



EQ-500

Semi-Parametric Equalizer 500-Series module

BUILD GUIDE (v3.5)

Upgraded : 25-November-2021



Thank you for purchasing the YannLu EQ-500 DIY full kit. This kit contains each component you need to achieve the building of the 500-series module.

Because the circuitry is quite complex due to the amount of components it is highly recommended to follow this guide step by step. This will avoid errors and a lot of waste of time in debugging process.

If you have a problem, please first check the placement of the components with the “Silkscreen sheet”. Are all the values matching with the marked references (see BOM) ? Are your soldering joints good ? By the way be careful to have an iron temperature around 350°C max.

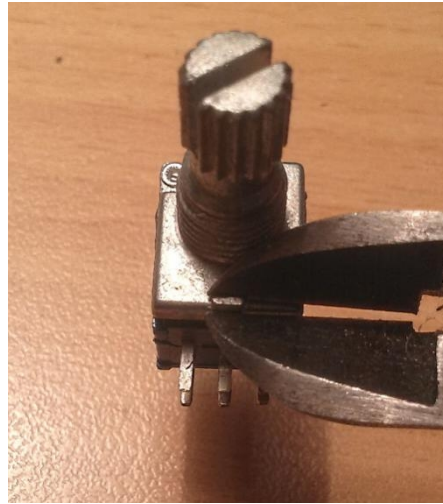
You need standard tools for electronics DIY : a good quality soldering iron and 1mm soldering wire, pliers, snips, wire cutters, screwdrivers, leads, heat-shrink tubes (very thin, just for LED leads insulation) and a multimeter.

Before starting the assembling, double check that you got every component from the BOM and identify them. Use the multimeter or color code if you have any doubt about the resistors.

ASSEMBLYING

- Separate both PCBs by breaking the board along the v-score line. Use abrasive sheet (fine grain) to smooth separated edges.
- Prepare all the resistors and diodes. With the help of a bending template, bend their leads to get 10.2mm as lead spacing (L/S) – 7.6mm for 1N4148 diodes.
- On the PCB1 place all the resistors and diodes. Double-check that there is no placement error. Use the “Silkscreen sheet” to help. Solder the resistors and diodes by the components side.
- From now it is still very important to respect the following soldering instructions.
- Each component or components group (o) should be soldered by the bottom side after being placed on the components side. This list begins by the smallest components and ends by the tallest ones.
 - IC sockets (pin 1 marked by a dot for DIP-8)
 - Ceramic capacitors (2.5mm and 5mm L/S)
 - Trimpots 3362P type
 - Transistors (bend leads to match with the footprint)
 - Receptacle 2x18 pin connector (J3)
 - Film capacitors
 - Electrolytic capacitors (long lead for “+” mark)
 - Trimpots 3296W type

Cut the location pin on the pots B10K before placement (see photo).



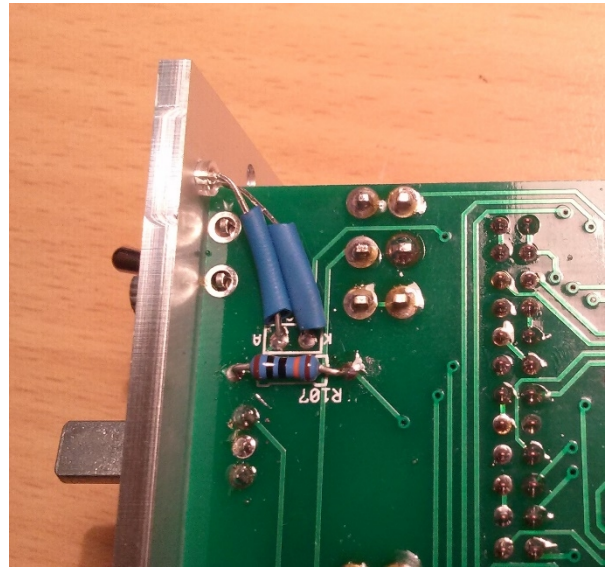
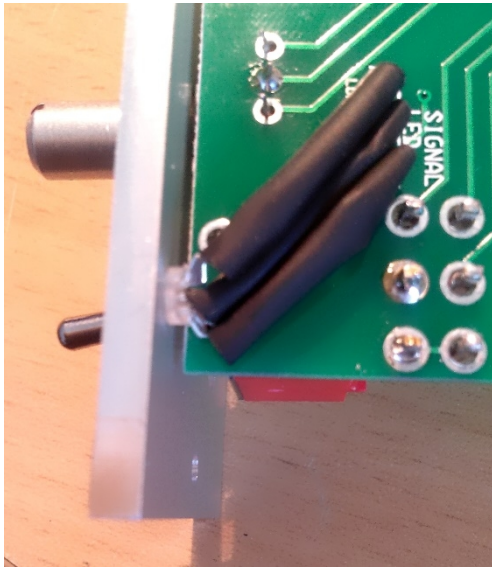
- Pots B10K (solder the central lead only)

On the DPDT switch “SW HI IN” cut the left location pin (see photo) in order to create space for the placement of the signal LED in the panel (see further).



- Switches DPDT ON-ON (solder the central lead only)
- Insulate the three leads of the bi-color signal LED with heat-shrink tubes and place them in J1 on the bottom side of PCB1 after cutting the leads at the right length.
- Insulate the leads of the blue power LED with heat-shrink tubes and place them in J2 on the bottom side of PCB1 after cutting the leads at the right length.

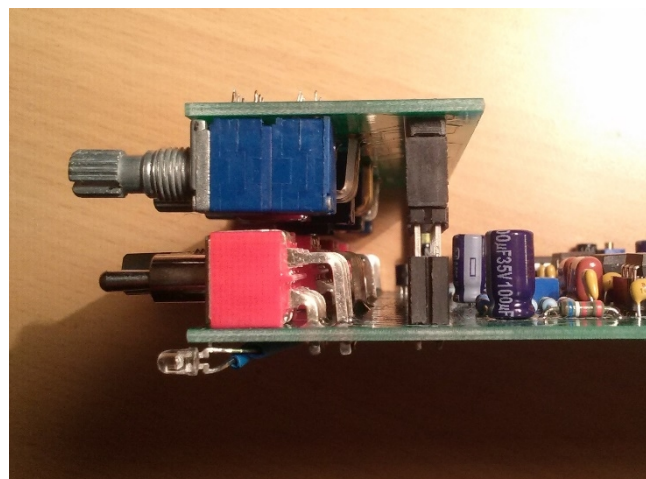
- Place the front panel. Bend the leads of the both LEDs and adjust them in the panel 3mm holes. Solder them by the components side (see photos).



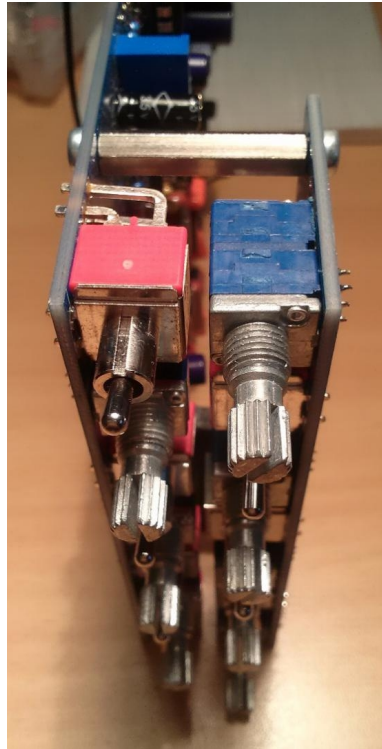
- On the PCB2 place following components on the bottom side then solder them by the soldering - "logo" side).
 - Pin 2x18 strip header (J4) : solder short pins

Cut the location pin on the pots C50K before placement.

 - Pots C50K (solder the central lead only)
 - Switches DPDT / ON-ON
 - Switches DPDT / ON-ON-ON
- Connect both PCBs together with the elevated socket (board-to-board).
Don't push too much the socket into the receptacle J3 because it could be hard to remove. The leads must be apparent in ca. 4mm long (see photo).



- Screw the 1" hex M3 thread thru the both 3mm holes (one on each PCB) with 2x M3 screws (see photo).

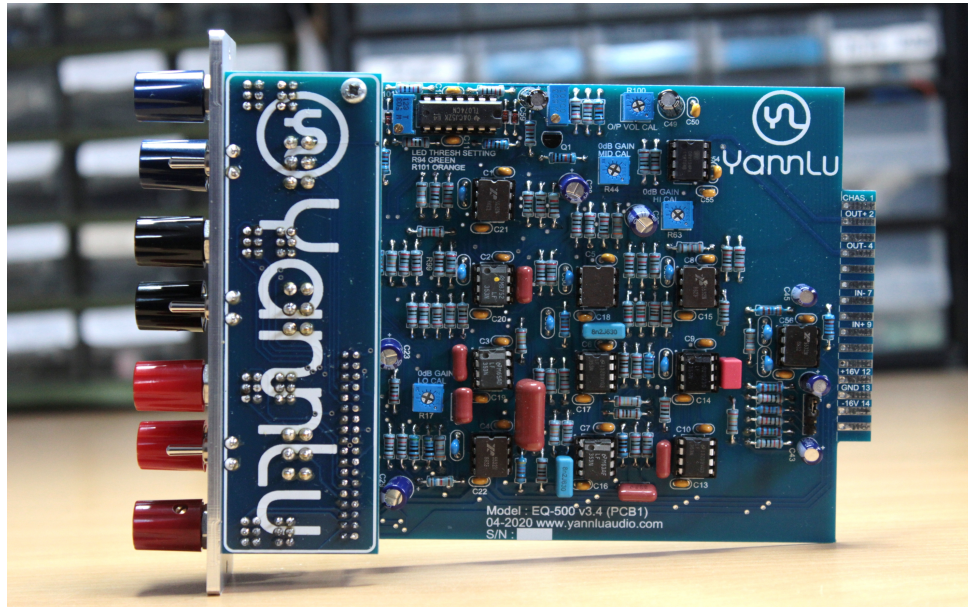


- Place the front panel. If it doesn't fit properly, adjust the placement of pots and switches by melting their central soldering joint (see photo).



- Screw nuts on the pots. Do not tighten them too much.

- Solder all the remaining leads of the switches and pots.
- Place knobs : colors of knobs can vary according the stock of the provider.
- Plug the ICs in the right sockets. Pay attention to pin 1 : to the top for DIP-8 ICs and to the right for DIP-14 IC (see photo).



- Connect your 500-series module into a “Lunchbox” type or equivalent 500-series rack enclosure. It is ready to be tested !



TEST AND CALIBRATION

Output volume calibration

- Set all the BYPASS switches to the low position (disabled filters).
- Inject a -18dB_{FS} at 1kHz sine to the balanced input of your 500-series rack.
- Adjust the trimpot R100 to obtain -18dB_{FS} on the output. Measure on your DAW.

Signal LED thresholds calibration

- Set all the BYPASS switches to the low position (disabled filters)
- Inject a -18dB_{FS} at 1kHz sine to the balanced input. Turn counter-clockwise the R94 trimpot until the green LED is on.
- Inject a -2dB_{FS} at 1kHz sine to the balanced input. Turn counter-clockwise the R101 trimpot until the orange LED is on.

0dB gain pots calibration

- Set all the BYPASS switches to the high position "IN" (activated filters)
- Set all the gain pots at 0dB (12:00 position, in the center detent)
- Set the HI and LO curve switches on the "Bell" mode.
- Set all the frequency pots at 12:00 position
- Inject white noise in the input. On a spectrum analyzer (freeware here : <http://www.roomeqwizard.com/>) measure that the curve stays flat when turning the frequency pot (one filter band at the time). If there is a peak or a valley, adjust the trimpots : R17 (low band), R44 (mid band), R63 (high band) to keep the curve flat.

Now your EQ-500 module is calibrated and ready to use. Have a lot of fun !

BILL OF MATERIALS (B.O.M.) (three next pages)

TYPE	QUANTITY	VALUE	REFERENCES								
RESISTORS	5	39.2 Ω	R6	R29	R32	R52	R65				
	2	560 Ω	R36	R46							
	4	1.1 kΩ	R28	R33	R98	R99					
	2	2.1 kΩ	R9	R55							
	2	2.2 kΩ	R97	R103							
	6	2.43 kΩ	R11	R12	R38	R39	R57	R58			
	1	4.87 kΩ	R34								
	1	8.25 kΩ	R35								
	1	9.09 kΩ	R27								
	32	10 kΩ	R2	R4	R5	R7	R14	R16	R20	R21	R23
		10 kΩ	R24	R25	R30	R41	R43	R48	R50	R51	R53
		10 kΩ	R60	R62	R69	R71	R73	R74	R90	R91	R93
		10 kΩ	R95	R102	R104	R105	R106				
	3	11.5 kΩ	R1	R19	R47						
	1	11.8 kΩ	R67								
	1	16.9 kΩ	R26								
	15	20 kΩ	R8	R10	R13	R15	R18	R31	R37	R40	
		20 kΩ	R42	R45	R54	R56	R59	R61	R64		
	2	21.5 kΩ	R70	R72							
	2	31.6 kΩ	R66	R68							
	3	76.8 kΩ	R3	R22	R49						
	3	100 kΩ	R92	R96	R107						
DIODES	4	1N4148	D1	D2	D3	D4					

TYPE	QUANTITY	VALUE	REFERENCES
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TRIMPOTS

TRIM-3362P	1	10 kΩ	R100
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TRIM-3362P	3	200 kΩ	R17	R44	R63
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TRIM-3296W	2	50 kΩ	R94	R101
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CERAMIC CAPACITORS	26	100 nF	C1	C2	C3	C4	C5	C6	C7	C8	C9
		100 nF	C10	C11	C12	C13	C14	C15	C16	C17	C18
		100 nF	C19	C20	C21	C22	C54	C55	C56	C57	

1	10 nF	C50
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9	68 pF	C24	C27	C30	C31	C36	C38	C41	C42	C44
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FILM CAPACITORS	1	220 pF	C39
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2	3.9 nF	C40	C58
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2	8.2 nF	C32	C33
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2	82 nF	C25	C26
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2	120 nF	C34	C35
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ELECTROL. CAPACITORS	2	1 μF	C59	C60
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1	10 μF	C49
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3	33 μF	C43	C45	C46
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4	100 μF	C23	C28	C29	C37
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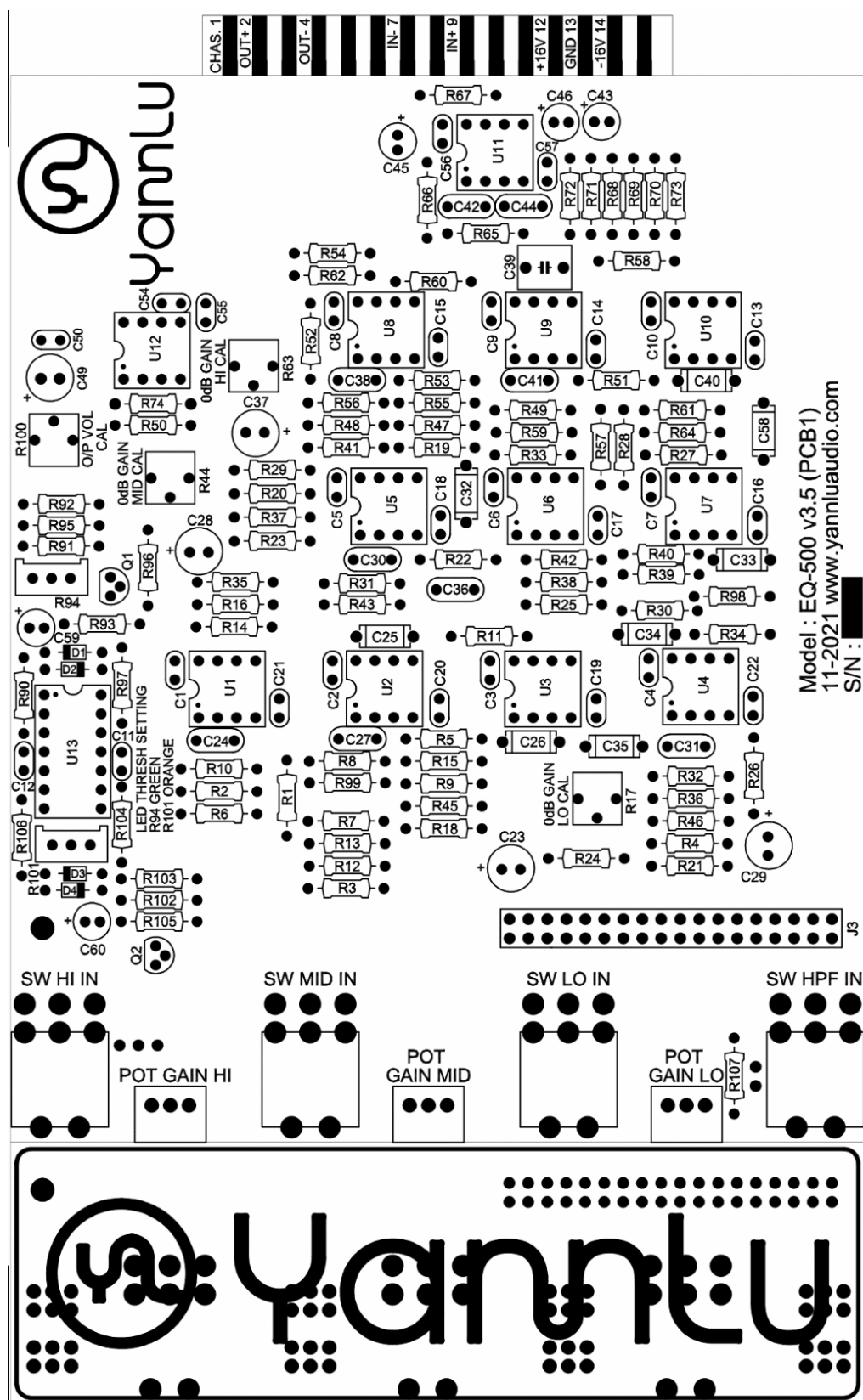
TRANSISTORS	2	BC549	Q1	Q2
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TYPE	QUANTITY	VALUE	REFERENCES						
SOCKETS + ICs									
DIP-8	6	LF353	U2	U3	U6	U7	U9	U10	
DIP-8	5	NE5532	U1	U4	U5	U8	U11		
DIP-8	1	DRV134	U12						
DIP-14	1	TL074	U13						
POTENTIOMETERS									
B10K center detent	3	POT GAIN LO	Shaft types depend on the stock of the provider						
		POT GAIN MID							
		POT GAIN HI							
C50K quad gang	4	POT HPF	Shaft types depend on the stock of the provider						
		POT LO							
		POT MID							
		POT HI							
SWITCHES									
DPDT ON-ON-ON	3	SW CURV LO							
		SW CURV MID							
		SW CURV HI							
DPDT ON-ON	4	SW HPF IN							
		SW LO IN							
		SW MID IN							
		SW HI IN							
LED	1	BI-COLOR GN/OR	J1						
	1	BLUE	J2						
CONNECTORS	1	RECEPTACLE 2x18	J3						
	1	HEADER PIN 2x18	J4						
	1	ELEVATED SOCKET							
HARDWARE	2	M3 SCREW	Colors depend on the stock of the provider						
	1	M3 HEX 1"SPACER							
	7	KNOBS							

SILKSCREEN SHEETS

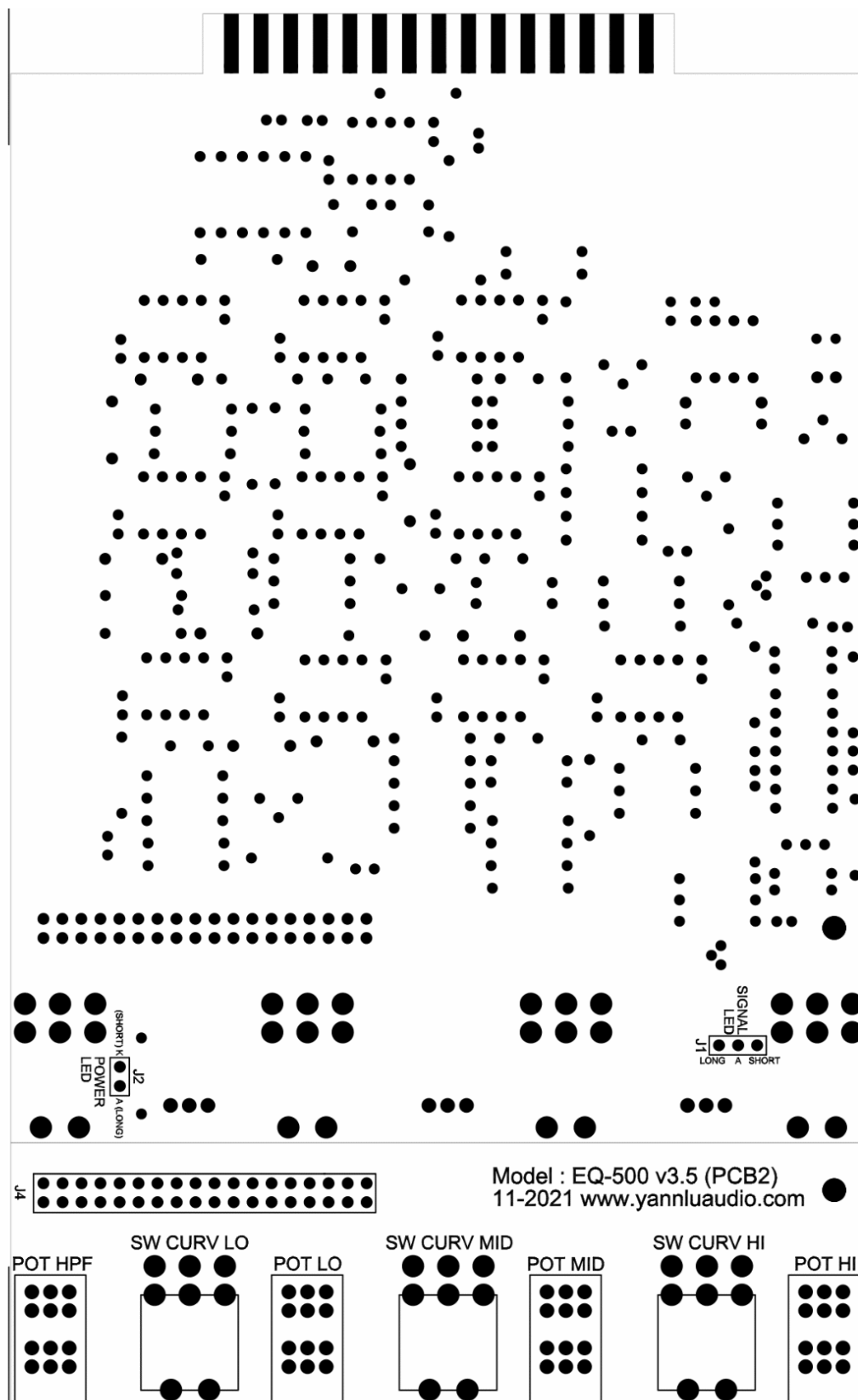
PCB 1 : Components side (top) – except for J1 and J2 (LEDs)

PCB 2 : Soldering side (logo)



PCB 1 : Soldering side (bottom) – except for J1 and J2 (LEDs)

PCB 2 : Components side



FEATURES

- Proportional Q
- High-Pass filter : 26 Hz to 2.2 kHz (12dB/oct)
- Low frequency band : 40 Hz to 800 Hz – Bells (2 widths) or Shelf mode
- Mid frequency band : 400 Hz to 8000 Hz
3 bells modes : Narrow / Standard / Wide
- High frequency band : 800 Hz to 15 kHz – Bells (2 widths) or Shelf mode
- Maximum 15 dB of boost/cut gain per band (center detent for 0dB)
- Bypass switch on each section
- Bi-color signal LED (green when signal, orange when clipping)
- Blue power LED

DIY KIT POLITICS

The DIY kit solutions are for experienced people in electronics able to read and understand the build guide, to solder neatly and to troubleshoot their own build.

I cannot guarantee you will end up with a working device but I will naturally replace any parts that we jointly identify as faulty. Your patience and co-operation with me is vital in ascertaining whether parts are faulty due to a build error or not.

Although I'm happy to help, I can't offer support on all issues. Please understand remote troubleshooting of a wrong build can be difficult and time consuming. In a last case of unsolvable problem, I could accept to service your unit if it's shipped to me.

I assume no liability for personal injury or damage to equipment or loss of use caused directly or indirectly by the use of the YannLu Audio kit.

I'm constantly improving my designs taking into consideration the users feedbacks or my own experience and some changes might occur without notice and can't be subject to complaint. But again I'm happy to answer any question, feel free to contact me.

The pics are for illustration purpose only and the actual unit can vary according PCB versions.

Yann Lu from Belgium
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