CASE STUDY 1/2024

provided the object(s) for analysis: **µicr0Bee** , 30.01.2024

Case

two subsequent dumps of the same disk made with KryoFlux to the RAW+ADF format show a few bytes of difference when comparing the resulting ADF files

- ➔ in both cases, the KryoFlux software (dtc.exe) did not retry readings and did not report any errors
- ➔ subsequent dumps of this disk are identical to the second one (considered correct)

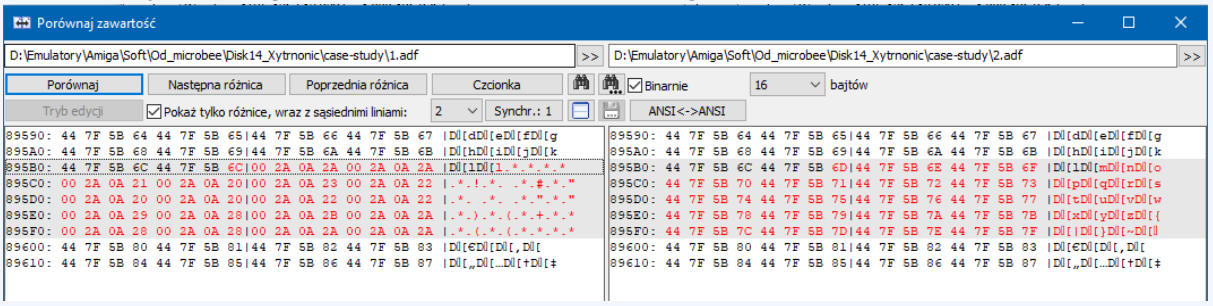
Subject

File names	**24011101-raw+adf.zip** contains two catalogs : [1] **24011101-raw+adf** - files RAW, log and file ADF (considered "wrong") [2] **24011101-240116-raw+adf** - files RAW, log and ADF (considered "correct")
Format	KryoFlux RAW + ADF
Media/system	Amiga 3,5" DS DD 880 kB
Hardware/soft	KryoFlux, KryoFlux DiskTool Console, v3.00_Win32, uiv.1, Apr 15 2018, 23:45:03

Metryczka dumpu

Analysis

Let's start by checking the differences in the ADF images provided :



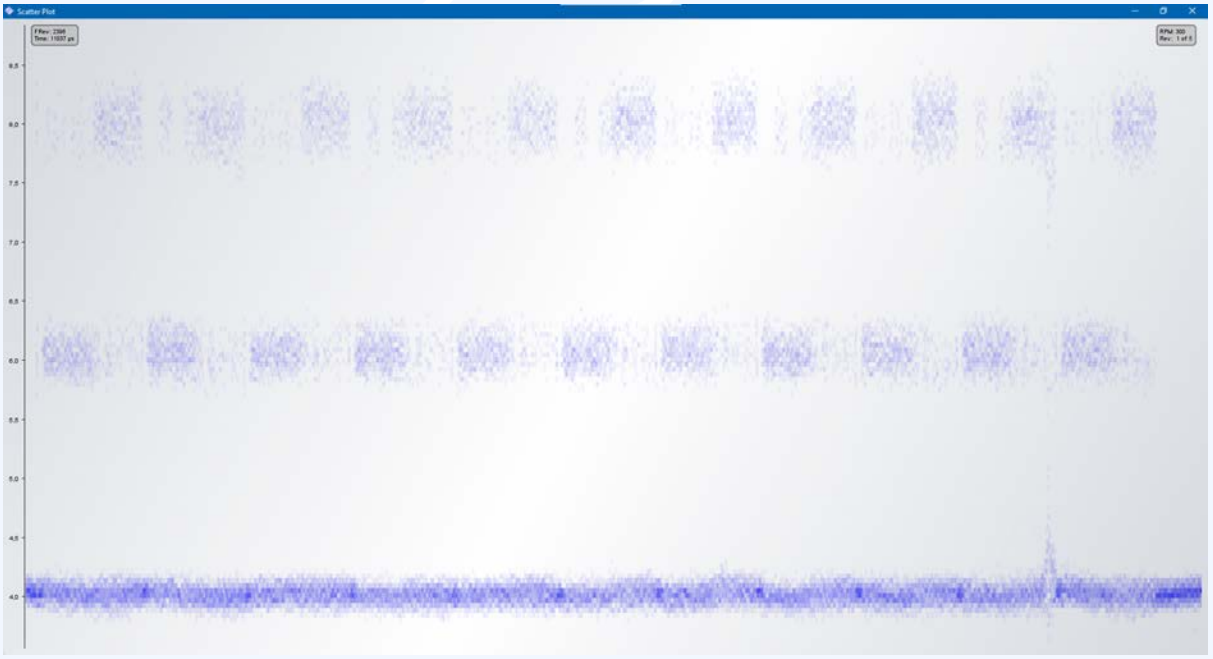
As you can see, it differs by several dozen (48) bytes from the address $895B7-$895FF. Which gives us Track 49, side 1, or block 1098 on the disk. We will need it later.
From the pattern with which the block is filled - the repeating pattern DOS+$01, DOS+$02...) - it can be concluded that this block is not used by data (the format command fills the blocks with an increasing sequence).

```
D:\Emulatory\Amiga\Tools\ADFCompare>adfcompare.exe 1.adf 2.adf

      ADFcompare v0.2

       26 March 2021

Track comparing file '1.adf' with '2.adf'

Successfully loaded '1.adf' as type: Standard 80 Track ADF
Successfully loaded '2.adf' as type: Standard 80 Track ADF

Track 49, side 1 differs


Comparison complete: 1 track differs
```

```
D:\Emulatory\Amiga\Tools\ADFCompare>adfcompare.exe -b 1.adf 2.adf

      ADFcompare v0.2

       26 March 2021

Block comparing file '1.adf' with '2.adf'

Successfully loaded '1.adf' as type: Standard 80 Track ADF
Successfully loaded '2.adf' as type: Standard 80 Track ADF

Block 1098 differs


Comparison complete: 1 block differs
```

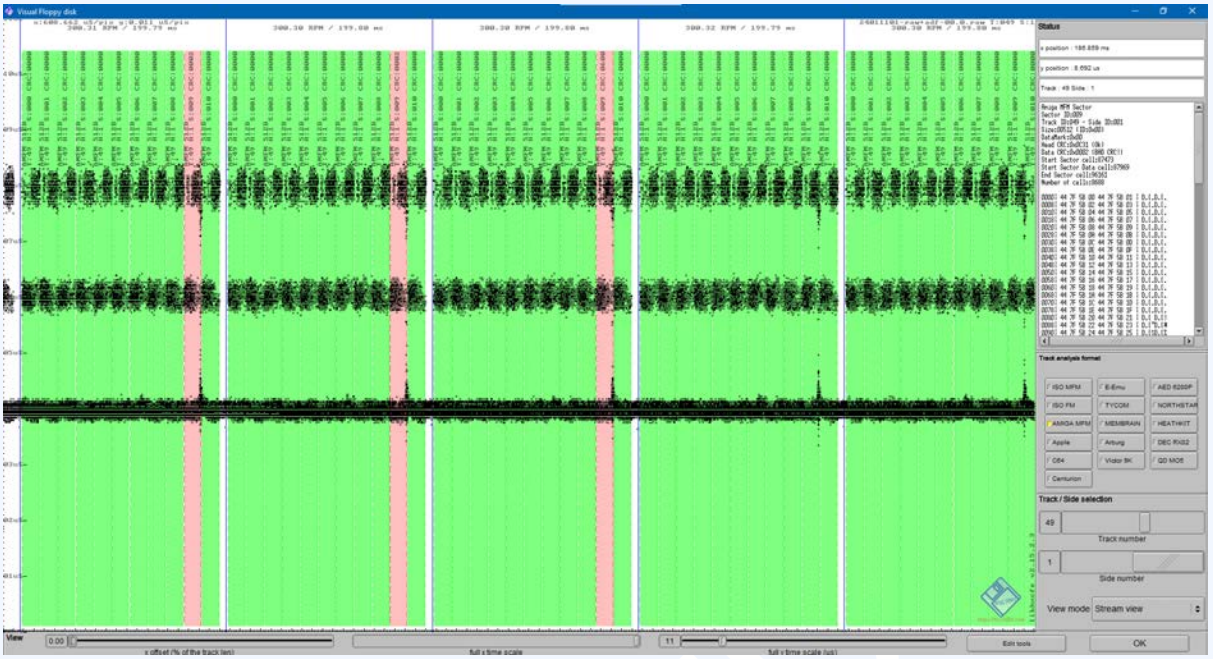
ADF [1] has some garbage in it. There is no point in comparing RAW screenshots because they will not be identical with each reading. It is actually a pure record of changes in the intensity of the carrier's magnetic field captured by the drive head in the time domain. Only the appropriate algorithm, knowing the target encoding format (MFM, AmigaDOS, IBM, etc.), converts it into specific bytes/blocks and finally a complete disk image.

Let's check the faulty path (49, side 1) in the preview in the KryoFlux-ui application - Scatter Plot option.



In the lowest bar in the right part we see a "peak", which indicates that there was indeed some fluctuation during reading, which could affect the final decoding result.

Let's check in more detail in HxC (Track Analyzer command), select track 49, side 1:



An interesting thing here, the path was recorded 5x (probably the -r5 option was used, maybe DTC has it as default). Sector 009 on this track was read with errors, the checksum does not match, but the last two revolutions of the diskette have this sector read correctly.

Ok, time to convert RAW to ADF, let's see what happens.

There are at least several applications for converting raw formats obtained from reading devices to floppy disks: KryoFlux (dtc), disk-utilities (disk-analyse.exe), Greaseweazle (gw.exe) or HxC (hxcfe.exe).

So let's see how they handle RAW files with [1] and the peak above. The commands used for conversion are located in the Tools section, and the conversions were performed using default settings - if a given application allows any configuration of decoder parameters:

Application	Obtained ADF image compared to the correct image [2]
KryoFlux (dtc.exe)	48 bad bytes, same as provided ADF in [1]
hxc.exe (wersja z 2021)	1 invalid byte
hxc.exe (wersja z 2024)	identical
disk-analyse.exe	identical

gw.exe	identical

As you can see, although other tools were able to use the correctly read sector (4 and 5 revolution), DTC for some reason did not do it with the default settings, producing a damaged ADF file, claiming that everything was fine :

```
49.1    : AmigaDOS: OK, trk: 099, sec: 11
```

What is the reason - we don't know, maybe an error? Maybe it requires additional configuration? There is a -rX switch where you can specify the number of revolutions, but it does not change anything in the final ADF after conversion.

Summary/advice

1. Dtc.exe from the KryoFlux package is the worst at decoding the flux stream among those tested here, without reporting errors
2. To convert from RAW to ADF, it is better to use a tool other than dtc.exe
3. For currently ripped ADFs that could potentially be exposed to this case, it is recommended to re-convert from RAW->ADF using another tool, or if RAWs were not taken - re-dump

Tools

Keirf disk-analyse: https://github.com/keirf/disk-utilities
Compiled : https://eab.abime.net/showthread.php?t=62217&highlight=disk-utilities&page=41

keirf disk-utilities 2023-12-19 git 8ee2ba8

```
> disk-analyse.exe --format=amigados 24011101-raw+adf- image.adf
```

Command to convert from RAW to ADF

HXC : https://hxc2001.com/download/floppy_drive_emulator/

v2021
HxC Floppy Emulator : Floppy image file converter v2.5.5.1
Copyright (C) 2006-2021 Jean-Francois DEL NERO
libhxcfe version : 2.13.6.6

v2024
HxC Floppy Emulator : Floppy image file converter v2.15.2.3
Copyright (C) 2006-2024 Jean-Francois DEL NERO

libhxcfe version : 2.15.2.3

Command to convert from RAW to ADF :

```
> hxcfe.exe -finput:24011101-raw+adf-00.0.raw -conv:AMIGA_ADF
-foutput:image.adf
```

Command to convert from RAW to ADF

KryoFlux: https://kryoflux.com/?page=download

KryoFlux DiskTool Console, v3.00_Win32, uiv.1, Apr 15 2018, 23:45:03
(c) 2009-2018 KryoFlux Products & Services Ltd.

```
> dtc.exe -l8 -fimage.adf -i5 -m1 -f24011101-raw+adf- -i0 -e83
```

Command to convert from RAW to ADF

GreaseWeazle (gw): https://github.com/keirf/greaseweazle
Host Tools: 1.16.2

```
> gw.exe convert --format amiga.amigados 24011101-raw+adf-00.0.raw
image.adf
```

Command to convert from RAW to ADF

Total Commander: https://www.ghisler.com/download.htm

ADFcompare v0.2: https://eab.abime.net/showpost.php?p=1473304&postcount=38