

TEXT ONLY
KaT34 POWER
AMPLIFIER KIT
INSTRUCTIONS

SAFETY WARNING

Lethal voltages exist in this amplifier. Please do not attempt to build it unless you have some understanding of valve circuitry and can follow safety precautions.

We do provide a back-up service, a help-line is manned from 9.00am to 5.00pm Monday to Friday, should you run into any problems. Additionally, if the worst comes to the worst and you cannot get your amplifier going, or simply want it checked, for a nominal charge, we will get your amplifier up and running.

For safety, never hold earthed metal work when testing. Make sure your body is isolated by rubber soled shoes. To aid construction use a multimeter, one capable of reading up to 1000 volts dc. You have electrical safety gloves so please wear them when testing, since the greatest danger comes from a slip at this time. Always remove the mains plug when you are soldering after switch on. The larger power supply capacitors will hold a nominal charge after switch off, so wear your gloves at all times when working internally.

Additionally be aware that the valves do get very hot and will burn skin on contact, therefore please position in a safe place, away from children and animals. The chassis's top surface does get hot and the front panel will be warm to the touch so take care.

FUSE

This amplifier consumes 1.2A from the mains and must be fitted with a 1.6A **ANTI-SURGE** fuse. If this blows, then there is a fault and it must be cleared before another fuse is re-inserted.

Do not use a higher rated fuse as you may burn out your transformers and always use the slow-blow type.

OUTPUT TRANSFORMERS

When it comes to switch on you should always have your output transformers connected up to a 8 ohm load, be it a dummy load (high power 8 ohm resistor) or a pair of speakers. If you have the 4 ohm output transformers then use a 4 ohm resistor. This is because the load is an integral part of the circuit, unlike most transistor amplifiers. Switch on without a load will cause unnecessary distress to the output transformers and failure if left in this state for a long time.

READING

Before you start building read through the instruction at least twice to avoid any mistakes.

All rights to the design are held by World Audio Publishing Ltd. No part of this manual may be reproduced without Copyright permission from the Company. The kit is for private constructors only. It is not to be re-sold or in any way used for commercial gain or profit without express written permission from World Audio Publishing Ltd.

World Audio Publishing Ltd.
12a Spring Gardens
Newport Pagnell
Milton Keynes
Bucks, MK16 0EE
HELP-LINE 01908 218836

Please note all valves supplied are guaranteed for 90 days and all other individual parts for 1 year

MEASURED PERFORMANCE

power.....	32watts into 8 ohms
frequency response.....	15Hz-85kHz
separation.....	70dB
noise.....	-90dB
distortion.....	0.05%
sensitivity.....	300mV

SKILL LEVEL

To build this amplifier you must be able to:

- a) solder to a good standard.
- b) have some knowledge of valve circuitry.
- c) possess a rudimentary understanding of electricity and electronics.
- e) have a multimeter and be able to use it.
- f) have access to a dummy load or an old pair of speakers.
- g) know the precautions necessary to avoid electric shocks from the mains and amplifier power lines.

BUILD SEQUENCE

Before you start building it is a good idea to check the parts supplied against your parts list. Use the iXî column on the parts list to cross off your components. To help you through the build process you will find at the rear of the manual diagrams labelled fig. 1, fig. 2 and so on. These will bear correlation to the text and a note in bold type after each section, will tell you which diagram to refer to.

FIXING OF THE HARDWARE

- 1) Front plate - Fit the front plate to the chassis using the M4 hex bolts and M4 nuts provided.
- 2) IEC mains input socket & power switch - this snaps easily in place. Orientate so that the power switch portion is nearer to the chassis corner. Place the fuse into the tray and push into place
- 3) Speaker binding posts - **see fig. 6 p.10**
- 4) Phonos sockets - **see fig. 4 p.10**
- 5) Earth post - To achieve a good chassis earth, scrap the paint away internally around the hole. You can solder straight onto the screw.
- 6) Valve bases - Orientation is vital so pay careful attention to the central locator pin of the 6 octal bases and the position of the gap on the 2 B9A socket. **see p. 8**
- 7) Capacitor clip - NB use the M3 x 6mm screw provided to attach the clip to the chassis. Fit C5 here.
- 8) Choke - use the M4 screws and nuts provided.
- 9) M3 x 25mm stand offs x 6. Fit tag board icî the power supply, use the holes as shown on **p. 8**
- 10) Output transformer - Orientation is important so pay careful attention to **fig. 5 & 7 p. 10**
- 11) Mains transformer - fit as illustrated on **fig. 5 & 7 p. 10** and position the correct way round .

WIRE ROUTING

- 1) Paying close attention to **fig. 7 p. 10 & p. 8** it is an idea to lay all leads and wire up leads where possible, using the self adhesive clips provided fit the leads along their suggested routes. Please note that the other tag boards have yet to be fixed in place, this is to ease routing underneath the board position. Where

leads are to be solder to the tag board, or to components not yet fitted, gauge the correct length and cut back and prepare for soldering later. Also note, that for ac carrying leads the associated wires are twisted together to reduce hum pick up.

2) Route A - **mains transformer secondary** - twist together the 2x purple leads, connect one to V2, pin 2 and the other to V2, pin 8. The yellow lead to the earth post. Plait the 2x black lead and white lead, solder one black lead to V1, pin 4 & 6, the other to V2, pin 4 & 6 and the white lead to the star earth, tag cL8.

Mains transformer primary - The yellow/green lead, solder to the earth post. **Other** - solder the star earth, tag cL9 to R47 soldered to the earth post, using 1/1.2 wire. Make a 15cm length of twisted pair 1/1.2 wire and connect V1, pin 8 to V2, pin 8 and connect V1, pin 2 to V2, pin 2. Make sure you have not got this the wrong way round, easily done as you are using a twisted length.

3) Route B - **mains transformer secondary** - twist together the 2x grey leads, connect one to Tag cL16 and the other to tag cL17.

4) Route C - **heater wiring for V5-V8** - Using 4 separate lengths of twisted 1/1.2 wire, one pair going to each valve, connect Tag cL18 to V5, pin 2, V6, pin 2, V7 pin 2 and V8 pin 2, then connect Tag cL15 to V5, pin 7, V6 pin 7, V7 pin 7 and V8 pin 7.

5) Route D - **heater wiring for V3 and V4** - Using 2 separate lengths of twisted 1/0.6 wire, one pair going to each valve, connect Tag cR18 to V3 pin 5 and V4 pin 5, then connect Tag cR15 to V3 pin 4 and V4 pin 4.

7) Route E - **signal input wiring** - connect up the phono input pair to the V3 and V4. Use the single screened wire and 1/0.6 wire provided.

8) Route F - **output transformer secondary** - twist the green and purple leads together on each channel and solder the green to the nearest black speaker post and the purple to the red post. **Feedback wiring** - prepare a length of screened wire and solder the braid to the black post and the red wire to the red post. Refer to **fig 10 p.11** and solder in C19/C20 and R34/R44 accordingly.

9) Route G - **output transformer primary** - Fit R39, R40, R41 & R42 to the valve bases. **Right channel** - connect the pink lead to R39, red lead to V7 pin 3, connect the grey lead to R41 and the black lead to V5 pin 3. Connect the 2x yellow lead to Tag cL12. **Left channel** - connect the pink lead to R40, red lead to V8 pin 3, connect the grey lead to R42 and the black lead to V6 pin 3. Connect the 2x yellow lead to Tag cL12

10) Route H - **mains transformer primary** - brown, blue, orange & red leads- **for 230/240Vac** (UK/EEC) operation solder together the orange & red leads and isolate with insulation tape. Twist all 4 wires together, solder the blue & brown wires to the power switch, the blue to blade 3 and the brown to blade 2. With the excess wire connect blade 1 to blade 5 and connect blade 4 to blade 6. **Other** - using 1/1.2 wire connect the mains socket earth, blade 7, to the earth post. **see fig. 1 p. 9**

WIRING UP THE INPUTS

1) Taking a 74cm length of 1/0.6 wire solder one end to the iL INPUT solder tag, connect the other end to central spigot of V4.

2) Taking a 74cm length of single screened wire, strip 2cm of one end. Twist together the outer silver braid, the i screen, tin it (apply a small amount of solder) and solder to the iL INPUT solder tag. Solder the red i signal wire, once stripped, to the centre spigot of the iL INPUT. Strip 2cm of the other end and strip 5mm of the signal.

3) Fit components R8 & R10 to the valve base of V4 keep the lead lengths to a minimum.

4) From 2) solder the braid to the central spigot of V4 and the red wire to the join of R8 & R10.

5) Taking a 43cm length of 1/0.6 wire solder one end to the iR INPUT solder tag, connect the other end to central spigot of V4.

- 6) Taking a 43cm length of single screened wire, strip 2cm of one end. Twist together the outer silver braid, the iscreenî , tin it (apply a small amount of solder) and solder to the îR INPUTî solder tag. Solder the red isignalî wire, once stripped, to the centre spigot of the îR INPUTî. Strip 2cm of the other end and strip 5mm of the signal.
- 7) Fit components R7 & R9 to the valve base of V3 keep the lead lengths to a minimum.
- 8) From 6) solder the braid to the central spigot of V3 and the red wire to the join of R7 & R9.

FITTING THE TAG BOARDS & COMPONENTS

- 1) Fit the remaining two tag boards in place using the circled cross-hairs guide holes, see diagram on **p. 8**. Bolt firmly in place with the M3 nuts provided.
- 2) Paying close attention to **p. 8** and the parts list / bag label for component identification and solder in all components.
- 3) Note well - Those components that are represented by broken lines lie underneath the tab board.
- 4) Note well - the bridge rectifier **see fig. 2 p. 9** and capacitors **see fig. 3 p 9** need to be located the correct way round otherwise you will destroy the component.
- 5) Solder in all inter tag board links, using the 1/0.6 wire provided, following the shortest route.
- 6) Solder all external links using 1/0.6 wire.
- 7) Solder in all wires prepared from the îwire routingî section.
- 8) Note well - some of the neighbouring tag points are to be joined together this is represented by a line joining them together.
- 9) All arrows with a text location, signify a connection from that point to the text location, use 1/0.6 wire unless stated otherwise.
- 10) There is a lot of wiring to be done in this section, thus it is vital you cover every inch of the diagram on **p. 8**

TIME TO CHECK

- 1) You may feel that the amplifier is ready for switch on, but you are at least an hour from this.
- 2) The KaT34 is more complicated to build than our PCB based products in that it is up to you to do all inter-component connections there are no copper PCB tracks to rely upon. So with the circuit diagram in front of you start at R1 and trace every single component, where does it come from? Where is it going? Is it correctly orientated? Is it going to the correct valve pin? Check everything.
- 3) There are over 160 solder points in this amplifier and nobody is perfect, I failed on 5% of the joins, but I caught them second time round, thus the amp. worked on first switch on. It saves a lot of messing around later, **so check and check again.**

FIRE UP TIME

- 1) Insert all valves. Now you are ready to fire her up. A useful piece of equipment to use at this stage is a Variac (rated at 2 Amps or over), to limit the initial voltage input. If you cannot get one do not worry most budding kit builders are armed with only a multimeter, this is sufficient. You must have a dummy load, a 8 ohm high wattage resistor, or an old pair of speakers connected up to the speaker binding posts.
- 2) The next step is to **PUT ON THE SAFETY GLOVES PROVIDED TO PREVENT ANY RISK OF RECEIVING ANY ELECTRIC SHOCK.**
- 3) Switch her on and step back, do not be put off by a slight tinkering sounds this is the noise of the valves warming up. You should see one/two small red points of light in each valve, these are the valve heaters. The EL34 heaters show themselves as a red glowing spot.

- 4) When the amplifier is working, measure all voltages to ensure they are correct, measure with 0 volts signal input, bearing in mind that a degree of variation (around 15%) is to be expected due to dependence upon the mains voltage. **KEEP YOUR GLOVES ON.**
- 5) When measuring do not touch any internal part even on switch off as capacitors can hold their charge. Leave for at least 5 minutes to discharge fully. Always disconnect from the mains when working internally. And always work with one arm behind your back (reduces the chance of a shock travelling across your heart).
- 6) Once fully tested fix the chassis base plate, using the screws provided, then fit the self adhesive feet in place. Now you can enjoy the wonders of the KaT34. Remember, need a pre-amplifier for it to work.

TEST VOLTAGES

voltage	label	position
125Vdc	aT	LC - V4 pin 1, RC - V3 pin 1
0Vdc	g1P	LC - V4 pin 2, RC - V3 pin 2
95Vdc	g2P	LC - V4 pin 3, RC - V3 pin 3
125Vdc	aP	LC - V4 pin 6, RC - V3 pin 6
1.75Vdc	cP, g3P	LC - V4 pin 7, RC - V3 pin 7
7Vdc	cT	LC - V4 pin 8, RC - V3 pin 8
28Vdc	g3, k	LC - V6, V8 pin 1 & 8, RC - V5, V7 pin 1 & 8
395Vdc	a	LC - V6, V8 pin 3, RC - V5, V7 pin 3
398Vdc	g2	LC - V6, V8 pin 4, RC - V5, V7 pin 4
6.3Vdc	h to h	ECF80 heater voltage - V1, V2 measure between pin 4 & pin 5
6.3Vac	h to h	EL34 heater voltage - V5, V6, V7, V8 measure between pin 2 & pin 7
400Vdc	choke 1	pin 1(HT)
408Vdc	choke 2	pin 2
375Vdc	none	positive terminal of C5

FAULTS AND HOW TO CLEAR THEM

- 1) Any serious faults will blow the mains fuse immediately. That is your guarantee. Do not squander it by fitting a larger fuse in frustration, because the situation will get worse not better.
- 2) The most common mistake are:
 - a) a wrongly placed component
 - b) a solder link forgotten
 - c) a component not soldered in place
 - d) an external to tag board connection wrongly placed
- 3) To start with turn the power switch off and pull the mains plug out. A way to remedy these possible faults is to go through the instructions and visually check everything again. Always wear your gloves even though the power is off as some residual charge may be held within the power supply capacitors.
- 4) If you are still having problems then call the helpline.

PARTS LIST

component description	X	quantity	bag No.	location in amp
R1/2/3/4 - 100K, 1W		4	1	tag board
R5 - 1.5K, 2W(medium)		1	1	"
R6a - 22K, 7W(large)		1	1	"
R6b - 33K, 7W		1	2	"
R7/8 - 100K, 0.5W		2	1	V3/V4 valve bases
R9/10 - 3.3K, 0.5W		2	2	V3/V4 valve bases
R11/12 - 430K, 0.5W		2	3	V5/V6/V7/V8 valve bases
R13/14 - 10R, 0.5W		2	4	"
R15/16/19/20 - 100K, 2W		4	3	"
R17/18 - 2.7K, 0.5W		2	5	"
R21/22/25/26/27/28/29/30 - 560K		8	4	"
R23/24 - 150K, 0.5W		2	6	"
R31/32/33/34 - 2.2K, 0.5W(small)		4	5	V5/V6/V7/V8 valve bases
R35/36/37/38 - 390R, 7W(large)		4	5	tag board & V5/6/7/8 valve base
R39/40/41/42 - 100R, 1W		4	6	V5/V6/V7/V8 valve bases
R43/44/47 - 10R, 2W		3	7	speaker post
R45/46 - 560R, 0.5W		2	7	tag board
VR1 100K dual log pot		1	7	front panel
C1/2/3/4 - 100uF, 450V		4	1	tag board
C5 - 120uF, 500V (black & large)		1	2	capacitor clip
C6 - 4700uF, 10V		1	3	tag board
C7/8 - 1uF, 400V(orange)		2	2	"
C9/10 - 1000uF, 10V (black)		2	3	"
C11/12/13/14 - 0.22uF, 400V		4	4	"
C15/16/17/18 - 100uF, 63V		4	2	"
C19/20 - 0.1uF, 100V (orange)		2	5	speaker post
C21/22 - 2.7nF, 30V (grey)		2	6	tag board
BR1 - KBU4D		1	7	"
1.6A slow blow fuse		1	8	in tray
M4 x 12 hex bolt		4	8	to fit front panel
M4 nut		6	8	to fit front panel & choke
M4 x 10 pozidrive screw		2	8	to fit choke
M3 x 12 pozidrive screw		31	8	to fit tag boards,base & valve bases
M3 nut		24	8	to fit stand off & tag boards
4mm speaker posts & fittings		2 pairs	8	rear panel
M3 x 25mm stand offs		6	8	chassis (to fix tag boards to)
red & black insulated phono socket		1	8	rear panel
earth post		1	8	rear panel

PARTS LIST

component description	X	quantity	bag No.	location in amp
IEC input & switch		1	8	rear panel
tie wraps		5	9	wire clean up
self adhesive clips		5	9	wire clean up
capacitor clip		1	9	chassis
M3 x 6mm screw 1		9	use to fit clip to chassis	
octal valve base & fixing ring		6	9	chassis
B9A valve base & fixing ring		2	9	chassis
self adhesive feet		4	9	chassis base
black 1/0.6 wire(thin)		6m	10	other wiring
single screened wire		2m	10	signal & feedback wiring
black 1/1.2 wire(thick)		4m	10	heater wiring EL34 & earth
Valve set (when ordered with kit)		1		returns 4 x EL34, 2 x 5U4, 2 x ECF80
2.5H choke		1		
output transformer + chrome cap		2		
mains transformer + chrome cap		1		
safety gloves		1		
IEC lead		1		
tag board		3		
chassis (3 parts)		1		
instruction manual		1		