

# Disk image layout

Subject to change / Änderungen vorbehalten

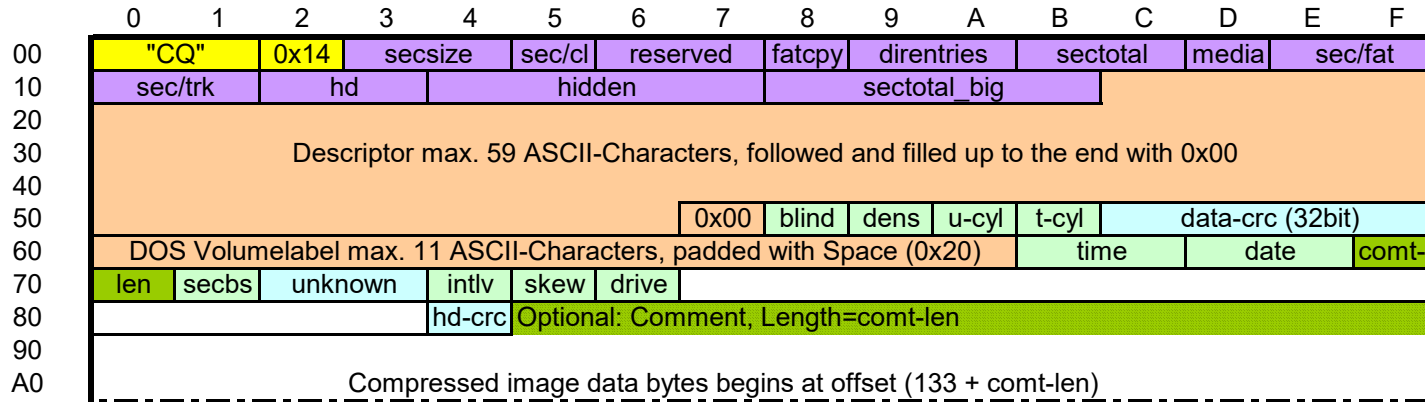
31.03.2023

## CopyQM Format (\*.cqm)

Latest known version: CopyQM v3.26 Plus (NTI)

Latest version I have: CopyQM v3.24 (Sydex)

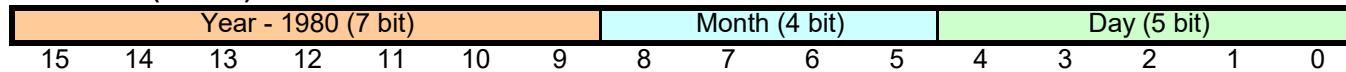
Headersize = 133 Byte (0x85)



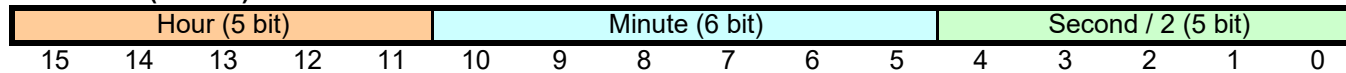
16/32bit values: Byteorder lowbyte...highbyte (little endian Byte ordering)

There is no (known) flag for write protection

### Date Field (16 bits)



### Time field (16 bits)



### Run length encoded data



V V  
 16bit positive integer, followed by count=length bytes of unencoded data (Sequences of unequal bytes)

16bit negative integer, the byte after is repeated -(-length) times (Sequences of equal bytes)

## Data-CRC Calculation

The CRC is calculated for the unencoded data over all used cylinders (header field **u-cyl**) in the image. The CRC value is initialized with 0 and is updated using the CRC 32 polynomial 0x104C11DB7, bit reverse algorithm (see source code of drvqm.c and crctable.c in LibDsk).

```
unsigned long* crc;  
*crc = crc32r_table[(byte ^ (unsigned char)*crc) & 0x3f] ^ (*crc >> 8);
```

Due to a feature in CopyQM (8 bit register as an index into a 1024 byte table) all bytes must have their top two bits removed (&0x3f) before added to the CRC.

## Header Checksum

The header checksum is calculated from the lowest 8 bit of the negative sum of all header bytes except the checksum field itself.

```
header[132] = (-sum(header[0]...header[131])) & 0xff
```

When reading the header, the sum over the entire header must be zero.

```
sum(header[0]...header[132]) = 0
```

## References

The LibDsk Library      <https://www.seasip.info/Unix/LibDsk/>

# The CopyQM image format in depth

Subject to change / Änderungen vorbehalten

31.03.2023

CQM image Offset	DOS bootsect Offset	Len	blind=1/2	Content	Description
0x00-0x02		3			Image identifier (Constant "CQ\x14")
0x03,0x04	0x0b,0x0c	2		sectsize	Sector length (Bytes per sector)
0x05	0x0d	1	unused	sec/cl	Sectors per cluster (Power of 2)
0x06,0x07	0x0e,0x0f	2	unused	reserved	Nr. of reserved sectors incl. the boot sector (min. 1)
0x08	0x10	1	unused	fatcpy	Nr. of FAT copies
0x09,0x0a	0x11,0x12	2	unused	direntries	Max. nr. of directory entries in root directory
0x0b,0x0c	0x13,0x14	2		sectotal	Nr. of total sectors if <= 65535, else 0
0x0d	0x15	1	unused	media	Media descriptor byte
0x0e,0x0f	0x16,0x17	2	unused	sec/fat	Nr. of sectors per FAT
0x10,0x11	0x18,0x19	2		sec/trk	Nr. of sectors per track
0x12,0x13	0x1a,0x1b	2		hd	Nr. of heads (1 or 2)
0x14-0x17	0x1c-0x1f	4	unused	hidden	Nr. of hidden sectors before the boot sector (zero on floppy disks)
0x18-0x1b	0x20-0x23	4	unused	sectotal_big	Nr. of total sectors if > 65535, else 0 (zero on floppy disks)
0x1c-0x57		60		descr	Description (ASCII Text, padded with \x00)
0x58		1		blind	Blind: 0=DOS, 1=blind, 2=HFS blind=0: => header contains additional filesystem (DOS) infos;
0x59		1		dens	Density: 0=DD, 1=HD, 2=ED
0x5a		1		u-cyl	Cylinders in image, set equal to t-cyl in blind (blind=1) images
0x5b		1		t-cyl	Cylinders on disk (total cylinders, physical cylinders)
0x5c-0x5f		4		data-crc	32bit data CRC
0x60-0x6a		11		label	DOS volume label (ASCII Text, padded with \x20 (Space))
0x6b,0x6c		2		time	Modification time (see diagram)
0x6d,0x6e		2		date	Modification date (see diagram)
0x6f,0x70		2		comt-len	Comment length (Length of optional comment field)
0x71		1		secbs	Sector base (Nr. of first sector - 1)
0x72,0x73		2	unused		Unknown, set by CopyQM v3.24 if blind=0, depends on disk contents
0x74		1		intlv	Interleave (1 if not interleaved)
0x75		1		skew	Skew (0 if not skewed)
0x76		1		drive	Source drive type: 1=5,25" 360KB, 2=5,25" 1,2MB, 3=3,5" 720KB, 4=3,5" 1,44MB, 6=3,5" 2,88MB, 8" is unknown (0 or 5?)
0x77-0x83		13			Unknown, always zero (\x00) in my tests
0x84		1		hd-crc	Header CRC
0x85-xxx		comt-len			If Comment, then comt-len bytes (incl. \x00 characters)
0x85-xxx					If no comment, then image starts here

Data starts at 0x85 (133) if no comment exists, or at 0x85 + "comt-len" if a comment exists

unused:

Unused fields in blind mode (blind=1) or in HFS images (blind=2) filled with zeros (\x00)

The purple part in DOS images (blind=0) corresponds to the BIOS Parameter Block (BPB) of a DOS floppy disk.