

# **ShapeShifter**

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<b>COLLABORATORS</b>
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	<i>TITLE :</i> ShapeShifter		
<i>ACTION</i>	<i>NAME</i>	<i>DATE</i>	<i>SIGNATURE</i>
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<b>REVISION HISTORY</b>
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## Chapter 1

# ShapeShifter

### 1.1 ShapeShifter Manual

The ShapeShifter  
Version 3.3  
What's new?

A Macintosh II emulator  
for Amiga computers

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Overview	What is ShapeShifter?
Registration	Limitations of the unregistered version
Support	Call me!
Installation	How to install ShapeShifter
Using ShapeShifter	The main part
Notes on the emulation	Things to pay attention to
Questions and answers	Solutions to common problems
The Mac-Handler	Mac volumes on your Workbench
Reference	For consultation
Copyright	Legal mush
Bug reports	How to report bugs
Credits	The author wishes to thank...
The author	Programmer's address
History	Revision history of ShapeShifter

### 1.2 What's new?

The most important changes to version 3.2a:

- The ShapeShifter settings can now be loaded and saved into arbitrary

files

- The SCSI Manager supports LUNs (this especially affects ZIP drives)
- The "Newton Package Installer" works
- My postal address has changed

Details are given in the revision history.

IMPORTANT NOTE: If you upgraded from ShapeShifter 3.1 and start 3.3 for the first time, you should check the graphics settings, especially if you are using a Merlin or Picasso card. Moreover, you have to re-enter your SCSI settings or you won't be able to use SCSI devices and you should delete the file "ShapeShifter PRAM" before the first start as its format has changed.

## 1.3 Overview

ShapeShifter is a multitasking Macintosh II emulator for the Amiga. It allows programs written for Apple Macintosh computers to run on the Amiga without hardware modifications or expansions. The emulation runs as a normal task under the Amiga operating system, so that Amiga and Macintosh programs can be used concurrently. With ShapeShifter you can combine the flexibility of the Amiga with the power of Macintosh software!

(Note: Almost every mention of "Macintosh" in this manual refers to the Macintosh emulated by ShapeShifter)

Some of the emulation's features:

- Color display with up to 256 colors on AA Amigas (1200/4000), up to 16 colors on older models in all available resolutions
  - Support for Amiga graphics cards with up to 16.7 million colors
  - Support for one or two monitors
  - Needs no MMU
  - No support for other Macintosh operating systems apart from System 7.x, only 32 bit clean programs will run
  - Uses up to two Amiga disk drives. Macintosh HD disks can be used directly with an HD drive as in the Amiga 4000, DD disks formatted with ShapeShifter can be read by any Macintosh. 800K Macintosh DD disks can be read and written with an original Macintosh drive if "CrossMAC" is installed.
  - Simulation of up to two Macintosh volumes in AmigaDOS files
  - Can use up to two hard drive partitions directly as Macintosh volumes
  - CD-ROM drives are supported
  - A SCSI interface in the Amiga can be accessed from the Macintosh and allows for using removable hard disks, scanners, streamers and
-



other devices

- Access to Ethernet networks with AppleTalk/MacTCP
- Multichannel sound output
- An Amiga sound digitizer at the parallel port is supported
- Amiga tablets can be used from the Macintosh side
- Redirection of the two Macintosh serial ports to the serial/parallel ports of the Amiga, even on I/O expansion cards
- Texts can be exchanged via the Macintosh and Amiga clipboard
- An AmigaDOS handler exists to access the files on Macintosh volumes from every Amiga program

## 1.4 Registration

ShapeShifter is shareware. To ease your decision whether to pay, the unregistered version has two limitations:

- CD-ROMs and SCSI devices cannot be used
- ShapeShifter cannot access hard disk partitions (DeviceDisks)

The shareware fee is US\$ 40,- or DM 50,-. Registered users will receive a personalized keyfile which enables the missing functions. This keyfile will work with all future versions of ShapeShifter, so as a registered user you can always download the most recent freely distributable version.

How do you become a registered user?

The simple way is to fill in the file "OrderForm", to print it out, sign it (in this order, if possible), put it in an envelope together with the registration fee and send it to me. I won't accept order forms which are not signed.

The keyfile will be sent to you either uuencoded via EMail or on floppy disk (as you like it).

## 1.5 Support

The Next Generation BBS (Koblenz, Germany) will always have the latest version of ShapeShifter:

Port 1: +49-261-805012 (Zyx19.2/ISDN)  
Port 2: +49-261-84280 (V.FC)

Board: ShapeShifter-SUPPORT

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You can also leave your bug reports there. The author of ShapeShifter can be reached under the user name "Cebix".

Those with ftp access can also get ShapeShifter and some useful accessories from the following server:

`ftp://server.biologie.uni-erlangen.de/pub/shapeshifter/`

The Frodo/ShapeShifter homepage in the WWW contains some links to the latest versions and other information related to ShapeShifter:

`http://www.uni-mainz.de/~bauec002/`

## 1.6 Installation

This section describes the requirements for running ShapeShifter on your Amiga and explains the installation of the program and the additional components required for operation.

You should, however, at first read the chapter Using ShapeShifter to become familiar with the usage and settings items of ShapeShifter.

System requirements

Installing the software

Installing PrepareEmul

Installing the Macintosh ROM

Installing the Mac operating system

## 1.7 System requirements

Requirements:

- The Amiga must have at least a 68020 processor. ShapeShifter will run on every Amiga 1200/3000/4000, but not on stock Amiga 500/2000.
- 4MB of memory are necessary.
- ShapeShifter runs under AmigaOS 2.1 and higher (CrossDOS must be installed).
- You need an original Macintosh ROM file or access to a real Macintosh.
- No Macintosh operating system is included with ShapeShifter. It can be purchased from every Apple dealer (best and most recent are System 7.1 or System 7.5).

Not required but recommended:

- A hard disk, as the Macintosh operating system can be used from disk, in principle, but it is very inconvenient. You don't have to reformat your hard drive to make the emulator use a part of it. But if you plan on working heavily with the emulation, you should

- consider buying a separate hard disk for the Macintosh.
- An HD disk drive as in the Amiga 4000 is necessary to read Macintosh HD disks (especially to install the Macintosh system software), in other respects only DD disks formatted with ShapeShifter can be used for data exchange with real Macintoshes unless you own "CrossMAC" and an original Macintosh drive.
- A graphics cards with chunky pixel modes (nearly all available models) will speed up color display extremely.
- Macintosh programs are very memory hungry. Your Amiga should have at least 8MB of RAM.

## 1.8 Installing the software

The archive contains the following files:

README	- Short description
ShapeShifter	- Main program
ShapeShifter PRAM	- Contents of the simulated Mac parameter RAM
ShapeShifter Prefs	- Settings of the emulator
ShapeShifter.guide	- This manual (german version)
ShapeShifter_E.guide	- This manual (english version)
PrepareEmul	- Small startup utility
KickShifter	- Utility for patching kickstart files
ReKick64s.lha	- Adapted softkicker for A2000s
SaveROM.mbin	- Program for reading the ROM (MacBinary)
SaveROM.hqx	- Program for reading the ROM (BinHex4)
empcdl4.lha	- Fast driver for CD-ROM drives
Bestellformular	- Order form (german version)
BonDeCommande	- Order form (french version)
OrderForm	- Order form (english version)
SSOktaPatch.lha	- For users of an Oktagon/AT-Bus 2008/AlfaPower/TandemAT/ALF2/ALF3
Catalogs/#?	- Language files
MacHandler/Mac-Handler	- Mac file handler
MacHandler/MAC	- Mountlist for the Mac-Handler
MacHandler/MacControl	- Control program for the Mac-Handler
Video Drivers/#?	- External video drivers

To install, simply create a new drawer for ShapeShifter on your hard disk and unpack the archive into it. The files in "Catalogs" don't have to be copied to LOCALE:, they can stay where they are. ShapeShifter needs no assigns.

For the file "ShapeShifter ROM", only the icon is present. This file must contain an original Macintosh 512K/1MB ROM which, for legal reasons, is not included in the archive. Please follow the instructions under Installing the Macintosh ROM to read the ROM from a real Macintosh and prepare it for ShapeShifter.

Users of an Oktagon/AT-Bus 2008/AlfaPower/TandemAT/ALF2/ALF3 should install the program "SSOktaPatch" (see the file "README" in the archive "SSOktaPatch.lha") to avoid errors when using DeviceDisks and SCSI devices.

## 1.9 Installing PrepareEmul

ShapeShifter poses to special requirements to the Amiga it is running on:

1. The (logical) start of the Chip RAM has to be at least at \$2000, i.e. the lower 8K have to remain completely free as they are being used by the MacOS
2. The VBR (vector base register) must not be zero, it has to point to a vector table in regular memory

To achieve this, there are a couple of possibilities:

### A) "PrepareEmul"

This program is included in the ShapeShifter archive and should do its job well under most circumstances (for the exceptions, see the other possibilities). Copy "PrepareEmul" into the C: directory of your hard disk and insert the line "C:PrepareEmul" into the file "S:Startup-Sequence" directly at the beginning. Now every Amiga cold reboot will be executed twice while PrepareEmul installs itself. In case of any problems: PrepareEmul disables itself when the Caps Lock key is pressed on startup (i.e. the red/green light is on). Then, however, you cannot start ShapeShifter.

PrepareEmul installs a "KickTag" to remain in memory after a reset. This is most likely to produce warning messages from virus scanners but you can calmly ignore them.

### B) "PrepareEmul A1200"

PrepareEmul does not work directly on expanded Amiga 1200s (esp. the "Blizzard" cards are making problems). In this case you have to call PrepareEmul in the Startup-Sequence with the line "C:PrepareEmul A1200". But there are some things to consider:

- The "A1200" switch works only with Kickstart V39 and V40
- During the boot phase, you will see colors to indicate that PrepareEmul has been installed
- Cold/CoolCapture vectors will be modified which might also cause warning messages from virus scanners
- If you have other programs installed in your Startup-Sequence that use Cold/CoolCapture vectors you have to call them BEFORE PrepareEmul
- You should call PrepareEmul only either with or without the "A1200" switch, never mixed
- Users of the "patch1230scsi" program must call that with the switch "TIMER"
- Users of Picasso graphics cards should, if they call PrepareEmul with the "A1200" switch, do this as early as possible in the Startup-Sequence and not bother about every second reset being done twice

### C) Softkickers and "KickShifter"

PrepareEmul doesn't work with programs that reload a Kickstart file from

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disk (softkick), except the A3000 with BootROMs. If you use such a program, you have to modify the Kickstart file. To do so, the program "KickShifter" is provided. KickShifter can only be started from the Shell and expects the name of a Kickstart file as argument. This file will be modified and written back under the same name. Therefore, you should make a backup copy of the Kickstart file in case anything goes wrong. Moreover, A2000 users should use the included program "ReKick" to load the Kickstart file.

D) AMAX IV/Emplant: "A-MaxInit"/"RsrvMem"

Owners of "Emplant" and "A-MAX IV" can leave "RsrvMem" resp. "A-MaxInit" installed as usual instead of "PrepareEmul".

E) Fusion Forty: "SetFF"

To be able to use all features of ShapeShifter, you have to install the original (AmigaOS) "68040.library" in LIBS: and insert the following two lines at the top of your Startup-Sequence:

```
SetFF FASTKICK AMAXIV
SetPatch NOAGA REVERSE QUIET
```

Or, if you are softkicking a different ROM image:

```
SetFF FASTKICK devs:kickstart AMAXIV
SetPatch NOAGA REVERSE QUIET
```

You don't need "PrepareEmul" then.

F) The most permanent solution: Burning a new Kickstart ROM

The best but also the most expensive solution for every PrepareEmul trouble is to read out the Kickstart ROM from your computer, modify it with KickShifter as described under C), burn the modified file into an EPROM and plug them into your Amiga instead of the ROMs. Then you will not need PrepareEmul any more (eventually only to set the VBR).

Another notice: If you start the developer tool "Enforcer" in your Startup-Sequence, you should remove it as it doesn't work with ShapeShifter (because of the "MacOS uses the lower 8K" thing, not because ShapeShifter has Enforcer hits :-).

## 1.10 Installing the Macintosh ROM

ShapeShifter requires the contents of an original Macintosh ROM as an Amiga file for operation. ShapeShifter can only use 512K or 1MB ROMs version 124. The version 124 ROMs are subdivided into different sub versions. ShapeShifter tries to work with all sub versions (tested with sub version 17, 19, 21, 34, and 39). If your ROM should not be suitable for some reason, ShapeShifter will display an appropriate message. If

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there is no message, but it nevertheless doesn't work, then try another ROM. The ROMs of PowerMacs cannot be used.

If your Amiga is fitted with a 68040/060 processor, you should use a 1MB ROM, as under the other sub versions, the performance of the system will drop notably. With a 68020/030 processor, a 1MB ROM is not necessary (and a pure waste of memory).

To get the ROM file you can use the program "SaveROM" from the archive which will read a Mac's ROM and save it to disk. In addition, you can check with this program whether the ROM version is suitable for ShapeShifter. "SaveROM" is a Macintosh program in MacBinary/BinHex4 format. It has to be converted before it can be run on a Macintosh.

Note: Reading out and using a ROM is only legal if you have acquired the rights for using, either by owning a real Macintosh or a real ROM chip. In any other case, the use is illegal. Under no circumstance will I send away ROM files.

The following step-by-step instructions explain how to get the needed ROM file:

1. Format an MS-DOS disk on your Amiga (using CrossDOS) and copy the files "SaveROM.mbin" and "SaveROM.hqx" on it.
  2. Look for a real Macintosh with 512K or 1MB ROM (e.g. a Macintosh LC/LC II, Performa, Quadra or a PowerBook) on which "AccessPC" or "PC Exchange" for reading MS-DOS disks is installed.
  3. Start the Macintosh and insert the MS-DOS disk.
  4. Use "StuffIt Expander" or one of the numerous other Macintosh utilities to convert "SaveROM.mbin" from MacBinary format or "SaveROM.hqx" from BinHex4 format to an executable Macintosh program. Repeat: SaveROM must be converted, a simple copy won't do!
  5. Start the program "Save ROM". You will see some data about the ROM and you are be told if this ROM is suitable for ShapeShifter (the message "Dieses ROM is für ShapeShifter geeignet" will appear). If the ROM is not suitable (message "Dieses ROM ist NICHT für ShapeShifter geeignet") click on "Abbrechen" and look for another Macintosh.
  6. If the ROM is suitable, click on "Speichern" and save the ROM with the default name "ROM Image" to the MS-DOS disk.
  7. Eject the ShapeShifter disk and insert it into the Amiga.
  8. Copy the file "ROMIMAGE.BIN" (or whatever it is named now) to the ShapeShifter directory.
  9. Rename the file to "ShapeShifter ROM".
  10. Done. Please note that for legal reasons ShapeShifter and the Macintosh the ROM was read from may not be used at the same time from now on.
-

## 1.11 Installing the Mac operating system

If you start the emulator without making further settings, you'll be prompted with a flashing question mark to insert a Macintosh system disk. ShapeShifter needs System 7 (System 7.0.1 with System 7 Tuner, System 7.1 or System 7.5). If you own such a system disk, you may start the Macintosh directly with this disk. System 7.0.1 is freely available via <ftp.support.apple.com> (directory `/pub/apple_sw_updates/US/Macintosh/System Software/System 7.0.1/`).

However, it's better if you first create one or more (simulated) volumes for the Macintosh (as described here), format them from the Macintosh and then install System 7 from installation disks on the Mac volume. (Note: In the following description, "hard disk" always refers to a FileDisk or a dedicated Mac partition on a hard disk).

For this, two passes are necessary: The first one to format the hard disk, the second one to install the System. This is because the System 7 installation program expects the hard disk to be formatted already, which of course isn't the case on the first bootup of the emulation. If you have acquired System 7.1 or 7.5, proceed as follows:

1. Create a FileDisk or a Mac partition on your hard disk and save the settings.
  2. Start the emulation. After a short while you should see an empty Macintosh screen and a disk icon with a flashing question mark will prompt you to insert a system disk.
  3. Insert the System-7-Disk "Disk Tools". The emulator should boot from it.
  4. After a while, a dialog box should appear: "Not a Macintosh disk" with the icon of the FileDisk or DeviceDisk next to it. Now click on "Initialize", then on "Erase", enter a name for the hard disk and click on "OK". The Macintosh volume will now be formatted.
  5. When the formatting is done, please wait until the startup process is complete, quit ShapeShifter with the menu item "Special/Shut down" and remove the "Disk Tools" disk.
  6. The hard disk is now formatted and the proper installation can begin. Start ShapeShifter again and start the emulation. Then insert the Disk "Installation 1".
  7. After a while, the window of the installation program appears. First click on "Volume" to select the volume you want the system to be installed onto, then click on "Custom". Here you can select which components you want to be installed. Please choose "System software for every Macintosh", "Ethertalk software" (you must install the Ethertalk software even if you are not going to use a network!) and "Software for ImageWriter" (you cannot use any of the Apple printer drivers but you should install a driver, so I recommend the smallest one, the ImageWriter driver. No, the "DeskWriter" driver doesn't work with the "DeskJet!") and click on "Install". Now follow the instructions of the installation program.
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8. When the installation is done, click on "Quit", wait until the shut down screen appears, eject the installation disk and select "Restart". The Macintosh should now boot from the hard disk.
9. Now the installation is finished and you can use the control panels to set up your system, select the sound volume, or switch on the color display (if present).

If you own a CD-ROM drive, you may of course install System 7.5 from CD. Activate the gadget Apple CD300 emulation in the window SCSI for this and start from the disk that came with the CD. After the formatting, you may insert the CD and start the installation.

## 1.12 Using ShapeShifter

This section describes the usage of ShapeShifter and explains the many settings items that will have an effect on the emulation.

- Starting and quitting ShapeShifter
- Arguments/Tool Types

- Selecting the graphics display
- Creating volumes for the Macintosh
- Using CD-ROM drives
- Using SCSI devices
- Using Amiga ports from the Macintosh
- Using printers
- Linking into Ethernet networks
- Allocating memory for the Macintosh
- Saving the settings

- Starting and quitting the emulation
- Switching between Amiga and Mac side

- Using keyboard and mouse
- Data exchange with the clipboard
- Sound input and output

## 1.13 Starting and quitting ShapeShifter

If PrepareEmul was installed correctly, you can start ShapeShifter by double-clicking its icon or the icon of a preferences file after rebooting your Amiga. Then the Main window for the emulation settings will appear. A click on one of the eight big gadgets will open additional windows where you can adjust the settings. All windows can be used simultaneously and the settings are used immediately.

If you enter the tool type "QUICKSTART" in ShapeShifter's icon, or give "QUICKSTART" as an argument when starting it from the shell, the settings window doesn't appear and ShapeShifter will start through to the emulation directly. If you use ShapeShifter from the Workbench, you



won't be able to access the settings window any more unless you remove the "QUICKSTART" tool type (e.g. by putting it in round brackets).

To quit ShapeShifter, click on the gadget "Quit" in the main window or select the menu item "Quit" (shortcut Amiga-Q). Please note that you'll lose your settings unless you saved them.

To quit the running emulation, select the menu item "Shut down" in the Macintosh Finder's "Special" menu. ShapeShifter will close the screen, save the Macintosh PRAM to the file "ShapeShifter PRAM" and quit.

In case of emergency, there is a way to quit ShapeShifter "the hard way", e.g. if the Macintosh doesn't boot or a program has crashed and you cannot reach the "Shut down" menu item. In this case, press the key combination <Ctrl><Shift left><Alt left><Esc>. ShapeShifter should then quit itself. However, you shouldn't use this key command as a quick way to quit the emulation. Please always use the "Shut down" menu item if possible, as this will leave the Macintosh system in a secure state.

## 1.14 Arguments/Tool Types

ShapeShifter understands the following arguments/tool types when being called from the Shell resp. the Workbench:

FILE <filename> - Loads the settings from the specified file

QUICKSTART - Prevents the opening of the settings window and directly starts through to the emulation when starting ShapeShifter

ENFORCER - Allows using "Enforcer" and ShapeShifter at the same time on a 68040 machine

DEBUG - Hands off! I really mean it!

NOCOPYBACK - Disables the 68040/060's CopyBack cache while the emulation is running (not possible on all 68040/060 machines)

720KKLUDGE - Allows formatting 720K Macintosh disks under System 7.5 without the 720K Disk Formatter extension

REMAP8K - On the 68040/060, allows caching the lower 8K of RAM while the emulation is running

STARTUPSOUND - Enables the Macintosh startup "bing" on (re)starting ShapeShifter

## 1.15 Selecting the graphics display

In this section, you'll learn how to use your Amiga's built-in graphics capabilities or a graphics card to display the Macintosh screen and how to set properties like color depth, resolution and graphics speed. These settings are done in the window "Graphics Settings" which can be

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opened by a click on the gadget "Grafik..." in the main window.

#### Macintosh graphics basics

- Display with built-in Amiga graphics
- Display on EGS graphics cards
- Display on CyberGraphX cards
- Display on Graffiti cards
- Display on the Picasso graphics card
- Display on the Merlin graphics card
- Display on the Retina Z3 graphics card
- Display in a window on the Workbench

Using video display modes

Using two monitors

- Changing the screen size
- Setting the refresh

## 1.16 Macintosh graphics basics

ShapeShifter allows using the built-in Amiga graphics hardware as well as stock graphics cards for displaying the Macintosh screen. You can use one or two monitors at the same time.

The graphics settings window contains three main groups of gadgets: The upper left group holds the settings for one monitor when the topmost gadget is set to "1 monitor" or the settings for the first monitor when it is set to "2 monitors". The upper right group contains the settings for the second monitor when "2 monitors" is selected. The lower group of gadgets contains settings that apply to both monitors.

The organization of the display memory is very different from the Amiga to the Macintosh. The Amiga uses the planar format, where the single bits of a color information are arranged in multiple bit planes one "behind" the other, the Macintosh uses the so-called chunky pixel format, where the bits of a pixel are arranged next to each other in memory.

QuickDraw (the Macintosh graphics routines) expect the Mac's display memory to be organized in chunky pixel format. With the built-in Amiga graphics, this is only the case for a color depth of 1 bit (2 colors) and e.g. with a VGA based graphics cards only for 8 bit (256 colors).

Otherwise, the whole graphics memory must be periodically converted ("refreshed") from the Macintosh to the Amiga format, thereby slowing down the speed of the emulator significantly.

Under Setting the Refresh you'll learn how to adjust the refresh settings in an optimal way and what configuration to use to avoid the need for refreshing completely and achieving the maximum graphics speed.

Generally, it can be said that you should use a graphics card for color display.

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In case you have misadjusted the graphics in a way that the display is completely corrupted, you should wait for the hard drive to stop and quit ShapeShifter with <Ctrl><Shift left><Alt left><Esc>.

## 1.17 Display with built-in Amiga graphics

If you don't own a graphics card or want to use the built-in graphics capabilities of your Amiga for other reasons for the ShapeShifter display, please proceed as follows:

1. Open the window "Graphics Settings" if you haven't done already.
2. Set the screen type to "Amiga Bitplanes".
3. Set the color depth to "1 bit (2 colors)" if you want the highest possible speed, or to one of the other possibilities (the more colors, the slower). The depths "15 bit" and "24 bit" cannot be used, however.
4. To select the screen mode, click on "Choose..." and choose a mode that fits your needs. The best choice is a mode with an aspect ratio of 1:1, e.g. "PAL Hires Lace" (if you have a video monitor) or "MULTISCAN Productivity" (for a VGA monitor). If you have selected more than two colors, you should not use big screen sizes.
5. The values in the "Size" gadgets are set automatically. You may input smaller values if you want to speed up the graphics in higher color depths. See changing the screen size.
6. If you have selected a color depth of more than 1 bit, please see under refresh how to select the "Refresh rate" the best way.
7. With the field "Black border" you can choose if the border around the Macintosh display should be black. This setting is a matter of personal taste.
8. In the main window, click on "Save" to make your settings permanent.

## 1.18 Display on EGS graphics cards

If you have a graphics card that uses the "Enhanced Graphics System" (EGS) by Viona Development, please proceed as follows to set up ShapeShifter in an optimal way for your card:

1. Open the window "Graphics Settings" if you haven't done already.
  2. Set the screen type to "EGS".
  3. For the color depth, you may choose between 8, 15 and 24 bit. You should try "8 bit (256 colors)" at first, as the depths "15 bit" and "24 bit" require a conversion.
-

4. To select the screen mode, click on "Choose..." and choose a mode of your card that fits your needs.
5. The values in the "Size" gadgets are set automatically. You should not change them.
6. If you have selected a color depth other than 8 bit, please see under refresh how to select the "Refresh rate" the best way.
7. In the main window, click on "Save" to make your settings permanent.

## 1.19 Display on CyberGraphX cards

If you have a graphics card with CyberGraphX driver, please proceed as follows to set up ShapeShifter in an optimal way for your card:

1. Open the window "Graphics Settings" if you haven't done already.
2. Set the screen type to "CyberGraphX".
3. To select the screen mode, click on "Choose..." and choose a mode of your card that fits your needs. The color depth setting is automatically adapted to the selected screen mode. For 15 and 24 bit modes, however, it may be that a refresh is necessary.
4. The values in the "Size" gadgets are set automatically. You should not change them.
5. If you have selected a color depth other than 8 bit, please see under refresh how to select the "Refresh rate" the best way. Depending on the graphics card, however, it may be that no conversion is needed at all. Especially the "CyberVision 64" can display 15 and 24 bit in full speed.
6. In the main window, click on "Save" to make your settings permanent.

## 1.20 Display on Graffity graphics cards

If you have a graphics card that uses the "Graffity" system by Alexander Kneer and Tobias Abt, please proceed as follows to set up ShapeShifter in an optimal way for your card:

1. Open the window "Graphics Settings" if you haven't done already.
  2. Set the screen type to "External".
  3. Click on the small gadget to the right of the "External driver" string gadget and choose the driver "Graffity" from the appearing file requester.
  4. For the color depth, you may choose between 8, 15 and 24 bit. You should try "8 bit (256 colors)" at first, as the depths "15 bit" and "24 bit" require a conversion.
-

5. To select the screen mode, click on "Choose..." and choose a mode of your card that fits your needs.
6. The values in the "Size" gadgets are set automatically. You should not change them.
7. If you have selected a color depth other than 8 bit, please see under refresh how to select the "Refresh rate" the best way.
8. In the main window, click on "Save" to make your settings permanent.

## 1.21 Display on the Picasso graphics card

If you use the "Picasso" graphics card by Village Tronic with the CyberGraphX system, then please see here. Otherwise, please proceed as follows to set up ShapeShifter in an optimal way for your card (the card must not be in segmented mode):

1. Open the window "Graphics Settings" if you haven't done already.
2. Set the screen type to "External".
3. Click on the small gadget to the right of the "External driver" string gadget and choose the driver "Picasso" from the appearing file requester.
4. For the color depth, you may choose between 8, 15 and 24 bit. You should try "8 bit (256 colors)" at first, as the depths "15 bit" and "24 bit" require a conversion.
5. To select the screen mode, click on "Choose..." and choose a mode of your card that fits your needs.
6. The values in the "Size" gadgets are set automatically. You should not change them.
7. If you have selected a color depth other than 8 bit, please see under refresh how to select the "Refresh rate" the best way.
8. In the main window, click on "Save" to make your settings permanent.

## 1.22 Display on the Merlin graphics card

If you use the "Merlin" graphics card by XPert/ProDev with the CyberGraphX system, then please see here. Otherwise, please proceed as follows to set up ShapeShifter in an optimal way for your card:

1. Open the window "Graphics Settings" if you haven't done already.
  2. Set the screen type to "External".
  3. Click on the small gadget to the right of the "External driver" string
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gadget and choose the driver "Merlin" from the appearing file requester.

4. For the color depth, you may choose between 8, 15 and 24 bit. You should try "8 bit (256 colors)" at first, as the depths "15 bit" and "24 bit" require a conversion.
5. To select the screen mode, click on "Choose..." and choose a mode of your card that fits your needs.
6. The values in the "Size" gadgets are set automatically. You should not change them.
7. If you have selected a color depth other than 8 bit, please see under refresh how to select the "Refresh rate" the best way.
8. In the main window, click on "Save" to make your settings permanent.

## 1.23 Display on the Retina Z3 graphics card

If you use the "Retina Z3" graphics card by MacroSystem with the CyberGraphX system, then please see here. Otherwise, please proceed as follows to set up ShapeShifter in an optimal way for your card:

1. The "RetinaEmu" must be activated to use the card with ShapeShifter. The older Retina Z2 cannot be used.
2. Open the window "Graphics Settings" if you haven't done already.
3. Set the screen type to "External".
4. Click on the small gadget to the right of the "External driver" string gadget and choose the driver "Retina Z3" from the appearing file requester.
5. For the color depth, you may choose between 8, 15 and 24 bit. You should try "8 bit (256 colors)" at first, as the depths "15 bit" and "24 bit" require a conversion.
6. To select the screen mode, click on "Choose..." and choose any mode, it does not matter which one.
7. You have to enter the desired resolution of the screen in "Size" gadgets, e.g. "640"  $\times$  "480".
8. If you have selected a color depth other than 8 bit, please see under refresh how to select the "Refresh rate" the best way.
9. In the main window, click on "Save" to make your settings permanent.

## 1.24 Display in a window on the Workbench

You can make ShapeShifter display the Macintosh desktop in a window on the Workbench. Then the Amiga mouse pointer will be used to control the

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gadgets and menus of the Macintosh. Sadly, the display is only monochrome at the moment. Please proceed as follows to set up ShapeShifter for this:

1. Open the window "Graphics Settings" if you haven't done already.
2. Set the screen type to "Amiga window".
3. Enter the desired window size in the "Size" gadgets. This will also be the size of the Macintosh desktop.
4. Select "1" or "2" as the "Refresh rate".
5. In the main window, click on "Save" to make your settings permanent.

## 1.25 Using video display modes

In contrast to most Macintosh models, with ShapeShifter you can record Mac graphics to video tape or display it on a TV set without problems. Things to take care for are:

1. You must select a screen mode that is compatible to video, that is one that has a beam frequency of 15kHz horizontally and 50Hz (NTSC: 60Hz) vertically, e.g. one of the "PAL ..." modes.
2. If you want to use the complete screen without disturbing borders, you have to set the overscan in the display mode requester to "Graphics size", "Extreme size" or "Maximum size". You can use the Overscan preferences editor to see and change the sizes of these regions.
3. Many graphics are not video compatible. If your graphics cards cannot handle video resolutions (see the manual for details) you have to use the built-in Amiga graphics.

## 1.26 Using two monitors

If you have connected two monitors to your Amiga (one monitor to the built-in video hardware and another monitor to a graphics card) you can use both monitors at the same time from the Macintosh and move windows back and forth between them. So you can, for example, use a high-resolution monitor on a graphics card for displaying and editing a 24 bit picture in an image processing program and keep the tool palettes and Finder windows on a second monitor to have more room for the 24 bit display.

To do this, set the topmost gadget in the window "Graphics settings" to "2 monitors" and make the settings for the second monitor in the right gadget group the same way as you did for the first monitor in the left group. There are only few limitations:

- You cannot set both monitors to "Amiga bitplanes"
  - You cannot use the screen type "Amiga window"
  - Your graphics card must allow a two-monitor setup. On CyberGraphX cards,
-

you have to set the environment variables "KEEPAMIGAVIDEO" and "NOPASSTHROUGH" to 1. For other cards, please consult the manual of your card.

After having made the settings for two monitors and having started the Macintosh, you must first open the "Monitors" control panel and set the arrangement and color display of both monitors. If you have used ShapeShifter with only one monitor before, the display on the second monitor is not activated until you close the control panel.

## 1.27 Changing the screen size

The values in the "Size" fields are set automatically when you select a screen mode.

You can change the size (in pixels) manually by entering other numbers there. By setting a smaller size you can, for instance, speed up the graphics refresh.

## 1.28 Setting the refresh

With the field "Refresh rate", you adjust how much processing time should be left free when the display mode you selected requires a periodical refresh (conversion of the screen memory). The refresh rate is given in 1/50th of a second. For example, a setting of "5" will leave 1/10ths of a second between two refreshes.

Sensible Values for an Amiga 4000/030 are 5 (2 bit), 20 (4 bit) and 60 (8 bit), but the 8 bit resolution is far too slow for serious work. If you plan on using more than 2 colors most of the time, you should use a graphics card with "chunky" modes (that are, for instance, all graphics cards based on a VGA chipset in 256 colors). Then the conversion is not necessary and the speed will go up extremely.

If you have a 68040/060 processor and enabled the option "MMU refresh", ShapeShifter will try to use the MMU to only update the portions of the screen that have actually changed. In this case, you can set the refresh rate to "1".

If you don't own a graphics card, you should select "Amiga bitplanes" and 1 bit color depth, otherwise "CyberGraphX"/"EGS"/"External" and 8 bit color depth. These settings give the best results in most cases.

By entering a smaller size in the "Size" fields (e.g. 512 $\times$ 384 instead of 640 $\times$ 480) the refresh speed will be raised a lot.

Another hint: If you use a graphics mode with refresh, you should switch of the "Largest free block" option in the Memory Settings window, and not set the amount of allocated Mac memory to the maximum possible, as parts of the screen memory could end up in slow Chip or 16 bit memory, thereby slowing down the refresh speed.

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Here is a list that shows you for which color depth/screen type combinations a refresh is necessary:

	Color depth					
Screen type	1 bit	2 bit	4 bit	8 bit	15 bit	24 bit
Amiga Bitplanes	no	yes	yes	yes	-	-
Amiga window	yes	-	-	-	-	-
CyberGraphX	-	-	no	(yes)	(yes)	
EGS	-	-	no	yes	yes	
External	--- depends on the driver ---					

## 1.29 Creating volumes for the Macintosh

Here, you'll learn how to use your floppy disk drives with the Macintosh, how to create simulated Macintosh hard disks (so-called FileDisks) without having to repartition your hard disk, how to place a real hard disk partition or a whole hard disk at the Mac's disposal (so-called DeviceDisks) and how to use SCSI devices like removable hard disks and CD-ROM drives with ShapeShifter. The necessary settings are done in the windows "Volumes", "Floppys" and "SCSI Settings" which can be opened by selecting the gadgets "Volumes/Disks...", "Floppys..." or "SCSI..." in the main window.

Using floppy disks

Creating a simulated hard disk  
 Creating a dedicated Macintosh partition  
 Accessing SCSI disks directly  
 Using CD-ROM drives

Formatting the volumes on the Mac side

Choosing the boot volume

## 1.30 Using floppy disks

ShapeShifter can use up to two floppy disk driver from the Macintosh side. With the emulation running, you can work with Macintosh as well as with Amiga disks as usual. The only difference between ShapeShifter and a real Macintosh concerning disk handling is when ejecting disks.

What disk formats ShapeShifter will understand depends on the type of drive installed in your Amiga:

Size Format	Hardware/Software required
720K Mac/PC DD	Any Amiga floppy drive, mfm.device V38/V40/V41
800K Mac DD	Original Macintosh drive and a CrossMAC supported adapter to connect the drive or any Amiga floppy drive with the A-MAX II+/IV cards, mfm.device V41

800K A-MAX/ Emplant DD	Any Amiga floppy drive, mfm.device V41
1440K Mac/PC HD	Amiga HD drive (drives requiring special drivers won't work), mfm.device V38/V40/V41

mfm.device V38/V40 is part of the CrossDOS version that comes with AmigaOS 2.1 and later releases. mfm.device V41 is included in the commercial versions of CrossDOS and CrossMAC by Consultron.

The 720K and 1440K formats can be read, written and formatted. The 800K formats can only be read and written but not formatted with ShapeShifter. To use the PC (MS-DOS) formats, a suitable Macintosh System Extension such as "PC Exchange" or "Access PC" must be installed.

All of the above formats, except the "800K A-MAX/Emplant DD" one can be read, written and formatted on a real Macintosh where the PC formats also require "PC Exchange"/"Access PC". To format the 720K Mac format, however, you need the "720K Disk Formatter" System Extension.

The 800K Mac DD format requires an original Mac drive or the A-MAX II+/IV card because these disks are divided into different speed zones like on C64 disks and this cannot be read with Amiga drives.

When inserting an Amiga formatted disk while the emulation is running, the Macintosh will show a dialog box with the message "Unreadable disk". But you may read from and write to the disk as usual from the Amiga side.

Which floppy drive ShapeShifter should use as the first and the second Macintosh drive can be selected in the "Floppy Settings" window that will open after a click on "Floppys..." in the main window with "Floppy 1" and "Floppy 2". With a click on "Search", ShapeShifter will automatically detect the first two drives connected to your Amiga.

A real Macintosh ejects disks electrically when picking the corresponding menu item or a disk icon is being dragged onto the trash can. This will prevent the user from ejecting a disk too early as the Macintosh caches some important data in RAM which is written back to disk only just before the disk is ejected.

As the Amiga has only drives with manual ejection, ShapeShifter uses a different method: The drive light will be constantly on while a Macintosh disk is inserted, to remind you that you may not yet eject the disk. Only if all data has been written and the disk is ready for ejection (after the disk icon has been dragged onto the trashcan), the light will go off and a flashing digit in the top right corner of the screen will indicate that the corresponding disk may be ejected. A '1' stands for the first floppy disk drive and a '2' for the second one.

So the normal procedure to eject a Macintosh disk will be as follows:

1. Drag the disk icon onto the trash can.
  2. Wait for the flashing digit to appear and the drive light goes off (sometimes, the digit will not appear, but then the light is off, everything is OK)
  3. Eject the disk.
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If you are using a real Mac drive, this disk will of course be ejected automatically.

When inserting a Macintosh disk, there is usually a delay until it is recognized as the AmigaDOS first tries to access it. This can be prevented by activating the gadget "Inhibit AmigaDOS" in the "Floppy Settings" window. This will completely inhibit this drive for AmigaDOS as long as ShapeShifter is running. If you want to read Amiga disks with it, you first have to quit ShapeShifter.

### 1.31 Creating a simulated hard disk

ShapeShifter allows the simulation of up to two Macintosh hard disks in Amiga files on your hard disk. These simulated hard disks are called FileDisks. You may use FileDisks if you don't want to repartition your hard disk or buy a dedicated Macintosh hard disk. However, the speed of a FileDisk is far below that of a real hard disk, especially with higher capacities (10MB+).

For creating a FileDisk, click on the "Create..." gadget of the corresponding FileDisk in the "Volumes" window. ShapeShifter will ask you how large the FileDisk should be (in KB). Enter a size that fits your needs and that fits on your hard disk and click on "Choose file...". A file requester will appear in which you must enter the name of the FileDisk file to be created. If you select an existing file, it will be overwritten. After a click on "OK" the file is created and the name is entered into the text gadget in the settings window. If you already have created one or more FileDisks, you can enter the name into the text gadget directly or select an existing file with the symbol to the right of the text gadget.

### 1.32 Creating a dedicated Macintosh partition

[Note: This function is not available in the unregistered version]

If you want to do serious work with ShapeShifter you should place an own hard disk partition or even a whole hard disk at the Mac's disposal. ShapeShifter allows using up to two such partitions, called DeviceDisks.

First, use "HDToolbox" or a similar hard disk installation program to create an Amiga partition on your Amiga hard disk or on a new hard disk you acquired for the Macintosh, with a size of your choice (if you are using a proper hard disk, you should create one partition that covers the whole disk). Please note that you will lose all saved data if you repartition a hard disk. So you should first backup your hard disk, then repartition it and finally restore the backup.

If the partition is recognized by the Amiga, you may click on "Choose..." near the corresponding DeviceDisk in the window "Volumes" and choose the partition by its name. When clicking "OK", ShapeShifter will analyze the partition and enter the data required for the emulation in the text

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gadgets. Expert users may change the values manually, but doing so may cause severe data losses on Amiga and Macintosh partitions. You may also enter the Amiga partition name (including the ":") into the DeviceDisk string gadget. ShapeShifter will then analyze the partition on run-time.

If the partition is on a removable media (e.g. SyQuest or CD-ROM), you also have to click on "Removable" to make ShapeShifter recognize media changes.

Now you should click on Save to make your settings permanent. When you have formatted the DeviceDisk from the Macintosh side, you may set the partition to "NoMount" with "HDToolbox", so the Amiga operating system will no longer worry about this partition (as it is only used by the Macintosh from now on).

### 1.33 Accessing SCSI disks directly

[Note: This function is not available in the unregistered version]

SCSI hard disks and removable disks should be configured as DeviceDisks if possible, as this will give you a higher performance.

But you may also partition and format a complete, dedicated hard disk with direct SCSI access as you would do with the hard disk of a real Macintosh. During this process, a Mac SCSI driver will also be copied onto the disk. To do this, you need a Macintosh hard disk installation program such as the program from Apple that comes on the "Disk Tools" disk or the better "Apple HD SC Setup" or the "HDT Primer" from FWB.

The Apple program on the "Disk Tools" system disk will only work with Apple OEM drives. But this can be bypassed by selecting the gadget "Apple hard disk emulation" in the "SCSI Settings" window. After formatting and partitioning the drive, you can and should turn this option off again.

### 1.34 Formatting the volumes on the Mac side

After the successful creation of a FileDisk or DeviceDisk, these have to be formatted by the Mac after starting the emulator. If the volume is recognized, a dialog box with the message "Damaged volume" or "Volume unreadable" and the icon of the volume will appear immediately after the Finder has started. The icon of the FileDisk is a sheet of paper with an Amiga checkmark and the number 1 or 2, the DeviceDisks use the icon of a disk, also with an Amiga checkmark and the number 1 or 2. After clicking on "Initialize" and entering a name for the volume, the volume gets formatted. Then the FileDisk or DeviceDisk is available to be used as a Macintosh volume.

### 1.35 Choosing the boot volume

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If you have installed multiple bootable volumes for the Macintosh, you can select which one to boot from. To do this, you have two alternatives: 1. The "Startup volume" control panel on the Mac, 2. the "Boot from" gadget in the volumes window.

The control panel only works with real SCSI devices, the "Boot from" gadget only with File-/DeviceDisks. The setting in ShapeShifter has priority over the control panel. Unless you set the gadget to "Last selection", the control panel setting is ignored. If you set the gadget to "Any", the Mac will start from the first bootable volume found (in the order floppy -> SCSI device -> DeviceDisk -> FileDisk).

To put it in other words: The setting "Last selection" of the "Boot from" gadget doesn't explicitly change the startup volume (this corresponds to the old behaviour of ShapeShifter). If you, for example, select "FileDisk 1" as the startup volume, it will boot from the first FileDisk. If you then choose "Last selection", it will still boot from the first FileDisk. Selecting "Any" then will make it boot again from the first bootable volume found. If you then set it to "Last selection", it will continue to start from the first volume found.

## 1.36 Using CD-ROM drives

[Note: This function is not available in the unregistered version]

For accessing CD-ROM drives under ShapeShifter, there are two possibilities:

1. As a "DeviceDisk" using the supplied "empcd.device" by Nicola Salmoria. This method is faster, doesn't require a special Macintosh driver and will also work with IDE drives, but you can only use data CDs.
2. With direct SCSI access. Though this method is slower, it is more compatible to Macintosh programs and you can also use audio and hybrid CDs and (with a suitable drive) programs to read CD-DA. However, the direct SCSI access requires a true SCSI drive (or an IDE drive with powerful SCSI emulation) and a CD-ROM driver on the Macintosh side.

For using the "empcd.device", please consult the documentation that comes with that driver and is included in the archive "empcd14.lha".

For the direct SCSI access, please read here how to make the SCSI settings in ShapeShifter. You will then also need a Macintosh driver suitable for your CD-ROM drive, e.g. the freely available NEC driver (which also works with drives from other manufacturers) or the extended "CD-ROM ToolKit" by FWB.

If you have no suitable driver but own a CD-ROM drive that conforms to the SCSI-2 standard, you may use it under ShapeShifter with the AppleCD driver that comes, for instance, with System 7.5 and is originally intended for Apple CD-ROM drives only.

To do this, activate the gadget "Apple CD300 emulation" in the window "SCSI-Settings". The drive will appear like an Apple CD300 drive from the Macintosh side and you won't need special driver software. If you have

connected a real Apple CD300 or have a special Macintosh driver for your drive, you should not select this option.

Some drives don't work correctly with the CD300 emulation. In this case, you have to use a different driver of access the drive with the "empcd.device".

## 1.37 Using SCSI devices

[Note: This function is not available in the unregistered version]

If your Amiga is fitted with a SCSI port (built-in into the Amiga 3000/4000T, otherwise you may use a stock SCSI adapter), ShapeShifter will allow using SCSI devices like CD-ROM drives, scanners and streamers from the Macintosh. The necessary settings are done in the Window "SCSI Settings" which can be opened by a click on the gadget "SCSI..." in the main window.

Configuring ShapeShifter for SCSI  
Disabling individual SCSI IDs

Accessing SCSI hard drives  
Using CD-ROM drives

Speed and memory requirement

## 1.38 Configuring ShapeShifter for SCSI

The Macintosh has access to a single SCSI bus with up to seven connected devices (referenced with IDs from 0 to 6) under ShapeShifter.

If you open the window "SCSI settings", you see in the upper part of the window seven rows with gadgets, each belonging to one ID whose number is printed at the very left of every row. Every single row contains three gadgets, namely

- A checkbox gadget which enables or disabled the access of the Macintosh to this ID. When the gadget is not checked, no device is connected for the Macintosh on this ID, even if the other gadgets specify a connected device.
- A string gadget ("SCSI driver") in which you must enter the name of the Amiga SCSI driver to be used for this ID. On the Amiga 3000/4000T or when using the Commodore SCSI cards A2091 or A4091, this is "scsi.device". If you are using a third party product, please consult your SCSI adapter's manual about what the driver's name is.
- A number gadget ("Unit") for entering the unit number that is to be accessed with this ID. The unit number normally corresponds to the real SCSI ID of the device. If you have multiple SCSI adapters of the same manufacturer built in, you can select which card to use with the hundred's digit of the unit number if both cards use the same driver.

The distinction between the real SCSI IDs resp. unit numbers of the devices and the logical IDs under which they appear on the Macintosh is important. Two examples to clarify this:

1. You have a CD-ROM drive (ID 2) and a scanner (ID 6) on the built-in SCSI connector of an Amiga 3000. To use both devices with the Macintosh you have to enter into the row of ID 2 as SCSI driver "scsi.device" and as unit "2" and into the row of ID 6 as driver also "scsi.device" and unit "6". Moreover, you have to put a checkmark into the checkbox gadgets of ID 2 and ID 6. With this, the CD-ROM would appear on ID 2 and the scanner on ID 6 from the Macintosh, just as from the Amiga.

You might have entered "scsi.device"/unit 6 into the row of ID 0 and "scsi.device"/unit 2 into the row of ID 1 as well and check the boxes for ID 0 and ID 1. Then, the CD-ROM would be connected to ID 1 and the scanner to ID 0 for the Macintosh.

2. You have an Amiga 4000 with a "GVP Series II" and a "Fastlane Z3" card. Several hard disks are connected to the Fastlane of which you want to use that with ID 3 for direct SCSI access under ShapeShifter. On the GVP card (with Guru ROM) there is a streamer, also with ID 3, which you want to use with the Macintosh, too. You can now, for example, enter into the row of ID 0 as SCSI driver "z3scsi.device"/unit 3 and into the row of ID 1 as driver "omniscsi.device"/unit 3 and check the boxes for both IDs. Then you can access the hard disk on ID 0 and the streamer on ID 1 from the Macintosh.

## 1.39 Disabling individual SCSI IDs

The checkboxes next to the numbers "0" to "6" at the left side of the window "SCSI settings" may be used to turn on and off individual SCSI IDs. So you can, for example, prevent long waits for devices you don't want to use but that have a long initialization phase, or you can switch off devices that don't work with certain programs.

## 1.40 Speed and memory requirement

ShapeShifter is using buffers allocated in memory for transferring SCSI data. The speed of the transfer may vary heavily, depending of the memory area used for the buffers.

With the gadget "Memory Type", you can select the memory area to be used for the SCSI buffers. For a properly designed and configured SCSI adapter, this setting will only affect the speed and not the reliability of the transfer.

If you use a PIO adapter, you may select "Any", for a Zorro-II adapter capable of DMA (e.g. GVP Series II) you should select "24 bit DMA" on an Amiga 2000/3000 and "Chip RAM" on the Amiga 4000, for a Zorro-III adapter (e.g. A4091 or Fastlane Z3), "Any" is the best setting. If you only understood half of the last sentence, don't bother. Simply set it to "Any"

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or experiment a bit (you may use a Macintosh SCSI benchmark program to find the best setting).

When the gadget "Direct transfers" is activated, ShapeShifter will bypass its buffers if possible and transfer the data directly from the SCSI card into the Macintosh memory (and the other way). This is less compatible with some Macintosh programs but requires less memory and is faster on SCSI adapters that can DMA into 32 bit memory. If you continuously get messages like "Could not allocate buffer for reading" from ShapeShifter, you should also activate this gadget. Some SCSI drivers with broken HD\_SCASICMD interface (e.g. Fastlane) also require this setting.

## 1.41 Using SCSI hard drives

SCSI hard disks should be configured as DeviceDisks if possible, as this will give you a higher performance. If you nevertheless want to configure a hard disk as a real Mac SCSI hard disk (with Mac partitions, SCSI driver and all), you can do this as usual with a suitable installation program. Please note, however, that the Apple installation program on the "Disk Tools" disk that comes with the System, will only work with Apple OEM drives. But this can be bypassed by selecting the gadget "Apple hard disk emulation" in the "SCSI Settings" window. After formatting and partitioning the drive, you can and should turn this option off again.

## 1.42 Using Amiga ports from the Macintosh

The modem and printer ports of the Macintosh are redirected to Amiga ports by ShapeShifter. In the serial settings of ShapeShifter, you specify which port should be mapped to which driver. ShapeShifter supports all drivers that are compatible to the "serial.device" or the "parallel.device" of the AmigaOS, i.e. even most I/O expansion card drivers.

All necessary settings are done in the window "Serial Settings" that will open after a click on the gadget "Serial..." in the main window. There are two sets of gadgets, one for the modem port and one for the printer port.

In the big text gadget, you enter the name of the driver (e.g. "serial.device"). When the driver is on disk, it may be selected with the gadget "Choose...".

If you are using an I/O expansion card with multiple ports, you can enter the unit number of the desired port into the gadget "Device unit". Please consult your card's manual about which number belongs to which port. For standard Amigas with only one serial and one parallel port, please enter "0" here.

Now, you have to tell ShapeShifter whether the selected port is a serial or a parallel one, as these have different properties (e.g. a parallel port doesn't have a baud rate setting). Activate or deactivate the gadget "Parallel device" for this.

E.g. if you want to redirect the modem port to the built-in serial port

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of the Amiga and the printer port to the parallel port, please enter the following:

- For the modem port: "serial.device", Unit 0, not a parallel device
- For the printer port: "parallel.device", Unit 0, parallel device

If you have an A-Max II+/IV card installed in your Amiga you can make ShapeShifter use the modem and printer ports on the card by activating the "A-Max II+/IV" gadget.

Macintosh computers are using round 8-pin connectors for the port, so you cannot connect Macintosh devices to normal Amigas (the Commodore serial card and the A-Max board, however, have these connectors). There is the following solution: The very first Macintoshes didn't have these 8-pin connectors, but 9-pin DSUB connectors, as PCs use today. By using an adapter from a 25-pin DSUB female to a 9-pin male connector (available in every PC store) and an adapter from a 9-pin female to the round 8-pin connector (available from Apple and some third-party suppliers) the Amiga can be fitted with a Macintosh-conforming port.

Another word about parallel devices: As these appear to be serial to the Macintosh, you can make all the settings typical for serial ports there, e.g. baud rate, parity etc. For parallel devices, all these settings are ignored, except for "hardware (CTS) handshake" which is mapped to the parallel "ACK handshake". With this, you can avoid data losses when transferring data to parallel printers.

## 1.43 Using printers

To use a printer with Centronics interface you have to choose the device belonging to the printer connection for the "printer port" in the serial settings of ShapeShifter (in most cases, this will be "parallel.device" for the built-in parallel port, but not "printer.device!") and activate the checkbox "Parallel device".

Then you have to install a suitable printer driver on the Mac side. You cannot use any of the drivers supplied with System 7 with ShapeShifter (the only exception is an Apple LaserWriter with EtherTalk connection). The "DeskWriter" driver does not work with the "DeskJet". For Epson compatible printers you can use "Chuck's Printer Driver" and for HP-PCL compatible printers "HPDJ" (both are freely available via FTP and in many BBS's). For some printers there are special Mac drivers that also work with ShapeShifter (e.g. for the Epson Stylus). GDT Softworks offers a quite universal driver package called "Power Print" ([see here](#)).

## 1.44 Linking into Ethernet networks

ShapeShifter supports Ethernet cards with SANA-II driver (e.g. A2065 or Ariadne) for use with AppleTalk and MacTCP. Using different network hardware (e.g. Arcnet) is not possible.

All necessary settings are done in the window "Network settings" that

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will open after a click on the gadget "Network..." in the main window of ShapeShifter.

In the gadget "Network driver", you specify the complete path to the SANA-II driver to be used (e.g. "DEVS:Networks/a2065.device"). You may also select the driver with a file requester by clicking on "Choose...". The setting "Device unit" is used to select the network card if you have several, all controlled by the same driver.

Important things to care for:

- Using AppleTalk and MacTCP with Ethernet requires a correct installation of the Macintosh System software (including the EtherTalk software!). Using System 7.0.1 is strongly discouraged.
- When using MacTCP, neither AmiTCP nor Envoy may run concurrently on the Amiga side on the same Ethernet card.

## 1.45 Allocating memory for the Macintosh

ShapeShifter needs for the emulation a memory area with selectable size that is used as the main memory by the Macintosh. If you, e.g., select 4MB of memory, the emulator will allocate 4MB of the Amiga's memory on startup. The Macintosh operating system will then believe that it ran on a Macintosh with 4MB installed main memory. All Macintosh programs will only use these 4MB of memory for their data and when you start a Mac program, it will be assigned a part of these 4MB, no matter how many free memory is available in your Amiga beyond that. As a result of a lack of flexibility of the Macintosh operating system, the emulator is only able to use one contiguous block of memory.

All settings concerning memory are done in the window "Memory Settings" that will open after a click on the gadget "Memory..." in the main window.

You can either use the "Mac memory (KB)" gadget to type in the size of the memory block to be used for the Macintosh or activate "Largest free block" so ShapeShifter will use the largest available block. Please note that the absolute minimum for System 7 is 1.5 MB. The maximum amount of memory available for ShapeShifter is displayed under "Maximum (KB)".

Please do not wonder why the memory display in the Workbench screen title is displaying a far greater amount of free memory than you can set in ShapeShifter. As I said before, the memory for the Macintosh must be available in one block, which is not the case if your memory is fragmented. Restarting your Amiga or entering the command "avail flush" may help.

When the gadget "Allocate Mac ROM memory first" is checked, ShapeShifter will allocate the memory for the Macintosh ROM before the Macintosh RAM, so it is less likely that the ROM will end up in slow memory areas. This will speed up the Macintosh operating system, but usually at the cost of less free Macintosh memory.

The cycle gadget "ROM memory type" sets the preferred memory type the Macintosh ROM should go into ("24-bit DMA" means 16-Bit FastRAM). Unless you want to have more memory free for the Macintosh, you can leave it at "Any".

---

With the setting "Write-protect ROM" in the "Misc" window, ShapeShifter tries to prevent write accesses to the Macintosh ROM. This will make the emulation more stable and better protected against buggy programs. However, the write protection only works with a 68040 processor. If you have a 68040 and problems starting ShapeShifter you can try if switching off the write protection helps. On the 68060, the write protection cannot be turned on.

To get the maximum amount of memory for the Macintosh, you should activate the options "Largest free block", disable "Allocate Mac ROM memory first" and set the ROM memory type to "24-bit DMA". If you want the highest speed, then turn on "Allocate Mac ROM memory first" and set the ROM memory type to "Any". The setting with the highest compatibility is achieved by turning off both options, setting the memory type to "Any" and entering in "Mac memory" the value of "Maximum" minus the size of the ROM (e.g. maximum amount displayed: 3120KB, Macintosh ROM size: 512KB -> enter "2608" in "Mac memory (KB)").

Another word about the memory reports of some Macintosh programs. The window that will open after selecting "About this Macintosh" in the Finder, the amount of memory selected (or the size of the "largest block") will be displayed. If a macintosh utility wanted you to believe that you have 127MB and more memory installed in your Amiga, this is because these utilities depend on the Macintosh memory beginning at the address zero, which is not the case on the Amiga.

## 1.46 Saving the settings

By clicking on "Save" in the main window of ShapeShifter or by selecting the menu item "Save" (shortcut Amiga-S), your settings will be saved to the file "ShapeShifter Prefs" and will be available on the next start of ShapeShifter.

With the menu item "Save As..." you can save the settings under a different name and with "Open..." you can load a different settings file. If you start ShapeShifter by double-clicking on a settings file icon or from the Shell with the name of the file as argument, these settings are loaded in automatically. You can have multiple settings in different files on your hard disk.

## 1.47 Starting and quitting the emulation

To start the Macintosh emulation, click on the gadget "Start" in the main window of ShapeShifter or select the menu item of the same name (shortcut Amiga-R). ShapeShifter will then close all its windows and open a screen for the Macintosh system. Mouse and keyboard inputs will now go to the Macintosh.

If you specify the tool type "QUICKSTART" in the icon of ShapeShifter or give "QUICKSTART" as an argument when starting from the shell, ShapeShifter will immediately start through to the emulation without displaying the settings window. This can be used if you only occasionally change the

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emulation settings.

If you want to quit the emulation, select the menu item "Shut down" in the Macintosh Finder from the menu "Special". ShapeShifter will close the screen, save the Macintosh PRAM into the file "ShapeShifter PRAM" and quit itself.

Please note that you will lose all your settings for the next time when starting the emulation unless they have been saved.

## 1.48 Switching between Amiga and Mac side

By pressing <Ctrl><Tab>, you can turn off and on the Macintosh mouse and keyboard query. As long as the Macintosh query is turned off, the Amiga mouse pointer will be invisible until you select a window on another screen or press <Ctrl><Tab>. Moreover, no graphics refreshes will take place when the Amiga mouse pointer is visible.

For instance, if you want to switch to another Amiga program while the emulator is running, you should first press <Ctrl><Tab> which will bring up the Amiga mouse pointer and then press Amiga-M to bring the screen of the Amiga program to the front. If you want to continue working on the Macintosh side, get the ShapeShifter screen to the front, click into it and press <Ctrl><Tab> again. The Amiga mouse pointer will disappear and the Macintosh will accept input again.

The Macintosh screen can be used as any other Amiga screen. You may send it to the back with Amiga-M and move it by holding an <Amiga> key and dragging it with the mouse.

## 1.49 Using keyboard and mouse

The mapping of the Macintosh special keys to the Amiga keyboard is as follows:

Option	-> <Alt>
Command	-> <Amiga>
Shift	-> <Shift>
Ctrl	-> <Ctrl>
Caps Lock	-> <Caps Lock>
F1-F10	-> <F1>-<F10>
Help	-> <Help>
Backspace	-> <Backspace> (<->)
Delete	-> <Del>

By pressing <Ctrl><Tab> you can turn off and on the Macintosh mouse and keyboard query and the graphics refresh.

The right mouse button has the same function as the <Alt> (option) key, if you are using a three-button mouse, the middle button will act like the <Shift> key.

---

Please note that all Amiga system key combinations will remain active. E.g. if you want to hold down the option and command keys to rebuild the desktop file of a volume, you have to press an <Amiga> key and the right mouse button, as the Amiga will interpret the combination <Alt><Amiga> as a replacement for the left mouse button. Likewise, the combination <Amiga left>-N will not create a new folder, but bring the Workbench screen to the front. To create a new folder, you have to press <Amiga right>-N.

The key combination <Ctrl><Shift left><Alt left><Esc> serves as a kind of emergency shut down option to quit ShapeShifter when the Finder menu item "Shut down" is not available (e.g. the Mac is not booting, garbage on the screen etc.). But this key command is only intended for emergencies.

With the key combination <Ctrl><Shift left><Alt left><Help>, you can activate Macintosh debuggers. If you don't have "MacsBug" installed, the ROM debugger will come up. If you happen to press these keys by mistake, you can quit the debugger by entering "G".

You may use graphics tablets or touchscreens instead of the mouse, if these appear like a mouse to the Amiga and are usable with all programs.

With the gadget "Direct mouse polling" in the "ShapeShifter Misc" window, you specify whether ShapeShifter should poll the mouse directly by itself or use the Amiga operating system to do so. The direct polling is more compatible with some Macintosh programs, but you cannot use graphics tablets or touchscreens with it.

## 1.50 Data exchange with the clipboard

Using the clipboard, you can exchange texts between the Amiga and the Macintosh side, i.e. if you select and cut text in a Macintosh program you can paste this text into an Amiga program and vice versa. An automatic conversion between the Mac and Amiga character sets will take place.

## 1.51 Sound input and output

ShapeShifter will use the built-in audio functions of your Amiga for sound output. You can disable all Macintosh sound output by deactivating the gadget "Audio output enabled" in the "Miscellaneous" settings window.

Please note that some Macintosh programs, especially games, are accessing the Macintosh sound chips directly. This will not result in a crash under ShapeShifter, but there will be no sound.

If you own a sound digitizer that is connected to the Amiga parallel port, you may also use it from the Macintosh side and, e.g. record your own alert sound with the Sound control panel. Please note that ShapeShifter will only record in mono at the moment.

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## 1.52 Notes on the emulation

Here, you will learn what to observe when using ShapeShifter and what problems you may encounter with the Macintosh emulation.

Restart, shut down etc.	Control over the emulator
Macintosh debuggers	The catcher comes
What ShapeShifter cannot do	Not yet! :-)
When nothing is working	The Mac won't boot. What now?
Possible problems on the Amiga side	Important! Read this!

## 1.53 Restart, shut down etc.

After selecting the Finder menu item "Restart", only the Macintosh side will be restarted, all Amiga programs and data will remain in memory.

The menu item Shut down will quit ShapeShifter and close the Macintosh emulation.

The "Restart"/"Shut down" buttons in some system error dialog boxes are not always working in the desired manner, however.

The "forced" quitting of a program with Command-Shift-Escape is not supported by ShapeShifter.

If you want to quit ShapeShifter, but the Finder menu item "Shut down" is not accesible (e.g. because of a crash/problems on startup), you may leave ShapeShifter with the key combination <Ctrl><Shift left><Alt left><Esc>. This command should only be used in case of emergency, however.

## 1.54 Macintosh debuggers

The key combination <Ctrl><Shift left><Alt left><Help> will simulate an NMI on the Macintosh side and can be used to activate debuggers. Unless you have installed "MacsBug", the debugger built into the Macintosh ROM (MicroBug) will appear. Both can be quit by entering "G".

The ROM debugger (recognizable by the ">" prompt) understands the folowing commands ([ ] marks an optional argument):

```
G [xxxxxxx]           : Start program at given address,
                        "G" without argument will quit the debugger
DM [xxxxxxx]          : Display memory
SM [xxxxxxx] [yy yy...] : Change memory
TD                    : Display memory at $0C30 (this is where the
                        processor registers are stored)
D0..D7 [xxxxxxx]      : Show/set data register
A0..A7 [xxxxxxx]      : Show/set address register
PC [xxxxxxx]          : Show/set program counter
SR [xxxx]             : Show/set status register
```

"xxxxxxx" stands for a hexadecimal expression which may contain the following special symbols, that can be linked with '+' and '-' as well:

RD0..RD7 : Contents of a data register  
RA0..RA7 : Contents of an address register  
. : The "current" address from which memory is being displayed  
@xxxxxxx : The contents of address xxxxxxxx

Pressing the return key only will repeat the last command and display the next memory area for "DM".

## 1.55 What ShapeShifter cannot do

The following Macintosh properties are not (yet) emulated by ShapeShifter:

- Virtual memory. Even on Amigas with MMU, you should not switch on the virtual memory.
- LocalTalk. You should never select LocalTalk in the Network control panel as this will most likely result in a crash (unless you have an A-Max II+/IV card).
- 24 bit addressing. You can only use 32 bit clean programs.
- Programs accessing the Macintosh hardware directly won't necessarily crash under ShapeShifter, but are limited in their usability. E.g. the game "Lemmings" is missing the sound (the Amiga version is nicer, anyway).
- Quitting a program with Command-Shift-Escape doesn't work.
- The serial drivers don't support hardware hangup with DTR.
- The Ethernet driver only supports packet types \$0000..\$05dc, \$0800 and \$0806 and has no ERead
- The SCSI routines don't support the scComp command
- The sound input driver can only record mono and has no VOX recording

The following Macintosh programs/utilities don't work with ShapeShifter or behave erratically:

- Peace of Mind, a hardware diagnostic program
  - Snooper, another diagnostic program
  - SoundEdit 16
  - Apeiron
  - Emagic MicroLOGIC (requires A-Max II+/IV card)
  - WACOM ArtPad driver
-

- System 7.0.1 Sound Control Panel

## 1.56 When nothing is working

In rare cases, it may happen that the Macintosh won't boot or might crash on startup. Then you should try the following:

- Turn the option "Allocate Mac ROM memory first" on.
- Turn the option "Write-protect ROM" off.
- Switch off the CPU cache (command "CPU NODATACACHE" from the Shell).
- Start ShapeShifter with the tool type "NOCOPYBACK".
- Disable the tool type "STARTUPSOUND".
- Delete the file "ShapeShifter PRAM" and start ShapeShifter again.
- Change the graphics settings to "Amiga Bitplanes", "1 Bit" or try the "Amiga window" mode.
- Hold down the left shift key on startup (first wait for the dithered Mac background pattern to appear). This will disable all system extensions.
- When you have problems with File-/DeviceDisks/SCSI then make sure that the maximum transfer sizes (MaxTransfer) are set correctly on the Amiga side as well as in the ShapeShifter settings. SCSI devices must be correctly terminated.
- Boot the Macintosh from disk and use "First Aid" or the Norton Disk Doctor to check the integrity of the start volume and the system file.
- Re-install the Macintosh System, "for every Macintosh", including the EtherTalk software.
- Try a different Macintosh ROM

## 1.57 Possible problems on the Amiga side

Some properties of ShapeShifter may lead to problems on the Amiga side or may disturb concurrently running Amiga programs:

- PrepareEmul will move the processor's vector base register (VBR). This may break some, very very few Amiga programs.
  - The FileDisks won't work with automatically (de)compressing file systems like XFH. If you use such a file system, you must create the FileDisk files using the name of the original (uncompressed) volume (e.g. "DH1:MacFileDisk" and not "XH1:MacFileDisk" if "XH1:"
-



is an XFH mirror of "DH1:").

- The debugging tool "Enforcer" is not compatible with ShapeShifter on principle. You have to turn it off.

## 1.58 Questions and answers

Question:

How do I rebuild the desktop file when starting the Macintosh?

Answer:

You have to hold down the left Amiga key and the right mouse button on startup. The key combination <Alt left><Amiga left> doesn't work because this combination is intercepted by the Amiga operating system as a replacement for the left mouse button.

Question:

How do I prevent volumes being ejected on restarting the Macintosh?

Answer:

Hold down the Alt key (or the right mouse button), choose the "Restart" menu item and keep holding the Alt key until the Macintosh screen is cleared.

Question:

I have xx MB of memory in my Amiga, but ShapeShifter is using only a small part of it.

Answer:

ShapeShifter can only use a contiguous memory block. E.g. if you have 2MB of Chip RAM, 8MB of 32 bit Fast RAM and 4MB of 16 bit Fast RAM, the theoretically available amount of memory for ShapeShifter is 8MB (and not 14MB). The Amiga operating system will, of course, use some of these 8MB for itself.

Question:

The Macintosh doesn't boot. How can I now quit ShapeShifter? The Finder is not loaded.

Answer:

Press <Ctrl><Shift left><Alt left><Esc>. ShapeShifter should then quit itself.

Question:

I have changed the graphics settings and now there is only garbage on the screen. How can I now quit ShapeShifter?

Answer:

Press <Ctrl><Shift left><Alt left><Esc> (eventually hold it down). ShapeShifter should then quit itself.

---

## Question:

In spite of my 68040, the Macintosh emulation is slower than on an Amiga 3000. How can that be?

## Answer:

You are probably using a 512K ROM. This ROM is not completely 68040 compatible and ShapeShifter has to turn off the data cache to make it run. If you use a 1MB ROM (e.g. from a Quadra) the speed should increase notably.

## Question:

PrepareEmul fails to work, it just reboots and reboots. My Amiga is softkicked.

## Answer:

PrepareEmul doesn't work with softkickers. The only solution is to patch the Kickstart file as shown here.

## Question:

PrepareEmul fails to work on my expanded A1200.

## Answer:

Start PrepareEmul with the "A1200" switch.

## Question:

PrepareEmul still doesn't work.

## Answer:

See here for alternatives.

## Question:

When I switch from the running emulation to my workbench screen, parts of the screen get overwritten with Macintosh graphics.

## Answer:

Sadly, there is no solution for this. Press <Ctrl><Tab> before switching screens and take care that no Macintosh program is drawing on the screen as long as the Workbench screen is in the front to minimize the effect. If you can live with a graphics slowdown, you may also activate the gadget "Refresh always" in the graphics settings.

## Question:

I have problems on my A2000 with G-Force040 accelerator and a 1MB ROM.

## Answer:

(According to Oliver Stein <SYLVESTER@dreamlnd.ruhr.de>):  
Find the program "Set040" by Nic Wilson and insert the following line in your "Startup-Sequence" right after PrepareEmul:

```
Set040 >NIL: FASTROM NOLOCAL NOZCACHE
```

---

(According to Stefan Raudonis <SRaudonis@cosmos-1.gun.de>):  
The program "GVPCPUCtrl" must not be started in the Startup-Sequence.  
The command alone, without parameters will cause programs to crash  
under ShapeShifter.

Question:

I have problems on my A2000 with a Fusion-Forty accelerator.

Answer:

To get rid of ALL problems regarding the Fusion-Forty and ShapeShifter  
and to be able to use ShapeShifter's MMU features, install the original  
(AmigaOS) "68040.library" in LIBS: and insert the following two lines at  
the top of your Startup-Sequence:

```
SetFF FASTKICK AMAXIV
SetPatch NOAGA REVERSE QUIET
```

Or, if you are softkicking a different ROM image:

```
SetFF FASTKICK devs:kickstart AMAXIV
SetPatch NOAGA REVERSE QUIET
```

You don't need "PrepareEmul" then.

Question:

My SCSI devices are not being recognized.

Answer:

1. The name of the SCSI driver must be spelt correctly. E.g. on the A3000 this is "scsi.device" in lowercase letters, without quotes, and without "DEVS:" in front.
2. The IDs of the devices you intend to use must have a checkmark in the SCSI settings (the gadgets directly near the digits 0..6).
3. The SCSI bus must be correctly terminated.

Question:

I cannot use DeviceDisks and/or SCSI devices with my Oktagon/AT-Bus 2008/  
AlfaPower/TandemAT/ALF-2/ALF-3 controller.

Answer:

You have to use "SSIOktaPatch". Please read the file "ReadMe" in the  
archive "SSOktaPatch.lha".

Question:

I have problems with CD-ROM drives on a FastLane Z3 controller.

Answer:

(According to Michael Böhmer <thorin@ods.de>):  
For using a CD-ROM drive on the SCSI controller FastLane Z3 under  
ShapeShifter it is absolutely necessary either to

- switch the transfer mode for SCSI direct commands to "Polling"  
for the CD-ROM with the program "UnitControl" (click on CD-ROM,
-

choose "Special" button, setting "SCSIDirect Polling")

- call the program "SetSCSIDirectMode" with

SetSCSIDirectMode [Unit # of CD-ROM] BlockTransfer

to enable the polling for the CD-ROM (ignore the message io\_error=0).

If the CD-ROM drive is being used with DMA ShapeShifter cannot access it ("Volume xyz cannot be read - Eject/Initialize").

Both programs are supplied on disk with the FastLane Z3. After quitting ShapeShifter you can revert to the DMA setting.

Question:

The screen refresh is as slow as ever. I thought that ShapeShifter will now use the MMU to speed things up?

Answer:

The MMU is used for the refresh only when

- A 68040/060 processor is present
- The MMU is turned on
- The option "MMU refresh" is enabled

Question:

How can I install the Macintosh System without HD floppy drives?

Answer:

(According to Mike Carlson <carlson@kaiwan.com>):

- Use a program called DiskDup+ on a real Mac to read in a Mac System disk. I used the Disk Tools (or whatever it's called) disk from System 7.5 as a test. It doesn't matter that the disk is 1.44 Mb.
- After DiskDup+ reads the disk, have it save the image to a file.
- Get it to your Amiga. I used a null-modem. But you can also use "Splitz" and "Jointz" to split the file into smaller parts that can be transferred with DD disks.
- Tell ShapeShifter that this image is a FileDisk.
- Start ShapeShifter.

Question:

How do I print under ShapeShifter?

Answer:

You need a suitable Mac printer driver. For Epson-compatible parallel printers you can use "Chuck's Printer Driver", for HP DeskJets/LaserJets you need "HPDJ 3.0" (both are on the FTP site). Simply configure the Mac printer port for the parallel port and choose it from the Mac printer driver. The serial settings don't matter but you should turn on "Hardware Handshake".

You may also use the commercial package "Power Print" that includes drivers for the most popular printers. For more info, contact:

GTD Softworks INC.  
4664 Lougheed Highway

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Suite #188  
Burnaby, BC  
Canada V5C6B7

Telephone: ++1-604-291-9121  
Fax: ++1-604-291-9689  
EMail: GDT.MKT@applelink.apple.com

Question:

I can no longer format 720K disks under System 7.5. With 7.1 it worked.

Answer:

Due to a brain-damaged modification to the Disk Initialization Package, System 7.5 refuses to format 720K disks unless the "720K Disk Formatter" extension is present. If you give ShapeShifter the tool type "720KKLUDGE", it will format these disks with 719.5K. Apart from losing 512 bytes disk space, it doesn't make any difference. 719.5K disks can be read on a real Mac as can 720K disks under ShapeShifter with System 7.5.

Question:

I can't use my sound sampler. The Amiga hangs as soon as I click on the "Record" button.

Answer:

Your CPU is probably not fast enough to do the sampling. The CPU load of sampling at 22kHz equals that of a serial transmission at a sustained data rate of approx. 250000bps. As you need a fast CPU to do this with the "serial.device", you need a fast CPU to do sound sampling under ShapeShifter. "But my A500 can sample at 48kHz!" you may answer. Then name any Amiga sound sampling program that multitasks while sampling.

Question:

Nothing works! After starting ShapeShifter, I only get a white/gray/dithered gray screen with/without startup sound (which sounds distorted/is continuously repeated).

Answer:

Try everything listed here. If that doesn't help, then I don't know (i.e. bug reports are useless).

## 1.59 The Mac-Handler

The Mac-Handler allows you to exchange files between the Amiga and the Mac side: With it, you can access Macintosh volumes like Amiga volumes while the emulation is running, and e.g. copy files from the Workbench.

To install, please copy the file "Mac-Handler" into the "L:" directory. The file "MAC" should not be copied to DEVS:DOSDrivers, as you might expect. This would mount the Mac-Handler at every restart automatically. But as it depends on ShapeShifter running, it doesn't work this way. You should copy "MAC" to SYS:Storage or wherever, instead.

---

To use it, first start ShapeShifter, wait until the Macintosh has finished the startup process and then double-click the "MAC" icon. Now, an icon for the Mac start volume should appear on the Workbench. You may access it from any Amiga program as if it was an Amiga volume.

To access other volumes than the start volume, you have to change the tool type "STARTUP" in the "MAC" icon. There, you give the number of the Macintosh volume to be used. 1 is always the start volume, the other volumes are counted up from 2.

All files on the Mac volume have a comment like "xxxx/yyyy". "xxxx" is the Macintosh file type and "yyyy" the signature of the creating program, e.g. "TEXT/ttxt" for a TeachText text file. Changing the comment will change type and creator of the corresponding Mac file. All folders have the number of contained objects (files or additional folders) as a comment.

The Mac-Handler can access only either the data or the resource fork of the Mac volume at a time, the file lengths are displayed accordingly. By default, it will use the data fork. The small program "MacControl" serves as a switch. It can only be used from the Shell and expects the device name of the Mac-Handler (e.g. "MAC") and one of the keywords "DATA" or "RESOURCE" as arguments. If you have, for instance, mounted a Mac volume as "MAC:", the command to switch to the resource forks is:

```
MacControl MAC: RESOURCE
```

And to switch back to the data forks, you use:

```
MacControl MAC: DATA
```

## 1.60 Reference

This section describes ShapeShifters window gadgets one by one in their function. You should use this reference for consultation if you want to learn more about the function of a single setting. How the settings interact and how to configure ShapeShifter for certain things is covered here.

Main window

Graphics

Volumes

Floppys

SCSI

Memory

Serial

Network

Miscellaneous

## 1.61 Main window reference

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The main window appears directly after starting ShapeShifter.

By selecting one of the eight big gadgets Graphics..., Volumes/Disks..., Floppys..., Memory..., SCSI..., Serial..., Network... and Miscellaneous... you can open the windows in which you do the settings.

A click on "Start" closes the settings windows of ShapeShifter and starts the Macintosh emulation.

With "Save", your settings are saved in the file "ShapeShifter Prefs", so they are available at the next start of ShapeShifter.

By selecting "Exit" you can quit ShapeShifter while discarding any unsaved settings.

ShapeShifter has only one menu, "Project", that offers three items:

"About ShapeShifter..." displays some information about the version of ShapeShifter used and the author of the program.

"Save settings" (shortcut Amiga-S) does the same as the gadget "Save". The settings are saved in the file "ShapeShifter Prefs".

With "Quit" (shortcut Amiga-Q), you quit ShapeShifter without saving the settings.

## 1.62 Graphics settings reference

**1 monitor/2 monitors:** This setting specifies if ShapeShifter is being used with one or two monitors. For one monitor, the left gadget group is used, for two monitors the left group is used for the first monitor and the right group for the second one.

**Color depth:** Here you set the number of colors to be used by the Macintosh for this monitor. This setting is done here and not in the Monitors control panel, as it gives you the chance to switch to a lower color depth without problems when the speed in higher depth becomes too slow.

**Screen type:** Here you choose how the screen memory should be handled by ShapeShifter. This setting is closely connected to the selected screen mode. The options are now discussed in detail:

"Amiga bitplanes" is the setting for the normal Amiga graphics modes. You can use 2 to 256 colors. When using more than 2 colors, the graphics have to be refreshed periodically, which has an impact on the speed. Only at 2 colors the graphics is running at full speed. This type can only used with one monitor at a time.

"CyberGraphX" is for graphics cards with a CyBERgraphics driver. Only color depths of 8, 15 and 24 bit are selectable, while most graphics cards require a refresh at 15 and 24 bit.

---

"EGS": If your graphics card works with the "EGS" (Enhanced Graphics System) by Viona Development, you must use this setting. Only color depths of 8, 15 and 24 bit are possible, while 15 and 24 bit require a refresh.

"Amiga window" displays the Macintosh desktop in 2 colors in a window on the Workbench. The Amiga mouse pointer will be used to control symbols and menus of the Macintosh. This type cannot be used with two monitors.

"External" uses the external video driver specified under "External driver".

External driver: This gadget specifies the path name of the external video driver if the screen type is set to "External".

Screen mode: After a click on "Choose...", the screen mode requester will open and allow the selection of any Amiga graphics mode to display the Macintosh screen, and the selection of the overscan region to be used. A high resolution, flicker-free mode like "Productivity" or a mode of a graphics card is recommended. For video applications, you can use the whole available screen for the display. When you have chosen a screen mode, the "Size" gadgets are set automatically to the normal values for this mode.

Size: Here you can manually set the size of the screen in pixels. By entering a smaller size (e.g. 512 $\times$ 384), you can, for instance, increase the speed in higher color depths. For the screen mode "Amiga window", the size of the window is specified here.

Refresh rate: Here you can specify how many 1/50ths of a second should pass between the refreshes. A value of 5 will, for instance, leave a tenth of a second of computing time for the emulator between the refreshes. For the optimal choice of this value, please read the chapter Setting the refresh.

Black border: When this gadget is selected, the border around the Macintosh screen is displayed in black (requires ECS/AA), as on the real Macintosh. For graphics cards, this is mostly without effect, they always display a black border.

Always refresh: In the 8 bit graphics card modes, the Macintosh graphics will always go to the front screen of the graphics card, even if it is the Workbench screen, for example. By activating this gadget, a refresh is done also in 8 bit, thereby preventing this annoying effect, but slowing down the graphics speed.

MMU refresh: When this option is enabled, ShapeShifter will try to use to MMU to only refresh the parts of the screen that have changed. This will only work on 68040/060s with default MMU setup and has no effect on other processors.

Amiga mouse pointer: If this box is checked, the Amiga mouse pointer will be used for selecting things on the Macintosh side, too. This is always the case in Amiga Window mode.

## 1.63 Volumes reference

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FileDisk 1/2: In these two gadgets, you give the name of the files that ShapeShifter should use for the first resp. the second FileDisk. Instead of entering the name by hand, you may as well click on the symbol to the right of the text gadgets that will open a file requester. The gadget "Create..." is used to create a new FileDisk file. First, you have to enter the size in KB and, after a click on "Choose file...", set the name of the file in the file requester (you can also select an existing file, it will then be overwritten).

DeviceDisk 1/2: Here you enter the name of the Amiga driver to be used for the first resp. the second DeviceDisk. For SCSI devices, this is usually the name of the SCSI driver, but you may use any other "trackdisk" compatible driver. With a click on "Choose...", a file requester will appear that allows the selection of an existing volume (e.g. a hard drive partition). ShapeShifter will then check if this volume is suitable as a DeviceDisk and will then enter the name of the driver and all the other data into the gadgets automatically. In the string gadget, you may also directly enter the device name of a Macintosh partition (including ":" ). The data will then be inquired at run-time.

Unit: Specifies the number of the driver's unit to be used. For SCSI devices, this is the ID of the SCSI device.

First sector/Number of sectors: These values define the section of the volume that is used by ShapeShifter. This is extremely important if you have created proper partitions for the Amiga operating system and ShapeShifter on a shared hard disk. Should the sector values be wrong, ShapeShifter might overwrite data on Amiga partitions. If you don't know about the logical structure of volumes, you should only create a DeviceDisk by using the "Choose..." symbol and not change the automatically entered sector values afterwards.

Maximum transfer size: Some IDE and older SCSI drivers don't like it when the amount of data transferred in one block exceeds a certain size (e.g. 64KB). In this case, you can set the maximum block size with this setting. The setting corresponds directly to the value "MaxTransfer" in the MountList and the Rigid Disk Block and is set right automatically when using "Choose...". When the hard disk has no limitation for the transfer size, you can set this to "-1" or "0".

Removable: If this box is checked ShapeShifter will recognize media changes on this DeviceDisk (e.g. for SyQuests or CD-ROMs).

Boot from: is used to select the startup volume. "Last selection" leaves the setting as it is (or as it has been set in the "Startup volume" control panel from the Mac), "Any" will make ShapeShifter boot from the first found bootable volume and "FileDisk 1" resp. "DeviceDisk 1" force it to boot from the first File-/DeviceDisk.

## 1.64 Floppy settings reference

Floppy 1/2: Here you select which Amiga floppy drives are to be used as the first and second Macintosh drives. With a click on "Search", ShapeShifter will automatically detect the first two connected drives.

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**Inhibit AmigaDOS:** If this option is selected, AmigaDOS is inhibited from accessing the corresponding drive as long as the emulation runs. This will speed up the recognition of inserted Macintosh disks.

## 1.65 SCSI settings reference

**0..6:** With these checkboxes, individual SCSI IDs can be turned on and off for the Mac. The gadgets in each row belong to these IDs.

**SCSI driver:** Here you give the name of the Amiga SCSI driver that ShapeShifter will use to access this ID. For Amigas with built-in SCSI port or the Commodore SCSI cards, this is "scsi.device". If you use a different SCSI adapter, please consult its documentation about the name of the driver.

**Unit number:** These gadgets contain the unit numbers ShapeShifter will use to access the respective ID. The unit number normally corresponds to the SCSI ID of the device. Most SCSI drivers use the hundred's digit of this number to select the card if multiple cards are installed.

**Memory type:** Here you set the type of memory to be used for the SCSI transfer buffers. "Chip RAM" will use the Chip RAM, "24 bit DMA" allocates memory in the 24 bit address space (important for DMA Zorro-II cards) and "Any" will get any (but not always the fastest) free memory. Please also read the chapter Speed and memory requirement.

**Apple CD300 emulation:** When this field is checked, you can use SCSI-2 conforming CD-ROM drives with the AppleCD driver. If you have connected a real Apple CD300 or are not using the AppleCD driver but a special one for your drive, you should disable this setting.

**Apple hard disk emulation:** This setting is only required to make Apple's hard disk installation program believe that an Apple hard drive is connected. Otherwise, it should be left switched off.

**Direct transfers:** If this field is checked, ShapeShifter tries to make SCSI transfers without using a buffer. For more information, look here.

## 1.66 Memory settings reference

**Mac memory:** Here you enter the amount of memory to be reserved for the Macintosh (in KB, 1MB=1024KB). For System 7, this must be at least 1.5MB. ShapeShifter requires additional memory for the ROM and the graphics memory. When you receive the message "There is not enough memory available" on starting the emulation, then please lower the value.

**Maximum (KB):** The maximum amount of memory available for ShapeShifter is displayed here.

**Largest free block:** With this setting, ShapeShifter will use the largest available memory block as Macintosh memory. The value entered in "Mac memory", the emulator gets all the memory it can.

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**Allocate Mac ROM memory first:** When this gadget is checked, ShapeShifter will allocate the memory for the Macintosh ROM before the other Macintosh memory. This increases the chance of the ROM to end up in the fastest available memory, speeding up the emulation. Otherwise, it could happen that the ROM ends up in Chip RAM or slow 16 bit memory.

**ROM memory type:** Here you set the type of memory to be used for the ROM. "24 bit DMA" normally refers to 16 bit FastRAM.

## 1.67 Serial settings reference

**Modem port/Printer port:** Here you give the name of the Amiga driver (e.g. "serial.device") to be used for input and output over the Macintosh modem resp. printer ports. When the driver is on disk, it can be selected with a click on "Choose...".

**Device unit:** For drivers that support multiple ports of one type, this selects the port. Please consult your I/O cards manual about this. For standard Amigas with one serial and one parallel port, enter "0".

**Parallel device:** Here you have to specify whether the selected driver is compatible to the "serial.device" or the "parallel.device", i.e. if it drives a serial or a parallel port. A wrong setting may result in malfunctions or even in crashes when accessing the ports.

**A-Max II+/IV:** This gadget is only available if an A-Max II+/IV card is installed. When the box is checked, the modem and printer port on the card will be used instead of those specified with the other gadgets.

## 1.68 Network settings reference

**Network driver:** Here you give the complete path of the SANA-II ethernet driver to be used (e.g. "DEVS:Networks/a2065.device"). Other network hardware like Arcnet is not supported (however, you can run AppleTalk Remote Access or MacTCP with InterSLIP or MacPPP over a serial connection).

**Device unit:** For drivers supporting multiple cards of one type, you select the card with this setting. Please consult the manual of your Ethernet card about this. Normally, the setting "0" refers to the first/only card.

## 1.69 Miscellaneous settings reference

**Direct mouse polling:** With this, you specify whether ShapeShifter should poll the mouse directly by itself or use the Amiga operating system to do this. The direct polling is more compatible to some Macintosh programs. However, you cannot use graphics tablets or touchscreens with it.

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**Write-protect ROM:** When this option is enabled, ShapeShifter will try to write-protect the Macintosh ROM. This will only work on 68040s with default MMU setup and has no effect on other processors.

**Audio enabled:** When this box is checked, the audio output of the Mac is enabled, otherwise it's turned off completely.

## 1.70 Copyright

The programs "ShapeShifter", "PrepareEmul", "Mac-Handler", "MacControl", "Save ROM" and this manual are © Copyright 1993-1995 Christian Bauer. They may be freely distributed as long as they remain unchanged (archiving and packing are allowed).

Chris J. Schnurr <cjs@icbl.heriott-watt.ac.uk> is hereby granted to place this manual on his WWW page <http://www.icbl.hw.ac.uk/~cjs/shape/>.

No profit must be made by distributing ShapeShifter, especially the price of a disk containing ShapeShifter may not exceed US\$ 5,- (or equivalent amounts in other currencies). Please feel free to distribute ShapeShifter over bulletin board systems and networks and as part of shareware/freeware CD-ROMs. All rights for commercial use remain at the author.

The keyfile that registered users will receive, must only be installed on one computer and in no case passed on to others. Offences will result in penal prosecution by me. With your signature on the order form, you accept these conditions.

The program is presented to the users as it is, without any warranty of any kind, be it expressed or implicit. Anyone using this program agrees to incur the risk of using it for himself. In no way can the author be made responsible for any damage directly or indirectly caused by the use or misuse of the program.

The Macintosh ROM files necessary for using ShapeShifter are not part of ShapeShifter and copyrighted by Apple. The author will not take upon himself the responsibility for the legal consequences, an illegal use of such a ROM file can have.

The user interface of the program was designed with GadToolsBox  
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Names of other hardware and software items mentioned in this manual and in program texts are in most cases registered trade marks of the respective companies and not marked as such. So the lack of such a note may not be used as an indication that these names are free.

## 1.71 Bug reports

If you find a bug or a misfeature in ShapeShifter, or have an idea how to make some things better, then please drop me a note so I'll be able to improve ShapeShifter in the future. My address can be found here.

Important for a bug report is the following information:

- Version of ShapeShifter (can be found by doing "version ShapeShifter" from the Shell)
- Used AmigaOS version (e.g. 2.1, 3.0 etc.)
- Used MacOS version (e.g. System 7.0.1, System 7.1 etc.)
- Installed hardware, if of interest for the problem
- Information about installed startup programs on the Amiga or INITs on the Macintosh
- ShapeShifter settings
- Detailed description what program produces the bug and how it can be reproduced

But first please look here if there's a solution to your problem.

And please consider: Even Macintosh software has bugs! So it is not always the emulator's fault when something is not working.

## 1.72 Credits

The following persons/companies deserve special thanks from me as they made a significant contribution to the development of ShapeShifter:

- Daniel Bobbert <dabo@coli.uni-sb.de>, my first beta tester, who printed dozens of pages from the "THINK Reference" for me
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  - All other beta testers for constructive criticism
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  - Jaba Development, whose GadToolsBox developed ShapeShifter's user interface
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  - Thomas Kessler <kessler@fim.uni-erlangen.de> for "ReKick"
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-

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  - Polish : Pawel Hernik <spi-ph@srv1.tu.kielce.pl>
  - Spanish : Jordi Casinos <fura.baus@servicom.es>
  - Greek : Minas N. Miliaras <mmiliaras@prometheus.hol.gr>
  - Norwegian: Jan-Tore Eliassen
  - Hungarian: László Török <phoenix@master.fok.hu>
  - Finnish : Jari Mikkila <jmikkila@paju.oulu.fi>
- Apple Computer Inc. who made writing a Macintosh emulator a child's play
- Ace of Base, whose music kept me up during hardcore debugging sessions when "nothing" was working

## 1.73 The author

No one wanted to develop a software Macintosh emulator.  
So I had to do it. :-)

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Questions, criticism, suggestions and bug reports are always welcome.  
EMail is preferred. But first look here if there's a solution to your problem and please understand that I can't answer every letter/mail personally.

Under no circumstance will I send you ROM files, not even "under friends"! No chance!

## 1.74 History

V1.14 29.Mar.95

- First public release

V2.0 11.Apr.95

- Pre-emptive multitasking
- Quickstart now works reliably
- Bug in stack handling corrected
- Graphics cards in 24 bit address space work with ROM 34
- CyBERgraphics 15 and 24 bit modes now work, selecting a CyBERgraphics mode will automatically set the color depth
- Needs no special ROM sub versions any more
- Setting for task priority removed
- Macintosh reset routine revamped
- Italian catalog files
- When the selected amount of Mac memory is not available, you can choose to use the largest free block
- Numerous internal corrections and improvements
- SCSI IDs individually switchable, an error when accessing ID 0 will no longer cause the other IDs to be skipped
- The graphics refresh is now done by a subtask, enabling the Amiga mouse pointer will prevent any refreshes
- ROM write-protection is now choosable
- The FileDisk driver will no longer open files with empty names

V3.0 11.Jun.95

- Multitasking behavior improved, no more deadlocks when waiting for I/O operations
  - Ethernet support for MacTCP
  - Serial driver now capable of asynchronous full-duplex operation
  - Using serial.device while ShapeShifter is running is now safe
  - Removed a bug when opening parallel devices in the serial driver
  - The serial hardware handshake flag is now mapped to ACK handshake on parallel devices
  - Serial devices are now always closed on shutdown
  - More compatible SCSI routines
  - Added a boot drive selector in the volumes window
  - Separate window for floppy disk settings
  - Macintosh-to-Amiga floppy drive assignment selectable
  - Option to inhibit AmigaDOS from accessing floppy drives while the Mac is running
  - Under "DeviceDisk 1/2" you may directly enter the name of a partition
  - DeviceDisks are now always fixed disks
  - Improved disk change detection
  - More compatible to mfm.device V41
  - Tooltype "720KKLUDGE" to allow 720K disks to be formatted under System 7.5 without the 720K Disk Formatter extension
  - Booting from the System 7.0.1 Disk Tools disk is now possible (LocalTalk will no longer crash)
-

- On the 68040, the MMU is now used to only refresh the parts of the screen that have changed (as long as the ROM write-protection is switched on) except the 8 bit Amiga mode
- Support for Merlin graphics card
- Distinction between EGS Chunky and EGS VGA removed
- New screen type "Amiga window" that will display the Macintosh desktop in a window on the Amiga workbench using the Amiga mouse pointer. The size gadgets specify the window dimensions.
- The screen width is rounded to a multiple of 16
- Refreshed modes read the screen base at every refresh, no more screen trashing
- Option "Refresh always" to force a refresh even in 8 bit chunky modes to prevent screen trashing
- The BytesPerRow of the "Amiga bitplane" mode are read from the BitMap
- Selecting a CyBERgraphics mode will set the "Color depth" gadget automatically
- The CyBERgraphics mode will respect the screen size settings
- The CyberGfx code loops ScreenToFront until ib\_FirstScreen is ShapeShifter's screen before calling GetCyberMapAttr/DISPADR
- Now complains when there's not enough free memory for a CyBERgraphics screen instead of crashing
- Background refresh rate removed, a refresh rate of 0 is intercepted and changed to 1
- Removed a screen closing bug
- New option to prevent the Macintosh from accessing the FPU (for 68060)
- 68060 compatible when FPU and ROM write-protection are disabled
- Control of 68040 copyback cache improved
- When quitting ShapeShifter, the original state of the cache is restored
- Option NOCOPYBACK to switch off the copyback cache
- Bus error handling revamped, VMM now runs if the ROM write-protection is switched off
- Dynamic memory handling removed
- Memory setting now with an integer gadget
- ROM checksum is tested
- Danish, french, swedish, dutch, and polish catalog files
- PrepareEmul can now use Olaf Barthel's "shutdown.library"

### V3.1 12.Aug.95

- ROM sub-version 17 runs again (but in general, this version is not recommended for ShapeShifter)
  - More detailed error messages concerning the Mac ROM
  - FPU exceptions intercepted on the Mac side
  - State of copyback cache is restored on exit
  - Separated settings for MMU refresh and ROM write-protection
  - The MMU code now also works with 8K pages
  - The caching of the lower 8K RAM is now switchable with a ToolType
  - 68060 FPU problems fixed
  - Minor fixes to the FPU and MMU routines
  - EtherTalk runs
  - SCSI routines completely rewritten
-



- Maximum transfer sizes are rounded down to an even multiple of 512
- DeviceDisks do CMD\_UPDATE on shutdown
- DeviceDisk write-protection detection more compatible with certain SCSI drivers
- Interface for external video drivers
- Faster graphics refresh in 2, 4 and 8 bit in Amiga bitplanes mode, 8 bit mode can now also use the MMU
- Implemented BGRA32 and RGBA32 refresh modes
- When audio.device cannot be opened or channels 0 and 1 are already allocated, ShapeShifter will now simply set the volume to 0 and skip the startup sound instead of quitting with an error message
- The '\|' key on american keyboards is now mapped correctly
- ShapeShifter is now AppleScript bug-proof
- PRAM handling rewritten, the PRAM file is now only 256 bytes long; the old (longer) files are converted on loading
- Safer keyfile loading
- Minor fixes for future Draco compatibility
- MacMem integrated into PrepareEmul by means of an "A1200" switch

### V3.2 17.Sep.95

- ROM write-protection disabled on 68060
  - Removed "Do not use FPU" setting
  - Early startup errors (e.g. PrepareEmul not installed) no longer affect the cache
  - Full Thread Manager support, including the 68060 and pre-emptive threads
  - Ethernet driver rewritten, now uses a subtask and eats 130k less memory (Honey, I shrank the .ENET driver!)
  - Added error requesters for unsupported Ethernet packet types, Ethernet cards that don't support multicast, and for ERead calls
  - Some Mac ROMs absorbed the Ethernet driver
  - A-Max II+/IV board serial ports supported
  - Support for 230kbps serial transmission
  - Workaround for mfm.device V38/V40 bug
  - Fixed bug in DeviceDisk 2 cleanup
  - Corrected MaxTransfer calculation
  - Device and unit for each SCSI ID can now be set individually
  - Implemented direct SCSI transfers
  - Small fixes in SCSI read, autosense and command completion
  - 2 Monitor support added, video driver code cleaned up
  - Merlin and Picasso support moved into external drivers
  - RTYPE\_CUSTOM corrected
  - RGBA32 refresh mode available under CyberGfx
  - Better Mac mouse blanking in Amiga mouse pointer mode
  - More reliable audio channel allocation/deallocation
  - Audio output can be disabled completely
  - Sound input driver works asynchronously again
  - Audio interrupt handling improved
-

- Mac startup sound is controlled by a tool type
- Settings item for Mac ROM memory type
- Task name is now always "ShapeShifter"
- Handling of level 2 interrupts more OS compliant
- Fixed problem with Mac mouse pointer settings
- Fixed bug in restart code (called Enable() without preceding Disable())
- Fixed bug in Mac-Handler ("Destination file removed" when copying files from Shell)
- Greek, spanish and norwegian catalog files

#### V3.2a 21.Sep.95

- Pre-emptive threads fixed for external FPUs

#### V3.3

- Completely new Time Manager
  - Disabled phase errors on SCSI autosense
  - Support for SCSI LUNs
  - Level 2 of the external video driver interface: Added a flags tag for SHEV\_OpenScreen
  - Better bitmap modulo calculation
  - Reimplemented old audio interrupt handling
  - Fixed bug in serial configuration
  - Loadable/saveable preferences, prefs files are ShapeShifter's "projects"
  - Finnish and hungarian catalog files
-