

**Twin Line Amp Eurocard**

**Configuration Options**

**and Bill of Materials**

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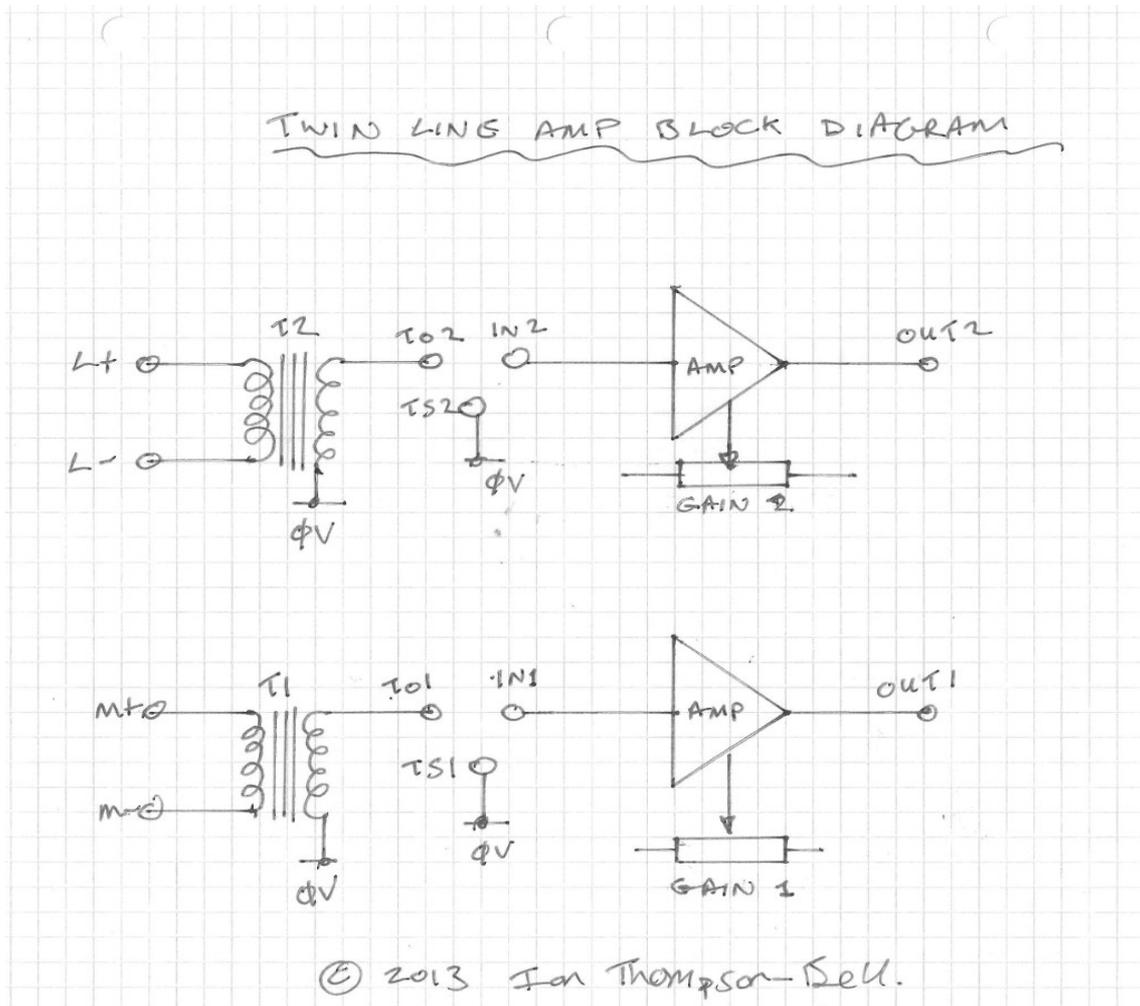
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## Introduction

The Twin Line Amp card is a variation of the EZTubeMixer Eurocard V3. It still contains two tube amplifiers but the additional components specific to a mic pre – stepped gain switch and Phantom/Phase/Pad/Mic|Line push buttons and mic input transformer– have been removed. In the space vacated by these components, a pair of general purpose input transformers have been included. The heater wiring has also been altered so that the two 6922 output tubes can be replaced by a pair of ECC99 tubes by changing a few links.

This document describes the way in which the Twin Line Amp card can be configured to perform a wide variety of functions and also provides a Bill of materials.

A simplified block diagram of the Twin Line Amp is shown below:



Either 6922 or ECC99 tubes can be used in the output stages of this card. It is configured for each type by wiring links as follows:

6922:

- Add wire links or zero ohm resistors in the two places marked '6922' on the silk screen.
- Connect a wire from HlinkA to HlinkB.
- Wire a link from pad P2 to one of the two pads marked HlinkAB.
- Connect a link in the place marked 'link' on the silk screen.
- Fit 680 ohm cathode and grid stopper resistors to both 6922 tubes (a total of six)

ECC99:

- Do **not** fit anything to the resistor places marked '6922' on the silk screen.
- Connect a link in the place marked 'link' on the silk screen
- Connect a link from pad P1 to pad P2
- Connect a wire from HlinkA to one of the HlinkAB pads.
- Connect a wire from HlinkB to the other HlinkAB pads
- Fit 300 ohm cathode and grid stopper resistors to both ECC99 tubes (a total of six)

In the descriptions that follow, 6922 tubes are assumed unless otherwise stated.

## **Twin Balanced Line Input**

In its simplest form the Twin Line amp acts as two balanced line input amplifiers with optional passive EQ. T1 and T2 are fitted with 10K:10K bridging transformers. The PCB is laid out to accept the following types:

Sowter	3293
Cinemag	CMLI-15/15PCA
Jensen	JT-11P-1HPC

Inputs are fed to M+/M- and L+/L-. Outputs are taken from OUT1 and Out 2.

If required, a fader can be included with its top connected to TO1 or TO2, its wiper to IN1 or IN2 and its bottom leg connected to TS1 or TS2. Any fader loss is made up by the amplifier whose gain is set by 10K linear pre-set pots connect to GAIN1 and GAIN2. Alternatively passive EQ can be connected with its EQ input fed from TO1 or TO2, the EQ output fed to IN1 or IN2 and its ground connected to TS1 or TS2. The amplifiers have an input impedance in excess of 470K so they present little or no load to passive EQ circuits.

## **Unbalanced Passive Bus Amplifier**

By omitting the transformers and feeding the output of two passive summing buses to IN1 and IN2, the card can act as a stereo bus amplifier with the make up gain set by a 10K linear pre-set potentiometer fitted to GAIN1 and GAIN2. If a master fader is required it can be connected across the bus and its wiper and ground leg fed to IN1 and TS1. A separate master fader can also be connected to IN2 and TS2 for the other amplifier.

## **Balanced Passive Bus Amplifier**

Many summers use a balanced passive bus, often slugged with a low value resistor, so the bus output can be fed to an external mic pre for gain make up. The Twin Line Amp card can act as a stereo balanced passive bus gain make up amplifier. To do this, the bus should be slugged to create a 150 ohm source impedance and 1:10 ratio microphone transformers are fitted at T1 and T2. The PCB is laid out to take the same three alternative mic transformers as the EZTubeMixer Eurocard V3 PCB namely:

Sowter	1948c
Cinemag	CMMI-10PCA
Jensen	JT-115K-EPC

To terminate these transformers correctly, Cz1 and Cz2 should be shorted and Rz1 and Rz1 each fitted with 150K resistors. 10K pre-set pots are used for GAIN1 and GAIN2 and should be set to give unity gain overall. A typical slugged balanced passive bus has a loss

in the region of 40dB. 20dB of this loss is made up by the mic transformer so the make up amplifier gain needs to be set to about 20dB which should be around the 50% rotation mark of a 10K linear pre-set pot.

If a balanced output is required, this can be obtained by connecting Carnhill VTB2291 transformers wired for 2K4:600 to OUT1 and OUT2. The 6dB transformer loss can be made up by altering the make up amp gain.

If output level control is required this can be added to the secondary of the output transformers in the form of a 1K pot or stepped switch.

This PCB and two external transformers makes a complete all tube balanced passive summer.

### **Low Cost Twin Channel Tube Mic Pre**

A low cost twin channel tube mic pre that fits inside a 2U rack case can be made with this card. By fitting 1:10 mic transformer for T1 and T2, up to 60dB of gain is available from a 150 ohm input. The PCB is laid out for the following mic transformers:

Sowter	1948c
Cinemag	CMMI-10PCA
Jensen	JT-115K-EPC

Inputs are connected to M+/M- and L+/L-. Outputs are connected to OUT1 and OUT2.

Gain can be varied over a 34dB range by the GAIN1 and GAIN2 pots. These can be external rotary pots or stepped switches. Circuits for phantom power, phase and pad switching would also need to be provided externally.

If balanced outputs are required these should be provided by Carnhill VTB2291 transformers wired for 2K4:600 connected to OUT1 and OUT2. These reduce the overall gain by 6dB to a maximum of 54dB

### **Stereo Headphones Amplifier**

By using appropriate output tubes, adjusting bias conditions and using appropriate output transformers, the card can be turned into a high quality all tube headphones amplifier. The input can, if required, be balanced by fitting 10K:10K bridging transformers for T1 And T2. A stereo volume control can be included by connecting its tops to TO1 and TO2, its wipers to IN1 And IN2 and its bottom legs to TS1 and TS2.

The basic modification that needs to be done is to replace the 6922 output tubes with

ECC99 types, alter the bias and change the heater links as described in the introduction. Various impedances of headphones then then be driven using suitable transformers connected to OUT1 and OUT2:

Carnhill VTB 2291:

- Wired 2K4:600 for 400 to 600 ohm headphones
- Wired 9K6:600 for 200 to 300 ohm headphones

Sowter 8665:

- Wired 250-600 for 250 to 600 ohm headphones
- Wired 100-250 for 100 to 250 ohm headphones
- Wired 30-100 for 30 to 100 ohm headphones

Eddor XSE10-50-8K for 32 to 64 ohm headphones

*Note for 400 to 600 ohms.* To run headphones of this impedance the existing 6922 output tubes can be retained but their standing current needs to be raised to ensure an adequate output power. To do this, change the 680 ohm cathode resistors of both the 6922 tubes from 680 ohms to 470 ohms. Using a Carnhill VTB 2291 output transformer wired 2K4:600, each amplifier will be able to output up to 200 mW into a 400 ohm to 600 ohm load.

## BOM

This section lists the components required to build the Twin Line Amp card. Like the EZTubeMixer mic pre Eurocard, most of the passive component values are printed on the PCB silk screen to ease assembly. Component idents are used only for the tubes , transformers, the 32way connector and some links. The components fitted to the places marked 6922, link, P1, P2, Hlink AB, HlinkA and HlinkB are described earlier in this document.

Note: all resistors are 0.25W metal film unless otherwise stated. Where special components are used the Farnell part number is given.

Ident	Component
V1 and V3	6922 or ECC99 (see text)
V2	12AX7LPS
1mm tube pins (27 off)	Farnell #149319
T1	See text
T2	See text
J1	32W connector (see text)

There are several alternatives for the 32W connector. The two cheapest are the following Farnell part numbers: **1656157, 1656177**

## Resistors

Value	Quantity
680R	6
470R	2
47K	4
10K	1
100K	2
150K	2
470K	2
1Meg	2
220K 1 watt	1 (RHT)

## Capacitors

Value	Quantity
100nF 400V Metal Film	4 (Farnell #1215494)
4.7uF 400V Metal Film	2 (Farnell #1854925)
10uF 400V electrolytic 5mm lead pitch	1 (Farnell #8126780)
220uF 63V electrolytic 5mm lead pitch	2 (Farnell #8767530)
100uF 250V electrolytic 7.5mm lead pitch	2 (Farnell #9694048)

Note, the Farnell part numbers given above for capacitors are just suggestions. There are many other parts that meet the specification.