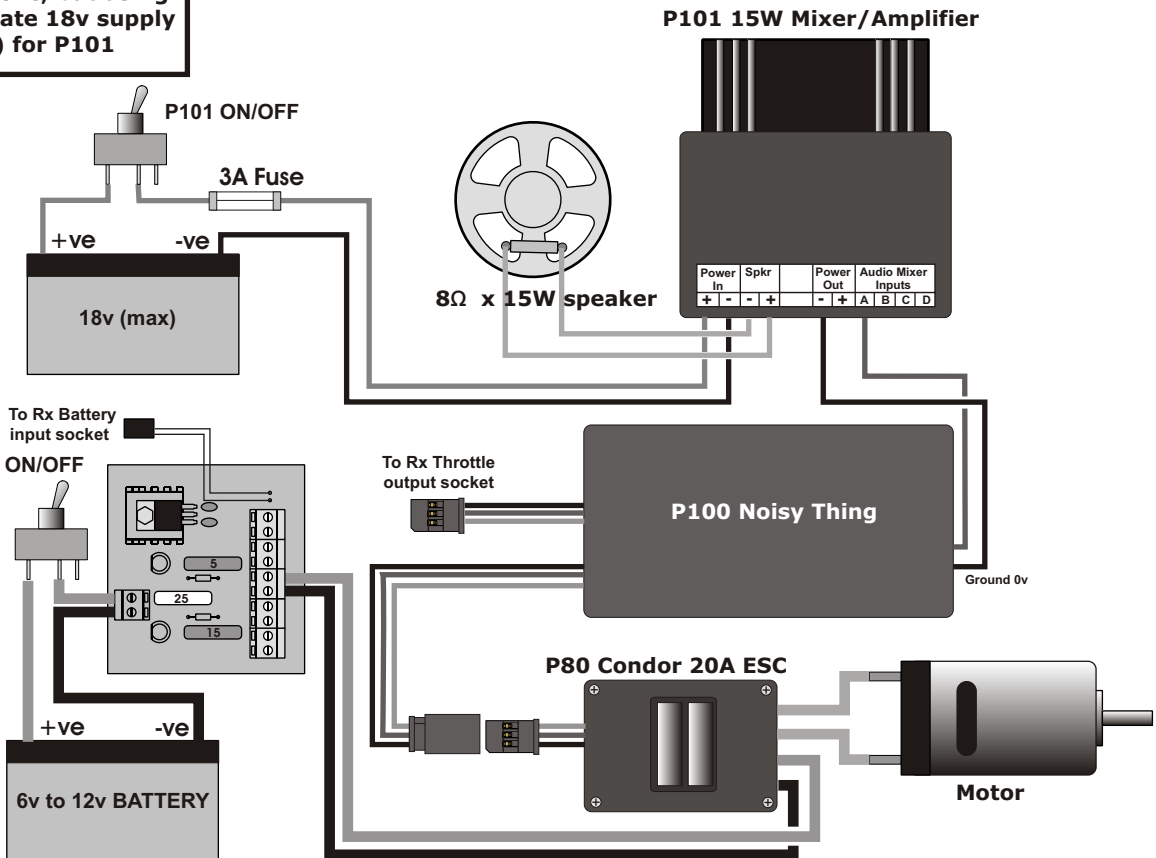


**P101 15Watt Audio Mixer/Amplifier**

Example of ACTION P101 used in conjunction with P100 Digital Engine Playback Module, P92 Power Distribution Board and P80 Conдор Electronic Speed Controller



As above, but using separate 18v supply (Max) for P101



## P101 Kit Instructions

[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 P101 and the full Instructions, Datasheet, Wiring Diagrams and Kit Assembly Sequence will open.](#)

### PCB

The PCB for this project is manufactured from high grade Epoxy-Glass Fibre Board. It requires no further preparation.

### 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 while a larger chisel-shaped bit is better for the screw terminal blocks.

### 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 C5 & C6 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 (longer) leg of the capacitor, of course, goes to the positive. The capacitor polarisations are shown on Component Placement.

The small capacitors C1-C4 are non-polarised and can be fitted either way round. C2 is a square, pale blue-coloured component; C4 is a dark blue-coloured 'blob' while C1 and C3 are rectangular and either cream or scarlet in colour.

The resistors R1 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 TB3 and the black spot towards the centre-line of the PCB See drawing.

The amplifier U1 is a long, rectangular component, black in colour, with nine pins on one edge and a metal insert on one of the faces. It is fitted with the metal insert towards heat-sink H1, with a heat-transfer Kool Pad sandwiched in between them - See the top sketch on the drawing. *You should take the usual anti-static precautions when handling this component.*

The square black moulding with a hexagonal hole at the centre and three legs is an adjustable trimmer pot (R2). 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 TB1 & 2 form J1 and the two 3-way blocks TB3 & TB4 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 to clear the heads of the heat-sink securing screws. HINT it helps when marking out the black ABS case to stick some low-tack masking tape to it first.
2. Fit the heatsink to the PCB with two M3 screws and washers, but don't fit the nuts yet. Bend the legs of the amplifier chip with a non-metallic tool; avoid touching the legs with your fingers. The printing on the chip should be uppermost when the unit is fitted onto the heatsink. Carefully push the legs of the amplifier into their holes in the PCB and lower the amplifier onto the two screws. Trim the Kool Pad to fit between the screws and place it underneath the amplifier. **DO NOT SOLDER THE AMP YET!** Fit washers and nuts to the screws and tighten the whole assembly up. NOW you can carefully solder the pins of the amplifier to the PCB.
3. Fit the diode D1, the small capacitors C1 to C4, and the resistor network R1 make sure this latter is fitted the right way round.
4. Now add the preset R2 and the electrolytic capacitors C5 and C6. Finally. Slot the pairs of terminal connector blocks TB1/2 and TB3/4 together and solder them into the PCB. Ensure that the wires can be inserted into the connector blocks from the outside edge of the PCB.
5. 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.
6. Mark out the case as shown, using a sharp pencil or scribe. Cut the large rectangular shape out of the base with a small hacksaw and sharp knife (along the long edge). Chain-drill a series of 4mm dia holes along the two slots for the wiring, then remove waste material with a sharp knife. Finally scrape or file the slots smooth. Drill the lid 6mm dia for the volume control spindle.

### 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 to ground 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. The trimmer pot R2 on the P101 is now the Master Volume Control for your sound system. P100 'Noisy Thing' doesn't have its own volume control, however.

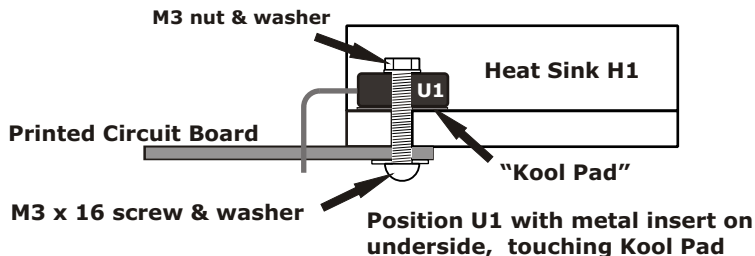
Note that the heat-sink WILL get hot in operation, so make sure you leave an air-gap of at least 1cm between it and the rest of your installation and don't allow any loose wiring to come into contact with it.

**P101**

**15Watt Audio Amplifier/Mixer**



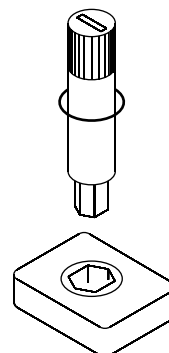
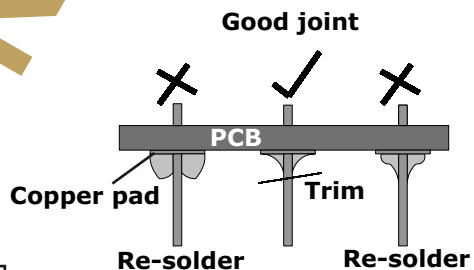
**Assemble heat-sink to circuit board thus:**



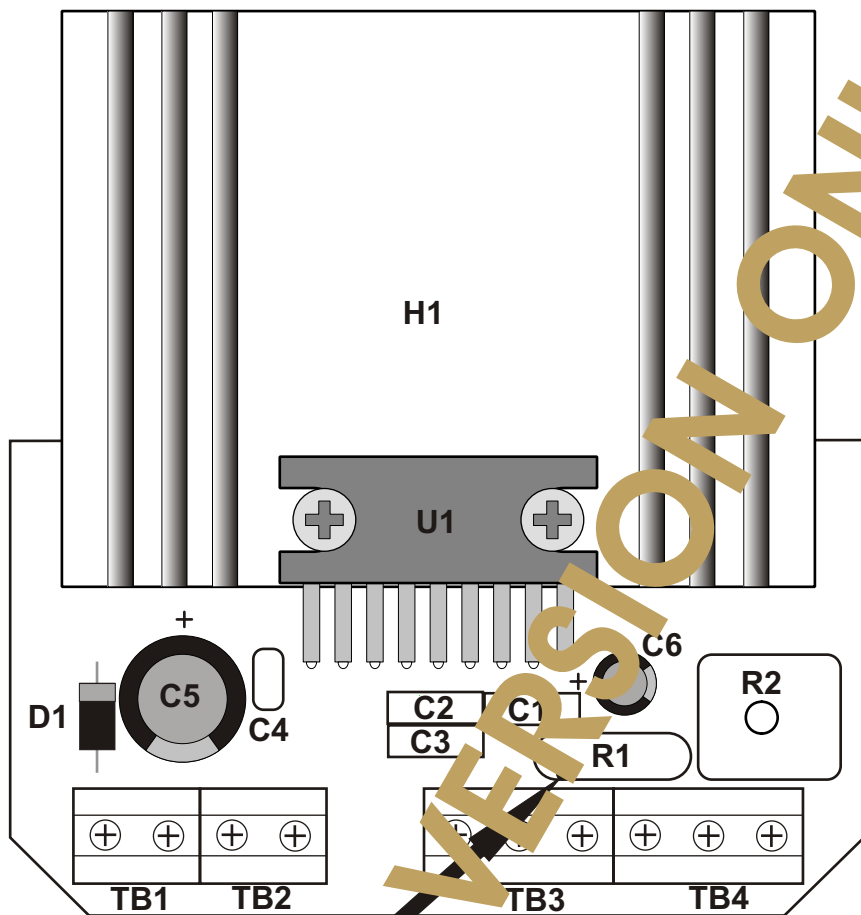
**Resistor colour bands**



**Soldering tips**



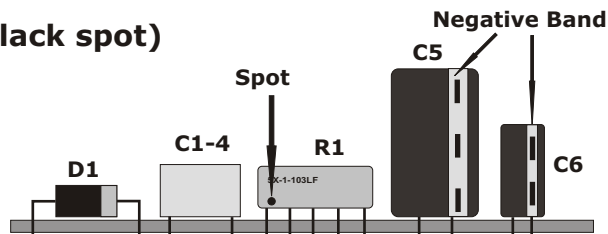
Insert spindle into R2 through hole in case lid



Spot at this end

**PARTS LIST**

- R1 10K 5 pin network (Note black spot)
- R2 10K Preset with spindle
- D1 1N4148
- C1, C3 0.1uF Poly (Cream)
- C2 2n2 Poly (Blue)
- C4 0.1uF ceramic (Blue blob)
- C5 1000uF 25v electrolytic
- C6 10uF 35v electrolytic
- U1 TDA8945S with Kool Pad, screws etc
- H1 Drilled and anodised finned heat-sink
- TB1, TB2 2-Way Screw terminal block
- TB3, TB4 3-Way Screw terminal block
- Case RX2010 type with screws and label
- PCB P101



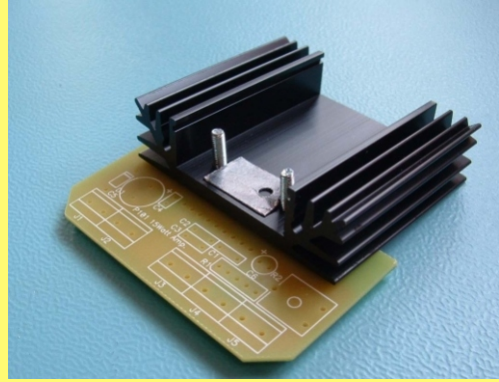
**Component placement**

# P101 15W AMPLIFIER/MIXER

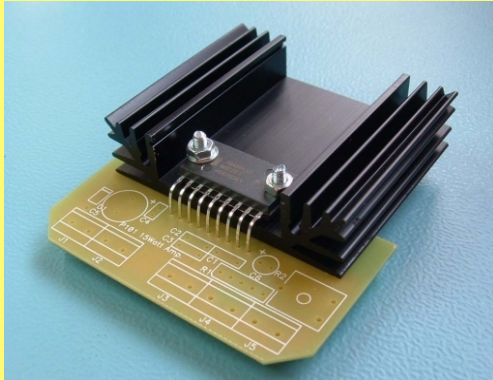
## PHOTOGRAPHIC BUILD SEQUENCE FOR KIT VERSION ONLY



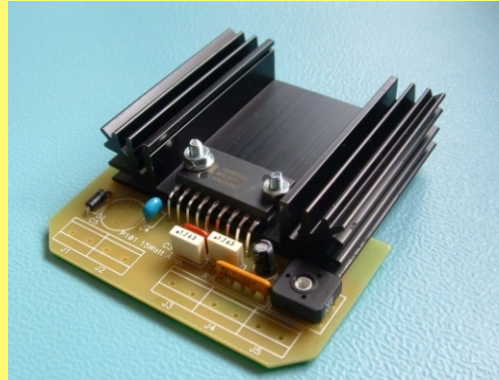
**PICTURE 1: Bend legs of amplifier I/C**  
**ANTI-STATIC PRECAUTIONS REQUIRED!**



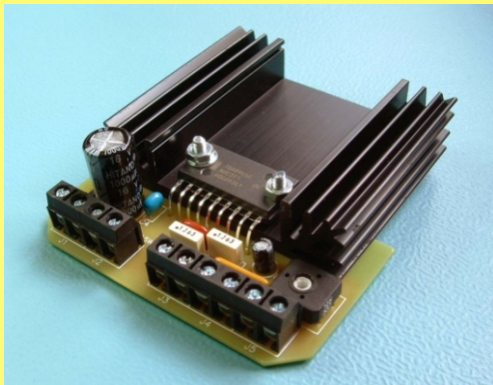
**PICTURE 2: Fit screws, heat-sink and trim Kool Pad to size as shown**



**PICTURE 3: Solder amplifier legs to PCB**  
**and tighten nuts carefully.**



**PICTURE 4: Fit smaller capacitors, R1 ,**  
**diode and pre-set volume control pot**



**PICTURE 5: Fit large capacitor and screw**  
**terminal blocks**



**PICTURE 6: Mark/drill 6mm holes in base**



**PICTURE 7: Mark and remove large cutout**  
**to clear finned heat-sink**



**PICTURE 8: Mark slots for wiring terminals**



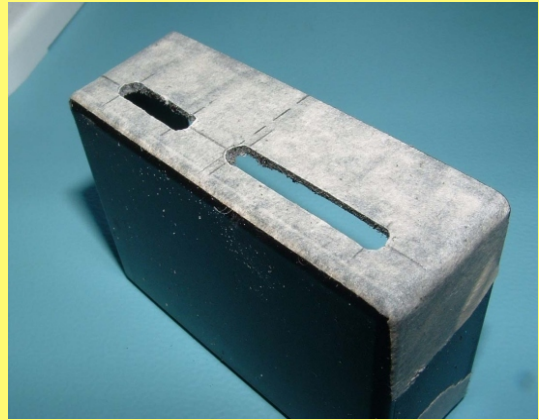


## P101 15W AMPLIFIER/MIXER

### PHOTOGRAPHIC BUILD SEQUENCE FOR KIT VERSION ONLY



**PICTURE 9: Chain-drill 4mm holes**



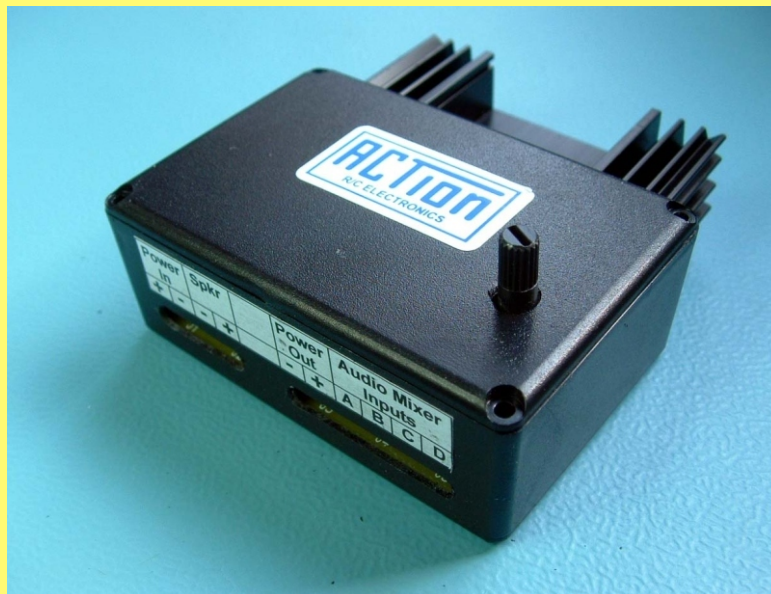
**PICTURE 10: Remove scrap material and file/scrape slots smooth**



**PICTURE 11: Mark out hole for spindle**



**PICTURE 12: Drill 6mm dia hole**



**PICTURE 13: Fit unit into case; fit spindle and lid; add self-adhesive labels.**