UltraSatan
Partitioning & User's Guide

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1 Introduction

The objective of this documentation is to provide practical information and procedures for partitioning Atari hard disks and more specifically SD Cards connected to UltraSatan Drive. It also contains a basic presentation of the Atari and DOS File systems to better understand the choices and limitations of the different types of partitions. For more details on the TOS and FAT file systems please refer to my document: ***Atari Hard Disk Partitioning – Technical information***.

Although the information presented here applies to generic ASCI/SCSI hard drives, specific details are provided for the UltraSatan Drive and the SatanDrive.

Note that the SatanDrive has the following limitations:

◆ The maximum size of SD card is 1GB,
◆ Only one SD card can be plugged,
◆ And SatanDrive only works with the HDDRIVER hard disk driver.

All the procedures described in this document have been tested on Atari ST and STE. Most of them should also apply to Atari Mega ST / Falcon / TT however no test has been performed on these platforms and therefore some of the described procedures might not work on these platforms.

This document also contains a brief user's guide for the UltraSatan Drive.

The information presented here is based on a compilation of many documents as well as personal knowledge and experimentations.

2 Partitioning Generic Information

This section provides basic information on Atari & PC hard disk **partitioning**. It also details the different **type of partitions** commonly used on the Atari platform. For more details on the TOS and FAT file systems please refer to my document: ***Atari Hard Disk Partitioning – Technical information***.

2.1 Hardware Consideration

Atari ST / STE computers provide an external ***DMA bus*** connection through the Atari Computer System Interface (ASCI) connector. This bus is very similar (simplified version) to the standard SCSI bus and allows connection of different type of devices such as hard disks.

When several devices are connected to an ASCI bus <u>each of them must have a unique ID</u>.

The disk drives are often connected to ASCI bus is to through a ***Host Adapter***. The host adapter acts as an interface between the DMA bus and the drive controller. For example a SCSI disk can be connected to the ASCI bus through an ***ICD AdSCSI Plus*** host adapter, or an SD card can be accessed through an UltraSatan Drive adapter.

The maximum supported size for a drive is limited by several factors: The Hard Disk Driver software, the File System limitations, and the capability of the Host Adapter.

We can differentiate two families of Host adapters:
- The host adapters that strictly interpret the ASCI-AHDI command set (corresponding to the SCSI group 0 command set). With this type of host adapter the maximum size of the drive is limited to 1GB (2^{11} sectors of 512 bytes). For examples: The ICD ***Link I***, the ***SatanDrive***…
- The host adapters that interpret the ICD extended command set (corresponding to the SCSI group 1 command set). With this type of adapter the maximum size of the drive is limited to 2TB (2^{32} sectors of 512 bytes). For examples: The ICD ***Link II***, the ***UltraSatan*** Drive…

In order to take advantage of the ICD extended command set supported by the host adapter the hard disk driver need also to support the ICD extended command set.

*Therefore to access drives over 1GB you need to have a <u>host adapter</u> **and** <u>a hard disk driver</u> that both understand the ICD extended command set.*

2.2 Hard Disk Partitioning Primer

The Atari ST/STE platform uses natively the TOS file system as defined in the <u>Atari AHDI 3.0 document</u>. The PC platform uses a wide variety of file systems but in this document we will only look at the DOS/FAT file systems that are used on Atari platform.

While both file systems look very similar they are <u>different</u>. Therefore you need to have a basic comprehension of both file systems in order to understand their limitations and incompatibilities.

An already partitioned and initialized disk is composed of:
- The *Reserved area*: containing the **Master Boot Record** (MBR), located at physical sector 0, and followed by more reserved sectors. The **MBR** defines the number of partitions and their positions on the disk.
- The *Partition area*: containing one or up to 4 partitions with the actual data.

There are two types of partitions:

◆ The Primary partition contains several control structures and the actual file and directory data.
◆ The Extended partition is a special kind of partition which itself is subdivided into one or several primary partitions allowing a number of partitions superior to 4 on the disk.

A primary partition contains:

◆ The **Boot Sector** located at the very beginning of the partition (logical sector 0). It includes an important area called the **BPB** (*BIOS Parameter Block)* that contains some basic file system information (in particular its type). Frequently it also contains some *boot loader* code.
◆ The **FATs** are maps of the Data, indicating which clusters are used by files and directories.
◆ The **Root Directory** stores information about the files and directories.
◆ The **Data Region** is where the actual file and directory data is stored.

Most of the problems of compatibility between the TOS and FAT file systems are located in the **BPB** part of the **Boot Sector**:

■ Two important parameters in the BPB are the number of bytes per sector (**BPS**) and the number of sectors per cluster (**SPC**). Together they define a **logical sector[1] = BPS * SPC**. On a TOS file system the **BPS** can range from 512 to 8192[2] bytes but the <u>SPC is always 2</u>. On a DOS/FAT file system the <u>BPS is always 512</u> bytes but the **SPC** can range from 1 to 128. Therefore we can see that to define *logical sectors* bigger than 512 bytes the two file systems use a dissimilar approach. For example an 8192 logical sector is achieved with a BPS=4096 and a SPC=2 with the TOS file system. The same logical sector is achieved with a BPS=512 and a SPC=16 with the DOS file system.

■ Another important parameter in the BPB is the total number of sectors. On a TOS file system this number is stored as a 16-bit quantity (**NSECTS** parameter). As a result the maximum size of a TOS partition is 2^16 * 8192 bytes or 512MB. On FAT file system the number of sectors can be stored as a 32-bit quantity (**HSECTS** parameter) allowing definition of partitions (up to 2TB).

2.3 Preparing a Drive

A drive needs to be "prepared" before it can be used to store data. With modern drive, this is done in two steps:

◆ The first step is called *partitioning*: Hard drives are divided into smaller logical drive units called **partitions**. In this way a single hard drive can appear to be two or more drives to the OS. Besides simply keeping drive sizes under the file system size limits, dividing a drive also allows partitions to be used for specific purposes, keeping the drive organized.
◆ The second step is called *high-level formatting* (also referred as *formatting* or *initialization[3]*):
This is the process of creating and initializing the basic disk's control structures: the **Boot Sector**, the **FATs**, and the **Root Directory** as described in the previous section.

Note: On old hard disks you also had to format them (low level formatting) before partitioning. Low level formatting allows the magnetic medium on the surfaces to be divided into tracks containing numbered sectors that the controller can find. With modern SCSI / IDE drives and with drives using SD cards this operation is not required anymore and therefore is not described in this document. It is therefore <u>not recommended</u> to low level format a drive unless you know exactly what you are doing.

2.4 Atari Different Types of Partitions

Before we detail the partitioning procedures for several hard disk drivers, we need to understand the types of partitions usable on Atari and their limitations.

2.4.1 TOS Partitions

This is the "native" type of partition used an Atari. It is supported by all the Atari hard disk drivers and in fact some of the old drivers only support this type. This is the preferred type of partitions that you should use on Atari unless you plan to use the drive to transfer data between Ataris and PCs.

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[1] Note that the term *logical sector* is sometimes used differently on Atari and PC platforms.
[2] 16384 for TOS4.0 on Falcon
3 The term "Formatting" is used in PC environment while the term "Initialization" is often used in Atari environment.

The following table shows the minimum logical sector size based on partition sizes:

Partition Size[4]	Sector Size
Up to 32MB	512
32MB – 64MB	1024
64 MB – 128MB	2048
128 MB – 256MB	4096
256MB – 512MB	8192
512MB – 1GB[5]	16384

With most of the partitioning programs you only need to specify the size of the partitions you want to create and the driver will compute for you the optimum logical sector size. With some hard disk drivers it is possible to modify this size (for example HDDRIVER). In that case you have to make sure that you specify a value superior or equal to the one presented in the table above.

Remember that the maximum partition size depends on: the hard disk driver, the host adapter capability, and the TOS version.

With recent hard disk driver and host adapters (supporting ICD extended commands) the maximum partition size can be:

◆ Up to 256MB for TOS < 1.04
◆ Up to 512MB for TOS ≥ 1.04
◆ Up to 1GB for TOS ≥ 4.x (Falcon)

Contrary to widely spread belief, the boot partition (usually the first partition on disk) can be a big partition (BGM) and therefore can have a size of up to 512MB. The actual limitation to 32MB (GEM) for the boot partition does not come from TOS/GEMDOS but from the hard disk driver. Only very old hard disk driver like SCSI Tools and AHDI exhibit this limitation.

2.4.2 DOS / FAT Partitions

2.4.2.1 Type and Limit of FAT Partitions

The following table summarizes the characteristics of different types of FAT partitions that are of interest for Atari users:

Partition Type	Fdisk	Size	Fat Type	Version
01	PRI DOS	0-15 MB	12 bits (FAT12)	MS-DOS 2.0
04	PRI DOS	16-32 MB	16 bits (FAT16A)	MS-DOS 3.0
05	EXT DOS	0-2 GB	n/a	MS-DOS 3.3
06	PRI DOS	32 MB-2 GB	16 bits (FAT16B)	MS-DOS 4.0
0E	PRI DOS	32 MB-2 GB	16 bits (FAT16B)	Windows 95[6]
0F	EXT DOS	0-2 GB	n/a	Windows 95
0B	PRI DOS	512 MB - 2 TB	32 bits (FAT32)	OSR2
0C	EXT DOS	512 MB - 2 TB	32 bits (FAT32)	OSR2

2.4.2.2 Small DOS/FAT Partitions

By Small DOS partition we mean partitions with a size < 32MB. These partitions are referred as:

◆ Type $04 (aka **FAT-16A**) with a size range of < 32MB

As we have seen previously, the TOS and FAT file systems **do not handle** large logical sector the same way. As a result it is only possible to use logical sectors size of 1024 (BPS=512 and SPC=2) for partitions that need to be accessed on both platforms. This implies a maximum size of 32MB (65536 * 512) for partitions. However we will see later that some solutions exist to overcome this limitation.

A number of Atari hard disk drivers (for example ICD) directly recognize the DOS/FAT partitions. This type of partition can therefore be useful when you need to transfer data between an Atari and a PC but the size is small (32MB) and therefore not well suited for large disks.

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[4] Partition size is given for TOS ≥ 1.04. Prior to this version the maximum partition size should be divided by 2
[5] Only supported in TOS 4.0
[6] Type 0x0E and 0x0F forces usage of LBA addressing instead of CHS addressing.

2.4.2.3 Large DOS/FAT Partitions

By large DOS partition we mean partitions with a size ≥ 32MB. These partitions are referred as:
- ◆ Type $06 or $0E (aka **FAT-16B**) with a size range of 32MB – 2GB
- ◆ Type $05 or $0F (aka **Extended FAT-16B**) with a size range of 32MB – 2GB

Remember also that in order to access data beyond 1GB you need to have a HD driver that support the ICD extended command set (SCSI Group 1) as well as a host adapter that also support this extended command set. For example an UltraSatan disk drive.

As we have seen due to the constraints imposed by the TOS file systems and the DOS file systems it seems that it is only possible to access Small (**FAT16A** ≤ 32 MB) DOS/TOS partitions with an Atari.

*Warning: Beware that FAT16B partitions are "recognized" by many Atari hard disk drivers and therefore on the surface they look fine: Partitions seems to be accessible and even reported with a correct size. However when you try to access data stored on these partitions beyond 32MB the driver returns <u>incorrect</u> values. Even worse if you write beyond this 32MB limit the driver actually writes the data at the beginning of the partition resulting in **a totally corrupted partition**.*

However the **BIGDOS** freeware allow access to Large DOS partitions (please refer to the BIGDOS documentation). To work with BIGDOS you need to use a hard disk driver that support the XHDI 1.20 (or above) specification. BIGDOS has been tested successfully by the author with HDDRIVER version 4.51 (or above) and with CBHD version 4.5 (or above). But unfortunately it does not work with some other drivers like the ICD AdSCSI hard disk driver.

Most of the problems, for example the fix value of SPC=2, comes from code inside GEMDOS. BIGDOS replaces GEMDOS at boot time and removes some of these limitations. More specifically it allows the support of SPC values of up to 64, and it can specify the maximum number of sectors as a 32-bit value instead of the 16-bit value. It is therefore possible to use more than 65536 big logical sectors and therefore BIGDOS removes the 32MB limitation.

For example using BIGDOS and HDDRIVER I have been able to create several 2GB partitions on an 8GB SD Card and to transfer data successfully between the Atari and the PC.

2.4.2.4 Huge DOS/FAT Partitions

By Huge DOS partition we mean partitions with a size ≥ 2GB. These partitions are referred as:
- ◆ Type $0B (aka **FAT32**) with a size range of 512MB – 2TB
- ◆ Type $0C (aka **Extended FAT32**) with a size range of 512MB – 2TB

With all of the Atari HD drivers that I have tried, I have not been able to successfully access huge DOS/FAT partitions on Atari even when using BIGDOS.

There are some solutions to access Huge DOS partitions on an Atari (for example by using Mint) but they are not covered in this document.

2.4.3 Medium TOS&DOS Partitions

Two Atari hard disk drivers (namely **PPTOSDOS** and **HDDRIVER**) use a hybrid type of partition called **TOS&DOS** partition. These partitions are perceived by PC DOS/Windows computers as a DOS/FAT partitions and by Atari computers as a TOS partitions. In fact for each TOS&DOS partition two boot sectors are written in the partition: one for the DOS file system and one for the TOS file system. The maximum size of a TOS&DOS partitions follows the TOS file system limitation of 512MB (for TOS ≥ 1.04). The HDDRIVER and PPTOSDOS packages use the same technique <u>but with different implementations</u> and therefore are **not compatible** (neither the programs nor the partitions).

As the TOS&DOS partition are correctly accessible on both platforms, can be made bootable, and can have a medium size of up to 512MB they are very well suited for data transfer between Atari and PC computers (for example using SD cards plugged into Satan or UltraSatan Drives).

*Important Warning: Although called TOS&DOS partition, this type of partition is <u>**not**</u> a regular TOS partition and therefore <u>it should only be used with the corresponding hard disk driver</u>. For example the ICD AdSCSI hard disk driver gives the impression to allow access to a TOS&DOS partition but if you try to write above the first 32MB of the partition you will **definitively corrupt the partition**.*

2.4.4 Bootable Partitions

Most probably you also want to have at least one bootable drive so that the Atari can be started without a diskette. The procedure to render a partition bootable is described, for each reviewed driver, in the next chapter. Note that only TOS and TOS&DOS partitions can be made bootable.

2.4.5 Note on Creating TOS Partitions

All the Atari Hard Disk driver packages provide a utility that allows you to create TOS partitions. We will describe the procedure for each of them. But it is interesting to note that whatever HD driver utility you use the TOS partitions created are compatibles. Therefore you can use the partitioning tool from one package and use the resulting partitioned drive with any other Atari hard disk driver.

2.4.6 Note on Creating DOS partitions

While many hard disk drivers support DOS / FAT file system, to some extent, only few of them allow to create FAT partitions on an Atari but not always correctly (e.g. HDDRIVER). It is therefore easier to create the DOS partitions directly on a PC. This is covered in Creating FAT Partitions on a PC.

2.4.7 Note on File Name

Remember that on Atari the file names are limited to 8+3 Characters. Before transferring files from a PC to an Atari make sure that all files are 8+3 and in Capital letters. If you do not follow these **two** constraints you may get unexpected behaviors. A PC tool like Total Commander can help you for that matter.

2.5 Setting up Partitions on the Atari Desktop

After partitioning a drive you need to add icons on the Atari desktop for each of the partitions. Without these icons, the partitions will be there, but you will not be able to access them.

The procedure is the following:

◆ On the Atari desktop, click on the icon associated with the floppy disk A and choose **Install Disk Drive...** from the **Options** drop-down menu.
◆ Change the **drive identifier** letter to "C" and the **Icon label** name to whatever name to you want to see on the Atari desktop for this partition.
◆ Click on **Install**, then move the new icon to the position you want it on the Atari desktop.
◆ Repeat this procedure for each of the partitions on the drive(s), incrementing the **Drive Identifier** letter each time.

Make sure you use capital letter for the drive identifier. Otherwise the system will think you are specifying a cartridge and the hard drive partition will not be accessible.

◆ Once you have added drive icons for all the partitions on all drives, save the desktop by selecting **Save Desktop** from the **Options** menu. This will write a **DESKTOP.INF** file on the boot drive that will be used to retrieve the defined environment when the computer is booted.

2.6 Information on Removable Drive

In order to support removable media a hard disk driver needs to have some specific features.

2.6.1 Disk Change Support

When the removable media is changed, the driver must recognize this the next time the drive is accessed and the drive must be logged again. If the new media has more partitions than the previous one, these should be added after the currently logged partitions.

2.6.2 Specification of the Maximum Logical Sector Size

In most of the drivers you have to specify a maximum logical sector size. At boot time, the driver will use this number to allocate internal read and write buffers. This is especially important when you need to switch media on a removable drive (e.g. on an UltraSatan), and the media are partitioned differently.

For example, suppose that you boot up the system and the size of the biggest logical sector on all the logical drives plugged in is 2048 bytes. Later, you need something from a removable media that has partitions whose logical sectors are 4096 bytes big (call it SD card A). If the maximum logical sector size has been set to 2048, you cannot access the partitions on SD card A whose logical sectors are 4096 bytes big, because the driver buffers are not big enough for its logical sectors.

2.6.3 Number of Partitions on a Card

With drivers that support removable media, usually you can specify the number of drive letters to be reserved for each unit. This number will only be used if the unit supports a removable media.

This is useful when you need to switch media on a removable drive (e.g. on an UltraSatan), and the medias are partitioned differently. At boot time, the driver will use this number, or the number of logical drives on a removable drive, whichever is bigger, and assign that number of drive letters to that particular unit. For example, suppose that you boot with a media that has two partitions on it (call it media A) in the drive. Later, you need something from another media that has four partitions on it (call it media B). If the reserved number of drive letters for this removable drive has not been set to be greater than two, you cannot access the last two partitions on media B, because only two drive letters were reserved for this removable drive.

3 Atari Hard Disk Drivers and Utilities

This chapter provides detailed procedures, for several Atari hard disk drivers:

■ To partition and initialize a drive.
■ To install a hard disk driver on a boot partition
■ To configure the installed hard disk driver.

3.1 Tested Hardware Configurations

Due to the fact that I have access to a limited set of hardware, and a limited time, I have performed the tests with only the following Computers and Devices:

■ Atari 1040 ST with US TOS 1.04 and 4 MB of RAM
■ Atari 520 STE with French TOS 1.62 and 4 MB of RAM
■ Satan Drive
■ UltraSatan Drive
■ SD Cards: 128MB, 512MB, 1GB, 2 GB, 8GB
■ AdSCSI Plus ICD host adapter connected to several SCSI hard disks, and a SCSI CD-ROM
■ Atari Megafile 20 drive (20MB!).
■ Many PCs running Windows XP, Windows Vista, and Windows 7.

3.2 ICD AdSCSI Pro 6.5.5

This section presents the ICD AdSCSI Pro 6.5.5 hard disk package. This package used to be a commercial package but is now widely available as an abandonware. You can find it here.

Note: Most of the ICD programs will automatically switch to the language used by your TOS (English, French, German…). The pictures in this document are in English (package used with a US TOS).

3.2.1 Portioning a drive

In order to use the ICD utilities the ICD hard disk driver has to be loaded. If you boot your Atari with the ICD distribution diskette inserted in the floppy drive, the driver should load automatically as a copy of the **ICDBOOT.PRG** is placed in the AUTO folder. Otherwise you will have to manually execute the **ICDBOOT.PRG**. The driver displays a welcome screen but more importantly it displays information about all the devices connected and eventually the already existing partitions on the drive.

```
┌─────────────────────────────┐
│ Select which unit to format │
├─────────────────────────────┤
│ ID,LUN   Drive/Controller   │
│ ═══════════════════════════ │
│ 0,0     UltraSatan  SD  483 MB │
│ 1,0     UltraSatan  SD 1914 MB │
│                             │
└─────────────────────────────┘
┌───────┐ ┌──────────┐ ┌──────┐
│RESCAN │ │ CONTINUE │ │ QUIT │
└───────┘ └──────────┘ └──────┘
```
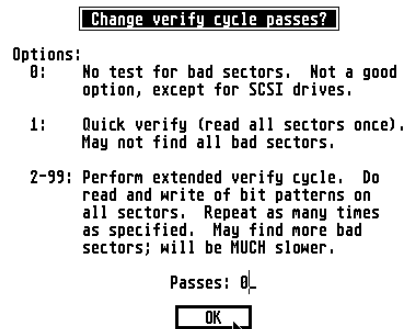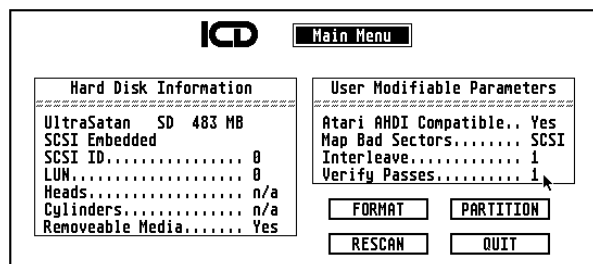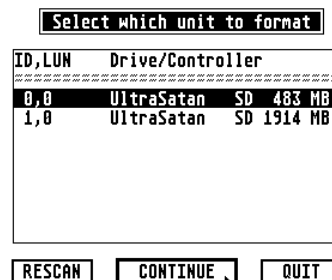
Run the **ICDFMT.PRG**: After displaying a welcome screen the program will scan for hard drives and controllers. All the units found will be listed in a selection menu. Select the Drive you want to partition (for example a specific SD Card in an UltraSatan drive) and click on **CONTINUE**.

You will be brought to the main menu that displays some information, about the hard disk selected, on the left side and some user modifiable parameters on the right side.

```
        ICD    ▣ Main Menu ▣
┌──────────────────────┐ ┌──────────────────────┐
│ Hard Disk Information │ │ User Modifiable Parameters │
│ ════════════════════ │ │ ════════════════════ │
│ UltraSatan  SD  483 MB │ │ Atari AHDI Compatible.. Yes │
│ SCSI Embedded        │ │ Map Bad Sectors........ SCSI │
│ SCSI ID............... 0 │ │ Interleave............. 1 │
│ LUN................... 0 │ │ Verify Passes.......... 1 │
│ Heads................. n/a │ │                      │
│ Cylinders............. n/a │ │ ┌────────┐ ┌───────────┐ │
│ Removeable Media....... Yes │ │ │ FORMAT │ │ PARTITION │ │
│                      │ │ └────────┘ └───────────┘ │
│                      │ │ ┌────────┐ ┌──────┐     │
│                      │ │ │ RESCAN │ │ QUIT │     │
└──────────────────────┘ └──────────────────────┘
```

Usually the only parameter you need to modify is the **Verify Passes** (it should be set to 1 initially). This parameter indicates the number of times each sector will be checked to see if it is bad.

Click **Verify Passes**: This will bring a new window. Set the **Passes** parameter to 0, to bypass the sectors verification, and then click **OK**.

If you do not set the Verify Passes parameter to 0 the partition operation will check all sectors in all the partitions on the drive and this can take a very long time on a large drive.

```
┌───────────────────────────┐
│ Change verify cycle passes? │
└───────────────────────────┘
Options:
  0:   No test for bad sectors.  Not a good
       option, except for SCSI drives.

  1:   Quick verify (read all sectors once).
       May not find all bad sectors.

  2-99: Perform extended verify cycle.  Do
       read and write of bit patterns on
       all sectors.  Repeat as many times
       as specified.  May find more bad
       sectors; will be MUCH slower.

          Passes: 0_
          ┌──────┐
          │  OK  │
          └──────┘
```

Click **PARTITION**: You are now presented the partition Main window. If the drive had already been partitioned you will see the values from the previous partitioning otherwise you will see some computed default values.

The windows display many fields that you can modify but the most useful ones are:

- The **Size** that specifies the size for each partition. Here you can enter the desired size for all the partitions that you want to create. At any time you can click **RECALCULATE** or hit return key to update the excess field (remaining space).
- **Name** is the name of the partitions. The **Show Info...** from the Atari desktop will display this value.
- The **On** column contains check marks for enabled partitions. Normally you want to set a checkmark for all the partitions otherwise they will not be accessible (hidden).

Note that the displayed and entered size values are in MEGS (1000^2) and not in megabytes (1024^2).

Click **PARTITION ENTIRE HARD DISK**: This writes the partition information based on values you have entered into the MBR of the hard drive. It will also write the boot sector, FAT, and directory information to each partition.

The program asks you to confirm and displays progress information and at the end it should indicates that partitioning has terminated successfully. You are then offered to print the partitions information and you probably want to click **CANCEL**.

*WARNING: Before partitioning make sure you that you have a check mark in the **On** column for all the partitions. Otherwise the program will warn you. You can click **CANCEL** and set **On** flags.*

If you are using removable media (for example a SD card on an UltraSatan) the program also displays a window indicating that a removable drive has been formatted and the maximum number of bytes for the logical sectors. Write down this value as you will need it to set the driver parameters and click **OK**.

A new window is presented to indicate that the partitions have changed and offers you to reboot the computer, click **OK**. During reboot the ICD driver should display all the drives connected and a list of all the partitions found.

3.2.2 Enabling and Disabling Autoboot

Autoboot allows your system to boot directly from the hard drive. This eliminates the need for a boot floppy diskette and speeds the booting process.
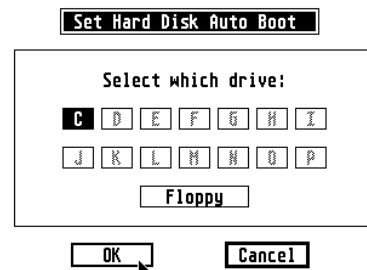
Run the ICD utility program **HDUTIL.PRG**. This brings you to the main menu.

To enable autoboot, click *Boot* from the main menu. The program default to partition C selected. If you wish to boot from a partition other than C, click on that partition. Locate the **ICDBOOT.PRG** (usually on floppy drive A) and click on *OK*. You will be prompted to be sure that you have the proper disk in. The boot sector of the partition will be modified to reflect autoboot status, and the **ICDBOOT.PRG** file will be copied to the root directory of the boot partition and named **ICDBOOT.SYS**. When this is done you will be returned to the main menu.

If you want to disable autoboot from hard click select *Floppy* as the boot drive and click on *OK*.

Note: If you wish to boot from floppy only on occasion it is not necessary to disable boot from hard drive. Simply hold down the CONTROL, SHIFT, and ALTERNATE keys simultaneously while booting the computer. This will bypass autoboot temporarily. On some newer computers it is necessary to wait for the floppy drive access light to come on before pressing these keys.

3.2.3 Configuring the AdSCSI Hard Disk Driver

Run the ICD utility program **HDUTIL.PRG**. This brings you to the main menu.

Click *Config*: All parameters are grayed because you first have to select the driver you want to configure. Select the driver from your boot partition (for example **C:\ICDBOOT.SYS**). You should see all the current parameters of the driver installed. You probably do not want to change any of these parameters with the following exceptions:

■ Max size for logical sector: If you are using removable media (e.g. SD cards on an UltraSatan) you must adjust the size for logical sector with the value that was reported at the end of the partitioning operation. This is done by pressing the up/down arrow buttons at the beginning of the line. See section 2.5.2

■ Set Clock: you have to select *NO* for the clock option unless you are using AdSCSI Plus ICD board.

Click *Save*: The program displays a file selector: select save to **C:\ICDBOOT.SYS**. Now click the *Exit* button to terminate the configuration.

The program returns to the main screen and you can now click on *QUIT*.

A new window will popup to remind you that **ICDBOOT.SYS** has been modified and offer you to reboot the computer: click *OK*.
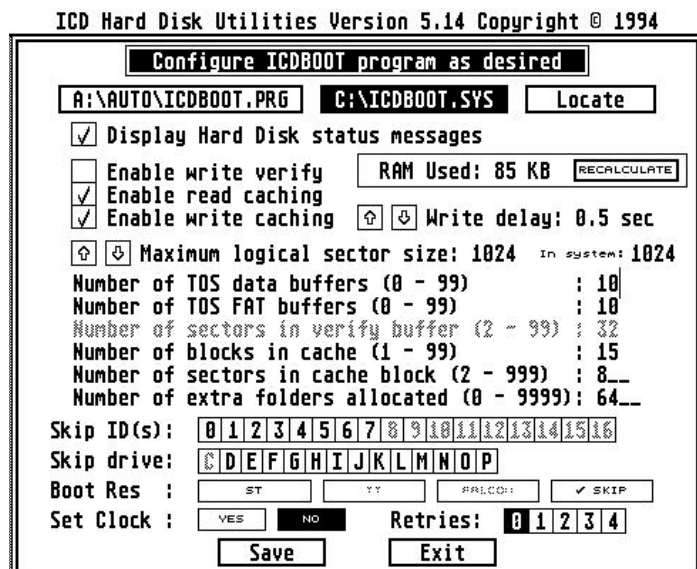
Note: The maximum size for logical sector is an important parameter as it reserves buffer s required by the driver. If you are using several SD cards this parameter should set to the maximum of the values reported during formatting of all the partitions on all the cards. See also section 2.5.2

There are some other parameters that can be changed and that will affect the performance of the driver but they are beyond the scope of this document and therefore not described. Please refer to ICD documentation for more information.

3.2.4 Removable Medium Drive Support

The ICDBOOT driver supports removable medium drives. When the card is changed, the driver recognizes this the next time the drive is accessed, a "Disk Change" message is flashed in the upper right-hand corner of the screen, and the drive is logged again. If the new card has more partitions than the previous, these are added after the currently logged partitions.

However it is not possible to reserve a number of partitions attached to a drive.

3.2.5 Accessing DOS Partitions with ICD

The AdSCSI hard disk driver only supports DOS partitions of type FAT16A. **Remember that these partitions are limited to 32MB**. Trying to access bigger DOS partition will at best return garbage and at worse definitively corrupt the partition.

AdSCSI Hard disk driver does not support XHDI 1.2 and consequently the BIGDOS program cannot be used with this driver. Note that *this is strange as ICD advertize XHDI 1.2 and BIGDOS support here*

3.3 HDDRIVER 8.23

This section presents the procedures with the HDDRIVER 8.23 hard disk driver package.

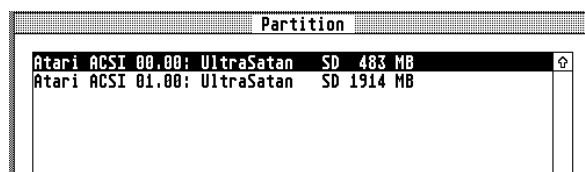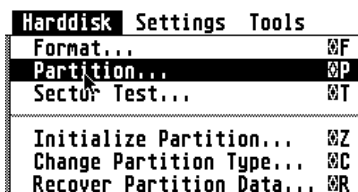The HDDRIVER package is a commercial application that you can buy from here.

Note: Most of the HDDRIVER programs will automatically switch to the language used by your TOS (English, French, German…). Pictures are in English (taken from Atari with US TOS)

3.3.1 Portioning a drive

In order to use the HDDRIVER utilities the HDDRIVER hard disk driver has to be loaded. Open the HDDRIVER diskette and double click on **HDDRIVER.PGR**. The driver displays a welcome screen but more importantly it displays information about all the connected devices and eventually already existing partitions on the SD cards.

If you do not see two lines with different IDs for the UltraSatan drive then you need to change the list of devices and partitions (please refer to 3.3.3)

Run the **HDDRUTIL.APP**: From the *Harddisk* menu select the *Partition…* command.
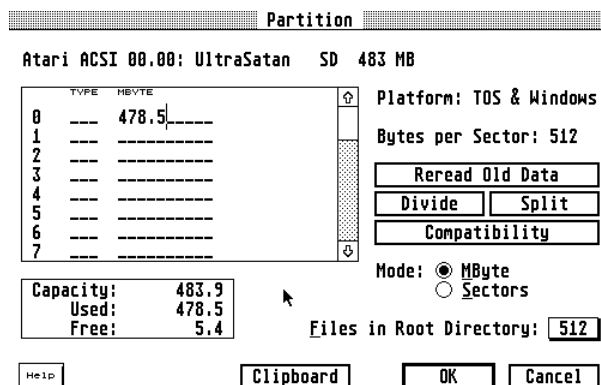

A list of all the drives connected is displayed. Select the SD card you want to partition and click **OK**.

You will be brought to the Partition Window. If the SD card had already been partitioned you will see the values from the previous partitioning otherwise you will see some default values.

The windows display several user modifiable fields where you can enter values. The most useful ones are the *MBYTE* fields: In these fields you can specify the size of all the partitions you want to create.

Normally you do not need to enter value in the *TYPE* fields unless you know exactly what you are doing.

Now you need to define the type of partition you want to create. You have three choices: TOS, Windows (called DOS before V8.0), and TOS&DOS.

If you want to create DOS partition you better use tools on a PC and therefore we will not review this option here.

3.3.1.1 Creating a TOS partition

In the partition window Click Compatibility: you will be presented a *Compatibility Option* window.
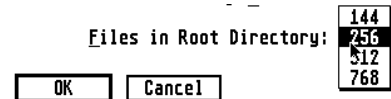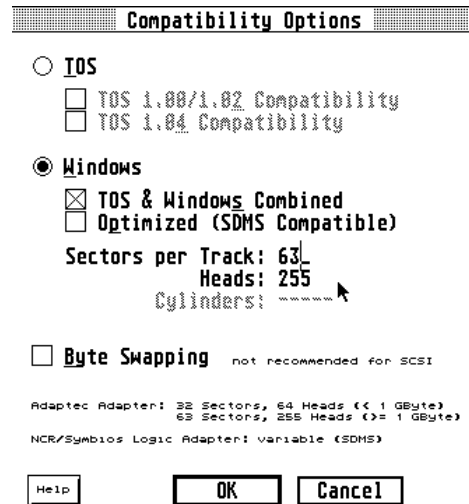
Select the **TOS** radio button and click **OK**.

3.3.1.2 Creating a TOS&DOS Partition

In the partition window Click Compatibility: you will be presented a *Compatibility Option* window. Select the **Windows** radio button and click on the **TOS & Windows Combined** checkbox. Set **Sector per Track** to 63 and **Heads** to 255 and click **OK**.
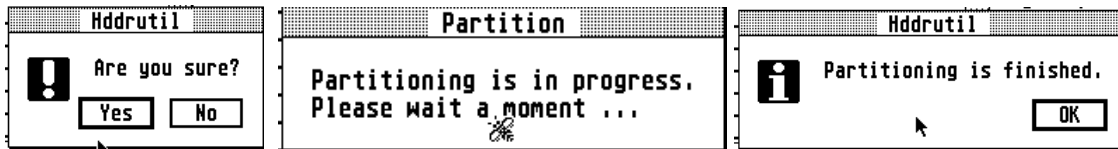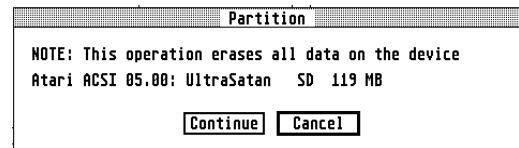
3.3.1.3 Actual Partitioning

Once you have set the size and defined the compatibility options for the partitions you are returned to the main window. You may want to change the **Files in the Root Directory** field first then click **OK** for the actual partitioning and initialization of the partitions.

Warning: *If you are in "TOS&DOS compatible mode" make sure you have defined one and only one partition defined before clicking **OK**. Otherwise the partitioning will fail with a message.*

A first message inform you that all information on the disk will be erased, click on **Continue.** A Second message asks you if you are sure, click **Yes**. At the end a new window indicates the partitioning is finished click **OK**. Note that the initialization of the partitions is done as part of the partitioning.

3.3.2 Enabling and Disabling Autoboot

Execute the **HDDRIVER.PGR** then the **HDDRUTIL.APP**. From the **File** menu select the **Install HDDRIVER…** command. You are presented a window with all the partitions; select the partition where you want the driver to be installed (this will become the boot partition). A window pops up to indicate that the driver has been installed, click **OK**.
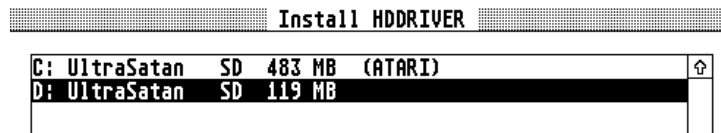
To disable the autoboot: From the **File** menu select the **Uninstall HDDRIVER…** command. You are presented a window with all the partitions; select the partition where you want the driver to be uninstalled.

### 3.3.3 Configuring the HDDRIVER Hard Disk Driver

Run the **HDDRUTIL.APP**. With version 8.x the **hddriver.sys** driver of the boot partition is automatically selected. If you want to modify a driver from another partition you need to first select it. From the **File** menu select the **Locate Hddriver…** and select the driver you want to modify.

■ From the **Settings** menu select the **General…** command.

Options that you have to checkmark depend of your host adapter and drives.

As we have already explained, without BIGDOS it is dangerous to see the DOS partitions because of their limitation to 32MB. Therefore to be safe you may want to checkmark the **Ignore PC Compatible Partitions**. Click **OK**.
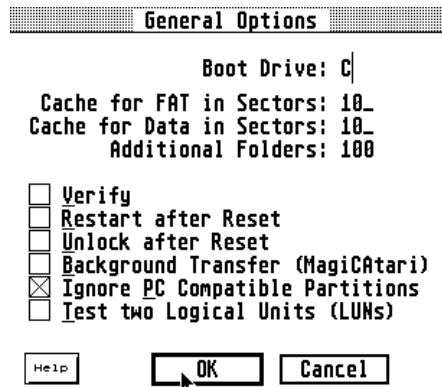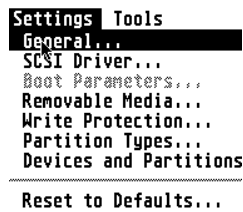
■ From the **Settings** menu select the **SCSI Driver…** command
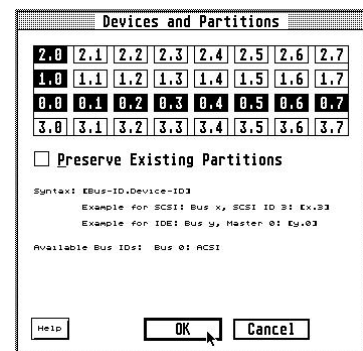Options that you have to check-mark depend of your host adapter and drives.
For example for an UltraSatan Drive adapter you need to select the following checkboxes:
◆ **SCSI Reset on Error**
◆ **ICD Compatible Adapter**. This will indicate the driver that it can use SCSI Group 1 commands to reach sectors beyond 2^11. This is mandatory if you want to access drives with more than 1GB.
◆ **Fast ACSI**. This will speed up quite a bit the transfers
Click **OK**.
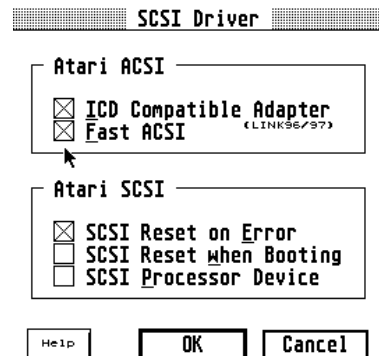
■ From the **Settings** menu select the **Devices and Partitions…** command. You are presented a window with the Devices and Partitions options.
Make sure that all devices 0.x are checked (other might be checked too). This will enable the usage of all the ACSI devices (with IDs from 0 to 7) by HDDRIVER.
Click **OK**.

3.3.4 Removable Medium Drive Support

The HDDRIVER driver also supports removable medium drives. When the card is changed, the driver recognizes this the next time the drive is accessed. If the new card has more partitions than the previous, these are added after the currently logged partitions. To support removable medium you also need to set the minimum number of partitions and sector size (see Important Parameters for Removable Drive)

Run the **HDDRUTIL.APP**. From the **Settings** menu select the **Removable Media…** command.

You are presented a window with the Removable media options. Set the **minimum number of partitions** to the maximum number of partitions on all the cards you are using. Set also the **maximum sector size** to the larger value for all the partitions on all the cards.

3.3.5 Accessing DOS Partitions

By default HDDRIVER only supports DOS partitions of type FAT16A. **Remember that these partitions are limited to 32MB**. Trying to use bigger DOS partition will at best return garbage.

However it is possible to use **BIGDOS** with HDDRIVER to access partitions up to 2GB. For example I have tested a 2GB DOS partitions without problem.

Of course it is not recommended to use such a large partition for performance reason.

3.4 HDDRIVER 7.8

This section presents the procedures with the HDDRIVER 7.8 hard disk driver commercial package. This release is not anymore available for purchase but it is widely used.
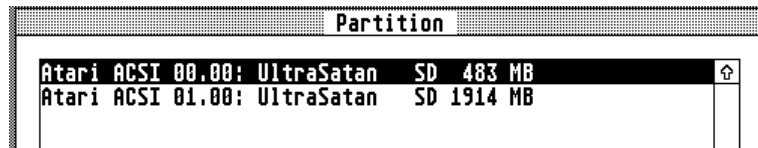
Note: Most of the HDDRIVER programs will automatically switch to the language used by your TOS (English, French, German…). Pictures are in English (taken from Atari with US TOS)

3.4.1 Portioning a drive

In order to use the HDDRIVER utilities the HDDRIVER hard disk driver has to be loaded. Open the HDDRIVER diskette and double click on **HDDRIVER.PGR**. The driver displays a welcome screen but more importantly it displays information about all the connected devices and eventually already existing partitions on the SD cards.

If you do not see two lines with different IDs for the UltraSatan drive then you need to change the list of devices and partitions (please refer to3.4.3)

Run the **HDDRUTIL.APP**: From the *Harddisk* menu select the *Partition…* command.

A list of all the drives connected is displayed. Select the SD card you want to partition and click *OK*.

You will be brought to the Partition Window.

If the SD card had already been partitioned you will see the values from the previous partitioning otherwise you will see some default values.

The windows display several user modifiable fields where you can enter values. The most useful ones are the *MBYTE* fields: In these fields you can specify the size of all the partitions you want to create.

Normally you do not need to enter value in the *TYPE* fields unless you know exactly what you are doing.

Now you need to define the type of partition you want to create. You have three choices: TOS, Dos (called Windows after V8.0), and TOS&DOS.

If you want to create DOS partition you better use tools on a PC and therefore we will not review this option here.

3.4.1.1   Creating a TOS partition

In the partition window Click Compatibility: you will be presented a *Compatibility Option* window.

Select the **TOS** radio button and click **OK**.

3.4.1.2   Creating a TOS&DOS Partition

In the partition window Click Compatibility: you will be presented a *Compatibility Option* window. Select the **Windows** radio button and click on the **TOS & DOS Combined** checkbox. Set **Sector per Track** to 63 and **Heads** to 255 and click **OK**.

3.4.1.3   Actual Partitioning

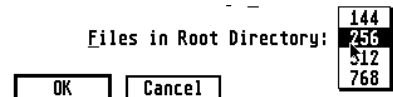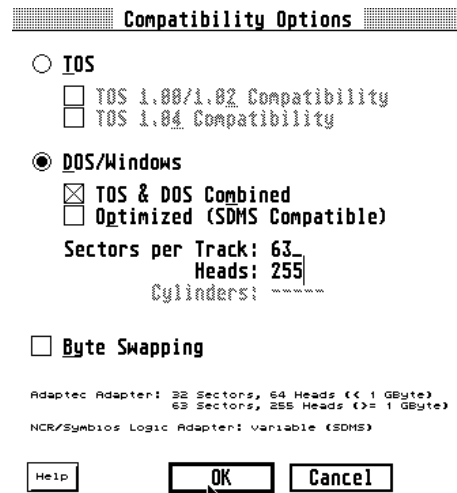Once you have set the size and defined the compatibility options for the partitions you are returned to the main window. You may want to change the **Files in the Root Directory** field first then click **OK** for the actual partitioning and initialization of the partitions.

Warning: If you are in "TOS&DOS compatible mode" make sure you have defined one and only one partition defined before clicking **OK**. Otherwise the partitioning will fail with a message.

A first message inform you that all information on the disk will be erased, click on **Continue.** A Second message asks you if you are sure, click **Yes**. At the end a new window indicates the partitioning is finished click **OK**. Note that the initialization of the partitions is done as part of the partitioning.

3.4.2 Enabling and Disabling Autoboot

Execute the **HDDRIVER.PGR** then the **HDDRUTIL.APP**. From the *File* menu select the *Install HDDRIVER…* command. You are presented a window with all the partitions; select the partition where you want the driver to be installed (this will become the boot partition). A window pops up to indicate that the driver has been installed, click **OK**.
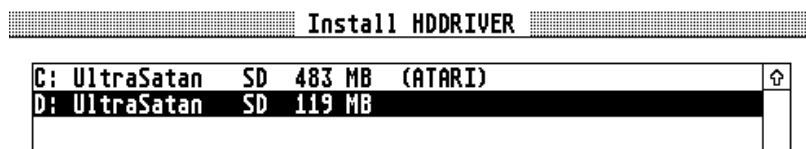
To disable the autoboot: From the *File* menu select the *Uninstall HDDRIVER…* command. You are presented a window with all the partitions; select the partition where you want the driver to be uninstalled.

3.4.3 Configuring the HDDRIVER Hard Disk Driver

Run the **HDDRUTIL.APP**. You first have to select the driver you want to work with for example **hddriver.sys** driver of the boot partition.

■ From the **Settings** menu select the **General…** command.

```
▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓ General Options ▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓

  ☐ Background Transfers (MagiC)      Boot Drive: C|
  ☐ Restart after Reset
  ☐ Unlock after Reset               Cache for FAT: 10_
  ☒ SCSI Reset on Error             Cache for Data: 10_
  ☐ SCSI Reset when Booting       Additional Folders: 100
  ☒ ICD compatible Adapter
  ☐ Verify              <LINK96/97>

  [Help]          [ OK ]  [Cancel]
```

The options that you have to checkmark depend of your host adapter and drives.
For UltraSatan Drive you need to check **SCSI Reset on Error**, but more importantly the **ICD compatible Adapter** (This <u>is mandatory if you want to access drives with more than 1GB</u>). Click **OK**.

■ From the **Settings** menu select the **Advanced…** command
Options that you have to check-mark depend of your host adapter and drives.
For example for an UltraSatan Drive adapter you need to select the following checkboxes:
◆ **Fast ACSI**. This will speed up quite a bit the transfers
◆ **Generic SCSI driver**
 Click **OK**.

```
▓▓▓▓▓▓▓▓▓▓▓▓ Advanced Options ▓▓▓▓▓▓▓▓▓▓▓▓

  ☒ Fast ACSI
  ☐ Install XFRB
  ☐ Test for two Logical Units (LUNs)
  ☒ Generic SCSI Driver
  ☐ SCSI Processor Device (TT/Falcon)

  [Help]        [ OK ]  [Cancel]
```

■ From the **Settings** menu select the **Devices and Partitions…** command. You are presented a window with the Devices and Partitions options.
Make sure that all devices 0.x are checked (other might be checked too). This will enable the usage of all the ACSI devices (with IDs from 0 to 7) by HDDRIVER.
Click **OK**.

```
▓▓▓▓▓▓▓ Devices and Partitions ▓▓▓▓▓▓▓

 [2.0][2.1][2.2][2.3][2.4][2.5][2.6][2.7]
 [1.0][1.1][1.2][1.3][1.4][1.5][1.6][1.7]
 [0.0][0.1][0.2][0.3][0.4][0.5][0.6][0.7]
 [3.0][3.1][3.2][3.3][3.4][3.5][3.6][3.7]

 ☐ Preserve Existing Partitions

 Syntax: [Bus-ID.Device-ID]
         Example for SCSI: Bus x, SCSI ID 3: [x.3]
         Example for IDE: Bus y, Master 0: [y.0]

 Available Bus IDs:  Bus 0: ACSI

 [Help]      [ OK ]  [Cancel]
```

3.4.4 Removable Medium Drive Support

The HDDRIVER driver also supports removable medium drives. When the card is changed, the driver recognizes this the next time the drive is accessed. If the new card has more partitions than the previous, these are added after the currently logged partitions. To support removable medium you also need to set the minimum number of partitions and sector size (see <u>Important Parameters for Removable Drive</u>)

Run the **HDDRUTIL.APP**. From the **Settings** menu select the **Removable Media…** command.

You are presented a window with the Removable media options. Set the **minimum number of partitions** to the maximum number of partitions on all the cards you are using. Set also the **maximum sector size** to the larger value for all the partitions on all the cards.

```
▓▓▓▓▓▓▓▓▓▓ Removable Media ▓▓▓▓▓▓▓▓▓▓

 ☐ CD-ROM Drives like Removable Disk Drives

 Minimum Number of Partitions: 4|
 Only relevant for C: and subsequent IDs

 Maximum Sector Size:  [ 8192 ]

 32768 bytes per sector with TOS 4.0x only
 Actual maximum sector size: 8192

 [Help]        [ OK ]  [Cancel]
```

3.4.5 Accessing DOS Partitions

By default HDDRIVER only supports DOS partitions of type FAT16A. **Remember that these partitions are limited to 32MB**. Trying to use bigger DOS partition will at best return garbage.

However it is possible to use **BIGDOS** with HDDRIVER to access partitions up to 2GB. For example I have tested a 2GB DOS partitions without problem.

Of course it is not recommended to use such a large partition for performance reason.

3.5 CBHD 5.0.2 – Hard Disk Driver and Utilities

This section presents procedures for partitioning and using a drive with the CBHD package.

This CBHD 502 package is widely available as a freeware. You can find it here.

Note: The original CBHD package is in German! However most of the program and utilities have been translated to English. You can find the English version here. This is the version presented below.

3.5.1 Portioning a drive

In order to use the CBHD utility the **SCSIDRV.PRG** program needs to be executed first. The driver displays a welcome screen but more importantly it displays information about all the devices connected.

Run the **CBHDCONF.APP**: From the *Disk* menu select the **Partition…** command. Select the drive you want to partition. If the drive was already partitioned you will be presented with the existing partitions.

You can change the size of any partition by clicking on the arrow icons. When you reach the maximum size available on the disk you will not be able to increment the partitions. When specifying large partitions this process can be painful!
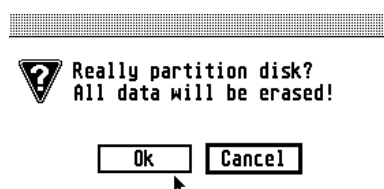
Once you have specified the sizes click *OK*. Confirm with *OK* that you want to partition disk.

This will write the partitioning information on the drive, and it will also initialize the content of all the partitions. Reboot the system.
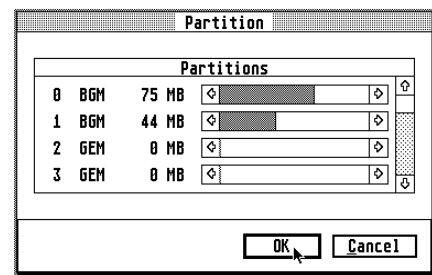
3.5.2 Enabling Autoboot

Autoboot allows your system to boot directly from the hard drive. This eliminates the need for a boot floppy diskette and speeds the booting process.

Enabling autoboot with CBHD is "a bit unusual". Please carefully follow the following steps:

- Run the **SCSIDRV.PRG** then Run **CBHDCONF.APP.**
- From the *Driver* menu select the **Install…** entry. This will write the boot loader to the selected partition, but it will not copy the driver to the boot partition for you.
- Run the **CBHD.PRG**. You should now be able to access the "C" boot partition from the desktop. If there is no hard disk icon on the desktop you need to install a hard disk icon.
- Copy the **CBHD.PRG** file from your installation floppy to this partition. Rename this file to **CBHD.SYS** using *File Show Info…* from the desktop menus.

You should now reboot the system. The CBHD hard disk driver should load automatically and display all the drives and partitions.
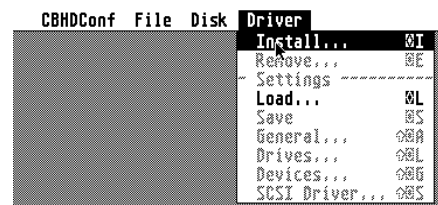
3.5.3 Configuring the CBHD Hard Disk Driver

Run the **SCSIDRV.PRG** then Run **CBHDCONF.APP**. Load the **CBHD.SYS** from your boot partition using *Driver* menu *Load…* command.

You can now modify several parameters according to your host adapter and drives. For UltraSatan Drive I only found one parameter that need to be checked.

From the *Driver* menu select *SCSI Driver…*
Verify that the Identify ICD is check marked (it should be by default).
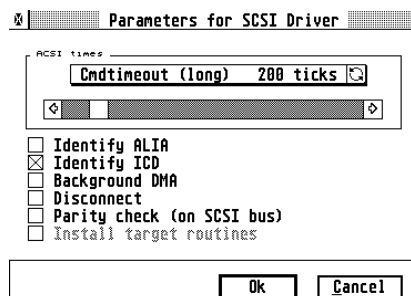
3.5.4 Removable Medium Drive Support

Not sure if there is any support for removable media in CBHD?

3.5.5 Accessing DOS Partitions

CBHD only supports DOS partitions of type FAT16A. **Remember that these partitions are limited to 32MB**. Trying to use bigger DOS partition will at best return garbage.

However by using BIGDOS with the CBHD502 hard disk driver it is possible to access large DOS partitions up to 2GB. I have tested a 2GB DOS partitions without problem.

Of course it is not recommended to use such a large partition for performance reason.

3.6 SCSI Tools 6.5.2

Originally I had planned to present this hard disk driver. However after testing it I discovered that it only supports a maximum size of 32MB for bootable partitions. Because of this limitation and the fact that it only exist in German I decided not to describe the procedures in this document.

3.7 PPDOSTOS Alpha

I have experimented with an alpha version of the up to come hard disk driver from Pera Putnik.

It is too early to describe the definitive procedures but this hard disk driver seems very promising with very nice and sometimes unique features:

+ Multiple TOS&DOS Partitions.
+ Bootable TOS&DOS Partition up to 512MB
+ Multiboot: selectable boot partitions allow easy selection of different configurations
+ Support FAT16A DOS Partitions (< 32MB)
+ Good Performance
+ Reasonably priced commercial application
+ Maximal support for gaming - driver loadable without XHDI, in top RAM, with HOLE (for old games, not compatible with higher TOS versions)

3.8 Driver Comparison Table

|	PPDRV	HDDRV8x	HDDRV7x	ICD655	CBHD502	SCSI Tool
Boot TOS partition	512MB	512MB	512MB	512MB	512MB	32MB
Boot TOS&DOS	Many	One	One	No	No	No
Multi Boot	Yes	No	No	No	Yes	No
FAT16A (32MB)	Yes	Yes	Yes	Yes	Yes	
FAT16B (2GB)	BIGDOS	BIGDOS	BIGDOS	No	BIGDOS	
Removable media	?	Yes	Yes	Limited	?	
XHDI	Yes	Yes	Yes	No	Yes	Yes
Maintained	Yes	Yes	New ver.	No	No	No
Price	10 €	45 €	Not avail.	Free	Free	Free
Performance						

4 PC Utilities

This chapter describes few programs that can be useful to partition, display content, and work with images of hard disks to be used on an Atari System.

4.1 Accessing Multiple Partitions from SD Cards

There are plenty of solutions to access multiple partitions from an SD Card plugged into a PC card reader. Here I present the solution I am using with the Hitachi Microfilter. You can find it from many places like here and here. The Hitachi Microfilter is a card reader driver that allows seeing the card reader as a hard drive. To setup this driver you first need to extract the two files **cfadisk.inf** and **cfadisk.sys** in a directory. Then start the Device Manager by executing the **devmgmt.msc** command.

■ In the device manager locate the card reader in the disk drive list, right click on it and select **Update driver software...**.
■ Select **Browse my Computer for driver software**.
■ Select **let me pick from a list of device driver on my computer**.
■ Click **have disk** button and locate the directory where the two driver files are located.
■ Select the **cfadisk.inf** file and in the Install from disk window click **OK**, ignore the fact that the driver not digitally signed message and click **Next**.
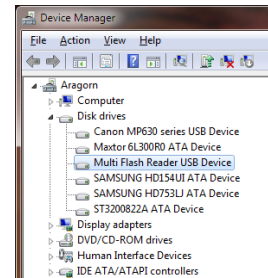
The driver is now installed for your SD card reader and let you access multiple partitions on any SD card plugged into it.

Note that this procedure has been tested on Windows XP, Vista, and 7 (all 32-bits pro editions).

4.2 Creating multiple FAT Partitions on a PC

As we have seen most of the Atari Hard disk drivers do not provide a utility to create DOS partitions. It is therefore very convenient to create DOS partitions directly on a PC. If you connect directly a drive (for example a SCSI drive) to a PC it is possible to create multiple partitions directly. However if you are using an SD card, connected to a PC card reader, you first need to install a specific driver, as explained above, to create multiple partitions.

Windows comes with a reasonable utility for partitioning drives called the **Disk Management Console**. You can execute it by executing the **diskmgmt.msc** command. You are presented with a list of all the drives and the partitions on the drives. Your SD card should be displayed. In the example shown Disk 5 is an 8GB SD Card. When you buy it the card is formatted by default as a FAT32 (only format for partitions ≥ 2GB).
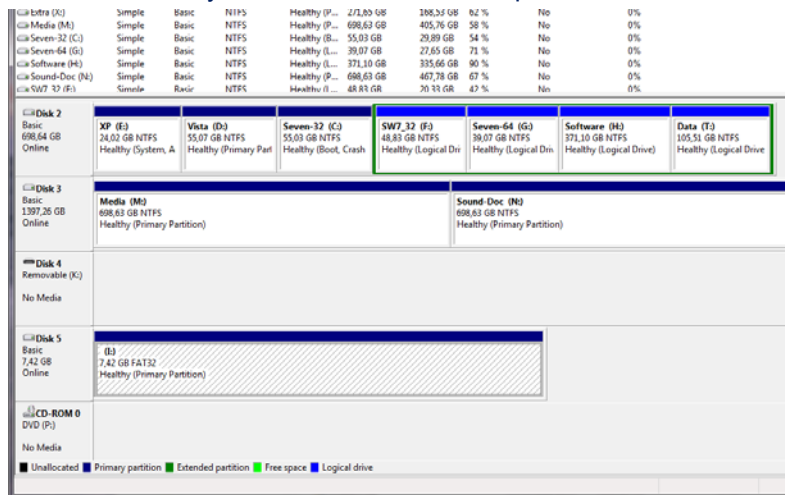
Suppose we want to partition the 8GB SD Card into four 2GB partitions. We plug the card into a card reader that can handle multiple partitions. We first have to delete the existing partition (normally FAT32) by using the **delete volume** command. We now use the **new simple volume** command. The new simple volume wizard pops up. We specify the volume size to 1900MB, and in the format windows we select **FAT** for the file system and **Default** for the allocation unit size.

We repeat the same operation for the three remaining partitions.
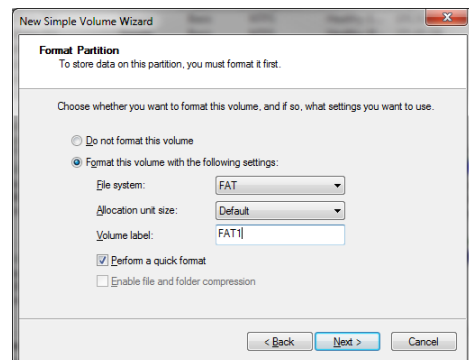
At the end of this process we end up with our four 2GB partitions and we can immediately transfer information from the PC on them.
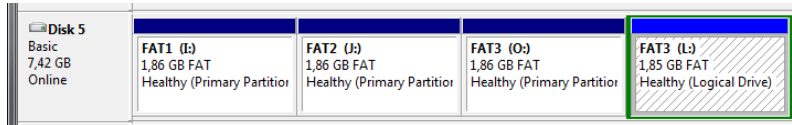
Remember that in order to access these large FAT16B partitions on Atari you need to use BIGDOS along with your hard disk driver.

4.3 Disk Images

A disk image is a file that contains an exact binary copy of the raw content of the disk. Images are useful to backup/restore SD card, to transfer information, and to run in emulators. There many tools available for creating and reading disk images.

One nice tool for imaging/restoring SD card plugged into a card reader is the USB-Image tool (currently in version 1.52) that you can get from here.

However I do not use it so much because it does not recognize an SD card plugged into a card reader using the Hitachi microfilter driver (described above). This is due to the fact that when using this driver the card is not seen anymore as an USB stick but as a hard drive.
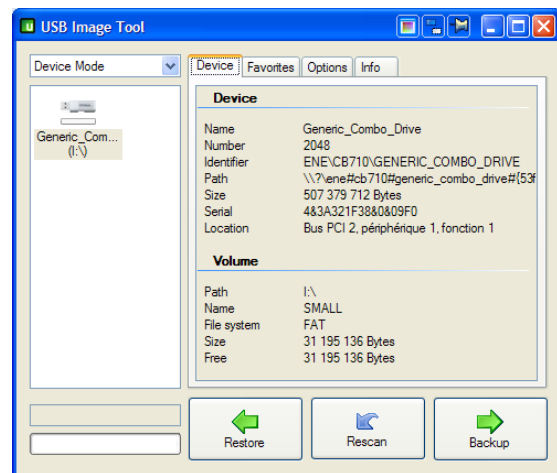
My prefered tool for creating and restoring images to be used on Atari is the Drive Image program from Pera Putnik.

Not only it allows creating and restoring images of a drive, but it also permits to look and modify the content of the all the partitions inside the image.
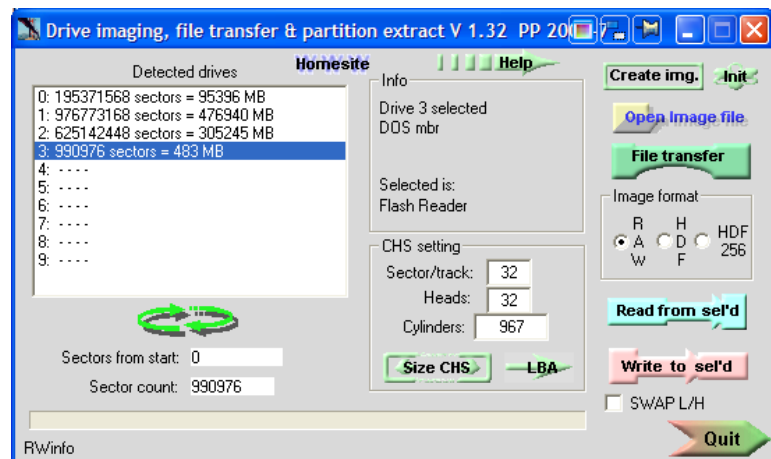
Also not directly meant to create and restore disk images the WinHex editor allows to perform these two operations easily. And of course it offers many more capabilities, for example I have used it to look at the detail content of SD cards and/or disk images of SD cards.

And last but not least are the capabilities of Atari emulators:

■ With Steem emulator it is possible to create and/or use Atari disk images by using the Pasti hard disk low level emulation. Unfortunately the current Pasti limits the size of the images to 1GB. You will also need a tool like WinHex to transfer the images to/from SD Cards.
■ With Hatari emulator It is possible to use (but not to create) Atari disk images. I have tested quickly this capability that seems to work well. And again you will need a tool like WinHex to transfer the images to/from an SD Cards.

5 UltraSatan–User's Guide

This chapter provides a short UltraSatan user's guide.

Note that most of the information presented here comes from Jookie documentation.

5.1 UltraSatan Quick Start

This section describes briefly the steps necessary to setup and use your USD with an Atari system:

■ The UltraSatan Disk must be connected to the ASCI port of your Atari (for example using Cable A) and to a regulated power supply (DC 7-9 V recommended). For initial tests, and configuration of your USD, I recommended that you do not connect any other ASCI/SCSI devices to the ASCI port.

*Important warning: Before you connect your USD make sure that there are no other devices on the ASCI bus with the same IDs as the one used by the USD (by default 0 and 1). Otherwise data on your hard disk device **might get corrupted** (for more information see Changing USD ASCI ID). This is especially important if you have an Atari with an internal hard disk (for example an Atari Mega STE)*

■ You must turn on the power switch of the USD before[7] you start your Atari computer.
■ You can insert and/or eject SD card(s) before or after starting the USD and/or the Atari.
■ Before you can use an SD card in your USD, it needs to be prepared. The procedures to partition and initialize SD cards, using different hard disk drivers, are described in the chapter Atari Hard Disk Drivers and Utilities or you can go to SD partitioning - Quick Steps Guide.
■ In order to access the partitions created on your SD card(s) you need to "install the partitions" on your Atari desktop. This is described in Setting up partitions on the Desktop section.

More specific usage and capabilities will be covered in later sections like:

■ How to use your USD with other ASCI/SCSI devices
■ How to change firmware or Inquiry Name of your USD
■ How to use the USD battery backup clock

5.2 USD Configuration and Utilities

When you receive an UltraSatan Drive you should be able to use it immediately the without changing the configuration **if it is connected alone** on the ASCI bus. By default it comes with the right firmware, the SD card slot 0 and 1 are respectively set to ASCI ID 0 and 1, and the day and time values of the USD real time clock are preset. However several utilities are provided to change important parameters of the USD.

5.2.1 Changing USD ASCI ID

The UltraSatan has two SD Card slots. Each of these slots is assign an ASCI ID. By default the ACSI IDs 0 and 1 are assigned to slot 0 and 1 respectively.

If you connect several devices to an Atari ASCI bus each of them **must have a unique ID**.

*Warning: If two or more devices on the Atari ASCI bus have the **same** ACSI IDs there is a high probability that the information on the connected Drives and/or SD Cards will get **corrupted**.*

Therefore when you connect an UltraSatan Drive with other ASCI devices you will probably need to change the IDs of some of the devices. Very often changing the ID of ASCI hard drive, for example a Megafile disk, is not easy as it needs to be done by adjusting some straps on the host adapter or the drive. On the other end it is easy to change the UltraSatan IDs as this can be done by software.

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[7] You can also power your USD and your computer at the same time (with a central switch), but this did not work reliably for me.

Before you execute the following procedure make sure that you first disconnect any other devices that may have a conflicting ID with your UltraSatan Drive (by default IDs 0 and 1). For example if you own a Mega STE you will need to disconnect the internal drive or use another Atari without drive.

With the UltraSatan Drive connected to the Atari ASCI bus run the **US_CONF.PRG** configuration program. The program will search for any UltraSatan on ACSI bus. The configuration window, with the current values stored in the UltraSatan, is now displayed.

```
Looking for UltraSatan:
0

UltraSatan ACSI ID: 0
FirmWare: UltraSatan v1.00 (by Jookie)
```

Use the up and down arrow keys until you reach the *Device SD/MMC card 1* ID value. You can now change it by directly entering the desired value (0 to 7) from the numeric keypads.

Repeat the operation if you need to change the ID for *Device SD/MMC card 2*.

At any time you can "read" (refresh) the current values stored in the USD by hitting the **R** key. This will discard any modification entered.

You need to save the new values entered to the UltraSatan device. For that matter press the **W** key. You will receive a confirmation that the configuration was saved to the USD.

```
>> Configuration tool for UltraSatan <<<
By Jookie (joo@kie.sk), December 2008

Firmware list (upload, select):
[ * ] base firmware (read only)
[   ] ( empty )
[   ] us101.ldr
[   ] ( empty )
[   ] ( empty )

Boot always base firmware:  NO

Device            ACSI ID
SD/MMC card 1      [ 0 ]
SD/MMC card 2      [ 1 ]

Little help:
Arrows  - move the cursor.
Q       - quit this program
R or W  - read or write settings
U       - upload new firmware
SPACE   - change the option
0 - 7   - to enter a number
```

You can now exit the configuration program by pressing the **Q** key.

You must restart the Atari (so it gets the new USD IDs) but it is not necessary to restart the USB.

If you use a utility that display the IDs of all the devices connected on the ASCI bus, you should now see the new IDs values for your USD.

5.2.2 Changing USD Firmware

The USD can store up to 5 different firmwares stored in its memory. One of them is read only, but the other four can be loaded from a file.

With the UltraSatan Drive connected to the Atari ASCI bus run the **US_CONF.PRG** configuration program. The program will search for any UltraSatan on ACSI bus and finally display the configuration window with the current values.

To upload a new firmware use the up and down arrow keys from the keyboard. Select one entry in the *Firmware List* and press the **U** key: you will be presented with a file selector, select the new firmware to upload (a file with .lrd extension) and click **OK**. At completion of the command the name of the uploaded firmware will be displayed next to the entry you selected. You can repeat the operation to load more firmwares.

To select a firmware that the USD will use at startup time use the up/down arrow key until you are positioned to the entry with the firmware you want to use, then press the space key. A star will be placed in front of this entry to indicate the selected firmware.

You need to save the newly selected firmware entry to the UltraSatan device. For that matter press the **W** key. You will receive a confirmation that the configuration was saved to USD. You can now exit the configuration program by pressing the **Q** key.

You must restart the Atari and it is also necessary to restart the USB (using for example the power switch) so that the newly selected firmware is loaded by the USD.

5.2.3 Changing USD Inquiry Name

The USD store an "Inquiry Name". The "Inquiry Name", completed by extra information about the type and size of the SD card, is the string returned by USD when an *Inquiry* ASCI command is executed. This is the string displayed by the driver during partitioning or at boot time.

To change the *Inquiry Name* of device press the **I** key. The program will display the existing name and you are offered to enter a new name. This name will be written to the USD immediately.

5.2.4 Recovering from bad firmware

You cannot select an empty firmware entry, but you can select a damaged firmware entry that does not allow the UltraSatan to boot correctly. In that case it might not be possible to even run the configuration tool. If this happen you should open the USD box and connect the 'BOOT ALWAYS BASE FW' pins with a jumper. When this jumper is present, the UltraSatan will always start with the base firmware no matter what other firmware you selected. With the base firmware running, run the configuration tool and fix the problem by selecting a known working firmware or replacing the bad firmware with a good one.
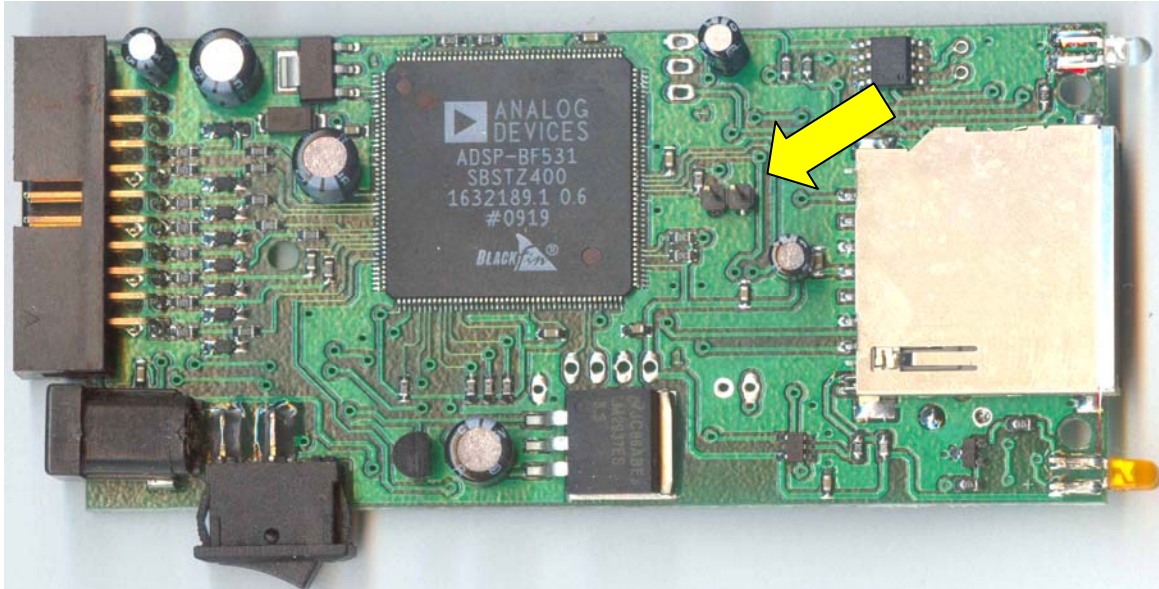
The configuration utility display **Boot always base firmware** followed by:
   ◆ **YES** if the jumper is present and the USD will always boot from the base firmware
   ◆ **NO** if the jumper is not present and the USD will boot from the selected firmware.

5.2.5 USD Real Time Clock

The UltraSatan Drive contains a memory backup Real Time Clock (RTC).

Before using the values from the USD internal RTC you need to set it up. Connect the USD to the Atari and Run the **US_SETCL.PRG**. The program searches for the connected USD and displays the current date and time from its internal RTC. To refresh the displayed time from the USD you can use any key other than **D**, **T**, and **Q** (for example space or return).

■ To change the date press the **D** key, enter the new date in format YYYY-MM-DD, and press Enter.
■ To set the time, press **T**, enter the new time in format HH:MM:SS and press Enter.
■ To quit the RTC setter, press **Q**.

You can update your Atari system time and date by using the values from the USD RTC.

Connect the USD to the Atari and run the **US_GETCL.PRG**. The program searches for the connected USD and set the Atari system date and time with the values read from the USD internal RTC.

This process can be automated each time you boot your Atari by placing the **US_GETCL.PRG** in the AUTO folder of your boot drive.

5.2.5.1   Y2K System Clock XBIOS Problem

It's well known that, on at least some machines, there is a problem with the XBIOS clock in some TOS versions (this is one of two internal Atari clocks, the other being the keyboard clock).

The problem prevents a date between 2000 and 2027 from being set correctly for this clock (date is actually set to 28). It is known to affect TOS versions 1.0, 1.2 and 1.62 (it is likely that it affects all TOS 1.x versions) but it has been reported with TOS 2.x.

5.2.5.2   Testing for the XBIOS problem

The most straightforward way to test for the problem is to install Daniel Hoepfl's clock CPX.

■ Run the CPX and set a 2000+ year. If you are using Xcontrol you may find that the year doesn't appear to change in Xcontrol's display unless you close it and re-open it.
■ Run the CPX again: if the date isn't the one you set (even if Xcontrol and other programs show your new date), then you probably have the XBIOS problem. Try installing the Linkweiler patch and re-test.

5.2.5.3   Patches for the XBIOS problem

There is a donation-ware patch available which seems to work fully, with the same beneficial effects on the behavior of the cartridge clock patch under TOS and MiNT as the Williams patch: Ingo Linkweiler's y2k_fix

5.2.5.4   Using the Y2K Patch with USD RTC

If you have the Y2K problem when trying to set Atari system clock from USD RTC, try the following:

■ Extract the program **Y2K_FIX.PRG** and place it in the AUTO folder.
■ Make sure the **Y2K_FIX.PRG** is executed before the **US_GETCL.PRG** (you may need to use a program like **AUTOSORT.PRG** for that matter).

Now the time should be set and displayed correctly.

5.3 Using USD with other ASCI/SCSI Devices

*Important warning: Before you connect your USD make sure that there are no other devices on the ASCI bus with the same IDs as the one used by the USD (by default 0 and 1). Otherwise data on your hard disk device **might get corrupted** (for more information see Changing USD ASCI ID). This is especially important if you have an Atari with an internal hard disk (for example an Atari Mega STE)*

In this chapter I provide a summary of the tests I have performed with an USD connected along with other ASCI/SCSI devices that I own. I have only tested USD with Megafile, AdSCSI Plus, and SatanDisk devices. If you are interested by the detail description of the different tests it is available as a separate document.

5.3.1 Connecting USD with an Atari Megafile 20 drive

The only working way to connect the devices on the ASCI bus is the following:

◆ Connect the Megafile input connector to the Atari DMA/ASCI port using a standard ASCI cable.
◆ Connect the Megafile output connector to the USD using a "Cable A"

I have been able the access and transfer files successfully between the two devices using the ICD hard disk driver (the HDDRIVER does not work with my Megafile 20).

5.3.2 Connecting USD with SCSI drives through an ICD adapter

For this test I have used an (old) ICD AdSCSI Plus adapter with 2 SCSI drives and a CD-ROM.

I have tried to connect the USD before (input port) and after (output port) the ICD host adapter in combination with various hard disk drivers. Unfortunately I have never been able the access and transfer files successfully between the devices.

*This **should not** be considered as a definitive indication that USD does not work with ICD AdSCSI Plus board for two reasons: My ICD adapter is a very early AdSCSI Plus model that does not understand ICD extended commands, and does not support parity. During the test the access LEDs of the USD did not show any activity. Therefore tests failure might be the result of a defective board.*

5.3.3 Connecting USD with a SatanDisk

I connected together an UltraSatan Drive and a SatanDrive using a "cable B". With this configuration it is possible to detect correctly the two devices. Unfortunately I have not been able the access and transfer files successfully between the two devices.

5.3.4 Not tested by me but reported as working

■ Two USD
■ USD and Link II

5.4 SD Card Partitioning - Quick Steps Guide

This section contains a list of instruction (for several hard disk drivers) for partitioning an SD Card plugged into an USD and to make it bootable (for more detailed procedures please refer to Atari Hard Disk Drivers and Utilities).

5.4.1 HDDRIVER 8.23

Procedure requires HDDRIVER and utilities on a floppy (or from another drive).

1. Run **HDDRIVER.PRG**: loads driver and displays all connected ASCI/SCSI/IDE drives. You should see the two IDs assigned to UltraSatan (if not see USD pitfalls).
2. Run **HDDRUTIL.APP**
3. Select menu *Harddisk → Partition…* then select SD Card to partition, click *OK*. Check that the size of the SD card is reported correctly (if not see USD pitfalls).
4. Click *Compatibility*, Select *TOS* or *Windows* (checkmark *TOS&Windows* if want TOS&DOS partition), Click *OK*
5. Enter partition(s) value(s) desired, and If needed change *Files in Root Directory*, Click *OK* : *Operation Erases…* Click *Continue*, Are you sure click *YES*, Partitioning finished click *OK*
6. Select *File → Install HDDRIVER…* select the partition where you want the driver to be installed (usually C) Driver installed… click *OK*.
7. Select menu *Settings → General…* Nothing really needs to be check marked
8. Select menu *Settings → SCSI Driver…* Checkmark *ICD compatible adapter* + *Fast ASCI*
9. Select menu *Settings → Removable media…* Set *Minimum number of partitions* to the number of partitions to reserved (max num expected on a card), Set *Max sector size* to maximum value of sector size for all SD card you are going to use (or 16384 to be safe).
10. Select menu *Settings → Devices and Partitions…* Highlight (click) *0.0* to *0.7* (to be safe)

5.4.2 HDDRIVER 7.8

Procedure requires HDDRIVER and utilities on a floppy (or from another drive).

1. Run **HDDRIVER.PRG**: loads driver and displays all connected ASCI/SCSI/IDE drives. You should see the two IDs assigned to UltraSatan (if not see USD pitfalls).
2. Run **HDDRUTIL.APP**
3. Select menu *Harddisk → Partition…* then select SD Card to partition, click *OK.* Check that the size of the SD card is reported correctly (if not see USD pitfalls).
4. Click *Compatibility*, Select *TOS* or *Windows* (checkmark *TOS&DOS* if want TOS&DOS partition), Click *OK*
5. Enter partition(s) value(s) desired, and If needed change *Files in Root Directory*, Click *OK: Operation Erases…* Click *Continue*, Are you sure click *YES*, Partitioning finished click *OK*
6. Select *File → Install HDDRIVER…* select the partition where you want the driver to be installed (usually C) Driver installed… click *OK*.
7. Select menu *Settings → General…* Checkmark *ICD compatible adapter*
8. Select menu *Settings → Advance…* checkmark *Fast ASCI*
9. Select menu *Settings → Removable media…* Set *Minimum number of partitions* to the number of partitions to reserved (max num expected on a card), Set *Max sector size* to maximum value of sector size for all SD card you are going to use (or 16384 to be safe).
10. Select menu *Settings → Devices and Partitions…* Highlight (click) *0.0* to *0.7* (to be safe)

5.4.3 ICD AdSCSI 6.5.5

Procedure requires ICD driver and utilities on a floppy (or from another drive).

1. Run **ICDBOOT.PRG**: loads the driver and displays all connected ASCI/SCSI/IDE drives. You should see the two IDs assigned to UltraSatan.
2. Run **ICDFMT.PRG**. Select SD Card to partition, click *Verify Passes*, Set *Passes* to *0*, click *OK*
3. Click *Partition*, Enter partition(s) value(s), click on *TOS x.x* if necessary (for TOS 1.0 & 1.2), and click *Partition Entire Disk* confirm operation, and *Cancel* printout of the Partitions. Click *QUIT,*

Write down the *maximum logical sector size* for removable media. Click *OK,* and click *OK* when offered to reboot system.

4. Run **HDUTIL.PRG**; click *Boot*, Select the partition to boot from (default C) and the source directory of the driver (default floppy).

5. Click *Config*, select driver from boot partition; enter the *maximum logical sector size*. If you are using several SD cards, this value must be set to the largest values reported during partitioning (see step 3 above). Set *Set Clock* to *NO* (unless you own an ICD AdSCSI Plus host adapter).

6. Click *Save* and select the icdboot.sys driver from partition you are booting from, Click Exit to exit the configuration.

7. Click *Quit* and click *OK* when offered to reboot.

5.4.4 CBHD 5.0.2

1. Run **SCSIDRV.PRG**, Run **CBHDCONF.PRG**, Select command *Disk → Partition…*

2. Set the size of the partition(s) by clicking on the arrow icons, click *OK*. Confirmation *OK,* reboot

3. Run **SCSIDRV.PRG**, Run **CBHDCONF.PRG**, Select command *Driver → Install…* select the boot partition, Install driver *OK*

4. Run **CBHD.PRG***.* Create disk icon on desktop for partition C (if not already there), copy **CBHD.PRG** to partition C and rename to **CBHD.SYS** and reboot

5.4.5 PPDOSTOS

I am working on it

5.5 USD Pitfalls

This section lists the most common pitfall when using USD. In most cases it will result in a system not working correctly or even in disk corruption.

5.5.1 General

◆ Always make sure that the IDs used by USD do not collide with any other devices ID on the ASCI bus otherwise you may corrupt data on drives or SD cards.
◆ Do not use power supply below 7V (6.5V is the limit) or over 9V (12V is the limit).

5.5.2 Driver Specific

5.5.2.1 HDDRIVER

◆ If you do not see the correct size for an SD Card ≥ 1GB: check for *ICD compatible adapter*
◆ If you want to improve the speed of the transfer: Set *Fast ASCI*
◆ If you do not see your USD IDs when driver loads or during partitioning: Highlights *0.0 to 0.7* in *Settings → Devices and Partitions…* and reboot. This can happen even when booting from floppy, as by default only 0.0 is selected.

6 References

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7 Revision History

- V0.8 November 2009 – Publication of an almost (?) finished version.
- V0.1 October 2009 – Publication of a first draft (only ICD)