Amiga_MO_FAQ

Mark Knibbs

COLLABORATORS

	TITLE : Amiga_MO_FAQ	

ACTION	*NAME*	*DATE*	*SIGNATURE*
WRITTEN BY	Mark Knibbs	July 31, 2024	

REVISION HISTORY

NUMBER	DATE	DESCRIPTION	NAME

Contents

1 Amiga_MO_FAQ **1**

1.1 Amiga Magneto-Optical Drive FAQ 1.4 (17.7.99) . . . 1
1.2 introduction . . . 2
1.3 What are Magneto-Optical Disk Drives? . . . 2
1.4 Advantages of Magneto-Optical Storage . . . 2
1.5 Pictures of MO Drives and Disks . . . 3
1.6 How MO Drives Work . . . 3
1.7 Types of MO Media . . . 4
1.8 LIMDOW Media . . . 4
1.9 Backward Compatibility . . . 5
1.10 Media Costs . . . 5
1.11 Drive Costs . . . 5
1.12 Drive Specifications . . . 6
1.13 Choosing an MO Drive . . . 6
1.14 Where To Get More Information . . . 7
1.15 Zip & Jaz Reliability Problems . . . 8
1.16 miscellaneous . . . 8
1.17 Amiga Requirements . . . 8
1.18 Drive Settings (DIP switches) . . . 9
1.19 Setting the Device Type . . . 9
1.20 Mounting and Using the Drive and Disks . . . 10
1.21 Using Different Disk Capacities . . . 11
1.22 Mount Files . . . 11
1.23 Example AmigaDOS Scripts . . . 13
1.24 HDToolBox Patch . . . 13
1.25 Low-Level Formatting . . . 14
1.26 About the Write-Back Cache . . . 15
1.27 MO Disk Icons 1.2 . . . 16
1.28 Cross-Platform Access . . . 16
1.29 ShapeShifter Patch . . . 17

1.30 Free Macintosh SCSI Driver Software . . . 18
1.31 Sharing the MO Drive Between an Amiga and PC or Macintosh . . . 18
1.32 Finding Programs Mentioned Here . . . 18
1.33 For Programmers . . . 19
1.34 About NSR and UDF . . . 20
1.35 List of Amiga MO Users . . . 20
1.36 Amiga MO Mailing List . . . 20
1.37 Information Wanted . . . 21
1.38 Contacting the Author . . . 21
1.39 Thanks To... . . . 21
1.40 Notes on This AmigaGuide Document . . . 21
1.41 To Do . . . 22
1.42 Version History . . . 22

Chapter 1

Amiga_MO_FAQ

1.1 Amiga Magneto-Optical Drive FAQ 1.4 (17.7.99)

========== Amiga Magneto-Optical Drive FAQ 1.4 (17-Jul-99) ==========

This document uses some Amigaguide V40 features. It may not display properly under earlier Amigaguide versions.

Introduction What are Magneto-Optical Drives?

Advantages of Magneto-Optical Pictures of MO Drives and Disks

How MO Drives Work

Types of MO media LIMDOW (direct overwrite) Media

Backward Compatibility Media Costs

Drive Costs Drive Specifications

Choosing an MO Drive

Where to Get More Information

Zip & Jaz Reliability Problems Miscellaneous

Amiga Requirements

Drive Settings Setting the Device Type

Mounting and Using Drive and Disks

Using Different Disk Capacities Mount Files

Example AmigaDOS Scripts HDToolBox Patch

Low-Level Formatting About the Write-Back Cache

MO Disk Icons

Cross-Platform Access

NEW ShapeShifter Patch NEW Free Macintosh SCSI Software

Sharing the Drive With a PC or Mac

Finding Programs Mentioned Here

For Programmers About NSR and UDF

List of Amiga MO Users

Amiga MO Mailing List

Information Wanted Contacting the Author

Thanks To... Notes on This AmigaGuide Document

To Do

Version History

1.2 introduction

Introduction

The Amiga Magneto-Optical Drive FAQ contains information about using magneto-optical (MO) disk drives with Amiga computers. It is freely distributable providing no changes are made.

(In case you're not familiar with the acronym, FAQ stands for Frequently Asked Questions. Compilations of information about various subjects on the Internet are commonly referred to as "FAQs".)

I hope the availability of this document will encourage more Amiga users to consider optical storage, instead of fragile magnetic media like Zip, Jaz and SyQuest.

Please contact me if you have any comments, suggestions or questions about this document or MO drives and media.

1.3 What are Magneto-Optical Disk Drives?

What are Magneto-Optical Disk Drives?

Magneto-optical ("MO") disk drives are versatile removable storage devices, which use very robust and inexpensive media. You can use an MO disk just like a large floppy disk, or like a hard disk. 3½" MO disks can store up to 1.3GB, and 5¼" MO disks can store up to 5.2GB. There are many advantages in using MO disks instead of other types of media.

The How MO Drives Work section explains how data is written to and read from MO disks.

In Japan MO drives are very popular, more so than Iomega's Zip drives (which seem to be inexplicably common in the West). Sony's increasing popular audio "Mini Disc" format uses a type of magneto-optical disk.

MO drives are available as internal or external, SCSI or IDE/ATAPI drives. MO "jukeboxes" are also available, but these are intended for business use as they are expensive, and few Amiga users need to store hundreds of gigabytes of data. Also, special driver software would be required and none exists for the Amiga.

1.4 Advantages of Magneto-Optical Storage

Advantages of Magneto-Optical Storage

Magneto-Optical storage has many advantages over other types of removable media: · Media life is at least 30 years, which greatly exceeds that of magnetic media like floppy disks, Zip and Jaz disks. Some manufacturers quote media life of 50 or even 100 years. Data can be rewritten at least a million times, and read at least 10 million times; some manufacturers quote figures ten times this. This figure also exceeds that for magnetic media. · There is no physical contact between disk surface and drive head, so there is no possibility of data loss through a head crash. · MO drives are backwardly compatible, which means that if you upgrade your drive in the future, you will be able to read and write all your existing disks on the new drive. · MO disks are not susceptible to magnetic fields. · If, for example, you spill a cup of coffee on an MO disk, you can clean the disk surface and continue to use the disk. Cleaning kits are available for both MO drives and disks. Disk cleaning kits are very cheap. · MO disks are simple in construction, unlike some other kinds of removable media which may contain moving parts. This is another reason why MO offers greater reliability than magnetic media. · MO disks are available in several different capacities, which vary in price. Cost per megabyte is much lower than all other kinds of random access removable media. · Unlike Zip, Jaz, SyQuest etc., MO drives and disks are not proprietary; they are made by many companies. The disks are covered by various international standards. So you will not be stuck if your drive manufacturer goes bust, as happened recently to SyQuest. · Compared to other forms of optical storage, there are no restrictions on writing and rewriting data to MO disks, unlike CD-R or

CD-RW. Also unlike CD-R & CD-RW, since the disk itself is protected by a plastic casing there is no danger of data corruption due to the disk getting scratched. · MO drives normally automatically verify written data to guarantee data integrity. There is no such verification with CD-R and CD-RW, so to be assured that the data has been written properly when using these, you would need to manually compare all copied files. · MO drives have much shorter seek times than PD and DVD-RAM drives. · Magneto-optical technology is well-proven. I believe the first ISO standard 5¼" MO drives were released in 1989 or 1990, with 128MB 3½" MO drives becoming available in 1991. 640MB 3½" drives have been available since 1996. Originally MO was largely restricted to professional use due to high drive cost, but over the past couple of years this situation has changed. · MO disks are convenient, compact and easy to use. 3½" MO disks are the same size as two floppy disks stacked on top of each other. They have a write-protect tab which works just like a floppy disk's.

1.5 Pictures of MO Drives and Disks

Pictures of MO Drives and Disks

This section contains some pictures of magneto-optical drives and disks, so you can see what they look like. You need to have a JPEG datatype installed in order to see these within MultiView. Alternatively you can use any JPEG viewer to display the images manually; they are in the Images drawer.

3½ inch transparent MO disk 5¼ inch MO disks

Olympus PowerMO 230II drive & disk Philips MO 640 drive & disk

Philips Gimo 1.3GB drive & disk

1.6 How MO Drives Work

How MO Drives Work

This section describes the theory of operation of MO drives. It is quite technical; it is not necessary to understand this in order to use a magneto-optical drive.

Magneto-optical drives use, as the name suggests, both magnetic and optical effects to read and write data. A layer within the media contains magnetically sensitive elements. When this layer is heated to its "Curie point", about 200°C, the polarity of the magnetic elements can be changed by an external magnetic field from the drive head.

To write data, on normal media two disk revolutions are needed. On the first revolution, a magnetic field is applied and the laser heats up the target area of the disk to its Curie point. This causes the magnetic elements to all align themselves parallel with the magnetic field. This effectively erases the target area, recording all 0 bits. On the next revolution of the disk, the magnetic field is reversed, and the laser heats up only those areas which are to have 1s recorded.

Because the written magnetic polarity is "frozen into" the disk, MO disks are not susceptible to magnetic fields as magnetic media are.

Data is read from the disk in a purely optical way. The laser is used at a low power which does not heat the disk. Depending on the recorded magnetic polarity, the polarity of the laser light reflected from the disk is rotated a few degrees either way. This rotation is called the Kerr effect. The drive detects this, and thus determines whether a 0 or 1 was read.

LIMDOW Media

Use of LIMDOW media significantly improves write speeds. LIMDOW-capable drives can read and write to conventional MO disks too.

When a LIMDOW disk is inserted, the drive detects this and enables additional control over the laser. LIMDOW disks have a different composition to normal media, which makes it possible to rewrite data in a single revolution rather than the two required by conventional disks.

The drive records data by heating areas of the disk to their Curie point, as with conventional media. However, depending on the laser beam power, the magnetic element orients itself with either the external magnetic field or with a reference layer that is built into the disk. Thus data can be written in a single pass.

Data is read from LIMDOW media in the same way as from conventional media.

1.7 Types of MO Media

Types of MO Media

There are two physical media sizes, 3½" and 5¼". This document concentrates in some places on 3½" drives and media, since 3½" MO drives are cheaper than 5¼" ones, and I have had less experience with 5¼" drives.

A 3½ MO disk looks similar to a 3½" floppy disk, except twice as thick. There is a metal shutter covering the disk surface, and a write-protect tab in the corner, just like a floppy disk. If you open the shutter, the disk inside has a similar appearance to the surface of a CD. Click here to see a picture of a 3½" MO disk, and here for a picture of some 5¼" MO disks.

Whilst there are two physical disk sizes, there are several different disk capacities. 3½" MO disks are currently available in the these capacities: · 128MB (512-byte sectors) · 230MB (512-byte sectors) · 540MB (512-byte sectors), 640MB (2048-byte sectors) · 1.3GB (2048-byte sectors)

5¼" MO disks are currently available in these capacities: · 600MB (512-byte sectors), 650MB (1024-byte sectors) · 1.2GB (512-byte sectors), 1.3GB (1024-byte sectors) · 2.3GB (512-byte sectors), 2.6GB (1024-byte sectors) · 4.1GB (512-byte sectors), 4.8GB (1024-byte sectors), 5.2GB (2048-byte sectors)

The only difference between 540MB and 640MB 3½" MO disks is the sector size. It is 512 bytes for 128MB, 230MB and 540MB disks, but 2048 bytes for 640MB disks. There is no real advantage to Amiga users in buying 540MB disks if you have a 640MB drive, unless you for some reason want to use a FastFileSystem version earlier than 40.1 (see the Amiga Requirements section), or use an operating system which does not support sector sizes greater than 512 bytes, such as NetBSD. Also, performance of 512-byte-sectors media with Macintosh emulators or a real Mac or PC computer may be better. A similar thing applies to 5¼" MO disks, 600MB vs 650MB, 4.1GB vs 5.2GB, etc.

3½" MO disks are single-sided. 5¼" ones are double-sided, and half the quoted capacity is accessed at a time. The disk is turned over to access the other half.

MO media can be bought as unformatted, or formatted for MS-DOS or Macintosh. If you're using a Mac emulator, you may wish to buy Mac formatted disks. For Amiga use it doesn't matter; you can just do a Format QUICK on the disk to make it ready for use, which only takes a few seconds.

MO disks are low-level formatted and usually certified at the factory. Certified disks have had their surface checked and any bad sectors are remapped. If you buy an uncertified disk (I don't know whether these are available), it will be a good idea to low-level format it before use.

More recent disk capacities (230MB, 540MB and 640MB for 3½" disks) are also available in LIMDOW variants, also known as "direct overwrite". Writing to LIMDOW disks is faster than to normal disks.

In common with hard disk manufacturers, MO disk capacities are usually quoted in millions of bytes, as opposed to the usual computer terminology where 1 megabyte = 1024×1024 = 1,048,576 bytes. The quoted figure is the unformatted capacity. For example, the formatted capacity of a 640MB 3½" disk is 635,600,896 bytes, which is just over 606 megabytes.

1.8 LIMDOW Media

LIMDOW Media

You may have heard of LIMDOW media. LIMDOW stands for Light Intensity Modulation Direct OverWrite, and is also known as "direct overwrite".

When using convential MO disks, in order for the drive to write a sector to disk, it erases the sector, writes the new data, and then verifies the just-written data. (You can enable or disable verification by using a DIP switch on the drive, or by sending the appropriate command to the drive.) This requires three revolutions of the disk.

With LIMDOW media and a LIMDOW-capable drive, the new data can be written with no need for the old data to be erased first. This means that writing speed is increased by about 50%. Without verification, writing speed would be almost doubled.

The down side to this is that, at least for the moment, LIMDOW media is more expensive than normal media.

1.9 Backward Compatibility

Backward Compatibility

The first generation of 3½" MO drives could only use 128MB disks. Second generation 230MB drives can read and write 128MB and 230MB disks. Current 640MB 3½" drives can read and write 128MB, 230MB, 540MB and 640MB disks (early 640MB drives could not write to 128MB disks). 1.3GB drives have recently been released by Fujitsu and Philips, and are read- and write-compatible with all previous types of disk as well as the new 1.3GB "Gigamo" disks. You can read about this drive on the Fujitsu Europe web site.

Similarly, 5¼" MO drives are also backwardly compatible. First generation 600/650MB drives were available in 1989 or 1990. Later generations supported 1.2/1.3GB and then 2.3/2.6GB disks. Current drives can read and write 4.1/4.8/5.2GB disks, and most can at least read all older generations. Current Sony drives can only write to 2.3/2.6GB and 4.1/4.8/5.2GB disks, not the older 600/650MB and 1.2/1.3GB disks. Nikon drives can read and write all generations, from 600/650MB to 4.1/4.8/5.2GB.

1.10 Media Costs

Media Costs

Cost per megabyte of MO media is much lower than other removable media like Zip, Jaz and LS120 disks. LIMDOW media is more expensive, but still works out cheaper than other types of removable media.

This section illustrates the relative price differences between MO disks and other types of removable media. It is not intended to be comprehensive or up-to-date or to cover all countries, just as a guide to how much cheaper MO disks are. Check a current computer magazine for up-to-date prices. Macintosh magazines are likely to have more adverts for MO drives and disks than PC ones.

Here are some costs for various types of MO media in the UK. They are the lowest prices that I have seen advertised. The prices below exclude 17.5% VAT (sales tax), figures are in pounds sterling:

Media type Cost (£) Cost/MB (p) 128MB 3½" 3 2.34 230MB 3½" 3 1.30 540MB 3¼" 5.50 1.02 640MB 3½" 5.50 0.86 640MB 3½" LIMDOW 12 1.88 650MB 5¼" 9.50 1.46 1.3GB 5¼" 10.50 0.81 2.6GB 5¼" 18 0.69 5.2GB 5¼" 47.50 0.91

Compare these prices with typical media costs for other storage devices:

Media type Cost (£) Cost/MB (p) 100MB Zip 6 6.00 120MB LS120 6.70 5.58 230MB SyQuest EZFlyer 15 8.70 250MB Zip 12 4.80 1GB Jaz 50 5.00 1.5GB SyJet 51 3.40 2GB Jaz 58 2.90

If you're in the United States or Canada, two web sites which may be useful for finding cheap MO media are http://shopper.com/ and http://www.pricewatch.com/.

Unlike proprietary systems like Zip and Jaz, MO drives and media are made by many different manufacturers. This is partly why MO disks are so much cheaper. With the Zip and Jaz, Iomega makes a large profit on the media allowing them to sell the bare drives quite cheaply, whereas different manufacturers of MO media are competing. MO disks are made by at least BASF, Dysan, Fujifilm, Fujitsu, IBM, Imation (3M), Maxell, Maxoptix, Olympus, Philips, Ricoh, Sony, TDK and Verbatim.

1.11 Drive Costs

Drive Costs

MO drives are usually more expensive than similar capacity magnetic media drives. However, given the low media cost, they will be more economical if you have more than a couple of disks. Drives are commonly bundled with several disks, making the cost very competitive with other removable media.

Compared with Iomega's recently released 250MB Zip drive, a 230MB MO drive is the same price from some resellers.

For example, here are some MO drive prices in pounds sterling:

Fujitsu 230MB internal 100 Fujitsu 230MB with one 230MB disk 140 Philips MO 230 with one 230MB disk 140 Philips Pegasus MO 230 with ten 230MB disks 175 Fujitsu DynaMO 640SE with one 640MB disk 215 Philips MO 640 with one 640MB disk 200

Unless stated, these prices are for external SCSI drives; internal models cost less, so if you have a tower case or a spare internal drive bay you can get one of them. If your Amiga has an IDE/ATAPI controller, you can consider buying an ATAPI rather than SCSI drive. But remember that with an external unit, you can easily connect the MO drive up to a Mac or PC.

In comparison, buying other types of removable drive with this amount of storage may cost significantly more; and of course magnetic removable media does not have the same level of reliability as MO. Some example prices are:

Zip 100MB with one disk 70 SyQuest EZFlyer 230MB with one disk 100 Zip 250MB with one disk 140 Jaz 1GB with one disk 190 SyQuest SyJet 1.5GB with one disk 200 Jaz 2GB with one disk 250

1.12 Drive Specifications

Drive Specifications

Modern 3½" 640MB MO drives are fast enough to be used as general storage or like a hard disk. However, writes are slower than reads, and if you are planning on using an MO disk for very write-intensive applications, you should probably use LIMDOW media to speed up writes. For general backup, file storage and running applications & games from, non-LIMDOW disks are fine. Note that the seek time will not be as quick as most modern hard disks.

Figures for Fujitsu's current 640MB 3½" MO drive mechanisms are as follows: +--------------------+------------+-----------+-----------+-----------+ |Storage Capacity | 128MB | 230MB | 540MB | 640MB | |--------------------+------------+-----------+-----------+-----------+ |Sector size (bytes) | 512 | 2048 | |--------------------+------------+-----------+-----------+-----------| |Transfer Rate (max) | | | | 3600rpm (MCC3064SS)| 1.09MB/s |1.3-2.1MB/s| 2.3-3.9MB/s | | 4300rpm (MCB3064SS)| 1.3MB/s |1.6-2.5MB/s| 2.8-4.7MB/s | | |------------+-----------+----------------------| | Interface | 5MB/s async., 10MB/s sync. | |--------------------+---| |Seek Time | | | Random Seek | 28ms typical | | Full Stroke | 60ms typical | |--------------------+---| |Average Latency Time| | | 3600rpm (MCC3064SS)| 8.3ms | | 4300rpm (MCB3064SS)| 7.0ms | |--------------------+---| |Rotational Speed | 3600rpm or 4300rpm depending on drive model | |--------------------+---| |Load/unload Time | 7 sec./5 sec. | |--------------------+---| |Buffer Size | 2MB | +--------------------+---+

Overall write speed will be about 1/3 of the maximum transfer rate for standard disks with verification enabled. It is about 1/2 of the maximum when using LIMDOW media with verification, or normal media without verification. Maximum write speed is achieved with LIMDOW media and verification disabled.

The drive has 2MB of buffer RAM which improves read and write speeds. Operation of the read-ahead cache can be seen when reading data from the drive; the drive's own activity LED only flashes occasionally (corresponding to when data is actually read from the disk), whereas the Amiga's SCSI activity LED is on constantly (corresponding to data being transferred from drive to computer). Earlier MO drives had less buffer RAM; the first 640MB drives had 512KB. Some 5¼" drives have 8MB.

There is also a write-back cache which can speed up writes, especially small ones. You may wish to disable the write-back cache to guarantee data integrity. However, there should not be a problem if you are aware of how the cache works.

The read speed of my 640MB drive easily outpaces the capability of my 1991-vintage GVP SCSI controller. For writing, on my system I get over 1MB per second using a direct overwrite 640MB disk, FFS 43.20 and DiskSpeed 4.2.

For specifications of other types of drive, consult the manufacturer's web page.

1.13 Choosing an MO Drive

Choosing an MO Drive

Once you have decided to buy an MO drive, which type should you choose? This section contains some things which you need to consider.

What disk capacity do you need? Of course this depends on what you will be using the drive for. For storing a large quantity of files downloaded from the Internet, backing up a large collection of floppy disks, or large hard disk partitions, using higher capacity disks can be much more convenient.

For professional use, a 2.6GB or 5.2GB 5¼" drive is a possibility. These drives are widely used in professional audio and video applications, e.g. for direct-to-disk audio recording. For most users, the cost of a new 5¼" drive will be too high, though used older-generation drives are sometimes available very cheaply.

This narrows it down to a 3½" unit; 230MB, 640MB or maybe one of the new 1.3GB drives. Unsurprisingly, 1.3GB drives are considerably more expensive than 640MB ones. Compared to 230MB drives, I think the higher cost of a 640MB drive is well worth it, given the extra storage capacity and data transfer speed.

Which manufacturer's product should you buy? If you want a 1.3GB 3½" drive, Fujitsu Europe recently released their DynaMO 1300SD external drive. Philips will be selling a rebadged version of this. The Fujitsu DynaMO 640SE or Philips MO 640 may be the best value 640MB external drives. The Fujitsu model comes in a dark-coloured casing, while Philips' rebadged version has a white/cream colour casing. Fujitsu also make a faster 3½" mechanism with a spin speed of 4300rpm, compared to 3600rpm for their other drives. You may want to investigate which companies sell units incorporating this faster mechanism; I believe the DynaMO 640SE uses the slower 3600rpm drive.

Recently Fujitsu introduced a new line of 640MB drive mechanisms, which have an improved seek time, 28ms average compared with 35ms for the older M2513 drives. The new MCC3064 mechanism is used in the DynaMO 640SE, but some drives from other companies may still use the older M2513 mechanism. Getting a drive with the faster seek time is a good idea, especially if you are planning on using it for intensive applications, e.g. use like a hard drive for booting from.

Olympus recently introduced their own external 640MB drive. I do not know how much this costs, but it may be a good option.

The best (at least, going from the spec sheet) 230MB drive mechanism is made by Olympus. External units are sold by Olympus and Philips; they are identical apart from the case colour. This drive has a 4500rpm spin speed and 1MB cache.

1.14 Where To Get More Information

Where To Get More Information

MO drives and disks are not as widely advertised in PC-oriented computer magazines as things like Zip and Jaz drives. I suggest you read the adverts in Macintosh magazines. A drive sold for Macintosh use will come with Mac driver software, which can be used on the Amiga with Macintosh emulators like ShapeShifter and Fusion.

A group of MO drive and media manufacturers have created the MO Forum web site at: http://www.mo-forum.com/ This contains general information on MO technology, even if the English version was clearly not written by a native English speaker...

Fujitsu make MO drives and media, including the DynaMO 640SE external SCSI drive and 1.3GB internal and external drives. Most 640MB drives sold by other companies use Fujitsu drive mechanisms. See Fujitsu's web sites at: http://www.fujitsu-europe.com/ http://www.fcpa.com/ http://www.fujitsu.co.jp/

The Fujitsu Europe site includes extensive documentation for their drives in PDF format; see the For Programmers section for the URLs.

Philips PDO used to sell the Galaxy MO 640, a rebadged Fujitsu DynaMO 640 unit. Their current MO 640 is a rebadged Fujitsu DynaMO 640SE. Typically the Philips drive is slightly cheaper than the functionally identical Fujitsu one. Philips also sell a 1.3GB drive, which seems to be a rebadged Fujitsu DynaMO 1300SD, and until recently sold a 230MB drive. Their web site is at: http://www.pdo.comp.philips.com/

Konica manufacture drives and media, and have an interesting web page which describes various things they subjected an MO disk to, and how data was still readable afterwards; e.g. soaking in coffee, dropping from second-floor window, putting fingerprint on the disk surface. Their web site is at: http://www.konica.co.jp/MO/index-e.html

Olympus' 230MB drive, the PowerMO 230II, is identical to the Philips 230MB drive, except in a different colour case. Their PowerMO 640 is a 640MB 3½" drive. Olypmus also sell an interesting product, the "dimo". This allows their digital cameras to be connected to a PowerMO 230 drive for storing images. Their web site is at: http://www.olympus-europa.com/mo/

The Plasmon and Maxoptix web sites contain some general information on optical storage which may be helpful, as well as information on their product ranges, which are mainly targetted at professional markets. The URLs are: http://www.plasmon.com/ http://www.plasmon.co.uk/ http://www.maxoptix.com/

LaCie, MaxOptix and Verbatim sell external 640MB 3½" drives, all using Fujitsu drive mechanisms. The LaCie and Verbatim web sites are at: http://www.lacie.com/ http://www.verbatimcorp.com/

Other MO drive manufacturers or OEMs are Canon, Epson, IBM, Mitsubishi, Pinnacle Micro, Pioneer, Plasmon, Ricoh, Sharp, Sony, and Toshiba. In particular, free Macintosh MO driver software can be downloaded from the Pinnacle Micro web site at: http://www.pinnaclemicro.com/

If you have contact/web site information for any other MO drive manufacturers, please contact me.

If you have any Amiga-specific questions, feel free to ask on the Amiga MO mailing list. Companies which sell MO drives will almost certainly know nothing about the Amiga.

1.15 Zip & Jaz Reliability Problems

Zip & Jaz Reliability Problems

Magnetic media in general is not a good choice for reliability and long-term data storage. However, the popular Zip and Jaz products from Iomega have had some problems on top of this. If you are considering buying an Iomega Zip or Jaz drive instead of an MO drive, you should know that many people have reported reliability problems with these drives. You should investigate this before making a decision.

Iomega have apparently admitted to a 10% failure rate for Jaz drives, and the actual rate may be much higher. See http://www.pinnaclemic for some information on this.

Information about the "Zip click of death" syndrome can be found at the Unofficial Iomega Click Death Page: http://www.thirdeyesp.com You can find many more web pages about this by using a search engine such as Altavista (http://altavista.digital.com/), to find pages which contain the words: Zip click death

Some time ago Iomega had to recall thousands of faulty Jaz disks because of a manufacturing quality problem.

1.16 miscellaneous

Miscellaneous

If you ever have trouble reading disks on your MO drive, it may be that the drive lens needs cleaning. Or if the problem is specific to a certain disk, that disk may need cleaning. There are products available for cleaning the drive lens and MO disks. Fujitsu, IBM and Verbatim are three sources for these. Non-brand-name combined MO/MiniDisc disk cleaners are available very cheaply; less then 2 pounds.

There are many products available for storing 3½" floppy disks. MO disks come in individual hard plastic cases, though you could instead store them in a 3½" disk box.

For portable storage, anything which holds an even number of 3½" floppy disks on top of each other should hold 3½" MO disks nicely. For example, the aidata "DiskToGo/2" product (model: 3502-4) is excellent for storing a single 3½" MO disk. The Allsop "DiskFile 2" product is similar. These are probably sturdy enough for sending MO disks by mail, but you should use a padded envelope in any case. A box for holding ten 3½" floppy disks will hold five 3½" MO disks.

MO disks usually come with a two stick-on labels. If you run out of labels, there is no problem; standard 3½" floppy disk labels fit nicely.

1.17 Amiga Requirements

Amiga Requirements

This section describes what hardware and software you need to have in order to use an MO drive.

Hardware Requirements

You need a SCSI controller in order to use a SCSI drive.

There are MO drives available which use the IDE/ATAPI interface, for example Fujitsu's MCA3064AP 640MB drive. It is probably possible to use these with an A1200 or A4000's built-in IDE controller in conjunction with software like "IDEfix", but I have not tried this.

Software Requirements

No special software is needed.

For using media with sector size other than 512 bytes, for example 640MB or 1.3GB 3½" disks, you will need to use FastFileSystem version 40.1 or later, which is in the Kickstart 3.1 ROM, and on the AmigaOS 3.1 Install disk.

FFS 40.1 is compatible with Kickstarts 1.2 & 1.3, so it is probably possible to use 640MB or 1.3GB 3½" MO disks under even these old operating systems. I have not tested this; perhaps the only problem will be in finding a suitable 1.x-compatible Mount command. It will definitely be possible to use 512-byte sectors MO media with these old OS versions and almost any FFS version, or the ROM OFS.

You can download the latest beta version of the FastFileSystem from the Amiga Inc. web site at: http://www.amiga.de/

I am currently using FFS 43.20 with my 640MB MO drive. The beta FFS versions seem to require at least AmigaOS 3.1. Alternatively, you can use another filesystem such as SFS or PFS2. If using disks with a sector size other than 512 bytes, make sure that whichever filesystem you use supports that sector size! PFS2 does not officially support sector sizes greater than 1024 bytes.

If you want to use HDToolBox to create RDBs on your MO disks, be aware that HDToolBox only allows RDBs to be installed on direct access devices, i.e. hard disks. See the Drive Settings (DIP switches) section for more information on the two selectable device types. I have created a patch for HDToolBox to allow you to use HDToolBox with MO drives that are set to "optical memory device" mode.

For information on reading and writing PC and Macintosh-formatted MO disks and using the drive under ShapeShifter, see the Cross-Platform Access section and the mount files.

SCSI utility programs such as SCSIUtil can be used to eject the disk, instead of having to press the Eject button on the drive. You can prevent and allow manual disk ejection with the same program. See the example scripts.

I have not tried using a large capacity 5¼" MO drive or disks with my Amiga. However, all current sizes are unlikely to be a problem. Remember that 5¼" disks are double-sided, and you turn over the disk to access the other half capacity. So with a 5.2GB MO disk, each side holds 2.6GB of data. There are none of the problems associated with hard disks larger than 4GB. Some programs including HDToolBox may get confused and report negative amounts of space free, but this should be harmless, and happens with any drive/partition over 2GB.

For use with alternative operating systems such as NetBSD, you may need to use media with 512-byte sectors if the OS only supports this sector size. You may not be able to use 640MB 3½" MO disks for example, since they have 2048-byte sectors. You can use 540MB disks instead.

1.18 Drive Settings (DIP switches)

Drive Settings (DIP switches)

To set up an MO drive for use on your Amiga, you need to set the following options using the MO drive's DIP switches: · Set the SCSI ID to one which is not currently in use. · You may need to set the device type to "direct access", if your SCSI controller driver is old or badly written. · Set "Macintosh mode" to off. I don't know what this setting means exactly, but my drive works okay with this switch off. I have not tried it when the Mac mode switch is on. According to Fujitsu: "Because of the differing ways that both Apple Macintosh and PC hosts respond to the status of the drive, set this switch accordingly. Mac mode ON will disable the 'UNIT ATTENTION' reporting on power up and media change." · If your drive supports SCAM (which stands for SCSI Configured AutoMatically), disable this feature. · Enable or disable termination depending on whether your MO drive is the last device in the SCSI chain. You may want to leave the disable the drive's termination and use an external active SCSI terminator instead. This may be necessary if your SCSI chain is very long. · Consider whether you want to have the write-back cache enabled. By default, most drives have it enabled. Generally, having it enabled should not cause any problems, but see the About the Write-Back Cache section for more information. · Set the verify mode. When disabled, the speed of write operations is improved by approximately 50%, however data integrity cannot be guaranteed. The improvement when using LIMDOW media is about 100%. I recommend that you always enable verify mode.

1.19 Setting the Device Type

Setting the Device Type

MO drives usually have a DIP switch to set the device type mode. Depending on how this is set, the drive reports itself as a direct access device (type 0, the normal value for hard disks), or as an optical memory device (type 7, the normal value for optical disks). In the absence of problems, it is probably best to set the device type to optical memory.

Some programs, especially those that access SCSI drives directly, may check the device type and refuse to work with drives of type other than zero. Commodore's HDToolBox is an example of this, though I have developed a patch to get around this problem. Some SCSI drivers might refuse to boot from non-type-0 devices. My old GVP controller does not have this problem.

The ShapeShifter Macintosh emulator refuses to boot from non-type-0 devices. You can patch ShapeShifter to fix this problem.

Apart from the reported device type, in direct access mode two hard disk mode pages are returned, which are not returned in optical memory mode. They are: · format device (page 3) · fixed disk geometry (page 4)

The values for number of cylinders, heads and sectors per track given in these two pages are "fake", for compatibility with PCs. For example, for 640MB disks, the geometry values reported in the device format and rigid disk parameter pages are 606 cylinders, 8 heads and 64 sectors per track, which implies that the total number of sectors is 606×8×64 = 310272. The actual number of sectors is 310352; some hard disk partitioning programs may use the 606×8×64 value instead of working out values based on the total disk size.

1.20 Mounting and Using the Drive and Disks

Mounting and Using the Drive and Disks

Using a mount file to access the drive is the best option if you want to use the MO disk for general data storage, and not for booting from. This gives the maximum amount of free disk space, and disks formatted like this will be easily interchangeable between Amigas.

If you want to boot from an MO disk, you must create an RDB (Rigid Disk Block) on the disk, just as you would with a SCSI hard drive. You can use HDToolBox or another hard disk partitioning program to do this. Using the RDB method, you can create several partitions on a single MO disk. Many partitioning programs come up with their own "fake" values for Cylinders, Heads and BlocksPerTrack, which mean that some space is wasted. This can also cause problems if you use two different partitioning programs, which use different sets of fake values. Rather than accepting the program's defaults, you should adjust the values for Cylinders, Heads and BlocksPerTrack so that: Cylinders × Heads × BlocksPerTrack = total number of sectors on disk To find suitable values for these parameters, refer to the prime factors in the table below. For other types of disk you can use PFactor.

If you reduce the (logical) number of blocks per track, the RDB will take up less space on the disk. Be careful not to make it too small though, in case you decide to add another filesystem in future; the RDB may be too small to hold it.

Hopefully an example will clarify this. 640MB disks have 310352 sectors. 310352 = 2×2×2×2×7×17×163, so some suitable values for Cylinders, Heads and BlocksPerTrack might be Cylinders = 17×163 = 2771, Heads = 2, BlocksPerTrack = 2×2×2×7 = 56 or Cylinders = 2×7×163 = 2282, Heads = 2×2 = 4, BlocksPerTrack = 2×17 = 34

HDToolbox needs to be patched if you want to use it with your MO drive in "optical memory device" mode.

Mount files for PC-formatted disks (AT-HD type) may not use the entire disk space; see the mount files for PC disks.

Here are tables of the number of usable sectors for each type of 3½" MO disk, and each type of 5¼" disk:

3½" disks +---------+-------------+-------------+---------------------+ | Disk | Sector size | Number of | Prime factors of | | type | (bytes) | sectors | number of sectors | |---------+-------------+-------------+---------------------| | 128MB | | 248,826 | 2×3×113×367 | |---------+ |-------------+---------------------| | 230MB | 512 | 446,325 | 3×5×5×11×541 | |---------+ |-------------+---------------------| | 540MB | | 1,041,500 | 2×2×5×5×5×2083 | |---------+-------------+-------------+---------------------| | 640MB | 2,048 | 310,352 | 2×2×2×2×2×7×17×163 | +---------+-------------+-------------+---------------------+ | 1.3GB | 2,048 | 625,633 | 37×37×457 | +---------+-------------+-------------+---------------------+

5¼" disks +---------+-------------+-------------+---------------------+ | Disk | Sector size | Number of | Prime factors of | | type | (bytes) | sectors | number of sectors | |---------+-------------+-------------+---------------------| | 600MB | 512 | 576,999 | 3×3×61×1051 | |---------+-------------|-------------+---------------------| | 650MB | 1,024 | 314,569 | 314569 | |---------+-------------|-------------+---------------------| | 1.2GB | 512 | 1,163,337 | 3×7×31×1787 | |---------+-------------+-------------+---------------------| | 1.3GB | 1,024 | 637,041 | 3×17×12491 | +---------+-------------+-------------+---------------------| | 2.3GB | 512 | 2,244,958 | 2×31×36209 | +---------+-------------+-------------+---------------------| | 2.6GB | 1,024 | 1,273,011 | 3×17×109×229 | +---------+-------------+-------------+---------------------| | 4.1GB | 512 | 3,973,952 | 2×2×2×2×2×2×31×2003 | +---------+-------------+-------------+---------------------+

| 4.8GB | 1,024 | 2,319,786 | 2×3×3×3×7×17×19×19 | +---------+-------------+-------------+---------------------| | 5.2GB | 2,048 | 1,263,472 | 2×2×2×2×7×29×389 | +---------+-------------+-------------+---------------------+

There are several mount files in the DOSDrivers-3½ and DOSDrivers-5¼ drawers which are part of the Amiga MO FAQ distribution. You can modify these if you need to create a mount file for other filesystems such as PFS2.

TO CREATE SOME KIND OF STANDARD FOR AMIGA-FORMATTED MO DISKS, ALWAYS USE 2 RESERVED BLOCKS.

The exact values of Cylinders, Surfaces, HighCyl and BlocksPerTrack are not important, provided that: Surfaces × BlocksPerTrack × (HighCyl+1) = total number of sectors on disk

For 640MB 3½" disks, this means that: Surfaces × BlocksPerTrack × (HighCyl+1) = 310352

This is to ensure that MO disks are easily interchangeable between different Amigas. If Surfaces × BlocksPerTrack × (HighCyl+1) is less than the number of sectors in the disk, you waste disk space, and would need to also send a copy of your mount file when sending an MO disk to someone.

If you use a mount file to mount the drive, you can use MO disks just as you would floppy disks. Ejecting and inserting a new disk should be automatically detected by the Amiga.

If you insert an MO disk with RDB after booting your Amiga, you will need to use a program such as SCSIMounter in order to mount the partition(s) on that disk.

It's easy to format a new MO disk for use. If using a mount file, you can just insert the disk and type a command like: Format DRIVE MO0: NAME "My MO disk" NOICONS FFS QUICK (Replace MO0: with whatever drive name you have mounted MO disks of that capacity as.) The MO disk will be ready for use in a couple of seconds. It is not necessary to do a full format (i.e., not to use the QUICK option), but you can if you want.

You may wish to perform a low-level format on your MO disks at some point. This is advisable if you buy uncertified disks.

1.21 Using Different Disk Capacities

Using Different Disk Capacities

As mentioned in the Types of MO Media section, MO drives can use several different capacities of disk. Since there is currently no special MO driver software for the Amiga, it is not possible to access different capacity MO disks using the same device name (but see Mounting and Using the Drive and Disks).

On my Amiga, I mount the MO0: device to access 640MB MO disks. To access 128MB, 230MB or 540MB media, I would have to use other mount files, e.g. for devices MO128:, MO230: and MO540:, in order to access disks of these capacities. This is not a major problem, since you will probably mostly use disks of the highest capacity your drive can handle. See the mount files.

1.22 Mount Files

Mount Files

Here are mount files for several different filesystems and disk types. Drag the icons for the mount files you want to install to DEVS:DOSDrivers or SYS:Storage/DOSDrivers, and set the DEVICE and UNIT tooltypes, and the Mask and MaxTransfer values appropriately for your system. Please contact me if you have problems with any of these mount files.

Amiga FFS After mounting an FFS volume, you can use the Format command to set the DosType just as you would a floppy disk or hard disk partition. For example: Format DRIVE MO640: NAME "My MO Disk" NOICONS FFS DIRCACHE QUICK 3½" FFS 128MB

FFS 230MB FFS 540MB

FFS 640MB FFS 1.3GB

5¼" FFS 600MB

FFS 650MB FFS 1.2GB

FFS 1.3GB FFS 2.3GB

FFS 2.6GB FFS 4.1GB

FFS 4.8GB FFS 5.2GB

Amiga SFS SFS is a new filesystem for the Amiga, developed by John Hendrikx. It is currently in beta testing, so I don't recommend that you use it for storage of important data yet. The current beta version of SFS is supposed to automatically support detection of different disk capacities, but this does not seem to work properly. There is an SFS support web page at http://www.xs4all.nl/~hjohn/SFS/. 3½" SFS 128MB

SFS 230MB SFS 540MB

SFS 640MB SFS 1.3GB

5¼" SFS 600MB

SFS 650MB SFS 1.2GB

SFS 1.3GB SFS 2.3GB

SFS 2.6GB SFS 4.1GB

SFS 4.8GB SFS 5.2GB

PC-compatible MS-DOS FAT (requires CrossDOS) It should be possible to use the following mount file with any AT-HD formatted disk, no matter what the partition layout. Mounting MOC: will access the first partition on the disk. To access other partitions, you need to copy and rename MOC to MOD, MOE, etc. CrossDOS determines which partition to mount by looking at the last letter of the device name; C for the first partition, D for the second and so on. This mount file is based on the one on Aminet as disk/misc/mount_msdos.lha, which was created by Dirk Eismann and Volker Remuß. PC AT-HD (MOC:)

These AT-HD type mount files can be used with disks which have been formatted on a PC, with a single partition. CrossDOS is not able to format disks of this type, but you can read and write them. It is probably better to use the MOC DOSDriver above, since that does not depend on a certain partition layout. PC AT-HD 128MB

PC AT-HD 230MB PC AT-HD 540MB

These mount files can be used to access disks in "superfloppy" format. The difference between PC AT-HD and superfloppy disk is similar to that between RDB and mount file disks on the Amiga. 3½" Superfloppy 128MB

Superfloppy 230MB Superfloppy 540MB

Superfloppy 640MB Superfloppy 1.3GB

5¼" Superfloppy 600MB

Superfloppy 650MB Superfloppy 1.2GB

Superfloppy 1.3GB Superfloppy 2.3GB

Superfloppy 2.6GB Superfloppy 4.1GB

Apple Macintosh HFS (requires CrossMac, may work with MaxDOS with changes) 3½" Mac 128MB

Mac 230MB Mac 540MB

Mac 640MB Mac 1.3GB

5¼" Mac 600MB

Mac 650MB Mac 1.2GB

Mac 1.3GB Mac 2.3GB

Mac 2.6GB Mac 4.1GB

Mac 4.8GB Mac 5.2GB

The following mount file is for 640MB disks formatted as a single partition using the free Pinnacle Micro Mac MO driver software. It gives read-only access on the Amiga side, and uses AmiCDFS. Rather than using this mount file directly, you should edit it to contain the correct LowCyl and HighCyl values for your disk, which will vary depending on which Mac MO software and which type of disk you use. Mac 640MB AmiCDFS

NetBSD (requires BFFS) 3½" BSD 230MB

BSD 540MB

1.23 Example AmigaDOS Scripts

Example AmigaDOS Scripts

I have created some simple AmigaDOS scripts for use with MO drives. They can also be used for e.g. CD-ROM drives. They have icons, and so can be run from Workbench; the default tool is IconX. The scripts make use of Gary Duncan's SCSIUtil program.

Since the scripts are simply single AmigaDOS commands, you can for example configure a program like ToolsDaemon with menu items to eject the disk, and allow/prevent medium removal.

You will need to edit the scripts to use the correct device name and unit number for your drive.

AllowMORemoval can be useful if you have been using a Mac emulator to access the MO drive as a SCSI device. If the emulated Mac crashes or hangs up, you will need to tell the drive to allow medium removal in order to eject the disk. Also HDToolBox has the habit of preventing ejection.

EjectMO AllowMORemoval

PreventMORemoval

1.24 HDToolBox Patch

HDToolBox Patch

HDToolBox is Commodore's utility for partitioning and formatting SCSI storage devices such as hard disks, and is supplied on the AmigaOS Install disk.

HDToolBox cannot be properly used with an MO drive that is set to "optical memory device" mode, as opposed to "direct access device", which is normal for hard disks. The same applies to Panasonic's PD rewriteable drives.

HDToolBox checks the device type, and if non-zero refuses to read data from the drive. Type 0 is direct access, type 7 is optical memory. This is not a major problem as MO drives typically have a DIP switch to set the device type. Nevertheless, it would be nice to use HDToolBox with an MO drive in optical memory device mode.

That is what the following patch allows. It modifies HDToolBox to work with both devices of type 0 and type 7. Luckily, because HDToolBox is written in C, there were just enough spare instructions so that I didn't have to alter the program size.

I have created patches for five versions of HDToolBox: · Version 2.2 is on the "Amiga Developer CD v1.1". · Version 2.22 is on the AmigaOS 2.05 Install disk. · Version 39.12 is on the AmigaOS 3.0 (39.29) Install disk · Version 40.3 is on the AmigaOS 3.1 beta (40.35) Install disk. · Version 40.4 is on the AmigaOS 3.1 (40.42) Install disk.

Use a binary file editor such as Hex to make the changes to the HDToolBox executable. All numbers are in hexadecimal.

HDToolBox 2.2 and 2.22 patch Offset Change From Change To $004602 102D FEF7 4A00 7000 102D FEF7 $00460A 7200 1200 2001 0C00 0007 6712

HDToolBox 39.12 patch Offset Change From Change To $0042A6 102D FEF7 4A00 7000 102D FEF7 $0042AE 7200 1200 2001 0C00 0007 6712

HDToolBox 40.3 patch Offset Change From Change To $005444 102D FEF7 4A00 7000 102D FEF7 $00544C 7200 1200 2001 0C00 0007 6712

HDToolBox 40.4 patch Offset Change From Change To $005430 102D FEF7 4A00 7000 102D FEF7 $005438 7200 1200 2001 0C00 0007 6712

Alternatively, I have created patch files for use in conjunction with GPatch. You can use these to patch your HDToolBox executable if you prefer not to apply the patch manually. The filenames are HDToolBox2.2_MO.gpch, HDToolBox2.22_MO.gpch, HDToolBox39.12_MO.gpch, HDToolBox40.3_MO.gpch and HDToolBox40.4_MO.gpch for versions 2.2, 2.22, 39.12, 40.3 and 40.4 respectively.

For example, to use GPatch to patch your HDToolBox 40.4 executable, you would use commands like: Rename HDToolBox HDToolBox.orig GPatch HDToolBox.orig HDToolBox40.4_MO.gpch HDToolBox

1.25 Low-Level Formatting

Low-Level Formatting

Low-level formatting is different from high-level formatting, which is done when you use the AmigaDOS Format command. This section gives a detailed explanation of what happens when a disk is low-level formatted and how bad sectors are remapped. You don't have to understand this in order to use MO disks.

The primary and secondary defect lists (PDL and SDL for short) are areas on the disk that store information about which sectors are bad, so that the drive knows to map the bad sectors out. This is all transparent to the Amiga, it is handled by the drive.

When a disk is low-level formatted, the drive completely erases the disk and checks its surface for defective sectors. If any bad sectors are found their positions are recorded in the PDL, and mapped out using a "sector slipping" algorithm. For a new disk, sectors recorded in the PDL correspond to sectors which really are bad, due to imperfections in the disk manufacturing process.

MO disks are normally low-level formatted and certified at the factory, so you do not need to low-level format new disks (but see below for my experience with a Sony 230MB disk). However, it is possible that some brands of disk are not certified (that is, the disk surface has not been checked at the factory). It is a good idea to low-level format uncertified disks before use. Almost all makes of MO disk are certified at the factory; it should say so on the disk packaging.

MO disks have a number of spare sectors which are used when bad sectors are remapped. For example, 640MB 3½" disks have 2244 spare sectors. Typically the number of bad sectors recorded in the PDL of a new disk is between 0 and 7.

The use of sector slipping means that bad sectors found during low-level formatting do not slow down disk access at all. It works like this. Suppose that sectors 3 and 7 are bad. Then the logical sectors as seen by the Amiga correspond to physical sectors like this: Logical Physical sector sector 0 ----------> 0 1 ----------> 1 2 ----------> 2 BAD 3 3 ----------> 4 4 ----------> 5 5 ----------> 6 BAD 7 6 ----------> 8 7 ----------> 9

When accessing the disk, the drive simply skips over the bad sectors. The extra time needed to skip a sector is simply the time taken for one sector to be read, which is very small.

The secondary defect list is used to record sectors which go bad after the disk has been low-level formatted. If a disk is quite old and has been used for a long time, dust or dirt on the surface may cause some sectors to become bad. If a verify error occurs when a sector is written to, the drive remaps that sector and records its position in the SDL.

Unlike bad sectors which are found during a low-level format, it is not possible to use a sector slipping algorithm for sectors which become bad later. Instead a linear replacement algorithm is used. For this, the drive replaces the bad sector by a sector from the spare area. This method of replacement does slow down access to replaced sectors, because the drive must seek to the spare area to read the sector, and then seek back again if more sectors are to be read.

The sectors in the SDL are probably not really defective, it's just that the drive cannot read them properly due to dirt or dust on the disk surface. For this reason, it is a good idea if you have a disk that has accumulated a large number of "bad" sectors, to clean the disk surface and then low-level format the disk. Of course you must backup all data on the disk before doing this!

To clean the disk surface, use an MO disk cleaning kit. These are very cheap; I have seen them sold for about 2 pounds. Low-level formatting after the disk surface is cleaned will clear the PDL and SDL, and completely erase and test the disk surface.

To put the situation into perspective, I have had my MO drive for about a year. Only one disk has developed a single bad sector since then, so unless you are in a very dusty environment you probably will not have to concern yourself with low-level formatting.

I have a new Sony 230MB MO disk that from the factory had 5 sectors recorded in the PDL. I initially did a high-level AmigaDOS Format (not quick) on the disk. Afterwards I used ProbeSCSI too see whether any other blocks had been mapped out by the drive, recorded in the SDL. Surprisingly, there were several sectors which the drive found to be bad, even though the disk was brand new. So I low-level formatted the disk, in order to have the extra bad sectors recorded in the PDL. In view of this, I recommend that you do a high-level format of new MO disks, and see whether any additional sectors have been mapped out by the drive afterwards. If so, it is a good idea to low-level format the disk.

Groups

The spare blocks are distributed over the disk depending how many "groups" are used. The number of groups is fixed except for 230MB disks:

Type of Number of disk groups 128MB 1 230MB 1 or 10 540MB 18 640MB 11

For 230MB disks, when low-level formatting you can specify how many groups to use, one or ten. Which you choose has a very subtle effect, and for most applications it will not matter (just as well, because there is currently no Amiga program to set the number of groups).

The number of groups determines how the spare sectors are arranged on the disk. With a single group, all the spare sectors are located after the user sectors. With ten groups, there are ten groups of spare sectors spread over the disk.

To illustrate this, suppose a (hypothetical) disk has 100,000 user sectors and 1,000 spare sectors. The diagram below illustrates how the spare sectors are arranged.

One group Ten groups _____ _____ 0| | 0| | | | | Group 1 | | | 9,999|_____|_____| | | Group 1 spare -> |_____|_____| | | 10,100| | | | | Group 2 | |100,000 user | 20,099|_____|_____| | | sectors | Group 2 spare -> |_____|_____| | | 20,200| | | | | Group 3 | | | 30,199|_____|_____| | | | : . . . : | | : . . . : | | :_____|_____: | | 80,800| | | | | Group 9 | | | 90,799|_____|_____| 99,999|_____|_____| Group 9 spare -> |_____|_____| 100,000| | 90,900| | | 1,000 spare | | Group 10 | | sectors | 100,899|_____|_____| 100,999|_____|_____| Group 10 spare -> |_____|_____|

For a disk formatted to have one group, if a sector is replaced, the drive head must seek to near the end of the disk to access the replacement sector. On average, this will mean that the head seeks half-way across the disk to access the replacement sector.

For a disk formatted to have ten groups, if a sector is replaced, the replacement sector is taken from the spare area for that group. On average, this will mean that the head seeks half-way across the group, i.e. 1/20 of the way across the disk, to access the replacement sector.

You can see that accessing replacement sectors is quicker for disks which have 10 groups than for disks with a single group. Why would anyone want to low-level format disks to have a single group then? It depends what the disk will be used for.

Imagine you want to store digitised video footage on a disk. If the playback rate of the footage is close to the maximum transfer rate of the drive, any interruption, no matter how small, to the data flow may cause problems. When playing back from a disk with ten groups, when the head reaches the end of one group it must skip over the spare area to get to the next sector, which is at the beginning of the next group. This will cause a (very brief) interruption to the flow of data to the computer.

For most Amiga users ten groups will be preferable, but there is little to choose either way.

Programs for Low-Level Formatting

Not all Amiga SCSI software is capable of low-level formatting. Commodore's HDToolBox fails to low-level format MO disks for me. One program which can, at least some of the time, successfully low-level format MO disks is GVP's ExpertPrep, which can be downloaded from: http://www.gvp-m.com/expert.lzh

ExpertPrep does not allow the number of groups to be specified; to do this you would need to use an MO-specific low-level formatting program, which does not exist yet on the Amiga.

Recently Thomas Richter released his SCSIFormat program on Aminet. I have successfully used SCSIFormat to low-level format disks in my Sony SMO-S501-11 5¼" drive, but did not manage to get it to work with my 3½" drive.

Another option is to use Macintosh MO/SCSI driver software under a Mac emulator like ShapeShifter.

If something interrupts the low-level format process, such as a power cut, or the Amiga crashes or resets, you must start the low-level format again. The disk will only be usable after the low-level format is complete.

1.26 About the Write-Back Cache

About the Write-Back Cache

MO drives have a write-back cache, which when enabled speeds up write times, because the drive does not wait for the data transferred to its buffer memory to be written to disk.

It works like this: · The Amiga sends a first piece of data to the drive. · This data is stored in the drive's buffer memory, and the drive immediately responds. · Drive begins to write the first data to the optical disk. While it is writing the data, a second piece of data can be sent from the Amiga to the drive's buffer memory.

But what if a write error occurs when the drive writes the first data to disk? So far the Amiga thinks that the first data has been written correctly. The drive will report the write error after the Amiga has sent the second piece of data to the drive. Depending

on the SCSI device in use (scsi.device, gvpscsi.device, etc.), the Amiga may incorrectly interpret the write error as referring to the second piece of data.

So the Amiga will display a Retry/Cancel requester. If you click Retry, the computer may retry sending the second piece of data. So the first data, which should be resent because of the write error, is not. Hence bad data remains on the disk. The first piece of data may not even still be in memory; the program that wrote it could have since freed or altered the memory.

For this reason, I do not believe that it is possible to (easily) completely support the write cache under AmigaOS, though partial support should be possible. However, in practice the write cache can usually be enabled without problems. The drive should transparently remap any bad sectors it encounters when writing, so the Amiga would only be told of this in extreme circumstances. If ever a write error requester appears, just click on Cancel, delete the file affected, and re-copy it. Do not assume that clicking Retry will work properly, because the Amiga may resend a different piece of data for which no write error occurred.

In fact, getting spurious write errors may indicate that there is a problem with your SCSI chain. Using an external active terminator may help here.

1.27 MO Disk Icons 1.2

MO Disk Icons 1.2

Junji Morokuma has made a collection of Macintosh icons for MO disks. I have converted these to IFF-ILBM format.

Rather than increase the size of the Amiga MO FAQ distribution, I have created a separate archive for the MO Disk Icons package. You can get the MO Disk Icons 1.2 archive from my web page or Aminet as pix/icon/MODiskIcons12.lha.

The original Macintosh-format collection, which may be of interest if you use a Mac emulator, can be found at: ftp://src.doc.ic.ac.uk/pack mac/gui/icon/mo-disk-icons-12.hqx

1.28 Cross-Platform Access

Cross-Platform Access

This section covers accessing PC and Macintosh-formatted MO disks on the Amiga, and also using an MO drive and disks with Macintosh and PC emulators on the Amiga.

Macintosh

It is very easy to use an MO drive and disks with emulators. I will mainly write about the ShapeShifter Macintosh emulator here. More information on the Fusion and A-Max Mac emulators can be added if I am sent a (legal!) copy of these programs to test, or someone else contributes information.

There are two ways to use MO disks under Mac emulation: · You can use an MO disk as a "DeviceDisk". This is probably the quickest method. There are two disadvantages. Firstly, MO disks used like this will not be readable on a real Macintosh. Even if you buy a Mac-formatted MO disk, you will need to reformat it in order to use as a DeviceDisk. Secondly, A-Max 2.50, Fusion and ShapeShifter do not support disks with a sector size other than 512 bytes. This means that 640MB 3½" disks cannot be used as DeviceDisks, since they have 2048-byte sectors. · You can use Macintosh MO driver software. It is a good idea to buy an MO drive that comes bundled with Mac driver software. However, if your drive did not come with any you can download several free Mac SCSI driver packages. I recommend the Pinnacle Micro software.

My Philips Galaxy MO 640 drive came with Mac software called FormatterOne Pro, which can also be used to access many other types of SCSI device. FormatterOne Pro is a commercial product; see the Software Architects web site at: http://www.softarch.com/

In fact, the free Pinnacle Micro software seems to have more features than FormatterOne Pro. It allows disks to be low-level formatted, something which some Amiga SCSI tools can not do. However, the Pinnacle software is apparently incompatible with System 8. I also had some problems running it under System 7.0.1, though these may be partly due to my old SCSI controller or bugs in ShapeShifter. The Pinnacle Formatter seems to require that the MO drive be set to type 0 in order to recognise it.

If you use this or other Mac driver software, you can buy Mac-formatted MO disks and use them immediately under the Mac emulation. There are other commercial Mac drivers, though I have not used them. CharisMac sell "Anubis Pro", which you can buy as a competitive upgrade for US$14.95. Presumably you could download the free Pinnacle Micro software and then upgrade to Anubis Pro. For more information, see CharisMac's web page at: http://www.charismac.com/anubis.html

Some other Mac commercial driver products are Silverlining, Disk Drive TuneUp, FWB Hard Disk Toolkit and MicroNet DiskWorks.

Note that to boot from an MO disk under ShapeShifter, the device type needs to be set to "direct access" (type 0). You can get around this by patching ShapeShifter to not check the device type.

A-Max 2.50 seems to be incompatible with all Mac SCSI driver software that I tried, but it is possible to use 512-byte-sectors MO disks as DeviceDisks with A-Max.

Accessing Macintosh disks from the Amiga for both reading and writing may require the commercial products CrossMac or MaxDOS. However, read-only access is possible by using filesystems such as AmiCDFileSystem or AmiCDFS which support Mac HFS CD-ROMs and floppies. If you have created multiple partitions on a Mac-formatted MO disk, you will need to make a mount file corresponding to each partition that you want to access.

There is a mount file using AmiCDFS that works for my 640MB Mac-formatted MO disk. I used the Pinnacle Micro Mac driver software to format it as a real Mac volume, not a DeviceDisk. I created a single HFS partition on it, which occupies sectors 96 to 310349 inclusive (sectors 310350 & 310351 do not seem to be used). So the LowCyl and HighCyl values for the mountlist are 96 and 310349 respectively (using BlocksPerTrack = 1). If I were to use different Mac MO driver software, the LowCyl and HighCyl values would need to be altered appropriately.

When creating mount files for your Mac volumes, you need some way of finding which range of sectors the volume uses. If you are using a (512-byte sectors) MO disk as a DeviceDisk with an emulator, this should be no problem; LowCyl = 0 and HighCyl = (number of sectors in disk - 1) should work. Using a real Mac-formatted disk, you need to use a Mac utility program which tells you which sectors are used by each partition to get this information.

PC

PC driver software is available from many manufacturers' web sites. The Fujitsu, Maxoptix, Philips and Pinnacle Micro sites are good places to start; see the Where to Get More Information section for their URLs. The Philips and Fujitsu Europe sites have drivers for MS-DOS, Windows 3.1, Windows 95 & 98, Windows NT 3.51 and 4.0, and OS/2.

It is possible to mount PC-formatted (AT-HD type) MO disks as Amiga devices, just like PC0: is used to access PC-formatted floppy disks. This requires CrossDOS (supplied with Workbench 2.1 and higher) or similar. It is probably not possible to format this type of disk without special software, so format disks on a PC first. Accessing PC disks which have been formatted to contain several partitions is easy using CrossDOS. CrossDOS can be configured to automatically recognise and mount partitions on a disk; it determines where on the disk the partitions are by reading the partition table. See the MOC DOSDriver in the Mount Files section. Alternatively you could create a mount file for each partition. This has the disadvantage of being tied to a specific partition layout. It may be possible to use MountDOS to help with this.

On a PC it is also possible to intialise MO disks in "superfloppy" format. This is similar to using a mount file as opposed to RDB for Amiga-formatted disks. Accessing such disks on the Amiga just requires a suitable mount file. (Superfloppy format does not apply to 4.8Gb and 5.2GB 5¼" disks, because the FAT filesystem has a maximum partition size of 2GB.)

See the Mount Files section if you want to experiment with reading PC or Macintosh-formatted MO disks.

You should also investigate XFS which is a kind of "universal filesystem" that can access PC and Mac volumes. It supports Windows 95 long filenames, which is otherwise only possible with CrossDOS 7.0. The author of XFS has created a web page about it, which can be found at: http://www.xfilesystem.freeserve.co.uk/

1.29 ShapeShifter Patch

ShapeShifter Patch for Optical Drives

Ever since version 3.4, the ShapeShifter Macintosh emulator can only boot from direct access (type 0) SCSI devices. It checks the device type, and if non-zero refuses to boot from that device. So you cannot boot from a Mac-formatted optical disk if your optical drive is set to "optical memory device" mode (type 7).

Here is an extract from the ShapeShifter version history:

V3.4 04.Mar.96 - ShapeShifter won't try to boot from SCSI devices other than direct access devices

Similarly to the HDToolBox patch, I have figured out a patch for version 3.10 of ShapeShifter to disable the device type checking, so it can boot from any type of device.

Use a binary file editor such as Hex to make the change to your ShapeShifter 3.10 executable. All numbers are in hexadecimal.

Offset Change From Change To $004280 41EB 603E

Alternatively, you can use GPatch to apply the enclosed SSOpticalPatch.gpch From a CLI/Shell window, CD to the directory where your ShapeShifter executable is, and use commands like: Rename ShapeShifter ShapeShifter.orig GPatch ShapeShifter.orig SSOpticalPatch.gpch ShapeShifter

1.30 Free Macintosh SCSI Driver Software

Free Macintosh SCSI Driver Software

Here is a list of some free Mac SCSI driver/formatter software. The only one that works successfully for me under ShapeShifter is the Pinnacle Micro driver. Others may well work under Fusion; ShapeShifter's SCSI support seems to be somewhat buggy.

It would be great if someone could run some benchmarks for each of these drivers, and also report on how stable they are under different emulators and hardware setups.

Lido 7.56 http://www.euronet.nl/users/ernstoud/pub/lido756.hqx

Ex-commercial package. Probably does not support 2K-per-sector MO disks.

Manager ftp://ftp.formac.com/public/updates/Manager/Manager-6.2.3.sit.hqx ftp://ftp.formac.com/public/updates/Manager/manager7.0
(the MacBinary files in the same directory are broken; ignore them)

Supplied with Formac storage devices. May be limited in its device support; examine the executable using ResEdit and read the device name strings.

MicroNet Utility and MicroNet Cartridge Extension ftp://www.infotogo.micronet.com/MacFiles/MNU727.hqx ftp://www.infotogo.micr

Supplied with MicroNet storage devices. See the MicroNet web site at http://www.infotogo.micronet.com/ for more information.

Pinnacle Formatter http://www.pinnaclemicro.com/files/fw_sw/mac/pmo33.hqx http://www.pinnaclemicro.com/files/fw_sw/mac/pmo32

This is probably specific to MO drives. Version 3.2 only works on Pinnacle Micro drives. Version 3.3 works on any, and supports 2K-per-sector disks. The formatter works for low- and high-level formats. You can set blind read/writes and write verify modes on a per-partition basis. Apparently incompatible with MacOS 8.x, though I have no way to test this. I'd like to know exactly what incompatibilities there are. Compared to generic software like FormatterOne Pro, the Pinnacle mounter INIT only uses about 27K of memory.

Also on the Pinnacle site is their old CD Burner software which may be of interest, because it includes a basic backup program that can backup to any volume, not just CD-Rs. It can do incremental as well as full and image backups.

1.31 Sharing the MO Drive Between an Amiga and PC or Macintosh

Sharing the MO Drive Between an Amiga and PC or Macintosh

For sharing large amounts of data, it is possible to connect an external MO drive to both your Amiga's and (say) a PC's SCSI controllers. To do this, you will need to set the SCSI IDs of the controllers so they do not clash. Most SCSI controllers are set to ID 7 by default.

Never try and write to the disk from both computers at once, or read and write at the same time.

On the Amiga you will need to run DiskChange for a volume that has been written to by the other computer, otherwise the Amiga will not notice that changes have been made. On a PC under Windows 95, press F5 to refresh the display of Windows Explorer.

1.32 Finding Programs Mentioned Here

Finding Programs Mentioned Here

This section gives the Aminet paths of various programs that are mentioned in the Amiga MO FAQ. They should also be available on recent Aminet CDs.

Name Aminet path AGMSSetSCSI disk/misc/AGMSSetSCSI.lha AmiCDFileSystem disk/cdrom/amicdfs.lha AmiCDFS disk/cdrom/amicdfs240.lha BFFS misc/emu/bffs1_3.lha Ghostscript text/print/ (various files) GPatch util/misc/gpatch.lha Hex disk/moni/HexED.lha MountDOS disk/misc/MountDOS100.lha PFactor misc/math/pfactor.lha ProbeSCSI disk/misc/ProbeSCSI008.lha SCSIFormat disk/misc/SCSIFormat.lha SCSIMounter disk/misc/SCSIMounter203.lha SCSIQuery disk/misc/SCSIQuery.lha SCSIUtil disk/cdrom/SCSIUtil.lha ShapeShifter misc/emu/ShapeShiftr310.lha SFS disk/misc/SFS_BETA.lha XFS disk/misc/xfs.lha

1.33 For Programmers

For Programmers

It is possible to support advanced features of MO drives on the Amiga by using custom driver software. No-one has written any such software yet (apart from perhaps the MO-MIGA software), but here are some things which could be done: · Support automatic media capacity detection. So regardless of whether a 128MB, 230MB, 540MB, 640MB or 1.3GB disk is inserted, the drive could be accessed as MO0:. This would be similar to the way that both high and low density floppy disks are supported as DFx:. The sector size can also change; it is 512 bytes for 128MB, 230MB and 540MB 3½" disks, but 2048 bytes for 640MB and 1.3GB 3½" disks. CrossDOS and XFS have this capability for AT-HD type MO disks. · Allow disks to be low-level formatted. Low-level formatting is possible using ExpertPrep, available from the GVP-M web site. However this does not provide full support for all features. · Partial support for the write cache may be possible, especially in conjunction with disk cache software running on the Amiga. · Extended error detection. Detect when the MO drive has to use its error correction circuitry or retry reading a track. This does not result in data loss, but many such occurrences may indicate that the disk or drive needs cleaning. A requester could optionally alert the user to this. The drive maintains a log of recoverable errors, and this is readable by the Amiga. · Allow various options to be changed in software, rather than having to change a DIP switch on the drive, such as spindle automatic stop mode, write cache mode and verify mode. · Allow other options to be set for which there are no DIP switches, such as spindle stop monitoring time and power save mode. · Filesystems could have an option to "pre-erase" unused areas of an MO disk, to allow writing new data to normal media to be as fast as for LIMDOW media. · Filesystems can enable or disable verification of writes on a per-partition (actually per-write) basis. This speeds up writes, and may be a good idea for partitions that contain temporary, unimportant data, such as a web browser's cache. · A filesystem could be written to support NSR format disks, or UDF which is a subset of NSR. See the About NSR and UDF section. · Some MO drives have their firmware in Flash ROM. This means that it is possible to update the firmware from the host computer. Software to do this exists for the PC; it would be useful to have an Amiga firmware downloader program also. An archive containing PC firmware downloader program and BIOS for Fujitsu M2513 640MB 3½" drive mechanisms is available from the Maxoptix web site. I have also created a web page which contains several firmware versions for Fujitsu and Philips OEM M2513A drives. This can be accessed from my main web page at: http://visitweb.com/mark At the time of writing, the direct URL is: http://home.freeuk.net/markk/MO/index.html

I envisage an "mo.device" being written, that goes in between the filesystem and the underlying SCSI device (scsi.device, gvpscsi.device, etc.). Multiple units of mo.device could access multiple MO drives on multiple SCSI controllers, if present. Something like this may already have been written by Fourth Level Developments. I would like to find information on their "MO-MIGA" software package.

Documentation

There is extensive documentation in PDF format for the Fujitsu M2513 and MCB3064SS/MCC3064SS 640MB 3½" SCSI and MCA3064AP IDE/ATAPI drive mechanisms available from the Fujitsu Europe web site at: http://www.fujitsu-europe.com/

You can print the PDF files on an Amiga using Ghostscript, or run Acrobat Reader under Macintosh emulation. The direct URLs for these files are as follows.

M2513S (DynaMO 640) Maintenance Manual; 1016015 bytes, 79 pages: http://www.fujitsu-europe.com/home/support/mo/manuals/cat4

M2513A OEM Manual - Specifications and Installation; 4594299 bytes, 182 pages: http://www.fujitsu-europe.com/home/support/mo/ma

M2513A OEM Manual - SCSI Logical Specifications; 1548914 bytes, 167 pages: http://www.fujitsu-europe.com/home/support/mo/man

MCA3064AP Optical Disk Drive Product Manual; 3927852 bytes, 227 pages: http://www.fujitsu-europe.com/home/support/mo/manuals

MCB3064SS, MCC3064SS Optical Disk Drives Product Manual; 7938348 bytes, 234 pages: http://www.fujitsu-europe.com/home/suppo

MCB3064AP, MCC3064AP Optical Disk Drives Product Manual; 3880565 bytes, 229 pages: http://www.fujitsu-europe.com/home/supp

If you are interested in the physical specifications of MO disks, there are some relevant ECMA standards. See the About NSR and UDF section for the URL of the ECMA web site.

1.34 About NSR and UDF

About NSR and UDF

NSR and UDF specify platform-independent file systems. UDF is a subset of NSR. NSR stands for Non-Sequential Recording, and UDF for Universal Disk Format.

They allow disks created on a wide variety of operating systems to be interchangeable between different OSes. Think of NSR and UDF as similar to the way the ISO 9660 standard allows any type of computer with a CD-ROM drive to read the files from a CD-ROM disc. With NSR or UDF support, it would be possible to read and write to NSR-formatted MO disks from a Macintosh, PC, Amiga, and other types of computer.

NSR is covered by ISO standard 13346 and an equivalent ECMA standard, ECMA-167 2nd edition. NSR is the international standard logical disk format. It is not restricted to optical disks.

ISO standards documents are not available free of charge. Information about ordering them can be found on the ISO web site at: http://www.iso.ch/

ECMA (European Computer Manufacturers Association) standards documents are available free of charge. They can be downloaded in PDF and Microsoft Word formats from the ECMA web site, where you can also order a free CD-ROM containing all ECMA standards. The URL is: http://www.ecma.ch/

UDF is a subset of NSR which is defined by the Optical Storage Technology Association (OSTA). You may have heard it mentioned in confunction with CD-RW and DVD technologies. It is likely to be more commonly used as the standard interchange format for MO disks. UDF specifications are available in PDF format from the OSTA web site, at: http://www.osta.org/

If the Amiga is ever to support new technologies like CD-RW and DVD properly, an NSR or UDF filesystem needs to be written. The issue of NSR/UDF support is not only applicable to MO disks.

1.35 List of Amiga MO Users

List of Amiga MO Users

The purpose of this section is to list the names and email addresses of people who use MO drives with the Amiga, partly so that MO- and SCSI-related utility programmers can contact them if they want beta-testers for their programs. This will be particularly useful if the programmer does not own an MO drive, but wants to include MO-specific features, or wants to support several types of MO drive.

Please contact me if you would like to be added to this section.

Name Drive Email address Michael Böhmer Fujitsu M2513A 640MB 3½" thorin@ods.de Keith Brown Pinnacle Vertex 2.6GB 5¼" commish@azstarnet.com Neil Cafferkey Philips Galaxy 640MB 3½" caffer@cs.ucc.ie Dave Hawthorn 230MB 3½" Dave.Hawthorn Rainer Kalthoff Fujitsu M2513A 640MB 3½" R.Kalthoff@ping.de Johnny Kitchens Olympus SYS.230 230MB 3½" kitchens@letter.con Mark Knibbs Philips Galaxy 640MB 3½" mark_k@iname.com Sony SMO-S501-11 650MB 5¼" Rainer Kraus Fujitsu M2512A 230MB 3½" kraus3@wtal.de Jürgen Müller Olympus PowerMO 230II 3½" Mueller-J@t-online.de Joachim Nink joachim.nink@gmx.de Jan Uerpmann Fujitsu 640MB 3½" J.Uerpmann@tu-bs.de Thomas Völkner Fujitsu M2513A6 640MB 3½" thomas.voelkner@med.uni-giessen.de

1.36 Amiga MO Mailing List

Amiga MO Mailing List

I have created a mailing list for discussing the use of MO drives with the Amiga, though MO-related topics not specifically involving the Amiga are okay too. MO drive users can exchange tips, mount files and other information using the list.

The list name is amiga-mo. To subscribe or unsubscribe, and for information about the various list options, go to: http://www.onelist.com/ Or you can send an email message to one of the following addresses to subscribe and unsubscribe respectively: amiga-mo-subscribe@onelist.com amiga-mo-unsubscribe@onelist.com

To send a message to the list, send it to: amiga-mo@onelist.com

1.37 Information Wanted

Information Wanted

To improve future versions of the Amiga MO FAQ, I would like to get hold of the following: · Information on using MO disks with non-512-byte sector sizes with operating systems like NetBSD, OpenBSD and Linux. · Information about using IDE/ATAPI MO drives with the built-in controller of the A600, A1200 and A4000. MO drives are also sold with PCMCIA adapters for use with laptop PCs. I would like to know whether these can be used without special software on the A600 & A1200. · Reports of compatibility or otherwise of various Mac MO/SCSI driver software products with different emulators. · If you have drawn some nice Workbench icons for MO disks, I would like to include them. · Is the "MO-MIGA" software, formerly sold by Fourth Level Developments, still available? This is mentioned in docs/misc/MO-MIGA.FAQ.lha on Aminet. · Any other information which you think should be included.

1.38 Contacting the Author

Contacting the Author

I can be reached by electronic mail at the following addresses: mark_k@iname.com mark_k@letterbox.com mark_k@softhome.net

My web page is at this URL: http://visitweb.com/mark

The latest version of the Amiga Magneto-Optical Drive FAQ should always be available from my web page, and on Aminet as: docs/help/Amiga_MO_FAQ.lha

An HTML version of the FAQ should be available on my web page. The HTML version is automatically generated from this AmigaGuide document, with only minor editing. Consequently the formatting is not particularly nice, but it is better than no HTML version at all. You can always reach this by following the link from my web page. At the time of writing, the direct URL for the HTML version is: http://home.freeuk.net/markk/Amiga_MO_FAQ/main.html

1.39 Thanks To...

Thanks To...

Thanks to the following people: · Goetz-Martin Bertelsmann for sending various mount files and general help. · Michael Böhmer and Gerhard Kozuschek for contributing PC "superfloppy" mount files. · Ralf Gruner for writing GPatch, which I used to create the HDToolBox and ShapeShifter patch files. The GPatch 2.6 executable is now included in the Amiga MO FAQ distribution, so you do not need to download it separately. (But it is a good idea to get the complete GPatch package, since that contains documentation for the program.) · Rainer Kalthoff for much of the information in the Sharing With a PC or Mac section. · Rainer Kraus for sending info about using CrossDOS to automatically access multiple partitions of AT-HD type MO disks. Rainer would like to hear from Atari ST users with MO drives. See the List of Amiga MO Users section for his email address. · Ken Müller-Nicolai of Philips PDO for telling me the number of user sectors for 1.3GB 3½" disks. · Joachim Nink for contributing a PC 128MB mount file, and pointing out mistakes in the comments of some other mount files. · Kazunori Tsuchiya of Sony for information on the number of user sectors for each type of 5¼" MO disk, which allowed me to create mount files for them.

1.40 Notes on This AmigaGuide Document

Notes on This Amigaguide Document

This document was created by hand, without using any AmigaGuide creation program. I hope it gives a good example of how fairly advanced formatting can be used in Amigaguide documents, such as bulleted lists which adjust to the window width nicely. Feel free to examine the file using a text editor and incorporate formatting ideas into your own Amigaguide documents.

1.41 To Do

To Do

Things which may be added in a future version of the Amiga MO FAQ: · Scripts using a program like AGMSSetSCSI to allow read retry count, write-verify mode and others to be changed. AGMSSetSCSI itself is not capable of this, so another program will need to be written.

1.42 Version History

Version History

1.4 17-Jul-99, fifth public release · Updated media costs table. · Added mount files for 1.3GB 3½" and all types of 5¼" MO disks, and for 128MB 3½" Mac-formatted disks. · Added information about Philips' and Fujitsu's 1.3GB 3½" drives, which are now available. · Added patch for ShapeShifter 3.10 to allow booting from any device type. · Added to the List of Amiga MO Users section. · Mention 5¼" drive backward compatibility. · Write about A-Max 2.50 in Cross-Platform Access section. · Added links to pictures of MO disks in Types of MO Media section. · Mention Thomas Richter's SCSIFormat program. · Included Ralf Gruner's GPatch version 1.6 executable. · Added pictures of Philips' 640MB and 1.3GB drives. · Reversed order in Version History section so that more recent details are first. · Various other minor changes.

1.3 25-Mar-99, fourth public release · Added patch information for HDToolBox versions 2.2, 2.22 and 40.3. · Added to the List of Amiga MO Users section. · Updated Olympus information and URL. Olympus now make their own 640MB external 3½" drive. · Added Free Mac SCSI Software, Low-Level Formatting, Notes on This AmigaGuide Document, Pictures of MO Drives and Disks and Setting the Device Type sections. · Added pointer to the MO Disk Icons package. · Highlighted all URLs and email addresses. · Mention that ShapeShifter's SCSI support is buggy. · Added questions about "MO-MIGA" software and PCMCIA MO drives to the Information Wanted section. · Changed format of Version History section. · Added "NEW" next to new section names on front page. · Split What are Magneto-Optical Drives? section into two parts. · Added URLs for Fujitsu MCB3064/MCC3064 SCSI and ATAPI Product Manuals to For Programmers section. · Updated media costs table; I found a source of cheap direct overwrite MO disks. · Added prime factorisations for numbers of sectors per disk to Mounting and Using the Drive and Disks section. · Added to the List of Amiga MO Users section. · Added SFS mount files, and reorganised mount files in DOSDrivers drawer into subdirectories. · Added FFS & SFS mount files for 600MB 5¼" disks. · Replaced instances of 3.5" with 3½" and 5.25" with 5¼". · Mention that an HTML version of the MO FAQ is on my web page. · Various other changes.

1.2 6-Dec-98, third public release · Added HDToolBox 40.4 patch information. · Added PC "superfloppy" mount files. · Added PC AT-HD mount file for arbitrary partition layout. · Updated Amiga FFS mount files to refer to FFS 43.20. · Added example AmigaDOS scripts to allow and prevent ejection, and to eject the disk. · Added Choosing an MO Drive section. · Renamed the Using MO Disks With Emulators section to Cross-Platform Access. · Mention Fusion and A-Max in the Cross-Platform Access section. · Updated the Information Wanted section. · ShapeShifter and Fusion do not support DeviceDisks with sector sizes other than 512 bytes. · Added information on using AmiCDFS for read-only access to Macintosh HFS format MO disks. · Added to the List of Amiga MO Users section. · Updated Amiga MO Mailing List section. · Added Finding Programs Mentioned Here section, giving the Aminet paths of various programs. · Added note about Fujitsu's prototype "Gigamo" 1.3GB 3½" drive. · Updated media costs table. · Added To Do section. · Various other minor changes.

1.1 5-Aug-98, second public release · Updated many sections. · Corrected mistakes in the comments of some mount files. · Added mount files for Amiga and PC 128MB disks. · Added Zip & Jaz Reliability Problems, Information Wanted, List of Amiga MO Users and Amiga MO Mailing List sections.

1.0 25-Jul-98, first public release