EZTubeMixerV3 PCB

Documentation and Assembly Notes

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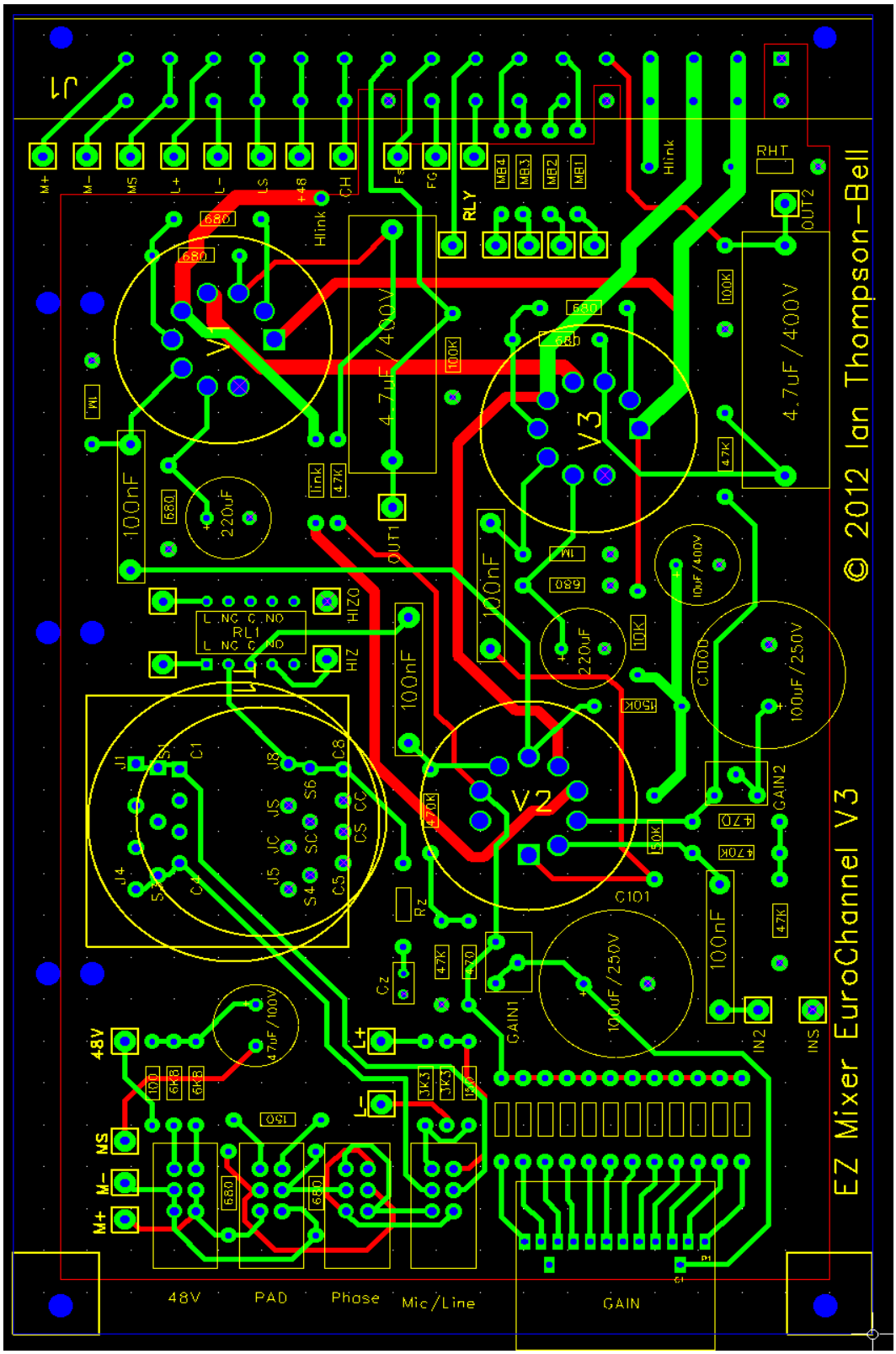
Introduction

The purpose of this document is to contain all the documentation for the EZTubeMixerV3 PCB including notes on its assembly.

Assembly Notes

PCB Layout

The layout of components on the V3 PCB is shown below:



Special Components

The EZTubeMixerV3 PCB uses mostly commonly available components and for ease of assembly their values are silk screened directly onto the PCB. The table below lists most of the uncommon or unusual components along with their Farnell part numbers.

Component	Farnell Part No.
32way edge connector	1656177
Harwin 1mm tube pins	149319
Rubycon 100uF 250V electrolytic capacitor	8126488
22uF 400V electrolytic capacitor	9693360
ALPS pushbutton	1123857
Grayhill 71BDF30-01-1-AJN switch	1366436
Panasonic 4.7uF 450V film capacitor	1854925
Vishay 100nF 400V film capacitor	1215494
Relay DPCO	1867358

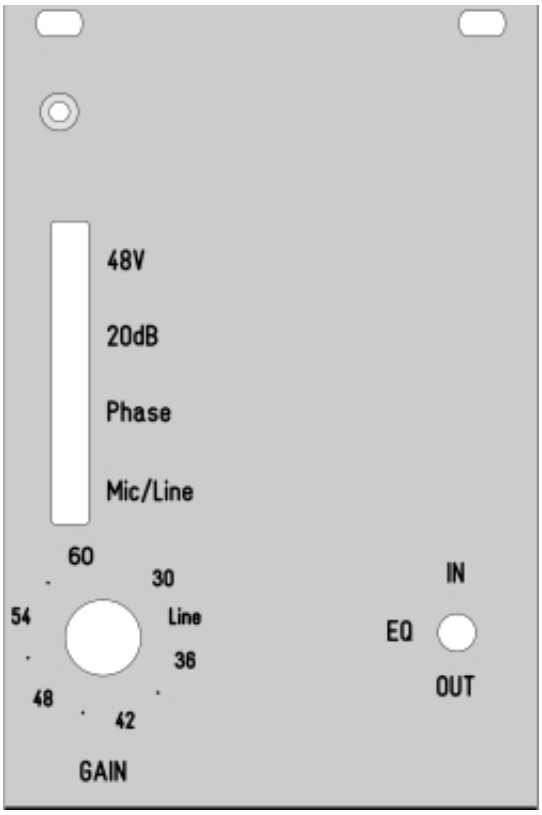
The 12 way Grayhill switch is used to set the amplifier gain. You can use any gain values you wish but the recommended gain and appropriate resistor values are shown in the table below: Note that the mic gain is 20dB higher than that of the amplifier itself due to the gain of the mic transformer.

Mic Gain (dB)	Amp Gain (dB)	Gain resistor
60	40	430
57	37	620
54	34	920 (820 + 100)
51	31	1K3 (1K2 + 100)
48	28	2K
45	25	2K7
42	22	4K3
39	19	6K2
36	16	10K
33	13	18K
30	10	39K
27	7	150K

The gain resistors are fitted directly above the Grayhill switch. The lowest gain resistor is the right most one which corresponds to switch position 1.

Note that when the Line/Mic push button switch is in the Line position, the line input is connected to the mic transformer via a 33dB attenuator. This means the mic gain needs to be switched to the 33dB position for a nominal zero gain from the line input. If you mark the front panel gain in 6dB steps from 60dB downwards and simply put a dot for the

intermediate gain steps, then you will end up with a dot at the 33dB position. It is convenient to replace this dot with the word 'Line' as illustrated below.



When set to line input, the line gain can be switched to minimum of -6dB (27dB position) and a maximum of 27dB (60dB position). The 48dB position, for example, is suitable for use with consumer level inputs (-10dBu)

Tubes

Only two types of tube are used. V1 and V3 are both 6922 types. V2 is a 12AX7 type. There are many different versions of these tubes available.

The 6922 is a high quality version of the 6DJ8 (European ECC88). It is important to choose a 6922 or equivalent that matches the 6922 specification in terms of maximum plate voltage, plate dissipation and heater cathode voltage. In this design, all three of these parameters are outside the regular 6DJ8 specification. I generally use either a 6922EH from Electro Harmonix, or a JJ E88CC.

The key parameter to select for in choosing a 12AX7 type is low noise as this tube is the primary determinant of the noise level in the mic pre. Other than that just about any 12AX& will be suitable.

Links

There are two wire links that need to be fitted to the PCB. The first is just below V1 and is marked “link” on the PCB. You can use a wire link here or fit a zero ohm resistor. The other

link is in the tubes heater circuit. Both ends of it are marked “Hlink”. One end is just above V1 and the other end is just above V3.

Rz and Cz

Rz and Cz are connected in series across the secondary of the mic transformer and are intended to ensure the transformer is properly terminated. The values used vary depending on the mic transformer used. The V3 PCB is designed to have one of three types of transformer fitted – a Sowter 1948, A Jensen JT-115K-EPC or a Cinemag CMMI-10-PCA. For all of these transformers, Cz should be a shorting link and Rz should be 150K.

Relay

The V3 PCB has an option to include a HI Z instrument input. In order not to compromise the noise performance of the mic pre when the HI Z input is not being used, the HI Z input is switched in by a relay (RL1 on the PCB) so that the connections from the transformer to the first tube remain short. To use the HI Z input you need to energise the relay. In the unenergised state, the normal Mic/Line input operates. Two pins, labelled “RLY” ,are provided on the 32 way connector through which you can feed a dc supply for the relay.

If you do not intend to use a HI Z input then do not fit the relay and link pins 2 and 3 of the relay footprint on the PCB together.

RHT

RHT is a resistor fitted at the top right hand corner of the V3 PCB. Its purpose is to discharge the on board HT decoupling when power is removed. Ts value is a compromise between speed of discharge and quiescent current draw. I find generally that 300K works well.

Mic/Line Inputs

The mic and line inputs are sensitive signals but they have to be fed from the 32 way connector at the top of the PCB to the push buttons at the bottom of the PCB. Rather than track these sensitive signals across the length of the PCB the signals are brought out to pads near the 32 way connector labelled M+, M-, Ms and L+, L- and Ls. You wire these with twin screened cable to the buttons on the other side of the PCB using the similarly named pads at that end. Three pairs of holes are included on the left hand edge of the PCB for securing these cables. Note, there is no connection to the Line cable screen at the push button end.

48V Supply

Like the Mic/Line signals, the 48V phantom power supply needs to be hand wired from the pad at the 32 way connector (labelled +48) to the similarly named pad (48V) at the push button end.

Assembly Order

I generally build up this PCB starting with the smallest components and working up to the largest. So I normally first fit the 1mm valve pins and then the resistors and links. Next I fit

the ALPS push buttons, the 32 way connector and the relay (if fitted). Then I fit the smaller electrolytic capacitors, the Grayhill switch and the 100nF film capacitors. Next I fit the transformer, followed by the two 4.7uF film capacitors and the two 100uF 250V electrolytic capacitors. Lastly I fit the tubes.