

HARDDISK

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REVISION HISTORY

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Chapter 1

HARDDISK

1.1 Contents

Amiga Hard Disk Guide

By Peter Hutchison Apr. 1999

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1.2 Choosing a hard disk

Choosing a hard disk

The type and size of hard disk are the main requirements when selecting a hard disk for your Amiga.

Types of interface

XT - Old Hard disk interface widely used on early Amigas e.g. A590 with 20Mb hard drive.

IDE - Intelligent Device Electronics. A simple interface designed mainly to add hard disks (upto 2) to a computer. Modern interfaces, using Atapi, can make it possible to add upto 4 devices including CDROMS using IDE Buffer and IDEFix or the Power Flyer or IDE Express. IDE also refers to ATA and EIDE which are also compatible.

SCSI - Small Computer System Interface. A faster and more powerful system than IDE which allows upto 7 devices added to the computer through a daisy chain. SCSI-3 drives are not usable at the moment.

FireWire - Latest and fastest system to replace SCSI. Can do 200MB/s or 400MB/s on more expensive boards. Will appear in the Amiga II. (IEEE 1394)

Other sub-types:

UDMA - Ultra Direct Memory Access. Speeds up transfers to 33MB/sec. Amiga does not directly support this but such drives 'should' work on older interfaces but work at slower speeds.

ATA 2/ATA 2 FAST - Fast IDE interfaces normally appear on newer computers such as PCs. Now supported by the IDE replacement, the 'Power Flyer' from Power Computing or the IDE Express for Eyetech.

You may come across other types but they are incompatible with the Amiga. eg MFM, ESDI.

Size of hard disks

The physical size of a hard disk can vary from 1½" to 5¼" in size. The most usual sizes are 2½" and 3½" sizes. The height of the hard disk depends on the number of platters (surfaces) the disk has: full height, half height, slim etc.

Capacity of hard disks

The capacity of hard disks has doubled approx. every two years and it is now possible to get 9Gb hard disks! It is quite difficult these days to find

small capacity hard disks. For 2.5" drives the smallest you can get is 80Mb, for 3.5" IDE it is 2Gb and 3.5" SCSI it is 540Mb.

It is recommended to buy the largest capacity hard disk you can afford, aim for around 500Mb or more.

Makes of Hard disks

Some Hard disks work better than other in Amigas and the things to look out for are:

- 1) Reliability.
- 2) Spin up speed
- 3) Access speed

Known Compatible drives:

Hitachi DK221A-34 (340Mb)
Hitachi DK223A-11 (1.1Gb)
Quantum Fireball 540
Fujitsu M1606S (SCSI, 1Gb)
Quantum Fireball TM3220S (SCSI, 3.2Gb)
Quantum Fireball 1280A (1.2Gb)
Seagate ST3144A (124Mb)
IBM 360Mb
Western Caviar (4Gb)
Seagate ST5127A (1Gb)
Seagate Barracuda ST32550N (SCSI, 2Gb)
Conner CPF1060S (SCSI, 1Gb)
Seagate ST1080N (SCSI, 1Gb)

Problematic drives:

IBM (80Mb) - slow spin up
Fujitsu 1Gb - slow spin up
Seagate Hawk - unreliable

Interfaces available in Amigas

A500 - None
A600 - IDE (2.5")
A1200 - IDE (2.5")
A1000 - None
A2000 - None
A1500 - None
A3000 - SCSI (3.5")
A4000 - IDE (3.5")
A4000T - SCSI (3.5")

The above are the recommended types and sizes to use in your Amiga.

IDE/SCSI Controllers

If you have a Zorro based Amiga, it is possible to purchase IDE or SCSI adaptors and add a hard disk that way. Some accelerators cards now have built in SCSI interfaces:

Commodore A2091 SCSI For A1500,A2000

Oktagon 2008S SCSI for Zorro Amigas
Warp Engine accelerator with SCSI-2
Squirrel SCSI For a600 and A1200
Blizzard accelerators have a SCSI option
Apollo accelerators have a SCSI option
CyberStorm accelerators have a SCSI option (SCSI-2/3)
A570 Hard disk for A500
Viper 520CD has a IDE interface for A500
IDE Interface for A500/A1500/A2000/A400
GVP HC-8 SCSI

Catweasel/Buddha IDE Controller for any Amigas
Alfa Quattro IDE interface for A4000

For A500 owners, the hard disk is usually supplied with an interface to be attached to the expansion port on the left side (on the A1000 it is on the right side).

The A600 and A1200 has a PCMCIA port and hard disks can be added via a SCSI interface such as the Squirrel or Dataflyer or a special Overdrive hard disk. Accelerator cards also have the option to add SCSI interfaces.

Attaching more than one hard disk

If you want to add a second hard disk then you must note the following:

For IDE systems the hard disks must be able to switch to master/slave mode through a jumper on the back of the hard disk. If the disk does not have such a jumper then you cannot attach a second disk. 2.5" Drives do not normally have master/slave jumpers but most 3.5" drives do.

For SCSI systems, all you need to do is set the SCSI ID number to an unused value (0-6) and add it to the scsi chain and check termination.

1.3 Installing a hard disk

This entirely depends on where the hard disk is going to be put. Most external HDs are very easily attached and require just common sense (See instructions supplied with HD for details). Internal HDs are a bit more complex:

A600/A1200 (Internal)

Unscrew the two halves of the Amiga. Remove the top half. The keyboard may need dettaching via the ribbon near the back on the Amiga. Insert the short IDE ribbon cable in the interface located in the small cradle in the metal shield on the left side of the Amiga. Make sure the cable orientation is correct as it also supplies power to the HD! Attached the IDE Hard disk to the other end of the cable and place it on the supplied hole in the sheilding. Now reassemble the Amiga.

A4000 (Internal)

Unscrew the lid of the Amiga. The hard drive will need a cradle and an IDE ribbon cable (if not already supplied). Unscrew the cradle from the Amiga and screw the HD into the cradle.

The cable should be attached to the multi-pin connector on the mother board and the cable to the back of the hard disk. Check that Pin 1 matches the 1 on the HD. The A4000 comes with extra power cables (four wires with a white coloured plug at the end) from the PSU, attach this to the back of the HD. Screw the cradle into the Amiga case at the back of the Amiga next to the PSU. Reassemble the Amiga.

If you are adding a second IDE HD then set the Master/Slave switch to Slave for the 2nd hard disk (these usually appear on 3.5" disks, not 2.5" disks). You will need a 2-way split IDE cable for both HDs as you cannot chain them like scsi disks.

For SCSI, ensure that the new HD has its own unique scsi id and insert it into the scsi chain, also change the termination if necessary or you may find that some scsi items may not be recognised.

Usually, instructions are supplied by the retailer or if you are unsure how to install a hard disk or if your Amiga is still under warranty get the dealer to fit it for you!

1.4 Partitioning a hard disk

Partitioning a hard disk

The standard partitioning software is called HDToolbox and it is usually supplied on the Install disk with Workbench. Sometimes third party software is supplied such as GVPPrep, FaastPrep, RDPrep and so on.

1. Locate and run HDToolbox.
 2. The program will search through available scsi slots and then display a menu screen. (NB: IDE drives on A1200/A600 are listed as SCSI, even if they are not, this is normal).
 3. At the top of the screen a list of drives is shown at the top. If it is not recognised then 'Unknown' would be listed. If it is unknown, then do the following steps:
 - a) Click on the item and select 'Change Drive Type'.
 - b) Click on 'Define New...'
 - c) Click on 'Read Configuration' to read the drive's settings.
 - d) Click on OK until the main menu appears.
 4. Now select 'Partition Drive'.
 - a) A new screen appears, with a graphical representation of the partition(s) set up on the hard disk. Sometimes a hard disk may be set up with one or two partitions.
 - b) You can resize partitions using the blue triangle to the appropriate size.
 - c) You can delete unwanted partitions by selecting the partition with
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the mouse and select 'Delete Partition'.

- d) If there is space, then selecting 'New Partition' will create a new partition for you by clicking in the free space. Use DHx for partition names where x is 0,1,2 etc..
 - e) To make a partition bootable, click on the appropriate partition e.g. DH0 and click on Advanced Options and tick the 'Bootable' option. Make sure no other partitions have this ticked.
 - f) Click on Change and more options will appear, click in the MaxTransfer box and change the default value (0xffff) to a low value eg 0x1fe00. This will prevent corruption when copying large files onto the hard disk. Click on OK.
 - g) If you have made a mistake, you can always, click on 'Cancel' and exit HDToolbox.
 - h) Once changes have been made to your satisfaction, click on OK and then on the main screen select Save Changes to Drive.
 - i) Exit HDToolbox and reboot your Amiga. This will force the system to read the new settings on bootup.
5. Boot off a copy of the Workbench disk or the Install disk (preferred).
 6. You can now format the new partitions using the Format option on the Workbench Icon menu. If the disk icons fail to appear you will need a new version of FFS.

1.5 Changing or Upgrading the File System

Most people use the filing system provided on the ROM (ie resident File system, also known as DOS1). For most users the FastFileSystem is the default.

It is possible to choose an alternative file system for your hard disk. If changing to a different file system than you must backup first, or you may loose all your data. The only other file system is called AFS (Advanced Filing System), a system developed from an older file system called PFS (Professional Filing System).

To upgade to a new file system, complete the Following steps:

1. Copy the new file system to the L: directory.
 2. Start up HDToolbox and enter Partition Drive screen.
 3. Select the partition you wish to update.
 4. Click on Advanced Options and then on 'Add/Update...' button.
 5. Click on 'Add New File System ...' and a dialog box will appear. (you can use Update if updating an existing file system).
 6. Enter path and name of the new file system e.g. 'L:FastFileSystem'.
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7. It will display the DosType (in hex) and the version, revision numbers.
8. Click on OK until the main menu appears.
9. To commit the changes click on 'Save Changes to Drive'.
10. Exit and reboot to use the new file system. If necessary, format the new partition ready to be used (for PFS2 this is required).

If you are using the beta FFS from Amiga Intl., the FFS may expire and you will get a alert message when you reboot or switch on. Get a newer version when this happens.

1.6 Installing Workbench on your Hard disk

1. If you have an Install disk then run the 'English' version of the installation script in the Install drawer.
 2. If you do not have the install script then follow these instructions:
 - a) Boot off a Workbench disk and double click on the Shell icon to open a Shell window.
 - b) Insert the Workbench disk and type:

```
COPY WORKBENCH3.0:#? DH0: All Clone Quiet
```

NB: If you have a different version of Workbench, change the name of the disk used to the one inserted (type INFO to see whats mounted). DH0: is the bootable partition.
 - c) Insert the Extras disk and type:

```
COPY EXTRAS3.0:#? DH0: All Clone Quiet
```
 - d) Insert the Fonts disk and type:

```
MAKEDIR DH0:Fonts  
COPY Fonts:#? DH0:Fonts All Clone Quiet
```
 - e) Insert the Locale disk and type:

```
MAKEDIR DH0:Locale  
COPY Locale:#? DH0:Locale All Clone Quiet
```
 - f) The Storage disk contains extra drivers and may be installed later. Not all the files are required but copy the files via Workbench if they are needed.
 3. Remove any disks and reboot the Amiga. It should now boot using the files stored on the Hard Disk.
 4. Run each of the Preferences programs to configure the keyboard, mouse, screen and printer as you see fit.
Some files may need to copied to DEVS drawer first for Printer, Keyboard and Monitor drivers from the Storage disk.
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1.7 Installing software on your Hard disk

1. Most application software can be installed in three ways:
 - a) Using an Installer script. If no Installer program is found, copy the program from the Install disk to the C directory.
If possible use the latest version, the current version is v43.3.
 - b) Using an AmigaDOS shell script.
 - c) Copying the Drawers or files via Workbench (or a File Manager) by dragging the files from one disk to another location on your Hard Disk
 2. Using method (c) is sometimes hit and miss and some programs require extra libraries and drivers to be installed seperately.
 - a) All files ending with .library should be copied to the LIBS drawer.

NB: It is now common for some programs to have their own libs drawer e.g. MUI. Also, never replace a library with an older version.
 - b) All files ending with .device should be copied to the DEVS drawer. Printers, keyboard maps, monitors, Datatypes are also stored in Devs and in Classes as well.
 - c) All files ending with .font with their drawer should be copied to the FONTS drawer. Compugraphic fonts are installed here, run Intellifont to install the new font. Run FixFonts if adding or removing bitmap fonts.
 - d) Handlers are stored in the L: directory.
 - f) Scripts, config files and so on can be stored in S: (or ENV:)
 - g) Check the program's manual to see what should be installed where.
 - h) If the program asks for you to insert a volume you should note down the name of the volume and then add an ASSIGN to make a fake volume (or logical volume) which points to the directory on your HD. These can be added to your s:user-startup or Assign Manager program if you use one.

e.g. The game Xtreme Racing requires an volume called XTR
ASSIGN XTR: Dh1:Games/XTR
 3. Check the program runs by double-clicking on the icon, it should run okay or give a requester asking for a particular library, device or whatever.
 4. If the program has its own preferences menu or prefs program run that so that it is set up correctly. Check the manual to see what preferences to set to.
 5. If you are unable to run a program, check its requirements. It may require
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a particular version of Workbench, a particular processor (maybe an FPU or MMU unit), amount of memory or disk space. Check requirements in the program's manual.

6. If you are still unable to run a program, find a copy of SnoopDos, run it and then try running the program. The log from Snoopdos can tell you which files it fails to open and what versions are required.
NB: Some open failures are ok to ignore but to decide whether its important or not is dependant on your experience.
7. Not all software is installable on hard disks. Disks that appear as DF0:NDOS or DF0:???? cannot be installed unless there is an installer program. A lot of old games can be installed using patches to copy the disk to the hard disk and run it. Check aminet in game/patch.

1.8 Looking after your hard disk

It is important that you look after the hard disk so that it is well organised and does not fill up too quickly. I read somewhere, that a certain person was having problems with his computer and could not save data until somebody pointed out that his hard disk was full!

The following tips should be noted:

1. Allows backup your hard disk. The cheapest method is to backup your hard disk onto floppy disk. It would be wise to invest in some good backup software and external backup device e.g. Tape drives, Zip drives etc.
You do not always have to do a full backup but an incremental every day, week or 2 weeks is advisable. It depends on how important the data is up to you.
2. Optimise the hard disk using a defragmentation utility. This speeds up the use of the hard disk as files can become fragmented over time. This only requires doing at the most once a month.
3. Delete programs that you are no longer using. Archive data onto other media if it no longer being used, you can always copy it back if you want it.
4. Get some disk repair tools such as DiskSalv or Quarterback Tools. This will enable you to repair any errors that may appear when the Filing System is damaged by errant programs. They will also allow you to Undelete files you accidently removed.
5. To save disk space, it is advisable to install some sort or real-time dearchiving utilities such as PowerPacker, or XPK utilities which allow you to compress files to save space and then unarchive them on-the-fly when you want to read/view them.
6. Make a note on paper the type, size and details of the partitions (see Advanced options). If the hard disk is accidently erased them it may be possible to setup the hard disk as normal. The RDB-Salv utility could be a life saver!

Useful software to have:

Workbench:

BRU (CLI Backup) - HD Backup
HDBackup - HD Backup
HDToolbox - HD Preparation

Freely distributable:

ABackup - Backup
AFSOptimiser - Disk defragmenter for AFS
AFSUndele - Undelete for AFS
Defrag - Disk defragmenter
DiskSalv 2 (WB2+) - Disk Salvager
FFSTD64 - 64 bit File System patch
FixDisk (WB 1.3) - Disk salvager
Format64 - Large disk formatter
GVP HD8 Tools - GVP setup tools
HDInstTools - HD Partitioning tool
IDEFix 97 - IDE Speedup/enhancer
Rochard RH800C - Rochard setup tools
MRBackup - Backup
MyFormat - Format replacement
RDBArc - RDB Backup
RDPrep - HD Preparation tool
ReOrg 3.11 - Disk defragmenter

Commercial:

Advanced File System (AFS), Fourth Level Developments (see PFS2)
AmiBack 2, White Knight Tech.
Diavolo Backup Pro, White Knight Technology
DiskSalv 4, LH Publishing
Pro. Filing System 2 (replaces AFS), Weird Science
Quarterback v6.1 & Tools, Wizard Developments
RDB-Salv (RDPrep also has a facility to save RDB info)
Video Backup System, Power Computing
Upper Disk Tools, HiSoft

1.9 Problems that may occur

As with any hardware or software, there may be problems that may occur when setting up or using a hard disk.

1. Programs won't load or run and data is corrupted.

This is mostly likely due to the MaxTransfer settings being too high for the Amiga to cope when copying files onto the hard disk. Load HDToolbox and goto Partition Drive, click on Advanced and then on Change.. Set the MaxTransfer value from 0xffff to 0x1fe00 (128k) and OK and Save Changes. Reboot and the new settings will be used. You will need to reinstall programs that don't load.

2. The Amiga reboots and the disk light is constantly on.

Best thing to do is boot with both mouse buttons held down and wait until the hard drive light goes out. When the hard disk filing system (FFS) is damaged the AmigaOS automatically runs a Validation routine on the partition

affected. Do NOT reboot if this happens, wait until it finishes before running anything. Use a utility called WaitValidate in your startup-sequence to cause the bootup to pause while validation is in progress.

If you want to avoid further Validation problems, you can replace the File System with a more uptodate version such a AFS and PFS2 which are commercially available.

3. Read/write errors are occuring on the hard disk.

This is more serious as this a hardware fault on the hard disk surface. These are known as Bad Blocks and can be mapped out from the Filing System by Using the Verify Data option in HDToolbox or use Quarterback Tools in Repair mode to check the hard disk surface for these Bad Blocks.

If you know where the errors occur on the hard disk you can also manually map them out using the 'Modify Bad Block List' screen and enter the Cylinder, Head, Bytes from Index and Sector.

If neither of these methods work, then try a Low Level Format on the drive (do not try this on very old drives), it may work or may not (ie completes within seconds). You could try making partitions around the affected area so that data never gets saved there!

4. Checksum errors, corrupted or undeletable files or directories.

These occur when the filing system is corrupted and the validation routine has not fixed them. You need to run a Repair of the filing System using a program such as DiskSalv or Quarterback Tools. As shareware version of DiskSalv 2 is available on Aminet (disk/salv) or other PD sources.

5. HDToolbox does not recognise my Hard disk.

Check the Tooltypes of HDToolbox, and look for the line that says SCSI_DEVICE_NAME=scsi.device or whatever. Make sure that is pointing to the correct Hard Disk driver (for IDE it is scsi.device). Please note that the case is important.

If this occurs, the hard disk is either incompatible or has become irretrievably damaged. I hope you have a backup of it! If important data is on this hard disk then some companies can retrieve it for you - for a price! Try rebuilding the hard disk from scratch.

If you own an A600, some models have an older version of ROM whose scsi.device does not recognise IDE drives. You will need to install a newer version of the ROM to use IDE hard drives. A ROM that ends with a 0 or 5 should work.

Make sure that the drive you do install is IDE and not SCSI, you can sometimes tell by either the label on the disk. SCSI drives tend to use 50 pin interfaces while IDE uses 40/44 pin interfaces.

6. The partitions have disappeared!

Unless you have a copy of the hard disk and partition information, it is next to impossible to retrieve information again. Viruses also may be a cause of losing RDB information! It is possible to recreate the partitions if the RDB is saved either on paper or on disk from RDB-Salv program. Use the Advanced Options in HDToolbox to manually enter the partition data.

If you are setting up partitions on a large hard disk and you are not using

the latest patches, do NOT partition anything above the 4Gb limit or else it will overwrite the RDB and the partition info is deleted.

7. Hard disk does not boot from cold or even a warm boot.

This sometimes occur on particular models of hard disks. If the hard disk does not boot from cold, press Ctrl+Amiga+Amiga again to boot up. The hard disk sometimes takes too long to spin up before the exec tries to read the hard disk's RDB. If the hard disk does not boot from cold or warm boots then check the Bootable option for DH0 in HDToolbox, cut line One of the cable to fix it or update Kickstart to 3.1 which has a built in feature to wait longer for slower hard disks.

8. I cannot partition my hard disk properly (-ve sizes, unaccessable partitions)

The Fast File System (v40) currently has a 2Gb limitation on the size of the partition you can have on the Amiga. Also, you cannot use hard disks larger than 4Gb as it cannot address the larger values, in such a case use many smaller disks (SCSI is best here) instead.

Older FFS may have lower size limitations, these occur if you try to add partitions above the limit and don't appear on the Workbench or cannot be formatted. To solve this get a new version of FFS or upgrade Kickstart and Workbench.

If using the standard FFS in ROM do not use any disk space above the 4Gb limit as data can wrap around to the start of the disk and overwrite the RDB thus losing all your partition info!

9. How can I use large hard disks?

If you intend to use large hard disks/partitions, then you can download the latest updates from <http://www.amiga.de/> File Area which supports >4Gb hard disks and large partitions.

You need Kickstart 3.1 and download the following files:

```
Fast File System v43.19 or better
IDE_SCSI v43 for Commodore HD controllers eg scsi.device
NSD Patch v43
```

The following files are also available from Aminet:

```
dev/misc trackdisk64 - Trackdisk with 64 bit extensions
disk/misc FFSTD64 - FFS with Track disk 64 bit extensions
disk/misc Format64 - Format disks >4GB
```

Get PFS2 (Professional Filing System) by Great Effects Development which supports hard disks and partitions upto 104 GB! See <http://www.greed.nl/> for further info.

1.10 About the Author

This guide was written by Peter J Hutchison on a A1200 with Apollo 1240/40, 32Mb RAM, 1.1GB 2.5" HD, Microvitec 1440, 12x CDROM, ZyFi Speakers.

Disclaimer:

Information in this guide is accurate as far as I know. Any modifications made to your hard disk is done at your own risk. I cannot claim responsibility for any damage caused directly or indirectly by the advice given in this guide.

Other Guides in the series:

Foozle
Workbench1.3
PC Task 4.x
Printer Guide
Upgrading WB
Expanding the Amiga
Accelerator
Workbench 3.1
A-Z Dictionary
Graphics Card

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