

KEL80

INTEGRATED INSTRUCTION MANUAL

TEXT ONLY

SAFETY WARNING

Lethal voltages exist in this amplifier. Even though this is one of our simplest kits, in terms of construction, 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 encounter problems, we will get you amplifier up and running, for a nominal charge .

For safety, never hold earthed metal work when testing. Make sure your body is isolated by rubber soled shoes. To aid construction use a voltmeter, one capable of reading up to 1000 volts would be adequate. **YOU MUST WEAR THE RUBBER SAFETY GLOVES PROVIDED** 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 charge after switch off, so continue to 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. Due to the compact size of the amplifier the chassis's top surface does get hot and the front panel will be warm to the touch.

FUSE

This amplifier consumes 1A from the mains and must be fitted with a 1.6A SLOW-BLOW 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 or a 4 ohm load, depending on which taps you have wired up, be it a dummy load (high power resistor) or a pair of speakers. 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.

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INTRODUCTION

KEL 80 monobloc is an inexpensive valve monoblock amplifier capable of providing no less than 80 watts into an 8 ohm load. This is enough power to satisfy those who feel the usual valve amp power of around 20 watts insufficient for their needs. The KEL 80 operates in Class AB, running in Class A at low signal levels to ensure distortion does not colour music at ordinary volumes. It is possible to bridge two monoblocs by paralleling the inputs and outputs, this delivers an amazing 160 watts into a 4 ohm load.

The KEL 80 uses a ultra quiet encapsulated toroidal mains transformers and a large high quality E/I output transformer to achieve a broad frequency response that will not waver even at full power. All valves, rectifiers and the passive components are mounted directly onto the large printed circuit board, thus improving ease of build compared with its hard-wired counterparts.

The circuit is similar to our popular KEL34 in that it uses the venerable 6AU6, directly coupled to a common cathode phase-splitter, the high power, high transconductance 5687. The output stage is four EL34 from Tesla (J.J. branded), in parallel push-pull

Simon Pope HFW editor says, "The KEL 80 manages to combine tube refinement and brute power in a two-box package. Opening with some classical tunes, the KEL80s brought out the depth of the orchestration as only valve amplification can, crisp, solid bass and lightning-fast transients coupled with an addictive smoothness to percussion and violins. It takes an amp with genuine control and grunt to bring out the full bass potential of `Mindfields`, and the KEL80s were well up for the job. They succeeded in reproducing that rare bass `bounce` that is rarely found in valve gear and almost never in solid state."

At this price, the amp is second to none and will open up the benefits of valve amplification to all you high power audio nuts.

MEASURED PERFORMANCE

power.....	78watts into 8 ohms
frequency response.....	24Hz-96kHz
separation.....	60dB
noise.....	-110dB
sensitivity.....	400mV
distortion.....1kHz..1 Watt..0.012%....	78 Watts..0.36%
distortion.....10kHz..1 Watt..0.1%.....	78 Watts..1.2%

SKILL LEVEL

To build this amplifier you must be able to:

- solder.
- have some knowledge of valve circuitry.
- possess a rudimentary understanding of electricity and electronics.
- have a multimeter and be able to use it.
- have access to a dummy load or an old pair of speakers.
- 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 "X" column on the parts list to tick off your components. To help you through the build process you will find to the rear of the manual, diagrams. These will bear correlation to the text and a footnote in bold type after each section will tell you which diagram to refer to.

FIXING OF THE HARDWARE

- 1) Mains switch - this snaps easily in place and is located at the front of the chassis.
- 2) Mains lead - you need to expose 55cm of the 3 core wire for internal wiring, this can be done using large wire strippers or a Stanley knife. Use the strain relief provided to fix the wire in place. see **fig. 5 page 11**
- 3) BFA speaker socket - they need to be isolated from the chassis. Fit the BFA socket in this sequence: speaker post attached to black holder - chassis - grey holder - M5 whole washer - split washer - nut.
- 4) Phonos socket - these need to be isolated from the chassis, hence the use of the M6 fibre washers. Fit the phono socket in this sequence: phono socket (female) - M6 fibre washer - chassis - M6 fibre washer - solder tag - nut. see **fig. 4 page 11**
- 5) Output transformer (O/P T) - Insulation from the chassis is important so pay careful attention to page 11. It is of no consequence which way around you fit the O/P T.
- 6) Mains transformer - The flying leads of the mains transformer are orientated to utilise the pre-drilled holes on the chassis. The fixing bolt is used in this instant for the chassis earth. So before fitting the mains transformer, scratch off the paint internally around the fixing hole with a small flat head screw driver. This ensures good electrical contact with the solder tag, this will be soldered up later.

POPULATING THE PRINTED CIRCUIT BOARD (PCB)

You will see that the PCB has tracks on both sides. It is important that you can identify which side is which. The side with all the labelling on, the "ident", consisting of outlines, positions and the names of components and tabs, is called the "component side", this is where all the components sit. The other side we have termed the "valve base side" as all the valve bases sit here. The PCB is of the double sided variety, which basically means that a pin (hole) that appears on both sides of the PCB is not electrically joined even though it is only the thickness of the PCB away from each other. The pin is joined by threading a piece of wire (usually in the form of component lead) through the pin and soldering both sides. Please note that there is one pin that is not related to a component, but needs to be threaded in a similar manner with a piece of wire and soldered both sides. This is denoted `PTH` on the PCB. There is an exception to the rule, namely, all the electrolytic, polypropylene capacitors and bridge rectifiers, these actually cover the pins on the component side, thus making it impossible to solder here. Additionally, there are heater links and inter-PCB links to be made, these are basically lengths of wire joining together two pins on the PCB, these are illustrated on page 9.

A GUIDE TO POPULATING THE PCB

- 1) Insert the terminal pins provided into tabs 1 to 19 to ease all PCB to external connections once the PCB is fitted into the chassis. You will need to push the terminal pins in place either by using a pair of snipe nose pliers or by heating the pin, once partially inserted, with your soldering iron, exerting a downward force, do not push too hard or you will snap your iron. Remember to solder both sides of the pin. see **page 8**

- 2) Start soldering all the resistor first.
- 3) All the high wattage resistors (above 1 watts) generate heat, thus, it is a good idea to give them at least 15mm clearance from the PCB to avoid tarnishing of the board. These resistors are the following: R1, R2, R7, R8, R13, R14, R19 and R27.
- 4) Solder in all the capacitors, Note well, C1 - C10, C14 are all electrolytics and only need soldering on the valve base side. Make sure all these electrolytics are correctly orientated as they will blow. The polarity is marked on the PCB. see **fig. 1 page 11**
- 5) Similarly, C11 and C12 only need soldering on the valve base side.
- 6) Solder in all the bridge rectifiers. Here, you only need solder them on the valve base side. Orientation is very important. The PCB is marked clearly, but pay close attention to **fig. 2 page 11**
- 7) Solder in the fuse holder, insert the 1.6A slow blow fuse and position fuse cover.
- 8) Solder in the valve bases so that they are sitting on the valve base side of the PCB. To reduce any unnecessary stress to the PCB it is a good idea to insert the EL34 valves into their octal bases a few times before you solder the bases on the PCB. The orientation of the octal valve base is very important it is marked by a key-hole (large hole, small key) shape on the PCB, this correlates to the shape of the central hole of the octal base. The B7G and B9A will only fit in one position.
- 9) Wire in the heater links and the PCB inter - links on the valve base side. see page 9
- 10) Solder in the wire link that connects the anode of V2 to the anode of V4, denoted by a white line and `link V4A` on the component side.

FIXING OF THE PCB

- 1) Using the 6 x M3 x 10 pan head screws and the 8 x M3 fibre washer provided, fit the PCB in place.

WIRING UP THE SIGNAL INPUTS

- 1) Take 50cm of single screen cable and wire one end to the phono socket on the back panel, the red signal section to the centre spigot and the screened section to the phono socket solder tag.
- 2) Wire the other end to the PCB, the red signal section to PCB tab 10 and the screened section to PCB tab 9. see **page 8**

WIRING UP THE MAINS

- 1) With the mains lead now fitted cut the brown wire 25cm from the end and solder the cut-off piece to the mains switch and the other end of the cut off piece to PCB tab 2. see **fig. 3 page 11 and page 8**
- 2) Solder the blue wire from the mains lead direct to the mains switch. see **fig. 3 page 11**
- 3) Solder the brown wire of the mains lead to PCB tab 1. see **page 8**
- 4) For 240V operation solder together the violet and grey(thin) leads and isolate. see **page 10**
- 5) Solder the brown lead of the mains transformer to the mains switch. see **fig. 3 page 11**
- 6) Solder the blue lead of the mains transformer to the mains switch. see **fig. 3 page 11**

WIRING UP THE SPEAKER OUTPUTS

- 1) Before you start, you must first select the correct output transformer setting to match your loud speakers, be it 4 ohms or 8 ohms. Most speaker use the 8 ohms setting.
- 2) Connect up the black BFA speaker post to the following.
 - a) PCB tab 5, using 1/1.13 black wire. see **page 8**
 - b) Blue leadout of the output transformer. see **page 10**

- c) Chassis earth solder tag, located on fixing bolt of mains transformer, using 1/1.13 black wire. see **page 10**
- 3) Connect up the red BFA speaker post to the following.
- a) For 4 ohm setting, connect the purple leadout from the O/P T. OR for 8 ohm setting, connect the red leadout from the O/P T. N.B. NEVER connect the 4 ohm & 8 ohm leads together or you will damage the O/P T. Always isolate the lead you are not using. see **page 10**.
- b) Cut a length of single screened cable at 60cm, expose 2cm of one end, remove the screened portion as this is not needed, and wire up the red signal wire to the speaker's red terminal. Exposed 2cm of the other end, wire up the red signal wire to PCB tab 8 and the screened portion to PCB tab 7. see **page 8**

WIRING THE PCB TO EXTERNAL CONNECTIONS

- 1) Refer to page 8 closely and solder all remaining 13 external joins to the PCB.
- 2) With all mains transformer connections, tab 4, 13 to 19 it is a good idea to twist up the relevant winding leads to reduce the likelihood of hum. Thus, twist together the following: white and orange, twist red, red and black and lastly twist yellow, yellow and grey(thick). see **page 10**

TABLE SHOWS PCB TO EXTERNAL CONNECTIONS

tab no.	label on PCB	external connection to:
1		brown wire from mains lead
2		brown wire to mains switch
3		earth wire from mains lead
4		mains transformer secondary grey wire(thick) earth connection
5		black BFA speaker post
6	A	black wire from output transformer
7	GND	ground of feedback screened wire
8	FB	signal of feedback screened wire
9	GND	ground of signal screened wire
10	I/P	signal of signal screened wire
11	A	white wire from output transformer
12	CT	2 x orange wire from output transformer
13		black wire from mains transformer
14		1 x red wire from mains transformer
15		1 x red wire from mains transformer
16		1 x yellow wire from mains transformer
17		1 x yellow wire from mains transformer
18		white wire from mains transformer
19		orange wire from mains transformer

FIRE UP TIME

- 1) 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. It is a good idea to have a dummy load, a 4 or 8 ohm high wattage resistor depending on how you have set it up, or an old pair of speakers connected up to the BFA speaker terminals.
- 2) The next step is to PUT ON THE SAFETY GLOVES PROVIDED TO PREVENT ANY RISK OF RECEIVING ANY ELECTRIC SHOCKS.
- 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 two small red points of light in each valve, these are the valve heaters.
- 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) Once fully tested fix the two chassis parts together, using the M3 x 10 flat head screws provided, then fix in place the self adhesive feet.
- 6) Now you can enjoy the wonders of the KEL 80.

TABLE SHOWS TEST VOLTAGES

voltage reading	label on PCB	position on PCB
1.5Vdc	k	V6 pin 7
125Vdc	a	V6 pin 5
225Vdc	a1	V5 pin 1
225Vdc	a2	V5 pin 9
130Vdc	k1, k2	V5 pin 3, 6
9Vdc	g3, k	V1 pin 1, 8
9Vdc	g3, k	V2 pin 1, 8
9Vdc	g3, k	V3 pin 1, 8
9Vdc	g3, k	V4 pin 1, 8
-10Vdc	g1	V1 pin 5, V2 pin 5, V3 pin 5, V4 pin 5
255Vdc	g2	V1 pin 4, V2 pin 4, V3 pin 4, V4 pin 4
505Vdc	a	V1 pin 3, V2 pin 3, V3 pin 3, V4 pin 3
6.3Vdc	h to h	6AU6 heater voltage: V6 pin 3 to pin 4
6.3Vac	h to h	5687 heater voltage: V5 pin 4 to pin 8 or pin 5 to pin 8
6.3Vac	h to h	EL34 heater voltage: V1, V2, V3, V4 pin 2 to pin 7

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 will be one of the following:
 - a) a wrongly placed component
 - b) a solder link forgotten
 - c) a component not soldered in place
 - d) an external to PCB 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. Always wear your gloves even though the power is off as some residual charge may be held within the power supply capacitors. You may need to take out the PCB to access the valve base side.
- 4) If you are still having problems then call the helpline.

PARTS LIST(for 2 off)

component description	quantity	bag No.	location in amp
R1 3.9K, 6W	2	1	PCB
R2 33K, 3W	2	2	PCB
R3 13K, 0.5	2	3	PCB
R4 36K, 0.5W	2	4	PCB
R5 100R, 1W	2	5	PCB
R6 100R, 1W	2	5	PCB
R7 180R, 7W	2	6	PCB
R8 180R, 7W	2	6	PCB
R9 3.3K, 0.5W	2	7	PCB
R10 3.3K, 0.5W	2	7	PCB
R11 100R, 1W	2	5	PCB
R12 not used	N/A	N/A	N/A
R13 180R, 7W	2	6	PCB
R14 180R, 7W	2	6	PCB
R15 3.3K, 0.5W	2	7	PCB
R16 3.3K, 0.5W	2	7	PCB
R17 220K, 0.5W	2	8	PCB
R18 220K, 0.5W	2	8	PCB
R19 10K, 3W	2	9	PCB
R20a 68K, 1W	2	10	PCB
R20b 82K, 1W	2	11	PCB
R21 15K, 1W	2	12	PCB
R22 15K, 1W	2	12	PCB
R23 1M, 0.5W	2	13	PCB
R24 390R, 0.5W	2	14	PCB
R25 330R, 0.5W	2	15	PCB
R26 27R, 0.5W	2	16	PCB
R27 39K, 3W	2	17	PCB
R28 100R, 0.5W	2	18	PCB
R29 2.2K, 0.5W	2	19	PCB
R30 1K, 0.5W	2	20	PCB
R31 100K, 0.5W	2	21	PCB
R32 100R 1W	2	5	PCB
C1 470uF 450V	2	22	PCB
C2 470uF 450V	2	22	PCB
C3 4700uF 16V	2	23	PCB
C4 100uF 35V	2	24	PCB
C5 100uF 450V	2	25	PCB
C6 100uF 450V	2	25	PCB
C7 220uF 25V	2	26	PCB

PARTS LIST

component description	quantity	bag No.	location in amp
C8 220uF 25V	2	26	PCB
C9 220uF 25V	2	26	PCB
C10 220uF 25V	2	26	PCB
C11 0.68uF 630V	2	27	PCB
C12 0.68uF 630V	2	27	PCB
C13 1uF 250V	2	28	PCB
C14 470uF 10V	2	29	PCB
C15 470pF 160V	2	30	PCB
BR1	2	31	PCB(device SKB B500 C3200/2200)
BR2	2	31	PCB(device 2KBP02M)
BR3	2	31	PCB(device WO2G)
HARDWARE			
mains switch	2	32	FRONT PANEL
fuse holder	2	32	PCB
fuse holder cover	2	32	PCB
fuse, 1.6A	2	32	PCB
M3 x 10 screws	24	32	to fit PCB and base plate to chassis
M3 fibre washers	12	32	to fit PCB
self adhesive clips	10	32	securing of wires
mains trans. fittings	2	32	to fit mains transformer to chassis
red phonos	1	32	BACK PANEL
black phonos	1	32	BACK PANEL
M6 fibre washer.	4	33	BACK PANEL for isolating phono sockets
strain relief	2	33	for fixing of the mains lead to the chassis
BFA speaker term.	2	33	BACK PANEL
M5 solder tag	2	33	chassis earth connected to output transformer bolt
PCB terminal pins	30	33	PCB
B9A valve base	2	33	PCB
B7G valve base	2	33	PCB
octal valve base	8	34	PCB
Wire			
1/0.6 black wire	350cm	35	wiring of 6AU6 & 5687 heaters & all pin pts. & link
1/1.13 black wire	300cm	35	wiring of EL34 heater & earth of spk. term , chassis
single screened wire	120cm	35	wiring of phono inputs & feedback links

component description	quantity	bag No.	location in amp
6AU6	2		on V6 valve base (on PCB)
5687	2		on V5 valve base (on PCB)
EL34	8		on V1, V2, V3, V4 valve bases (on PCB)
mains transformer	2		
output transformer	2		
PCB	2		
safety gloves	1 pair		
maind lead	2		
chassis(2 parts)	2		
instruction manual	1		

ALTERATIONS TO KEL80 INSTRUCTIONS

Wiring up tab 2 to mains switch:

- Insert the terminal pin to tab 2 so that it projects into the valve base side of the PCB and solder both side.
- Solder one end of the 25cm brown wire (excess from the mains lead) to tab 2.
- Solder the other end of the brown wire to the mains switch later once the PCB is ready for fitting.