



**The Brewing Academy
Presents
ElectroTrains
Ultimate Atari Cartridge
Revision date: 21 Apr 2020**

Basic Usage

The Label side/SD card slot side should be facing upward (or forwards) in the computer, with the chip side downwards (or backwards).

Insert an SD card (either full size, or MicroSD in an adapter) into the slot. The card does not require any special preparation, since the Ultimate cartridge can read FAT (including FAT32) file systems. Long file names are supported.

When the Atari is powered on, a list of any ROM & CAR files and directories on the SD card should be shown on the Atari's screen. Keyboard commands are shown at the bottom of the screen. This version of the firmware also supports XEX files.

It is best to organize your files in directories since the cartridge will load and sort the files in the directory before display. If you have to many files in any one directory, this may cause a noticeable pause before display. Also, only the first 20 files are displayed (A through T).

List Navigation

Whether you choose to organize your files in folder/subdirectories or just pile them all in the root directory, you can navigate through the files in a variety of methods.

Joystick: Up moves you up the list and down, obviously, goes down the list. Fire starts the file/changes to the highlighted subdirectory.

Keyboard: Any associated letter will start the corresponding file/change to the directory. Up arrow will move up the list. Down arrow will move down the list. Once you have reached the bottom/top of the screen, it will scroll to the next page (if one exists). Left arrow will move to the prior directory, if applicable. Control+Up [or Down] Arrow will move up/down to the next page (if applicable). Shift+Control+Up [or Down] Arrow will move you to the Start/End of the entire list of files.

You can disable the cartridge (using the X key) if you want to boot normally (e.g. to disk) and leave the cartridge plugged in (to avoid wear and tear).

SD Cards

Higher speed SD cards are recommended. SDHC (High capacity) cards are supported. On a high-speed card, a 1 megabyte ROM file (e.g. AtariMax) takes about 3 seconds to be loaded into the cartridge when selected. Slower cards may take longer.

Status LED

LED	Meaning
Blinking	The cartridge menu screen is active
On	Selected cartridge is enabled for access (RD4 or RD5 active)
Off	Selected cartridge is disabled (RD4 and RD5 inactive)

Reset Button

Press the reset button (next to the SD card slot) to reset the cartridge firmware. This will generally cause the Atari to crash, and the reset button on the Atari can then be pressed to return to the cartridge menu.

Supported Cartridge Types (CAR files)

Description	CAR Type(s)
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Standard Atari 8k	1
Standard Atari 16k	2
Atari XEGS 32-1024k	12-14, 23-25
AtariMax 1mbit (128k)	41
AtariMax 8mbit (1024k)	42
Switchable XEGS 32-1024k	33-38
Megacart 16-1024k	26-32
Bounty Bob	18
Williams 32k, 64k	8, 22
OSS 8k	44
OSS 16k (034M)	3
OSS 16k (043M)	45
OSS 16k (type B)	15
SIC!Cart (128k, 256k, 512k)	54-56
SDX 64k	11
Diamond 64k	10
Express 64k	9
SDX 128k	43
Blizzard 16k	40

Converting to CAR format

Utilities are available to convert ROM/BIN files into the CAR file format. The ROM2CAR utility available at <http://www.thebrewingacademy.net/ROM2CAR.htm> provides an easy drag and drop interface to do this.

With the most common 8k and 16k Atari ROMs, there is no need to convert these first to CAR format since these cartridge types will simply be assumed from the size of the ROM file (see below).

ROM Files

Plain ROM files are supported, but since these files are raw cartridge dumps, the Ultimate Cart will decide what type of cartridge they come from based on the file size only. The table below shows what types will be used.

ROM File Size	Cartridge Type
8k	Standard Atari 8k
16k	Standard Atari 16k
32k	Atari XEGS 32k
64k	Atari XEGS 64k
128k	Atari XEGS 128k
256k	SIC!Cart
512k	SIC!Cart
1024k	AtariMax 8mbit

XEX Files

The latest version of the firmware adds a new menu, with joystick control. It also supports loading XEX files (in addition to cartridge files).

Note that the XEX loader is copied to location \$700 in the Atari's RAM. This should be compatible with most software in XEX form.

Alternative Menu

If a file named `_BOOT.ROM` (8k) is present in the root directory of the SD card, the cartridge will attempt to overwrite the in-built boot ROM with this file before the Atari starts accessing the ROM. This allows the menu to be replaced with an alternative version, but successful operation may require a fast SD card. Delete the file to revert to the built-in menu.

Source code for the built-in menu is available on the project website.

Note that setting the hidden or system flag on `_BOOT.ROM` (using a PC) will prevent this file being displayed on the menu.

Upgrading the Firmware

Should new firmware be available, a USB Blaster (or clone) can be used to upgrade your cartridge. A JTAG socket is present on the FPGA side of the board. Connect this to the USB Blaster and power the board. A POF file can then be programmed to the chip using the Altera Quartus Programmer (free download).

The board can be powered during the firmware update through the cartridge slot of the Atari. Alternatively, you may install a two-pin header in the space provided on the board. This has not been installed to prevent accidental shorting.

