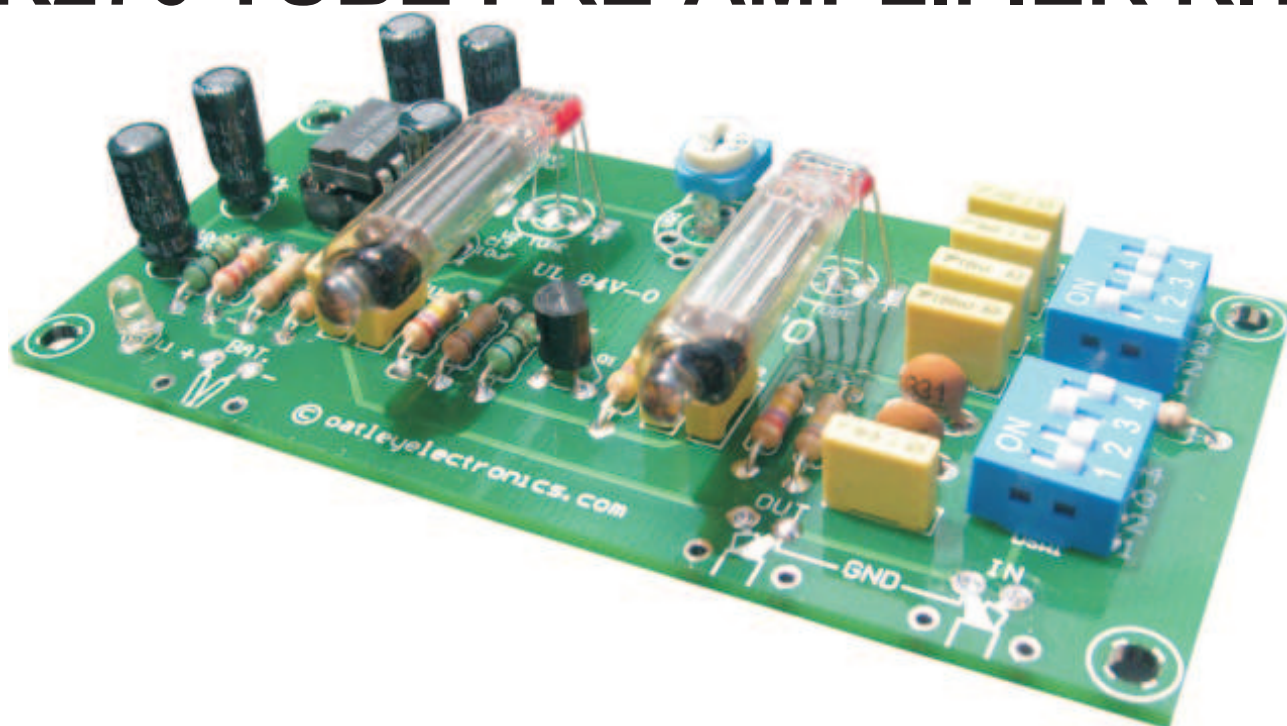


K270 TUBE PRE-AMPLIFIER KIT



NOTE

Make sure that you read and understand these notes before starting any assembly of the kit.

K270 TUBE PREAMPLIFIER

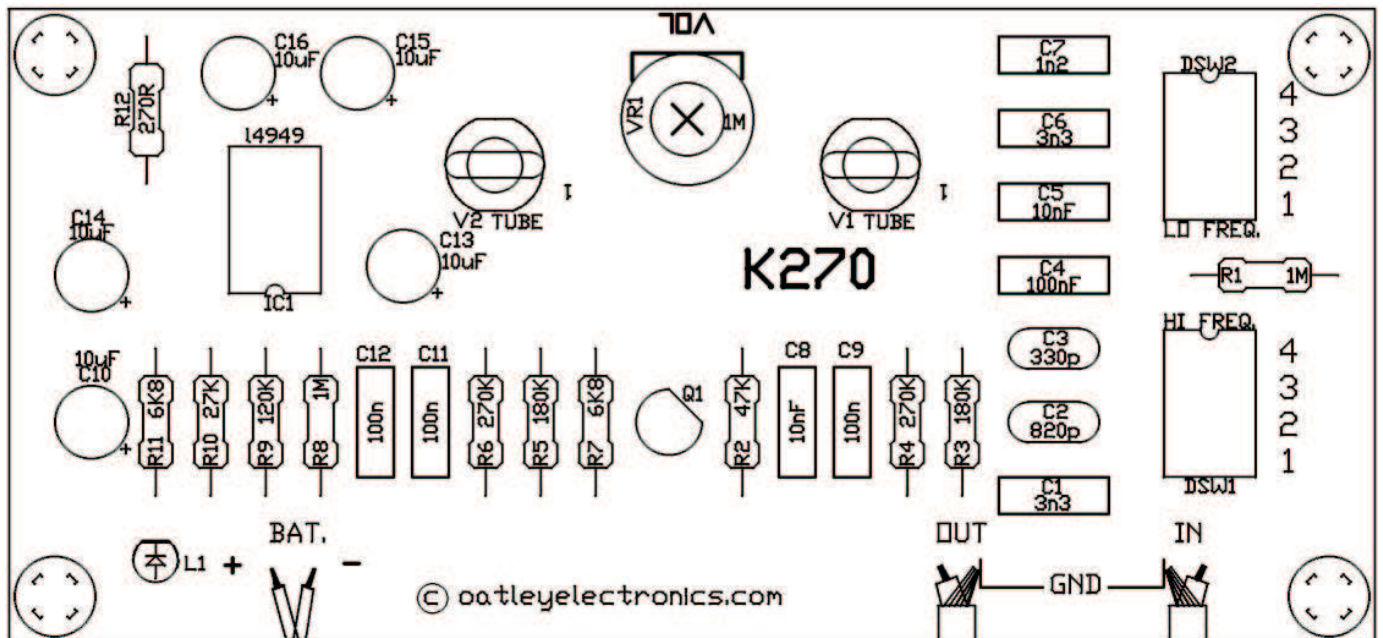
This low cost tube preamplifier lets you experience "tube sound". It is based on two low power consumption Raytheon JAN6418 sub-miniature pentodes. These tubes were made in USA very late in the peak of the tube making era: Around 1980. It is interesting to know that Audio Technica uses one of these tubes in its model AT3060 condenser microphone, which currently sells for around \$600US. Professionals describe this microphone as having a warm classic tube sound. Even when used in conjunction with solid state power amplifiers, professional musicians have described this preamplifier as adding a real "richness", and "warmth" to the sound. The warmth in this preamplifier can

certainly not be attributed to the heat given off by the filament: The 1.2V filament draws just 10mA! You can barely see it glow in a very dark room. The whole preamplifier draws just 11mA from a 9V battery! The preamplifier could be used in conjunction with microphones, electric guitars, and acoustic guitars, which are fitted with a piezoelectric pick-up, etc. There is also provision made for the selection of high and low frequency filters that enhance the performance of electric and acoustic guitars. The filter selection is made by two DIPswitches, which are mounted on the PCB. The gain of this preamplifier is adjustable from 0 to 100 times, the output voltage can be up to 5V P-P (1.8V RMS) with a fresh 9V battery, and the widest frequency response extends from 20Hz to 30kHz. The circuitry also includes an LED battery voltage monitor. The LED will light briefly when the

power is first connected if the supply voltage is above 7V. But the LED will remain on continuously when the battery voltage is below 6.8V.

HOW IT WORKS PREAMPLIFIER SECTION.

The preamplifier is based on two cascaded common cathode tube amplifier stages, which are followed by a MOSFET source follower buffer amplifier stage. The input signal is applied via a coupling capacitor that is selected by SW2 to the grid of tube V1. The combination of selected capacitor, and resistor R2, form a High Pass filter. The corner frequency (-3dB) of this filter is around 20Hz, 100Hz, 1KHz and 3KHz when the switch is the on position 1,2,3 & 4 respectively. The combination of the capacitor, which is selected by SW1 and resistor R3, form a Low Pass filter. The corner frequency (-3dB) of this filter is around 600Hz, 2KHz, 5KHz and 30KHz when the switch is



the on position 1,2,3 and 4 respectively. The amplified signal at the anode of V1 is applied via coupling capacitor C8 to potentiometer VR1. The setting of VR1 determines the signal level that is applied to the grid of tube V2. The amplified signal at the anode of V2 is applied to the gate of MOSFET Q1. The MOSFET is configured as a source follower and this stage has a voltage gain of 1. The MOSFET presents a negligible load to the output at the anode of V2 and therefore isolates the load from the output of V2. Without this stage the output signal amplitude would be greatly reduced when the preamplifier was connected to a load: Typically 47Kohm for line level inputs of Hi-Fi, PA, and Guitar amplifiers. Each of the amplifier stages has a voltage gain of around 10X so when the potentiometer is set for maximum output the overall gain of the preamplifier is around 100X.

FILAMENT CURRENT REGULATION AND BATTERY INDICATION.

IC1 is described as being a low dropout 5V voltage regulator with power-on reset

DSW1

- 1
- 2
- 3
- 4

DSW2

- 1
- 2
- 3
- 4

TREBLE

- Med.+
- Med.-
- Min.
- Max. (flat)

BASS

- Max. (flat)
- Med.+
- Med.-
- Min.

For use with Bass guitar or HiFi systems C4 should be changed to 0.22uF.

and input voltage sense. Its data can be found at the manufacturers web site under: <http://www.onsemi.com/pub/Collateral/L4949-D.PDF> In this application only the 5V regulator, and the input voltage sensing sections of the IC are employed. The unregulated 9V battery voltage is applied to the IC's power input pin 1. The regulated 5V output at pin 8 is connected via the current limiting resistor R12 to the series combination of the two tube filaments. The filament current remains at a constant current of around 10mA with a battery voltage variation of 5.2-10V. The open collector of a transistor inside the IC is connected to pin 7. This transistor is turned on when the voltage at the sensing pin (2) drops below 1.2V, and it is turned off when the voltage

INSTRUMENT

- Acoustic / electric guitar
- Acoustic / electric guitar
- Bass guitar
- Electric guitar

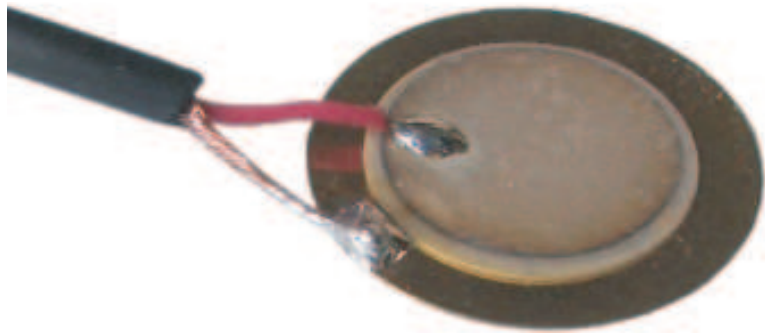
INSTRUMENT

- Bass guitar / acoustic
- Acoustic / electric
- Electric
- Electric

risers above 1.3V. With the resistance values chosen in the voltage divider made up by R9 and R10, the LED would light when the battery voltage falls below 6.8V, and extinguish when the battery voltage rises above 7V. At the instant when the preamplifier is first switched on, capacitor C13 is dis-charged. Until C13 charges to 1.3V the LED would light. The LED flashes for about one second when the preamplifier is switched thus indicating that the battery voltage is above 7V. However when the battery voltage falls below 6.8V the LED would light continuously. Further information for the JAN6418 tube can be found by searching on google.com for "6418 data tube".

PIEZO PICKUP

The piezo disk should be connected via shielded cable. The center conductor of the cable connects to the light coloured center of the disk and the shield connects to the outer gold coloured section of the disk. It is easy to solder to the center disk but you will need to be careful not to use too much solder. Create a small loop in the end of the wire and tin it with solder, place the wire in position on the disk and place the soldering iron on the wire to flow the solder. To stop the wires fraying and breaking you can use some epoxy glue. This assembly can then be attached to musical instrument like a guitar with double sided tape.



CABLE STRAIN RELIEF

There are a number of pairs of holes provided on the PCB. They can be used as strain relief for the cables to reduce the chance of cables fraying. Just use discarded component leads as shown in the diagram.



MICROPHONIC TUBE

The tube used in this kit like all other tubes is microphonic. And will "ring" if struck. For best results The PCB and tube assembly suspended in some soft foam or acoustic material to cushion it from any external vibration. Rubber grommets can be fitted to the tubes to greatly reduce / eliminate the ringing. Elastic bands would give a similar result but not look as good. The rubber grommets are not supplied but can be easily found at hardware or auto spare part shops.



NOTE

We do not supply hookup wire or solder in our kits.

Items supplied as follows...

SEMICONDUCTORS

- 2 X 6418 Valve
1 X 3mm red LED
1 X L4949 IC + IC socket
1 X BSN254A MOSFET

CAPACITORS

- 1 X 330p Ceramic disk
1 X 820p Ceramic disk
1 X 1n2 MKT
2 X 3n3 MKT
2 X 10n MKT
4 X 0.1uF MKT
3 X 10uF Electrolytic

1/4 W RESISTORS

- 1 X 270R
2 X 6K8
1 X 33K
2 X 47K
1 X 120K
2 X 180K
2 X 270K
2 X 1M
1 X 1M Trimpot

MISC.

- 2 X 4Way DIP switches
1 X K270 PCB
1 X Piezo disk
1 X 9VDC Battery Clip
1 X Instructions

