

Quadram Corporation introduces an impressive conversion card that persuades PCs to accept many—if not all—Apple programs.

Quadlink: An "Appleboard" For The PC

Quadlink

Quadram Corp.
4357 Park Dr.
Norcross, GA 30093
(404) 923-6666

List Price: \$680

CIRCLE 624 ON READER SERVICE CARD

Quadram Corporation calls it Quadlink: a new product as unusual in concept as in design. What it does is let your IBM Personal Computer act like an Apple II. The design phase for the Quadlink card is completed. Quadram has been tooling up and expects to begin delivering Quadlinks by midsummer at a retail price of \$680. The card is aimed at large companies that already have a substantial investment in Apple software. It will allow a company to purchase IBM PCs without having to sacrifice its investments in Apple software and documentation.

Other potential users might include schools that wish to train people on different microcomputers. With Quadlink, a single PC accommodates software designed for at least two different computers.

The Quadlink fits into a single slot in the PC expansion bus. The PC disk-controller cable is plugged into the Quadlink and connects from there to the drives.



Figure 1: An IBM PC running Apple software using Quadlink by Quadram.

Also, the PC video display cable is routed through the Quadlink. According to

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Quadram president, Tim Farris, installation will be easy. The prototype I looked at had a number of cables sticking out through the rear of the PC's case.

Quadlink shares the PC drives and display. You can use the PC with standard PC-DOS and two drives or run the special Quadlink program and have, in effect, an Apple with the same two drives. There is no need to unplug the video display; the display is automatically switched to the Quadlink display.

The Quadlink display seems to mimic the Apple display perfectly. Even the imperfections apparent in a 24-by-40 display designed for color TVs were visible on the prototype configuration. Quadlink does have one advantage. You can plug it into an RGB monitor as well as a TV and get a higher-quality display.

Although the card seems to contain circuitry that acts like the Apple disk-controller card, I was told that certain software that uses half-track copy protection would not run on the PC due to differences in the drives.

Rather than put the Apple ROM on a Quadram card (potentially a litigation-inspiring maneuver), Quadram elected to provide 80K RAM of memory on the Quadlink. This allows the card to be loaded like an Apple language card and to accommodate boot programs that can talk to the PC serial and parallel ports.

Thus, the Quadlink provides an Apple emulation with disk-drive controller, video display, 64K of usable RAM, game port, and the 6502 microcomputer, all on one card. Of course, with the PC, you also have an upper and lower case keyboard. All serial and parallel communications (as

well as the keyboard control) take place through the PC. Although the prototype hook-up did not produce any sound, I was told that Quadlink will also share the speaker with the PC, so that shoot-em-up games can have the proper noises.

Exceptions

The most-likely problem with the Quadlink is copy protection. Many of the Apple programs are copy-protected by using a technique called "half-tracking." With half-tracking, information is actually written between the usual tracks on a disk. Software copy-protected in this way will not run on the Quadlink card.

Another thing to watch out for are programs that read the Apple keyboard ports or serial and parallel ports directly. Because these functions are built in on the Quadlink, this approach will not work.

Some Apple software also uses pieces of the Apple ROM that exist at specific locations (much like the PC software interrupts). Although I don't know for certain, my guess is that some of this software will not work with Quadlink.

If you have visions of setting up a bunch of pseudo-Apples using a number

of Quadlink cards in a single PC, you can also forget that. A single PC cannot accommodate more than one Quadlink.

It appears as if a large proportion of the available Apple software will run using a PC and the Quadlink card. Quadram insists that about 90 percent of the Apple software runs; in this manner, but the sample was too small to be typical.

The Quadlink card will run on a PC-XT, but it cannot take advantage of the XT hard disk.

My Observations

I went down to Quadram with a pile of Apple software to test. Due to a misunderstanding, I did not have the opportunity to try the prototype. After a short interview with Mr. Farris, I found out that the prototype had been whisked away for further software development (despite the fact that my previously-sealed software had been opened). One can only wonder.

Anyway, I did get to see the prototype running something that certainly looked like Apple DOS. It signed on with the usual Apple II prompt and the funny looking 24-by-40 display. We also got to try one game, and it appeared to work satisfacto-



rily. Certainly the graphics looked excellent, although no noise came from the speaker. The Apple disk is considerably slower than the IBM disk.

If Quadlink works at least as well as the prototype I saw, it probably deserves applause. Designing a full Apple II on a single IBM PC expansion card is no mean feat.

Quadlink and the Apple IIe

Quadlink was designed to emulate the Apple II. Any software that runs on the IIe and also on the II, should run using a Quadlink card. Software that takes advantage of new features of the IIe will probably not run using Quadlink. Quadlink does contain an upper- and lower-case keyboard, a feature both the IIe and the emulation share. Another common trait is the 64K, which comes standard, not expandable, on Quadlink.

Summary

Cards such as the Z-80 CP/M-80 emulators have been, well, not overwhelming successes. In part, this was due to the rapid conversion of existing Z-80 software to

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the IBM PC. The 8088 microprocessor in the PC is very much like the Z-80 processor, so that software conversion was a fairly simple task. Also, most Z-80 applications assumed characteristics that the PC shares, such as a 24-by-80 display and a full ASCII keyboard.

The Apple, on the other hand, is so totally unlike a PC that converting applications is a far more difficult task. A 6502 microprocessor chip (used on the Apple) has a completely different instruction set and register setup. The display on the

The Short Sweet History of Quadram

In this business quick response time is as important as a good idea.

Quadram Corporation was formed in 1980 by Tim Farris and William Strange. Tim Farris has a background in engineering and manufacturing, while William Strange has a background in marketing and finance. They made a very good team. Strange is former owner of a retail computer store, and as a result Quadram's products were aimed at that market.

Quadram's first few products in early 1981 were add-on cards for the Apple II and some printer buffers (the Interfazer and Microfazer line). When the IBM PC came out in late 1981, the partners rushed down to the local ComputerLand. They were excited by the technical documentation, and actually designed their first card for the PC (a 192K add-on memory card) from the manuals alone. The product was out in less than 2 months. Other products for the IBM PC (a dual printer card, a battery-backed-up clock) followed quickly.

In early 1982, Quadram counted about ten employees and could boast of a modest sales record. Strange's experiences on the road for the company led to the decision to take the four previous cards and integrate them into a single (and very suc-

cessful) unit, the Quadboard.

Today, Quadram has about 200 employees. It still sells plenty of Quadboards

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and MicroFazers and is beginning to branch out into other products. Farris insists that Quadram has no plans to produce a microcomputer of its own. It is strictly an enhancements manufacturer.

All production on Quadram products takes place in Atlanta. The company is finishing a new building, which will contain three times the space that Quadram now occupies.

—M.S.

Apple comes standard with graphics; the resolution is different from that available using a PC color/graphics adapter. The memory organization of the two machines is quite different. Finally, the Apple is a fairly old, static design. This has caused program designers to use characteristics that are more hardware-dependent than those dictated by CP/M-80, which is naturally hardware-independent.

The end result is that the Quadlink provides a far cheaper solution to running existing Apple software than converting the software to a PC. Conversion would imply essentially rewriting the software and documentation from scratch.

However, I am not so convinced of the

need for an Apple emulator. My subjective opinion is that, apart from games, very little substantive software exists for an Apple. VisiCalc does run on an Apple, but VisiCalc files are completely portable from machine to machine. And the instruction set is nearly identical.

Time will tell, but you would certainly have to be a games fanatic to be willing to spend \$680 just to transport your existing library of Apple games to a new machine. Perhaps Tim Farris is right that the best prospects are companies that would like a more capable computer that does not make existing software, training, and documentation obsolete. Hope they don't pick a IIe.

/PC