

# ***adf-copy***

Version 1.100

## User's manual

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## Introduction

ADF stands for the Amiga Disk Format (.adf), and ADF-Copy is a combination of hard and software to read and write Amiga Disks with a modern Computer running Windows, Linux or Apple OSX.

This document describes the usage of the ADF-Copy application. The application reads, writes, formats and erases floppy disks in Amiga Format. It is also able to create a flux level image of a disk of almost any other format and save it in the common supercard pro format (.scp). This can be analysed and converted by third party tools like the HxCFloppyEmulator Tool into other formats and be used in emulators like WinUAE. Currently the supported input & output format is .adf, additional it can output .scp SuperCard Pro.

The program and firmware updates can be downloaded at:

<https://nickslabor.niteto.de/download/>

The Application requires an installed Java Version 8, other versions might work but are not tested. The program comes as a Java JAR All-In-One file which contains the necessary native code for Windows, Linux, Mac OSX and Raspberry Pi.

Starting the program depends on your OS and installation, either by double clicking the .jar file or by starting it in a shell or command line by typing:

```
java -jar ADF_Copy_1100.jar
```

Some Operating Systems (usually Linux) might require installing the "49-teensy.rules" to access the serial device without superuser priviledges. Please google how to do it, i'm a windows guy. :)

At first start the program tries to write a "adf-copy.ini" file into the installed directory, so check for write permissions or setting will always be at default like window positions. Deleting the file will reset the settings to default. But there are not much settings at the moment.

If you have found bugs, got suggestions or like to buy a pcb or a kit, please feel free to send me an e-mail: [nickslabor@niteto.de](mailto:nickslabor@niteto.de)

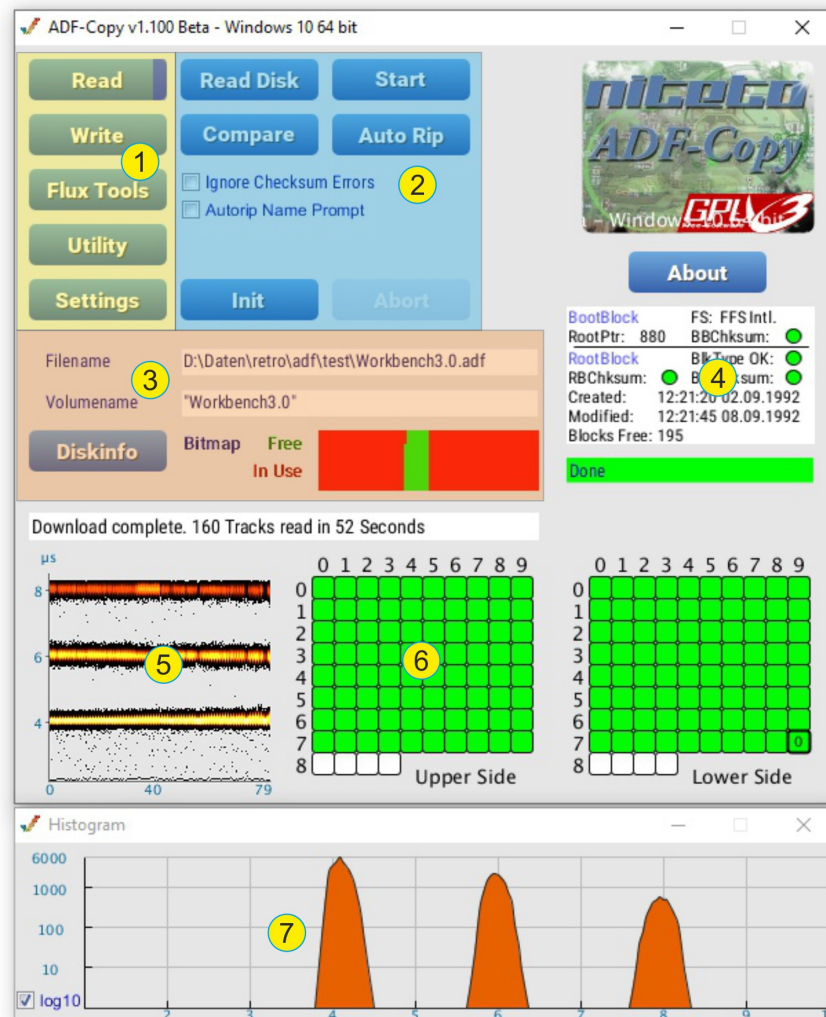
# **Important!**

**Originals and important  
Disks should always be  
write protected.**

**There are functions  
which format, write or  
erase disks without  
asking many questions!**

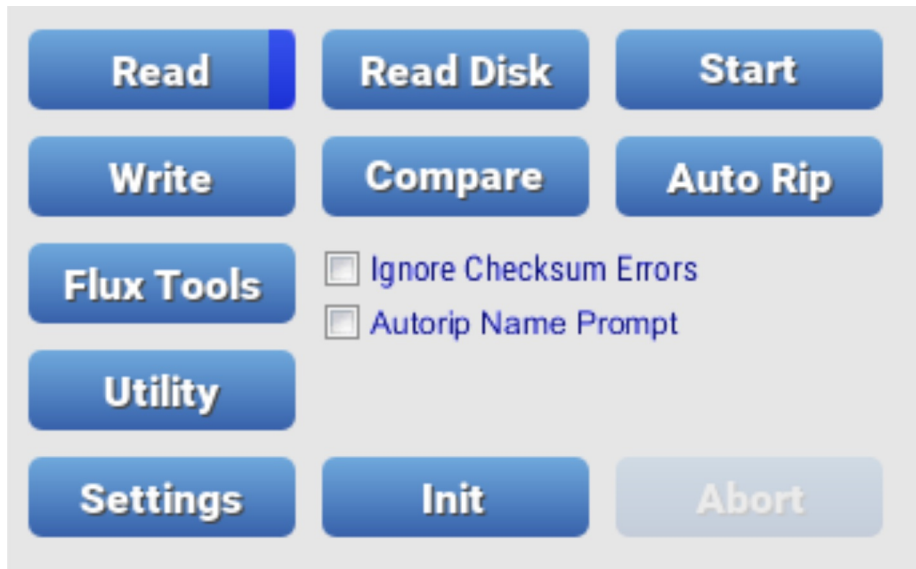
## Using ADF-Copy

When the program starts you will see the following window:



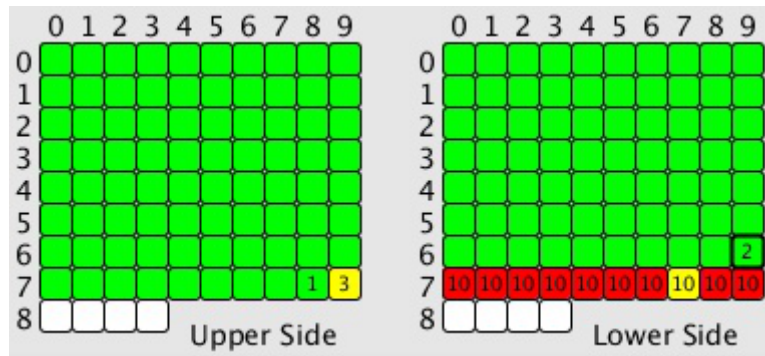
- The command list (1): Read, Write, Flux Tools, Utility and Settings. This selects the commands of the function-block to the right of it.
- The function-block (2): contains the commands and settings. Those are explained in detail later.
- This block (3) shows the current filename, volume name and the bitmap block of the disk. Pressing "Disk info" tries to read the disk and if successful will fill out the volume name, bitmap and Disk info field (4).
- This graphic (5) shows the distribution of the transitions over the disk. This graphic is also saved to the same directory of the adf image when a disk is read.
- The trackgrid (6) shows progress of the reading and writing. Clicking selects the focused track.
- This (7) displays the distribution of the transitions of a single track, its either the last read track or when clicking the trackgrid the focused track.

## The Read functions:



- **Read Disk** will open a File requester where you can navigate to the directory and specify a filename under which the image should be saved. If you read the volume name by pressing the **Disk Info** button a matching filename will be suggested. If there is already a file with this name you will be prompted for overwriting it.
- **Start** will read the disk and save it to the specified file.
- **Compare** will prompt for a file and compare it to the inserted disk in the drive, errors will be shown read in the trackgrid, identical tracks show green.
- **Auto Rip** will prompt for a directory where to save the images and start reading disks until **Abort** is pressed. When a disk is complete you will be prompted to insert the next one, or just press **Abort** to stop the ripping. The filenames will be generated by volume name (or NDOS) and the system time.
- **Ignore Checksum Errors** – normally the checksum of the sector header and data section are checked and a read retry is done, this ignores the check completely, your image might be faulty. - Not recommended
- **Autorip Name Prompt** – this prompts for a name each time when auto ripping disks.
- **Init** – resets drive and move head to track 0

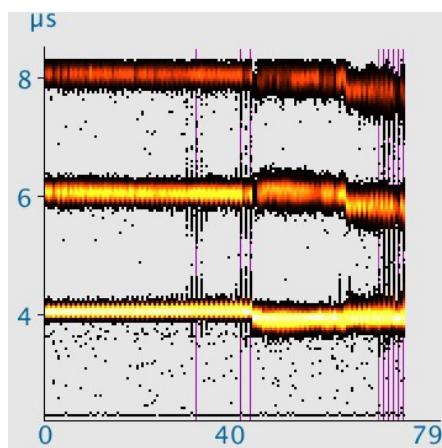
## The Trackgrid:



The Trackgrid displays the progress in detail during an operation in different colors.

- Green – success without error, when writing or formatting without verify this just means the drive behaved as expected.
- Yellow – there were at least 3 retries needed to read the track.
- Blue – this color is used for a write access.
- Red – there was at least one error that wasn't correctable, click on the grid and the details of the error are displayed in the status field.
- The number in each square displays the retries which were needed, the retries will also be noted in the log file when creating an adf from a disk.

## The Flux Overview:



This shows the complete overview of a read, written or formatted disk when verify is on. The x axis are the tracks, the y-axis the transition time in microseconds. When retries were needed this is noted by a red vertical line. As you can see this disk is damaged in the higher tracks. The bands are getting very broad and there are a lot scattered transitions outside of the bands.

## The Write functions:



- **Write Disk** will prompt you for an adf image to write to the disk. DD and HD images are supported.
- **Start** will start the writing.
- **Auto Write** – not yet implemented, does anyone really need this?
- **Verify** – will read and compare each track after writing, highly recommended to leave this turned on.
- **Pre erase** – this nulls the track with 4 $\mu$ s (2 $\mu$ s for HD disks) transitions before writing, this helps to reduce retries and save time when writing to old disks. Disabling saves about 30 seconds when writing to disks in good condition.
- **Index aligned** – this aligns the start of each track to the index hole of the disk, the Amiga does not care, but it looks nice when scanned at flux level. Makes writing slower.

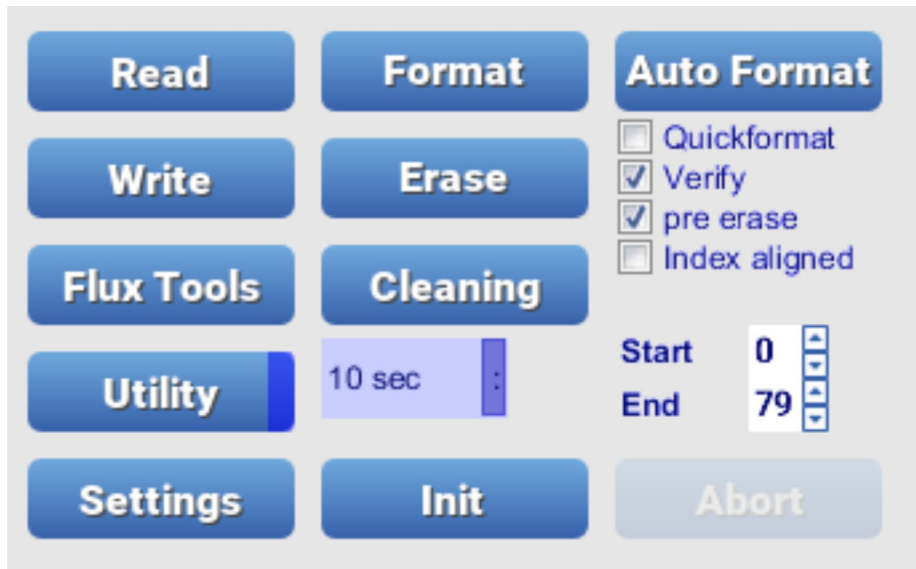
## The Fluxtools functions:



- **Read SCP** will open a File requester where you can navigate to the directory and specify a filename under which the image should be saved. If you read the volume name by pressing the **Disk Info** button a matching filename will be suggested. If there is already a file with this name you will be prompted for overwriting it. The Read will start immediately.
- **Scan Disk** is similar but does not save an image, it's for just having a look.
- **Start** and **End** selects the start and end track of the read or scan, right clicking advances by 10 units. Most drives are able to read to track 81, but it is not guaranteed, going higher might damage your drive but never happened to me. There is no check if the drive is really able to read that far, my drives just stay and read track 81 when going higher.
- **Revolutions** selects how many revolutions are read and stored in the image, 3 is default.
- **Histogram**, **Fluxdiagram** and **Diskview** select the visibility of the according window.

The Flux and Disk windows are explained later in this manual.

## The Utility functions:



- **Format** – prompts for a name and formats the disk in Amiga OFS
- **Auto Format** – does the same with each inserted disk, prompts for name and to insert next disk.
- **Erase** – writes 4 $\mu$ s (2 $\mu$ s for HD disks) transitions to the disk, this is the fastest way to destroy the contents of a disk. :) Ignores verify and index align.
- **Cleaning** – this function is meant to be used with a special cleaning disk, this moves the head around for a specified amount of time.
- **Quickformat** – just writes boot block and root block track, rest is untouched.
- **Verify, pre erase, Index aligned** are explained in the write functions section.
- **Start** and **End** – defines start and end of the Format, Erase and Auto Format commands.

## The Settings page:

Settings	
Motor Spinup ms:	600
Motor Spindown $\mu$ s:	50
Drive Select $\mu$ s:	100
Drive Deselect $\mu$ s:	5
Dir Change $\mu$ s:	5
Side Change $\mu$ s:	200
Step Pulse $\mu$ s:	2
Step Settle ms:	3
goto Settle ms:	18
DD Retries:	10
HD Retries:	30
Mtp Mode On	<input checked="" type="checkbox"/> <- requires drive restart

Filename

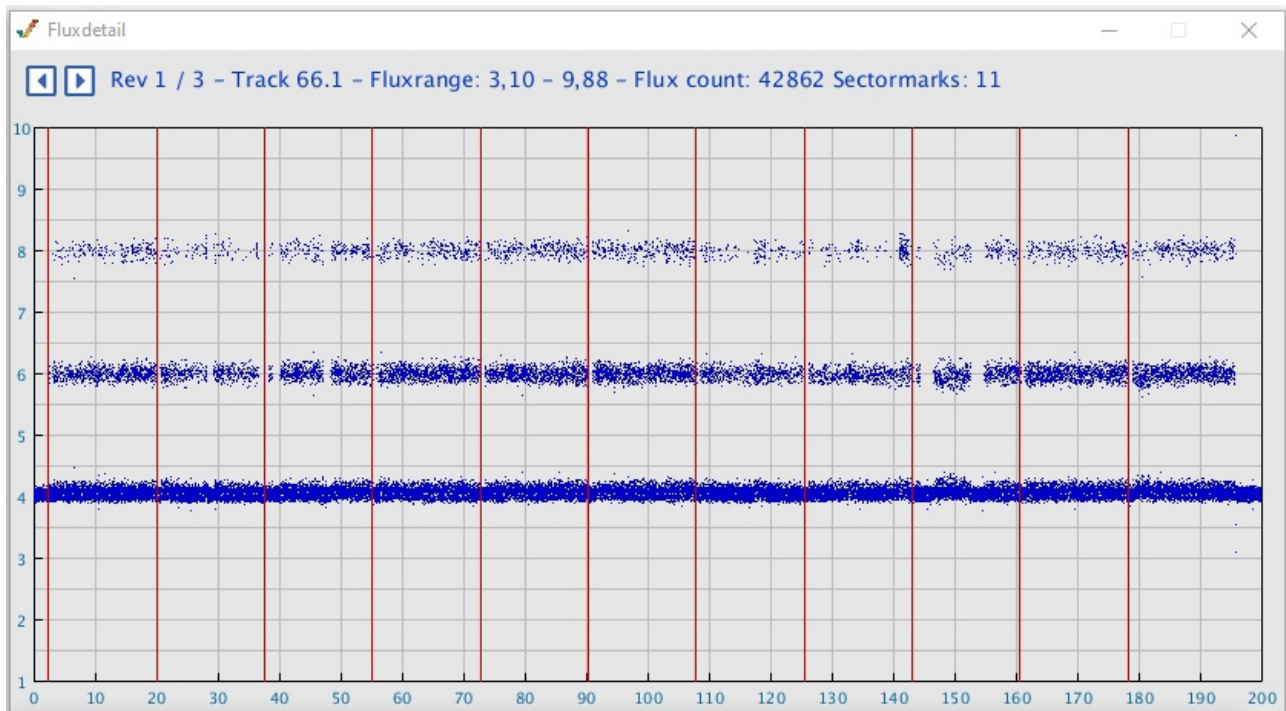
Volumename

Load Save Save&Store

reset EEPROM to drive defaults

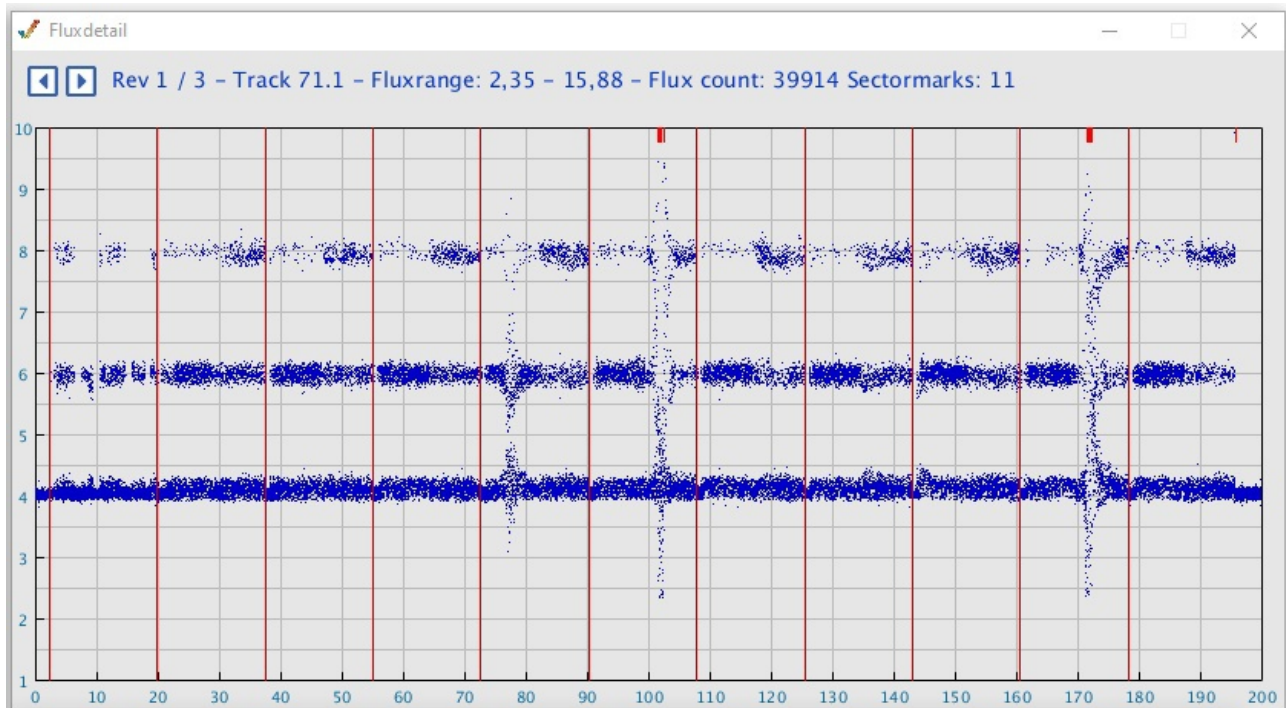
- **Load** – this loads the settings stored in the hardware into the application
- **Save** – this saves the (modified) settings into the ram of the drive, this is gone after a power loss of the drive.
- **Save&Store** – this saves the settings to the EEPROM of the drive, this survives power down and resets.
- **Reset EEPROM to drive defaults** – this resets all setting to the defaults stored in the firmware.

## The Fluxdetail window:



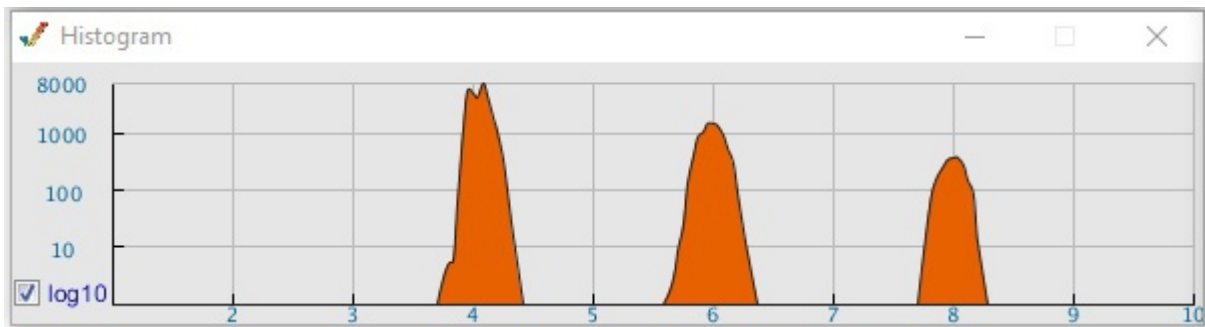
The Fluxdetail window is only available when reading or scanning a disk on flux level. You can choose which track is displayed by clicking in the Trackgrid on the desired track. In the left corner you can change which revolution of the scan is displayed, the Track is 66.1 which means physical track 66 side 1. The side can be 0 or 1. The Fluxrange shows minimum and maximum time of the transitions. Flux Count is the number of transitions overall, the sector marks display the number of Amiga Sectors. The x axis is the position from the beginning of the track in milliseconds, the y axis the transition time in microseconds. The red lines marks the found Amiga sector marks (0x44894489). This looks like a normal healthy track.

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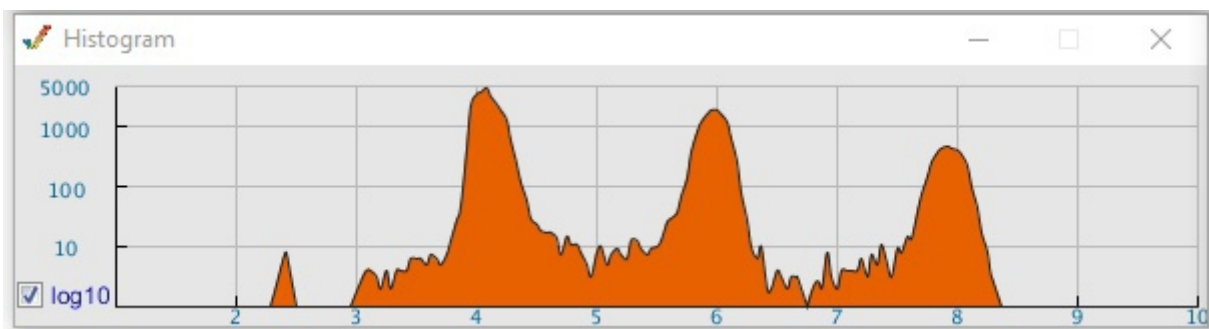
In this picture you can see that the flux range has a minimum of 2.35µs and a maximum of 15.88µs. Normally the range should be about 3.5-8.5µs, random transitions can occur in the track gap, this depends how the disk was written. In this screenshot you can see at the top of the graph some red marks, these are transitions that are longer than 10µs and below them the bands look smeared, this is a sign of a damaged magnetic surface. This track is by the way unreadable in an Amiga.

## The Histogram window:



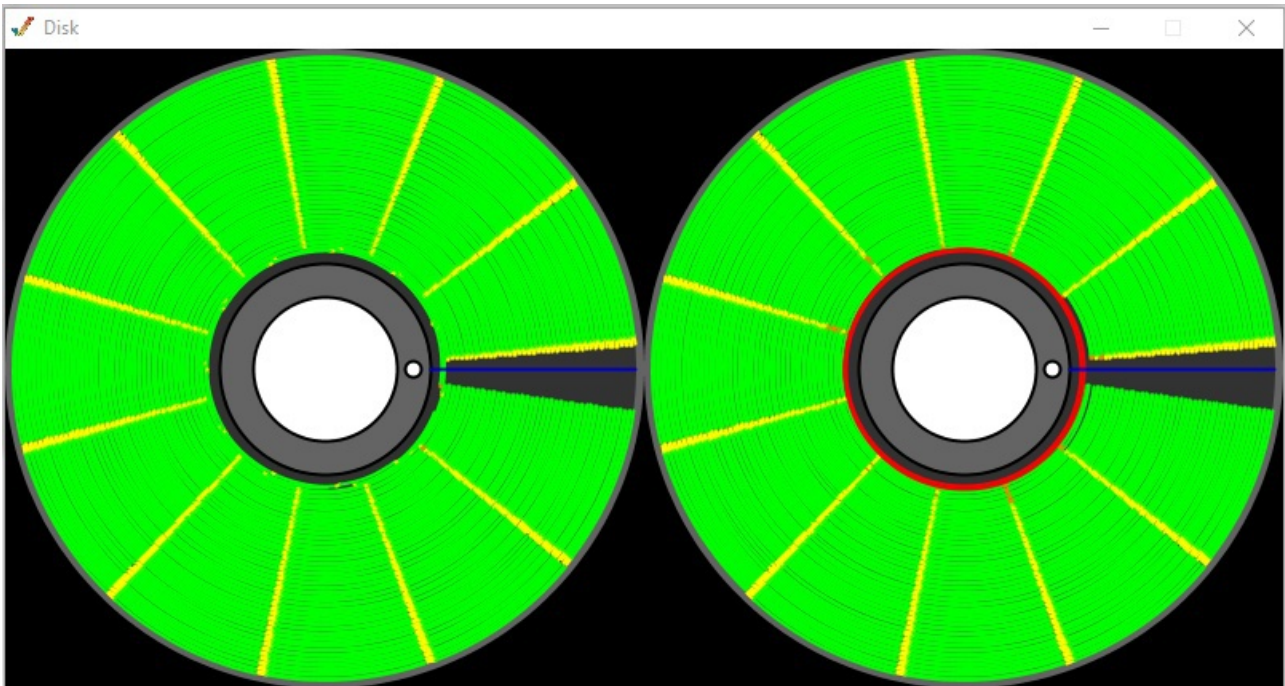
This is the Histogram window, it is displayed in all modes, usually it displays the current track, but when the operation is finished you can choose which track is displayed by clicking in the Trackgrid on the desired track.

In the picture above you can see how a track should look, nicely separated 4,6, and 8 $\mu$ s transitions. I recommend to leave log10 selected, this displays the data logarithmic to the power of 10.



Now this is the damaged track from the second Fluxdetail example, here you can see that the transitions go all over the place, even with a small spike in the 2.5 $\mu$ s area. You can try formatting or erasing a disk like this and try again, if it still shows those signs, it will make a great coaster.

## The Diskview window:



This shows a disk scan. Header areas are displayed yellow when the checksum is correct, orange when there is an error, data areas are displayed green when everything is fine, otherwise red when there is an error or no sectors found at all. The blue line marks the index hole.

In the example above you can see that the disk was written index aligned, has some header checksum errors (orange) in the upper tracks on side 1, missing sectors in the highest track and some unreadable tracks (red).

## Error blink-codes of the Hardware:

- 3 flashes then pause: read error in MTP Mode
- 5 flashes then pause: write error in MTP Mode
- slow flashing: out of memory error (might trigger a reset by watchdog after 8 seconds)
- fast flashing: no floppy drive detected

## Troubleshooting “no floppy drive detected”:

- check if floppy is connected correctly, the drive has to be connected directly, a cable will swap upper and lower row, LED of floppy might be permanently on and motor spinning.
- floppy has no power.
- jumpers on floppy are not in default position.
- drive is modified for use in an amiga, this can also cause this error and other problems.

## References

- 1: Grote, Gelfland, Abraham, Amiga Disk Drives: Inside & Out, 1988
- 2: INTEL CORPORATION, 82077SL CHMOS Single-Chip Floppy Disk Controller, 1991
- 3: Haardt, Knaff, Niemi, The floppy user guide, 2001
- 4: Cecil, Gopalan, Llewellyn, Masood, Tucci, Wakeman, AN-413 Disk Interface Design Guide and Users Manual, 1986
- 5: Samsung, OEM MANUALSFD-321B, 2007
- 6: John G. Theus, United States Patent 4334250 - MFM Data Encoder with Write Precompensation, 1982
- 7: Laurent Clévy, The .ADF (Amiga Disk File) format FAQ v1.14, 2017,  
[http://lclevy.free.fr/adflib/adf\\_info.html](http://lclevy.free.fr/adflib/adf_info.html)
- 8: Jim Drew, SuperCard Pro Image File Specification v2.2, 2020,  
[https://www.cbmstuff.com/downloads/scp/scp\\_image\\_specs.txt](https://www.cbmstuff.com/downloads/scp/scp_image_specs.txt)