Compact Flash as an Alternative to Hard Drives in Arcade Games

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Call me old fashioned, but putting hard drives in arcade games was just a bad idea. Granted that the games themselves definitely benefit from the additional storage capacity (Gauntlet Dark Legacy, San Francisco Rush, Hyperdrive, Carnevil-- all excellent titles to be sure), but the problem is that you'd be hard pressed to find a less hospitable retail environment than a commercial arcade for trying to keep a harddrive *working*. Long hours, jarring impacts, less than careful handling, and lack of cooling all contribute to a high rate of failure for hard drives in an arcade machine.

3.5" vs. 2.5" HD sizes

Atari and other manufacturers (Konami for example) experimented by using 2.5" 'laptop' sized hard drives instead of the 3.5" version common in personal computers. Although the laptop drives have superior shock and vibration resistance (and more flexible power requirements) they too still fail with time... No way around it, a hard drive has bearings, motors, and an aluminum disc spinning at >5000RPM waiting to reduce any magnetoresistive read/write head to shrapnel should the machine take an unexpected jolt while operating.

3.5" HD vs. Compact Flash

Alas, up until recent times the options for storing large (Gigabyte sized) chunks of data were largely limited to hard drives. Even a CD's ~650Mbyte capacity wouldn't come close to a hard-drive. (CD-ROMs in arcade machines is arguably an even *worse* idea than a harddrive-- one look at the amount of dust that gets inside an arcade cabinet explains why CD a consumer CD mechanism is not long for this world in an arcade.)

Recently a relatively new alternative to using a harddrive in an arcade game has become financially viable. Introduced in 1994, Compact Flash cards have been around for a long time, but driven by the popularity of digital cameras and the ever expanding space requirements of embedded systems, the lowly Compact Flash card has suddenly become affordable in densities useful in the arcade.

For several years now I've been watching and waiting for CF densities to go up and prices to come down. In the last few months (as of the time of this writing) this has finally happened. A (relatively) high speed 2GByte Compact Flash card can now be had for under $120. Now we're talking!

Compact Flash to IDE Adapters (direct plug-in and cabled versions)

Compact Flash cards at a firmware level are essentially ATA (Advanced Technology Attachment-- the "IDE" interface used in most modern IBM PC compatible computers) devices that use the modern LBA (Logical Block Addressing) scheme. What's that mean? Basically they "look" just like a regular harddrive as far as most software is concerned. One need not but glance at a Compact Flash card to conclude that they are radically different electrically and mechanically however. As luck would have it, there are a variety of "CF to IDE" adapters on the market which make it easy to plug a CF card into a "normal" IDE interface. They typically are available the $10-20 range.

CF to IDE adapter in place on Area51 PCB (click above for larger image)

With a suitably large (>1GB) Compact Flash in hand and an inexpensive ($12.99) CF to IDE adapter I decided to finally sate my curiosity after all these years. I was going to convert an Atari Area51 boardset to use Compact Flash.

The process would seem to be simple-- connect the Compact Flash card with the IDE adapter to a PC, use a sector/LBA level disk copier ("DOLLY.ZIP" in this case) to make a 1:1 image copy of the Area51 drive to the Compact Flash card, plug that into the Area51 boardset and off we go!

The only problem was that I didn't have a good Area51 hard drive to start with...

Here's where the popularity of MAME is an indisputable benefit to those of us still using the "original" hardware for our games. Area51 has been emulated by MAME for a while, so compressed images of original Area51 harddrives are easily found on the Internet. In my case, I located "area51.chd" and proceeded to decompress it using the "CHDMAN.EXE" program that comes with most MAME executable archives.