

MOS 6529 Single Port Interface replacement

Installation instructions

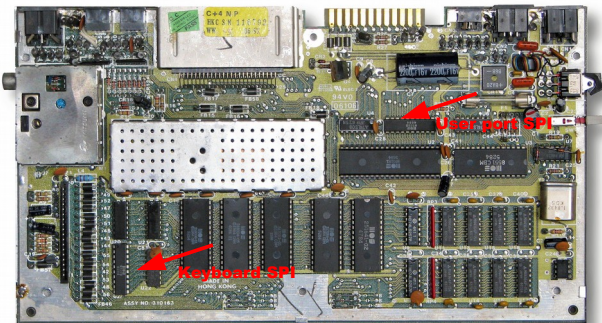
Enclosed in the package is a soldering kit to build a replacement for the MOS Technology 6529 Single Port interface. It is a full replacement that supports both reading and writing to the port. It is compatible with the Commodore 16, 116 and Plus/4 computers.

74xx652 or 74xx654

The main component of the replacement is a 74xx652 or 74xx654 IC. In order to replicate the weak pull-up behaviour of the 6529, the open-collector outputs of the 654 are useful. However, the 652 is more common and easier to find. Because of this, the PCB has been designed to be compatible with both the 652 and 654. In case of a 652, diodes on the outputs are used to get similar behaviour as with open-collector outputs. In the case of a 654, these diodes are replaced by 0 ohm resistors.

Space considerations for Plus/4 keyboard SPI

Space is tight in the Commodore 116 and Plus/4 computers. The replacement has been designed to be compact in size in order to fit into these computers. Nevertheless, if you want to replace the SPI in the Plus/4 that handles the keyboard, you must not use sockets. Do not install a socket into the mainboard, and solder the 74xx65x directly into the PCB. It will be a permanent modification.



Instructions for assembly

In order to the assembly, the following tools and materials are recommended:

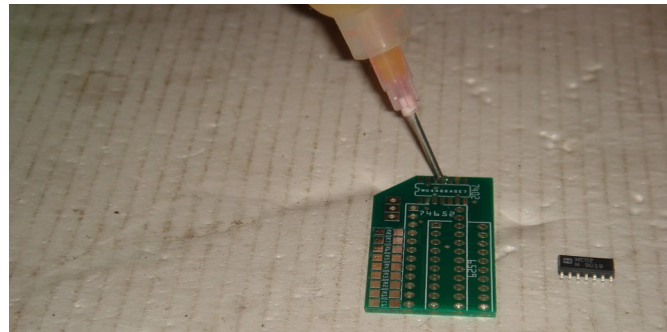
- Soldering iron
- Multimeter
- Tweezers
- Soldering tin
- Soldering flux

In order to correct errors, you may want to have:

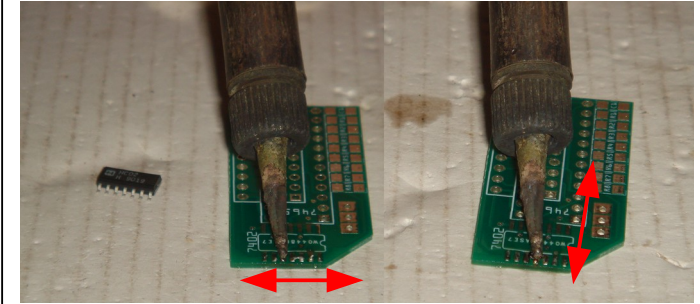
- Desolder wick
- Hot air gun

The replacement PCB needs SMD components. There is not a single truth in the best approach to SMD soldering, therefore what follows is the way I do it myself, but you may want to take a different approach if that suits you better.

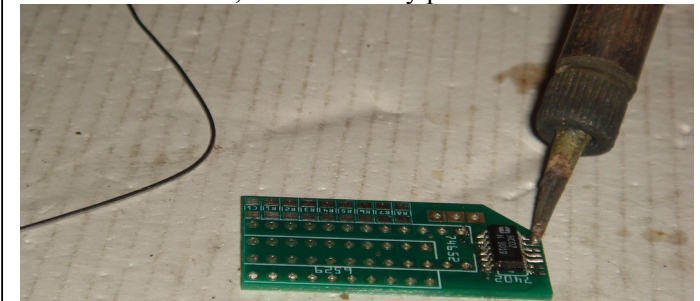
We will start soldering the 74xx02. Start by applying some flux to the PCB:



Next we will tin the pads that the 74xx02 will connect to first. Now, if we would tin each pad one-by-one, we would quickly get too much solder on each pad. Therefore, apply tin on a random pad, and move your iron left-and-right quickly to spread the solder to the other pads:

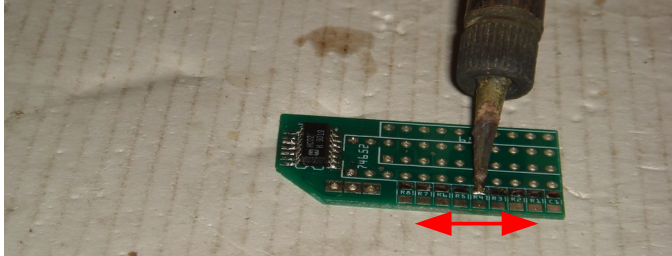


You will create bridges between pads in the process, but these will disappear when you move your iron back and forth. Next, place the 74xx02 on the pads, hold it in place with e.g. tweezers and drag with your iron along the pads. The pins will get soldered to the board, repeat for the other side of the IC. The 74xx02 is soldered. The advantage of this soldering method is that as long as the IC is not soldered on the board, you can very easily remove excess solder with soldering wick. Therefore the chance of creating bridges is much lower than when you apply tin with the IC in position. Should you a bridge with the chip already in place, try to remove it with solder wick. If that doesn't help, don't keep trying but remove the IC with hot air and start again. If it went fine, reheat every pin and push it downwards to towards the board with the iron, to ensure every pin is soldered:

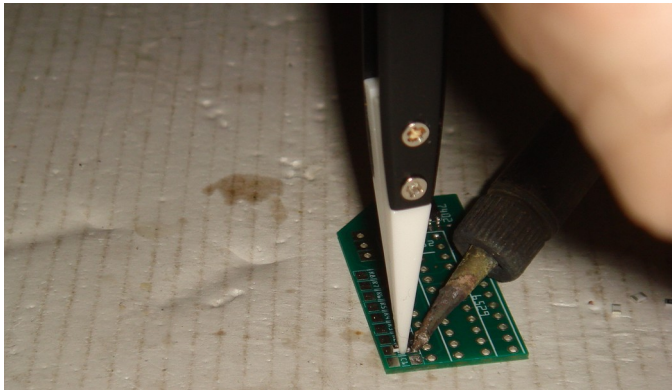


Test each pin with a multimeter with one probe gently touching the leg and the other touching the pad.

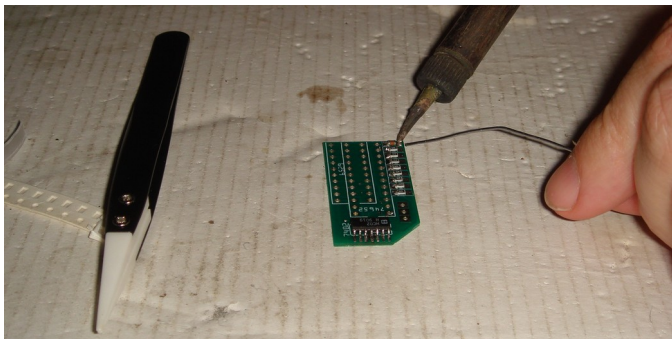
Now start soldering the smoothing capacitors and pull-up resistors. Using voltage dividers the pull-up resistance of the 6529 was found to be approximately $8k\Omega$, resistors between $6k\Omega$ and $10k\Omega$ should get the right results. I recommend to tin the pads on one side first:



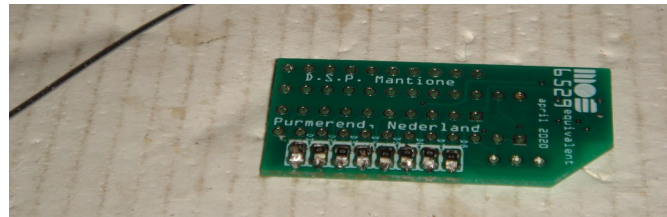
Then, heat up the pad and put the component in place with tweezers using your other hand:



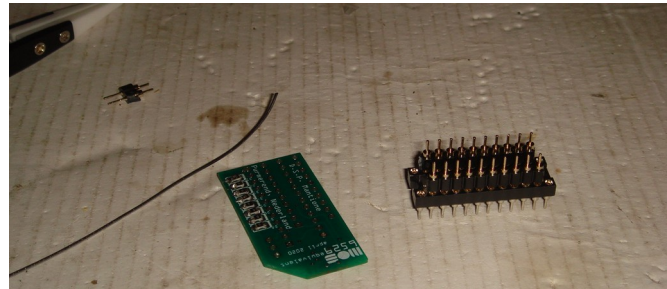
Then apply solder to the other side of the component:



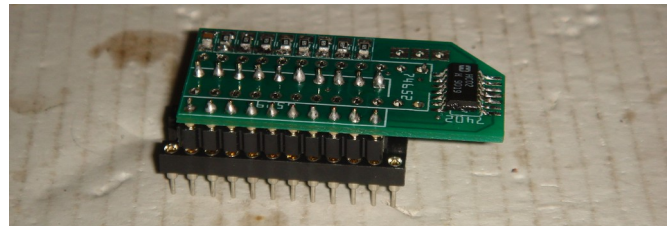
If you are using a 74xx652, solder diodes on the bottom side of the PCB. If you are using a 74xx654, solder 0Ω resistors to the bottom side of the PCB:



Prepare the headers by inserting them into a socket:



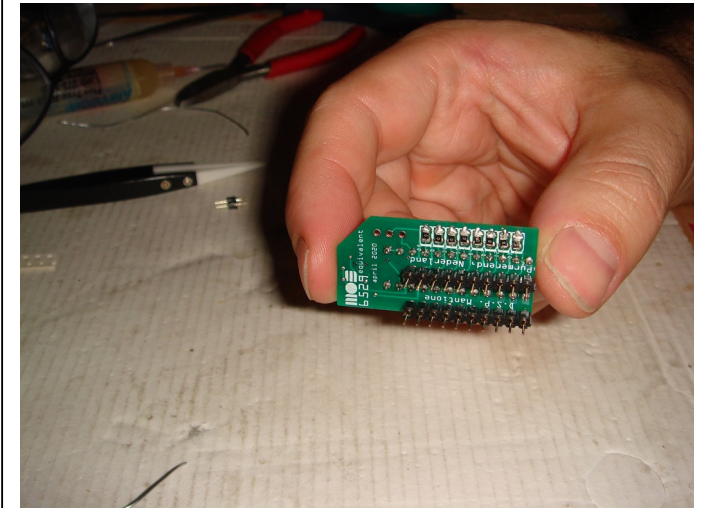
Place the PCB on top. **Important:** The 74xx02 goes on the top side of the PCB, the MOS logo goes on the bottom side! Solder the PCB to the headers.



Next, solder the socket and add the 74xx65x, but, if you are replacing the keyboard SPI of the Plus/4, do not solder the socket, but solder the 74xx65x directly!



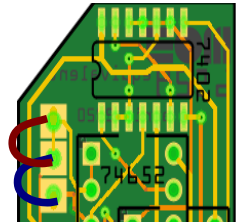
Done! You have now built a 6529 SPI replacement:



The SPI replacement can now be inserted into the Commodore 16, 116 or Plus/4. The keyboard, joysticks and user port should behave normally. In case of problems, please test the board with a multimeter if all connections have been made correctly.

Jumper setting

The PCB contains an optional jumper that can be used to adjust the behaviour during read. By default the jumper is connected as indicated with the red line. In this mode, an output that is low will remain low during read, which means that you can only read from that pin if you set it high. This is compatible with the 6529. If you break the connection and create the blue connection, the adapter will stop driving the pins during reads, so you no longer need to set a pin high in order to read. The caveat is that you can accidentally transmit data while reading on pins intended for output.



Contact

In case of problems, you can contact me on daniel.mantione@freepascal.org. Besides, English, you can also write me in Dutch, German, Italian or Afrikaans.