

Omikron TRS-80 Boards, NEWDOS +, and Sundry Other Matters

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Editor's Note

The other day we were sitting around the BYTE offices listening to software and hardware explosions going off around us in the microcomputer world. We wondered, "Who could cover some of the latest developments for us in a funny, frank (and sometimes irascible) style?" The phone rang. It was Jerry Pournelle with an idea for a funny, frank (and occasionally irascible) series of articles to be presented in BYTE on a semi-regular (ie: every 2 or 3 months) basis, which would cover the wild microcomputer goings-on at the Pournelle House ("Chaos Manor") in Southern California. We said yes. Herewith the first installmentCM

About the Author

Jerry Pournelle spent 15 years in the aerospace business before he became a full-time writer of science fact and fiction. He is the former director of the Human Factors Laboratories for the Boeing Company, and he worked on projects Mercury, Gemini, and Apollo, as well as military space systems.

Together with Larry Niven, Jerry Pournelle is coauthor of *Lucifer's Hammer* and *The Mote in God's Eye*; he has also written a dozen novels on his own, including *The Mercenary*, *Birth of Fire*, and *West of Honor*.

Dr Pournelle holds degrees in engineering, psychology, and political science. He succeeded the late Willy Ley as science editor for *Galaxy Science Fiction Magazine*; recently he has moved his science-fact column to the magazine *Destinies*, published by *Ace Science Fiction*.

My mad friend was raving again. "What this world needs," he said, "is some computer reviews by users."

"There are a lot of good reviews," I said.

"Yeah, some," he admitted. "But a lot more of them read like rewrites of the manufacturer's spec sheets. What I want is reviews by people who've really used the stuff."

I thought about that for a while and called BYTE. You're looking at the result. This will be a column by and for computer users, and with rare exceptions I won't discuss anything I haven't installed and implemented here in Chaos Manor. At Chaos Manor we have computer users ranging in sophistication from my 9-year-old through a college-undergraduate assistant and on up to myself. (Not that I'm the last word in sophistication, but I do sit here and pound this machine a lot; if I can't get something to work, it takes an expert.)

Fair warning, then: the very nature of this column limits its scope. I can't talk about anything I can't run on my machines, nor am I likely to discuss things I have no use for. Fortunately, that latter category is not so limiting as you might suppose. An author is most certainly running a small business, and I have accounting, mail-handling, and filing problems that you wouldn't believe. (Try sorting out data on subjects ranging from solar-power satellites and general relativity, on one end, to a concordance of the *chansons du geste* (French poems from the time of Charlemagne) on the other, coming from sources ranging from books and

journals to letters from readers.)

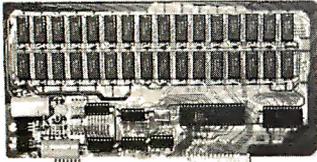
The equipment limitations are more severe.

Primarily, I use my friend Ezekiel, who happens to be a Cromemco Z-2 with iCom 8-inch soft-sectored floppy-disk drives. He talks to me through a Processor Technology VDM direct-memory-address (DMA) video-display board, driving a 15-inch Hitachi monitor. However, I can fool him into believing he's no more than a smart terminal to drive a Novation modem at 300 bits per second (bps); in that case he talks to me through an IMSAI VIO video board on a Sanyo 15-inch monitor because most of my network contacts prefer a 24 by 80 screen format. Incidentally, the VIO is set up for address hexadecimal B000 in memory-address space and routinely shares memory with the regular Industrial Micro static memory that fills Ezekiel from top to bottom. If I turn on the VIO screen I get a picture of what is in memory from location B000 to B780, and a weird picture it can be when we're running a long command file...

Zeke also turns out hard copy on a Diablo 1620 daisy-wheel printer running at 1200 bps. The Diablo is easily the most expensive part of my system, but in my business — writing books and articles, I require top manuscript quality, and the Diablo certainly delivers it reliably and efficiently (if noisily; sometimes it's a bit like being in the same room with a machine gun).

Ezekiel's main operating system is CP/M version 1.4, although we're

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In addition to Ezekiel, I have a TRS-80 Model I Level II with expansion interface and a full 48 K bytes of memory. The TRS-80 will run 5-inch disks on the TRSDOS or NEWDOS+ disk operating systems. It will also run 8-inch disks on CP/M, and therein lies a tale.

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In fact, my TRS-80 will run both 8-inch and 5-inch disks on CP/M, and programs created on Ezekiel will run on the TRS-80, or vice versa. Moreover, I can take programs written for the TRS-80 on cassette tape or TRSDOS and bring them up onto the CP/M system, then carry the disks in, and run them on the Cromemco. All this happens painlessly and without glitches, which sounds miraculous.

When George Gardner of Omikron Systems (1127 Hearst St, Berkeley CA 94702, (415) 845-8013) told me about the possibility of full CP/M on the TRS-80, I admit I was skeptical. I'd originally intended to let the TRS-80 talk to the Cromemco through serial RS-232C ports, thus allowing my assistants to prepare text on the TRS-80 and then squirt it over at day's end. I'd already started on the program: get files off the TRS-80 5-inch disks into TRS-80 memory, then send them with handshaking over to Ezekiel where they would be put onto 8-inch disks in CP/M format. The code isn't very complicated, but the whole thing would have been w*o*r*k, and I am as lazy as the next man. Fortunately, Omikron saved me all that trouble.

The Omikron system consists of a pair of neatly constructed circuit boards, comprehensible documentation, the CP/M operating system with a number of *excellent* additional utility programs, and, optionally, a pair of 8-inch floppy-disk drives (you can use your own drives if you like). The boards, which Omikron calls

Mappers, fit neatly inside the TRS-80 and can be installed by totally unskilled personnel in about 1 hour.

Omikron's Mapper I (\$199; specify memory size when ordering) fits into the TRS-80 keyboard unit. The installation instructions are exceptionally clear, at the level of "orient the unit so that the space bar is nearest yourself." They proceed step by step and end by telling you exactly how to reassemble the TRS-80. Omikron even tells you which length of screws go in which holes.

Although in theory you will have voided your Radio Shack warranty by breaking the seal (a dab of paint on one of the screws holding the TRS-80 case together), the Omikron Mapper requires no soldering, trace cutting, or any other alteration. What happens is that you pull out the Z80 processor, insert Omikron's board, and put the Z80 into a socket on the Omikron board.

When that's accomplished you can turn on the TRS-80; you get the message "T = TRS-80 C = CPM". If you hit T you will have a normal TRS-80; the Omikron equipment is totally invisible to both BASIC and assembly-language programs. (We've had our Mapper installed for weeks, and we have run some very sophisticated programs, without a glitch.)

If you hit C you have CP/M operating on your 5-inch disks. My disk drives happen to be forty-track Matchless units (Matchless Systems, 18444 South Broadway, Gardena CA 90248 (213) 327-1010), and they work about eight times as fast as Radio Shack's standard 5-inch disks. They have caused absolutely no problems with the Omikron Mapper and CP/M. Incidentally, my TRS-80 has Radio Shack's lowercase modification, and that has caused no problems either.

Omikron's Mapper II (\$99 plus \$10 per cable connector) installs in the TRS-80 expansion interface; installation is even simpler than Mapper I, and again involves no soldering, trace cutting, or other alteration of the TRS-80. If the Mappers are removed there is no way to know they were ever there.

The Mapper II in the expansion interface works under both CP/M and TRSDOS. In TRSDOS it acts as an external data separator for the floppy-disk drive, eliminating sector retry errors — those mysterious

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glitches that lose files.

With Mapper II installed I now run both 5-inch and 8-inch disks under CP/M, and I can transfer programs from 5- to 8-inch disks using the CP/M utility program PIP. George also furnishes a program to take files (including programs) from TRSDOS to CP/M format. My own operates with the Omikron disks. (Omikron sells a single 8-inch drive with both Mappers for \$1195; dual drives with Mappers are \$1795. Cables are included.) Omikron also furnishes the required software; we ran CP/M instantly after installing the Mapper boards.

The bottom line is that my TRS-80 with Omikron's additions has become a perfectly normal 48 K-byte Z80 computer, and yet can continue to function as a standard TRS-80 as well. It's as if I had both Model I and Model II TRS-80 in the same package. For those not familiar with the TRS-80 this may not seem so miraculous, but believe me, it is.

Nor is it hard to operate: my 9-year-old son is in the other room playing Temple of Apsai (an excellent real-time dungeon game) under TRSDOS, while his older brother (age 11) is impatiently champing to get on and run Adventure under CP/M. My secretary runs Electric Pencil on the TRS-80, then translates the files to CP/M format so that Ezekiel can read them.

Sure, Zeke is a better machine; but he cost a lot more than the TRS-80 plus the Omikron modifications. Omikron has made the TRS-80 a very convenient way to add a second computer without going bankrupt. Any TRS-80 owner feeling left out because all the good programs are written in CP/M (or who's using 5-inch disks for business systems and going mad because of the limited storage capacity of the little beasts) should get in touch with Omikron immediately. [Another device, the Maxi-Disk, that allows a user to run CP/M on both 5-inch and 8-inch floppy disks on the TRS-80 Model I is offered at a comparable price by Parasitic Engineering (1101 9th Ave, Oakland CA 94606). Although I have no direct experience with their product, the company is known for the soundness of their hardware design....GW]

"Impossible," my mad friend told me when I described the Omikron system. "The TRS-80 has BASIC in

read-only memory down in low memory-address space; CP/M can't run because hexadecimal locations 0 thru 0100 are full of BASIC. Radio Shack gave up on CP/M."

"But you see it does work," I said smugly. "Not only that, but you see the programs you brought from your machine work just fine on the TRS-80."

"Hmm," said he. "There's only one way he could do that."

And he was right. What Omikron's board does is "phantom out" all those read-only-memory parts down in low memory. It also re-addresses the TRS-80's memory-mapped video-display screen to hexadecimal FC00. The BIOS that Omikron furnishes does the rest. [BIOS is the module of CP/M that controls the transfer of data to and from the peripherals....RSS] George Gardner says there are some obsolete CP/M programs that might not run on the modified TRS-80, but I haven't found any. CBASIC and programs written in CBASIC run fine. So do all the various versions of Microsoft Disk BASIC, Tarbell BASIC, the BDS C Compiler, four programs written in Microsoft Compiling BASIC, the Vulcan data base, Microsoft's FORTRAN, Adventure, DDT, and a lot of utility programs obtained from the CP/M User's Group.

Omikron also furnishes utilities: a disk test, a memory test, programs to reformat 8-inch floppy disks as well as a formatter for 5-inch disks, copy utilities for both 8-inch and 5-inch disks, and some software to make the TRS-80 keyboard more convenient (allows absolute cursor addressing by emulating a Soroc IQ-120 terminal with all control characters plus square brackets), an initialization routine, and a program to set up your TRS-80's RS-232 port for serial input/output (I/O). All in all, it's quite a package. It's not often that I can recommend something without reservations, but I'm happy to say that Omikron (all equipment guaranteed for 6 months, parts and labor) is a real bargain that for a wonder works just as advertised. It really will make a TRS-80 Model I into a serious computer.

The basic TRS-80 is a lot of computer for the money. It comes ready to run right out of the box, and it can be set up by three boys — ages 9, 11, and 13. (At least mine was, not

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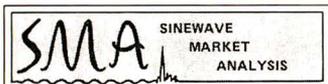
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without threats of mayhem which weren't the computer's fault.) The Tandy/Radio Shack documentation is excellent, and there are a lot of good programs available for the TRS-80. The Radio Shack service is speedy, efficient, and uncomplaining.

Just about every component of my TRS-80 has taken a trip to the local store to be fixed. None of that cost me anything; it wasn't even inconvenient, especially with local Radio Shacks all over the place. It was annoying (between my secretary and my boys, a day without the second computer can be an, uh, *interesting* day). Still, all computers have infant mortality problems. When Ezekiel was first installed, I thought Tony Pietsch of Proteus Engineering in Pasadena, California (the man who set up Ezekiel) was going to wire himself in as an integral component. Although each major part of my TRS-80 has been to the shop, my neighbor down the street has had a full system running from the first day with no glitches whatsoever. Given the price of the TRS-80, Tandy's quality control is better than you'd expect.

But there are some problems. The Tandy disk operating system, TRSDOS, is needlessly complex; the editor/assembler and T-BUG monitor aren't that good, and most of their business programs are simply not in the same class with their competition. Although Fort Worth (Tandy headquarters) lately seems anxious to fix up their act and send out revisions of both software and hardware, they remain secretive. For the moment, the best disk operating system for the TRS-80 is Apparat's NEWDOS+, a much better operating system than Radio Shack's, and it's upward compatible with TRSDOS. In fact, Tandy ought to be marketing NEWDOS+ themselves.

NEWDOS+ not only works better than TRSDOS, but also has Superzap: a routine which lets you go out to a disk file and examine and change it as easily as a good monitor will let you twiddle bits in memory! It's incredibly convenient. That's the good news. The bad news is that the documentation is nearly incomprehensible. Fortunately, though, there's a fix for that too: H C Pennington's book *TRS-80 Disk and Other Mysteries*, also available from Apparat (7310 E Princeton Ave, Denver

CO 80237) tells all you'll ever need to know about Superzap and the TRS-80 disk system.

NEWDOS+ and Superzap will let you read and write disk files sector by sector, change bits, defeat the TRS-80's silly "protection" systems, etc. It won't make TRSDOS as convenient as CP/M, nor will anything else except Omikron and CP/M itself; but they will make the TRS-80 operating system tolerable.

NEWDOS+ also has a disassembler. I haven't gotten around to aiming it at the TRS-80's read-only memory, but I'm about to; people I trust tell me it works fine. I already have Fuller Software's Supermap, which is an extensive set of comments to add to a disassembly of the TRS-80's Level II system firmware. Supermap has its problems, and strange lacunae; its author doesn't seem to know where the TRS-80 memory-mapped screen is addressed, as an example. Still, it's worth the price (about \$18) for anyone who wants to understand his TRS-80 (and there are some really nifty bit-twiddling routines in those read-only memories; with a good disassembly you can patch into them when writing your own assembly-language programs, thus saving a lot of memory and code).

I must admit I fail to understand Tandy's philosophy. Radio Shack charges about \$100 more for a 35-track 40 ms-access-time disk drive than Matchless, or Percom, or Vista is charging for the same type of equipment (which works better than Radio Shack's).

(Incidentally, most companies manufacturing disk drives for the TRS-80 write confusing advertising copy. For the record, the disk controller is in the TRS-80 expansion interface, and Matchless, Vista, or Percom 5-inch disks will work as either add-on drives or as the *first* disk drive. You will have to spend about \$20 at Radio Shack for a copy of the TRSDOS operating system and documentation, but I don't recommend Radio Shack disk drives.)

The TRS-80 with Omikron's Mappers is a truly competitive machine. You can buy a TRS-80 Model I with Level II BASIC, equipped with expansion interface, for under \$1500; fill it with memory for about \$200 more; add a pair of Omikron 8-inch disk drives for \$1795, and Matchless

5-inch drives for \$400 each; get a good line printer (again, I have Matchless at \$750). For a total cost of under \$5000, you have a 48 K-byte machine capable of running all the TRS-80 programs, CP/M software, and top-grade text editors like Word Master, Magic Wand, Electric Pencil, and the Proteus editor—and run both 5-inch and 8-inch disks in the bargain, all without building a single kit. And I can guarantee that a 9-year-old can use it.

I started off describing my system, and ended up talking a lot about the TRS-80. I don't use the TRS-80 all that much—it is the secondary system. So what *does* get run around here?

Well, first of course, text editors. I've written five or six books using Ezekiel, as well as countless articles and letters. Most of that has been described in articles in BYTE's companion magazine *onComputing*, but as Alice said in Wonderland, "things flow here so!"

In particular, there are at last a whole flock of new text editors, some excellent, some not as good as the old standards. One, unfortunately not

quite finished, promises to be better than anything available for the biggest machines. My next column will dissect a number of editors to show their good and bad points. (Also see my article, "A Writer Looks at Word Processors," in the Summer 1980 *onComputing*.) We'll not only include the big ones like Electric Pencil, WordStar and WordMaster, Magic Wand, Proteus, and the like, but even bigger ones like MIT's EMACS.

Secondly, here at Chaos Manor we have a file-management problem like nothing you have ever seen, and thus we have a plethora of file handlers and data bases. For quick and dirty work I use a simple (and inexpensive) data-base system from Workman Associates (112 Marion Ave, Pasadena CA 91106, for about \$75); it's far more than adequate for Christmas cards, telephone numbers, meal plans, and cooking-duty assignments for long-term Boy Scout hikes, and such statistics as mean, standard deviation, and two-variable correlations.

For more complicated work we use Vulcan (available for \$490 from SCDP Systems, 6542 Greeley St,

Tujunga CA 91042). Vulcan is a program that falls into a category I call "infuriatingly excellent"; that means it does everything you'd like it to, and perhaps a lot more, but the documentation is plain lousy. Vulcan will let you very quickly and easily structure a complex data base and enter data. You can add to it as you will, including taking files off other data bases like Workman's. Since Vulcan makes random-access disk files, the data base can be as large as you like.

It's much faster than any other disk-storage data base I've ever seen, and lets you do really complex things like: find all items with keywords "Solar" OR "Conservation" but NOT "Wind" AND NOT "Windmill"; sort by AUTHOR and create a new file; add the PRICE of all those items and INCREASE the price by 10%.

Actually, that wouldn't be a very complicated task for Vulcan, which is as much a language as a program; in fact, Vulcan has a limited BASIC-language system built into it. Vulcan can also execute command files (very handy if you have operations to be done at regular, say weekly or monthly, intervals). It will drive both

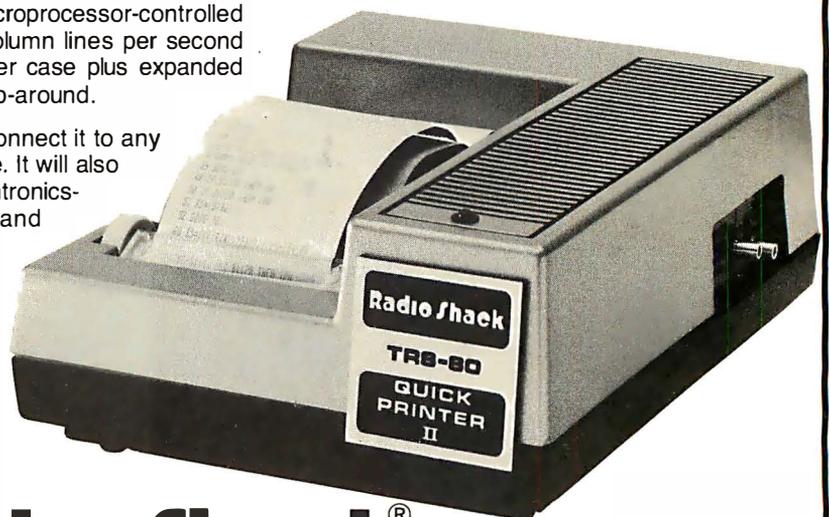
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console and hard-copy devices. It is really useful.

But it drives you mad, because Vulcan's author didn't include enough examples in the instructions. We find Vulcan worth the effort, because it is fast, and comprehensive, and allows you to change the field structure of the data base at will, or create new data bases selectively out of the master; but we do a lot of pounding on the table and screaming in rage at the documentation.

There's a lot of software like that: infuriatingly better than its competition, but hampered by instructions meaningful only to the software's author. I sometimes think there is a secret school that teaches the black art of writing a document such that the author can prove conclusively

that every bit of needed information is contained in the book — but it is guaranteed to be useless to anyone who doesn't already know it to begin with. In fact, I am sure there is such a school, and someday I'm going to find it and put it out of business. Until then, though, we'll have "infuriatingly excellent" software with us and there's not a lot to be done about it.

An upcoming "User's Column" will discuss a number of data bases, including some I've been promised but haven't received, and go over their strengths and weaknesses.

We'll also look at languages, including the BDS and Whitesmith C compilers (see *The C Programming Language* by B Kernighan and D Ritchie, Prentice-Hall 1978; C is a really marvelous language); BASICs

that run source code interpretively and can then compile it (easily the best way to write quick and dirty programs that have to run this afternoon); FORTH; SMAL-80 if we can ever get a copy that runs; LISP (want 800-digit precision? cryptographers do!); and other alternatives to BASIC and FORTRAN.

I'm collecting accounting systems and other business software, and we'll have a column on those also.

I'm also open to suggestions and always interested in programs that can run on my systems and would be valuable to BYTE readers; if you're curious about software, let me know. Chances are I'll be as interested as you are, and we'll both learn something. ■

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