Project Documentation

C128 A/V-Adaptor

Project number: 187

Revision: 0

Date: 22.12.2021

C128 A/V-Adaptor Rev. 0

Module Description

Introduction

The A/V-Adaptor allows to connect standard S-Video and Audio or Composite-Video cables to the A/V-Jack of the Commodore C128.

A 330Ω resistor to attenuate the Chroma signal for S-Video is installed, but it can be deactivated by setting a jumper (JP2). This attenuation is required, since the chroma signal has a level, which is too high for standard S-Video. However, using the higher chroma signal can be desirable.

Further, the audio input can be connected to GND, in case it is not in use to reduce the noise introduction.

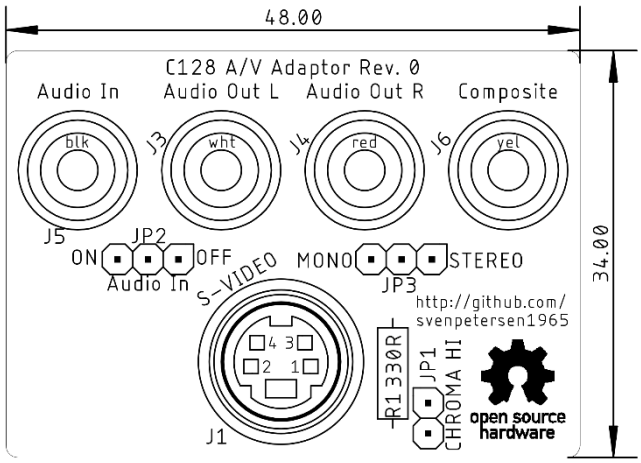


Figure 1: Component side of the A/V-Adaptor

The two audio output jacks can be connected by a jumper. Alternatively, the stereo sound output (A/V-Jack, pin 7, in case a 2nd SID is installed inside the C128) can be connected to the right channel of the audio output. The first SID output is connected to the left channel of the audio output.

Connectors

A/V-Plug – J2

The A/V-Plug for the C128 is the inner part of a Lumberg 033099 SV 80 DIN-Plug (8 pins, horse shoe = 262°). It provides a round plastic shell of the DIN-connector and long enough pins, so the adaptor can sit firmly in the A/V jack. The inner part of a cheaper (standard) connector cannot be used, since it does not sit firm enough.

Pin	Signal
1	Luminance
2	GND
3	Audio Out (mono/left)
4	Composite Video
5	Audio In
6	Chrominance
7	Audio Out (right – if provided)
8	-

S-Video Jack – J1

A vertical PCB mount Mini-DIN jack (4 circuits)

Pin	Signal
1	GND (Luminance)
2	GND (Chrominance)
3	Luminance
4	Chrominance

RCA-Jacks – J3, J4, J5 & J6

Connector	Signal
J3	Audio Out (mono/left)
J4	Audio Out (mono/right)
J5	Audio In
J6	Composite Video

Jumpers

Chrominance attenuation – JP1

The chrominance signal has a too high level for the standard S-Video chroma signal. The jumper bridges the 330Ω resistor (R1) to switch off this attenuation.

Status	Configuration
open	Attenuation active
Set	Attenuation inactive/off

Audio Input Off – JP2

To reduce the noise introduction to the Audio Input, this can be grounded.

Status	Configuration
ON	SID Audio In connected to J5
OFF	SID Audio In connected to GND

Mono/Stereo – JP3

The standard audio output of the SID is one channel (mono). In cases a 2nd SID is installed, the 2nd audio output is (usually) connected to Pin 7 of the Audio/Video jack of the C128. JP3 connected the right channel of the audio output (J4) to either J2, Pin 3 or Pin 7.

Status	Configuration
MONO	J4 connected to J2, Pin 3
STEREO	J4 connected to J2, Pin 7

Assembly

Install the DIN plug (J2) on the solder side (bottom) first. Put the PCB on a suitable surface, the solder side up. Insert the DIN-plug, make sure, it is vertical and solder one pin first (from the solder side, which is pointing up, refer to Figure 2). Check again that the plug is straight, correct if required and finally solder all other pins.

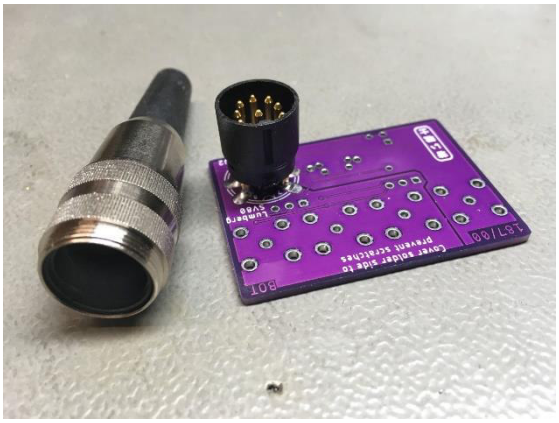


Figure 2: Soldering the DIN-plug J2

Figure 3: DIN-plug seen from the component side ("TOP")

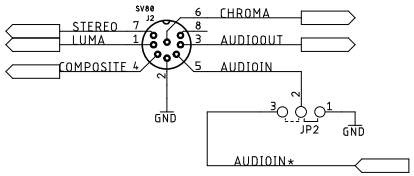
Install and solder all other components from the component side. Watch the angle of the components, solder them from the solder side. Clip excess pin length.

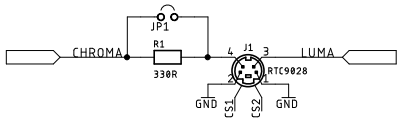
In case no enclosure is used, cover the solder side (except J2) with duct tape to prevent scratching or install it in the provided 3D printed case.

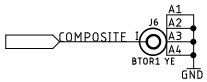
Revision History

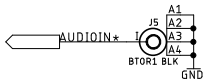
Rev. 0

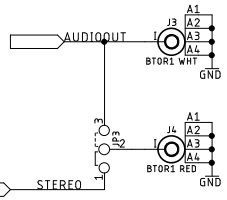
Fully functional prototype.







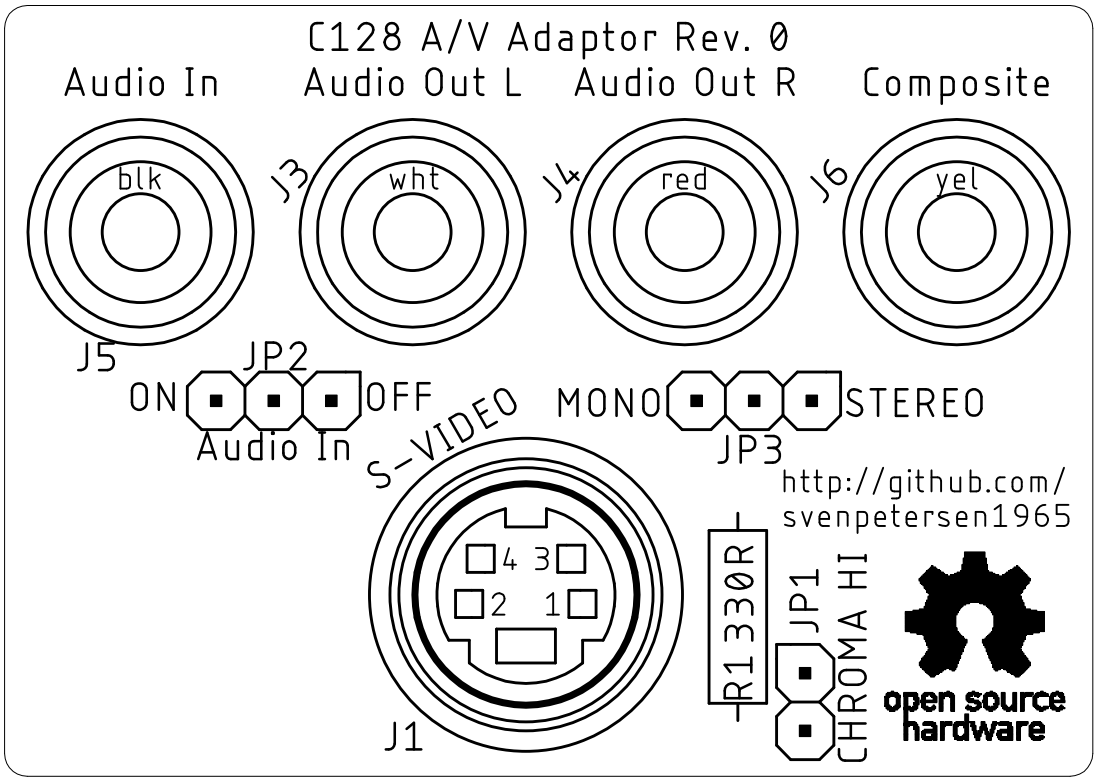




open source hardware

Title: C128 A/V-Adapter		Doc.-No.:	187-1-01-00
		Draft.:	Sven Petersen
Date: 31.10.2021 12:46	Rev.: 0	Page 1/1	
File: C128_AV-Adapter			
http://github.com/svenpetersen1965			A3

Sven Petersen 2021	Doc.-No.: 187-2-01-00	
	Cu: 35µm	Cu-Layers: 2
C128_AV-Adapter		
31.10.2021 14:33		Rev.: 0
placement component side		

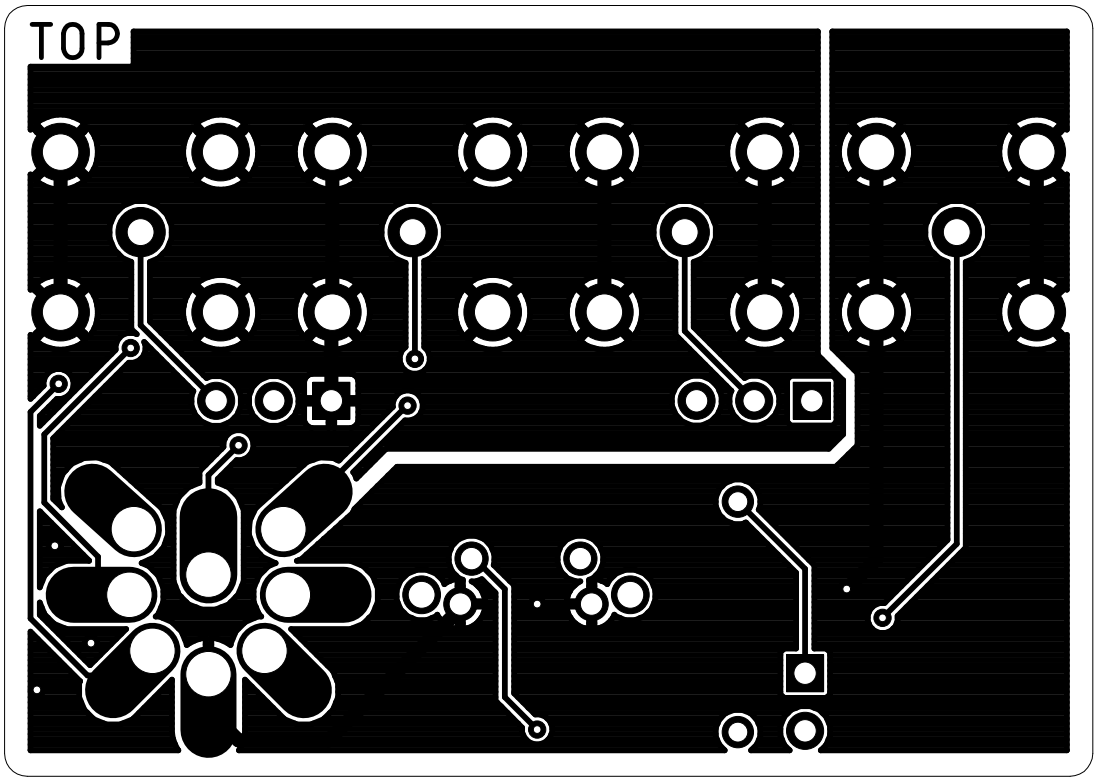


Sven Petersen 2021	Doc.-No.: 187-2-01-00	
	Cu: 35µm	Cu-Layers: 2
C128_AV-Adapter		
31.10.2021 14:33		Rev.: 0
placement solder side		

Cover solder side to
prevent scratches

Lumberg
SV80

Sven Petersen 2021	Doc.-No.: 187-2-01-00	
	Cu: 35µm	Cu-Layers: 2
C128_AV-Adapter		
31.10.2021 18:30		Rev.: 0
top	[redacted]	



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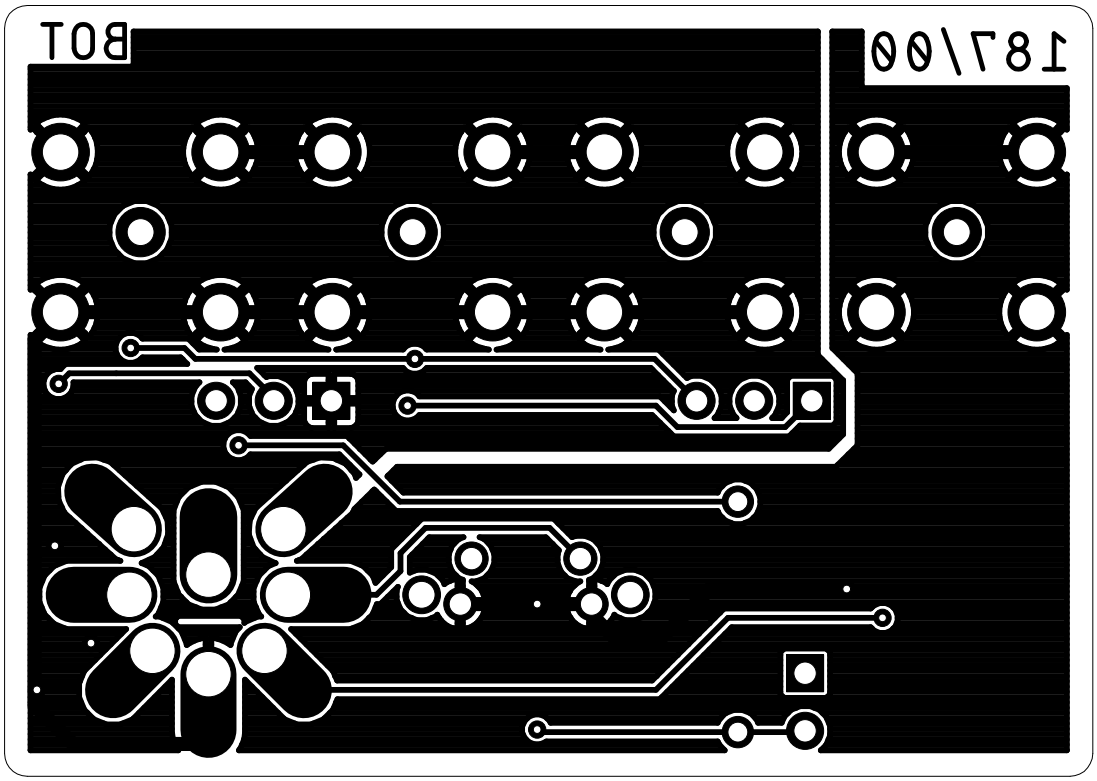

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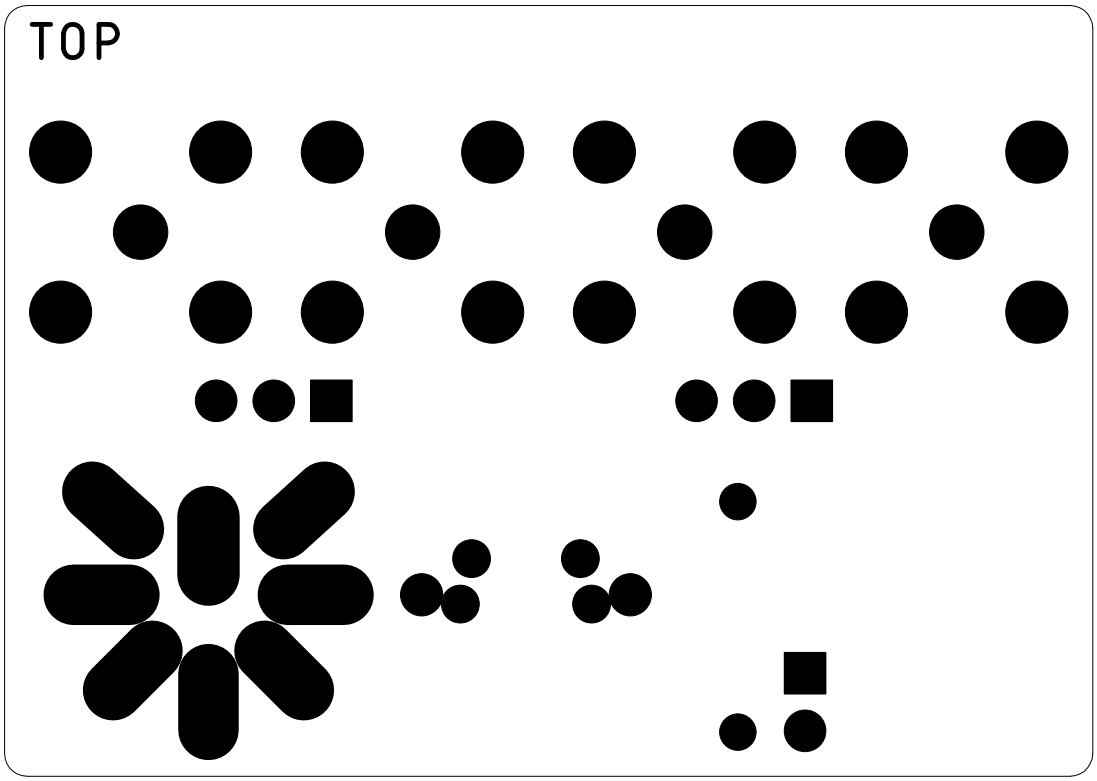
C128_AV-Adapter		
31.10.2021 18:30		Rev.: 0
stopmask component side		



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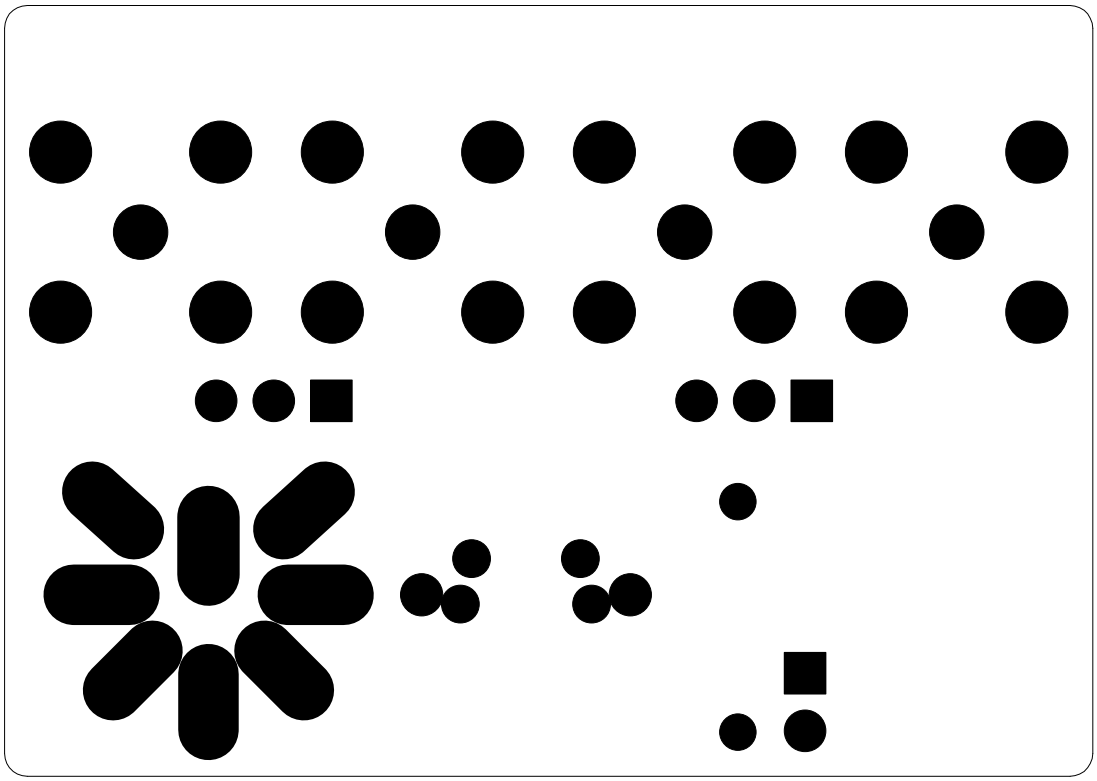
C128_AV-Adapter		
31.10.2021 18:30		Rev.: 0
stopmask solder side		



Sven Petersen 2021	Doc.-No.: 187-2-01-00	
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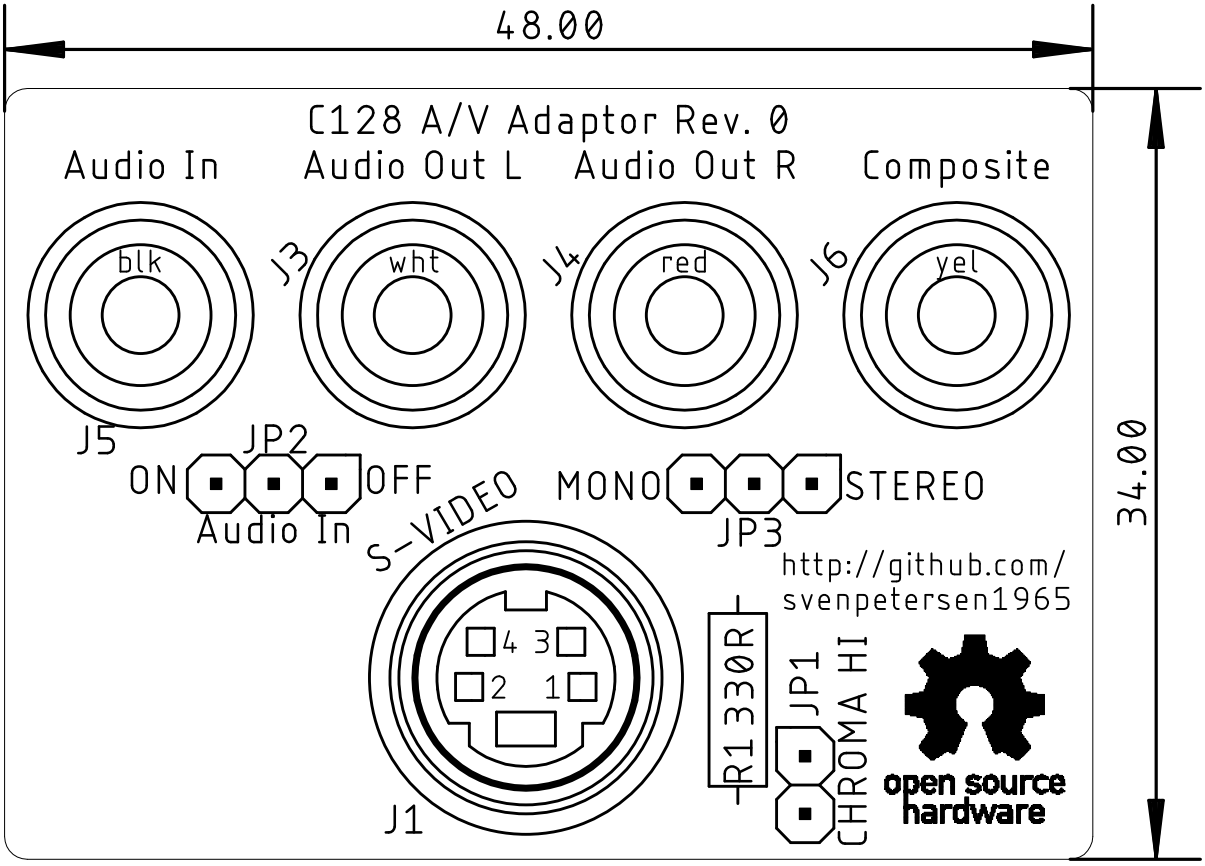
C128_AV-Adapter		
31.10.2021 14:33		Rev.: 0
placement component side measures		



C128 A/V-Adaptor Rev. 0

Testing v0.0

Introduction

The test was conducted with a prototype of the A/V-Adaptor Rev. 0. For the electrical/functional tests a C128 was used. A Framemeister XRGB mini was used to connect an (HDMI) monitor.

Figure 1: Test Setup

Tests

Assembly

The prototype was assembled, all footprints worked out. The DIN plug was assembled the way described in the Module Description. No problems occurred while the assembly.

Mechanical fitting

The A/V-Adaptor was installed on a C128, which works well with the prototype. It is required to install the DIN plug with a distance to the bottom side of the PCB to get deep enough into the video jack of the C128 to obtain a stabile seating.

Figure 2: Mechanical testing with a C128.

No ports are blocked.

Functional testing

The A/V-adaptor was connected to the C128 and the computer was switched on. The jumpers were set to

Jumper	Setting
JP1 (Chroma Hi)	Close (=330R resistor bridged)
JP2 (Audio in)	Off (audio in → GND)
JP3 (mono/stereo)	Mono (both audio channels connected to J2, Pin 3)

Test	Result	Testing
S-Video cable connected	The displayed image was clear and not distorted	Ok
Audio cable	Both speakers had a clear audio output (mono)	Ok
Composite video	The displayed image was clear and not distorted	Ok
Audio input (JP2 → on)	The audio signal connected was passed through the filter.	Ok
Stereo mode	TBD	TBD
Chroma high (s-video), 330R resistor bridged	The quality of the displayed imaged changed. The colors got stronger and slightly distorted. This was expected.	Ok

The stereo mode was **not** tested.

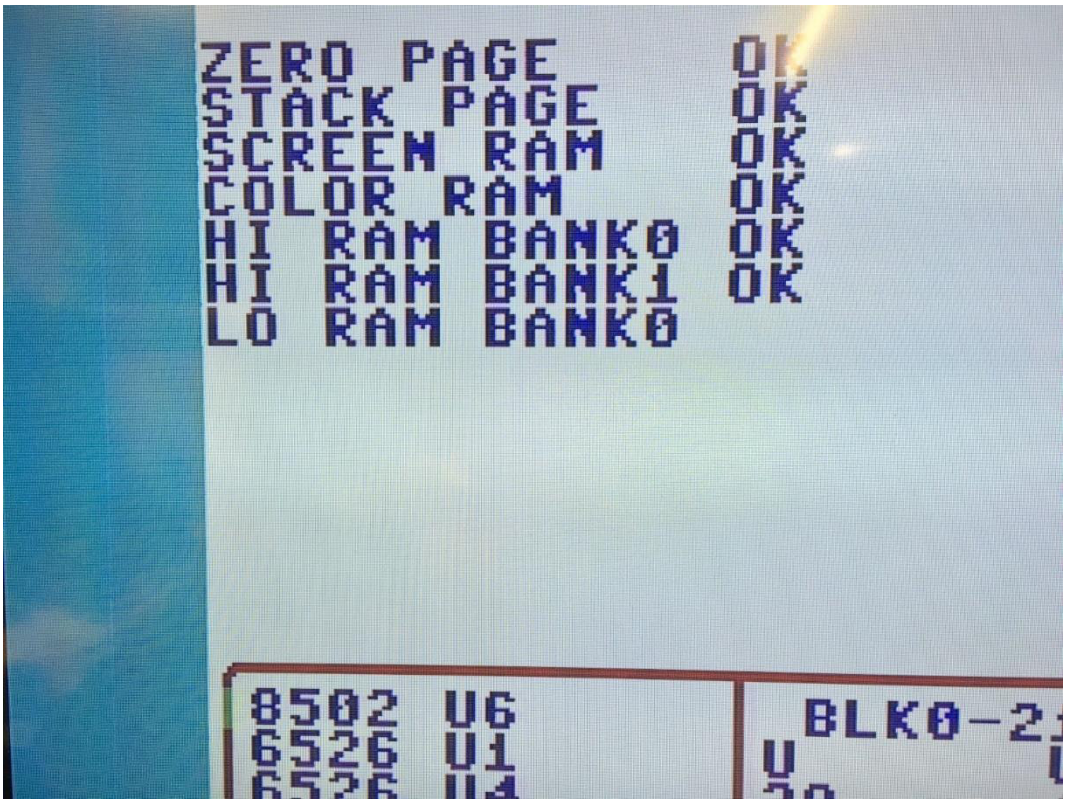


Figure 3: Photography of the S-Video output

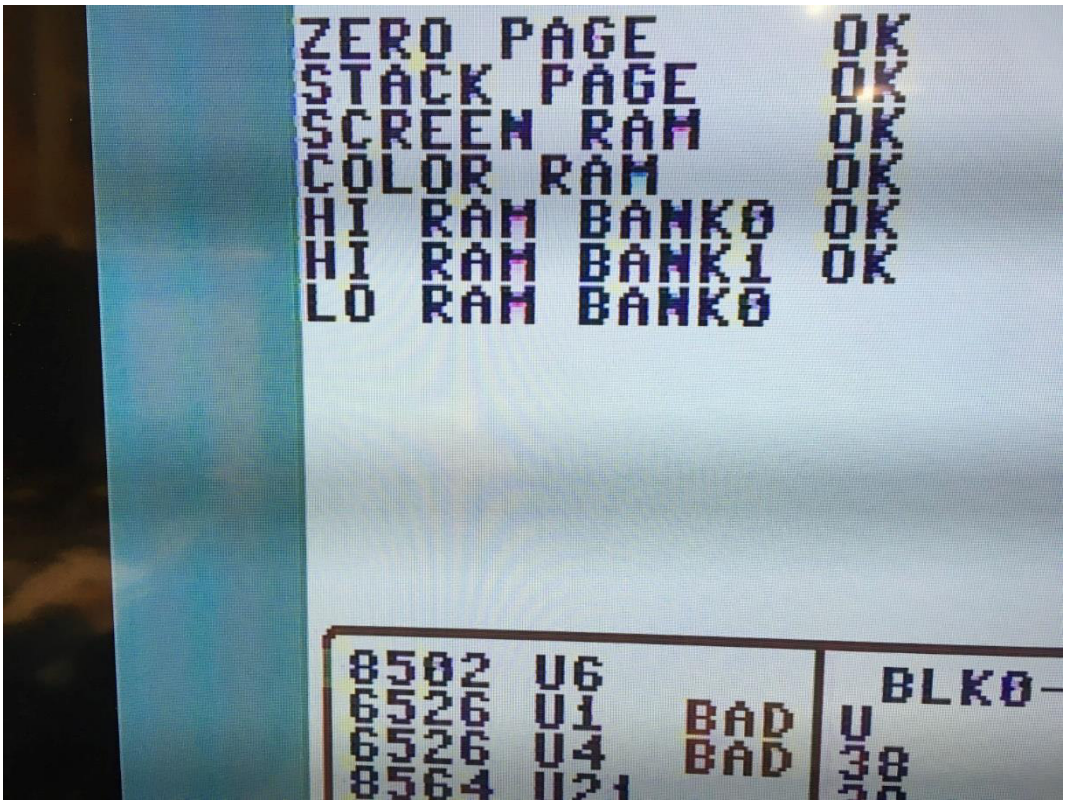


Figure 4: Photography of the Composite Video output

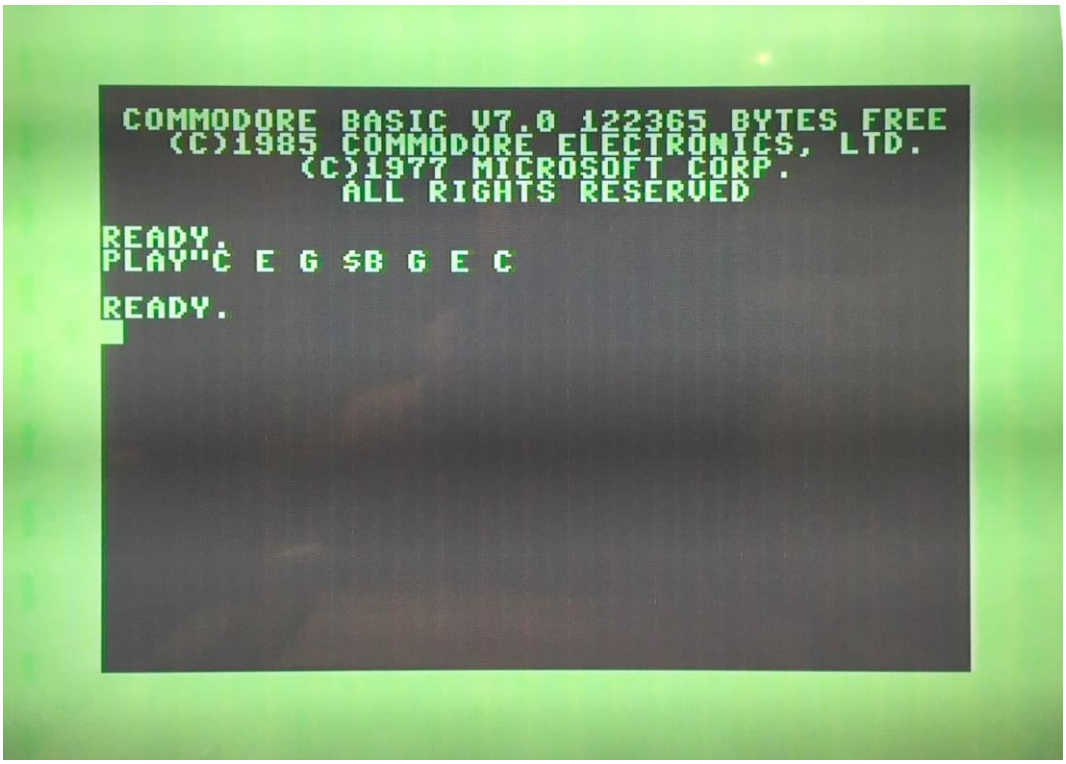


Figure 5: Sound test

The sound test was accomplished by playing some notes from BASIC V7.0. These were audible.

NOTE: Photographing an TFT/LCD-Display never really shows the real image. That is matter due to raster effects (Moiré patterns) and dynamic effects (darker areas/strips).

3D-printed cases

After trimming the solder pins of the RCA jacks, all three versions of the board fit into the bottom shell. The respective top shells could be installed and fit well. The decals (labels) fit on the top shell.

The A/V-Adaptors passed a drop test (a drop of 1m on a table top).

Test Result

The C128 A/V-Adaptor Rev. 0 is fully functional. It seems, that the colors of s-video and composite video are looking more similar, when the jumper “Chroma High” is bridged.

C128 A/V-Adaptor Rev. 0
Bill of Material Rev. 0.0

Pos.	Qty	Value	Footprint	Ref.-No.	Comment
1	1	187-2-01-00	2 Layer	PCB Rev. 0	2 layer, Cu 35µ, HASL, 48.0mm x 34.0mm, 1.6mm FR4
2	2	1x 3p pin header, pitch 2.54mm	1X03	JP2, JP3	standard pin header, e.g. Reichelt RND 205-00624,
3	1	1x 2p pin header, pitch 2.54mm	1X02	JP1	standard pin header, e.g. Reichelt RND 205-00623
4	3	Jumper 2.54mm pitch	jumper	(JP1), (JP2), (JP3)	Jumper (0,1") with holder/latch, e.g. tme.eu: JUMPER-H/B, Farnell: 2396301, Newark: 93K5732 , Reichelt: JUMPER 2,54GL SW.
5	1	330R	R-10	R1	resistor, 0.25W or more, 5% or better.
6	1	BTOR1 (black)	BTOR1	J5	Lumberg, RCA jack, vertical, black. E.G. Reichelt LUM BTOR1 SW, Farnell: 1217030, Newark: 96K7172, TME.eu: BTOR1B
7	1	BTOR1 RED	BTOR1	J4	Lumberg, RCA jack, vertical, red. E.G. Reichelt LUM BTOR1 RT, Farnell: 1368644, Newark: 53M6863, TME.eu: BTOR1R
8	1	BTOR1 WHITE	BTOR1	J3	Lumberg, RCA jack, vertical, white. E.G. Reichelt LUM BTOR1 WS, Farnell: 1368645, Newark: 53M6864, TME.eu: BTOR1W
9	1	BTOR1 YELLOW	BTOR1	J6	Lumberg, RCA jack, vertical, yellow. E.G. Reichelt LUM BTOR1 GE, Farnell: 1368642, Newark: 53M6865, TME.eu: BTOR1Y
10	1	RTC9028	MINIDIN4_V	J1	Mini-DIN, 4p, vertical. E.g. AliExpress:
					RTConnector: RTC9028
					ebay.de
11	1	SV80	SV80_INNER	J2	Inner part of Lumberg 033099 SV 80, e.G. Reichelt: LUM SV 80, Newark: 23AH4043, Farnell: 1321482, TME.eu: SV80, alliedelec.com: 70151558. LUM SV 50 for 5-pin C64 and VIC-20