Rainbow 2.1

Atari 8-bit Emulator

User Guide

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Document Revision: 2.1

Introduction to Version 2.0

Welcome to Rainbow 2.0. It's been 12 years since I last updated Rainbow so it's not surprising that version 2.0 arrives with some major improvements. It provides better emulation as well as a variety of full screen and display options and support for 2 PC USB joysticks. I have also made available the debugging tools I used for development.

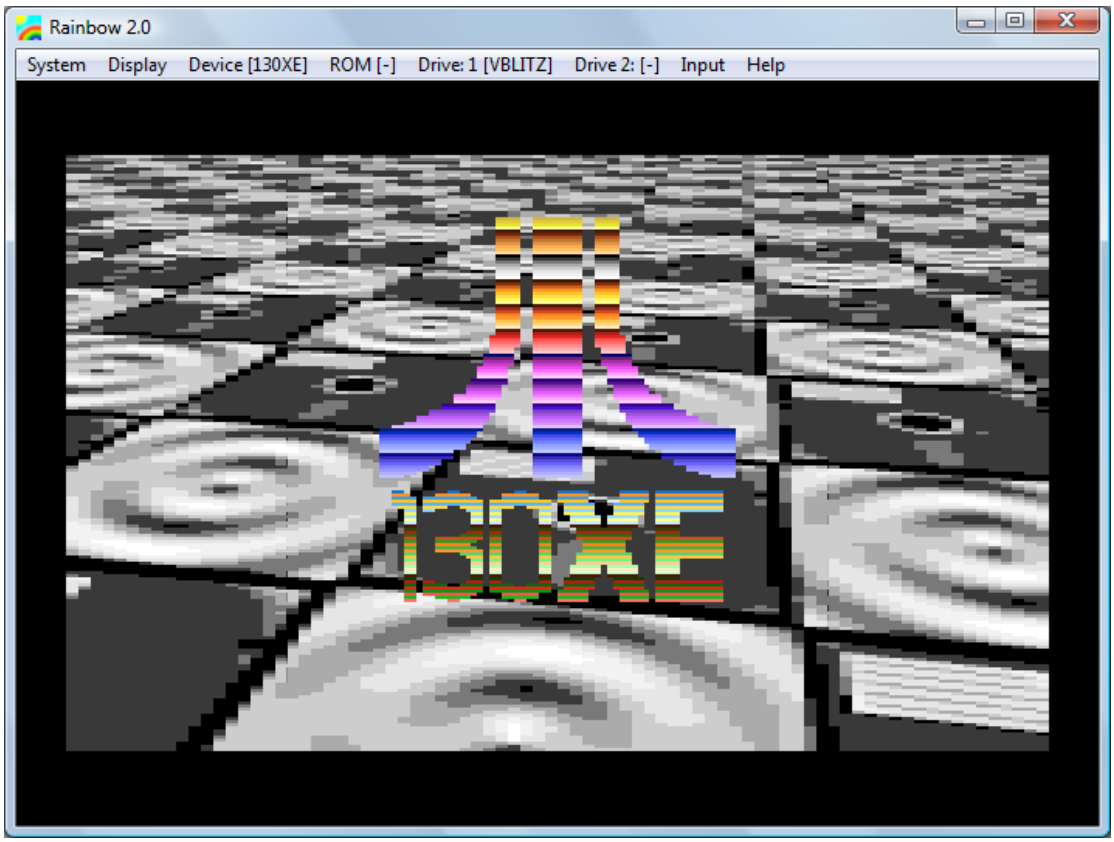
It's been fun revisiting all this stuff… any suggestions or bugs please let me know, as I will be updating Rainbow more frequently in future.

For a history of release changes, visit www.chrislam.co.uk

Getting Started

Rainbow emulates the Atari 8-bit series of home computers including the 400/800, 800XL,130XE and the 5200 games console.

You also need to install Microsoft Visual C++ 2010 Redistributable Package.



A demo disk (demo.dsk) is provided with 3 demos: Bounce, Robot and Swan.

Another demo disk (vblitz.atr) shows off the 130XE extra memory. A demo game called F.R.E.E is also included.

See the Appendix for tips on getting games to run on Rainbow.

Display Options

Rainbow 2.0 provides a number of display modes. There are 3 window modes: 640x480, 960x720 and a maximised window mode. There are also 2 full screen modes, one with the menu bar and one without.

Use ALT+space bar to rotate between window mode, full screen with menubar and full screen without menubar. In full screen mode click the mouse to show/hide menu bar.

In full screen mode (or maximised window) you can hide vertical overscan to give a much bigger display. Ignoring aspect ratio also helps fill the screen. In the smaller window displays the “aspect ratio” and “hide overscan” has no effect.

Show FPS (frames per second) is used to see whether Rainbow is running at normal Atari speed, which is 60 fps for NTSC and 50 fps for PAL. 100% means normal Atari speed; a value of 200% means it is running at twice Atari speed. Disabling the “100% Speed Cap” under the System menu makes Rainbow run flat out. Setting the region to NTSC will mean most games run faster than with the PAL setting. Some European games may need a PAL screen to work properly.

For slower computers, set frame rate to 50%; here Rainbow will only display alternate frames.

ROM Cartridges

ROM images can be inserted and need to be 8K or 16K.

Note that some ROMs have been modified to run from disk as a binary file. Rainbow does not recognise these as legitimate ROMs.You may be able to 'surgically' remove the actual ROM image from these binary files using a hex editor.

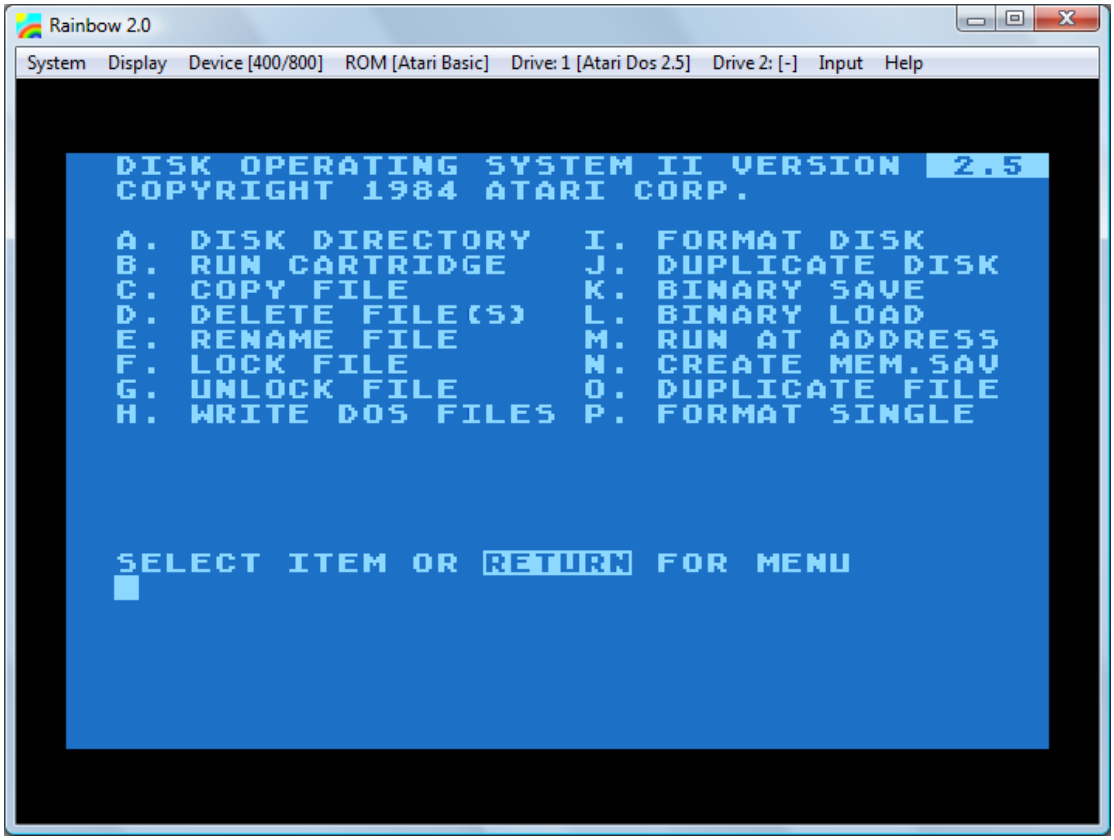
For the 5200 device, you can insert either 16K or 32K ROM images.

Rainbow can run SuperCartridges e.g. MAC/65 and Action. It's a 16K ROM mapped into 8K of space, with the other 8K accessed by hardware paging.

Insertion or removal of ROMs is followed by a re-boot.

Disk Drives

Two disk drives (1 and 2) are available. When an image has been modified an asterisk will appear next to the name in the menubar, and Rainbow will always prompt you to save it before removing the image or exiting Rainbow. Ticking Write Protect will prevent any write to the image.



The disk drives may be set to 810 or 1050. When you insert a disk, Rainbow will automatically sense standard and ATR images and whether they are single or enhanced density, adjusting the drive accordingly.

The 810 drive reads single density disks; the 1050 can read enhanced ones. Single density images have 720 sectors whereas enhanced ones have 1040. Each sector holds 128 bytes.

You can make the drives behave as 810s or 1050s on the fly. It's quite a dangerous thing to do and you should follow this by formatting the drive. This feature does NOT convert your single density images to enhanced density; it merely tells the drive how to behave. The effect can be seen when you use options I and P to format disks.

The size of the image saved depends on whether the drive is set to 810 or 1050 mode. Images are saved as standard images, with no ATR header.

Rainbow can automatically detect if a disk image has an ATR header. The largest image allowed is the enhanced density size (1040 sectors x 128 bytes). Other disk formats such as ATX are not currently supported.

To speed up disk access Rainbow drops the frame rate during disk I/O operations.

The “auto boot” option tells Rainbow to automatically reboot after a disk image is inserted into drive 0. The “auto boot” option can be set to on when Rainbow starts up (see Rainbow.config).

Importing external files into Drive 1

This facility will intelligently paste an external file from your PC hard disk onto the disk image in Drive 1, updating the directory, VTOC etc. This will work as long as the file is not too large for the remaining space on the disk and if the directory is not full.

N.B. Importing DOS.SYS and DUP.SYS files into a blank disk will not give you a bootable disk; in additional you must set the 15th byte in sector 1 from zero to one. This can be accomplished using some kind of hex editor.

This option is only highlighted when a disk is in Drive 1.

This feature assumes Atari DOS images and should work with similar DOSes.

Exporting disk files from Drive 1

Choosing this option will allow you to export valid DOS files from a disk image in Drive 1 onto your PC hard disk. For each suitable file, you will be presented with a dialog box. Click on 'Cancel' to skip a file.

But what is a suitable file? Files on an image created by Atari DOS. If other DOSes use the same disk layout (i.e. VTOC, sector and directory format etc.) then these should export OK.

This option is only highlighted when a disk image is in Drive 1.

This feature assumes Atari DOS images and should work with similar DOSes.

System Options

“Power up” reboots the Atari device (the same as switching a real Atari off and on again). If you keep Ctrl key pressed while powering up then this removes all ROMs and disks, useful to escape a crash situation.

“100% Speed Cap” limits Rainbow to actual Atari speed.

“Cheat mode” turns off PMG collision detection, just a bit of fun in games like Pac Man.

By default Rainbow pauses when the app loses focus. Should you want it running while you check your email tick “Run in background”.

Keyboard

All Atari keys are mapped to the PC keyboard. Extra keys are:

PC Key	**Atari Key**
System Reset	F12
Option	F1
Select	F2
Start	F3
Help	F4 (XL/XE only)
Pause	F4 (5200 only)
Break	Shift+Esc
Atari Logo	Page Up

If you select joystick emulation with cursor keys or L<>? then these keys will not function properly when typing. Select joystick emulation with keypad to resolve this. You can change the default keys in the Rainbow config file.

Note that Atari’s Caps Lock is not synchronised with the PC’s Caps Lock. Otherwise Rainbow would have to set PC’s Caps Lock on every time, which is quite annoying.

All Rainbow menu shortcuts use the ALT key to avoid conflict with Atari keyboard.

Be sure to turn off Window’s Sticky Keys, as this will get in the way of using Rainbow.

5200 controller

The real 5200’s controller has an analogue stick and a keypad. On Rainbow # and * keys are at Z and X for easy access. The top fire button is Shift, the lower fire is Ctrl. The Pause key is at F4 and the 10 digit keys at the usual place.

Joystick Support

You can use 1 or 2 real joysticks with Rainbow. Plug in the joysticks before launching Rainbow. Then click “Show joystick inputs” in the Input menu. This will tell you if the joysticks are detected ok and which one belongs to Player 1.

If you don’t have a PC USB joystick you can buy cheap ones off Ebay for £5. This one has analogue sticks which can be used with Rainbow.

Native joystick support

Simply plug in the joysticks to play. Two player games are supported with both players using the same one joystick (for games where each player plays alternately) or 2 separate ones (for games where 2 players play at the same time).

Shoulder buttons are Option and Select keys (or * and # for 5200); Select button is pause, and Start button is the Start key.

Joystick emulation using keyboard

If you don’t have joysticks Rainbow emulates a joystick using the cursor keys, numeric keypad or L<>? combination, with Ctrl or zero (numeric keyboard) keys for fire. Only joystick 0 is emulated using the keyboard.

If you select joystick emulation with cursor keys or L<>? then these keys will not function properly when typing. Select joystick emulation with keypad to resolve this. You can change the default keys in the Rainbow config file.

Paddle emulation using the mouse

Paddle 0 is emulated using the mouse. Select this option under Input menu for games like Kaboom!; fire is Control key.

5200 controller

The 5200 had an analogue joystick. Because the real 5200 joystick is analogue, some games won't play properly in emulated joystick mode (joystick mode is also self-centering). At this point you can select paddle emulation and use the mouse. Rainbow can use a real joystick, and if your real joystick has analogue sticks try using those.

The 5200 has 2 fire buttons, on the joystick fire1 is North-South buttons, fire 2 is West-East buttons. E.g. Choplifter makes use of both fire buttons for turning and firing.

Using a real joystick the shoulder buttons are * and # keys; Select button is pause, and Start button is the Start key.

For games like Gorf and Kaboom! use the mouse (paddle emulation) to move properly.

Sound

Rainbow plays sound through 4 channels using POKEY samples to give realistic audio effects. Disk noise is also emulated, as well as the internal speaker (which gives the key clicks).

Tools & Trace

The menus for Tools & Trace can be turned on in Rainbow.config.

The Tools features allow you to perform diagnostic actions such as disabling players/missiles, DLIs, etc. Bullet Time slows the speed right down.

The Trace features allow you to create a log file of certain Atari activities. All files are written to the Trace folder. You can trace:

- CPU execution (this will create a very large file in only a few seconds, so use sparingly). The value in square brackets is the target address to act on, which is helpful for complicated instructions such as STA (&FC),Y. The time is given as scanline and cycle number at the start of each line.
- Interrupt events (such as NMI, DLI, IRQ, Pokey timers)
- Display list details (cycles stolen, display list commands, etc.)
- Serial I/O (SIO) disk activity

Select “Start Tracing” to begin. Only when you stop tracing will the trace file (Rainbow System Trace.txt) be available for examination.

“Dump RAM To Files” will write out RAM to a number of files.

“Only Trace CPU in RAM” will omit code with address > $c000.

Appendix A: Rainbow.config file

This file contains the startup default for various settings including ROM sockets, DIP switches and disk images. The file is commented and should be self-explanatory.

The config file is loaded when Rainbow starts up. If you make changes, exit and relaunch Rainbow. Use this file to define default menu settings, screen size, etc. You also specify which files to use for OS ROMs.

Use /* and */ to comment a block of lines.

Appendix B: Tips for running Atari software

For a list of titles tested on Rainbow visit www.chrislam.co.uk

Here are some general tips on getting software to run on Rainbow.

Make sure the images and files are of good quality. There are plenty of duff Atari files on the web, some hacked without any testing. I recommend downloading from trustworthy websites.

Always power up before loading a game.

Some games may need a 800XL or 130XE device to run; some may (or may not) need BASIC. Keep F1 (Option) pressed when re-booting XL/XE to disable BASIC (this is a Atari OS feature, not Rainbow!)

Make sure you chosen the proper input device for the game (joystick or paddle).

If your favourite game doesn’t work, let me know.

Appendix C: Problems running Rainbow

Rainbow 2.0 is primarily targeted at Windows 7 and Vista. However Windows XP should work ok.

Full screen modes may inadvertently show the Windows taskbar (especially in XP), but press ALT+Space a few times and it should disappear. In Windows 7 and Vista you can specify whether the taskbar should display on top of other windows, if problems persist.

If sound is a bit crackly check your version of DirectX. XP users can try turning off hardware acceleration to see if sound quality improves. Turn off any other sound card effects (like echo, 3D surround, etc.) to hear the Atari sounds as nature intended.