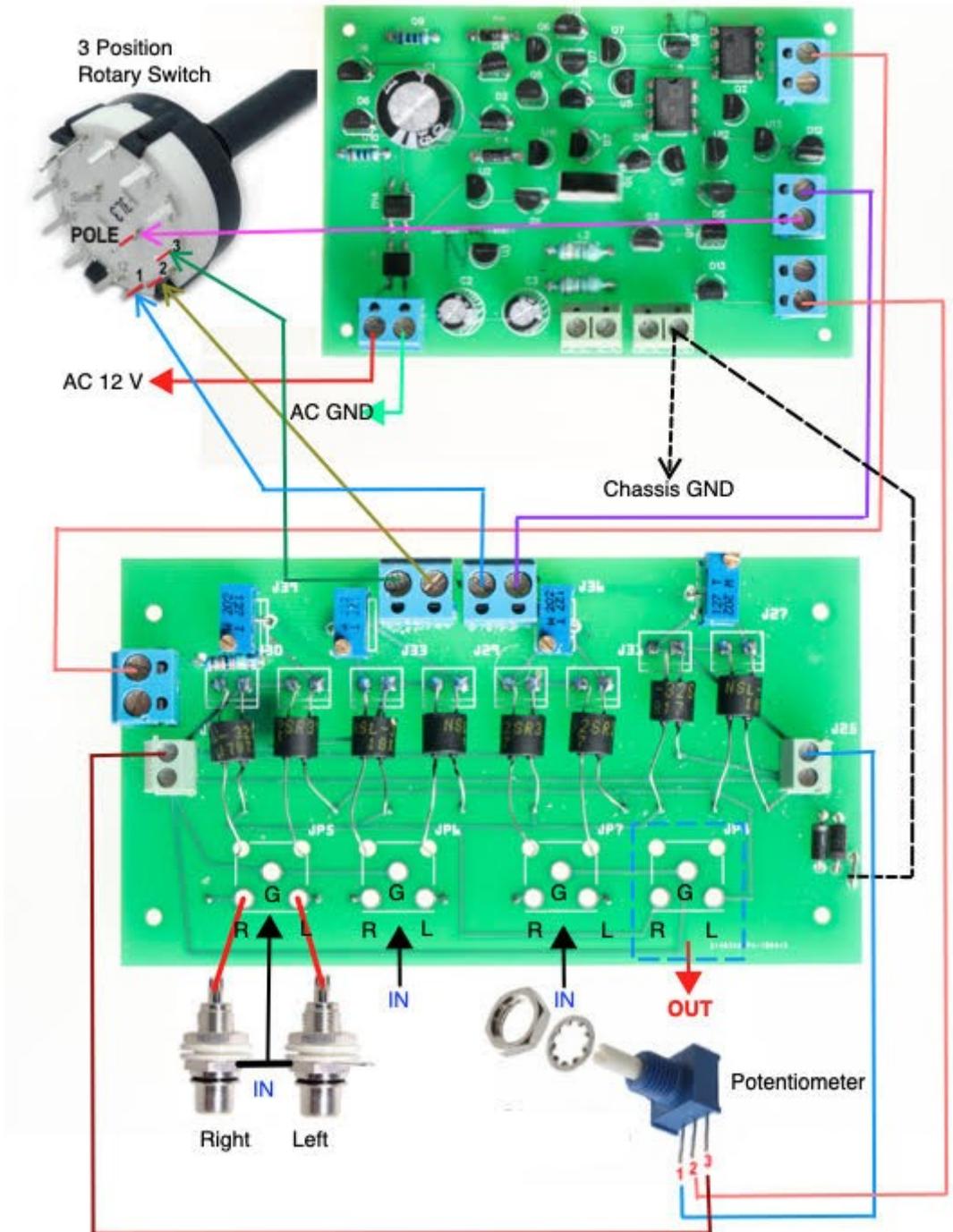


## Stereo coffee LDR 3 Input Kit Instructions May 2019

Thank you for purchasing the stereo coffee LDR 3 input kit, which represents over 10 years of continual development to bring you the best audio possible. The attenuator is intended to be used between three stereo source components and a stereo power amplifier. Input switching is contactless. The attenuator achieves silence at zero volume and will be the best investment you can make for your audio system.

The standard kit is comprised of 4 parts

- The preassembled main board
- The preassembled LDR board
- A two pole six way switch
- A 50k Bourns potentiometer, or optional Remote Volume board



As can be seen the kit is relatively straightforward to connect, however each section is explained so let's get started.

### Tools

Soldering is required for the potentiometer and switch, and for tinning wire ends

Some useful tools are

Sidecutters

A flat blade screwdriver

A well lit area



### Powering

The kit is powered with AC 12V, this is quite different to 12v DC  
12V AC is available with a plugpack supply, however note that the marketplaces are saturated with DC type plugpacks. You need to carefully observe the markings on the supply to ensure it says 12V AC

This is Jaycar part MP3026 a 12vAC plugpack.

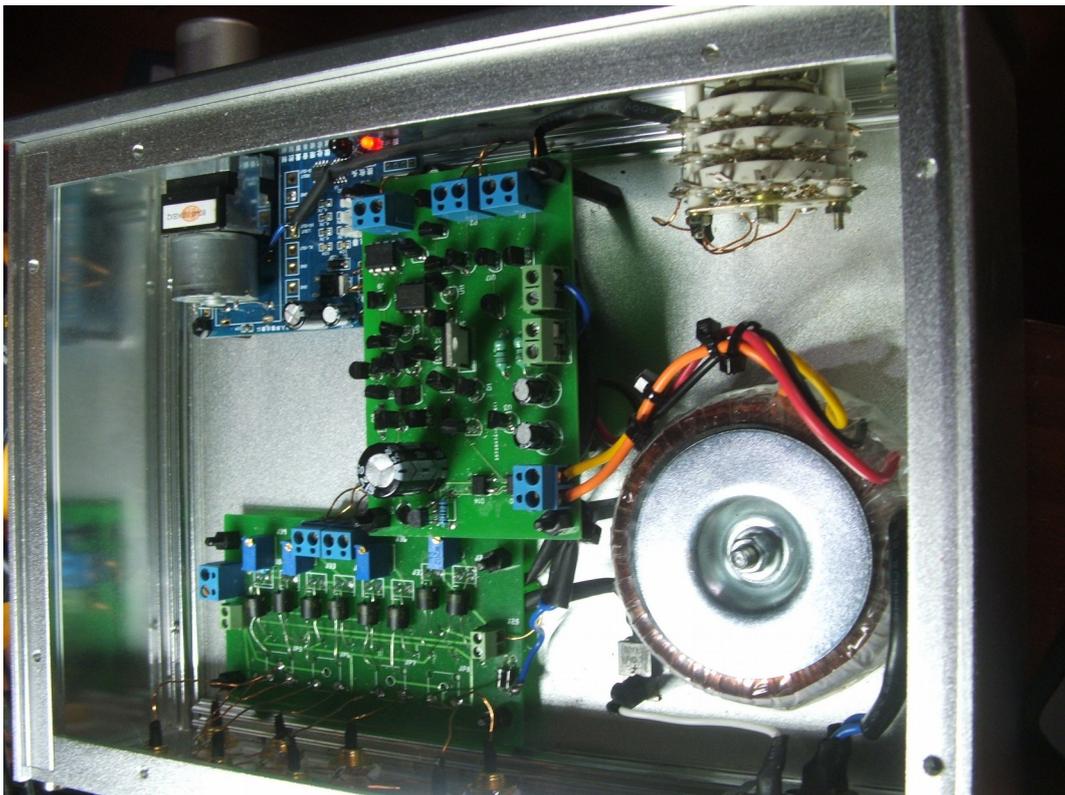


In the US a 12VAC plugpack suiting 120V mains is available at allied Electronics as **Triad Magnetics WAU12-200**

Connecting a 12vAC plugpack that has a 2.1mm fitting , can be done with a chassis socket, which needs to be isolated from a metal chassis. Note how the two connectors are unable to contact chassis metal.



Alternatively a toroidal transformer can be used, here seen also powering the optional remote volume control board.



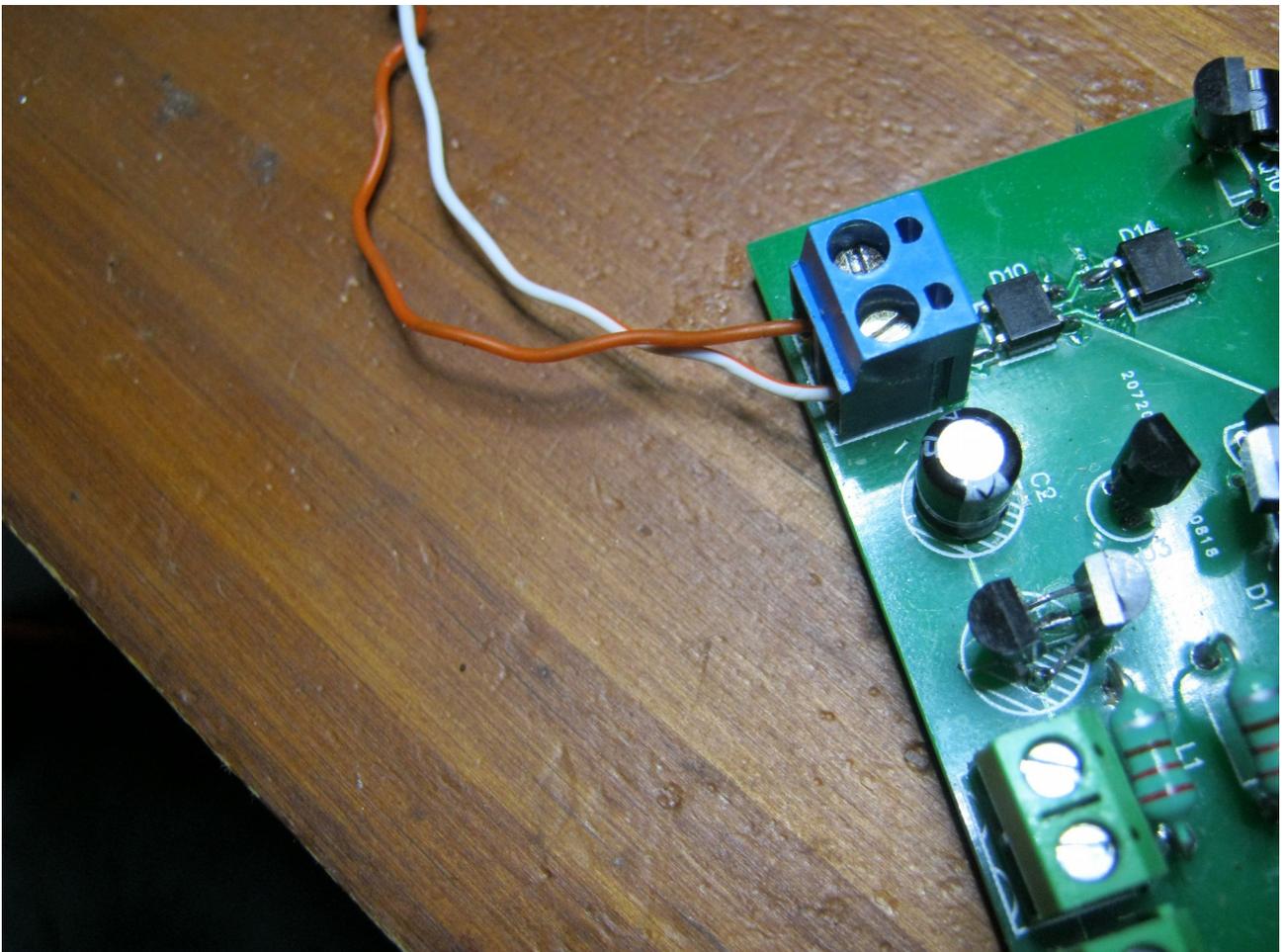
So begin by mounting the boards so that the RCA sockets used are close to the LDR board as seen in the above image, then mount the main board so it can be accessed by the incoming supply

### **ON/OFF switching vs Mute**

A common thought is to have a ON/Off switch , however in practice it is not necessary due to the extremely low current used by the circuit. Typically current is below 10ma . The estimated life of LDR's is over 50 years due to the very low current used. Additional reasons become apparent to favour a Mute switch rather than a ON/Off, as dropping power altogether really needs to be done in correct sequence at the power amp first, followed by the attenuator. And the reverse when re-powering.

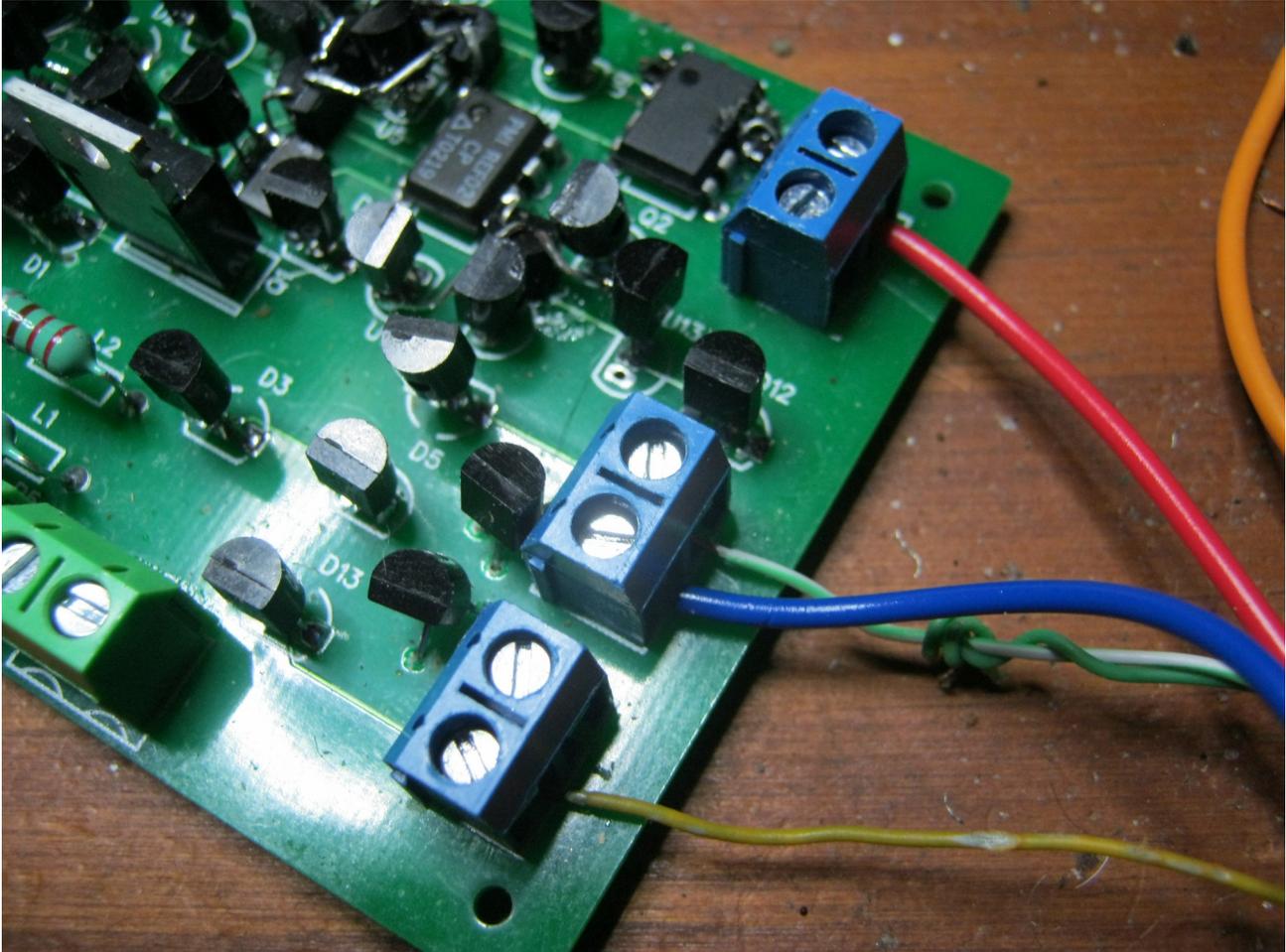
A MUTE switch is a far better arrangement and is easily arranged with either a switch wired between the series anode from the main board to the pole of the switch , or by leaving position 1 on the supplied input switch unconnected, and then having input 1 at Contact 2 Input 2 at Contact 3 and Input 3 at Contact 4 of the supplied switch.

But lets begin by showing where we make the AC 12V connection.



Shown above the two wires get inserted either /each side of the end blue receptacle, just don't let them touch each other. The circuit then creates its own DC power, to very high specification, far better than any conventional supply can achieve. Everything has been thought of to bring you the highest quality audio possible.

Next we discuss each of wires at the side of the main board, Lets begin with the Red wire  
This is the Start circuit wire, the Start Circuit defines where volume commences with silence.  
Notice in the following image it is at the TOP receptacle of the Blue block- its placement there  
applies to all new kits supplied with a LDR board  
( see the section later discussing the alternate start circuit used when a new main board is used in  
earlier kits )



Referencing the first pages diagram we can see the red wire gets wired to the end blue connector on the LDR board

Next wire we see is a green wire – it gets wired to the SHUNT anode on the LDR board which is in the diagram the far right blue block receptacle.

Then the Blue wire gets wired to the Pole of the switch- and from there distributes via the switch contacts in turn to the SERIES LDR anodes – follow the diagram and markings on the switch for aligning the switch contacts with the Ldr series anodes

Lastly the Yellow wire gets wired to the Middle pin of the potentiometer – this is called the Wiper

The image below shows a build by BRM on the Stereo Net forum, this is using Hammond casework available at leading electronics outlets such as Digi Key  
<https://www.digikey.co.nz/products/en?keywords=Hammond%20HM1739-ND>



### **Why its so good, How the circuit works, explaining potential differences.**

The kit uses the NSL32SR3 LDR which is the best LDR currently available, it has good resistance On figures and excellent Resistance Off and the lowest distortion of any available LDR.

Much technical discussion has been made of LDR's, however few designers have mastered their actual capability. Even the LDR manufacturers themselves have failed to harness just what is possible. Simply put, the LDR reflects back with audio result, exactly how the anode and cathode of the internal LED on each LDR is driven. Ignore that by providing cheap inappropriate parts and LDR's sound average similar to stepped attenuators, however where the anode and cathode are properly considered the NSL32SR3 transforms into easily the best sounding method of attenuation.

You will notice how the main circuit board carries very few passive components, this is because passives are not up to the task, rather use is made of internal resistances within semiconductors as these have a much higher level of precision.

The middle blue block provides sufficient voltage and current to the LDR anodes ( from the latin word meaning way In seen of doors in Roman buildings ) located on the LDR board. The internal LED within each LDR then shines light toward a variable resistor, the variable resistor is connected to your source component, then to the output and signal ground . The circuit formed on the signal side is a conventional L Pad. Light intensity is being used to alter volume and input switching

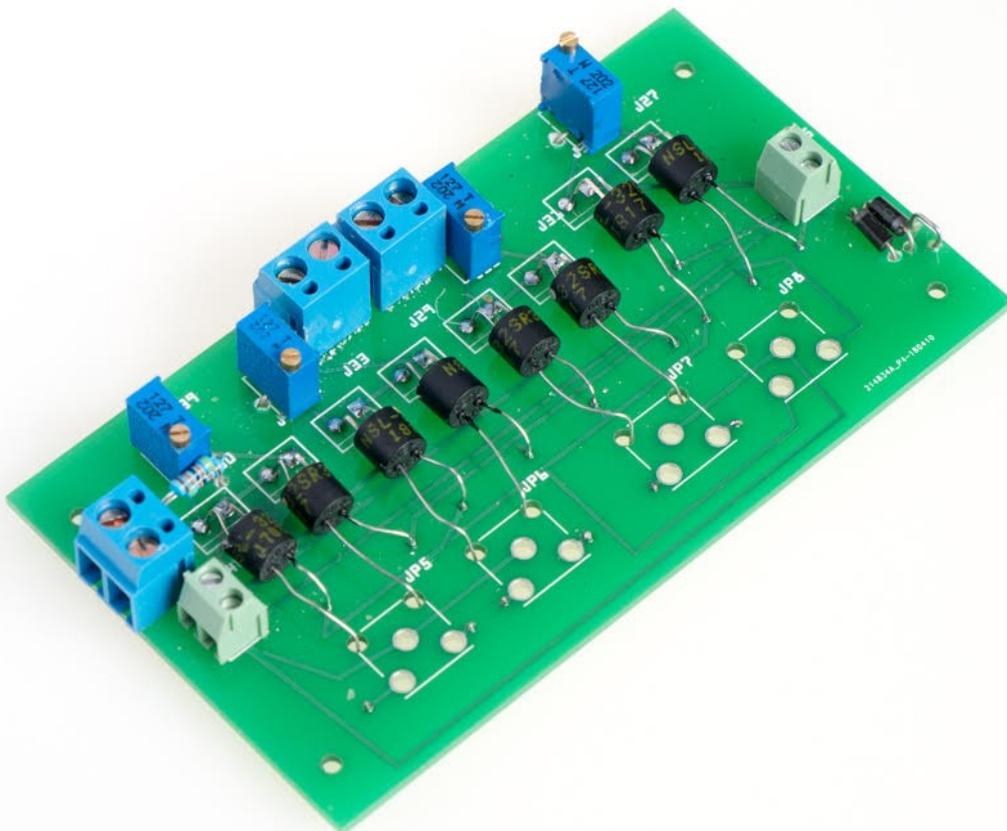
The cathodes ( yes way Out from the latin ) are identified as J25 upper for the shunt pair and J40 upper for the series cathodes. You will see these markings near the small green connector blocks The lower side of each of these connectors is signal ground

We access J25 upper to be wired to the Volume Down side of the potentiometer, and J40 upper to be wired to the Volume up side of the potentiometer.

Their meeting point the middle pin of the potentiometer called the Wiper is connected back to the main board that has a lower potential – but is not earth – measured it is 2.6 volts above earth. Hence signal earth is kept separate from the cathode current. Cheap LDR circuits wire signal earth to be at the same potential as the cathodes. You can start to see a lot of research has gone into these boards. We achieve attenuation as a volume control by swinging the lower potential current toward the series cathodes to make volume increase, and toward the shunt pair to make volume decrease.

### **Start Circuit assists**

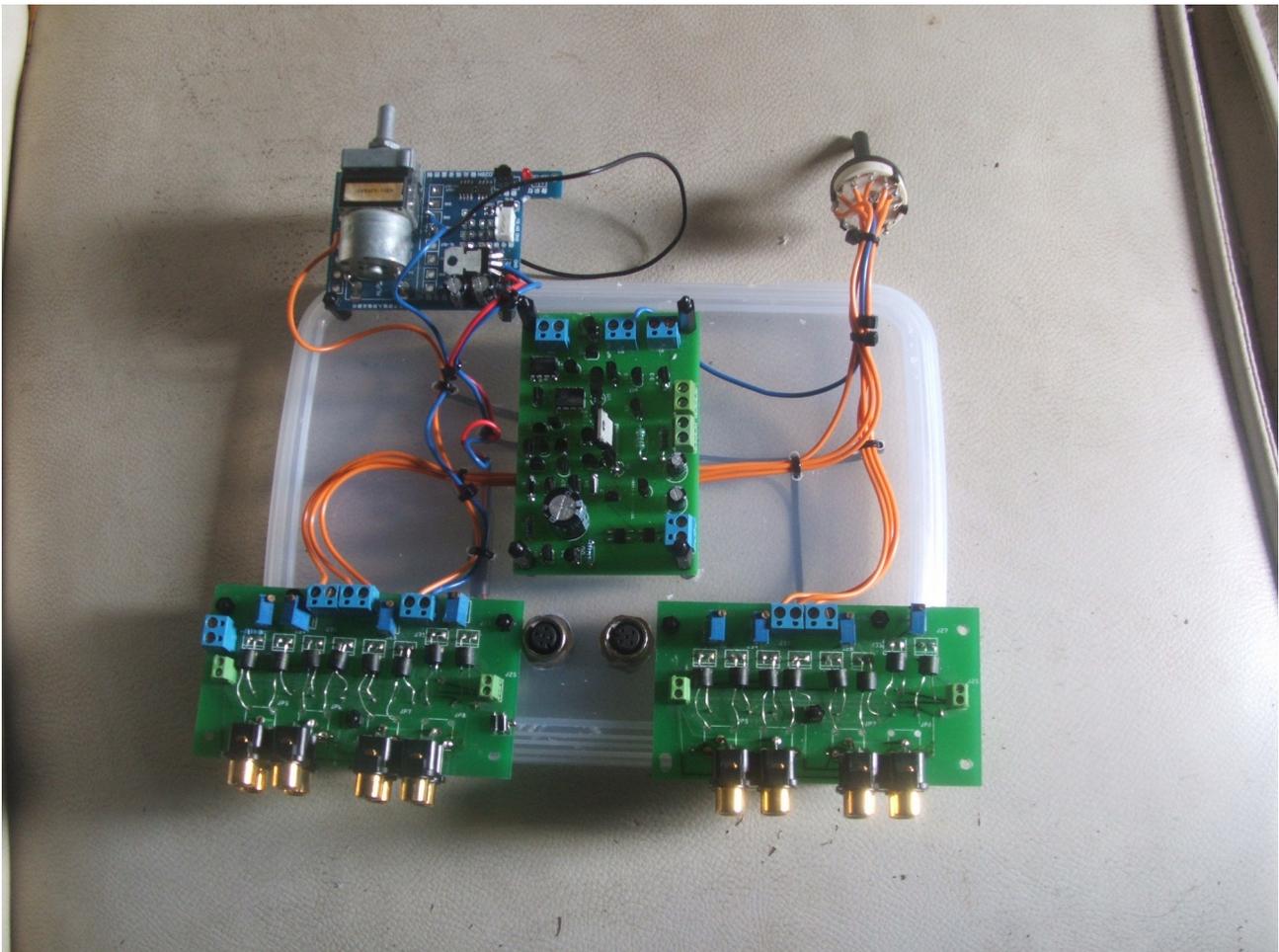
if we involve too much resistance either in the cathodes or the anodes sound quality begins to change, the start circuit assists to keep sufficient current exactly where it is needed and to cause silence at zero volume. When you purchase a 3 input LDR kit, the start volume adjustment has already been done via the resistor placed at the end of the LDR board , you should have volume commencing by 7-8 am ( expressing volume as a timepiece to show increments )



## Input switching

The stereo coffee kit uses the natural ability of the NSL32SR3 LDR to be a switch as well as an attenuator. So we achieve contact-less switching of inputs. We normally use one pole of the supplied switch, the pole is in the middle body of the switch this is wired as shown in the diagram from the lower receptacle of the middle blue block, and the contacts are on the outside edge. Refer to the diagram on page 1 for how the switch distributes in turn current from the main board receptacle to each of the series LDR anodes. If you look carefully using a magnifying lens the switch contacts are numbered 1-12 and the poles are labelled A and B Pole A applies to contacts 1-6 and Pole B to Contacts 7-12

The image below shows a custom 6 input build where the full complement of switch contacts are used



## Grounding

The green blocks on the main board, are for grounding. The circuit interestingly establishes its own ground at the junction of C3 now a voltage reference integrated circuit and mosfet, and L2 and happens to work exceptionally well without any additional ground reference.

With LDR's you will notice that there is total silence unlike conventional active preamps, that always have a noise floor.

Two wires can though be provided for comprehensive grounding, firstly as your RCA sockets enter your chassis they should be isolated from chassis ground via isolating washers, which is normal.

At the edge of the LDR board are back to back diodes, that can be wired from the small hook formed there to the green blocks, and secondly from the green blocks to a metal chassis.

Where wood or plastic is used for casework just connect the back to back diode hook with a wire to the green blocks on the main board.

### Audio system requirements

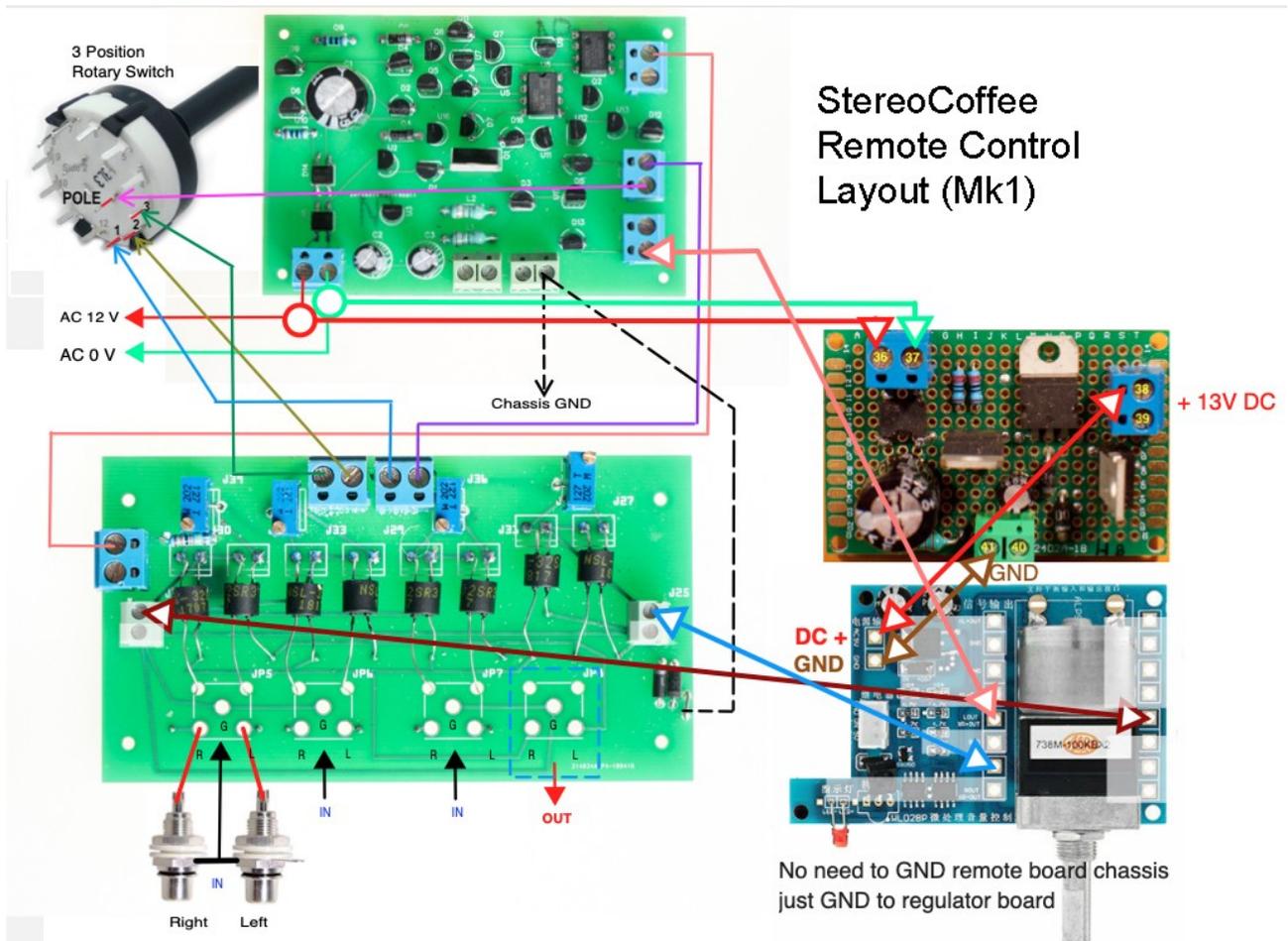
The LDR kit suits power amps with sensitivity less than 1.5 volts for full output, and with resistive loading at the power amp input of 20k or more. Thankfully this is the majority of audio equipment. Some exceptions occur where a manufacturer sells their own brand active preamp, and deliberately creates incompatibility with passives forcing you to buy their preamp. Best advice is to avoid restrictions like this and buy power amplifiers with sensible sensitivity below 1.5 volts for full output. Source components like CD players Tuners (exception is the Quad FM3 which is very insensitive) and DAC's all have more than adequate output to use with stereo coffee.

### Remote Control Volume

Where ordered the kit works well with a remote volume control board as pictured. The board when ordered is modified to accept the LDR cathode current, is prewired and is supplied with a regulator board.



The remote volume board wiring is shown with a Mk1 regulator board, this is presently receiving attention to be even easier to connect.



**Your kit is also supplied with 24/7 email assistance to help you [dbxrecord@gmail.com](mailto:dbxrecord@gmail.com)**

If you wish to contribute to forums there are a number discussing the kit  
<https://www.stereo.net.au/forums/topic/260371-2019-stereocoffee-ldr-preattenuator-kit/>

Thankyou for purchasing the 2019 stereo coffee kit. Cheers / Chris

### **Alternate start circuit**

The 2019 kit is likely to remain in production for some considerable time as it has reached a level of quality that is hard to improve upon, however to support existing customer the latest May 2019 board is available. To use the later main board with an earlier kit, the alternate start circuit is supplied. The attached image shows its wiring.

