

User Guide

Introduction

I have recently acquired an Amiga 500 and wanted to expand its capability by adding a Gotek drive but didn't want to lose the internal floppy drive. I soon came across some of the restrictions of the A500 design which basically meant that if you have the Gotek as the primary, bootable drive the internal floppy drive (df1) wouldn't work. I could have course have gone down the external floppy route but I didn't want all that stuff hanging out the back of the Amiga.

So I started this project with these objectives:

- To support two floppy drives internally to the A500
- To be able to switch which one is bootable
- For the second drive to always be available
- Not to require any irreversible change to the A500
- Not to have any connections out to the external drive port

There are a number of issues to overcome to achieve these objectives:

1. All of the needed signals need to be picked up from the motherboard
2. A motor control signal has to be generated for the second drive
3. A drive identification has to be generated for the second drive
4. Some means of switching between the drives needs to be devised

The Design

There is a well known circuit to achieve 2. and 3. (see

http://www.primrosebank.net/computers/amiga/upgrades/amiga_upgrades_storage_fd_con.htm)

which needs the MTRX, IORESET and SEL1 signals as input and produces MTR1, RDY and INUSE as output. This design makes use of NAND gates from a 74LS38 and a D-Type Flip-Flop in a 74LS74.

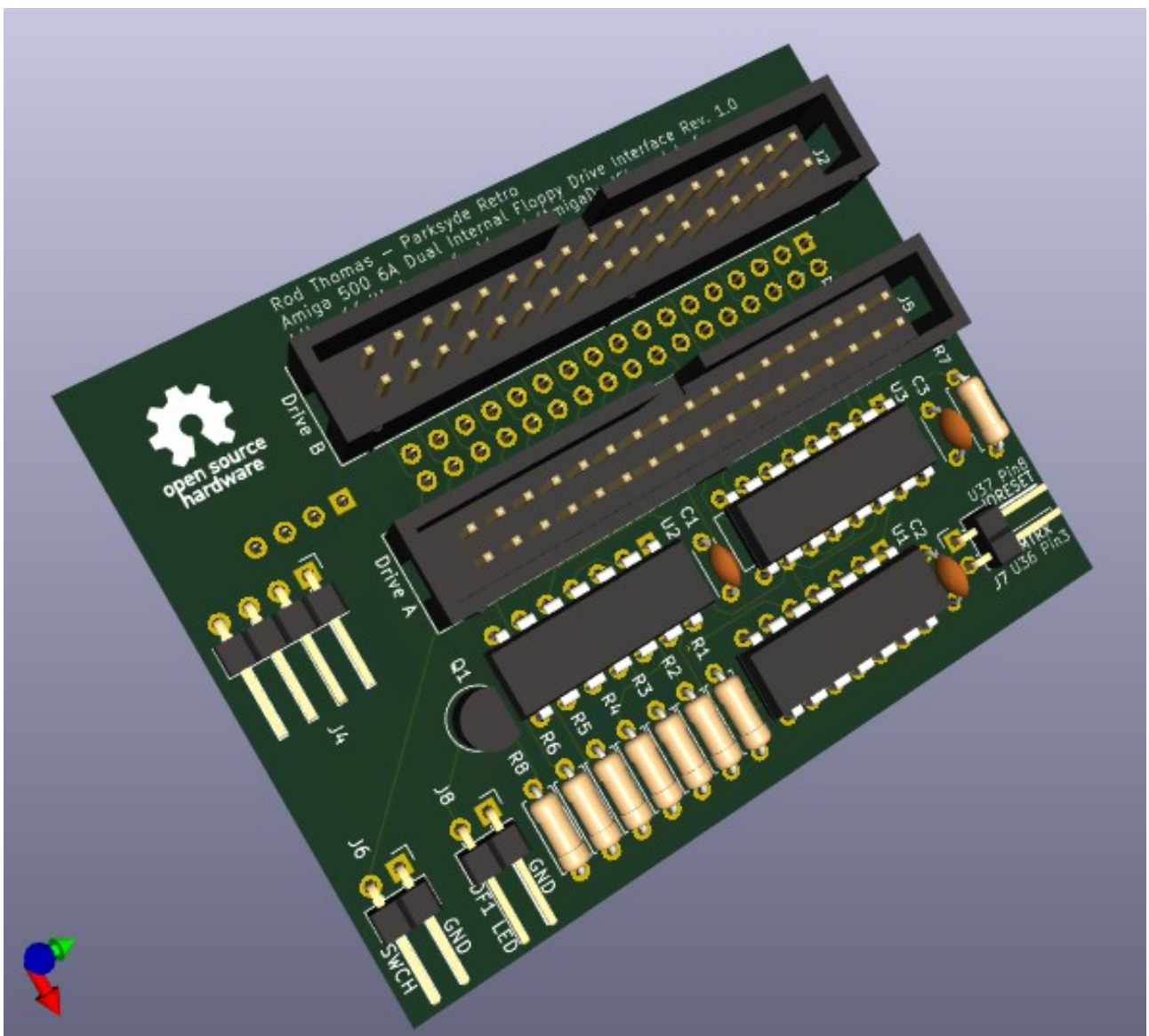
Amiga A500 6A Dual Internal Floppy Drive Interface

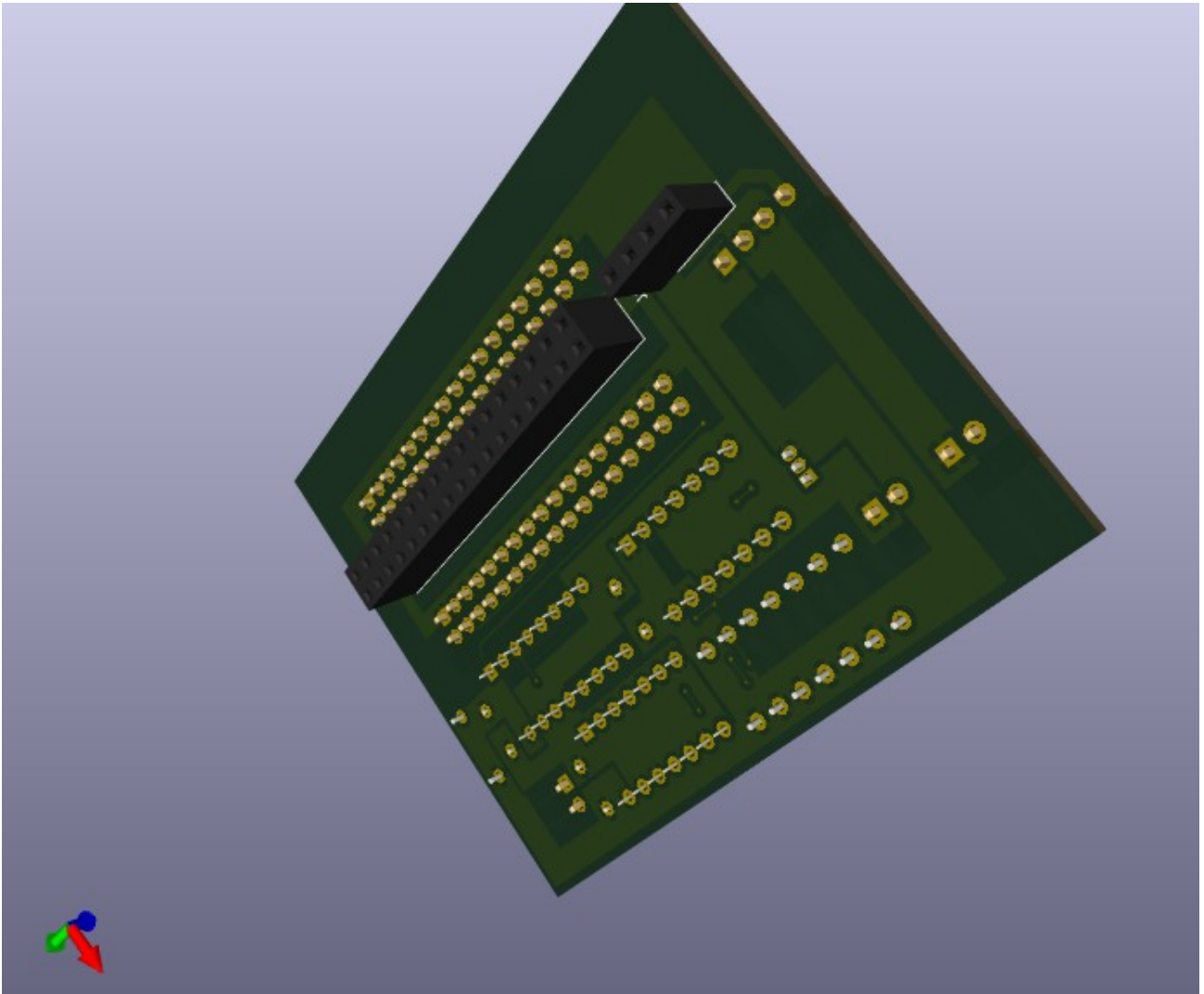
A common way to achieve switching is to add some circuitry under the EVEN CIA chip, which gives access to SEL0 and SEL1 but not MTRX, RDY or IORESET. This design instead uses the floppy interface which provides everything except MTRX and IORESET which can be picked up from nearby U36 and U37 respectively.

In order to provide switching it uses a multiplexer chip (74LS157) to swap both SEL and MTR lines. Switching is effected by a single input being pulled to ground.

To provide an activity indication for the second drive the df0 circuit from the motherboard is duplicated for df1 and with a connector allowing an LED (and associated resistor) to be attached and located wherever needed.

The design was created using KiCad, the project files are in the KiCad folder. Production ready files are provided in the KiCad/Gerber folder and PDF versions of the schematic, BOM and PCB are provided in the Docs folder.

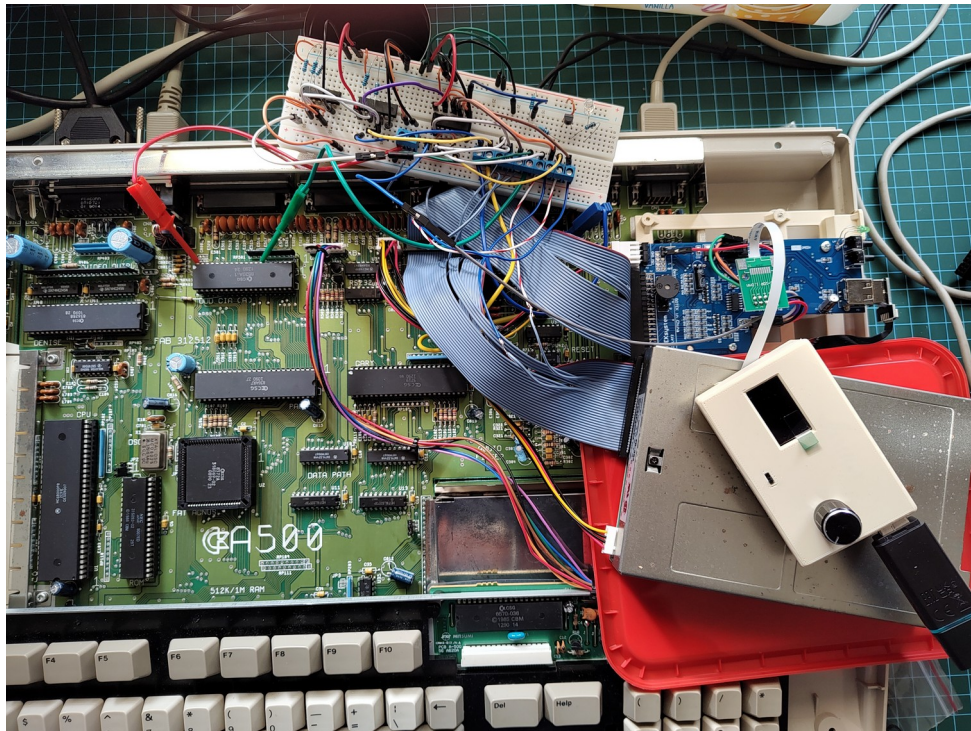




The board is designed for an Issue 6A A500 board as that is all I have. It may well work with other motherboard issues but I can't guarantee that as the relative positions of components could have changed.

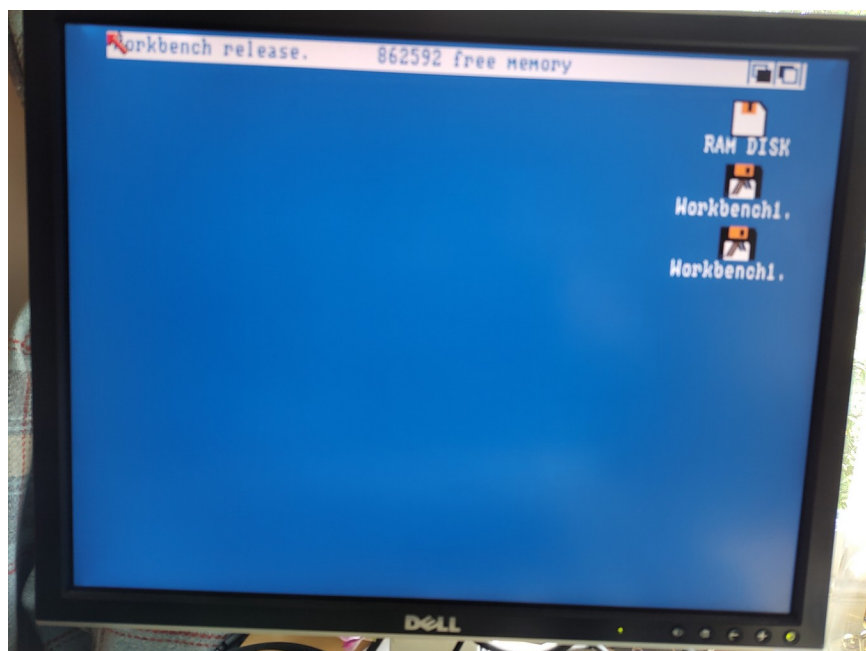
Testing

To prove the design I lashed up a breadboard and butchered a ribbon cable to pick up the required signals. The two probes on the ODD CIA are purely for power and to inject the RDY signal and won't be needed with the PCB.



It worked very well, both drives were visible regardless of which was selected as the boot drive. I had Workbench 1.3 in both the floppy and Gotek so I could boot from whichever was selected.

One quirk that I've noticed is that if the same Workbench 1.3 disk is in both drives it can get very confused when booting up, sometimes prompting to put the Workbench disk in any drive, but not finding either – very odd.



Building the Board

The assembly is pretty straightforward but the right order of fitting components can make life easier. I fit the female 34 way connector and female 4 way connector to the bottom of the board first. Its very important to get these sitting flush and perpendicular to the board to ensure it will fit onto the motherboard. I tack a couple of pins and then adjust before soldering the rest of the pins.

The other components I fit in this order:

- Resistors (make sure the right values go in the right positions)
- ICs
- Pin headers
- Capacitors
- Transistor
- Box Connectors

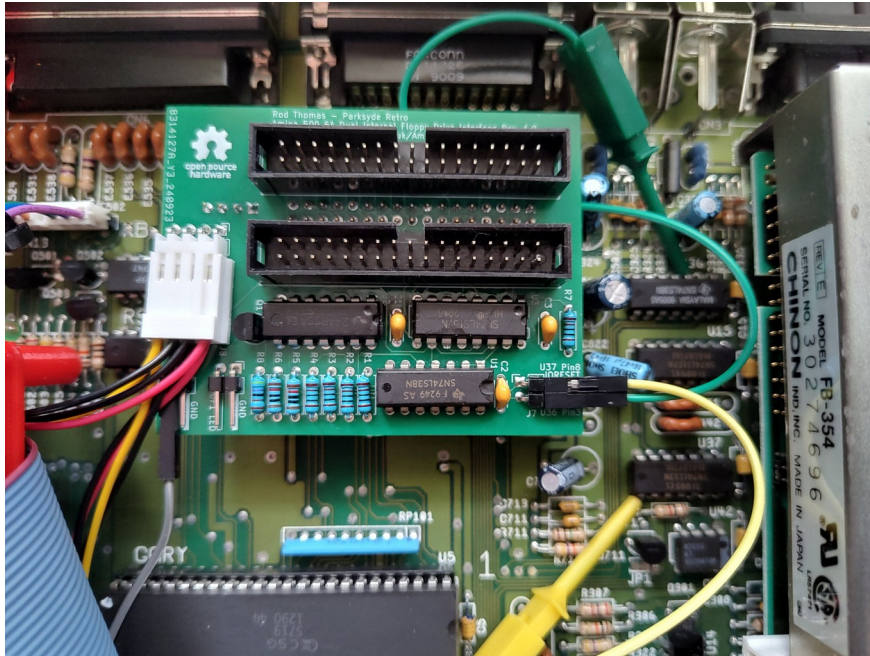
A bit of Blu-Tak is always handy for holding components in position while you solder.

The flying leads are simple to put together.

- Strip a few millimetres and tin the wire
- Pull off the shroud from the probe and feed the wire through it
- Solder the wire onto the probe
- Refit the shroud

Fitting the Board

The board fits onto both the Floppy Drive connector and the Floppy power connector. Two flying leads need to be connected. One from the IORESET pin to pin 8 of U37 and one from the MTRX pin to pin 3 of U36. I'm using clip on probes so that the mod is reversible but I have found that this can be a bit flaky as the probes can lose connection. A more secure connection can be made by soldering the flying leads onto the pins.



The board has separate IDC Box Connectors for the two internal drives and a power connector to which a Y-cable can be connected to provide power to the two drives. Since one of the drives is anticipated to be a Gotek (which does not consume much power) this should not overload the system.

A switch can be connected between the SWCH and GND pins to effect changing which is the boot drive. N.B. Switching should only be done with the Amiga off, otherwise confusion will reign! If switching isn't required, fit a jumper to boot from Drive A (Floppy) or leave it open to boot from Drive B (Gotek).

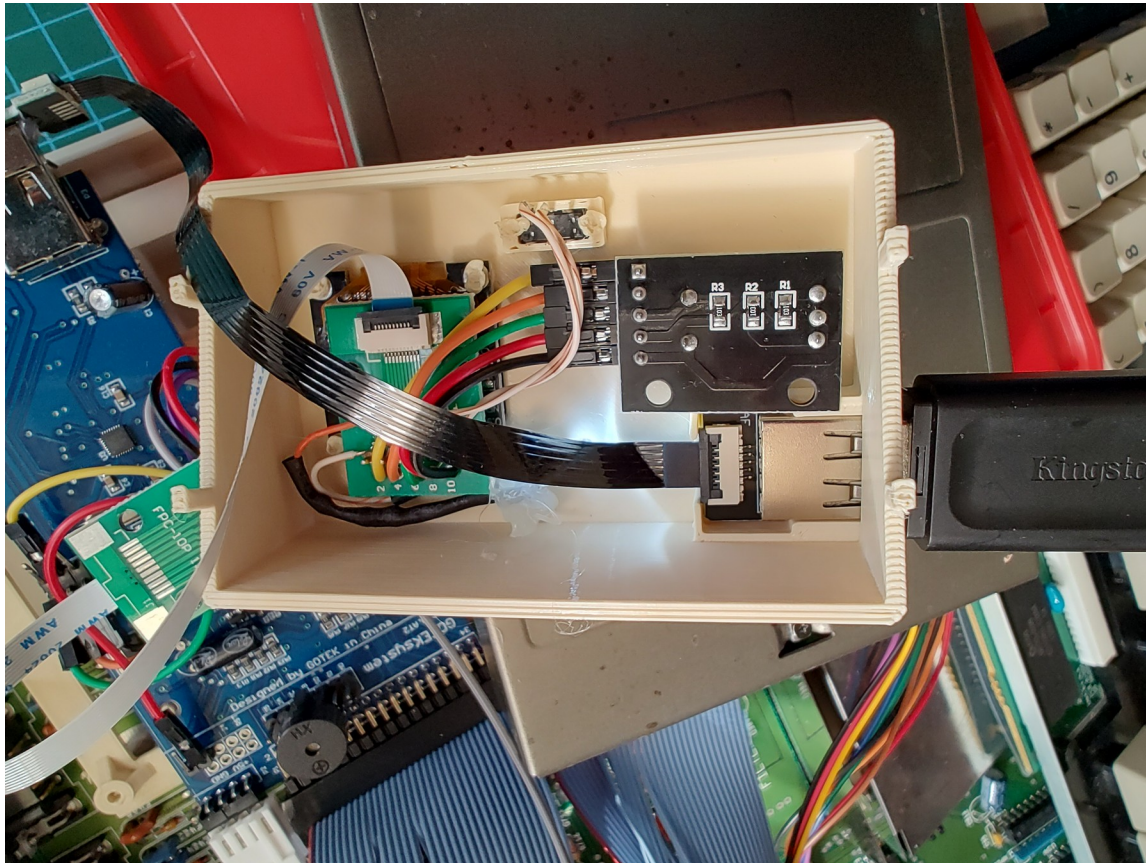
Both drives should be configured as drive 0 in keeping with normal practice for Amigas.

The Gotek Controller

With the Gotek nestling inside the case there needs to be a way of controlling it. My solution to this is to connect the OLED display, rotary controller and drive switch signals to an FFC breakout board allowing an FFC cable to be threaded through the Amiga vents to a 3D printed enclosure for the display, rotary controller and drive switch.

In a similar fashion, a USB extension cable using an FFC can also be fitted in the same way so that the memory stick can be inserted into the external box.

Amiga A500 6A Dual Internal Floppy Drive Interface



I've also come up with a novel solution for fitting a buzzer to the Gotek. It simply uses two open ended jumpers allowing the buzzer to be plugged in directly.

Finally, I fitted an LED to illuminate an Amiga logo embedded in the enclosure. ☺

