

# Just For Starters

by Jason Compton



## THE GREAT CARTRIDGE EXPANSE

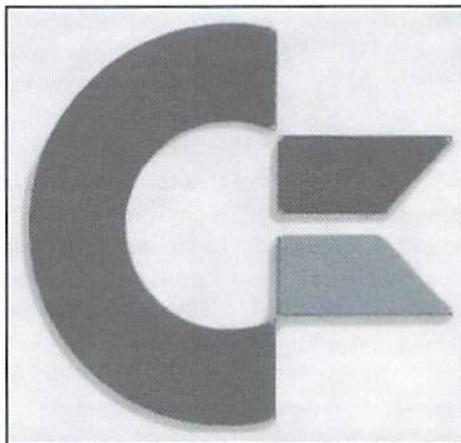
The Commodore 64 was launched with a set of expansion ports unique to its design. The role that the bus designers foresaw for the "expansion", or cartridge, port of the C-64 and 128 was probably not the same as that seen by modern-day Commodore developers. The past fourteen years have brought a slew of cartridges, some forgettable and some eminently useful, and the present holds a great deal of promise.

### ROM Cartridges

Early in the 64's life, floppy drives were very expensive, making disks a fairly unattractive medium for personal storage and commercial publication. The other alternative, cassette tape drives, were relatively cheap and the storage medium plentiful and abundant, but loading from tape can be a horribly slow process, requiring up to a half an hour to load a single program.

Enter ROM cartridges (read-only memory, indicating a memory chip or chips with data that cannot be altered or erased). More expensive to build and reproduce than cassette tapes, cartridges provided a medium that any C-64 user could take advantage of, without requiring the ownership of an expensive disk drive or a painful tape drive. Cartridges can be plugged directly into the expansion slot, and when the machine is powered on, the computer has almost instant access to the program. And from a marketing standpoint, cartridges were a well-established and understood concept among the general buying public, who had already been introduced to cartridge-based consoles such as the Atari 2600.

Generally, the first cartridges contained relatively simple but charming games such as Radar Rat Race and Crisis Mountain, and several big names in the industry, such as Sega and Parker Brothers, brought their popular titles to Commodore cartridge slots. Commodore also published a few personal utility programs on



cartridge, as well as the BASIC enhancer Simon's BASIC, but in time the cartridge lost its appeal as the more flexible floppy drive, with its dirt-cheap mass-production of disks, came down in price.

But the cartridge port would not rest and collect dust so easily. With the cartridge port freed up, developers sought new and more innovative applications for the powerful slot.

### Fastloaders

Floppy drives (in general, trusty 1541 units) were in millions of homes by then, and people started discovering a drawback to the use of Commodore floppy drives: access was pretty slow. Not as slow as cassette tapes had been, but still at a pace that was rather inconvenient to the average user. It didn't take long for developers to discover a number of means, entirely through software, to make the 1541 and C-64 talk to each other more rapidly. The problem with these solutions was that they had to occupy a small but significant portion of the computer's memory at all times, meaning that a large program, or one with its own loading routines, could easily corrupt the new routine.

So companies turned to the cartridge port as a way to store their rapid disk access methods without infringing on the computer's standard

64k of memory. The trusty favorites in this category were FastLoad from Epyx and Mach-5 (C-64) and Mach 128 (C-128) from Access. Both offered increased load and save speed, a DOS wedge, and a rudimentary set of disk utilities. While the rapid loading routines of these cartridges were not always compatible with commercial software, particularly copy-protected programs, in general they served users and kept them reasonably happy with their disk access.

### RAM Expansion

When the Commodore 64 was released, it was the most cost-effective computer in its class. Its standard 64k was greater than all but the high-end (and high-price) IBM PC line. Over time, users began to recognize that to handle serious quantities of data often requires a great deal of available memory, and that 64k was simply not sufficient. The inception of GEOS, the powerful but memory-intensive graphical operating system for the C-64 and 128, only added to this frustration, as a new line of easy-to-use tools offered the potential to work with large documents, but were hindered by the 64's memory limits. While the release of the 128k C-128 helped to some extent, for 64 users unwilling to change computers, the RAM expanders were a blessing.

Initially produced by Commodore but later taken up by several other companies, including GeoWorks and CMD, RAM expansion units live in the cartridge slot and offer the use of RAM disks (exceptionally fast areas of memory used for storage much like a floppy disk) and additional document space for programs designed to take advantage of them (usually GEOS and related applications). The first RAM expansion units offered as little as 128k of extra storage for the C-64. Soon, with the introduction of the Commodore 1750 and 1750 Clone and the GEOS-specific GeoRAM, 512k became the high-end standard for extra memory.

Over time, even more memory expansion became possible through such products as the BBGRAM and the RAMLink. Both can be battery-backed (so that even if the 64 loses power, the contents of expansion memory remain intact). The BBGRAM was available in up to a 2 megabyte form. The CMDRAMLink can hold up to 16 megs and contains JiffyDOS, CMD's high-speed disk access protocol for even faster access to memory storage. The CMDRAMLink also offers a cartridge passthrough slot; the usefulness of which should be growing more and more apparent.

### **Better Video?**

One of the laments of high-end C-64 users is the machine's limited text resolution of 40 columns of characters eight pixels wide. While GEOS attempted to relieve the restriction somewhat, some wanted a solution that would work with existing software and would allow an 80-column text display, like that offered by computers like the IBM, Amiga, and Macintosh.

To this end, various workarounds developed. One found its way onto a cartridge, presumably in order to better reside in the Commodore's memory. The 80 column programs do not enhance the Commodore's basic graphics capability (a displayable area of 320x200 pixels, 320 pixels wide divided by 8 pixels wide equals 40 columns of text) but instead alter the way it thinks of characters (320x200, 320 pixels wide divided by 4 pixels wide equals 80 columns). In effect, everything becomes 50% thinner.

The workaround only proves mildly compatible with existing software, and is only readable under certain color combinations. The rest are too blurry to discern. Overall, the 64 80 column mode is a disappointment. Those serious about 80 column mode would be well advised to investigate the C-128's true 80 column mode, which is considerably superior.

### **Serial Speed**

Commodore users, like other computer users, are never satisfied; feeling that the grass is greener on the other side. For some time, the standard for modem speed was 2400 baud, a speed most Commodore terminal software supported. Modems made exclusively for the Commodore User port (the port on the opposite side from the cartridge port) as well as specific serial adapters designed to allow the use of industry standard modems supported this speed. But after a time, the industry began pulling away, first with the popularization of 9600 baud modems, and then pushing beyond to 14,400 (14.4) and 28,800 baud.

Users tried to squeeze more from their user port, but the modem manufacturers weren't

catering to the 64. A conventional solution wasn't in sight. Then came SwiftLink. Initially promoted as a way to use the new 9600 baud modems on the 64, but later realized at speeds capable of supporting the high-end 28,800, the SwiftLink puts an industry-standard 9-pin serial port on the Commodore's cartridge port. This means that for a reasonable investment, Commodore users have access to the same speed of connectivity that PC owners feel makes them gods.

### **Double-Barrel SID**

The Commodore 64's musical abilities have been much lauded over the years. For years, it offered better sound than standard IBM PCs, and its compactness and ease of use were quite appealing. The SID chip, the heart of the 64's sound generation, has been the subject of technical journal articles, and has been explored by serious musicians and hackers alike. Somewhere along the line, the two pursuits merged and the SID Symphony cartridge was born.

The cartridge contains a second SID chip and, for those programs and songs designed to take advantage of it, will use the two chips in tandem for a combined 6 voices of synthesized sound.

### **The Super Cartridges**

While it's fun to play with more sound and music and to have speedy telecommunications, the fact of the matter is that a number of users were looking for new avenues to explore their machines with, and needed more power and disk speed than the FastLoad and Mach line offered.

Thus sprung the "super cartridges". Among this generation of utility and fast loading cartridge was the Explode, the Super Snapshot, the Final Cartridge, and perhaps the best and most powerful super cartridge of the lot, the Action Replay. While no two super cartridges are exactly the same, each was built with some or all of the same features and goals in mind.

Better and faster disk access was of course a high priority. Most cartridges offered some sort of "monitor", a program used to directly examine and alter memory. All included a reset button, used to escape from machine crashes without powering down, or to escape from a program with the memory intact for later examination. They picked up where Simon's BASIC left off, adding new commands to BASIC to make its use easier. Many included a new and innovative capability called "freezing."

Freezing involves halting the program currently loaded and entering into a special menu of options provided from the cartridge. Options include the ability to save the current screen as a picture, the ability to make an exact backup copy of the program

(allowing you to reload the program at the exact point of the freeze; convenient for games which don't allow you to save your progress), or on the Action Replay, enter monitor mode and alter the program as it ran.

Avenues are opened up for frustrated gamers, budding programmers and explorers with these units. The best in my experience, and the only one still widely available, is the Action Replay. Its freezer is second to none, and provides a useful set of utilities and disk access programs. Some cartridges have individual assets that outshine the others (FastLoad still has one of the best disk editors, and Final Cartridge III has a graphical interface environment), but AR is the most well rounded.

### **Juggling Cartridges**

Now that you have all of these cartridges, you face the truth: you have more useful cartridges than you have cartridge slots. Devices such as the EX2+1 or EX3 circumvent this problem.

At first, cartridge expansion devices were intended to "avoid wear on the cartridge slot" by providing you with four new cartridge slots you could plug your favorite games into. By flipping a switch, you could choose which cartridge you wanted to be active, and could swap out games on the expansion unit rather than the main computer.

As the expansion devices such as SwiftLink came about and the usefulness of super cartridges was apparent, a new solution was needed. Cards like the EX3 allow multiple cartridges to be active at once, so using your favorite term program and 14.4 modem with a SwiftLink won't keep you from programming in your Action Replay anymore.

### **Last But Not Least: Accelerators**

What more could you do with the cartridge port? Over the years, that question has been asked and answered many times. The most dramatic statement has been in the development of Commodore accelerator cards, bringing increased speed to the computer itself through the port initially conceived of for a game of Tapper.

The early entries came at speeds of 4 and 8 MHz; significant improvements over the 64's 1 MHz, but compatibility was a problem. CMD's SuperCPU line for the 64 and 128 promise 20 MHz performance.

Given the course of innovation at every step in the exploration of the Commodore cartridge port, I can only believe that the new accelerators will have a positive influence on the future of Commodore computing.

