Project Documentation

User Port/Parallel Adapter for Commodore 1541/1541-II

Project number: 150

Revision: 0

Date: 18.08.2020

User Port/Parallel Adapter for Commodore 1541/1541-II Rev. 0

Module Description

Introduction

Some speed-loaders for the C64 make use of a parallel data transfer for communicating with the Commodore 1541 or 1541-II floppy disk drive. This is possible, because in both FDDs a complete port (PAx) and two hand shake pins (CA2, CB1) of the 2nd VIA (6522) are not used.

SpeedDOS utilizes this fact and uses a ribbon cable between the VIA and the User Port.

Very often, the ribbon cable has been attached to an extra DIP40 socket, which it is soldered to, that fits between the original socket and the VIA. This ribbon cable is then connected to an edge connector for the user port. This is a cheap solution, which is not very reliable. A wire can be torn off the socket or the ribbon cable gets old and brittle etc.
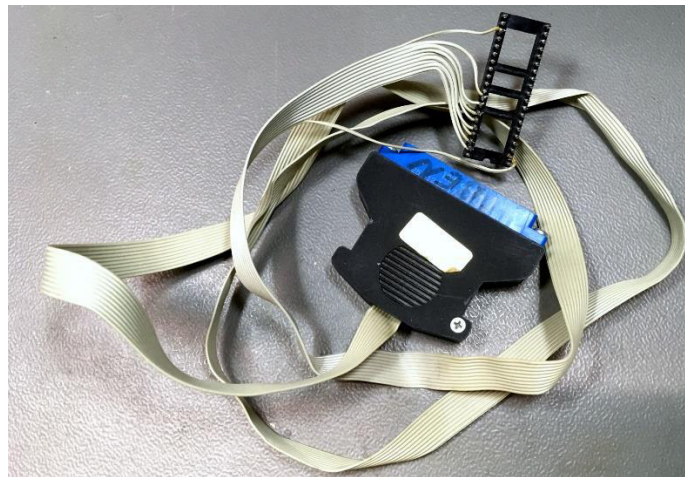

Figure 1: Traditional Parallel Cable

The User Port Adapter provides a solution with an easy to make and easy to replace cable. The risk of a wrong assembly is little. It works in conjunction with a dedicated VIA adapter for the 1541 and a low-profile adapter for the 1541-II.
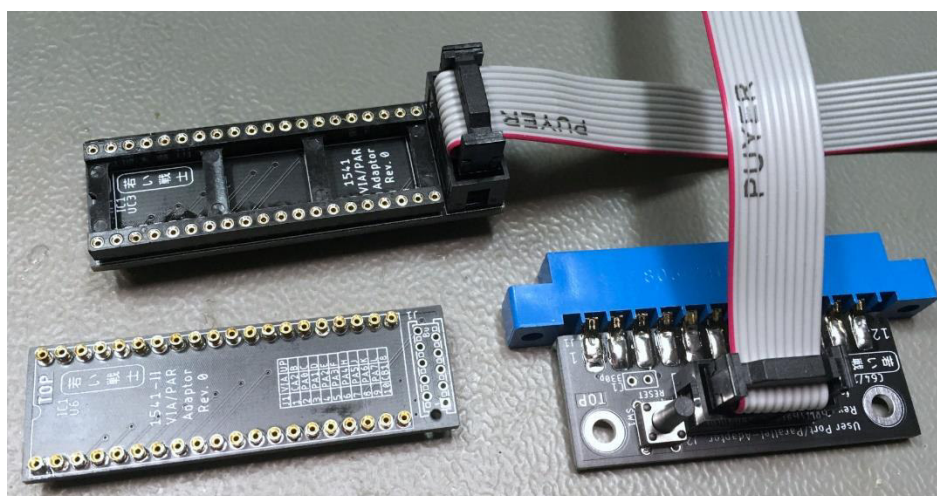

Figure 2: User Port Parallel Adapter and both sorts of VIA Adapters

The connections between the user port and the VIA for SpeedDOS are defined like this:

UP (pin)	VIA (pin)	J2	J2	VIA (pin)	UP (pin)
$\overline{\text{FLAG2}}$ (B)	CA2 (39)	1	2	PA0 (2)	PB0 (C)
PB1 (D)	PA1 (3)	3	4	PA2 (4)	PB2 (E)
PB3 (F)	PA3 (5)	5	6	PA4 (6)	PB4 (H)
PB5 (J)	PA5 (7)	7	8	PA6 (8)	PB6 (K)
PB7 (L)	PA7 (9)	9	10	CB1 (18)	$\overline{\text{PC2}}$ (8)

In the 1541, the used VIA is UC3, in the 1541-II, the VIA is U6.

The User Port parallel adapter provides a RESET button and also two capacitors between CA2 and GND and between CB1 and GND. Those capacitors are recommended to improve problems due to crosstalk here: http://pitsch.de/stuff/c64/index_floppy.htm#B1.3.

Crosstalk problems were not experienced while testing without the capacitors, they do not cause problems, either, so they are at least an option.
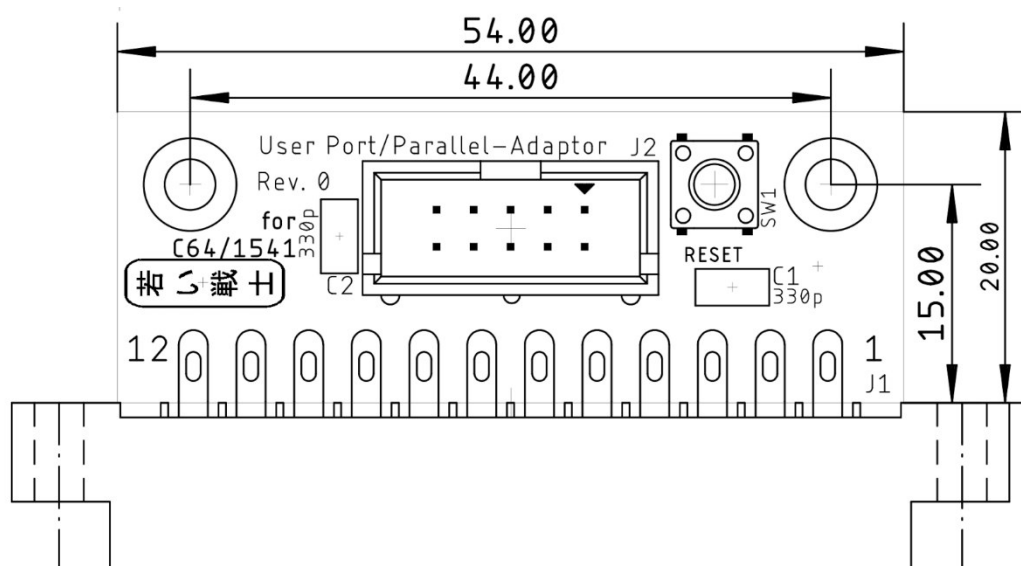
Dimensions

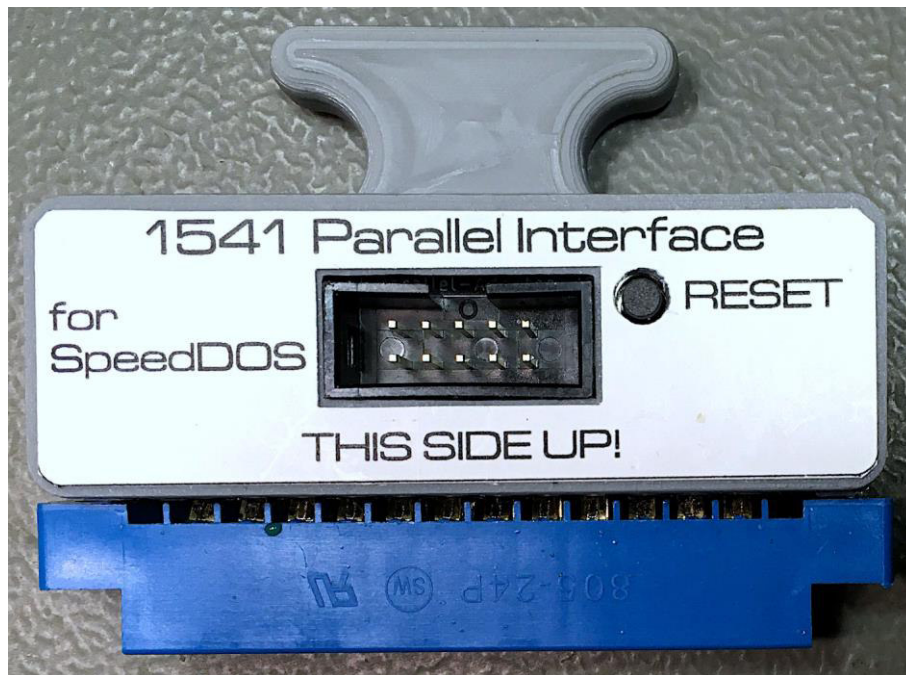*Figure 3: Dimensions of the User Port Parallel Adapter*

Case

*Figure 4: User Port Adapter in a 3D-printed case*

Annotations

SpeedDOS requires a special Software in the 1541 and 1541-II floppy disk drive. While the 1541-II accepts a 27C128 EPROM, the EPROM of the 1541 is a 2364 type, which requires an adapter. The Long Board Kernal Adapter (https://github.com/svenpetersen1965/C64-Kernal-Adapter-Switch-Long-Board) can serve this purpose. The height is not critical in the 1541, but installing a vertical pin header instead of a 90° type is recommended.

The cable making is pretty simple. Both ends of the cable are connected to IDC type connectors, which means, a small vice is a sufficient tool for attaching the connectors to the ribbon cable. In case you are not familiar with this work, please consult my article about cable making: http://tech.guitarsite.de/cable_making.html#Ribbon%20Cables

Revision History

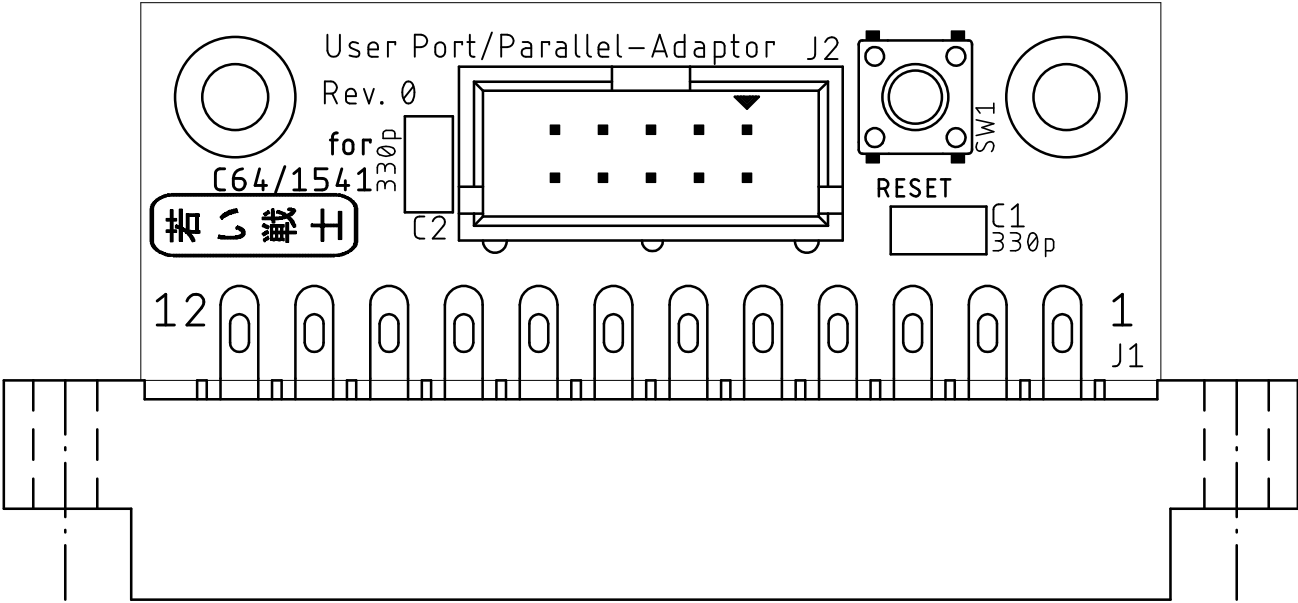### Rev. 0

- Prototype (fully functional)
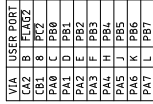
VIA	USER PORT		
CA2	B	FLAG2	
CB1	8	PC2	
PA0	C	PB0	
PA1	D	PB1	
PA2	E	PB2	
PA3	F	PB3	
PA4	H	PB4	
PA5	J	PB5	
PA6	K	PB6	
PA7	L	PB7	

J2
1 CA2   2 PA0
3 PA1   4 PA2
5 PA3   6 PA4
7 PA5   8 PA6
9 PA7   10 CB1

SW1
JTP-1130

330p
C2
GND
GND

top
GND   1
+5V   2
RESET   3
CNT1   5
SP1   5
CNT2   7
SP2   7
PC2   8
ATN   9
9VAC1   10
9VAC2   11
GND   12
GND

C64-USERPORT

bottom
FLAG2   A GND
PB0   B
PB1   C PA0
PB2   D PA1
PB3   E PA2
PB4   F PA3
PB5   H PA4
PB6   J PA5
PB7   K PA6
PA2   L PA7
GND   M
GND   N
GND
CA2   A GND
CB1

330p
C1
GND

DRL1 DRL2

Sven Petersen 2020	Doc.-No.: 150-2-01-00	
	Cu: 35µm	Cu-Layers: 2
UP-PAR-Adaptor		
07.08.2020 09:21	Rev.: 0	
placement component side		

User Port/Parallel-Adaptor   J2

Rev. 0

for

C64/1541

330p

C2

12

1
J1

SW1

RESET

C1
330p

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Sven Petersen 2020	Doc.-No.: 150-2-01-00	
	Cu: 35µm	Cu-Layers: 2
UP-PAR-Adaptor		
07.08.2020 09:21	Rev.: 0	
	placement solder side	

http:\\github.com\svenpetersen1965

PA7 PA6 PA5 PA4 PA3 PA2 PA1 PA0 PA4 PA2 PA0 CB1 PA6 PA4 PA2 PA0

open source hardware

Sven Petersen 2020	Doc.-No.: 150-2-01-00	
	Cu: 35µm	Cu-Layers: 2
UP-PAR-Adaptor		
06.06.2020 17:43	Rev.: 0	
bottom		
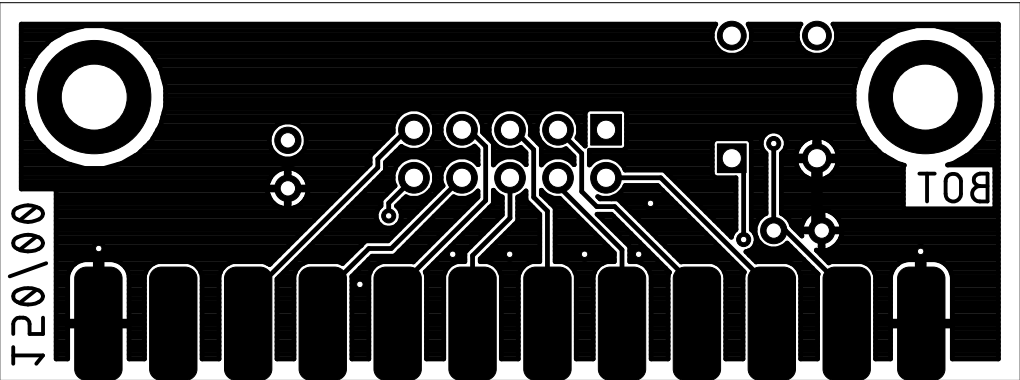
Sven Petersen 2020	Doc.-No.: 150-2-01-00	
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UP-PAR-Adaptor		
06.06.2020 17:43	Rev.: 0	
stopmask component side		
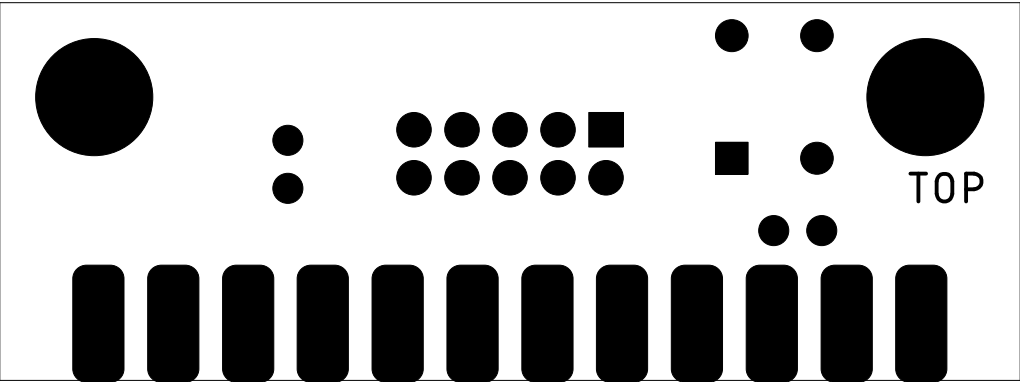
TOP

Sven Petersen 2020	Doc.-No.: 150-2-01-00	
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UP-PAR-Adaptor		
06.06.2020 17:43	Rev.: 0	
stopmask solder side		
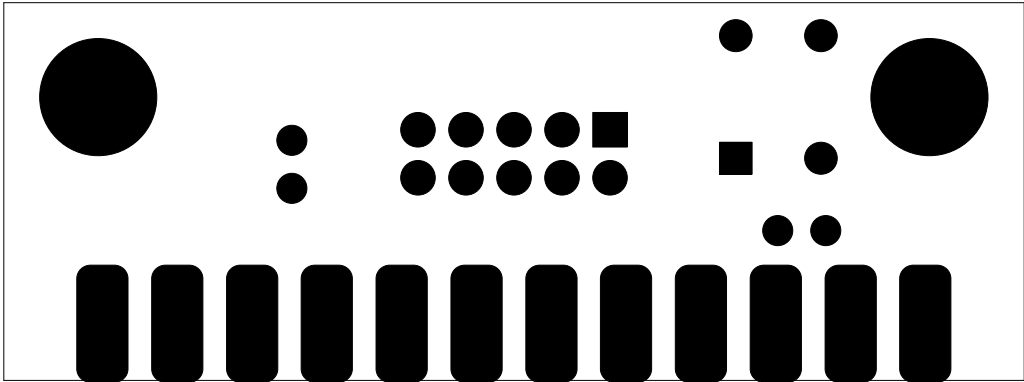
Sven Petersen 2020	Doc.-No.: 150-2-01-00	
	Cu: 35μm	Cu-Layers: 2
UP-PAR-Adaptor		
30.07.2020 21:53	Rev.: 0	
placement component side measures		

54.00

44.00

User Port/Parallel-Adaptor J2

Rev. 0

for

C64/1541

若 し 載 十

C2

330p

J2

SW1

RESET

C1

330p

12

1

J1

15.00

20.00
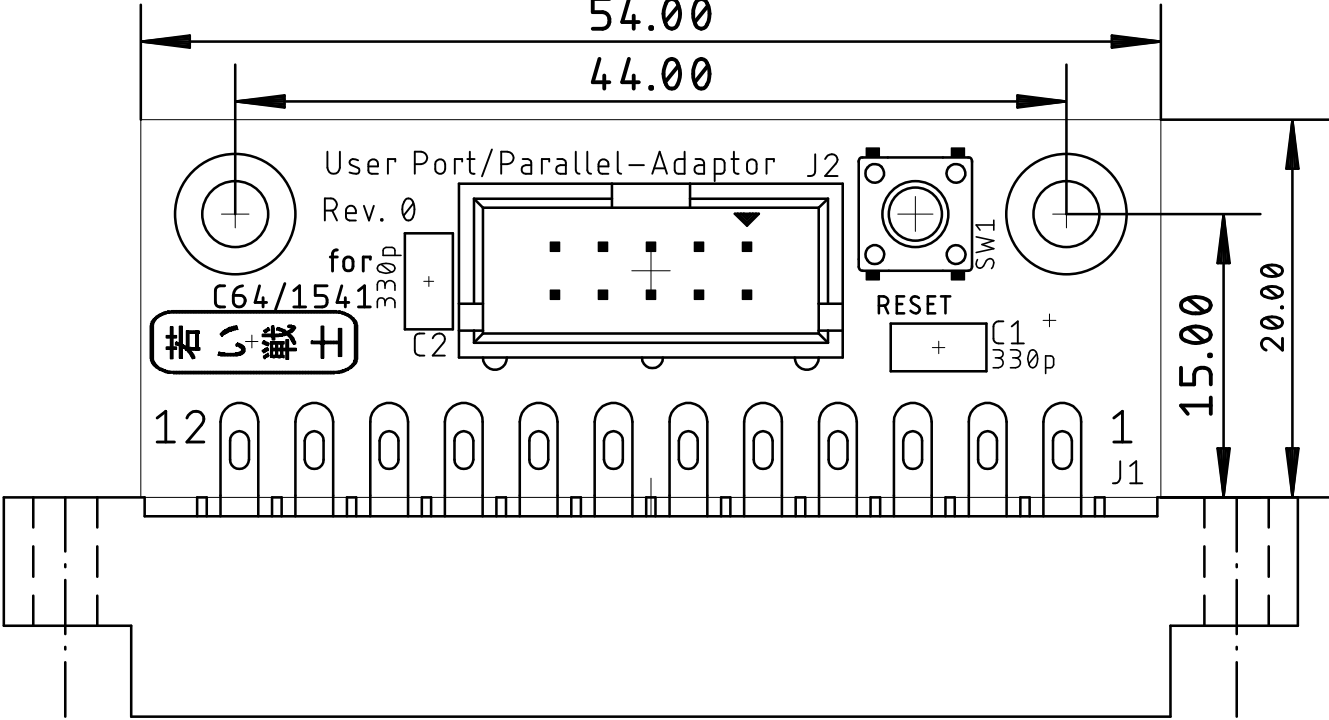
User Port/Parallel Adapter for Commodore 1541/1541-II Rev. 0

Testing

Test Setup

The tests were conducted with both a Commodore 1541 and a 1541-II and a C64 ASSY 250425 with SpeedDOS 2.7+ Kernal (Figure 1). The 1541 had a SpeedDOS 2.7 installed, the 1541-II required an EPROM (27C128) with SpeedDOS 2.7. Later, the tests were also conducted with a C64 ASSY 250469 (short board) with a SpeedDOS 2.7 Kernal and a 1541 that originally did not have the SpeedDOS Kernal. An EPROM with the original Kernal and SpeedDOS 2.7 (for 1541) was installed on the long board Kernal adapter along with the original 1541 Kernal.
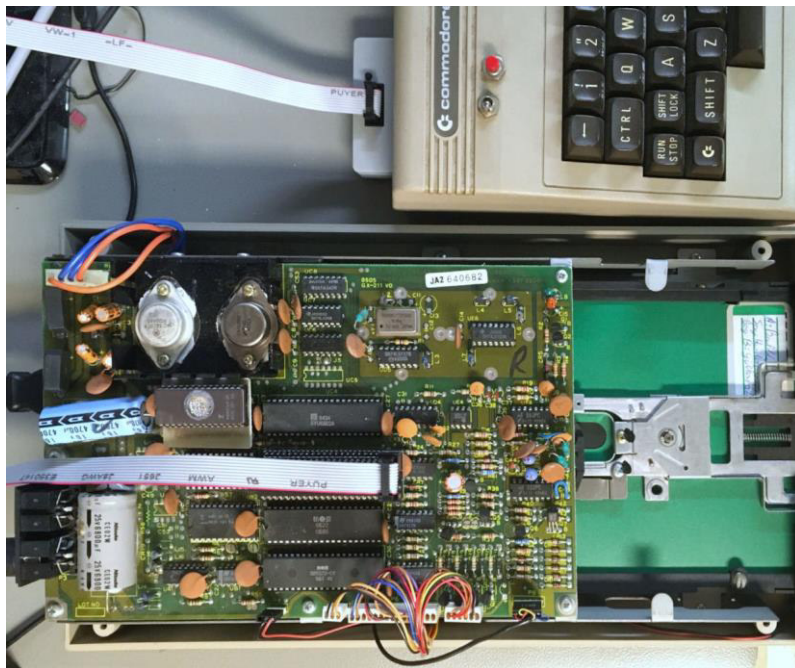

Figure 1: Test Setup

Test Procedures

The drive was connected via the serial cable, the parallel cable remained unconnected. Both, the drive and the C64 were switched on. The drive could be accessed. The status was reported as "73, SPEEDDOS 2.7 1541,00,00". The directory of the disk could be displayed properly and the program "Bubble Bobble" was loading properly in 1minute 54 seconds.

The setup was switched off and the parallel cable was connected to the User Port Parallel Adapter, which was connected to the user port.

After switching on the test setup again, the status was reported correctly, the directory was displayed properly and the program "Bubble Bobble" was loading within about 16.8 seconds.

Clearly, the parallel transmission has **reduced the loading time** of "Bubble Bobble" **to 15%**.

Several programs were loaded successfully with the SpeedDOS parallel setup.

A 2nd 1541 drive was equipped with a SpeedDOS-Kernal and the parallel cable (Figure 2). The drive was connected to an ASSY 250469 short board. The previous tests were conducted successfully with the new setup.
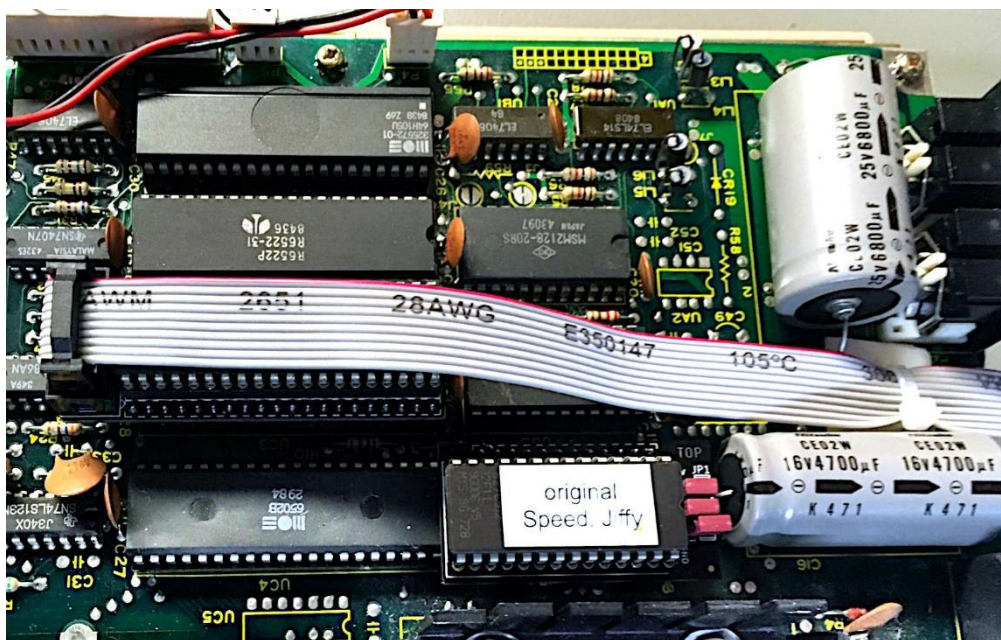

Figure 2: VIA adapter and a SpeedDOS EPROM (on adapter board)

After the low-profile VIA Parallel Adapter was finally working, the tests were conducted with a 1541-II drive (Figure 3) and the ASSY250425 C64.

Figure 3: SpeedDOS Setup in a 1541-II

Conclusion

The User Port Parallel adaptor in conjunction with both VIA Parallel adaptors are **fully functional**.

User Port Parallel Adapter Rev. 0
Bill of Material Rev. 0.0

Pos.	Qty	Value	Footprint	Ref.-No.	Comment
1	1	150-2-01-00	2 Layer	PCB Rev. 0	2 layer, Cu 35μ, HASL, 54.0mm x 20.0mm , 1.6mm FR4
	1	2x5 box connector	2X05WV	J2	e.g. Reichelt WSL 10G
	2	330p	C-2,5	C1, C2	Ceramic Cap, 2.5mm pitch,
	1	2x12, 3.96mm pitch	USERPORT	J1	edge connector, C64 user port
	1	tact switch 6x6mm, h=9.5mm	JTP-1130	SW1	e.G. Reichelt TASTER 3301B