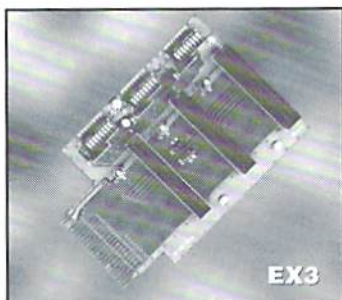


HARDWARE

IN REVIEW

CARTRIDGE PORT EXPANDERS: CMD'S EX3 & EX2+1



3-slot Cartridge Port Expander; \$34.95 (EX2+1 with two vertical and one horizontal: \$39.95); Creative Micro Designs, Inc., P.O. Box 646, East Longmeadow, MA 01028-0646; (800)638-3263 (orders); (413) 525-0023 (info); (413) 525-0147 (fax).

There you are with your computer and a mess of cartridges, a RAM expansion unit, and possibly a SwiftLink or Hart RS-232 cartridge. You'd love to use the REU with the SwiftLink, but you can't fit two cartridges into one expansion port slot. What do you do? This has been a problem for C-64 and C-128 owners for years, so hardware called cartridge port expansion units were developed to remedy this. The latest offerings in cartridge port expanders are Creative Micro Designs' EX3 and EX2+1. While I had only the EX3 for this review, the only difference on the EX2+1 is orientation of the third port—horizontal on the EX2+1, as opposed to vertical on the EX3.

Having no case, one can immediately see the simplicity of the

EX3's design. The circuit board has a total of 17 components, including 3 expansion port connectors, 3 sets of DIP switches, a reset switch, and 2 sets of I/O jumpers. The plastic legs attached to the board makes the EX3 the correct height to plug right into a C-64 or 128. One end of the circuit board plugs into the expansion port of the C-64/128 computer, and cartridges are plugged into the 3 connectors on top of the EX3.

As I said, there's no case; I'm sure adding one would have increased the cost. Not to worry—a fully utilized EX3 is practically hidden from view underneath the cartridges plugged into it. From the looks of the cases on some other expanders, not having one looks better to me. One might even argue that the lack of a case makes it easier to vacuum up the cheesy curls that inevitably fall down into cases—but none of us eat while computing, do we?

I'm not sure it's worth quoting the exact time it took to install the EX3—my watch simply doesn't have enough precision. With your computer off, unplug any cartridges, plug the EX3 in and plug the cartridge into the EX3 cartridge slot #1, which is nearest the computer. That's it. Turn the computer on and verify that nothing has changed. Your computer shouldn't notice any difference with the EX3 installed.

Now, the power of the EX3 comes from allowing multiple cartridges to share the expansion port. However, achieving this expansion

port utopia is a skill that will take time and some understanding of the Commodore expansion port. So, be prepared to try out some different configurations in your quest. CMD supplies a small pamphlet with the EX3 that describes the different switches and jumpers, but it doesn't go into great detail on how to set up the EX3, since there are hundreds of possibilities. I suggest finding each cartridges manual, and dusting off a book that describes the Commodore expansion port pins.

On the EX3, each expansion port connector has a set of 8 DIP switches that control it. The switches are labeled as follows:

SWITCH	SIGNAL
1	+5V
2	+5V
3	GAME
4	EXROM
5	I/O1
6	I/O2
7	ROML
8	ROMH

When a switch is ON, it makes that pin active to the cartridge plugged into the connector. A switch in the OFF position makes the corresponding expansion port pin inactive.

In addition, the middle connector (connector #2) allows the user to flip the meaning of I/O1 and I/O2. This means that, when flipped, a cartridge designed to activate on I/O2 will activate on I/O1. Typical examples of

cartridges that utilize I/O1 or I/O2 are the SID Symphony, SwiftLink cartridge, and Commodore's RAM Expansion Units (REU's). However, in order for this flipping to work, your software must be able to work with the cartridge whether it is activated via I/O1 or I/O2.

There isn't much to dislike about the EX3. It tackles a simple job, and does it about as well as can be done. It won't fix all the problems, but it tries. After I put the unit through its paces with some of the cartridges and I/O units I had, I discovered the following:

1. The EX3 is a great addition for people who have multiple I/O cartridges, like and REU, a SwiftLink, a HART Cartridge, or a SID Symphony cartridge. Although the REU is expected to be at I/O2, cartridges like the SwiftLink can work at either I/O1 or I/O2, and most software supports this feature.
2. The choice is unclear for users who have multiple game or productivity cartridges. Most program cartridges cannot share the expansion port, so a lot of switch flipping will occur when selecting a new cartridge. With such small DIP switches, this can get tedious.

As a computer engineer, I took a good look at how the EX3 was constructed, since the EX3 would be