

## Opus Discovery PC drive upgrade

Thank you for purchasing this upgrade to enhance your Opus Discovery with a modern PC drive (or two)!

This upgrade will allow you to store over four times the amount of data (800KB) compared to the original Opus Discovery drive (170KB).

The disks formatted with the new drive will also enable you to exchange software on a PC floppy drive (with an emulator or tools like SamDisk).

This manual describes how to install one or two modern PC drive(s) to use as DSDD - double sided double density - drive(s) in your Opus Discovery.

### Installation steps

The underneath steps show how to configure the new drive as the first drive on your Opus Discovery, and the original Opus Discovery drive as drive 2.

Only where there are differences with the upgrade of two DD drives, it is indicated.

1. Remove the metal piece on the drives side that covered the hole of the second drive



You don't need this anymore.

2. Disconnect the cables of the original floppy drive

One from the power and one flatcable.

3. Unscrew and detach the plate with the original floppy drive

Some Opus Discovery interfaces do not have a detachable top plate. If yours doesn't have one, simply continue with the next step.

*Be careful with the voltage regulator that is connected to the bottom of the top plate!*

*If wires come loose, you will have to reattach them, which can be a nasty job (especially if the wires or pins of the regulator break).*

I usually unscrew and detach the regulator too, so its wires can't break accidentally.

If it's too risky, leave the top plate on and continue with step 2; it's not mandatory to remove the top plate, but it is handy as some new holes must be drilled!

4. Unscrew the original Opus Discovery drive

Keep the non-metal shield that comes off on the bottom (if your Opus Discovery has that); it's for protection of the power circuit and must be reattached with the new PC drive.

5. Insert the 6116 ram chip and replace the rom

This can be a bit tricky because of the short wire length to the regulator that is attached to the plate with the floppy drives, when you have detached that.

When you weren't able to detach the plate, you can reach both chips / sockets from the edge connector on the right.

Use a screwdriver or pliers to remove the original rom.

*Be very careful when inserting the new chips; the legs of both chips will easily get bent or break!*



6. Change the drive select jumper on the Opus drive to drive 2

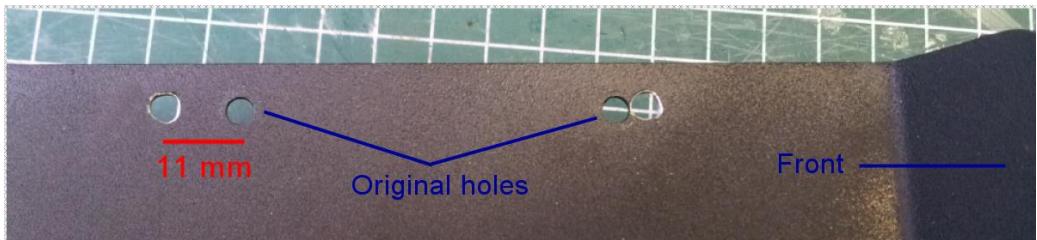
Of course this is only needed when you are still going to use the original drive.



7. Reattach the original drive on the other side of the plate

Again, only if you are going to use the original drive.

8. Create 2 new holes on the side where the original drive was



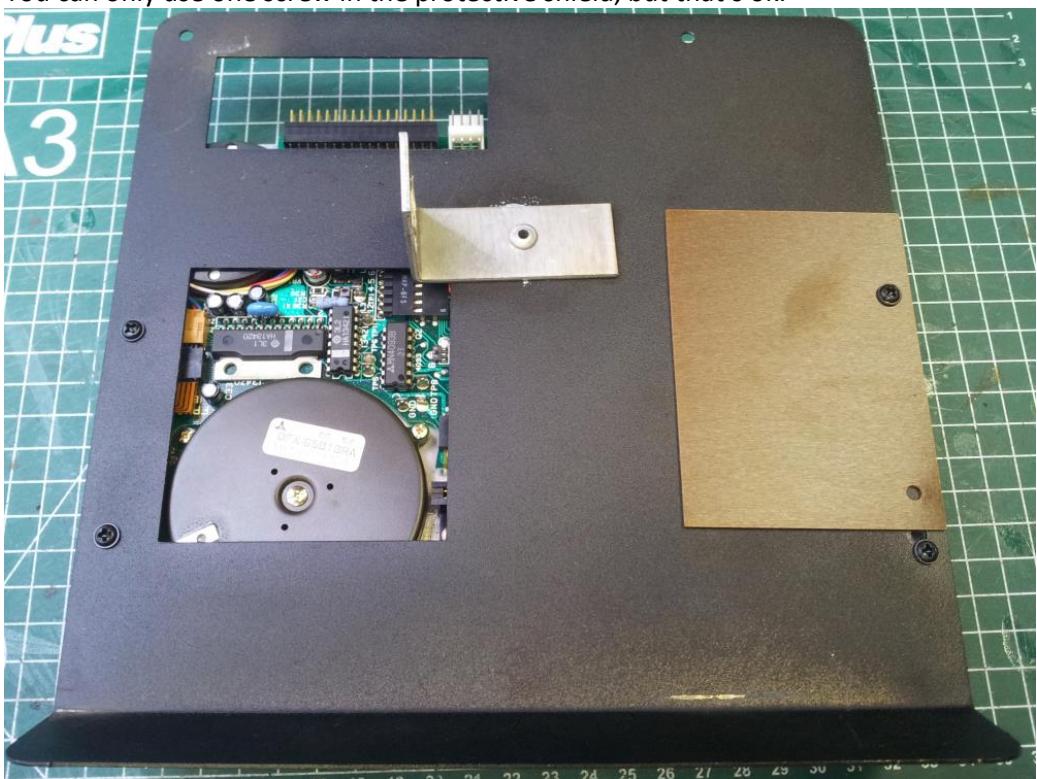
When you are upgrading to two PC drives, do the same at the other side of the plate.

**Be sure to remove any drilling residue by using a vacuum cleaner or by vibrating the metal dust out!**

#### 9. Fix the new drive(s) and the protective shield

The protective shield must be mounted at its original side.

You can only use one screw in the protective shield, but that's ok:



**10. Connect the new flatcable to the Opus Discovery circuit board**

Connect it to the second connector behind the fixed connector for the first drive.

The twisted side will be connected to the Floppydrive, so connect the other side to the board. The red wire should be on the side which says "1" on the board (the original fixed cable might have the red wire on the opposite, wrong, side).

**11. Reattach the top plate with the two floppydrives**



**12. Connect the power cables**

Make sure you connect the power correctly: the yellow wire usually is the 5V line (not sure if that is consequent on each Opus Discovery).

Connector pinout:



On original Opus drive:



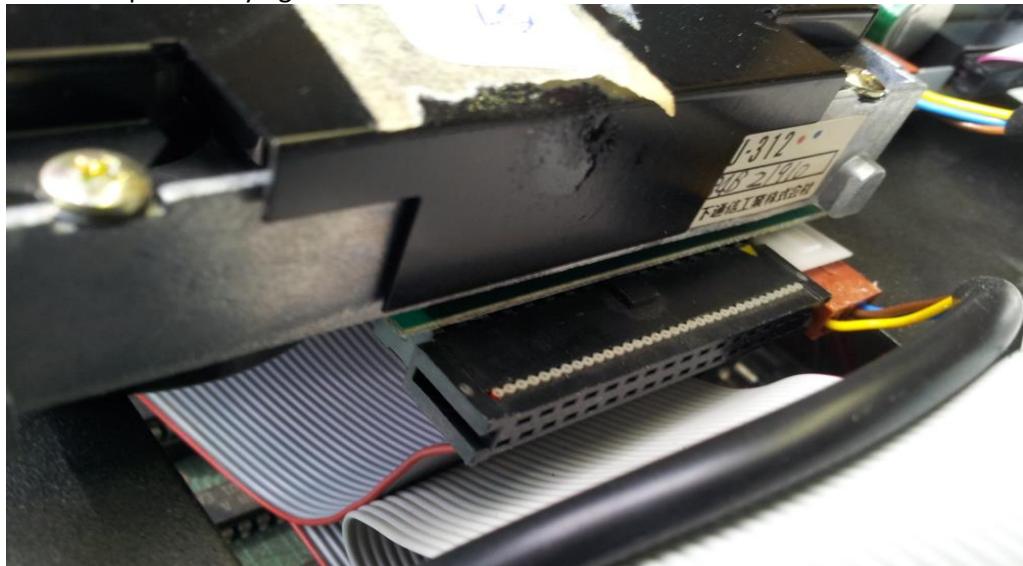
On PC drive:



### 13. Connect the flat cables

Connect the old cable (that is fixed to the Opus board) to the old drive (or second PC drive). Note that the red wire isn't on the correct side on the original cable, but the connector has a yellow marker for pin 1.

Here is a photo of the original drive and the orientation of the flatcable; you can put the cable under the metal plate carrying the drives:



On the PC drive the cable should be the other way around!  
It is a bit harder to put the cable away then.

Connect the new cable with the twisted side to the PC drive:



### 14. Test the set

Before continuing, test the set carefully before closing it with the top cover.

### 15. Close the top cover

## **Formatting and copying**

The disk labeled 'copy' and 'format' contains two utilities needed to use DD disks.

Enter 'RUN' after booting your ZX Spectrum with Opus Discovery and the autoload program will ask you which of these programs you want to use, or follow the loading instructions underneath.

### format

Formatting using the standard command will always format to 40 tracks, single sides, etc.

To use the full capacity of the new drive, you will need another formatting utility.

Load the format tool by:

LOAD \*1;"format"

or

LOAD \*"m";1;"format"

This utility configures the disk format values in the table stored in the 6116 ram chip, and formats floppy disks with this format.

The utility asks a number of questions.

For formatting double density disks in the new PC drive, use these settings:

- 80 tracks
- 10 sectors per track
- 512 bytes per sector
- 7 CAT blocks / sectors
- 2 sides

Read the 'Using modern HD floppies' paragraph underneath when using HD floppies.

### copy

Copying using the original command won't work:

MOVE "d";1 TO "d";2

As this command only works with two identical drives / floppies.

Load the copy tool by:

LOAD \*1;"copy"

or

LOAD \*"m";1;"copy"

## **Using modern HD floppies**

You can high density (HD) floppy disks as double density (DD) disks, but a HD floppy must be reconfigured as DD disk as follows:

Cover the HD hole on a HD floppy to use it as DD floppy.

If you do not cover this hole, you can expect errors when trying to format as DD.

## **Using SD formatted floppies in a PC drive**

It's impossible to read or write floppies that are formatted on the original 170KB drive in a PC drive. The main reason is that the step size is twice as large, and also the track width is different.

When you try this, you will get read or write errors (maybe not at the first track, but you will when putting more data on the disk).