

The MULTIROM board for the ZX81/Lambda 8300/Power 3000

Assembling Manual
www.eightbits.de

Version: v011

1 Disclaimer

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2 Introduction

The intention of the MULTIROM PCB was initially to provide a ROM upgrade for the Lambda 8300 to change between the original Lambda and the modified ZX81 compatible ROM. During the development of the board user demands came up to use the board in a ZX81 as well. Either to change the ROM on Reset during a key on the keyboard is pressed, to prevent external switches, was a user request which could be fulfilled.

3 Part List

A complete MULTIROM kit consists of the following parts:

1	x	GAL 16V8-25LP	GAL
1	x	27C512-100	EPROM
1	x	GS 20P	IC SOCKET
1	x	GS 28P	IC SOCKET
6	x	METALL 18,0K	RESISTOR 18,0K
3	x	SM 10/16RAD	CAPACITOR 10µF/16Volt
1	x	SM 4,7/50RAD	CAPACITOR 4,7µF/50Volt
2	x	KK28025C	RIBBON CABLE SOCKET
1	x	AWG 28-34G 3M	RIBBON CABLE 34 WIRES
1	x	MULTIROM PCB	THE PCB ITSELF

The EEPROM like the GAL have to be specifically programmed. If you want to do it yourself you can download the GAL as well as the EPROM files on www.eightbits.de.

4 Soldering

ATTENTION:

- If you are not well versed in soldering, electronics and digital electronics seek the services of a competent professional.
- Wrong soldering, assembling or setup may destroy the MULTIROM board, the ZX81 or Lambda/Power 3000 computer and other internal an external parts connected with your computer system.
- If your are not sure about what you do, stop your work, don't connect the MULTIROM, contact the author (asgi99@gmx.de) or seek the services of a competent professional.

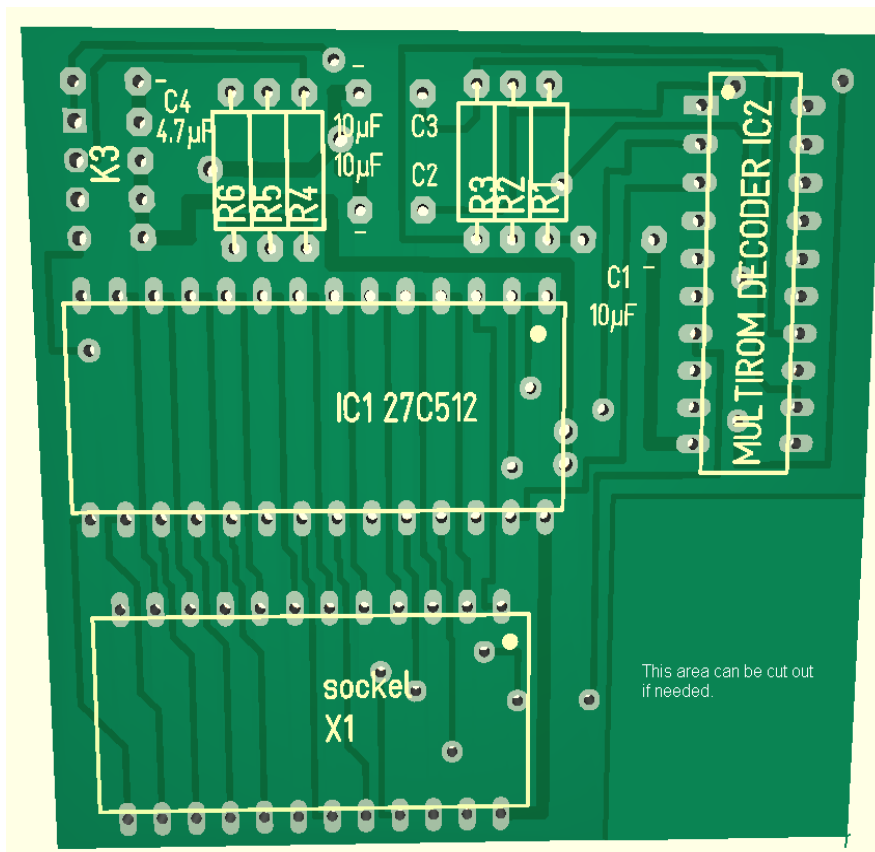
It is suggested to perform the soldering according the following steps.

Step 1

Compare all parts you have with the part list provided in the chapter “Part List”. Put all parts on your the table.

Step 2

To reduce costs the MULTIROM PCB is not printed. Put the PCB in front of you on the table. On the lower right hand side you'll have to see the rectangular area.



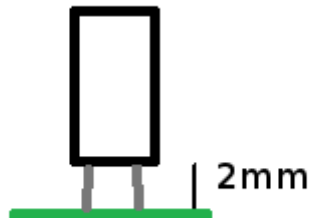
Step 3

Assemble the resistors and solder them.

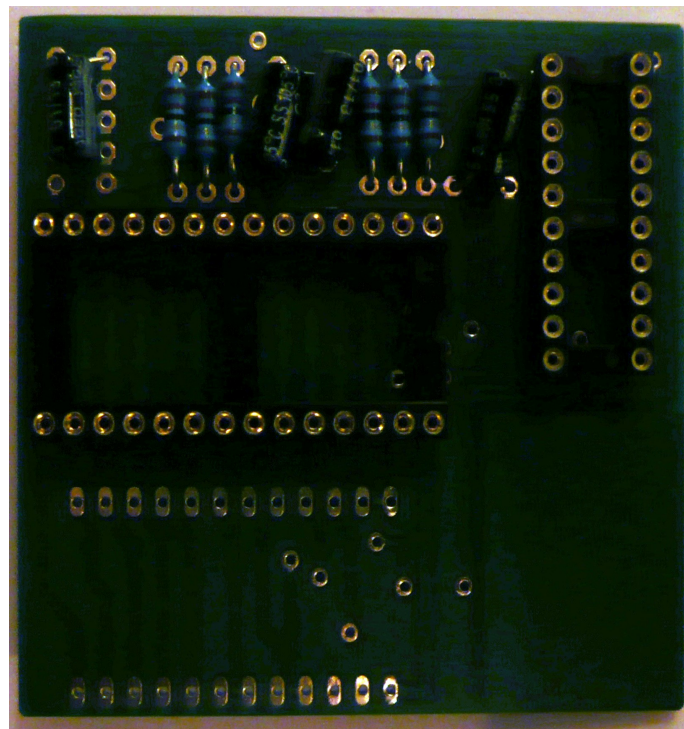
Assemble the sockets and solder them.

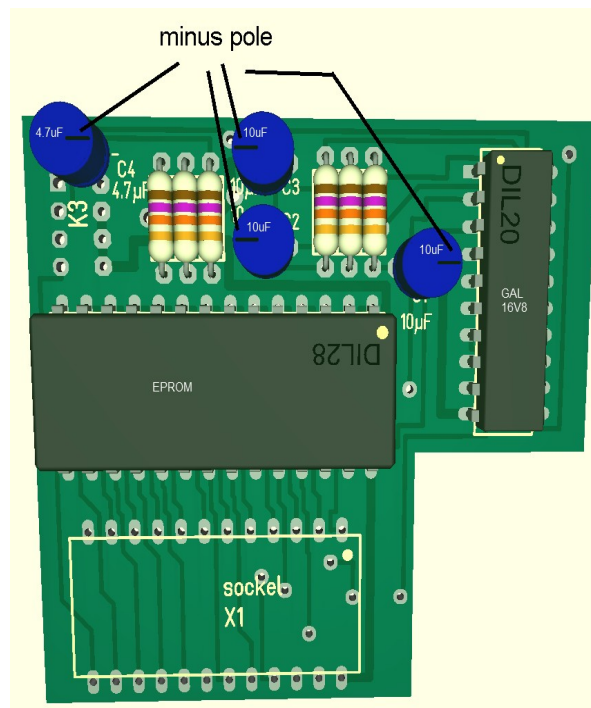
Before assembling the capacitors read chapter “The Reset Capacitor”

Assemble the capacitors and solder them, except the reset capacitor. Keep the capacitors 2mm above the board.



Later you can, if you like, bend the capacitors to reduce height.
The result should look like this.

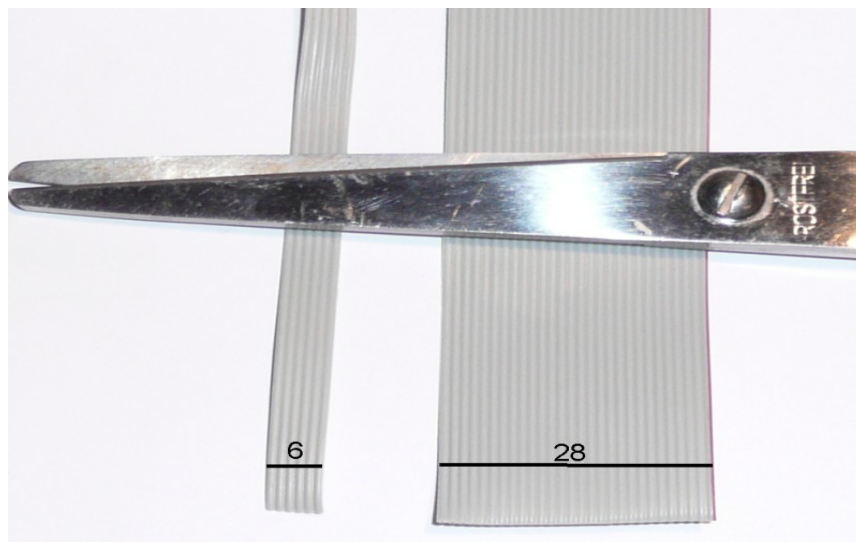




Step 4

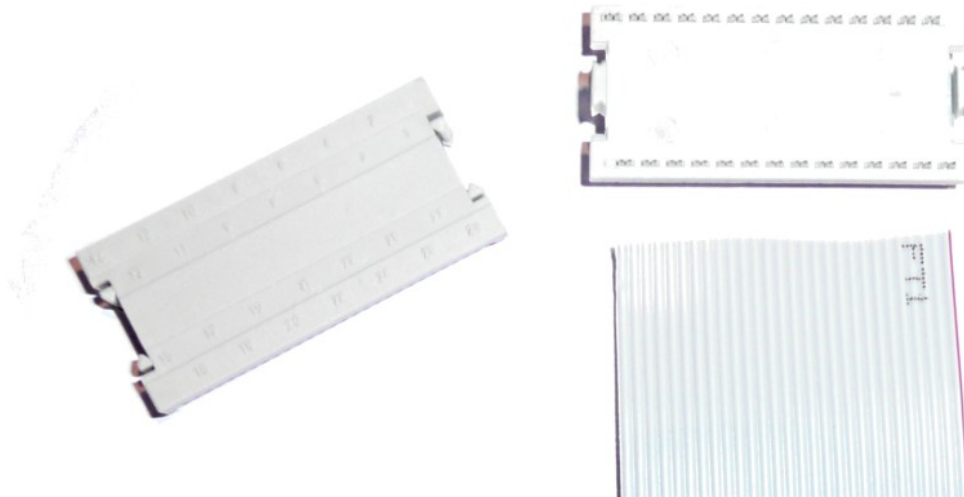
Prepare the cable by cutting of the ribbon cable according to your needs. The author suggests a length of 15cm, however keep it as short as possible to prevent EMC problems.

Strip down 6 cables cause we need 28 for the ribbon cable socket.



Step 5

The ribbon cable will be connected with the socket.



Shift the ribbon cable over the socket. The cable should fit tightly on the left and on the right side.



Put the upper part of the ribbon cable socket on top. The upper part must snap in.



Use a pipe wrench or a similar tool to press the top and bottom of the socket together. First on the left hand side than on the right side followed by the middle (not shown here).



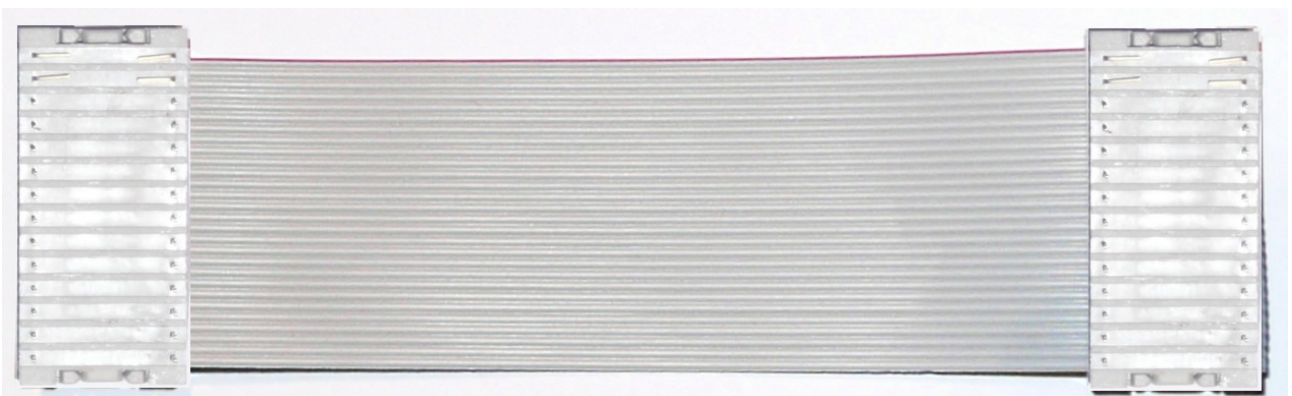


Install the socket on both ends of the cable to get the following:



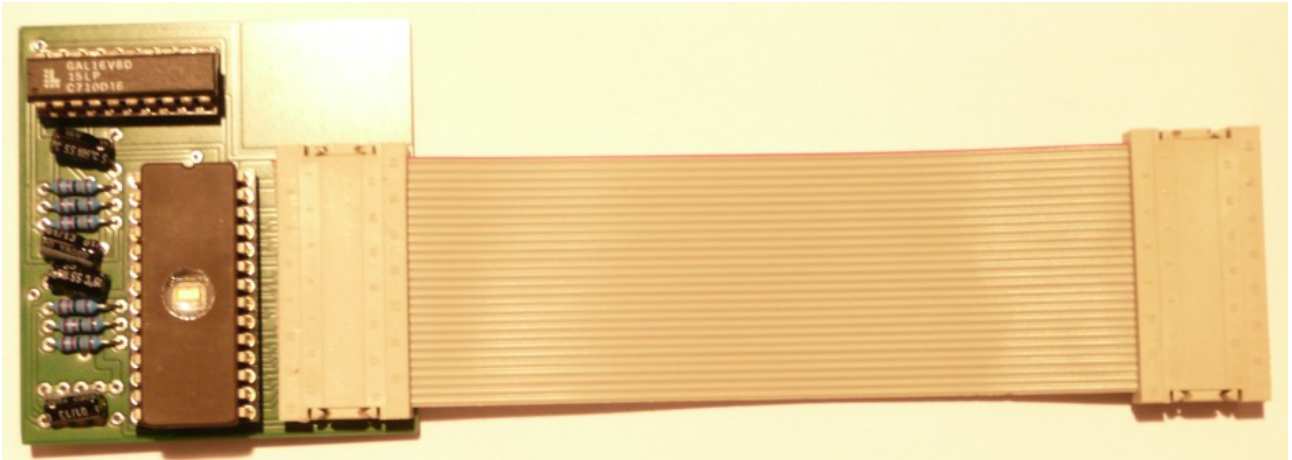
Step 6

Bend or cut off 4 pins on each end of the cable, cause the sockets have 4 pins more than needed.



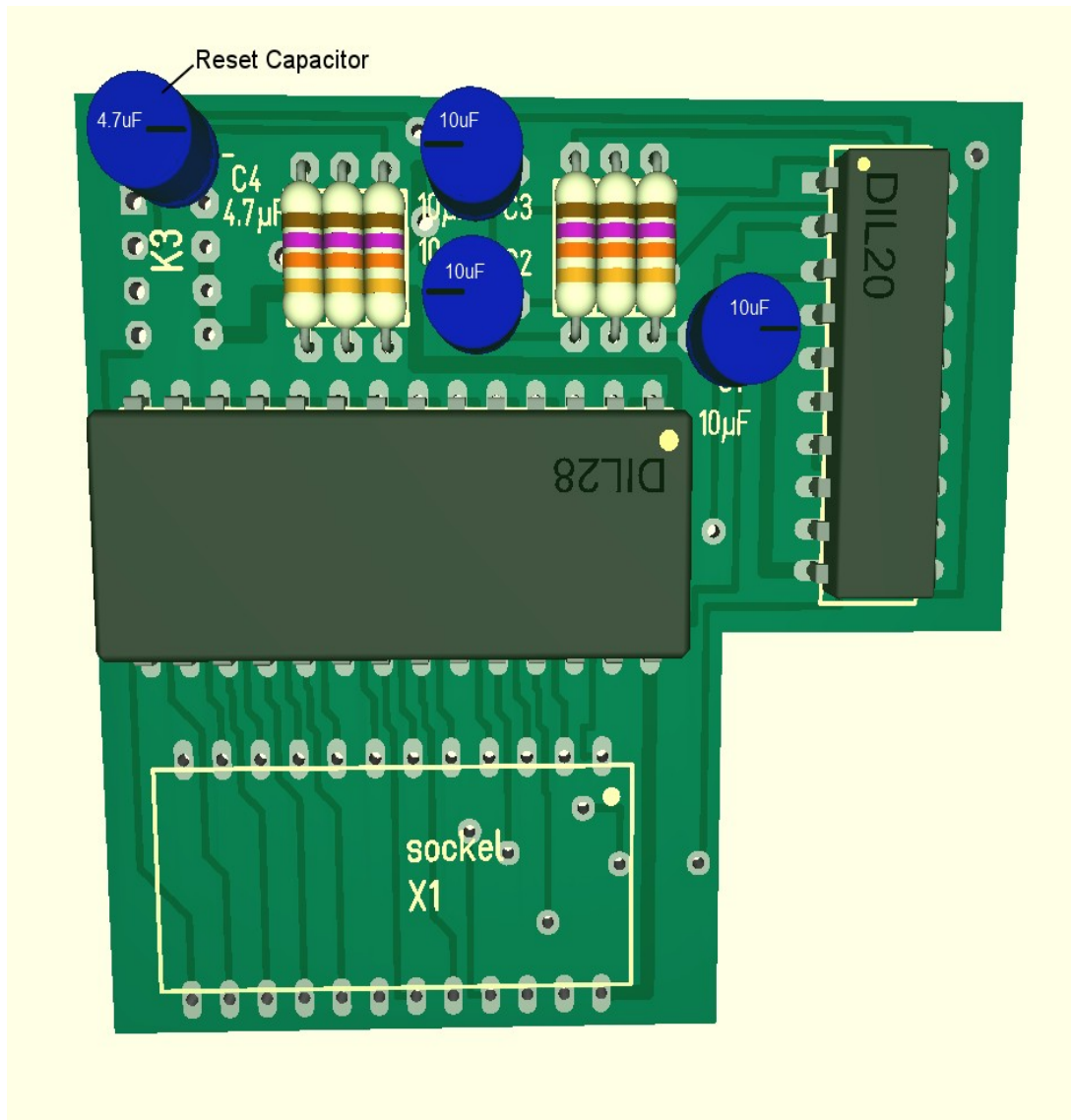
Step 7

Solder one end of the cable with the PCB. Put in the GAL and EPROM chip (must be programmed already).



5 The Reset Capacitor

The “reset capacitor” can be considered to be a parallel to the one originally soldered in the ZX81 or Lambda 8300. Thus the endurance of the reset pulse will be increased.



One major problem is to find the correct value for this capacitor. While the author of this document had ZX81 computers which worked perfectly with 4.7uF while other ones needed 10uF to work properly it seems to be difficult to define a default value valid for all machines.

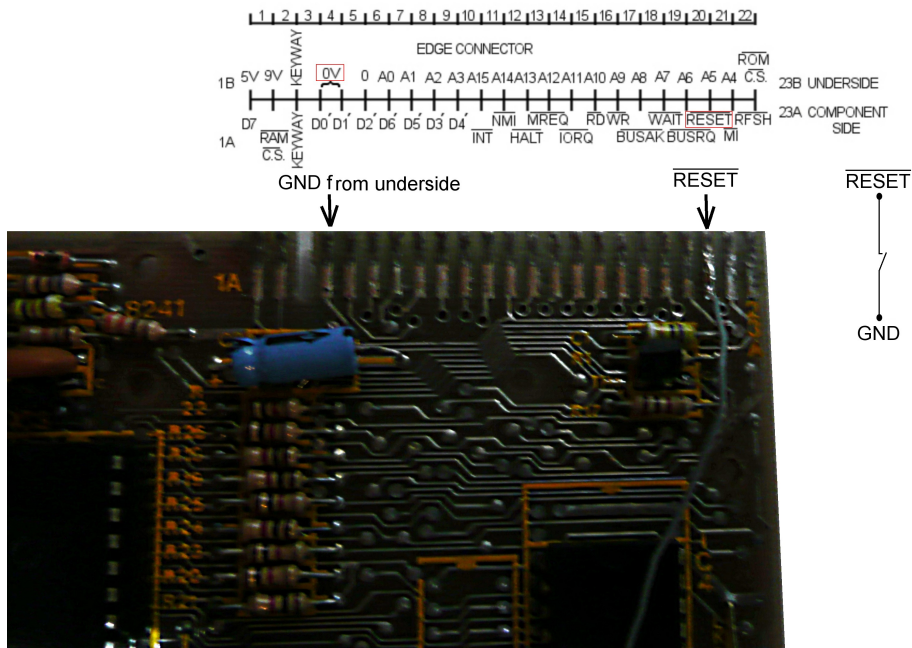
So before soldering this capacitor try the MULTIROM PCB without the “reset capacitor”. If the ZX81 needs a RESET pulse after switch on, to work properly, solder a 4.7uF “reset capacitor”. If this capacitor prevents the ZX81/Lambda computer to start up, solder a smaller one. If this capacitor still needs a second reset for starting up the computer, solder a bigger one.

It cannot be excluded that there are ZX81/Lambda boards which never will work 100% correct with the MULTIROM PCB!

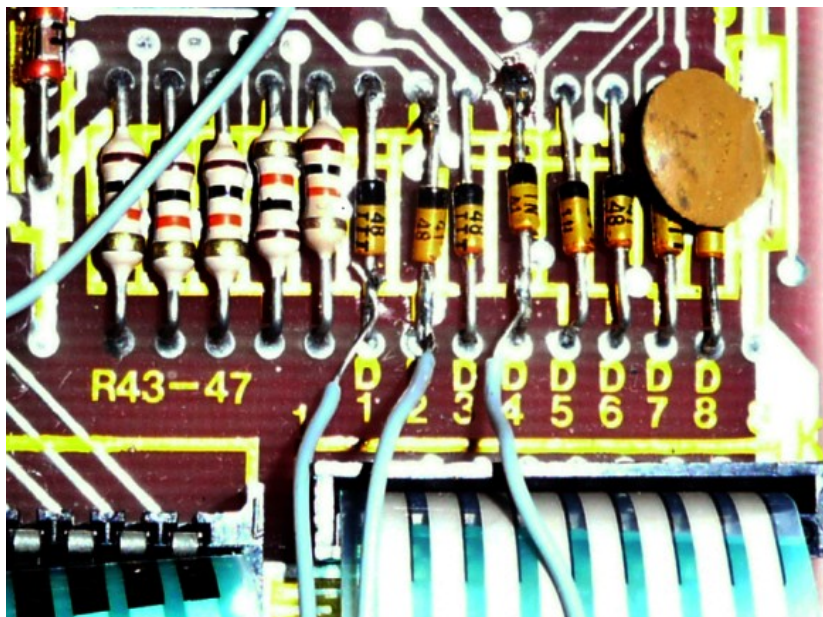
6 Installation In The ZX81

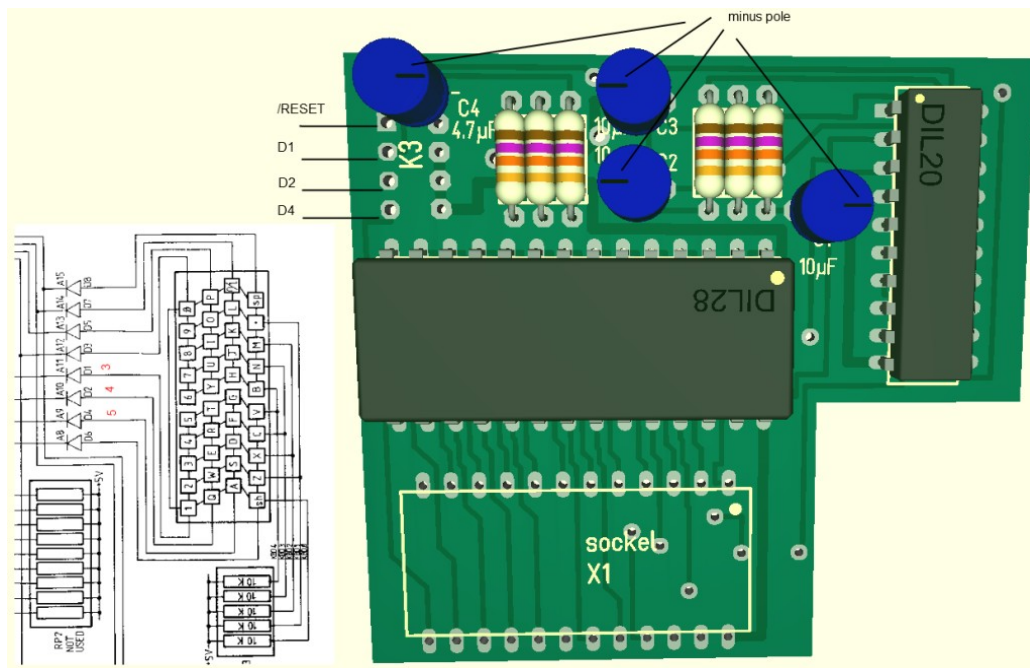
The installation can be done in the following:

- Solder a cable to connect the ZX81 RESET signal i.e. from expansion bus or from pin 26 from the Z80 CPU
- Connect GND/OV with RESET by a switch. (not shown in the picture)

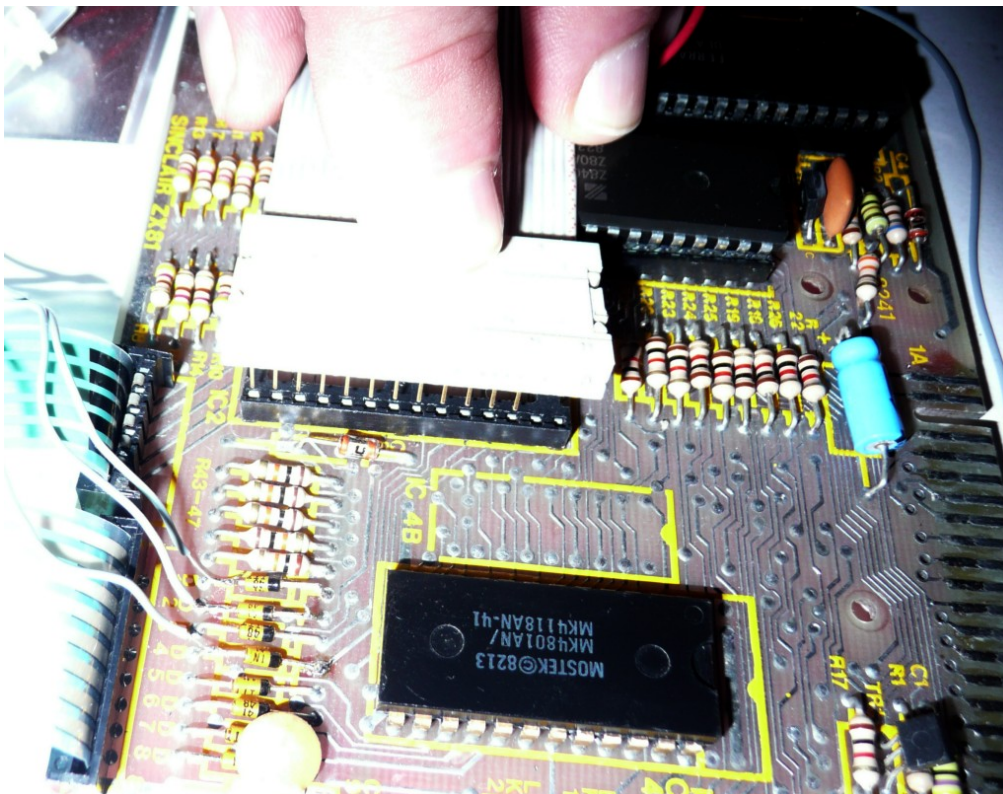


- Solder a cable to connect the signals D1, D2 and D4 from the ZX81 board with the multirom.

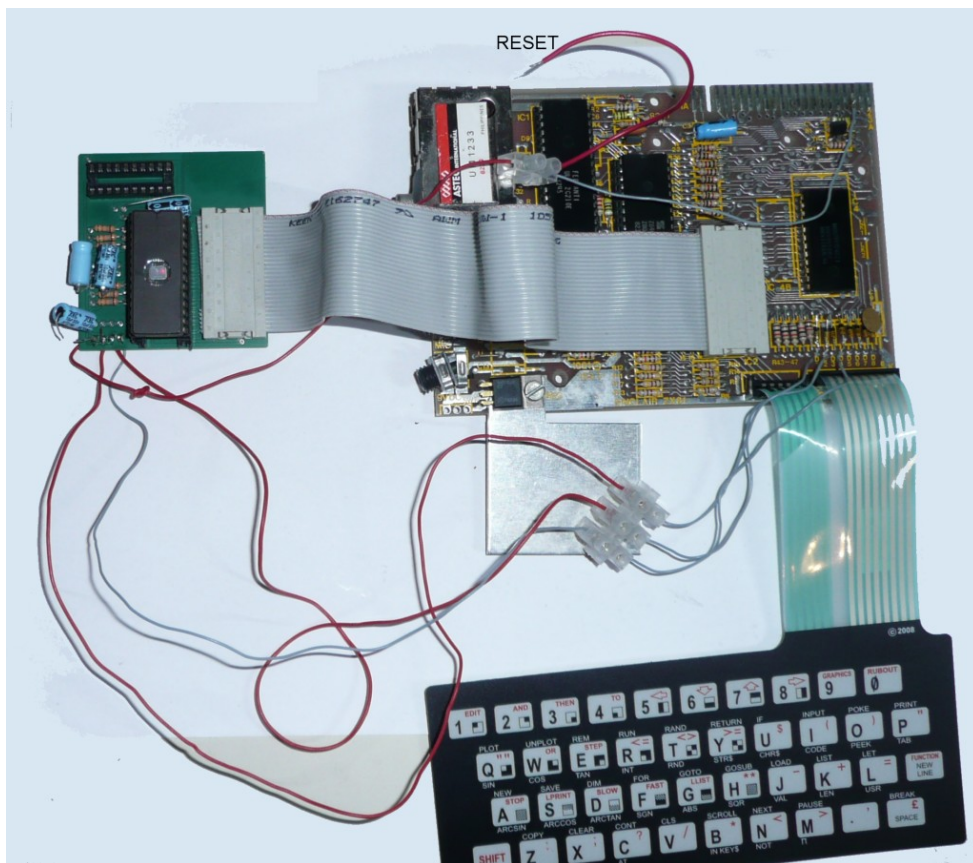




- Pull out the original ROM and plug in the MULTIROM connector.



The result may look like this (the picture shows a demo board, the luster terminals are not necessary, the reset switch is just a cable which can be manually connected with GND i.e. with the modulator shield):

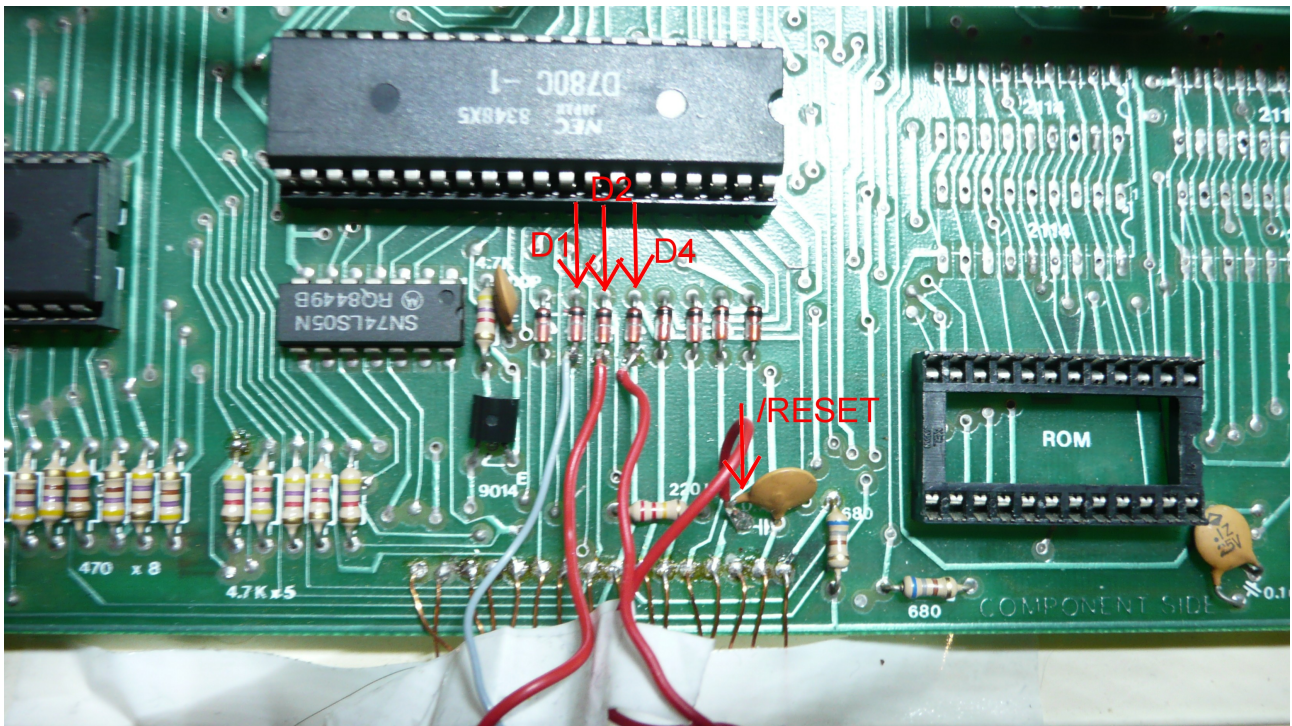


7 Installation In The Lambda 8300/Power 3000

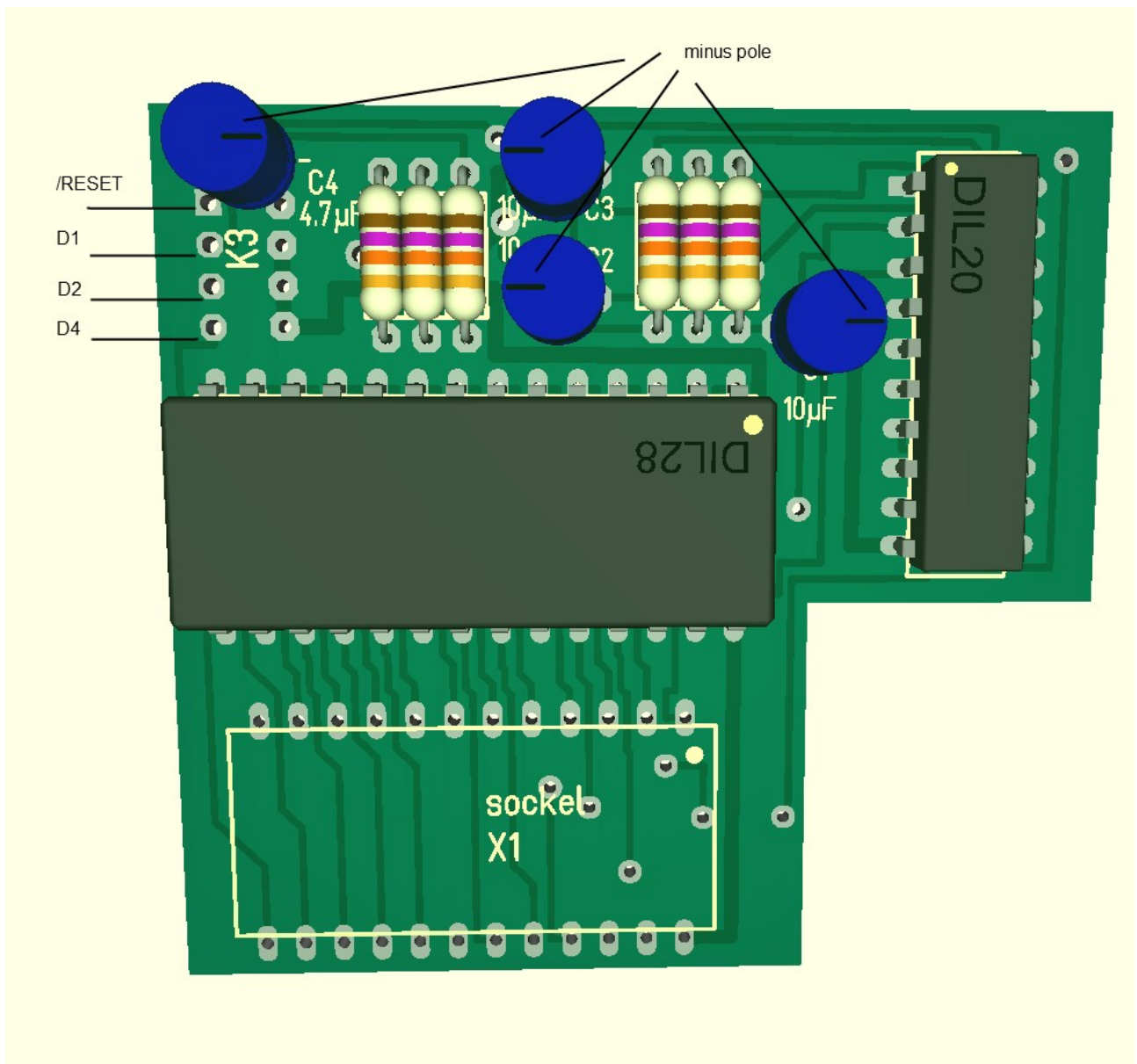
In principle the multirom has to be installed in the same way like in the ZX81. Main differences are:

- The Lambda 8300/Power 3000 has already a reset button on the keyboard, so no additional reset switch is needed.
- The lambdas keyboard signals have to be taken from a different area of the mother board.

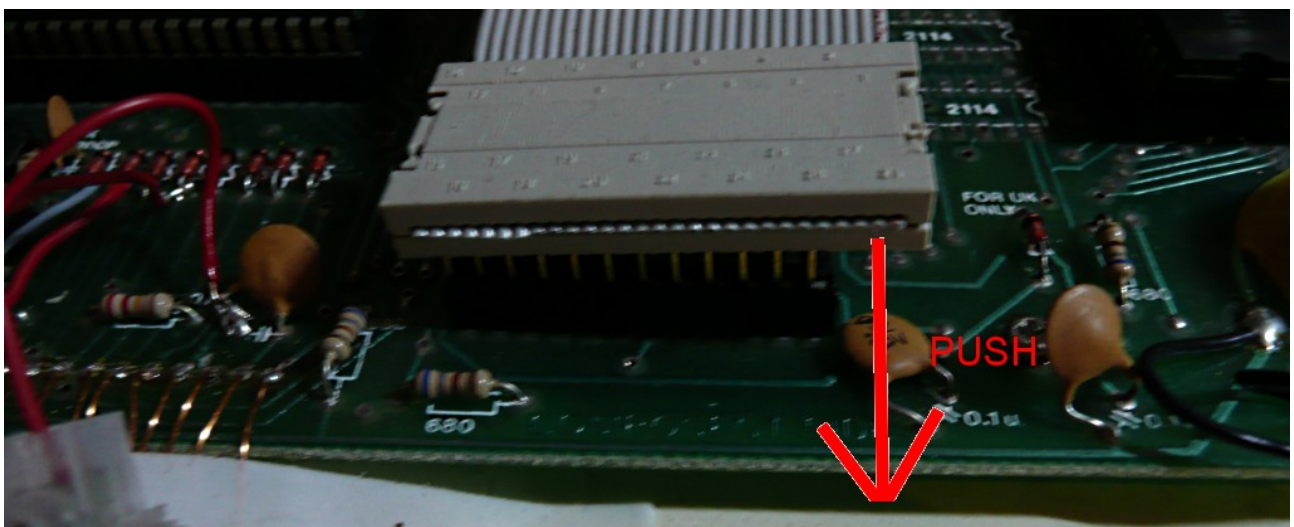
The following 4 cables have to be soldered:



Plug in the multirom PCB instead of the original ROM:



Of course the cable connector must be plugged in the socket completely:



8 Usage

After the multirom is installed an appropriate place within the case has to be found. To avoid shortcuts the author suggests to put the multirom PCB into an insulating plastic or self made paper bag.

If you want to use the multirom PCB external, just ensure that the ribbon cable is long enough. Protect the PCB from short cuts!

When you switch on the computer with a correct installed multirom the computer should start with the first burned ROM.

If you want to change now to another ROM press a combination of the keys 1,A,Q and similarly press the RESET button for two seconds. Release the RESET button and than the keys. To select the according ROM the following keys have to be pressed:

no key	---> ROM 0
1	---> ROM 1
A	---> ROM 2
1+A	---> ROM 3
Q	---> ROM 4
1+Q	---> ROM 5
A+Q	---> ROM 6
1+A+Q	---> ROM 7

The following ROMS are available and can be burned in nearly an arbitrary way. However for a ZX81 use only ZX81 ROMS, For a Lambda 8300/Power 3000 use only Lambda/Power-ROMS.

ZX81:

zx81 'shoulders of giants'.rom	(S)
zx81 version 1 'standard'.rom	(Z)
zx81 version 2 'improved'.rom	(I)
h4th (Forth).rom	(F)
aszmic (z80 assembler os).rom	(A)

Lambda:

Lambda 8300.rom	(L)
Lambda 8300 ROM modified ZX81 compatible.rom	(M)

So for example a combination for the ZX81 could be:

SZIFAFIZ

The following keys activate the following ROMS:

no key	---> SZIFAFIZ
1	---> SZIFAFIZ
A	---> SZIFAFIZ
1+A	---> SZIFAFIZ
Q	---> SZIFAFIZ
1+Q	---> SZIFAFIZ
A+Q	---> SZIFAFIZ
1+A+Q	---> SZIFAFIZ

For the lambda a combination could be:

LMLMLMLM

The following keys activate the following ROMS:

no key	---> LMLMLMLM
1	---> LMLMLMLM
A	---> LMLMLMLM
1+A	---> LMLMLMLM
Q	---> LMLMLMLM
1+Q	---> LMLMLMLM
A+Q	---> LMLMLMLM
1+A+Q	---> LMLMLMLM

Of course the user is free to define the combination ROMS within the Eprom when the order is sent to the author, or he can burn the Eprom himself with any kind of combination of ROMS.

9 Contact

In case of questions or problems please contact the author of this document by mail:

asgi99@gmx.de