

Apple // Mass Storage Results

Setup Overview

All tests use:

- ROM03 Apple IIGS with System 6.0.1
- TransWarp GS (clone) running at 7Mhz

GS/OS boot is defined as: video of screen recorded at 60fps. Frames counted from first partial visible frame of GS/OS load screen to last visible partial frame of stopwatch in upper left corner of screen.

GS/OS verify is defined as: video of screen recorded at 60fps. Frames counted from first partial visible frame of verify window until last partial frame of verify window.

Image file tests use ProDOS Order (.PO) files.

Device Tests

MicroDrive Turbo from UltimateMicro

Version: 0.7, Firmware 1.0 (Card is dated 1996).

Overview

Target Audience:

- Folks who need a super-fast “hard drive like” setup for their Apple IIgs, but who don’t want or need to swap disks or images around much.

Pros:

- SPEED! This is the fastest device I was able to obtain and test.
- Easy to install.
- About equal in setup/use as a classic CFFA2, but has more available features with the included software.
- Production availability.

Cons:

- Old Technology:
 - <http://mirrors.apple2.org.za/apple2.caltech.edu/miscinfo/idecard>
- More cumbersome to setup and use than most other devices.
- A little difficult to remove from the slot due to size.
- Utilities are included on a boot image on the CompactFlash drive, not built into the device firmware. This means to reconfigure the device, you may have to leave your environment.
- No hot-swap of media or disk images. If you want to load up another volume or partition, you have to shut down, swap your media, boot to their tool, set up your volume/partition, then boot back into your target environment.
- Partitioning CFs is a little cumbersome because it uses formatting native to the design. The utility that comes with the card is the best for partitioning your CFs, it results in fewer problems.

- Comes with IIGS firmware pre-installed, so you can't just throw it into an older Apple II. Requires you to manually reprogram the flash chip to get multi-machine capability and when you make that change it decreases IIGS performance.

Benchmarks

- GS/OS Boot: 11.383 sec (683 frames)
- GS/OS Verify: 3m 3.317s (10,999 frames)
- Brutal Deluxe Benchmarked

Drive	Img Type	Test	Avg. Throughput
Lexar 256MB 40X CF	MDT Native	File Read	117.3 KB/s
Lexar 256MB 40X CF	MDT Native	File Write	86.3 KB/s
Lexar 256MB 40X CF	MDT Native	R64	KB/s
Lexar 256MB 40X CF	MDT Native	RBbyB	88 KB/s

CFFA3000 from R&D Automation

Version: 1.0 / Revision: C / Firmware: 3.1

Overview

Target Audience:

- Everyone: has all the options for the power users, and elegant ease-of-use for casual Apple II fans.

Pros:

- Best set of features of all of the cards.
- Supports CF "formatted", CF FAT32 and USB FAT32
- USB is Hot Swappable!
- Not the fastest, but fast enough.
- Super easy to change images while in use – on classic Apple 2 you can use the drive switcher cable, on IIGs, just drop into the CDA and change images at will.

Cons:

- Production availability. It's only available every 2-3 years, in small batches.
- "Drive Switcher" pins on the back of the card can be bent if you're not very careful when removing the card.

Notes

- There is some variability in speed depending on the media type and image formatting you use, but not enough of a difference in everyday use to warrant worrying about what card/image you're using.

Benchmarks

- GS/OS Boot
 - CF – CFFA Native: 13.233s (794 frames)
 - CF – Image: 12.317s (739 frames)
 - USB – Image: 12.383s (743 frames)
- GS/OS Verify
 - CF – CFFA Native: 5m 23.333s (19,382 frames)

- CF – Image File: 5m 20.183s (19,211 frames)
- USB– Image File: 5m 22.133s (19,328 frames)
- **Brutal Deluxe Benchmarked**

Drive	Img Type	Test	Avg. Throughput
Corsair Survivor 1GB USB	PO	File Write	44.6 KB/s
Corsair Survivor 1GB USB	PO	File Read	84 KB/s
Corsair Survivor 1GB USB	PO	R64	106 KB/s
Corsair Survivor 1GB USB	PO	RBbyB	79 KB/s
Trancend 8GB 133X CF	PO	File Write	51 KB/s
Trancend 8GB 133X CF	PO	File Read	85 KB/s
Trancend 8GB 133X CF	PO	R64	106 KB/s
Trancend 8GB 133X CF	PO	RBbyB	79 KB/s
Komputerbay 16GB 600x CF	CFFA Native	File Write	53 KB/sec
Komputerbay 16GB 600x CF	CFFA Native	File Read	85 KB/sec
Komputerbay 16GB 600x CF	CFFA Native	R64	106 KB/sec
Komputerbay 16GB 600x CF	CFFA Native	RBbyB	64 KB/sec

CFFA2 from R&D Automation

Version: 1.2 / Revision: B / Firmware: 1.2

Overview:

- It's an oldie, but a goodie – one of the first available mass produced flash storage solutions for Apple 2 computers. Included here as a sort of control.

Target Audience:

- Nobody, as the card is out of production.

Pros:

- It works.

Cons:

- No longer available.
- Not the fastest option.
- Not much in the way of configuration: Format your card in CiderPress, select the matching options in jumpers and get to work.

Benchmarks

- GS/OS boot - CF - CFFA Native: 23.383s (1,403 frames)
- GS/OS Verify: 13m 16.350s (47,781 frames)
- **Brutal Deluxe Benchmarked**

Drive	Img Type	Test	Avg. Throughput
Komputerbay 16GB 600x CF	CFFA Native	File Write	26 KB/sec
Komputerbay 16GB 600x CF	CFFA Native	File Read	39 KB/sec
Komputerbay 16GB 600x CF	CFFA Native	R64	43 KB/sec
Komputerbay 16GB 600x CF	CFFA Native	RBbyB	34 KB/sec

FloppyEMU from Steve Chamberlin

Version: 1 / Revision: 1.3 / Firmware: apple-II-0.1P-F6 / Mode: Smartport

Overview:

Target Audience:

- Casual users of both Apple 2 and Classic Macs who want a single device that will work across their entire collection.

Pros:

- Most versatile of all the devices. Works on any SmartPort, Floppy or HD20 capable Apple 2, Mac or Lisa (The newest version is better as some extra compatibility and circuit protection are built in.)
- Rarely requires opening your computer.
- Production availability.

Cons:

- Glacially slow due to limitations of 19-pin drive port technology.
- Can have problems with certain kinds of formatting utilities. Always suggested to either use file-by-file copy or sector copy to move data to an image file on the device and not use format-copy operations. (Read the manual!)
- No unified firmware for both Mac/Lisa and Apple II modes. If you want to use a single unit on both types of systems, you have to change the firmware each time, a manual process.
- When in HD20 or Smartport mode, you can only use a single image at a time and have no option to change images while the system is running.

Benchmarks

- GS/OS boot - SD - Image File: 44.167s (2,641 frames)
- GS/OS Verify: 29m 29.167 seconds (extrapolated due to FloppyEMU crash during test)
 - 43392 blocks in 70277 frames (19.31.17 total time), so 1.619584255162242 frames per block
 - 65536 total blocks, so 106141.0737463127 frames extrapolated.
 - 106141 frames = 29 minutes, 29.167 seconds, (104400/1740/1)
- Brutal Deluxe Benchmarked
 - | <u>Drive</u> | <u>Img Type</u> | <u>Test</u> | <u>Avg. Throughput</u> |
|---------------------|-----------------|-------------|------------------------|
| Sandisk 8GB MicroSD | PO | File Write | 15 KB/s |
| Sandisk 8GB MicroSD | PO | File Read | 18 KB/s |
| Sandisk 8GB MicroSD | PO | R64 | 18 KB/s |
| Sandisk 8GB MicroSD | PO | RBbyB | 17 KB/s |

Other items I was not able to benchmark or test, but have enough information to include here:

SDFloppyII from A2 Heaven

Version: ? / Revision: ? / Firmware: ?

Overview:

Target Audience:

- Casual users of classic Apple 2 units who want a simple option for using or preserving disk images.

Pros:

- Production Availability

- Easy to install – plug it in just like a classic Disk II drive.
- You can get an adapter from the same builder to allow you to connect the device to //c and IIGS units.
- You can get a custom enclosure to make it look like a Disk II. NERD CRED!

Cons:

- SDFloppyII emulates only the original Disk II drive and supports only 140K Disk Images.
- Slower than other options – basically at Disk II Card speed with no DMA.
- Clunky LED/Button interface to determine which images to pick.

Benchmarks

- n/a

UNISDISK from Nishida Radio

Version: ? / Revision: ? / Firmware: ?

Overview:

Target Audience:

- Intermediate to advanced users of classic Apple 2 units who want a simple option for using or preserving disk images.

Pros:

- None?

Cons:

- Production Availability – made in very small batches and likely will not be available again.
- No enclosure – it's just a bare board that sits outside your machine.

Benchmarks

- n/a

UNISDISK Air from Nishida Radio

Version: ? / Revision: ? / Firmware: ?

Overview:

Target Audience:

- Intermediate to advanced users of classic Apple 2 units who want a unique option and extra versatility for using or preserving disk images.

Pros:

- It has a WiFi option that does not require any onboard media. NIFTY!

Cons:

- Production Availability – made in very small batches.
- No universal hardware - there are three different versions of the device depending on the Apple 2 you wish to use it with.
- No enclosure – it's just a bare board that sits outside your machine.

- In wireless mode it depends on another computer for media hosting.
- Relatively difficult to get the primary configuration going.
- You cannot format disk images using it.

Benchmarks

- n/a