

Notes for the TSE-II BOM

- 1) C1, C12 and C13 are all connected in parallel. All three are needed for 2A3 tubes to support 5 amps of filament current. One may be omitted for 45's or 300B tubes.
- 2) R2 MUST be 100 ohms for 45's and 2A3 tubes to provide 2.5 volts. R2 MUST be 300 ohms for 300B's to provide 5 volts. Measure the filament voltage BEFORE installing any tubes!
- 3) HS1, the heat sink for the regulator chip, IC3 is grounded through the tab on the IC. No insulator is required, but one may be used if desired.
- 4) HS2, the heat sink for D1 is connected to the filament raw DC source. This voltage is low, about 8 volts maximum, but LARGE currents could flow and parts WILL be damaged if this heat sink touches the one near it, or anything that is grounded. An insulator and thermal paste is recommended. Do not mount both heat sinks to a common metal surface without an insulator on D1.
- 5) HS3 and HS4 are the heat sinks for the mosfets, Q1 and Q2. No insulator is needed IF THE RECOMMENDED mosfets, or any mosfet with an insulated case are used. If a mosfet with an exposed metal tab is used, an insulator and thermal paste is required. The tab operates at 150 to 200 volts.
- 6) HS5 and HS6 are the heat sinks for the CCS chips, IC1 and IC2. They are NOT available in an insulated case and the FULL B+ VOLTAGE is on the metal tab. Insulators and thermal paste MUST be used. Last night I was taking voltage readings on a live board, and turned it over to adjust the bias. There was a LARGE BANG scaring me and causing my wife to scream. The grounded volume pot had touched one of the heat sinks causing a few BIG SPARKS. That LOW ESR cap at C5 can store some serious energy. I put some insulators on my board.....you should too!
- 7) Zener diode D6 and resistor R36 reduce the voltage to the mosfets, which gets some of the heat out of the center of the board. For B+ voltages up to 350 volts, the specified 150 volt diode is fine. R36 will dissipate about 4 watts with B+ at 350 volts. For B+ voltages over 350 volts D6 should be changed to a 200 volt part. This will put some of the excess heat back into the mosfets, but is needed to keep R36 below 4 watts. The resistor is rated for 6.5 watts, but puts too much heat into the board at that power level. The On Semiconductor part number is [1N5388BRLG](#), Mouser # 863-1N5388BRLG and Digikey # 1N5388BRLGOSCT-ND
- 8) Provisions for a choke in the power supply have been added to the board. You may connect a choke to the connector marked "CHOKE" or you may install R4. Do not use both, it won't hurt anything but the choke works best without a resistor in the board.
- 9) The tube socket part numbers are from Antique Electronic Supply (www.tubesandmore.com). There are two valid types of the 9 pin sockets and both fit the board. Look at the pictures and choose the style you want. I usually get my sockets from ESRC, but he is out of the 4 pin sockets at the moment....."on their way from China." Other suppliers carry the same Chinese parts although the numbers vary.

- 10) As with the original TSE a jumper is used to configure the 6.3 volt winding of the power transformer. A jumper from Pad 1 to Pad 4 is needed for 2.5 volt tubes like the 2A3 or 45. A jumper from Pad 3 to Pad 4 is needed for 5 volt tubes like the 300B. Measure the filament voltage BEFORE installing any tubes.