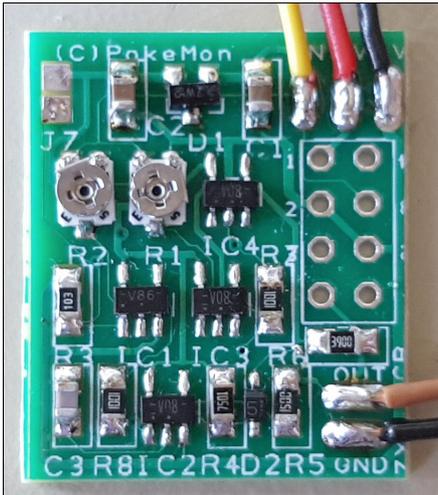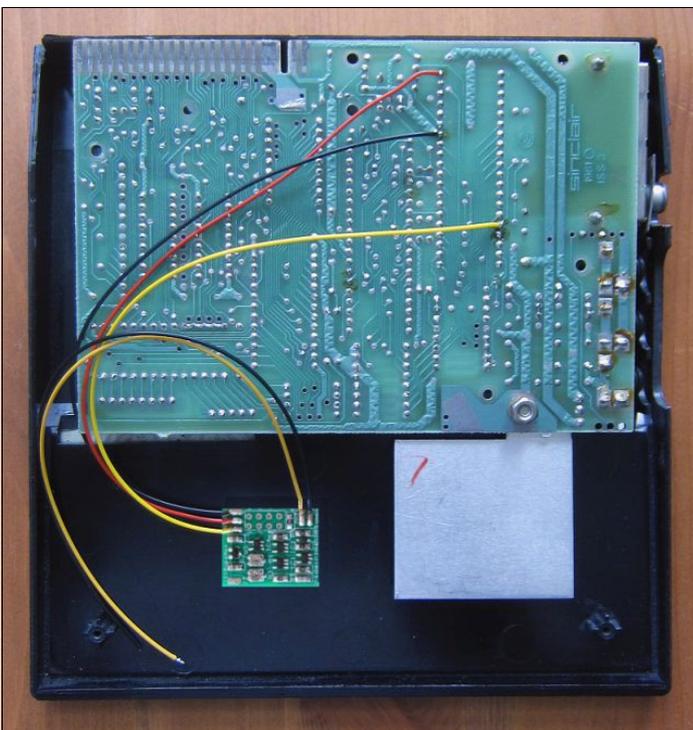# ZX8-CCB – video out for Sinclair ZX80/ZX81

The board ZX8-CCB works up the video signal from Sinclair ZX81 digital (ULA output) und works together with both ULA versions (C184 or C210) used in the very first model of ZX81 (Issue One) or following models (Issue 3, ISS3). Due to digital work up the noise in the video signal will be eliminated (nearly) full. Additional the board adds a valid back porch in the signal regardless if ULA produces it or not. The result in conjunction with the very fast logic gates (74LVC series) is a very clear picture without any noise in the background and a very sharp and crispy picture.

Via the soldering jumper J7 you can choose either normal video (jumper not set) or inverted picture (jumper set). The circuit delivers approx. 1Vss at any standard 75R video input. The output is safe against any shorts.

The SDM module has 20 x 25 x 3 mm (L x W x H) and fits into the modulator case (if you remove it's content) but could also be fixed with a adhesive tape anywhere inside the case of the ZX81. You only have to remove the back cover of ZX81, not the main board itself. So the very sensitive keyboard membrane will not be touched or damaged. You could also integrate a small video jack (3.5mm) between the two cover parts, which is quite easy.

connectors:

input:
red=+5V, ULA pin 40
black=0V, ULA pin 34
yellow=video In, ULA pin 16

output:
brown=video out
black=0V / GND

jumper J7 not set = normal picture
jumper J7 set = inverted picture

Adjustment:
The modul is preadjusted to old ULA type (C184, Issue One). For new ULA (C210, ISS3) it could be necessary to change the adjustment. But for optimal video quality it could be even better to adapt the adjustment on your own ZX81. The trimmer R1 influences the SYNC signal/level, the trimmer R2 adjusts the PIXEL signal. Mostly adjusting R2 is sufficient to get a (better) picture.

For a complete readjustment you can turn the PIXEL trimmer full to the right (clockwise) which will result in a complete white picture with jumper J7 not set. Now you can adjust the SYNC trimmer for a valid picture on your TV without sync failures, it will be more easy if you choose 4:3 format on a widescreen TV. After you can adjust the PIXEL trimmer for finding the cursor "K" (inverted) on the white background. Maybe you try a command like PRINT for more easy adjustment. After try the normal video display and find the maybe best compromise.