

## **NP D1 pcb changes in Ver2**

### **Marking on board:**

BAL PCM63 DAC

2007-4-v30

DIY Fun - CSK

1. Add a super clock (11.2896MHz) output socket pad (J20). This is reserve for the clock to feedback back to CD transport.
2. Allow more space and add holes for all TO-220 heat sink (total 15 TO-220 parts).
3. Add one more relay to select digital input (K2). Use jumper to select either XLR or RCA input (J8).
4. Short circuit the PCM63 Iout to BPO and thus no more jumper is required (J1-4 are eliminated).
5. Enlarge all hole/pad sizes.
6. Add a ground connection for the ground plan on top near main filter capacitors (J19).
7. Jumper to select the “clock regulator” or “5842 regulator” for the 8414 IC (J17). Thus the regulator for 8414 will be isolated from 5842 when the on board clock is not used.
8. Use LM317T and LM337T regulators (better noise performance) for all DAC chips.
9. Add de-emphasis LED indicator (D32).
10. Split the ground plan in sections: 8414, 5842, Input relay and logic IC, DAC left and DAC right.
11. Relocate the rectification section (diodes and caps) of the 30V supply so that the last few filter caps will be closed to a centre ground point J19.
12. Add “+” mark for all E-capacitors for easy polarity identification.
13. Add resistor and VR for all PCM63 to trim the MSB (this adjustment is optional and reserve for DIYer to play around the trimming of MSB).
14. Add Trimmer pot (R8, 9, 17 & 18) to adjust Jfet IV output level to match “+” and “-“ cycle. This is also optional and need an accurate voltmeter and test CD to do the adjustment. Do not solder the parts if not use.

END

### **Stuffing and Adjustment Procedures:**

1. Solder resistors, LED and diodes
2. Solder film capacitors except the BIG 10uF cap
3. Solder all jumper pins
4. Solder IC sockets
5. Solder bead, inductors
6. Solder Pulse transformer
7. Solder all pots (VR)
8. Solder small E-caps (22uF to 330uF)
9. Solder Regulator Jfet / Transistors / TL431 etc.. (do not solder jfet IV fets)
10. Solder connectors if used
11. Solder big E-caps (1000uF and 2200uF)
12. Solder all relays
13. Solder IRF610/9610 with heat sink
14. Verify the +/- 20V regulator (across R59 and R60) is working and adjust the output voltage.
15. If cannot adjust the voltage to 20V, solder a 220k resistor and parallel to R47, R48, R65 or R66. Do this when needed.
16. Then solder the Jfet IV FETs section module by module.
17. Power up again and adjust Pot R1 until Point A to 10Vdc, Adjust Pot R2 until Point B is 0Vdc, Repeat adjustment on R1 and R2 when necessary.
18. Then adjust Pot R8 until voltage across R14 is 5Vdc.
19. Repeat to solder other Jfet IV section and adjust voltages as above.
20. Solder the LM317 and 337 with heat sink in pairs and verify the regulator output voltage is 5V +/-0.1V at the PCM63 IC socket positions.
21. Repeat and verify all regulators to PCM63 is either +5 or -5V.
22. Verify the +20/-20V regulators are still at correct voltage. This voltage should not change more than 0.2V or else something may be wrong.
23. Now solder the 7805 and 7808 in the digital sections and verify all output voltage correct. You can check voltage at the IC sockets pins to double confirm.
24. Solder the 8412/8414 chips in position. Plug in 5842 chip.
25. Short the pins for 8414 power to clock regulator. Also select the input jumper to RCA socket (right side two pins shorted).
26. Power up the digital section, the error LED should be ON after 1 second. Then inject a SPDIF signal to the RCA digital in socket, the Error LED should be OFF now.
27. Use a scope to check if there is pulsed at CLK, LE, DOL and DOR nets. If don't have scope, use a DC voltmeter and check voltage is about 2.5Vdc.
28. Power down and go back to DAC section.
29. Plug in PCM63 first chip.
30. Verify the Iout is at 0V dc (point B), if not, fine tune the R2. Note that this voltage should not change much after the first adjustment. Check point A still at about 10V.
31. Repeat for other PCM63 one by one.

32. Then check the current drain at R81 and R82 (5.1 ohm resistors). The voltage drop across R81 is about 0.97V while the voltage at R82 is about 1.15V.
33. Solder the 4 BIG film caps 10uF.
34. If everything is fine, plug in transport and you should hear music from the output.
35. Perform normal testing with a test CD.
36. Warm up the set for 1 hrs and adjust the voltage at point A and B again when needed.

Notes:

1. The “+” mark on D10 LED is wrong polarity.

**Update: 13-May-2007**

1. The output level at balance mode is about 4Vrms which is too high for my pre-amp (DIY jfet SE pre-amp). Thus I put a 4.7k resistor in parallel to R4, R13, R24, & R34 (solder at the bottom side of pcb). This has no effect to the sound but match the sound level of my pre-amp volume control. Due to this change, all the pot R1, R10, R21, & R31 has to be re-adjust till Point A back to 10Vdc (half of the +ve voltage 20V).
2. I change the 4 output BIG film cap from Vishay 4u7 back to Rifa PHE 426 10uF 250V type. I found the sound improves a lot and sonic is more sweet and relax (less harsh). Thus you should consider to invest on better capacitor at the output coupling.
3. I change the DF from 5847 and 5842 back and fore and find that the 5842 did sound better to me (more relax). No wonder VC America sell the 5842 so high. There is also sonic difference between 5842AP and 5842APT chip, APT is a bit better.
4. My original testing is using a China make 20VA transformer of 24V x 2. I put in the Farnell 9531750 30VA 25V x 2 potted transformer, the pre-regulated voltage is about 30.5V and is very stable. Sonic wide is more stable and sound is more relax also. Anyway I also recommend to use Farnell 9531718 30VA 9Vx 2 transformer.
5. I believe this DAC has lots of potential for diyer to play around to get and improve to better sound. One idea is to use DIR9001 receive IC instead of 8414. 9001 has only 50ps jitter and thus I believe the sound should improve more. I don't have this converter board yet and I may either build my own or buy one from China diy forum.
6. Thanks for all the support and I hope to receive more comment about this pcb. Thanks. Here is the update photo for reference.

**Update: Apr 2008:**

1. Change R49, R50, R67 & R68 from 1.5k to 4.7k. This allow to use a 18V x 2 AC transformer at J12 and J13.
2. Change R123 from 150 to 110 ohms. Correct mistake.

3. R85, 86, 87, R92, 93, 94, R99, 100, 101, R106, 107, 108 can use either 47 to 150 ohm resistors.
4. Adjust R47, R48, R66 & R67 values in case you cannot get to +/-20V regulated voltage. Reduce the resistance value by solder another 330k resistor in parallel with them in case the voltage is higher than 20V.
5. In fact, it is recommended to adjust the regulators from +/-20V to +/-18V dc so that the 5V regulators are not that hot. Thus you may try to use a 120k ohm resistors solder in parallel with all the resistors in item 4 at the bottom of the pcb.
6. For LED, adjust the series resistor value to have the brightness you want.
7. The clock section is not used and you can skip to solder all the parts for future use.
8. Recommended transformers: 50VA 18Vx2, 30VA 9Vx2, all AC voltages.

END