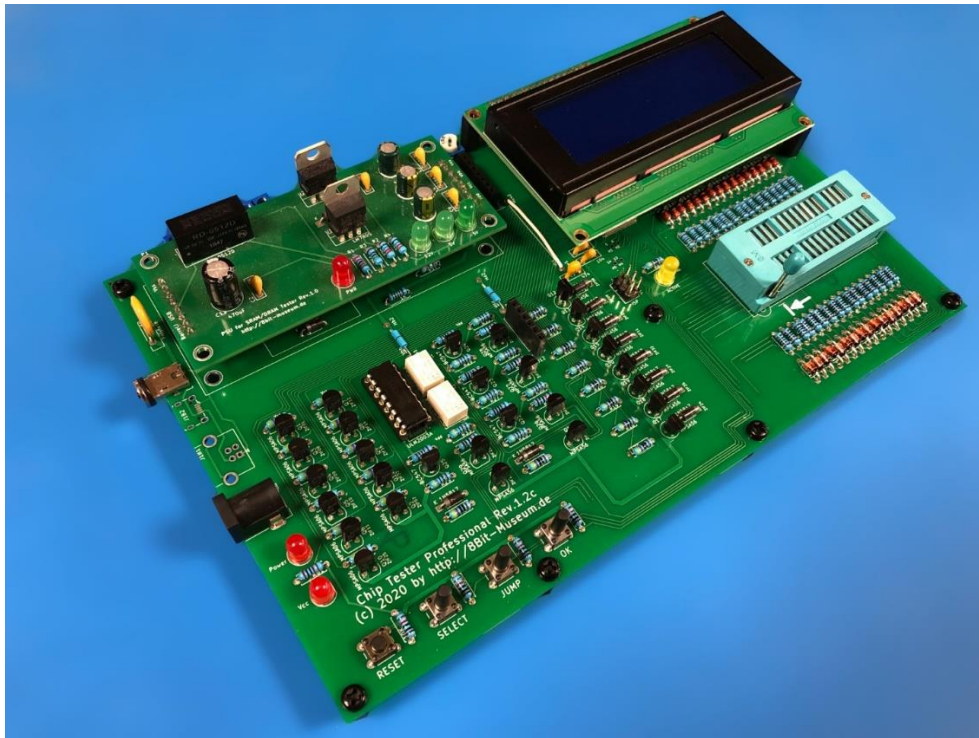


Retro Chip Tester Pro

<http://8bit-museum.de>

Bill of materials (BOM)



Rev.1.2

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1 Required components

1.1 Prepared shopping cart

At the German electronics mail order company Reichelt, shopping baskets can be called up which contain the required materials. Since Reichelt has problems with the shopping carts every now and then, please always check them carefully before ordering:

Tester Mainboard (to rev.1.2i): <https://www.reichelt.de/my/1859729> (41 Positions)

Tester Mainboard (from rev.1.2k): <https://www.reichelt.de/my/1882307> (42 Positions)

DC/DC-Modul (Standard): <https://www.reichelt.de/my/1727275> (13 Positions)

DC/DC-Modul (#2): <https://www.reichelt.de/my/1735406> (20 Positions)

DC/DC-Modul (#3): <https://www.reichelt.de/my/1748570> (12 Positions)

All statements without guarantee!

Deselect the ATmega2560 if the board is pre-equipped with an ATmega2560. If the lists do not show all articles, it is possible that an article is not immediately available.

The 1N5818 is still mentioned on the DC/DC boards. In order to simplify ordering (fewer different components), the 1N5817 is provided in the shopping cart for this purpose.

1.2 Notes on some components

Attention:

Please only use high quality components. Do not use components from dubious shops, because fakes are very difficult to identify later and can lead to unpredictable behavior of the Tester (crashes, errors in program processing, incorrect results). It is enough if one of the nearly 200 components is incorrect or defective to cause problems.

A note on using the Retro Chip Tester as a logic tester:

The Retro Chip Tester was developed with the intention of being able to test as many old memory chips as possible. Over time, there was also the desire to be able to test old bipolar logic chips (Standard TTL 74xx ICs).

In principle, all supported logic ICs can be tested. There are a few components (7490, 7493, 75115 and a few others, without further identification, such as LS, L) that require a higher input current on their inputs (mainly clock or reset signals).

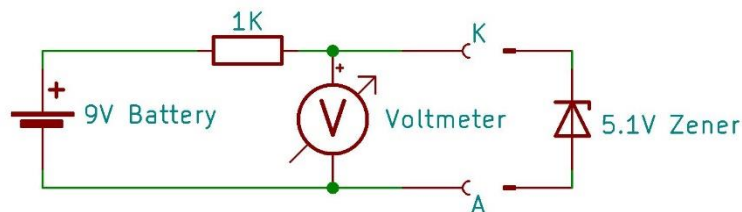
Since many users now also use the RCT as a logic tester, the protective resistances have been changed from 1k Ohms to 470 Ohms from board version 1.2i and the BOM has been adapted accordingly. The only difference between 1.2h and 1.2i is the labeling of these resistors.

1.2.1 5V1 Zener diodes 1N4733A, 1 Watt

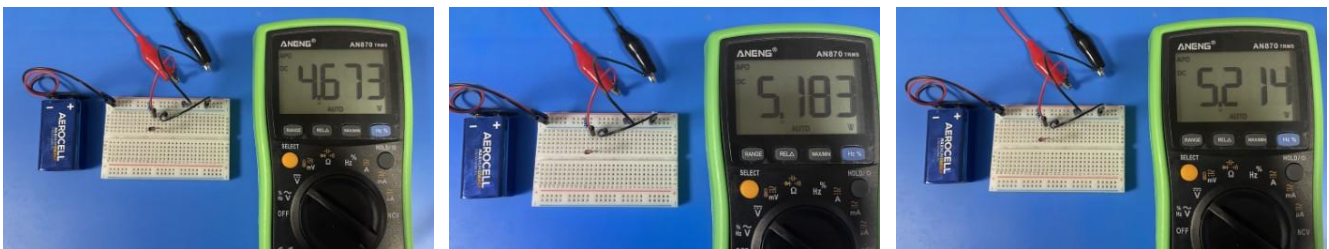
Zener diode selection is critical. Be sure to use high-quality Zener diodes. These diodes protect the ATmega2560 from the 12V supply voltage that some ICs need. The Zener diodes must therefore ensure that no more than 5.3V is applied, but also no less than 4.8V (better more). Unfortunately, Zener diodes have a fairly high tolerance, the 1N4733A has a 5% tolerance.

Alternatives: 1N4733C (2%), 1N4733D (1%), BZX 79C5V1 (5%), BZX 79B5V1 (2%), BZX 55C5V1 (5%), BZX 55B5V1 (2%)

If you use other tolerances, you should definitely test the diodes. Values below 5.0V are not recommended although minor deviations are acceptable. Values over 5.3V are not acceptable. If you want to test the Zener diodes quickly, you can use the following circuit:

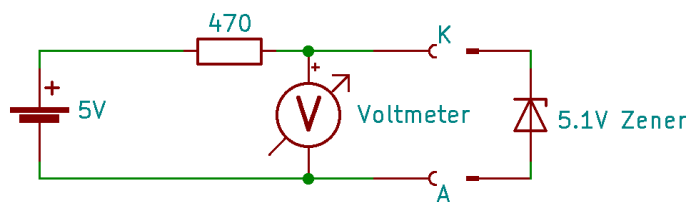


The following three pictures each show a 5V1 Zener diode:



The Zener diode in picture 1 is not suitable. The diodes in picture 2 and 3 are ok.

If you want to select very good Zener diodes, test the Zener diodes with a 5V power supply (use a good, stabilized power supply):



When you measure the Zener diode, a value of 5.0V is very good, a value of at least 4.85V is good, a value of at least 4.7V is just about acceptable. Note: These values are below the values measured with a 9V supply voltage (for example, at 5V voltage the Zener diodes from the pictures above are at 4.25V, 4.95V and 5.0V)

The DO-35 footprint was intentionally used for the Zener diodes so that they are close together. The diodes (usually in the DO-41 housing) fit, but the wires must be bent very close to the housing.

1.2.2 Free-wheeling diodes 1N5818 on the DC/DC boards

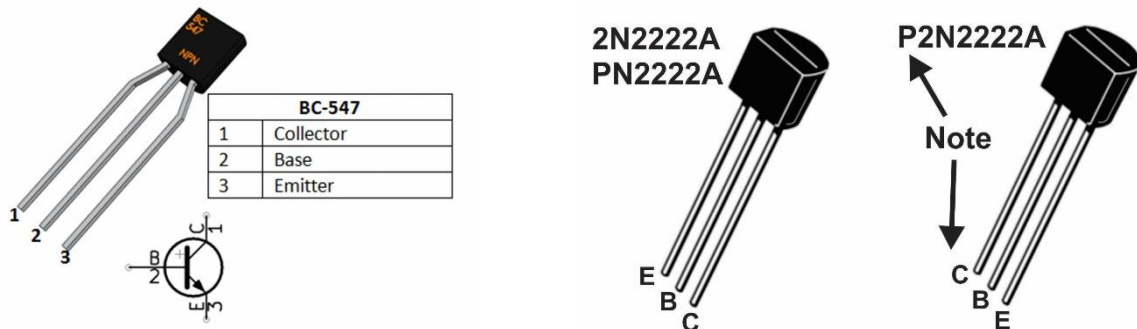
The free-wheeling diodes can be replaced by the 1N5817, for example. However, a 1N400x can also be used.

1.2.3 All resistors

¼ Watt is sufficient for all resistors. Resistors with a higher tolerance can be used.

1.2.4 Transistor BC547

The BC547 is not critical and can be replaced by other types of NPN, e.g. the P2N2222A.



The 2N2222A (without "P") or even the MPSA06 (or SS8050) can also be used. Then the transistor has to be installed rotated by 180 degrees.

1.2.5 MOSFET IRF5305

The MOSFET IRF5305 (Q31) can be replaced by a logic-level MOSFET such as the IRLIB9343 or IRF9Z34N.

From version 1.2h there is another footprint for a MOSFET (Q32) in a SOT-23 housing. If the above-mentioned MOSFETs in the TO220 housing are not available, this can be used instead, e.g. IRLML6401PBF or IRLML6402PBF.

Never assemble Q31 and Q32 at the same time!

1.2.6 Relais G6K-2P 5V

When the relay "G6K-2P 5V" is not available, you can also use the relay "G6K-2P-Y DC5" (from Rev.1.2d+).

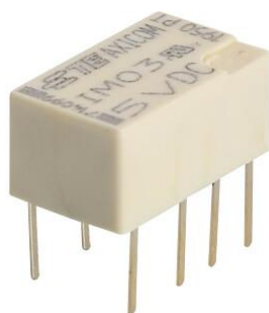


G6K-2P 5V

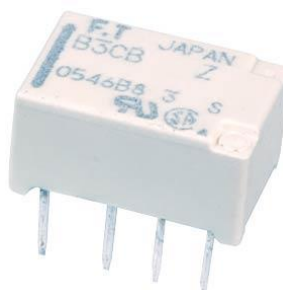


G6K-2P-Y DC5

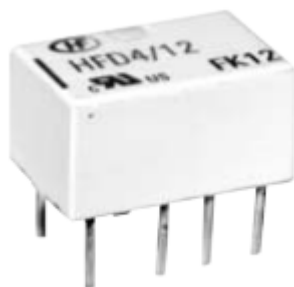
There are other alternatives that I haven't been able to try myself:



AXICOM IM03TS (1-1462037-8)



FTR B3C A4,5Z



HONGFA HFD4/5



TE Connectivity IM03TS (PB1094-ND)

1.2.7 DC/DC-Converter RECOM RD-0512D

The RECOM RD-0512D can be replaced e.g. by the

- TRACO POWER TMH-0512D – (Reichelt TMH 0512D)
- AIMTEC AM2D-0512DZ – (Reichelt SIM2-0512D)
- AIMTEC AM2DS-0512D-NZ (Digikey 2374-AM2DS-0512D-NZ-ND)
- AIMTEC AM3D-0512DZ – (3 Watt, Digikey 2721-AM3D-0512DZ-ND)
- CUI Inc. PDM2-S5-D12-S (Digikey 102-2732-ND)
- HN Power SIM2-0512D-SIL7
- Gapterc 3S7A_0512D1U – (3 Watt, Digikey 3182-3S7A_0512D1U-ND)
- XP Power IH0512S – (2 Watt, Digikey 1470-1442-5-ND)
- XP Power IR0512S – (3 Watt, Digikey 1470-1537-5-ND)

1.2.8 1N5817 (critical component)

The Schottky diodes 1N5817 (D1-D10) on the main board should not be replaced.

1.2.9 ULN2003A

The ULN2003A can be replaced with other drivers such as the ULQ2003A, TBD62003APG or the ULN2001.

You can also replace it with a ULN2803 or ULN2801 which have two pins more. Insert this IC bottom aligned, so pin 1 and pin 18 are not in the socket.

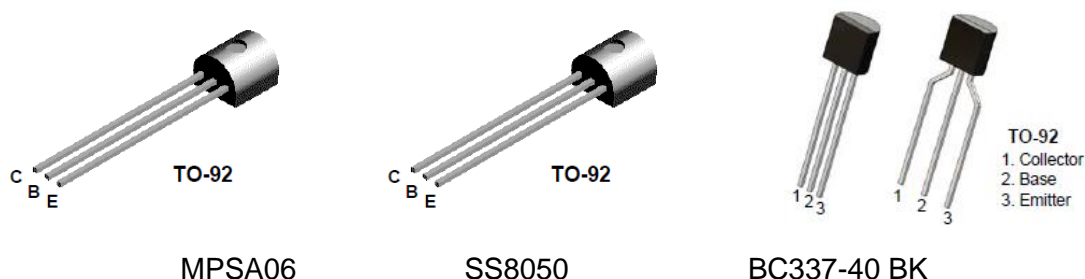
1.2.10 MPSA06 and MPSA56 (critical components)

Alternative Digikey part numbers:

MPSA06	MPSA56
MPSA06-ND	1514-MPSA56PBFREE-ND
2156-MPSA06-OS-ND	2721-MPSA56BK-ND
2721-MPSA06BK-ND	<u>Formed Leads:</u>
2796-MPSA06BK-ND	2721-MPSA56-ND
MPSA06BK	2156-MPSA56-FS-ND
<u>Formed Leads:</u>	
2721-MPSA06-ND	
MPSA06RATR-ND	
MPSA06RACT-ND	
2156-SSV1MPSA06-ND	
MPSA06-APMSCT-ND	
MPSA06RACT-ND	

MPSA06

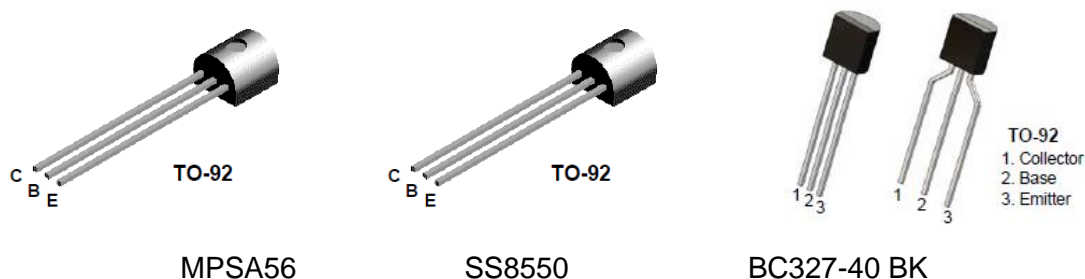
If the MPSA06 is not available, a SS8050 (also known as SC8050, CD8050 or simple 8050) or BC337-40 can be used (8050 is preferred since it is pin-compatible).



Caution: The pin assignment of the BC337-40 is different, i.e. the transistor must be installed rotated 180 degrees.

MPSA56

If the MPSA56 is not available, a SS8550 (also known as SC8550, CD8550 or simple 8550) or BC327-40 can be used (8550 is preferred since it is pin-compatible).



Caution: The pin assignment of the BC327-40 is different, i.e. the transistor must be installed rotated 180 degrees.

Note: The suffix "BK" indicates a pitch of 1.27mm, i.e. the pins do not have to be specially bent. I have not tested the replacement types BC327/337, but they should also work.

1.2.11 Pin Header 2x03 (J11)

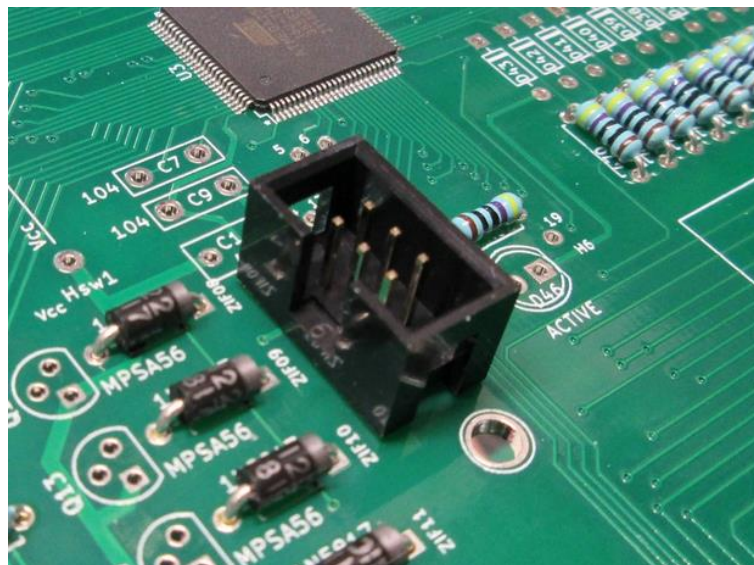
Instead of the pin header (J11, ISP), a shrouded header can also be installed. Personally, I find the pin header more practical.



Pin Header



Shrouded Header

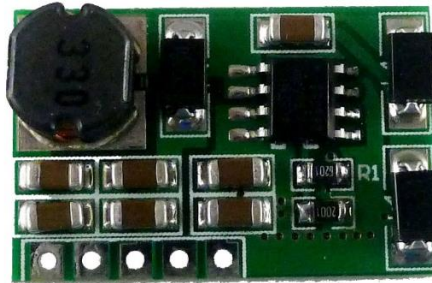


Shrouded Header (orientation)

1.3 Assembling the standard DC/DC module

The standard supplied DC/DC module (see sec. 2.4.1) allows an alternative equipment: Instead of the RECOM RD-0512D, a cheaper DD1718PA with +/-12V can be equipped.

<https://www.aliexpress.com/wholesale?catId=0&SearchText=DD1718PA>



DD1718PA

However, the RECOM module (or a compatible type) is recommended.

1.4 Display (not in the shopping cart)

The display is a normal LCD2004, as used in Arduino projects, e.g.

<https://www.amazon.de/AZDelivery-HD44780-2004-Display-Zeichen/dp/B0822QV8HK/>

The display is addressed in parallel, the often included I2C adapter is not required.



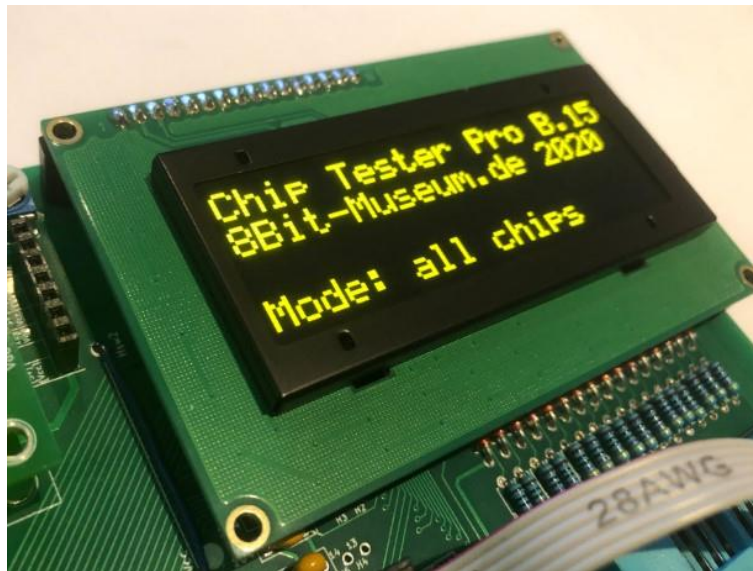
Alternatively, an OLED can also be used. But these are quite expensive and difficult to find.

https://www.aliexpress.com/wholesale?catId=0&initiative_id=SB_20201117074906&SearchText=20x4+oled

<https://cpc.farnell.com/winstar/weh002004alpp5n00000/oled-display-module-20x4-yellow/dp/SC15041>

<https://www.reichelt.de/display-oled-4x20-98x60mm-gelb-ea-w204-xlg-p113324.html>

<https://www.digikey.de/en/products/detail/newhaven-display-intl/NHD-0420DZW-AB5/4073854>



Attention: Not all OLEDs are compatible and run without problems! Possible errors are described in the manual ("Troubleshooting").

Known compatible OLEDs:

- LEC2041-... 56, Laurel Electronics Co. Ltd.

Limited compatibility OLEDs (see manual, section "Troubleshooting", for a fix; as of firmware v.20b4, these should also work without a hardware fix):

- EH002004A Rev.C from 2014(!), Winstar
- NHD-0420DZW-AG5, Newhaven (seems to be a Winstar clone or vice versa)

Incompatible OLEDs and LCDs:

- None known yet

1.5 Socket for Tester (not in the shopping cart)

The ZIF socket can be obtained cheaply from e.g. Pollin:

<https://www.pollin.de/p/nullkraft-socket-32-polig-400136>

With this ZIF socket, the openings are quite deep, so that you must ensure that the chip lies flat after insertion. No recommendation can be given for this.

The cheap China sockets are often more suitable in this regard.

https://www.aliexpress.com/wholesale?catId=0&initiative_id=SB_20200929101928&SearchText=zif+32+socket

If you order from Digikey or Mouser, you can use the very good quality socket from Aries Electronics:

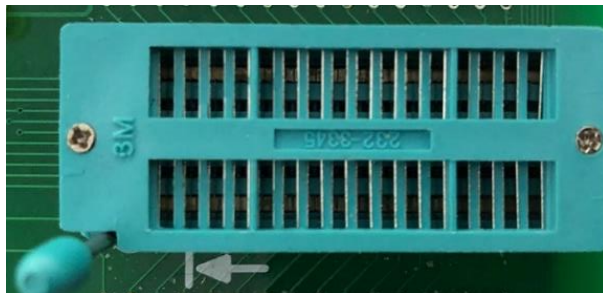
<https://www.mouser.de/ProductDetail/Aries-Electronics/32-6554-10?qs=NcOKNhEP%252BDYiQjaKSMDuQ==> (Zinn)

<https://www.mouser.de/ProductDetail/Aries-Electronics/32-6554-11/?qs=%2Fha2pyFaduhQiu85%2Frq%252BmYE8430pH4AKqu1rZf%252B5j2w%3D> (Gold)

<https://www.digikey.de/product-detail/de/aries-electronics/32-6554-10/A304-ND/27596> (Zinn)

<https://www.digikey.de/product-detail/de/aries-electronics/32-6554-11/A305-ND/27598> (Gold)

If you prefer to have the handle on the right side of the board, change "6554" to "6553" and solder the socket rotated 180 degrees.



Important: Pay attention to the wide slots respectively the narrow bar!

The official 3M TEXT TOOL designation for this socket is: **232-1287-00-0602J** (Mouser: 517-232-1287-00, Digikey: 3M5005-ND).

The socket also uses the names 232-3345 or 232-6182 (caution: when buying "china goods" these designations are also used for sockets with the wide bar).

If the socket is plugged onto the circuit board, you should carefully pull the pins (from the back) with pliers so that the closer does not get stuck on the grid on the top.

For the socket, make sure that the row to row spacing is 15.24mm (there are also sockets with 7.62mm row to row spacing, but this is rare with 32pin).

If necessary, you can use a ZIF40 socket but you have to cut or unmount the lower or upper four rows (not recommended because of optical reasons).

1.6 Spacer sleeves (not in the shopping cart)

Spacer sleeves (hexagon, M3) for attaching the display and for a good level of board should be used. You will need:

- 9x spacers, hexagon, M3, 11mm (internal thread on both sides) for the feet
- 3x spacers, hexagon, M3, 11mm¹ (internal thread on one side) for the display
- 1x spacers, hexagon, M3, 11mm (internal thread on both sides) for the display (only one side will be fixed to the display)
- 6x screws, M3 (to mount the feet) and if necessary, additionally 4x screws (to mound the display)

The hex spacers should be made of plastic so no scratches on the table arise, in addition, the plastic spacers are much cheaper.

https://www.aliexpress.com/wholesale?catId=0&initiative_id=SB_20200929102359&SearchText=nylon+hex+spacer

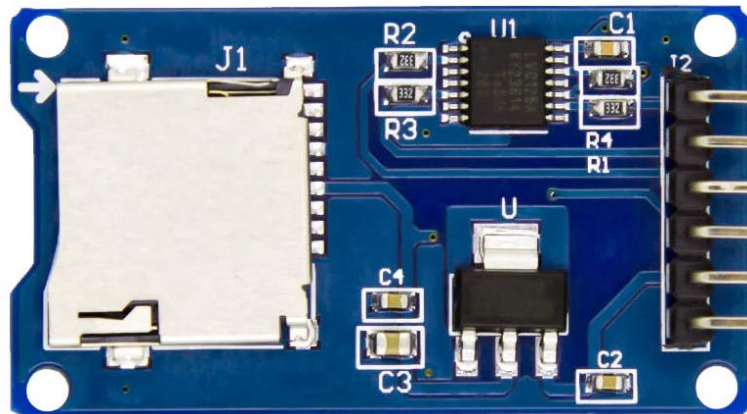
https://www.aliexpress.com/wholesale?catId=0&initiative_id=SB_20201129033921&SearchText=M3+White+Black+Spacing+Screw+Plastic+Nylon+Spacer

https://www.ebay.de/sch/i.html?_nkw=m3+abstandshalter

¹ 11mm spacers are a little harder to find, but they are available. If necessary, a 12mm spacer can be shortened.

1.7 Optional: SD card adapter (not in the shopping cart)

The chip tester can save the contents of chips on an SD memory card. The adapter used for this is also used in Arduino projects.



e.g.

<https://www.amazon.de/AZDelivery-Reader-Speicher-Memory-Arduino/dp/B06X1DX5WS/>

https://www.aliexpress.com/wholesale?catId=0&initiative_id=SB_20200929104957&SearchText=sd+card+spi+adapter

<https://www.reichelt.de/entwicklerboards-breakout-board-fuer-microsd-karten-debo-microsd-2-p266045.html>

1.8 Optional: Power supply unit (not in the shopping cart)

A power supply unit is not absolutely necessary as the power supply can be done via USB. If you prefer the barrel connector, you should choose a power supply with 7.5V to 9V DC voltage with at least 1A. The barrel connector has positive polarity.



An on/off switch could also be useful. Usually, the primary side should always be switched, but the following cable has proven to be useful as an alternative:



Obtainable through various online retailers, e.g.

https://www.ebay.de/sch/i.html?_nkw=male+to+female+switch

<https://www.aliexpress.com/wholesale?SearchText=Inline+304+DC+Switch+On+Off+with+Female+Male+Power>

These cables are also available for the micro USB connection.

1.9 ISP Programmer for the ATmega2560

As a programmer, I recommend the following:

<https://www.diamex.de/dxshop/USB-ISP-Programmer-fuer-AVR-STM32-LPC-Cortex-Prog-S2>

It does not require a driver under Windows 10 and is addressed as "STK500".

The manual contains a list of other compatible programmers. The widespread USBASP is not recommended because some use firmware with a 128kB bug and so cannot program the ATmega2560 (more on this in the manual, section "Well-established programmers").

2 Bill of materials

2.1 List of all versions

Version	Description
1.0	Experiment board with different solutions
1.1	Prototype, limited functionality
1.2	First fully executable hardware version, Vcc for ZIF12/26 and Vss for ZIF25 added, further optimizations 1.2a – labeling corrected 1.2b – Vcc on ZIF01 changed, some components tightened 1.2c – additionally header for a SD card adapter 1.2d – Omron G6K 2P and G6K 2P-Y footprint combined 1.2e – C1 moved a few mm to the right 1.2f – Loudspeaker, contrast regulator and barrel connector labeled, holes for micro SD card adapter 1.2g – TO-92 distance of the pads increased by 0.2mm, drill holes for display corrected by 0.5mm 1.2h – added a SOT-23 footprint for an alternative p-MOSFET 1.2i – Labelling of protective resistors changed to 470 Ohm (was 1k Ohm) 1.2j – (skipped) 1.2k – additional push button added, jumpers for decoupling on board

2.2 Bill of materials - Chip Tester (Rev.1.2i)

Nr	Referenz	Value	Footprint	Qty
1	C4	100uF	CP Radial D7.5mm P2.50mm	1
2	C5, C6	22 / 22pF	C Disc D3.8mm W2.6mm P2.50mm	2
3	C3, C7, C8, C9	104 / 100nF [C3, 2]	C Disc D7.5mm W2.5mm P5.00mm	4
4	C1	474 / 470nF	C Disc D7.5mm W2.5mm P5.00mm	1
5	C2	224 / 220nF [C2, 2]	C Disc D7.5mm W2.5mm P5.00mm	1
6	R22, R23, R24, R25, R54, R58, R81	1K	R Axial DIN0207 L6.3mm D2.5mm P7.62mm Horizontal	7
7	R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12, R13, R14, R15, R16, R17, R18, R19, R20, R21, R38, R39, R40, R41, R42, R43, R44, R45, R46, R47, R48, R49, R50, R51, R52, R53, R59, R60, R61, R62, R63, R64, R65, R66, R67, R68, R69, R70, R71, R72, R73, R74, R82	470	R Axial DIN0207 L6.3mm D2.5mm P7.62mm Horizontal	54
8	R26, R27, R28, R29, R30, R31, R32, R33, R55	4K7	R Axial DIN0207 L6.3mm D2.5mm P7.62mm Horizontal	9
9	R34, R35, R36, R37, R56, R77, R78, R79, R80	10K	R Axial DIN0207 L6.3mm D2.5mm P7.62mm Horizontal	9
10	R57	4.7	R Axial DIN0207 L6.3mm D2.5mm P7.62mm Horizontal	1
11	R75	220 [5]	R Axial DIN0207 L6.3mm D2.5mm P7.62mm Horizontal	1
12	R76	1M	R Axial DIN0207 L6.3mm D2.5mm P7.62mm Horizontal	1
13	D11, D12, D13, D14, D15, D16, D17, D18, D19, D20, D21, D22, D23, D24, D26, D27, D28, D29, D30, D31, D32, D33, D34, D35, D36, D37, D38, D39, D40, D41, D42, D43	5V1 1W 1N4733	D DO-35 SOD27 P7.62mm Horizontal	32
14	D1, D2, D3, D4, D5, D6, D7, D8, D9, D10, D44	1N5817 [D44, 2]	D DO-35 SOD27 P7.62mm Horizontal	11
15	D25	Vcc	LED D5.0mm	1
16	D45	Power	LED D5.0mm	1

Nr	Referenz	Value	Footprint	Qty
17	D46	ACTIVE	LED D5.0mm	1
18	U1	ULN2003A	DIP-16 W7.62mm	1
19	U2	L7805, 1A [U2, 2]	TO-220-3 Horizontal TabDown	1
20	U3	ATmega2560-16AU	TQFP-100 14.0x14.0x0.5P	1
21	Y1	16MHz	Crystal HC49-U Vertical low height	1
22	F1	Polyfuse	1100mA Polyfuse [1]	1
23	SW1	RESET	SW PUSH 6mm	1
24	SW2	SELECT	SW PUSH 6mm	1
25	SW3	JUMP	SW PUSH 6mm	1
26	SW4	OK	SW PUSH 6mm	1
27	BZ1	Buzzer (passive)	Buzzer 12x9.5RM6,5-7.6	1
28	JP1, JP4	Barrel Jack	PinHeader 1x02 P2.54mm Vertical	2
29	JP2	USB	PinHeader 1x02 P2.54mm Vertical	1
30	JP3	GND	PinHeader 1x02 P2.54mm Vertical	1
31	RV1	10K	Potentiometer RM-065 Vertical	1
32	RV2	1K	Potentiometer RM-065 Vertical	1
33	K1, K2	G6K-2P 5V	Relay DPDT Omron G6K-2P	2
34	Q31	IRF5305P	TO-220-3 Horizontal TabDown	1
35	Q12, Q13, Q14, Q15, Q16, Q17, Q18, Q19, Q20, Q21, Q26, Q27, Q28, Q29	MPSA56	TO-92L	14
36	Q1, Q2, Q3, Q4, Q5, Q6, Q7, Q8, Q9, Q10, Q11	MPSA06	TO-92L	11
37	Q22, Q23, Q24, Q25, Q30	BC547C	TO-92L	5
38	J3	Barrel Jack	BarrelJack Wuerth 6941xx301002	1
39	J1	ZIF32	DIP Socket-32 W11.9 W12.7 W15.24 W17.78 W18.5 3M 232- 1287-00-0602J	1
40	J11	ISP	PinHeader 2x03 P2.54mm Vertical	1
41	J4	PwrCon	PinSocket 1x07 P2.54mm Vertical	1
42	J5	PowerIn	PinSocket 1x08 P2.54mm Vertical	1
43	J6	PowerOut	PinSocket 1x08 P2.54mm Vertical	1
44	J10	Display	PinSocket 1x16 P2.54mm Vertical	1

Nr	Referenz	Value	Footprint	Qty
45	J12	SD Card	PinSocket 1x06 P2.54mm Vertical	1
46	J7	Vbb [4]	TerminalBlock bornier-2 P5.08mm	1
47	J8	Vcc [4]	TerminalBlock bornier-2 P5.08mm	1
48	J9	Vdd [4]	TerminalBlock bornier-2 P5.08mm	1
49	J1B1	USB B [3]	USB B OST USB-B1HSxx Horizontal	1
50	J2	USB B Micro [3]	USB Micro-B 2pol	1
51	J1B2	USB B Micro [3]	USB Micro-B Wuerth 629105150521	1
52	JP1, JP2, JP3, JP4	Jumper [JP1/2, 2]	Jumper 2.54mm	4
53	Q32	---	nicht bestücken / Alternative für Q31	0

For the socket a wide 32-pin ZIF socket is used. The wide socket must have wide slots to test even "small" chips.

There are several options for the power supply, so you can save a few components (see manual and note [2]).

[1] see manual

[2] **Optional:** If the barrel connector is used for the power supply and no DC / DC converter is used.

[3] USB ports: Can be equipped according to availability: USB B or Micro-USB (2x)

[4] **Optional:** Only required if -5V and 12V should be injected from an external power supply.

[5] Can usually omitted (solder a bridge). The 220 ohms are necessary if the display module has no series resistor installed.

2.3 Bill of materials - Chip Tester (Rev.1.2k) – Additional components

These components are required for Rev.1.2k in addition to Rev.1.2i:

Nr	Referenz	Value	Footprint	Qty
1	R83	10K	R Axial DIN0207 L6.3mm D2.5mm P7.62mm Horizontal	1
2	SW5	FUNC	SW PUSH 6mm	1
3	JP5, JP7		PinHeader 1x02 P2.54mm Vertical	2
4	JP6		PinHeader 1x03 P2.54mm Vertical	1
5		Jumper	Jumper 2.54mm	1
6	C10	104 / 100nF	C Disc D7.5mm W2.5mm P5.00mm	1

2.4 Bill of materials - DC/DC module

Detailed explanations of the individual modules can be found in the manual.

2.4.1 Option #1 (using RD-0512D) - **Standard**



assembled with DD1718PA

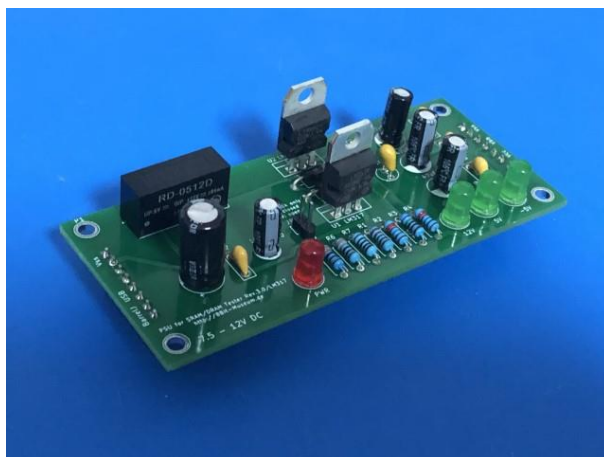


assembled with RECOM RD-0512D

Due to the better stability, it is recommended to assemble the RECOM RD-0512D. If this is not available, a DD1718PA can be used.

Qty	Reference(s)	Value
1	C1	470uF (min. 25V)
5	C2, C4, C5, C7, C9	104
3	C3, C6, C8	47uF (min. 25V)
1	D1	1N5818 or 1N5817 or 1N400x (flyback diode)
1	D2	LED 5.0mm red
3	D3, D4, D5	LED 5.0mm green
2	J1, J2	PinHeader_1x08_P2.54mm
1	R1	1K
2	R2, R4	220
1	R3	750
1	U1	7805, min. 1A
1	U2	7905, min. 0.5A
1	PS1 or PS2	RECOM RD-0512D or DD1718PA

2.4.2 Option #2 (with RD-0512D and LM317)



New version with **two Jumper**:

Qty	Reference(s)	Value
1	C1	470uF / 25V
1	C3	1uF / 25V
3	C6, C8, C11	47uF / 25V
5	C2, C4, C5, C7, C9	100 nF
1	C10	10uF / 25V
2	D1, D6	1N5818 or 1N5817 or 1N400x (flyback diode)
1	D2	LED 5mm, red
3	D3, D4, D5	LED 5mm, green
2	J1, J2	PinHeader_1x08_P2.54mm
1	JP1	Jumper, 2,54mm
1	JP2	Jumper, 2,54mm
1	PS1	RECOM RD-0512D
1	R1	1K
1	R3	750
2	R2, R4	220
1	R5	3K3
1	R6	6K8
1	R7	330
1	R8	100
1	U1	LM317
1	U2	LM7905

2.4.3 Option #3 (with RD-0512D and RS-0505S)



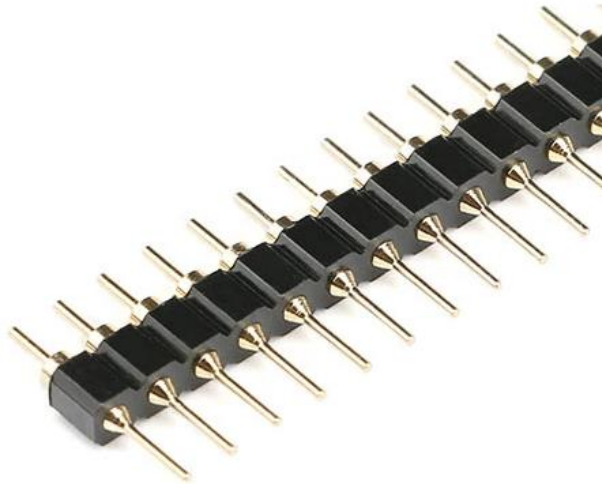
Qty	Reference(s)	Value
1	C1	10uF / 25V
3	C3, C6, C8	47uF / 25V
5	C2, C4, C5, C7, C9	100 nF
3	D1, D2, D3	LED 5mm, green
1	D4	LED 5mm, red
1	J1, J2	PinHeader_1x08_P2.54mm
1	PS1	RECOM RS-0505S or RSE-0505S
1	PS2	RECOM RD-0512D
1	R2	750
2	R1, R3	220
1	R4	1K
1	U1	LM7905

2.5 Bill of materials - Adapters

Detailed explanations of the individual adapters can be found in the manual.

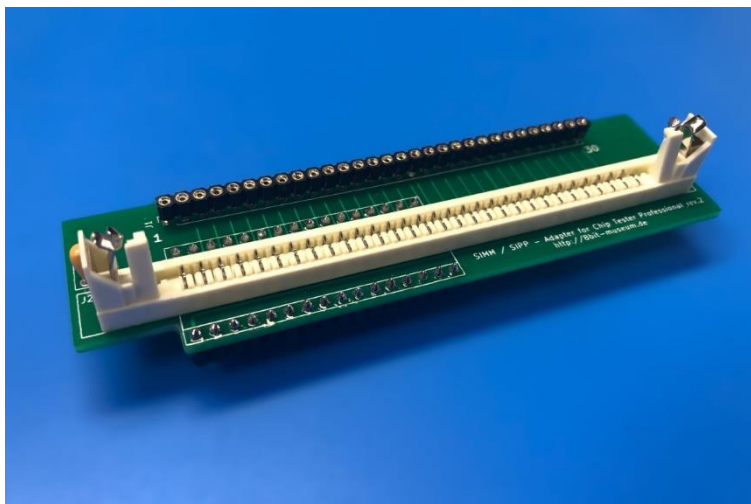
Tip:

As "pin header" the "round" version should be used. The pins are thinner and put less stress on the ZIF socket (see image).



Pin Header (round)

2.5.1 SIMM/SIPP Adapter (20 pins)



SIMM / SIPP Adapter (Rev.2)



SIMM Connector

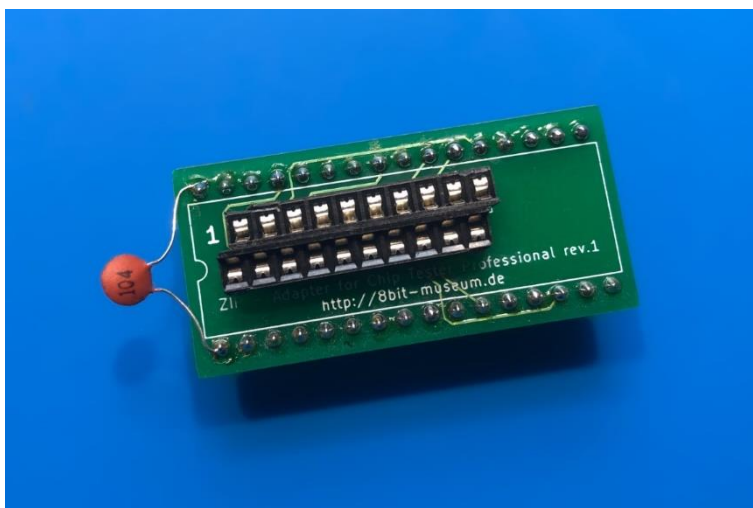
Qty	Reference(s)	Value
1	J1	Pin Socket 1x30
1	J2	SIMM Socket 30 pins (see picture)
2	J3	Pin Header 1x16 (round)

<https://www.peconnectors.com/sockets-pga-cpu-and-memory/hws5040/>

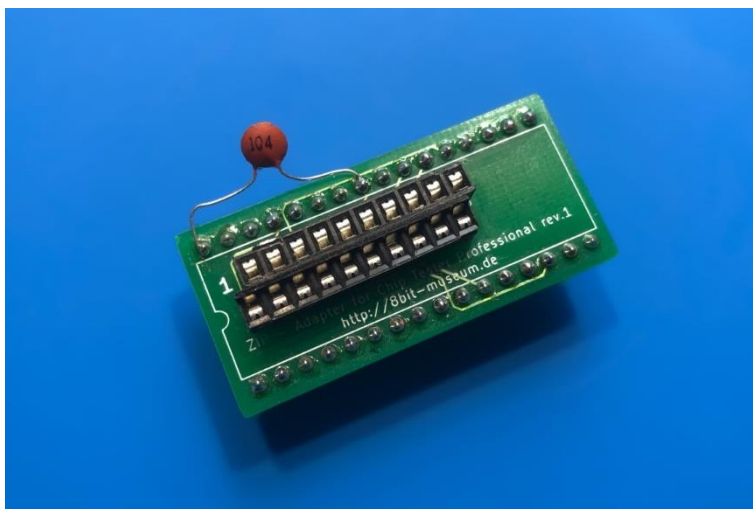
2.5.2 ZIP20 Adapter (20 pins)



ZIP adapter (Rev.2) for 256k x 4, 1024k x 4 and 64k x 4, 1024k x 1



ZIP adapter (Rev.1) for 256k x 4 and 1024k x 4 (capacitor between ZIF01/ZIF32)



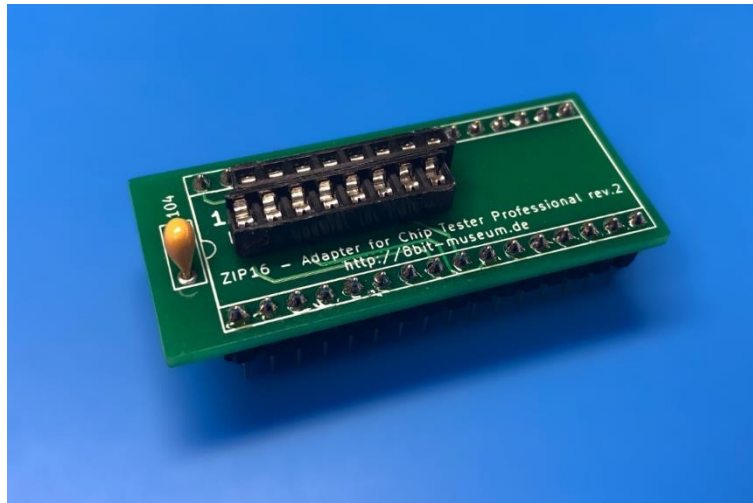
ZIP adapter (Rev.1) for 64k x 4 and 1024k x 1 (capacitor between ZIF25/ZIF32)

Qty	Reference(s)	Value
2	J1, J2	Pin Socket 1x10
2	U1	Pin Header 1x16 (round)
1	C1	100nF

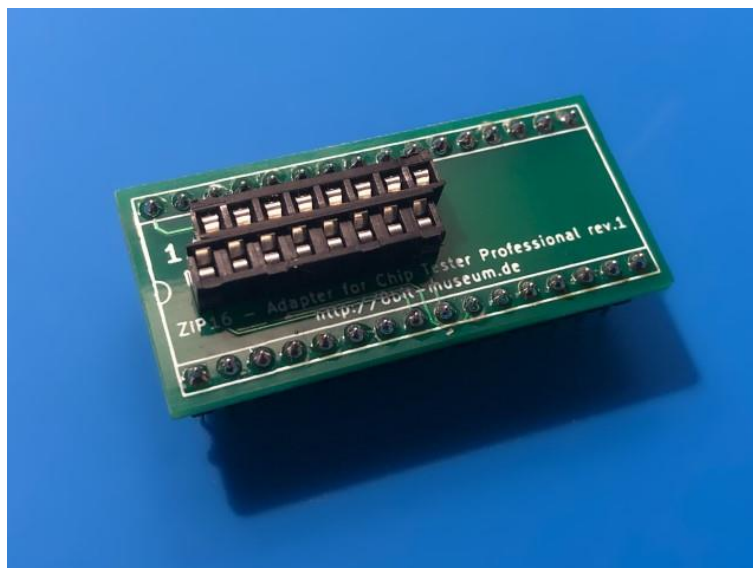
For the socket with spring contacts, divide a normal 20-pins IC socket lengthways and solder the halves.

The capacitor is used for stability. A ZIP memory can usually be tested without the decoupling capacitor. However, a few ICs cause problems due to a high inrush current (an error occurs right at the beginning of the test at address "0"). A capacitor should be attached here - as shown above: either between ZIF01 and ZIF32 or ZIF25 and ZIF32.

2.5.3 ZIP16 Adapter (16 pins)



ZIP adapter (Rev.2)



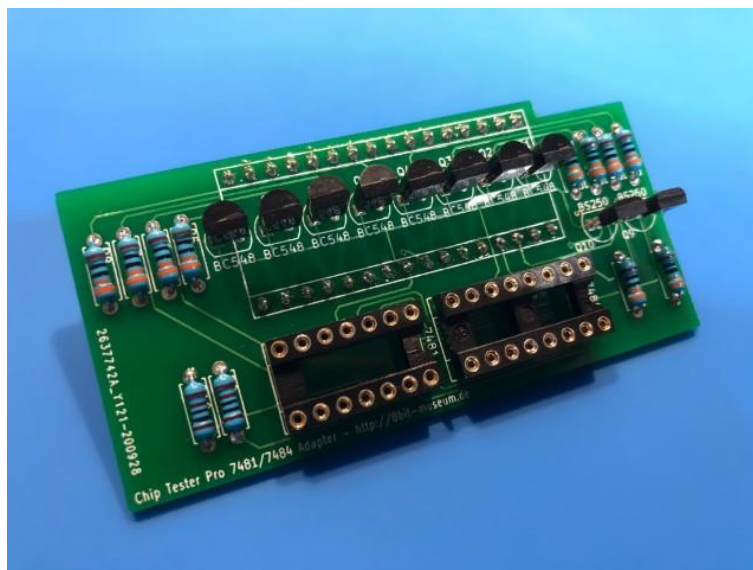
ZIP adapter (Rev.1)

Qty	Reference(s)	Value
2	J1, J2	Pin Socket 1x08
2	U1	Pin Header 1x16 (round)
1	C1	100nF

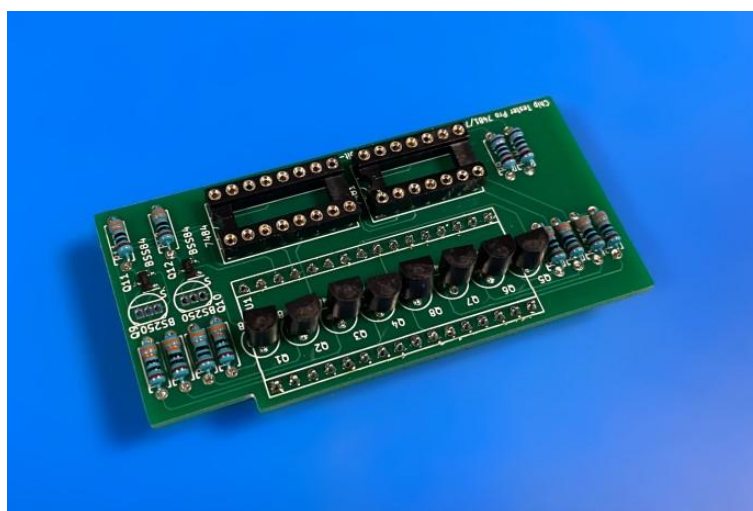
For the socket with spring contacts, divide a normal 16-pins IC socket lengthways and solder the halves.

The capacitor is used for stability. A ZIP memory can usually be tested without the decoupling capacitor. However, a few ICs cause problems due to a high inrush current (an error occurs right at the beginning of the test at address "0"). A capacitor should be attached here - as shown above between ZIF01 and ZIF32 (see picture ZIP20).

2.5.4 7481/7484 Adapter (14 and 16 pins)



Rev.2



Rev.3 with SMD replacements

Qty	Reference(s)	Value
8	Q1 – Q8	BC548 (NPN)
2	Q9, Q10	BS250 (p-MOSFET)
10	R1 – R8, R11, R12	330
2	R9, R10	1K
2	U1	Pin Header 1x16 (round)
1	U2	DIP Socket 14
1	U3	DIP Socket 16

Instead of Q9/Q10, Q11/Q12 can be assembled with an SMT p-MOSFET (e.g. BS250, BSS84).

2.5.5 1702A / 1602A Adapter



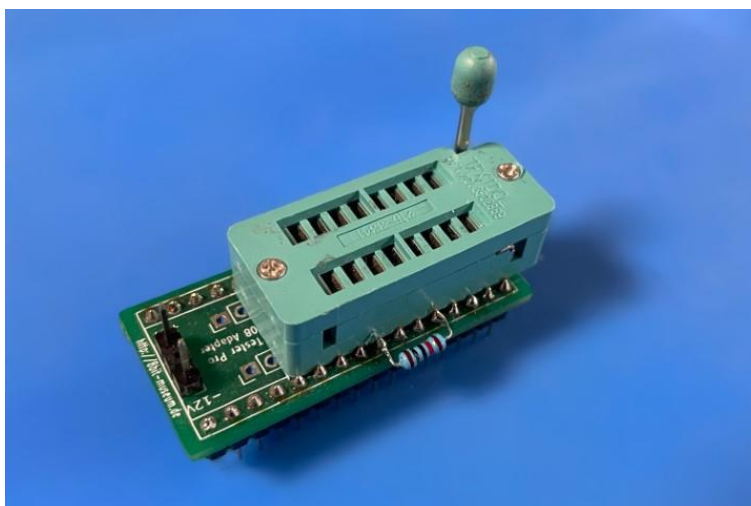
Qty	Reference(s)	Value
2	U1	Pin Header 1x16 (round)
1	U2	DIP Socket 24
1	U3	LM7909
1	C1	104
2	J1, J2	Pin Header 1x1

2.5.6 MK4006/MK4008 Adapter



Qty	Reference(s)	Value
2	U1	Pin Header 1x16 (round)
1	U2	DIP Socket 16
2	J1, J2	Pin Header 1x1
1	R1	10K

An additional 10k Ohm resistor must be soldered on the right(!) side between the 5th pin and 8th pin (counting from the top, see picture).

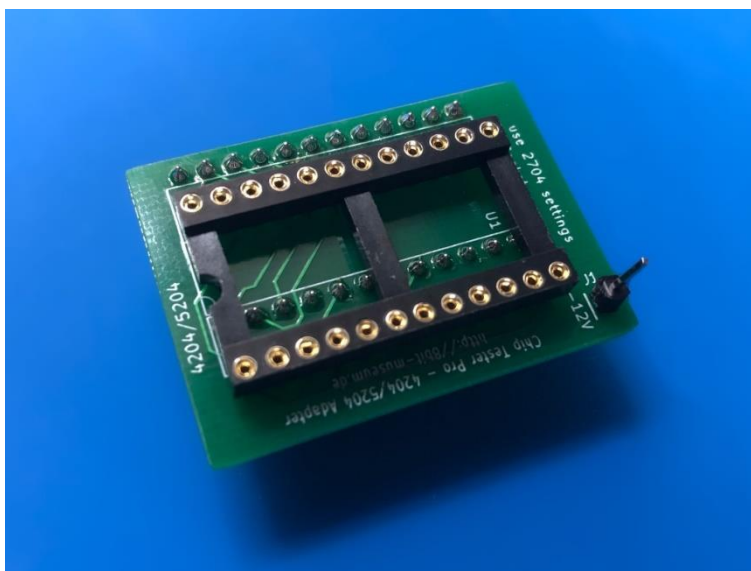


2.5.7 2513 Adapter (+5V/-5V/-12V version)



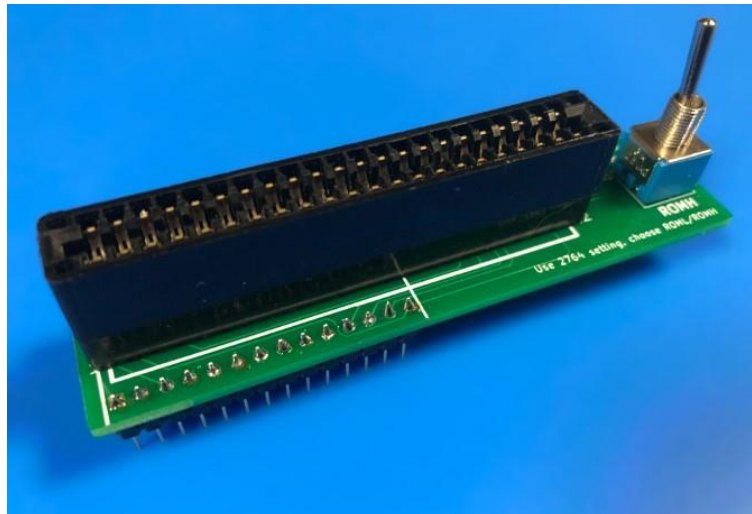
Qty	Reference(s)	Value
2	U1	Pin Header 1x12(round)
1	U2	DIP Socket 24
1	J1	Pin Header 1x1
3	R1, R2, R3	470

2.5.8 MM4204 and MM5204 Adapter

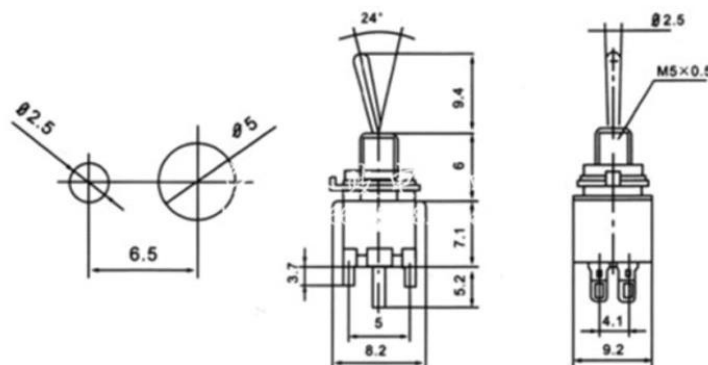


Qty	Reference(s)	Value
2	U1	Pin Header 1x12 (round)
1	U2	DIP Socket 24
1	J1	Pin Header 1x1

2.5.9 Commodore C64 Cartridge Adapter



Qty	Reference(s)	Value
2	U1	Pin Header 1x16 (round)
1	U2	Edge Card Connector 2x22
1	SW1	DPDT Mini Toggle Switch SMTS-202 or 2x 1x3 Pin Header



Instead of the “DPDT Mini Toggle Switch”, two “1x03 pin headers” can also be used. In this case two jumpers at the top (ROMH) or two jumpers at the bottom (ROML) must be set depending on the ROM choice.

For the Edge Card Connector, e.g.

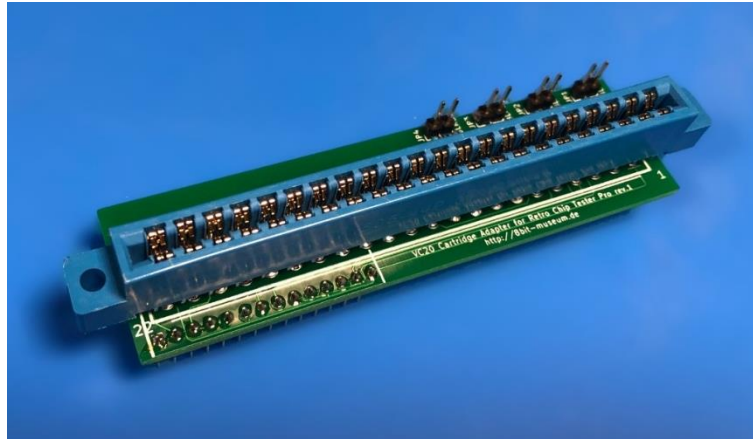
<https://www.aliexpress.com/item/4000490392119.html>

For the switch e.g. (without guarantee, as no data sheet is available):

<https://www.reichelt.de/kippschalter-3a-125vac-2x-ein-ein-ms-245-p13148.html>

<https://www.aliexpress.com/item/32961778090.html>

2.5.10 Commodore VC20 Cartridge Adapter



Qty	Reference(s)	Value
2	U1	Pin Header 1x14 (round)
1	U2	Edge Card Connector 2x22
4	R1, R2, R3, R4	10K
4	JP1, JP2, JP3, JP4	Pin Header 1x02 pin
1		Jumper

For the Edge Card Connector, e.g.

<https://www.aliexpress.com/item/32822330990.html>

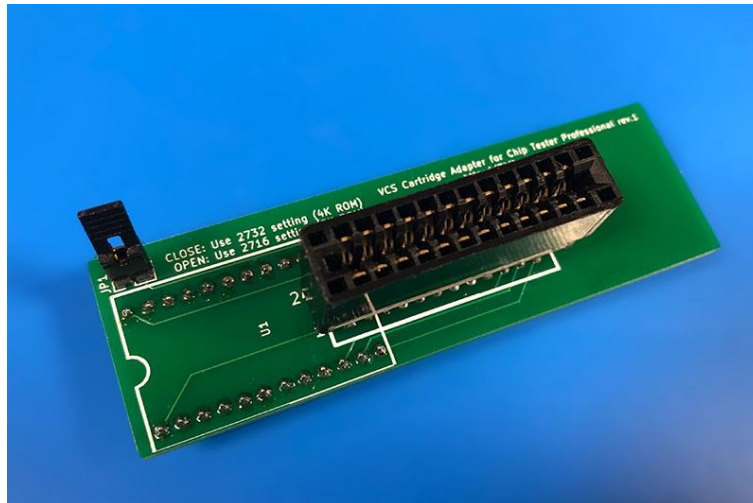
<https://www.digikey.de/product-detail/de/sullins-connector-solutions/EBM22DRTH/S3352-ND/927304>

<https://www.digikey.de/product-detail/de/sullins-connector-solutions/EBM22DRXH/S3353-ND/927305>

<https://www.digikey.de/product-detail/de/edac-inc/305-044-520-202/EDC305442-ND/107517>

<https://www.digikey.de/product-detail/de/te-connectivity-amp-connectors/7-530689-6/7-530689-6-ND/2258921>

2.5.11 Atari VCS Cartridge Adapter



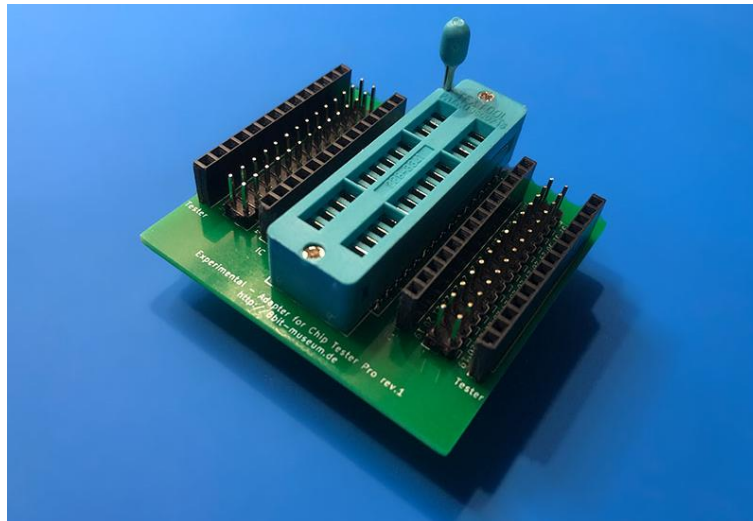
Qty	Reference(s)	Value
2	U1	Pin Header 1x16 (round)
1	U2	Edge Card Connector 2x12
1	JP1	Pin Header 1x02 pin
1		Jumper

For the Edge Card Connector, e.g.

<https://www.aliexpress.com/item/4000490392119.html>

The connection pins of the circuit board connector should be as long as possible. The linked connector may only be soldered “just about” so that the connection protrudes far enough to securely connect a cartridge.

2.5.12 Experimental/Breakout Adapter



Qty	Reference(s)	Value
1	U1	Socket 28 pin / 7.62mm
4		Pin Socket 1x14
4		Pin Header 1x14 (or 2x14)
2		Pin Header 1x16 (round)
28		Jumper

Allows to connect the IC or Tester signals. Jumper are required to connect IC to Tester

A ZIF socket with a row spacing of 7.62mm is required for the Breakout Adapter. The socket itself should not be wider than 15.2mm.

The adapter supports sockets up to 28 pins (2x14). These sockets are available on AliExpress:

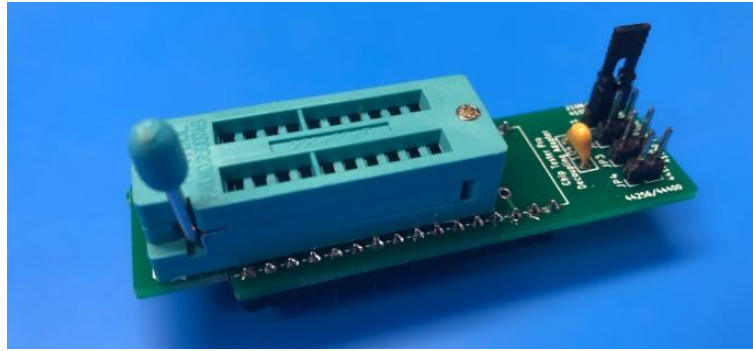
<https://www.aliexpress.com/wholesale?catId=0&SearchText=zif+socket+28>

Since narrow 28-pin ICs are quite uncommon, a 24-pin socket is usually sufficient.

At Digikey and Mouse under the 3M manufacturer number 224-5248-00-0602J (2x12 pins):

<https://www.digikey.de/products/de?keywords=224-5248-00-0602J>

2.5.13 Decoupling Adapter



Qty	Reference(s)	Value
1	J3	Socket 20 - 28 pin / 7.62mm
2	J1, J2	Pin Header 1x16 (round)
4	JP1, JP2, JP3, JP4	Pin Header 1x02
1		Jumper
1	C1	100 nF
1	J4	Pin Header 1x03

A ZIF socket with a row spacing of 7.62mm is required for the Decoupling Adapter. The socket itself should not be wider than 15.2mm.

A 2x10 (20 pin) socket should be used. However, up to 2x14 (28 pin) can be used, the additional positions are not used.

The 1x03 pin header is used to power the IC directly. When an IC requires lots of current you can connect it directly with the Power Socket (between DC/DC module and Display). You can cut the middle pin or remove it (it is not connected).

These sockets are available on AliExpress:

<https://www.aliexpress.com/wholesale?catId=0&SearchText=zif+socket+20>

At Digikey and Mouse under the 3M manufacturer numbers 220-3342-00-0602J (2x10 pins) or 224-5248-00-0602J (2x12 pins):

<https://www.digikey.de/products/de?keywords=224-5248-00-0602J>

2.5.14 ZIP-to-DIP Adapter



This Adapter exists in three variants:

- for 256k x 1 and 64k x 1 ZIP modules,
- for 64k x 4 and 1024k x 1 ZIP modules,
- for 256k x 4 and 1024k x 4 ZIP modules.

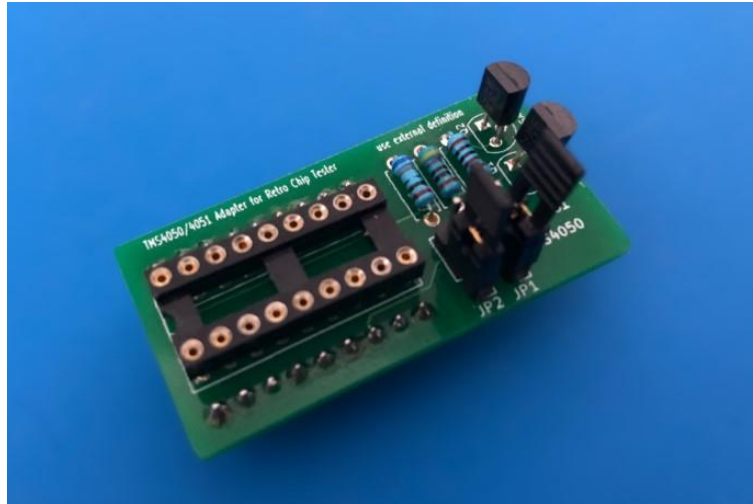
It allows to test ZIP modules like the ZIP20 or ZIP16 adapter. The difference is that the standard test functions for DRAMs are used and you do not have two adapters (one for ZIP16 and one for ZIP20) but three adapters.

That means you can test a 256k x 1 ZIP module with the “256k x 1 / 64k x 1” ZIP-to-DIP adapter using the 41256 test function.

This adapter should also work with other DRAM testers.

Qty	Reference(s)	Value
1		Socket 16 pin
2		Socket 20 pin
2		Pin Header 1x8 (round)
2		Pin Header 1x9 (round)
2		Pin Header 1x10 (round)
3	C1	100nF

2.5.15 TMS4050/TMS4051 Adapter



Qty	Reference(s)	Value
2	U1	Pin Header 1x09 (round)
1	U2	DIP Socket 18
2	J1, J2	Pin Header 1x03
1	R1	470
1	R2	680
1	R3	1k
1	Q1	MPSA06
1	Q2	MPSA56
1	C1	100nF

2.5.16 CDP18U42 Adapter



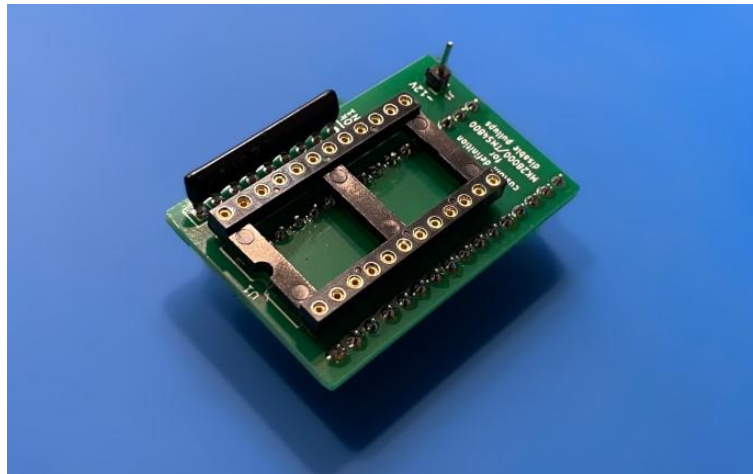
Qty	Reference(s)	Value
1	U1	DIP Socket 24
2	J1, J2	Pin Header 1x10 (round)

2.5.17 Signetics 2530 Adapter



Qty	Reference(s)	Value
2	U1	Pin Header 1x16 (round)
1	U2	DIP Socket 24
1	J1	Pin Header 1x1

2.5.18 Mostek MK28000 / TMS4800 Adapter

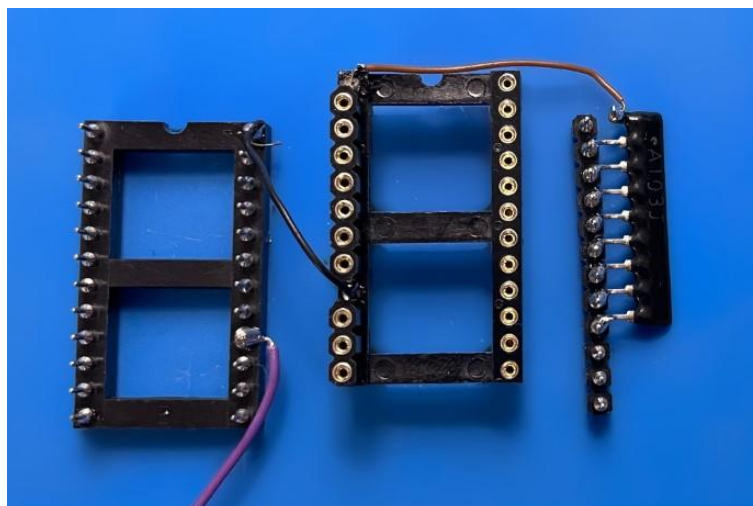


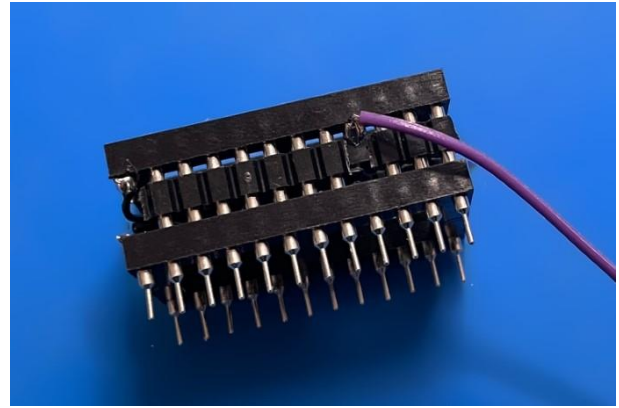
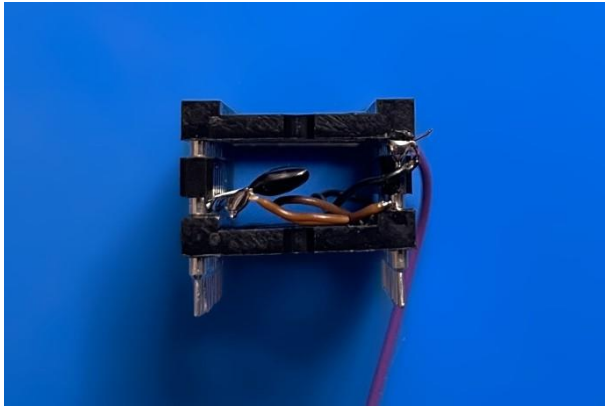
Qty	Reference(s)	Value
2	U1	Pin Header 1x16 (round)
1	U2	DIP Socket 24
1	J1	Pin Header 1x1
1	RN1	Resistor Network 10k (SIL9)

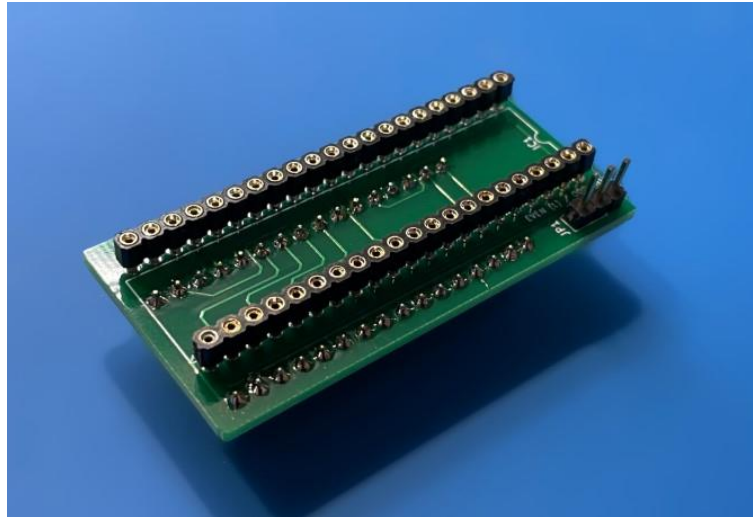
The adapter can be built with two 24-pin sockets (round holes):

1. The first socket is plugged into the ZIF socket, the second is mounted on the first via two headers.
2. Upper socket: We solder a wire to pin 9 (-12V). This pin is not connected to the lower socket but to the -12V connection on the DC/DC board.
3. Upper socket: We solder a wire to pin 1 and connect it to the lower socket pin 9 (ZIF09). We get the +5V supply voltage via ZIF09.
4. Lower socket: We solder a wire to pin 1 and connect it to pin 1 of a 10k Ohm resistor network. The eight resistors are connected to the data lines (pin 16 through pin 23).
5. The two sockets are now plugged into each other so that all other pins are connected 1:1.

Since the MK28000 has open drain outputs to which pulldown(!) resistors are connected, the internal pullups for ROMs of the RCT must be switched off in the configuration.

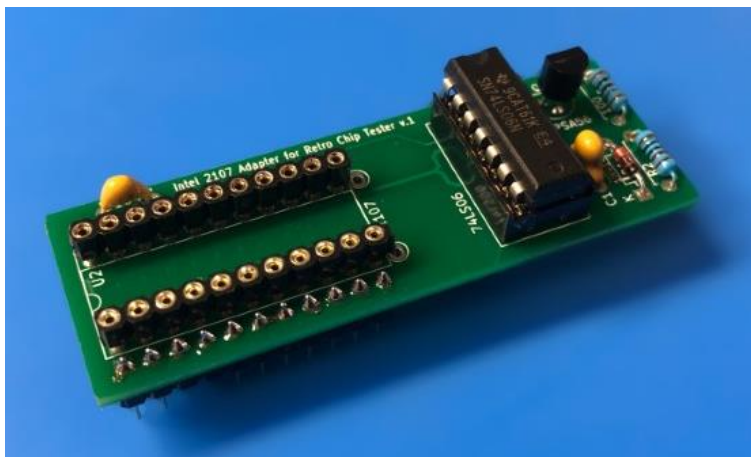




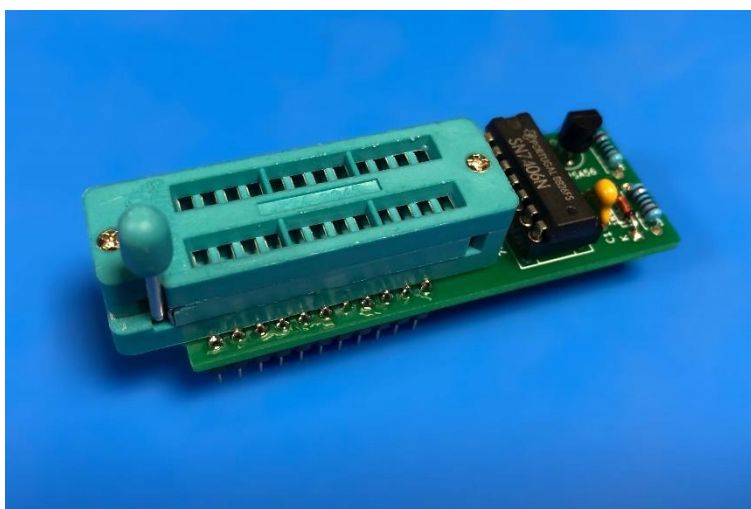
2.5.19 1-16 Mbit EPROM Adapter (8 Bit) (Prototype)

Qty	Reference(s)	Value
2	U1	Pin Header 1x16 (round)
2	U2	Pin Header 1x20 (round)
1	J1	Pin Header 1x3
1		Jumper

2.5.20 Intel 2107 Adapter



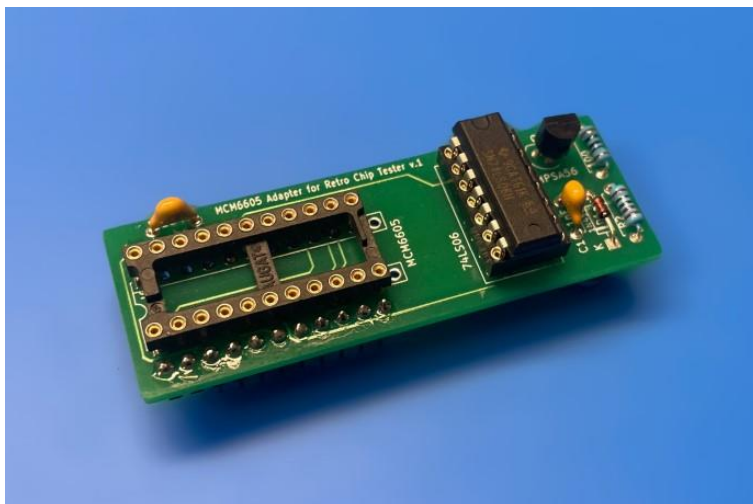
2107 adapter with DIP-22 socket or “socket header”



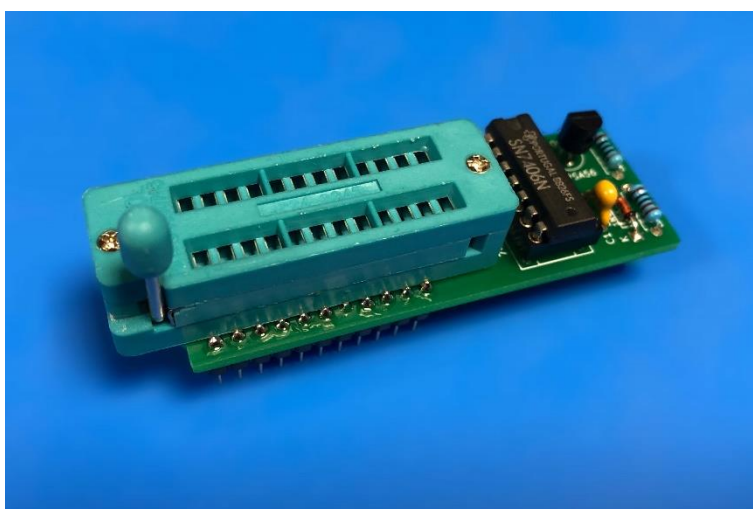
2107 adapter with ZIF-24 socket

Qty	Reference(s)	Value
1	C1	1 nF
1	C2	100 nF
1	D1	1N4148
2	J1, J2	Pin Header 1x11 (round)
1	Q1	MPSA56
1	R1	100
1	R2	1K
1	U1	7406 (74LS06 should also work)
1	U2	DIP Socket 22 (10.16mm) or ZIF-24 Socket

2.5.21 Motorola MCM6605 Adapter



6605 adapter with DIP-22 socket



6605 adapter with ZIF-24 socket

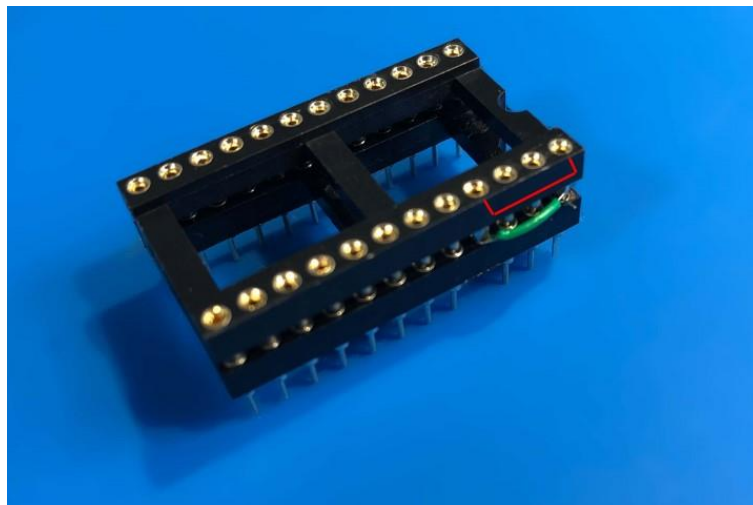
Qty	Reference(s)	Value
1	C1	1 nF
1	C2	100 nF
1	D1	1N4148
2	J1, J2	Pin Header 1x11 (round)
1	Q1	MPSA56
1	R1	100
1	R2	1K
1	U1	7406 (74LS06 should also work)
1	U2	DIP Socket 22 (10.16mm) or ZIF-24 Socket

2.5.22 Dump-Adapter for 2716, 2532, 2508, 2758 EPROMs



Qty	Reference(s)	Value
2	J1, J2	Pin Header 1x16 (round)
1	U1	DIP Socket 24

A simple intermediate socket can also be used instead of the adapter.

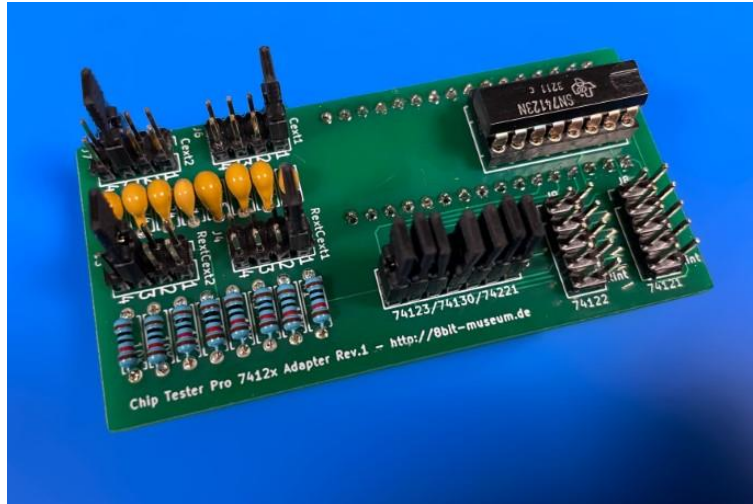


Pin 21 on the lower socket has been removed so that there is no longer a connection to the ZIF socket. Pins 21 (Vpp) and 24 (Vcc) of the upper socket have been connected with a small wire bridge (see red marking).

Alternatively, the definition "2716 Rev (2k x 8 - EPROM).txt" can be used for the 2716. The IC must then be inserted rotated 180 degrees.

More information on this in the manual.

2.5.23 Multivibrator 74121, 74122, 74123, et al. Adapter



Qty	Reference(s)	Value
2	C1, C5	100 nF
2	C2, C6	220 nF
2	C3, C7	470 nF
2	C4, C8	1 uF
2	J1, J2	Pin Header 1x16 (round)
1	J3	DIP Socket 16
4	J4-J7	Pin Header 2x4
2	J8, J9	Pin Header 2x5
1	J10	Pin Header 2x7
8	R1-R8	10K
9		Jumper

Tip:

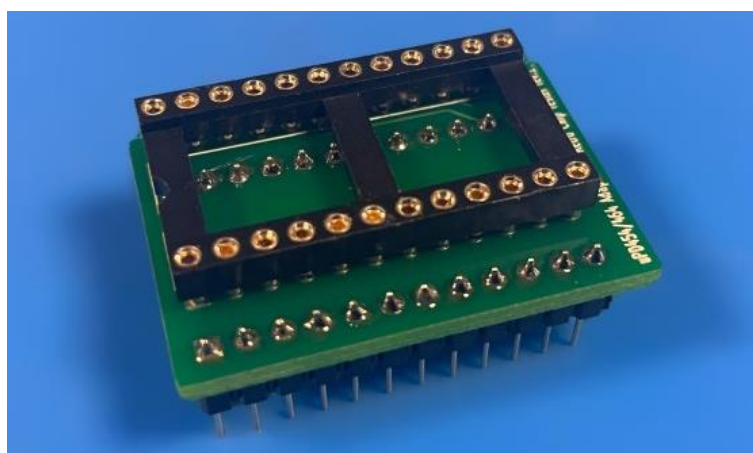
In order to save yourself having to switch plugs, use three adapters and replace the jumpers with wire bridges, i.e. seven wire bridges or two four(!) wire bridges. With the 2x5 pin headers, Rint should remain pluggable via a jumper.

2.5.24 Multivibrator CD4098/4528/4538 Adapter



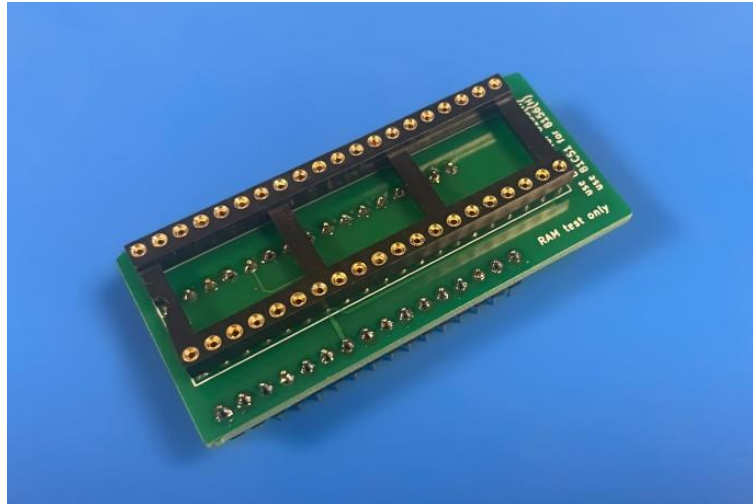
Qty	Reference(s)	Value
2	C1, C5	100 nF
2	C2, C6	220 nF
2	C3, C7	470 nF
2	C4, C8	1 uF
2	J1, J2	Pin Header 1x16 (round)
1	J3	DIP Socket 16
4	J4-J7	Pin Header 2x4
1	R1-R8	10K
2		Jumper

2.5.25 uPD454/464 Adapter



Qty	Reference(s)	Value
2	J1, J2	Pin Header 1x12 (round)
1	U1	DIP Socket 24

2.5.26 Intel D8155/D8156 Adapter



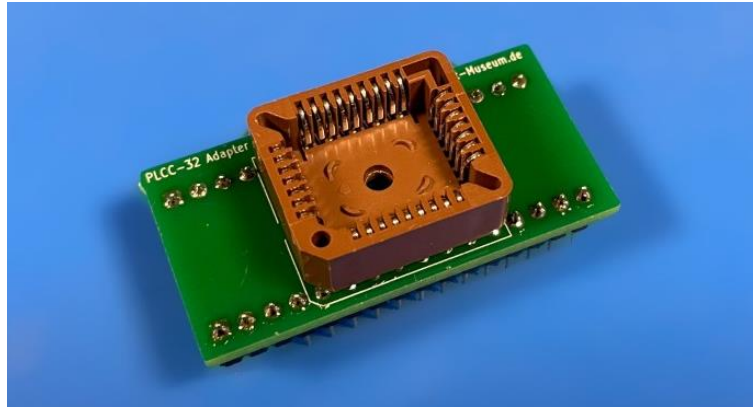
Qty	Reference(s)	Value
2	J1, J2	Pin Header 1x15 (round)
1	U1	DIP Socket 40

2.5.27 1-8 Mbit EPROM Signature Adapter



Qty	Reference(s)	Value
2	J1, J2	Pin Header 1x14 (round)
1	U1	DIP Socket 32

2.5.28 PLCC28 / PLCC32 Adapter

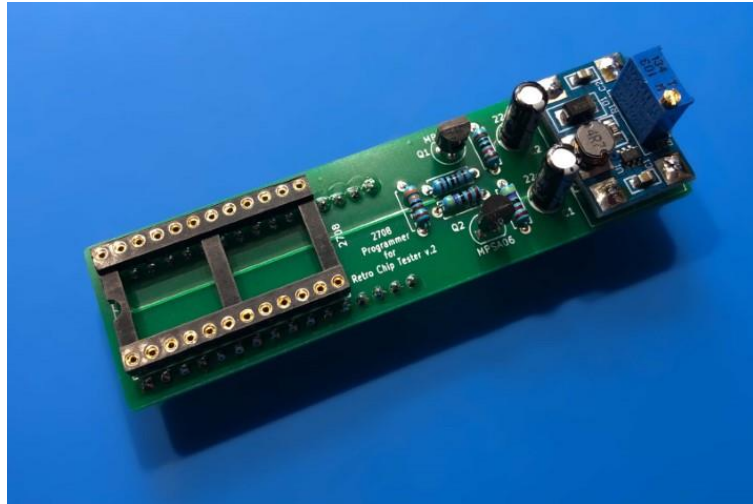


PLCC32 Adapter

Qty	Reference(s)	Value
2	J1, J2	Pin Header 1x14 (round)
1	U1	PLCC Socket 28

Qty	Reference(s)	Value
2	J1, J2	Pin Header 1x16 (round)
1	U1	PLCC Socket 32

2.5.29 Programming Adapter for 2708 EPROM



Qty	Reference(s)	Value
2	C1, C2	22uF / 35V
2	J1, J2	Pin Header 1x16 (round)
1	PS1	DC/DC Step Up Modul SX1308
1	Q1	MPSA56
1	Q2	MPSA06
1	R1	10K
2	R2, R4	4.7K
1	R3	1K
1	R5	3.3K
1	U1	24 Pin Socket

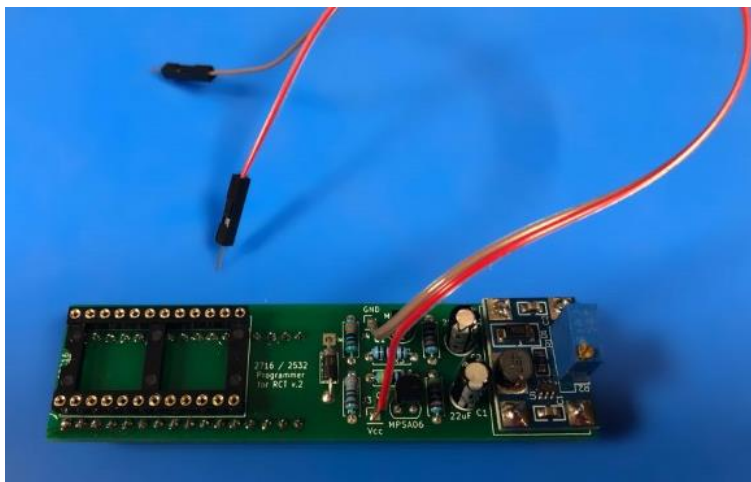
The required step-up module is e.g. available on AliExpress:

<https://www.aliexpress.com/item/4001225203693.html>

<https://www.aliexpress.com/af/2%25252d24V-to-2%25252d28V-2A-DC%25252dDC-SX1308-Step%25252dUP-Adjustable-.html?d=y&origin=n&SearchText=2-24V+to+2-28V+2A+DC-DC+SX1308+Step-UP+Adjustable+>

When assembling, make sure that the step-up module is set to the required programming voltage (usually 25V to 27V). To do this, apply 5V to the input and turn the trimmer until 25V is measured at the output (the trimmer must be turned for a while until something changes at all).

2.5.30 Programming Adapter for 2716/2532 EPROM



Qty	Reference(s)	Value
2	C1, C2	22uF / 35V
1	D1	1N5817
2	J1, J2	Pin Header 1x16 (round)
1	PS1	DC/DC Step Up Modul SX1308
1	Q1	MPSA56
1	Q2	MPSA06
1	R1	10K
2	R2, R4	4.7K
1	R3	1K
1	R5	3.3K
1	R6	330
1	U1	24 Pin Socket

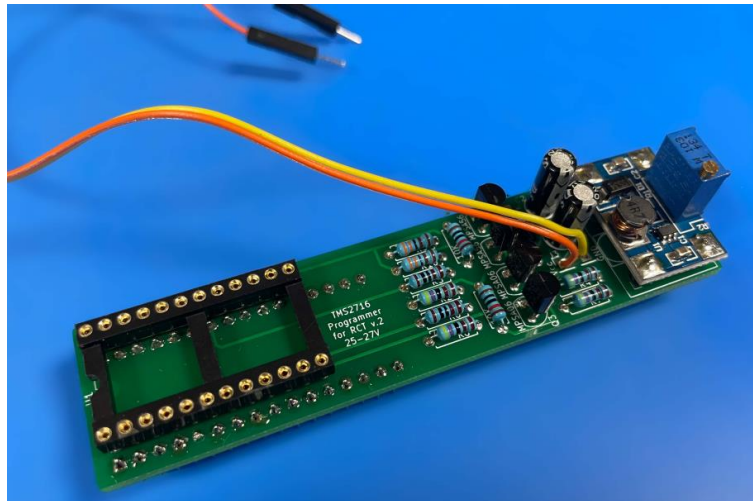
The required step-up module is e.g. available on AliExpress:

<https://www.aliexpress.com/item/4001225203693.html>

<https://www.aliexpress.com/af/2%25252d24V-to-2%25252d28V-2A-DC%25252dDC-SX1308-Step%25252dUP-Adjustable-.html?d=y&origin=n&SearchText=2-24V+to+2-28V+2A+DC-DC+SX1308+Step-UP+Adjustable+>

When assembling, make sure that the step-up module is set to the required programming voltage (usually 21V or 25V). To do this, apply 5V to the input and turn the trimmer anti-clockwise until the required voltage is measured at the output (the trimmer must be turned for a while until something changes at all).

2.5.31 Programming Adapter for TMS2716



Qty	Reference(s)	Value
2	C1, C2	22uF / 35V
1	D1	1N5817
2	J1, J2	Pin Header 1x16 (round)
1	PS1	DC/DC Step Up Modul SX1308
2	Q1, Q4	MPSA56
2	Q2, Q3	MPSA06
2	R1, R9	10K
4	R2, R4, R7, R8	4.7K
2	R3, R6	1K
2	R5, R10	3.3K
1	U1	24 Pin Socket

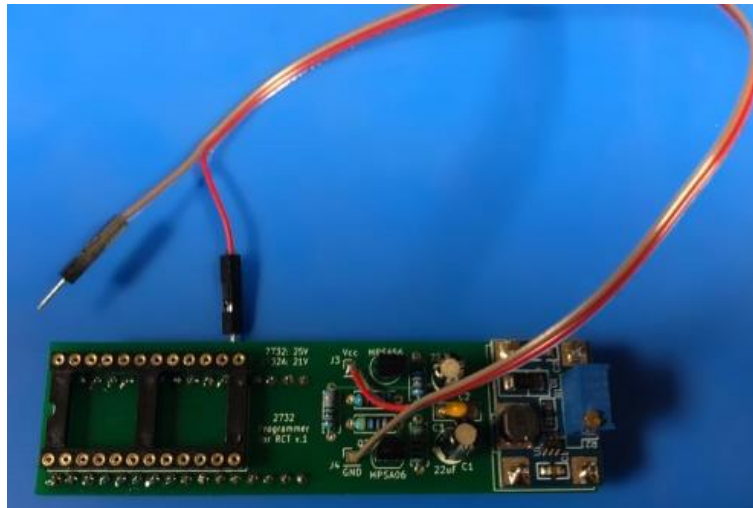
The required step-up module is e.g. available on AliExpress:

<https://www.aliexpress.com/item/4001225203693.html>

<https://www.aliexpress.com/af/2%25252d24V-to-2%25252d28V-2A-DC%25252dDC-SX1308-Step%25252dUP-Adjustable-.html?d=y&origin=n&SearchText=2-24V+to+2-28V+2A+DC-DC+SX1308+Step-UP+Adjustable+>

When assembling, make sure that the step-up module is set to the required programming voltage (usually 26V). To do this, apply 5V to the input and turn the trimmer anti-clockwise until the required voltage is measured at the output (the trimmer must be turned for a while until something changes at all).

2.5.32 Programming Adapter for 2732 EPROM



Qty	Reference(s)	Value
2	C1, C2	22uF / 35V
1	C3	100 nF
2	J1, J2	Pin Header 1x16 (round)
1	PS1	DC/DC Step Up Modul SX1308
1	Q1	MPSA56
1	Q2	MPSA06
1	R1	10K
2	R2, R4	4.7K
1	R3	1K
1	R5	3.3K
1	R6	330
1	U1	24 Pin Socket

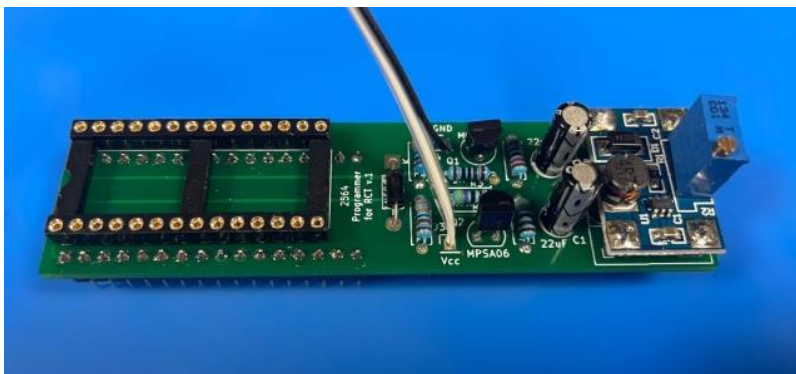
The required step-up module is e.g. available on AliExpress:

<https://www.aliexpress.com/item/4001225203693.html>

<https://www.aliexpress.com/af/2%25252d24V-to-2%25252d28V-2A-DC%25252dDC-SX1308-Step%25252dUP-Adjustable-.html?d=y&origin=n&SearchText=2-24V+to+2-28V+2A+DC-DC+sx1308+step-up+adjustable+>

When assembling, make sure that the step-up module is set to the required programming voltage (usually 21V or 25V). To do this, apply 5V to the input and turn the trimmer anti-clockwise until the required voltage is measured at the output (the trimmer must be turned for a while until something changes at all).

2.5.33 Programming Adapter for 2564 EPROM



Qty	Reference(s)	Value
2	C1, C2	22uF / 35V
1	D1	1N5817
2	J1, J2	Pin Header 1x16 (round)
1	PS1	DC/DC Step Up Modul SX1308
1	Q1	MPSA56
1	Q2	MPSA06
1	R1	10K
2	R2, R4	4.7K
1	R3	1K
1	R5	3.3K
1	R6	330
1	U1	28 Pin Socket

The required step-up module is e.g. available on AliExpress:

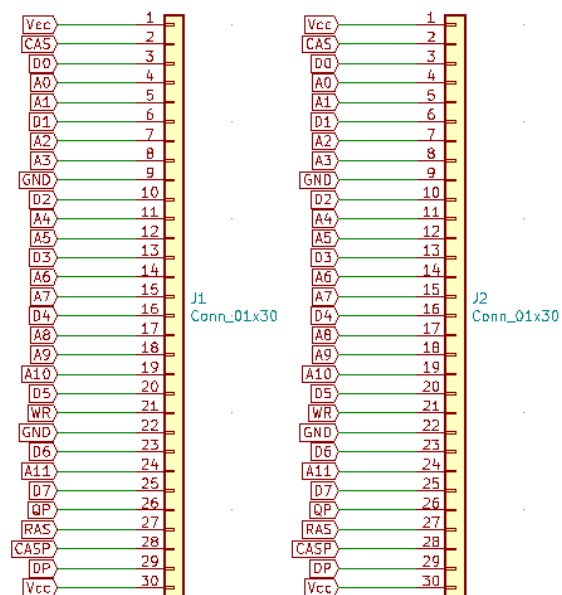
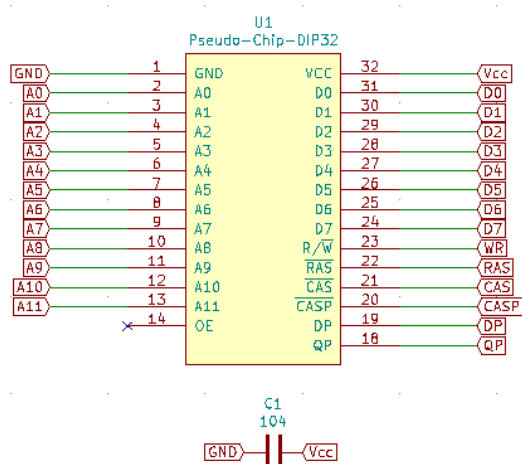
<https://www.aliexpress.com/item/4001225203693.html>

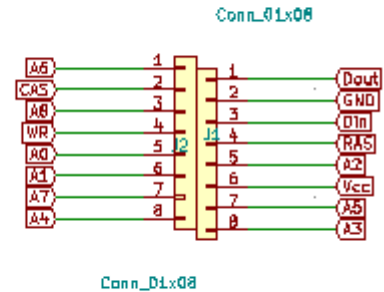
<https://www.aliexpress.com/af/2%25252d24V-to-2%25252d28V-2A-DC%25252dDC-SX1308-Step%25252dUP-Adjustable-.html?d=y&origin=n&SearchText=2-24V+to+2-28V+2A+DC-DC+SX1308+Step-UP+Adjustable+>

When assembling, make sure that the step-up module is set to the required programming voltage (usually 25V). To do this, apply 5V to the input and turn the trimmer anti-clockwise until the required voltage is measured at the output (the trimmer must be turned for a while until something changes at all).

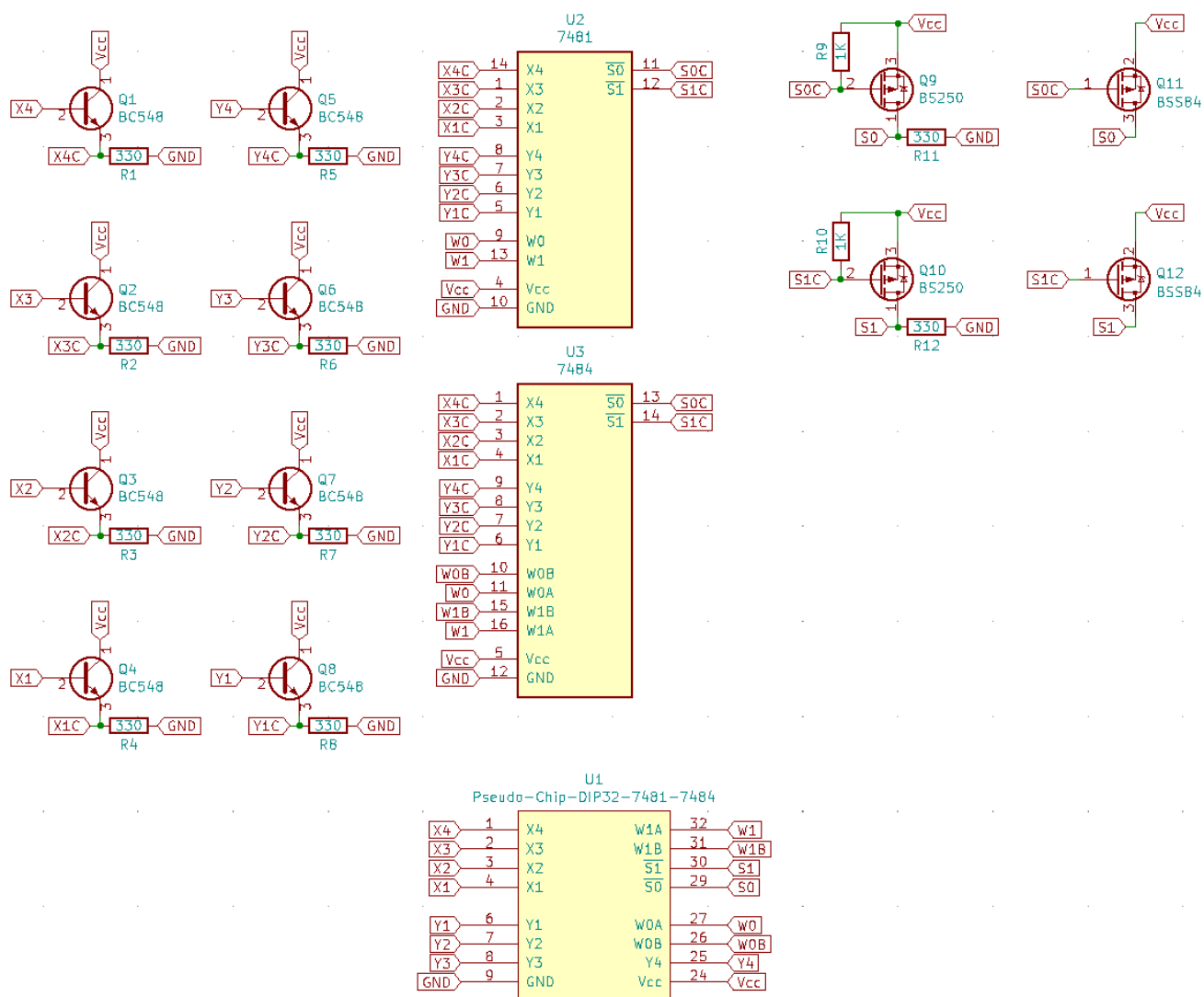
2.6 Schematics - Adapters

2.6.1 SIMM/SIPP Adapter (30 pol)

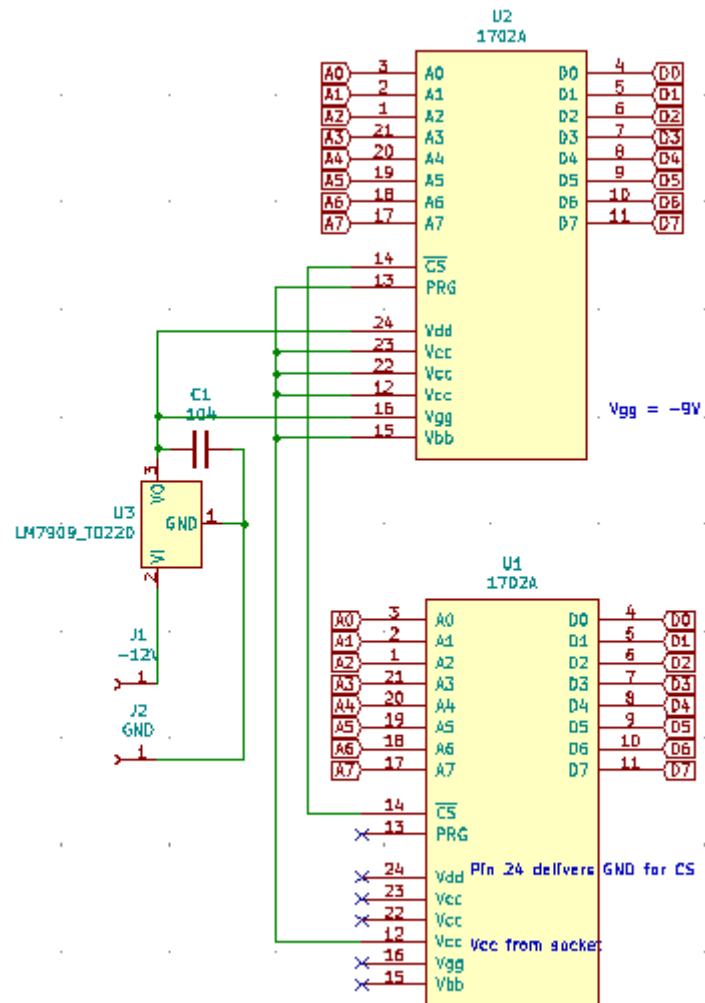




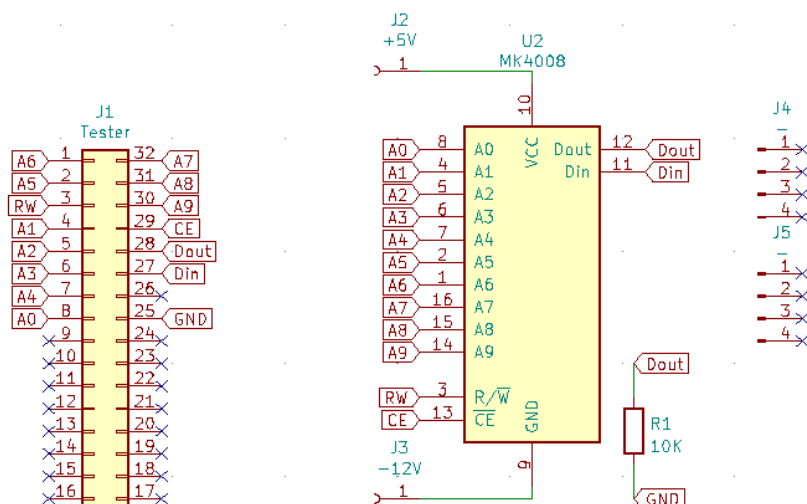
2.6.4 7481/7484 Adapter (14 and 16 pol)



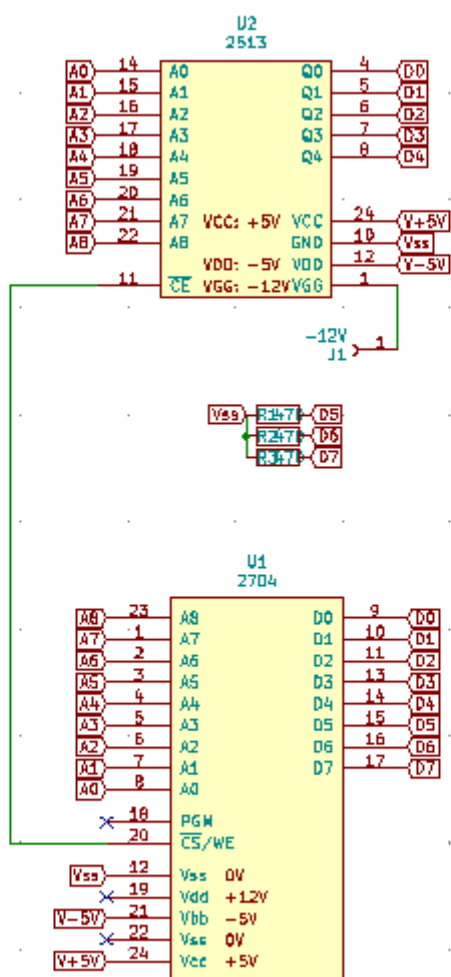
2.6.5 1702A / 1602A Adapter (24 pol)



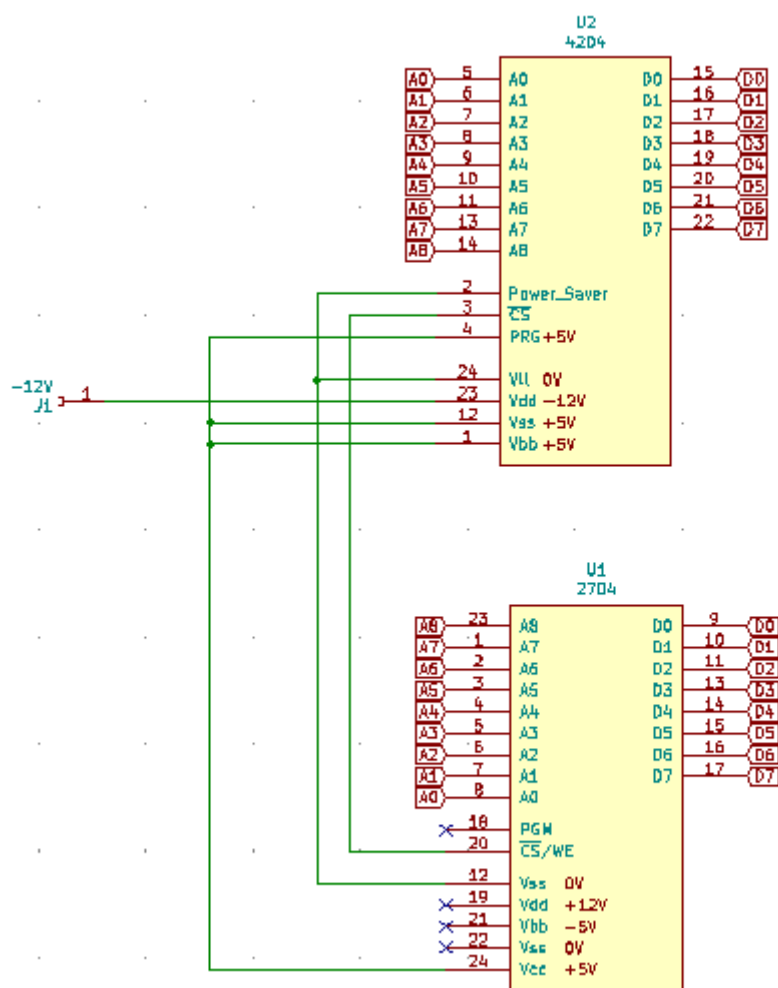
2.6.6 MK4006/MK4008 Adapter (16 pol)

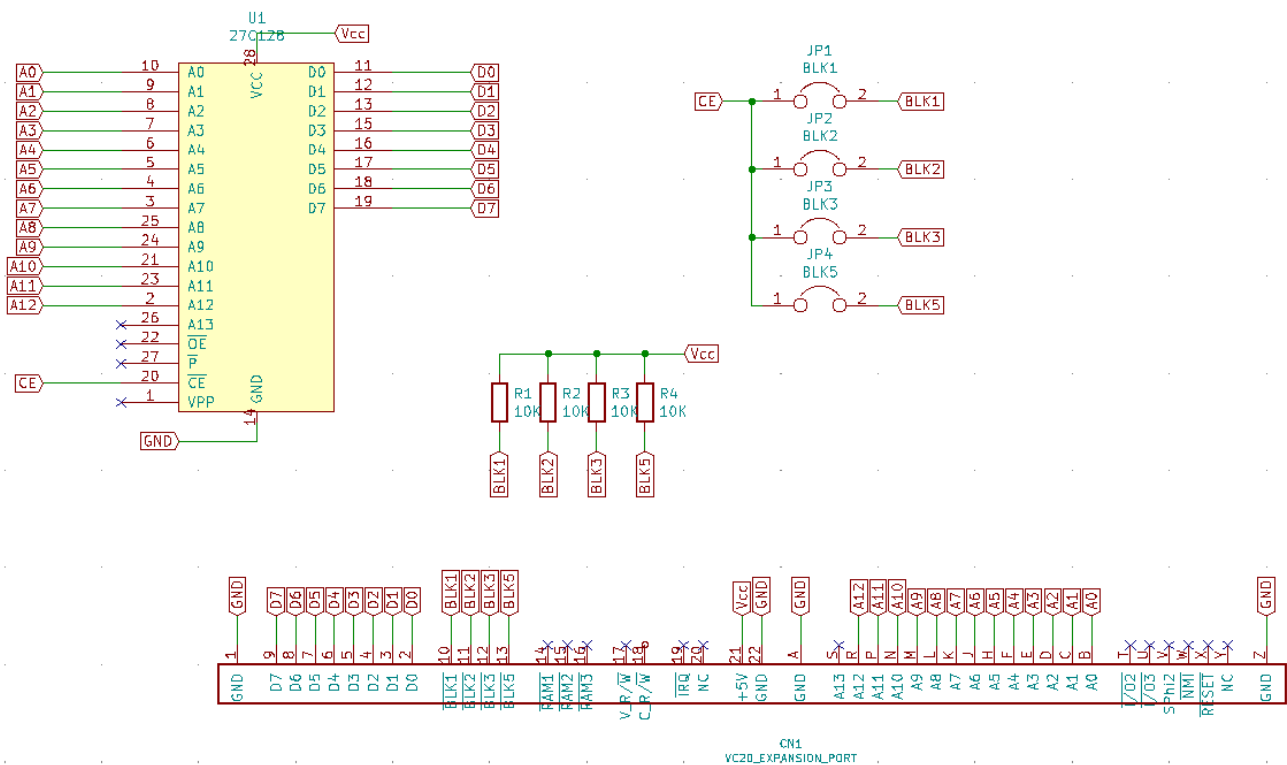
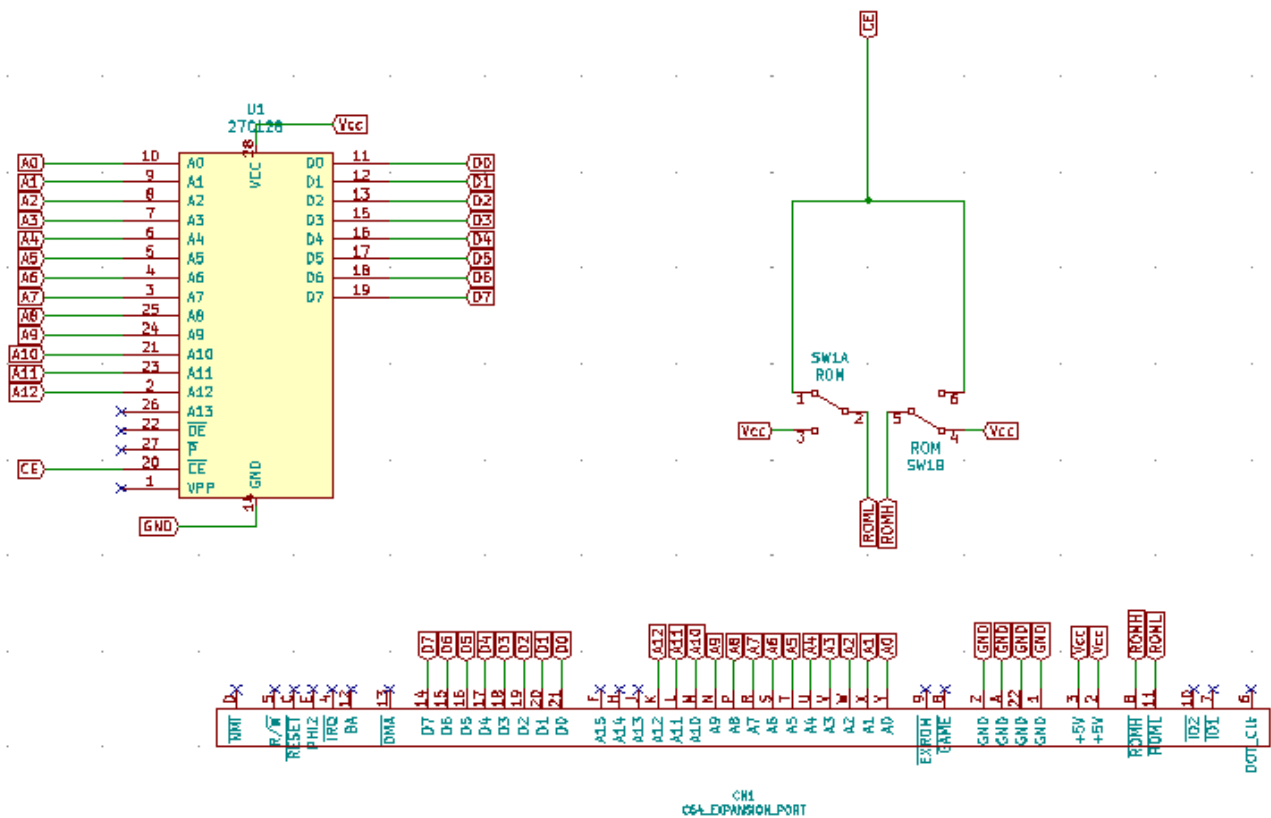


2.6.7 2513 Adapter (+5V/-5V/-12V Version)

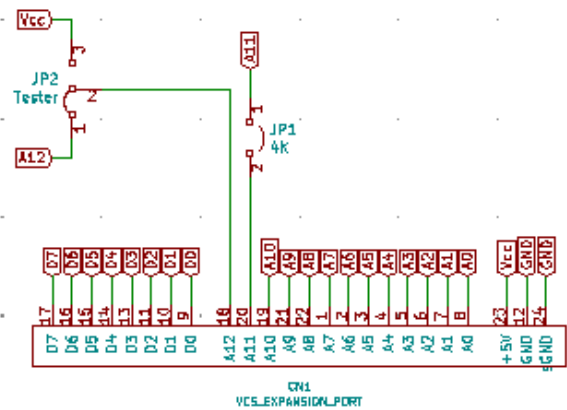
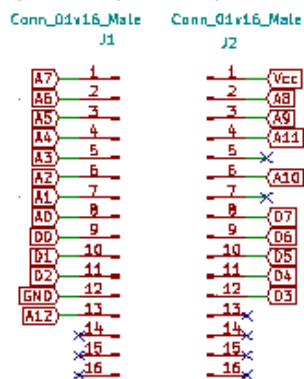


2.6.8 MM4204 and MM5204 Adapter (24 pol)

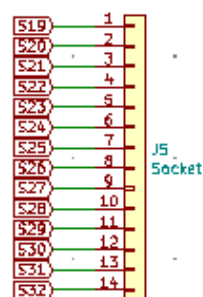
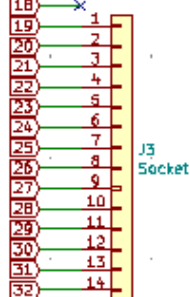
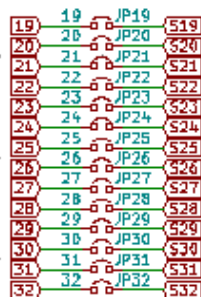
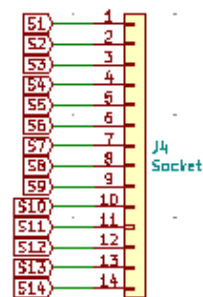
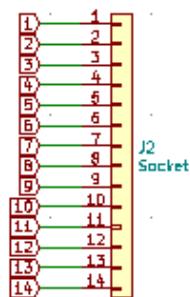
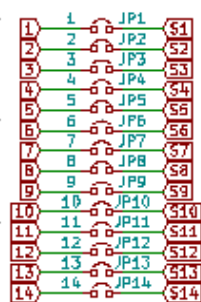
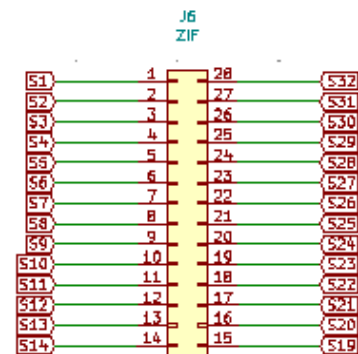
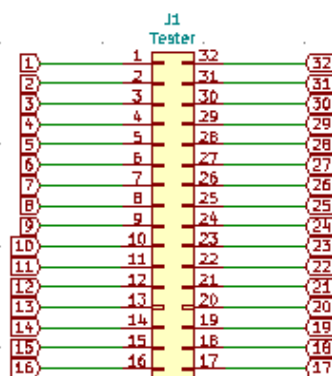




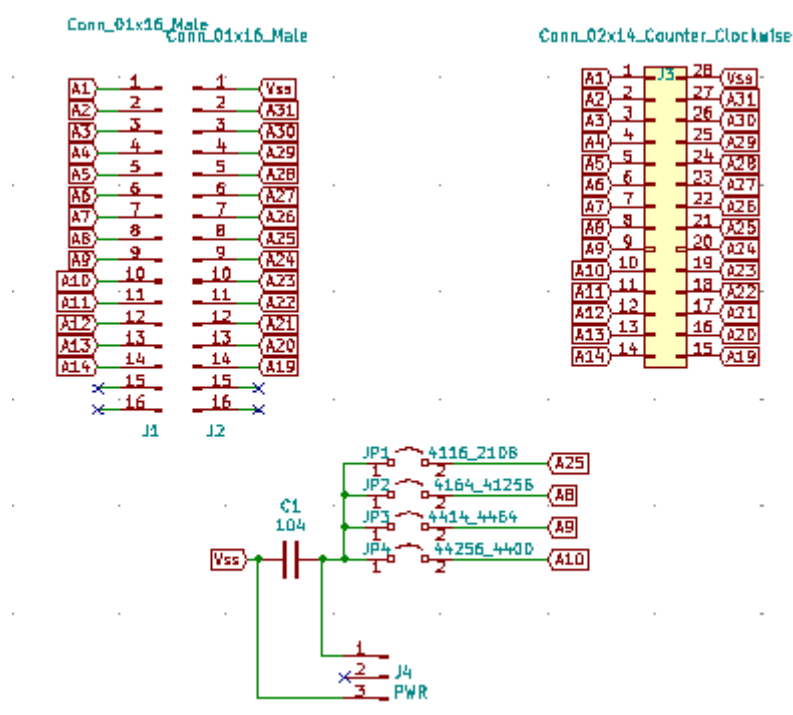
2.6.11 Atari VCS Cartridge Adapter



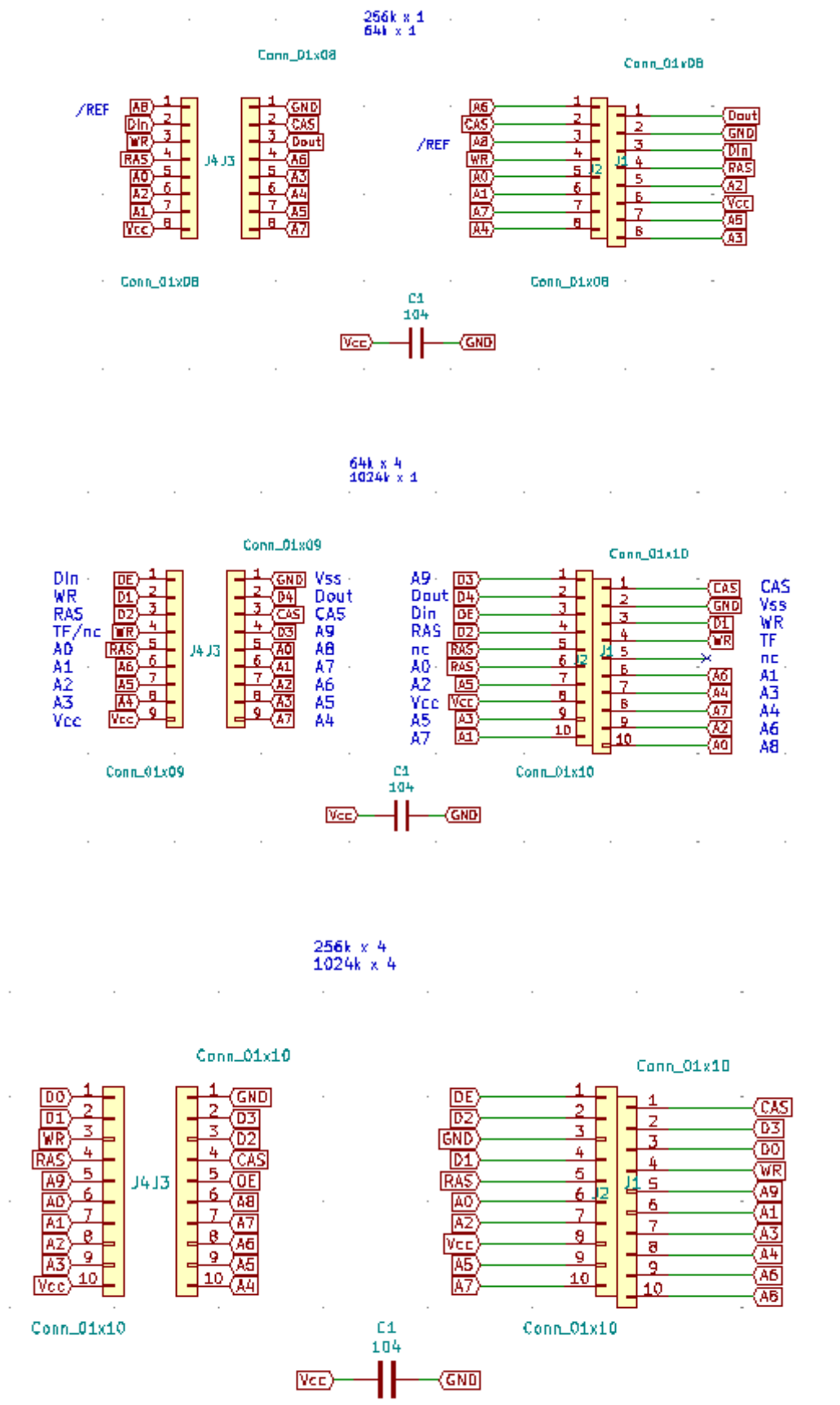
2.6.12 Experimental/Breakout Adapter

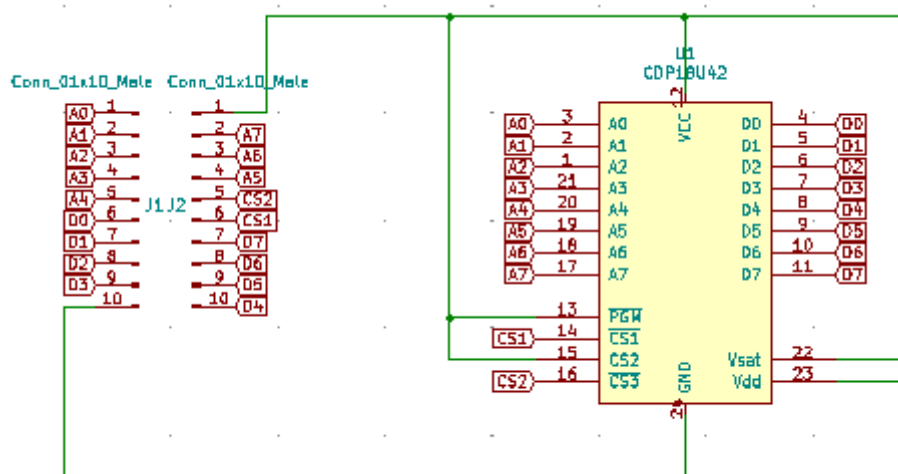


2.6.13 Decoupling Adapter

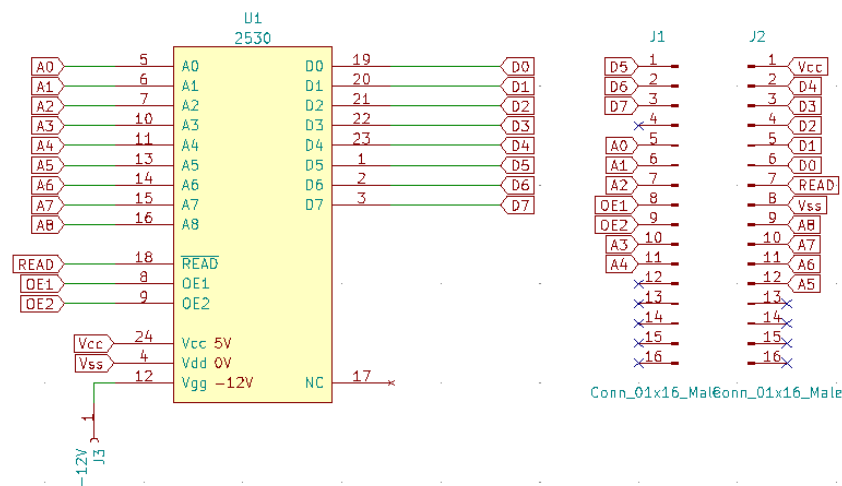


2.6.14 ZIP-to-DIP Adapter

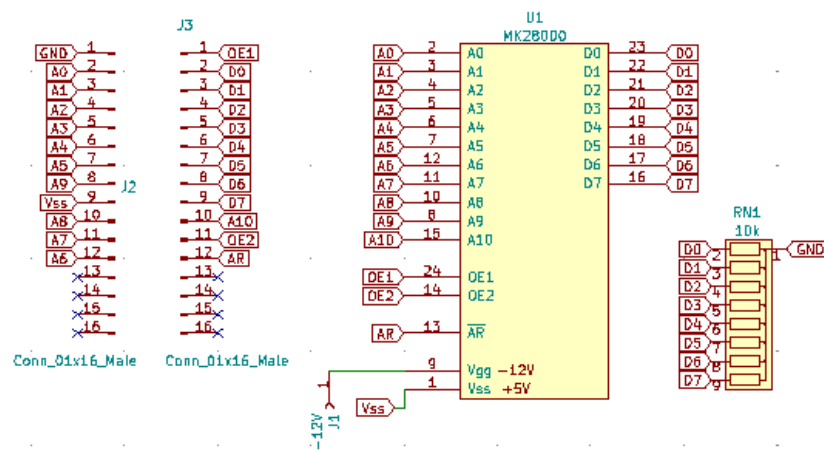




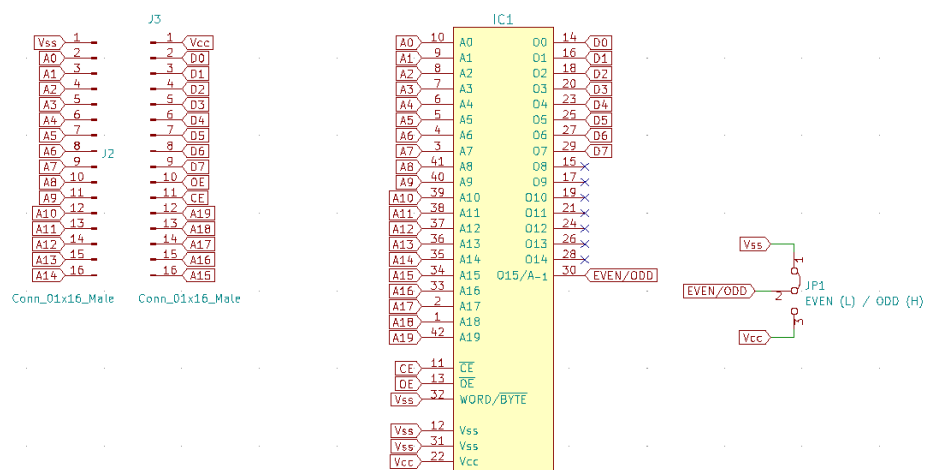
2.6.17 Signetics 2530 Adapter

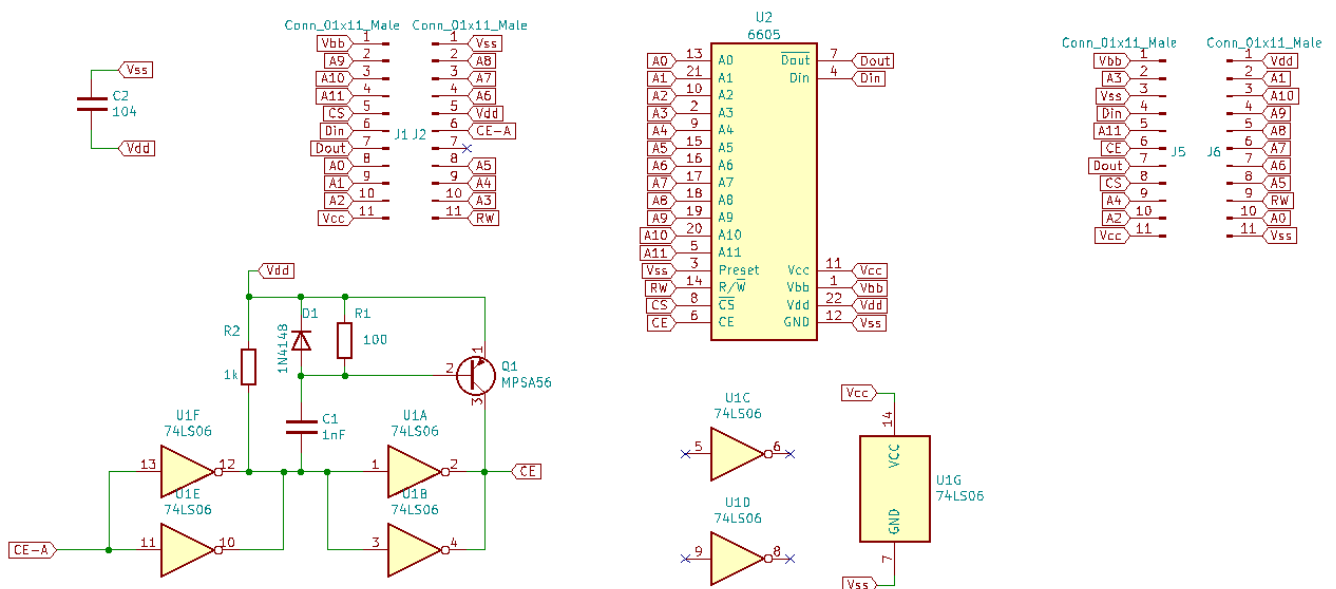
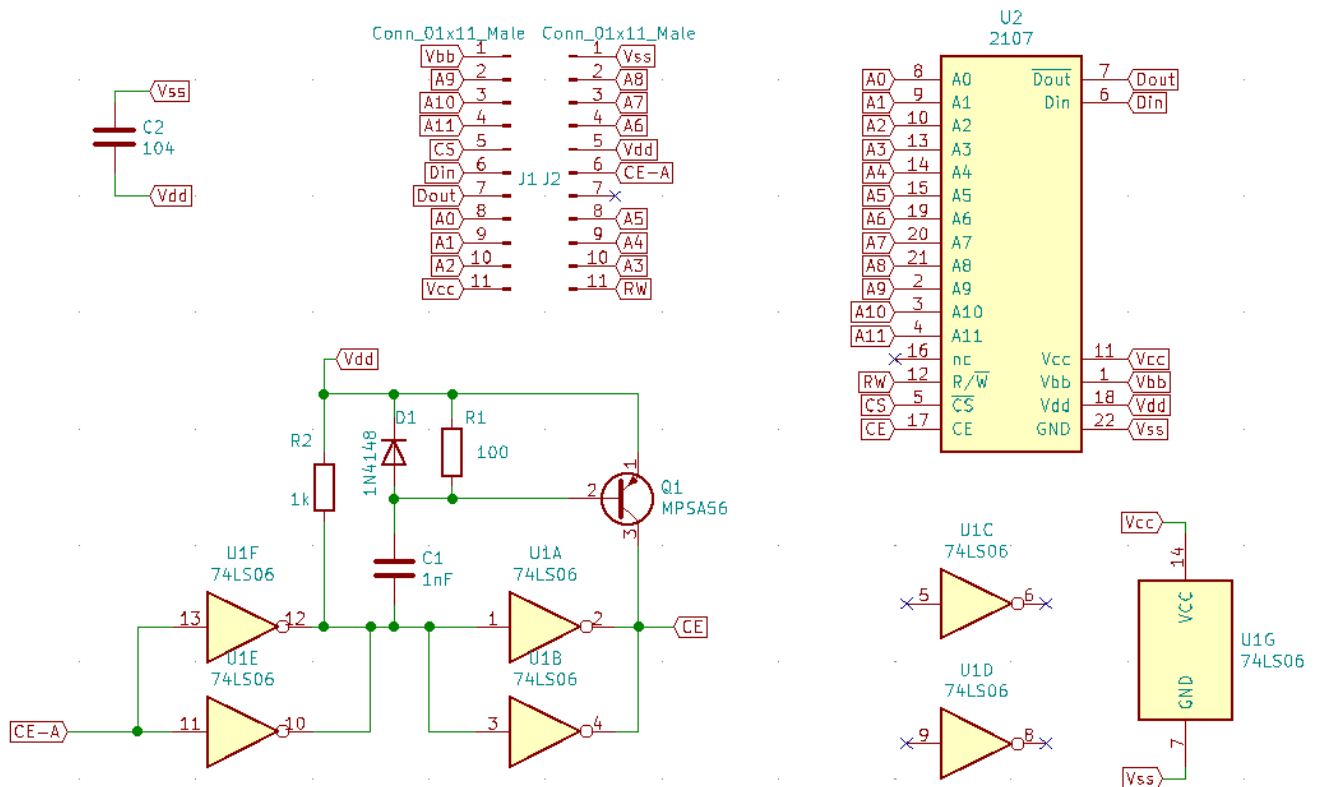


2.6.18 Mostek MK28000 / TMS4800 Adapter



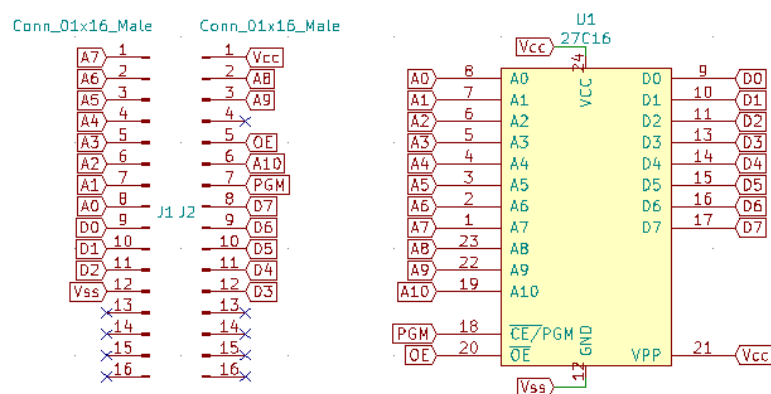
2.6.19 1-16 Mbit EPROM Adapter (8 Bit) (Prototype)



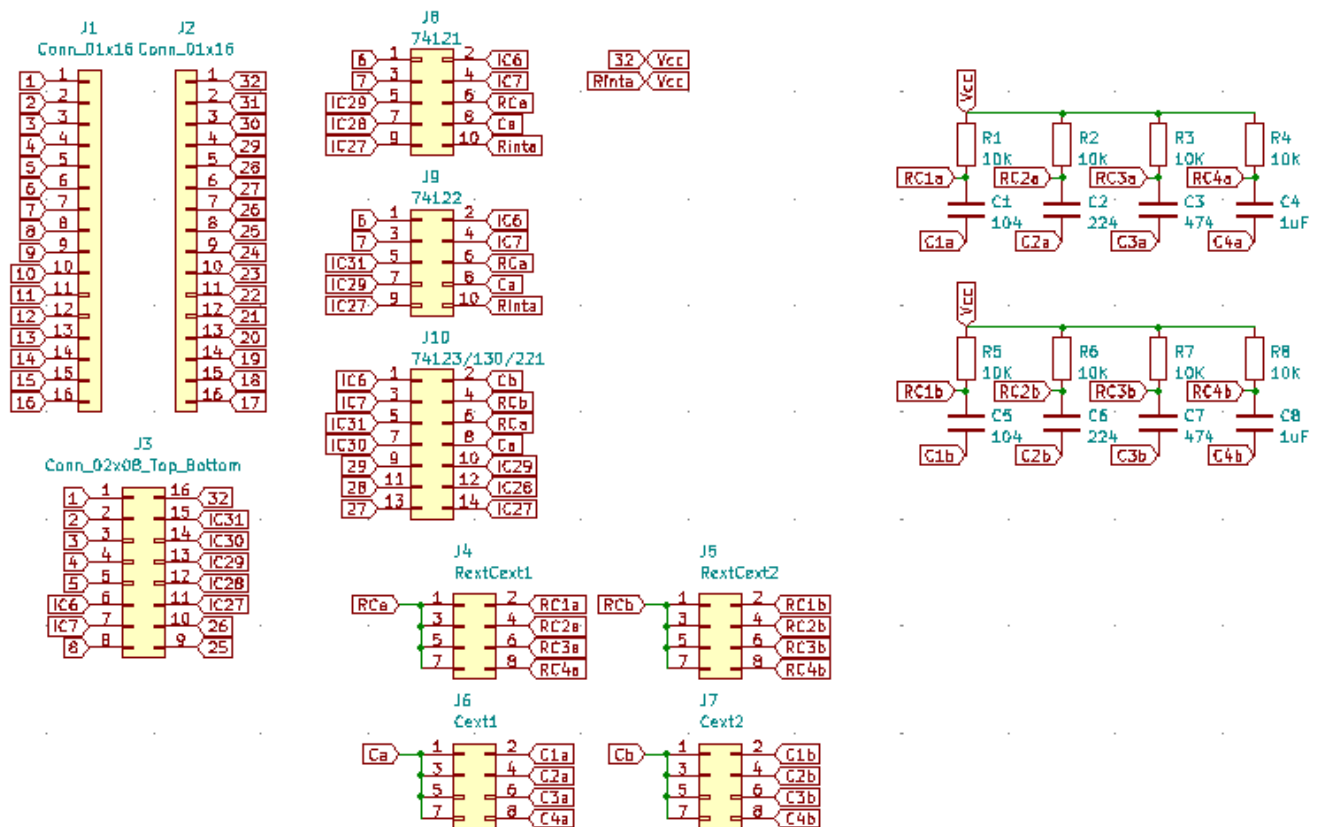


Works fine with a 7406 but also works with the 74LS06.

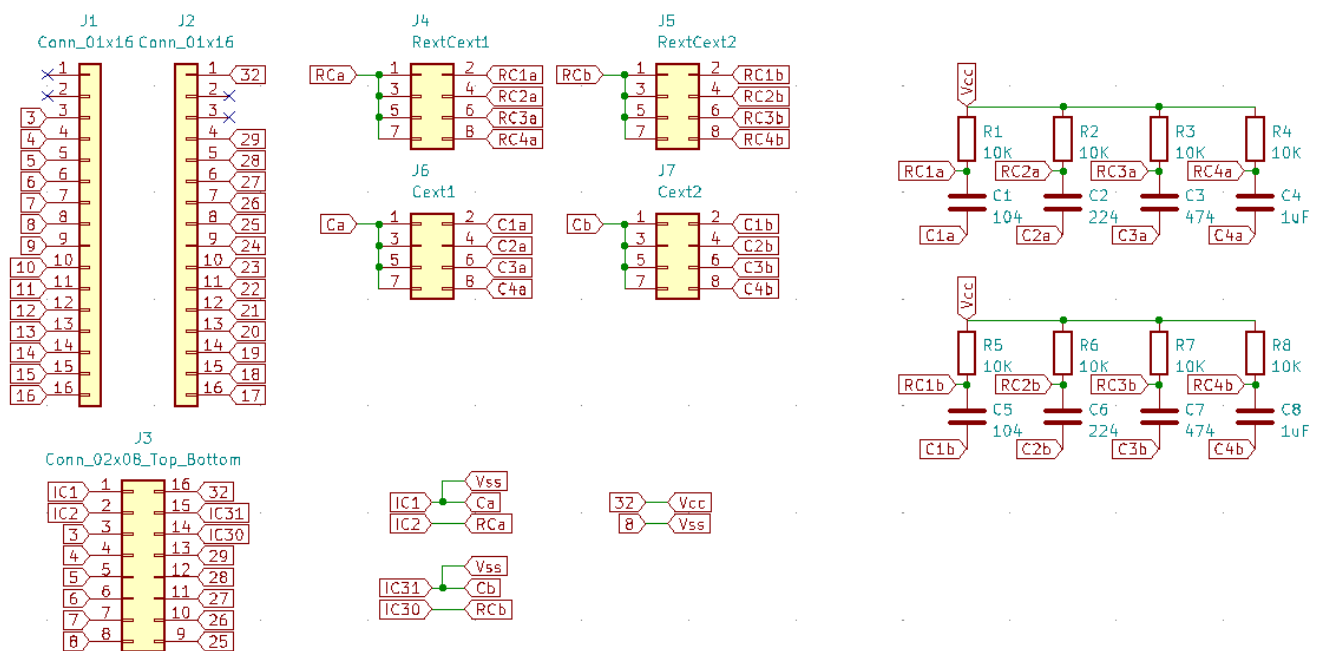
2.6.22 Dump-Adapter for 2716, 2532, 2508, 2758 EPROMs



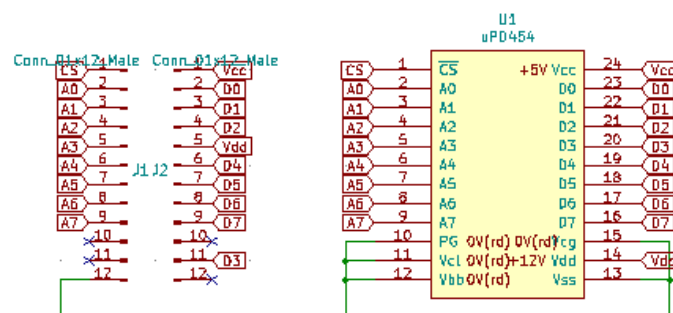
2.6.23 Multivibrator 74121, 74122, 74123, et al. Adapter



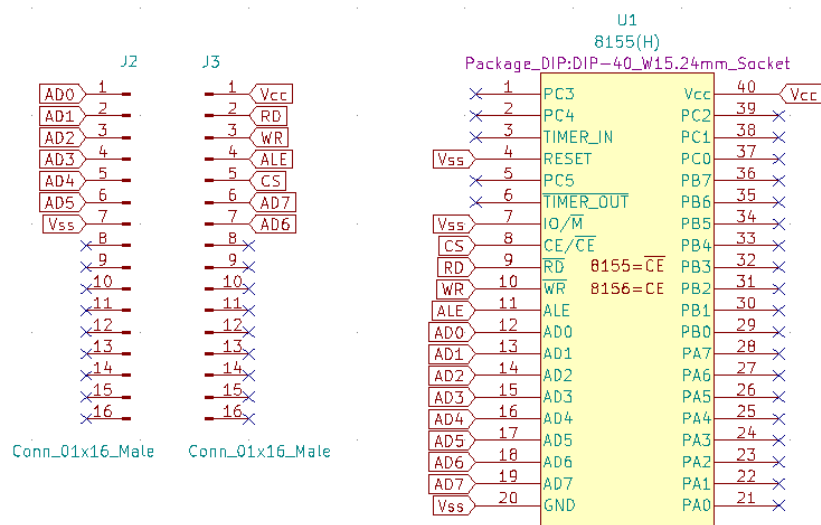
2.6.24 Multivibrator CD4098/4528/4538 Adapter



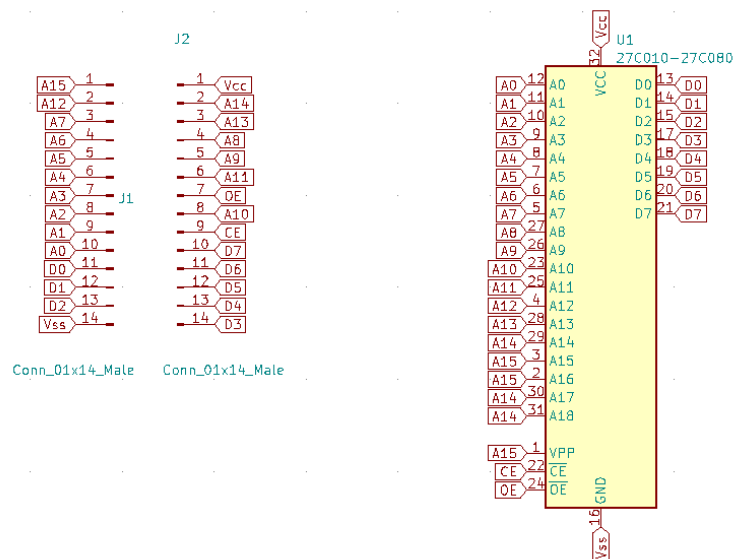
2.6.25 uPD454/464 Adapter



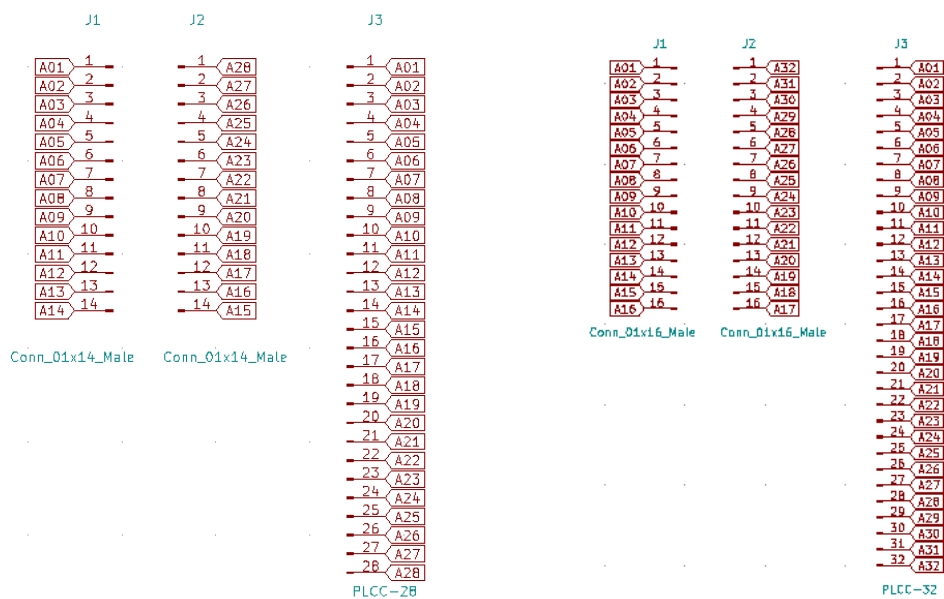
2.6.26 Intel D8155/D8156 Adapter



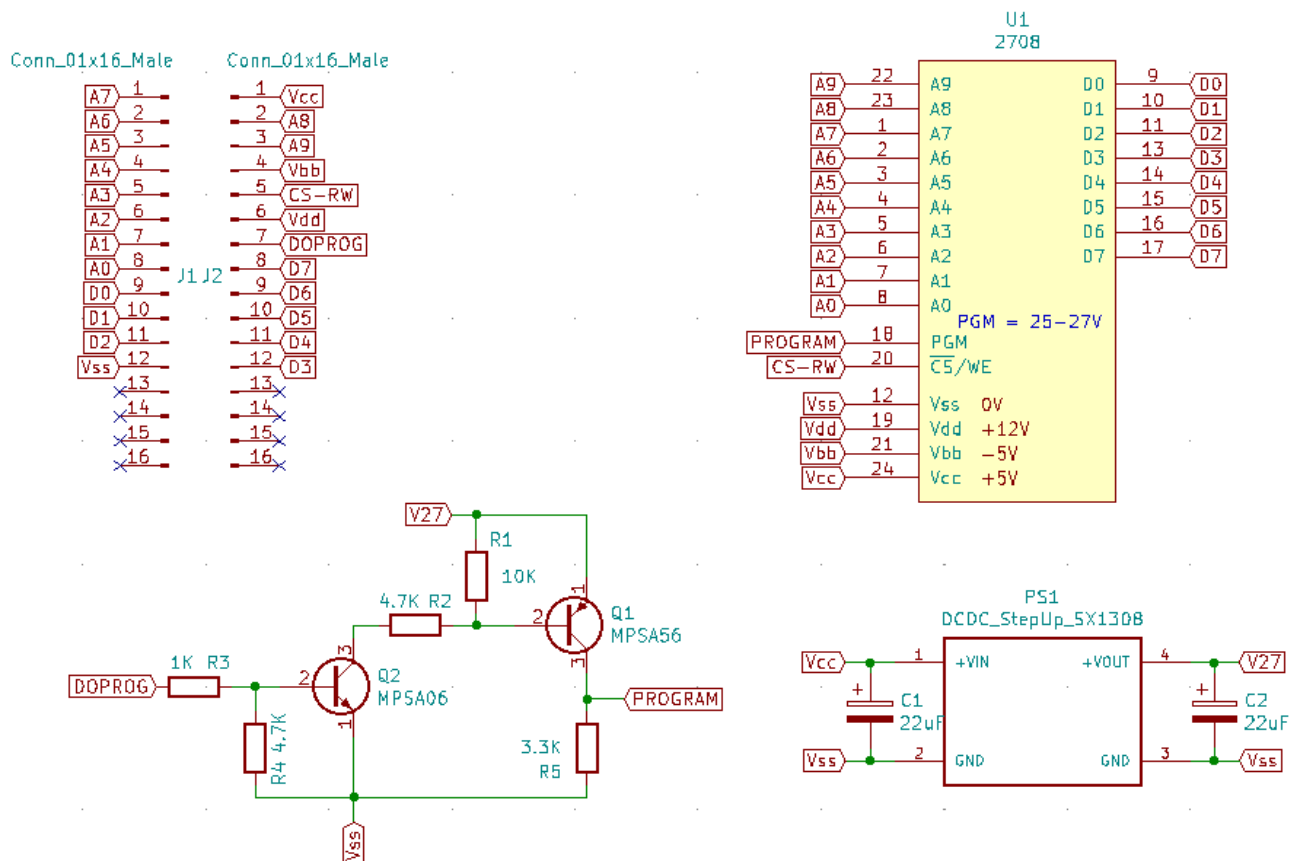
2.6.27 1-8 Mbit EPROM Signature Adapter



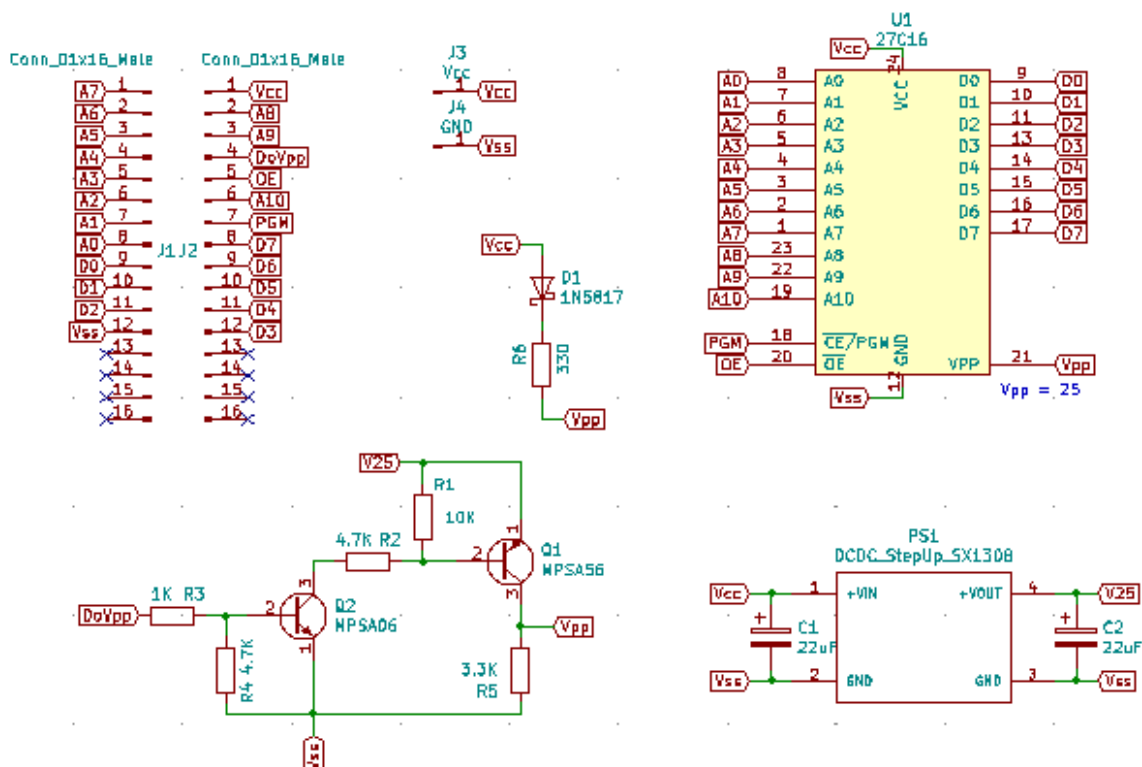
2.6.28 PLCC28 / PLCC32 Adapter



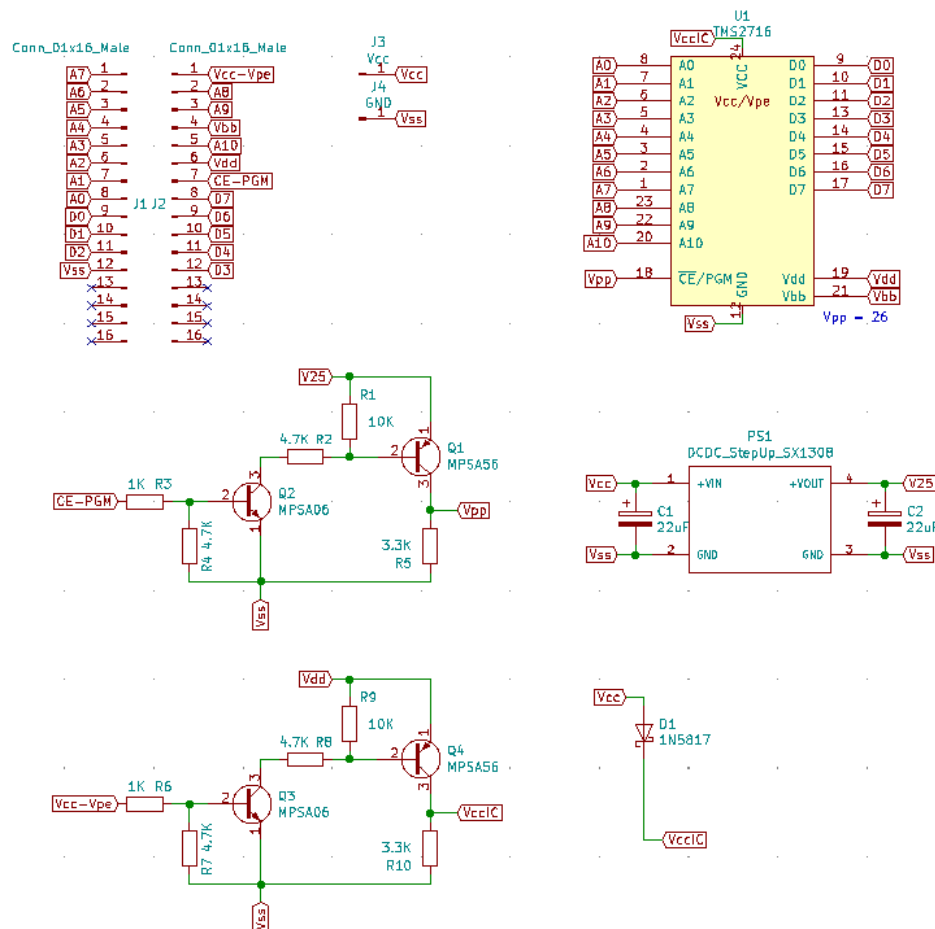
2.6.29 Programming Adapter for 2708 EPROM



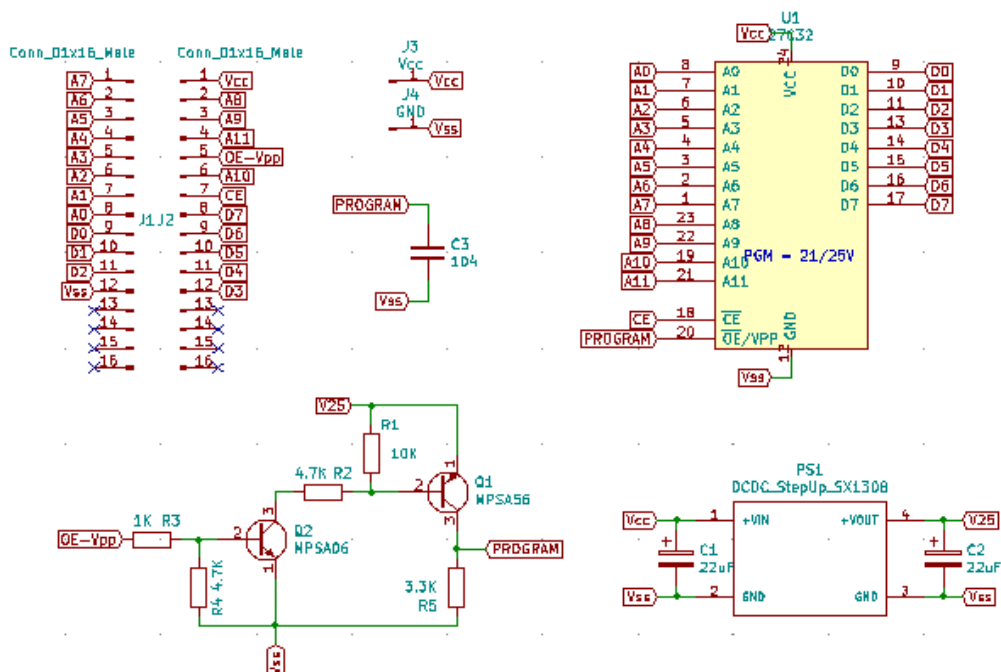
2.6.30 Programming Adapter for 2716/2532 EPROM



2.6.31 Programming Adapter for TMS2716



2.6.32 Programming Adapter for 2732 EPROM



2.6.33 Programming Adapter for 2564 EPROM

