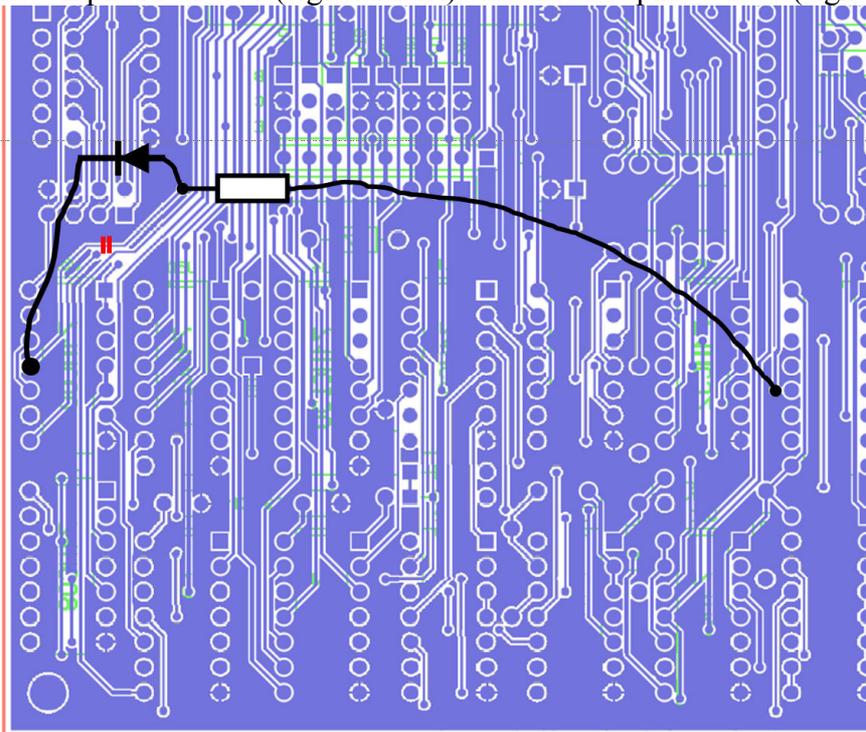
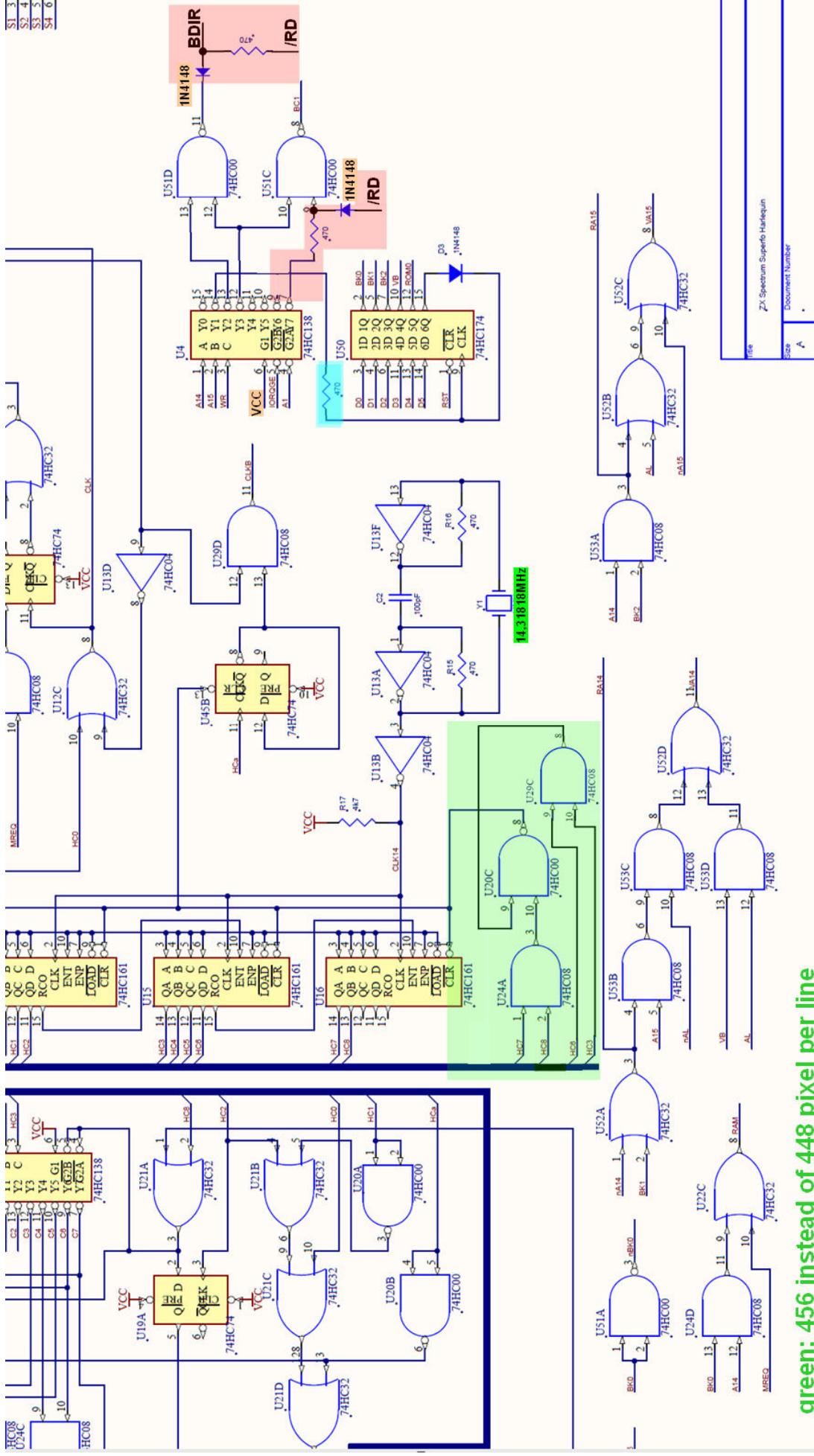


At the bottom side cut the connection that comes from pin 11 of U51. Insert a resistor of 470 in series to that line and insert a diode 1N4148 – cathode at the side of the new resistor that is not on pin 11 of U51 (signal BDIR) and anode at pin 5 of U5 (signal /RD).



Now there are 3 additional resistors of 470 Ohm and 2 diodes 1N4148 inserted for the addressing of the sound chip..
At the following page you find the mods in the schematic.



green: 456 instead of 448 pixel per line

red: correct addressing for AY3-8912 sound chip – identical to 128k heatsink / gray +2

cyan: additional 470 Ω resistor to get correct level at CLK pin of U50 and avoid high output currents

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Document Number	.

S1	3
S2	4
S3	5
S4	6

4. correct a timing problem at the lower RAM:

Insert a 180 pF capacitor from pin 29 of U8 (/WR) to pin 16 of U8 (ground). I noted some situations where switching the RAM access between the ULA circuitry and the CPU/DMA there is undesired /WR low, /CE low for about 50 ns because /WR is enabled just before /CE is disabled as desired. The additional capacitor shorts the small glitch and delays /WR a bit. This way there is no undesired RAM write.

5. improving picture quality at composite output – PAL

I found that some switching regulators are producing together with the PAL coder undesired moiré at the PAL signal. To avoid this it was useful to cut the line between the output of the switching regulator and to insert an inductance of 10 μ H or more with low DC resistance. I myself used a 100 μ H inductor with $R < 0.2 \Omega$, that I had in my stock.

A further undesired effect is that there are vertical structures visible especially at magenta paper similar to that at 48k Spectrum boards. To avoid this I substituted the electrolytic capacitor C27 (initially 10 μ F) by a 1000 μ F/6V type. This way the structures disappeared.

6. improving the sound output:

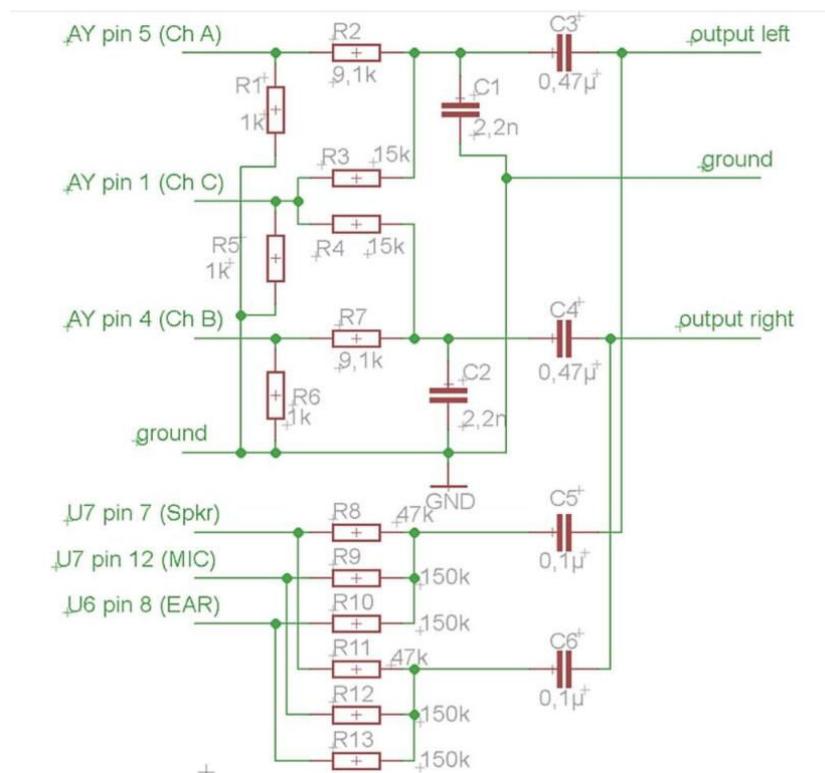
The last mod I recommend relates to the sound output and mixing of the AY-signal and the beep, load and save tones.

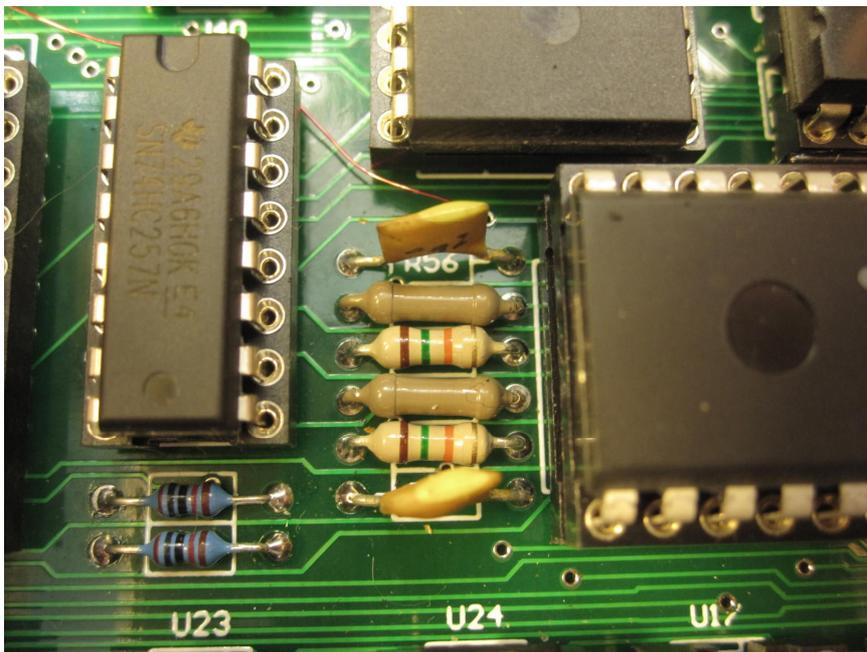
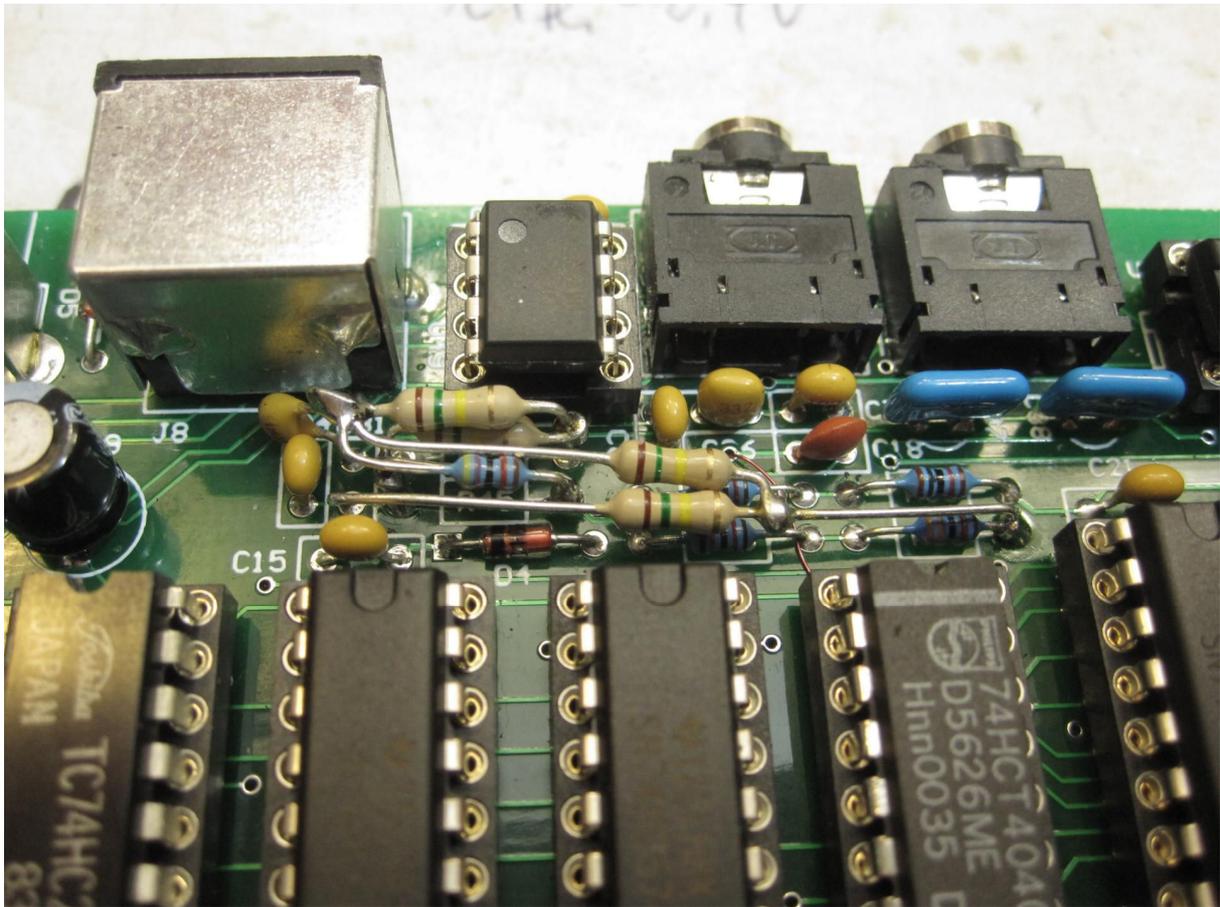
Instead of R56 and R57 solder 2,2 nF capacitors. R52 and R55 change to be 9,1 k Ω and for R53 and R54 use 15 k Ω .

From pin 1, 4 and 5 of U54 (AY3-8912) there have to be 1 k Ω resistors to ground (I used SMD types at the bottom side of the board).

C37, C38 should be 0,47 μ F ceramic capacitors

C31, C34, R46, R45 have to be removed or not be soldered. Instead the schematic shown on the following page should be realized (only resistors and capacitors). Note that the numbers of the capacitors and resistors in that schematic do not refer to the numbering in the schematic of the harlequin 128k issue 1.





I did all these mods myself and finally got a computer that does not differ from my 128k heatsink or from my gray +2. I tested it with divide and MB02+. Finally all demos I tested run perfectly also the DMA using programs. But I cannot give any guarantee, that the solution I recommend is free of errors nor that it could damage any parts.
Some pictures from my board:



Superfo Harlequin 128K ISSUE 1

UA880D
V3
MME

AY38912A/P
YAMAHA
92510 CA
Mitsubishi

74HC161E
D3625ME
Hnn0035 D

TC74HC253P
JAPAN
8348H

TC74HC253P
JAPAN
8348H

C074HC161E
H 9314

C074HC161E
H 9314

C074HC161E
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