BYTELINES

News and Speculation about Personal Computers

Conducted by Sol Libes

Random Rumors: Add the following items to the NCC (National Computer Conference) rumor list I gave in last month's BYTELINES: Hitachi is expected to show a personal computer *prototype* with specifications very similar to the IBM machine. It will use the Intel 8088 processor and will also have three operating systems: MS-DOS, CP/M-86, and Pascal. It should be on the market before year-end. . . . Also expected at NCC is a scaled-down version of the Star work station from Xerox, expected to sell for 50 percent less and to be called (what else?) the Starlet. Incidentally, although the Star was a hit at last year's NCC, I am not aware that any units have been shipped to customers. . . . Other anticipated new entries at NCC include a videodisc-to-microcomputer interface and a videodisc with a 250-megabyte legal database from Xedex, New York, and a 120K-byte, 6809-based multiuser system, with a Unix-like operating system, from Gimix, Chicago, Illinois. . . . Also at NCC you can expect to see at least four manufacturers running Microsoft's Xenix multiuser DOS on their systems.

Look for Panasonic to shortly introduce a $199 personal computer; a color version will sell for $299. Later the firm expects to introduce voice I/O for the unit. Options will include memory expansion, disk drives, joysticks, and an 80-column printer. Software packages will include word processing and business applications under standard CP/M and Apple CP/M. . . . Several IBM look-alikes are expected on the market shortly.

Random News Bits: Digital Research has confirmed what was previously rumored in this column, namely that it is working on a 68000 implementation of the CP/M disk operating system. Hitachi is expected to be the first to use it. . . . Vector Graphic has reported a 156 percent increase in income for the last quarter of 1981—$1 million, up from $395,000 the year before. Sales for the quarter were $9.68 million. . . . Commodore reported that its net income rose 63 percent on a sales increase of 55 percent for the second half of 1981 ($124 million). . . . Diablo reportedly will shortly begin making video-display terminals. . . . Cromemco, Mountain View, California, has disclosed that it is working on a 2-megabyte S-100-card memory, designed primarily for its new 68000 system. With just eight cards, the user can have 16 megabytes of directly addressable memory! . . . G & G Engineering, San Leandro, California, has introduced "IBM-ulator" for S-100 CP/M systems. Using an 8088 processor card, the IBM-ulator can read and write CP/M-compatible files from and to an IBM 5¼-inch disk. . . .Later this year Toshiba will introduce a dot-matrix printer with a 24-pin head mechanism capable of producing fully formed characters at 100 characters per second (cps) and draft-formed characters at 160 cps. . . . New England Digital Corporation, White River Junction, Vermont, and Hazelcom Industries Ltd., Toronto, Ontario, have announced machines with piano-like keyboards that transcribe whatever music is played on them.

Marketing Is the Name of the Game: Computerland Corporation has disclosed that it is planning to set up franchised stores that will sell only software. The company's goal is to have 400 software stores open by 1984. . . . Sears is so delighted with the performance of its five computer stores that it will shortly open 45 more in 17 cities. The stores will be known as "Business System Centers" and will employ an expected 300 sales personnel. The Sears stores currently carry IBM, NEC (Nippon Electric Company), and Vector Graphic computer systems, TI (Texas Instruments) and HP (Hewlett-Packard) calculators, Exxon and Olivetti typewriters, Saxon copiers, and Wang word processors.

There is no doubt that success in the personal computing marketplace now is less a function of having a well-designed product than of having adequate distribution. I recently made a brief survey of all the computer stores in the 10 largest U.S. cities to determine system distribution. I checked Boston, Chicago, Dallas, Detroit, Houston, Los Angeles, New York, Philadelphia, San Francisco, and Washington, DC., and I discovered that in these cities a total of 165 computer stores were carrying 37 different makes of computers. Ranked in order, the 20 leading systems and the number of dealers for each system were: Apple, 120; Atari, 60; HP, 43; IBM, 38; Commodore, 37; Vector Graphic, 35; Radio Shack Computer Centers, 34 (full-line stores not included); Cromemco, 30; TI, 21; North Star, 18; Dynabyte, 18; Data General, 16; DEC (Digital Equipment Corporation), 15; Zenith, 15; and Altos, 15.

Some interesting conclusions can be drawn. First, Apple is far and away the most popular with dealers, probably due to the large amount of advertising done by Apple that, in effect, presells the system for the dealer. Second, most of the leading systems are made by large companies to whom computers are only a small part of the total business. Most of the companies that grew out of garages, so to speak, are now only a small part of the industry. Third, none of the Japanese suppliers has yet achieved acceptance from computer stores. I found only six dealers who carried the NEC system, and only one carried the Sharp system.

Integrated Circuits: Fujitsu has disclosed that it will shortly begin providing samples of a 64K-bit CMOS EPROM (erasable programmable read-only memory). . . . DEC will soon start supplying the integrated circuits used in its base-level PDP-11 machines. . . . Motorola is making final plans to introduce the MCM2816, an EEPROM (electrically erasable programmable read-only memory) that will be a pin-for-pin replacement for the popular 2716 EPROM. The company will follow this shortly with a 32K-bit version. The days of the ultraviolet

EPROM eraser appear to be numbered. . . .

IBM News Items: Software Techniques, Alexandria, Virginia, has published a report that provides engineering data on the custom integrated circuits and proprietary devices used in the IBM Personal Computer system. It includes schematics, parts lists, timing diagrams, etc., not provided by IBM in its documentation. The report costs $5000. . . . Xedex Corporation, New York, has introduced a plug-in Z80 processor card with 64K bytes of memory (similar to the Microsoft Softcard for the Apple II) that allows an IBM Personal Computer to run CP/M-80 software. The price is $600. Xedex hopes that IBM users will take advantage of this until there is a decent amount of software available for the IBM system. . . . IBM is expected to open soon a Personal Computer manufacturing plant in France. . . . Several Computerland stores are reportedly offering quantity discounts on the IBM Personal Computer. . . . Corvus Systems, San Jose, California, is rumored to be working on a networking system for the Personal Computer that should be available later this year. . . . Several C compilers for the Personal Computer are due for release this summer.

IBM has also introduced a robot, called the 7535 Manufacturing System, that can be programmed using an IBM Personal Computer system with a special version of IBM's new robotics language called AML (A Manufacturing Language). The robot is built in Japan and will cost $28,500. The program costs $5575. IBM is also test-marketing the RS-I robotic system, which has an arm that can move in six directions and a two-fingered hand. The RS-I is presently being used to assemble IBM computers.

Apple Happenings: Microsoft's Z80-based processor card for the Apple III will be marketed exclusively through Apple Computer Inc. Microsoft disclosed that 20 percent of all Apple IIs are using the company's Softcard with CP/M. . . . Franklin Computer Corporation, Pennsauken, New Jersey, has introduced a computer that is compatible with the Apple II. The machine will do everything the Apple II does except display color graphics (that would infringe on Apple patents). The Franklin computer, however, has extra keyboard functions, more memory, and sells for $300 less than the Apple II. I suspect that Franklin should find several mail-order dealers very interested in selling its product. . . . Several imitations of the Apple II are reportedly being made in the Far East. Apple is investigating action against these copiers as the machine is protected by four or five patents.

CP/M News: Digital Research reports that CP/M-80 has now been implemented on over 450 different computer systems. Can there be any doubt that CP/M is the standard for single-user 8-bit disk-operating systems? . . . Lifeboat Associates, New York, has released EM-86, a software module that will allow CP/M-86 software to run under the control of Microsoft's MS-DOS without any modifications. The module costs $75. . . . Dasoft Design Systems, Aloha, Oregon, has introduced a design-automation system called Magic. Running under CP/M, it aids in the design of circuits, documentation, and printed-circuit generation. It includes a design editor, device library, schematic generator, and more. It produces camera-ready artwork and is priced at $729. . . . Virtual Microsystems, Berkeley, California, has introduced a CP/M-80 simulator for DEC PDP-11 and VAX-11 systems. Running as a task under RSTS, RSX, or Unix, it allows the reading and writing of standard 8-inch CP/M disks and the running of CP/M programs.

MS-DOS Versus CP/M: When Microsoft wanted to implement many of its languages and applications packages on the Apple II, the company chose what it considered the easiest, fastest, and most economical way to do it: creation of a "hardware bridge"—a Z80 processor card for the Apple II that allows the running of CP/M-based versions of Microsoft's software.

There is no doubt that CP/M has become the most successful microcomputer DOS. It has the broadest support from language- and application-software suppliers and public-domain software (I challenge anyone to tell me, with any accuracy, how many software packages are currently available for CP/M-based systems). CP/M has been licensed, according to Digital Research, on over 450 different types of systems (this probably translates into over 450,000 actual machines).

Microsoft, with extensive experience in system software development, last year decided to introduce its own DOS, called MS-DOS, naturally (for Microsoft disk operating system). Actually MS-DOS was created a few years earlier by Seattle Computer Products for its 8086-based S-100 system when the company gave up waiting for Digital Research to introduce CP/M-86. Microsoft acquired exclusive rights to the DOS, hired its author and invested a considerable effort in enhancing it.

The battle lines have now been drawn—picture CP/M as Goliath and MS-DOS as David. In just six short months, MS-DOS has gained a strong foothold in the single-user/single-task DOS marketplace. The greatest coup, of course, is the IBM Personal Computer: although IBM has announced three different operating systems for the Personal Computer, at this writing only one is available—MS-DOS. Microsoft has further announced that MS-DOS has already been implemented on 20 different machines and that 32 more (11 of which will be from Japan) should be announced by year-end. In other words, MS-DOS will have been implemented on over 50 machines by the end of 1982.

Microsoft took a close look at CP/M—its strengths and particularly its weaknesses—in developing MS-DOS. There is little doubt that the firm has created a DOS that is much more user-friendly, faster, with many more advantages, and fewer disadvantages than CP/M.

One of MS-DOS's biggest disadvantages appears to be the lack of a floppy-disk-format standard that allows users of different systems to exchange disks. One of CP/M's greatest advantages is that software vendors can supply CP/M software on 8-inch single-density soft-sectored disks and cover most of the CP/M marketplace (although the increasing popularity of 5¼-inch disks is becoming a problem). Microsoft is attempting to convince its MS-DOS original equipment manufacturers that a 5¼-inch disk format is important. With IBM's help the 5¼-inch format may become

a standard. In other words, while machines may be able to read other formats, they should at least be able to read the standard format.

Microsoft has announced that this fall it will introduce Version 2.0 of MS-DOS; among the new features are a visual shell, more user friendliness, network interface (so the system can be used as a work station in a local network), improved utilities (print spooler, debug, etc.) and standard terminal interface including graphics using ANSI (American National Standards Institute) standard escape sequences. Microsoft has disclosed that it is working on MS-DOS enhancements (version 3?) that will include MS-DOS recoded in the C language for easy conversion to other microprocessors, a C compiler to be included with MS-DOS, file I/O transparency across networks, and diskless work stations. Microsoft has also revealed that it is working on language enhancements that will include support for the Intel 8087 floating-point math processor.

As an aside, Microsoft, a privately held company, disclosed that last year it grossed $16 million and this year it expects to double that figure.

More 32-Bit Micros: Bell Laboratories and Hewlett-Packard have disclosed that they will shortly begin manufacturing 32-bit microprocessor integrated circuits. The Bell Labs version is called Bellmac-32A. It is a full 32-bit microprocessor; the data and address buses, internal and external, have 32 lines. All of the registers are 32 bits wide and all instructions operate directly on 32-bit data words. The device, which has close to 150,000 transistors, can directly address a gigabyte of memory. It has been designed with the Unix operating system and the C language in mind.

The HP 32-bit device is a set of ICs that will be used in a new product to be introduced in about a year. The set includes the processor, memory controller, read/write and read-only memory, I/O processor, and clock generator. The processor is on a ¼-inch-square chip that has three to eight times the circuit density of any current IC, according to HP, and contains 450,000 transistors.

Motorola Adds to 68000 family: Motorola has reached an agreement with six other semiconductor manufacturers whereby the companies involved will design new devices to add to the MC68000 family of microcomputers. The joint contributions of Motorola and the six members of the design group (Mostek, Signetics, Rockwell, Hitachi, Thompson CSF, and Philips) allow the addition of far more products to the 68000 product line than any company could do by itself. The new products announced are 8-bit-bus and 32-bit-bus versions of the 68000 microprocessor, a virtual-memory version of the 68000, and a floating-point mathematics processor. Some of the products will not be available until late 1983 or early 1984. The following is a brief look at the announced products.

The 68008 is a 48-pin version of the 68000 that has data and address buses compatible with conventional 8-bit microcomputers. Motorola obviously hopes it will find a market analogous to that of Intel's 8088, an 8-bit-bus variation of the 8086 microprocessor. The 68008 will address one megabyte of memory. Samples will be available in the fourth quarter of 1982.

The 68020 is reported to be the beginning of a 32-bit family of microprocessors. It will have 32-bit-wide data and address paths and will come in several configurations, the largest of which will be a package with 100 pins. Because of mechanical problems with a device of this size, Motorola is discarding the dual-inline design of present ICs for a new package. The address space of this largest configuration will be 4 *billion* bytes of memory. The 68020 will have several interesting features, including a cache memory, a 16-MHz clock (allowing it to execute 1.5 million instructions per second), and an interface to auxiliary coprocessors. One interesting technical note: the chip, which is primarily conventional NMOS (negative-channel metal-oxide semiconductor), will have a small portion of grafted-on CMOS (complementary metal-oxide semiconductor) circuitry. According to Motorola, this will significantly reduce power consumption. Motorola is calling this new process HCMOS III or "merged MOS." Samples are promised for the fourth quarter of 1983.

The 68881 is a floating-point math coprocessor that is said to be the first of a line of coprocessors for use with the 68020 microprocessor and other members of the 68000 family. The unit will handle several degrees of precision, conform to the IEEE (Institute of Electrical and Electronics Engineers) floating-point standard, coprocess with the 68020 whenever possible, and do over 150,000 operations per second. It will also use the HCMOS III technology described above, and samples will be available by the fourth quarter of 1983. The 68452, a bus-arbitration module, and the 68440 dual DMA (direct memory access) coprocessor will be introduced in late 1983 or early 1984.

The 68010 is a microprocessor, pin-compatible with the 68000, that will work with the existing 68451 Memory Management Unit (MMU) to create a microcomputer that implements virtual memory (i.e., the majority of the memory will actually reside on a disk and will be swapped in and out of random-access memory automatically). . . . **G. W.**

Spreadsheets Proliferate: Visicalc, introduced in late 1979, was the first spreadsheet program. Now about 24 such programs are on the market. Visicalc, without doubt, is the most successful, and to a great extent it has made the Apple II the success that it is.

But Visicalc has some limitations: restricted memory capacity; crude editing, text processing, and formatting; and lack of conditional statements. However, the most serious shortcoming has been the lack of a CP/M version.

Competing spreadsheet programs have capitalized on these limitations. Most run under CP/M. Some offer modeling-language extensions to allow manipulation of the work sheet itself (e.g., Microplan, Plannercalc). Some allow different spreadsheets to associate with one another by means of a sheet-linkage feature (e.g., Multiplan, Calcstar, Forecaster). One (NEC Report Manager) even allows a three-dimensional sheet. Many allow their spreadsheets to share data with other programs.

It is also interesting to note that some software suppliers now offer versions for minicomputers. One supplier (Digicalc) offers a spreadsheet

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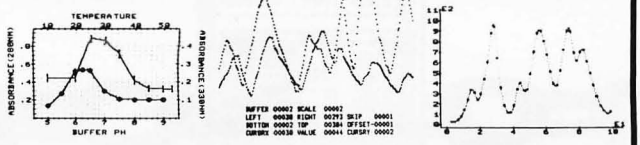

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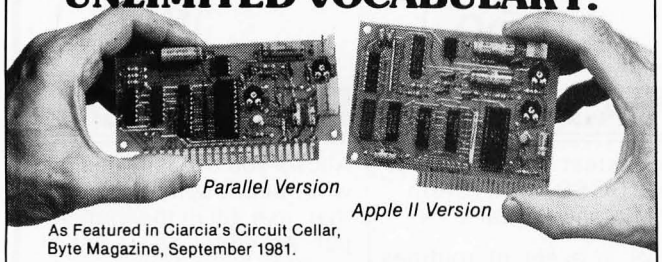

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Color-Graphics Costs Drop: Color-graphics-display terminals are being introduced at new low prices, some under $1000. This is expected to bring color graphics into the business marketplace. In fact, in a few more years, color may become standard. Leading the way now is Intelligent Systems Corporation (ISC), Norcross, Georgia, which is shipping a color-video terminal priced at $995 for single units. Televideo and Applied Digital Data Systems Inc. are expected to introduce competing units by year-end. The ISC unit can display eight foreground and eight background colors on a 13-inch video screen. It includes function keys and firmware for drawing vectors, bar graphs, and point plots. (Incidentally, Megatek Corporation, San Diego, California, has announced a three-dimensional color-graphics terminal: prices start at $50,000.)

Color-printer prices are dropping quickly too. Integral Data Systems has a color impact printer for under $2000 that produces eight colors using a four-band ribbon. Integrex Ltd., England, has developed a color printer based on the Epson MX-80 that it sells for $1995.

A host of companies are producing color pen plotters. The lowest in cost is currently the Radio Shack 6-pen plotter at $1995.

The Japanese have not yet entered this market, although they are known to be developing color printers. When they do enter, substantial price reductions can be expected.

Floppy-Disk News: Last year 568,000 double-sided 5¼-inch disk drives were made. This year the figure should double to 1.1 million drives. Also, track densities are increasing. The 96-tpi (track per inch) density will soon dominate the market. The result is that companies such as Micropolis have announced 5¼-inch drives with 2-megabyte storage capacities. Delivery of these drives has been slowed pending the availability of improved disks. Better materials are necessary because uneven disk coating and thermal and hygroscopic distortion of the disk surface increase errors.

Several companies have announced they will soon start production of 1.6-inch-high 5¼-inch drives. Thus two drives will fit into the space previously occupied by one drive. Half-high 8-inch drives are already available.

Sony's 3½-inch disk drive is being used in Sony's word-processing system. However, because it is available from only a single source, other manufacturers have been leery of designing it into their products. Sony has announced that it will soon introduce a dual-sided version of the drive.

Finally, 68000 Software: I receive many letters from readers of this column regarding the availability of 68000-system software and low-cost hardware. The following, I think, answers most of the questions raised.

It should be noted that Intel introduced its 8086 16-bit microprocessor in 1977—almost five years ago. The first systems using the 8086 became available the following year. However, it was not until 1980-81 that the first DOS development software became available. And it is only now, in 1982—five years later—that applications soft-

Circle 502 on inquiry card.

ware packages are beginning to appear.

The 68000 was introduced by Motorola in 1980, and the first 68000 system became available last year. The disk operating systems are only now becoming available, and languages should start becoming available early next year. Therefore, I do not expect to see any significant amount of 68000 applications software becoming available until 1984.

I doubt that the 68000 will have much of an impact on the single-user/single-task personal computer market. Its great strengths will be in the multi-user/multi-tasking market competing against traditional minicomputers. Keep in mind that Microsoft's 68000 DOS (Xenix) requires 50K bytes of 16-bit-wide user memory, as compared to 8086 DOS (MS-DOS), a single-user/single-tasking DOS that occupies only about 5K bytes of memory. I am not currently aware of any companies developing low-cost 68000-based personal computer systems. I would appreciate hearing from anyone who knows of one.

Large Direct-view LCD: Kylex Inc. of Mountain View, California, a subsidiary of 3M Company, has developed a new type of alphanumeric liquid-crystal display (LCD) called the TAD (thermally addressed dye) display that has been incorporated into what is possibly the largest direct-view panel LCD ever made: a 6- by 7-inch, 288- by 357-pixel flat display screen. Each pixel is 15 hundredths of an inch square, and in alphanumeric use 24 lines of 50 characters each can be displayed. The TAD display could make possible a new generation of portable computer terminals.

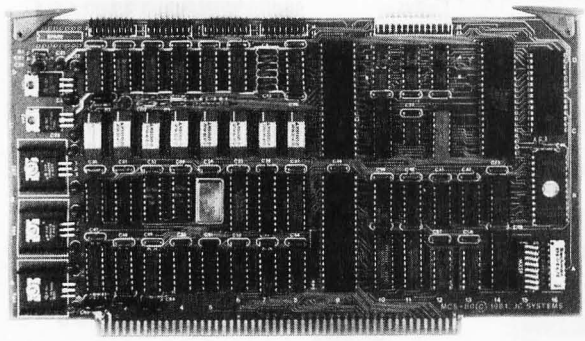
The TAD technology uses a so-called guest molecule of dichroic dye attached to host molecules of liquid crystal; the two types of molecules have a similar physical structure. In the normal nematic molecular orientation, the dye is invisible. When the liquid-crystal molecules are reoriented in the display, the dye molecules are also reoriented, causing the dye to become visible.

For the liquid-crystal molecules to be changed in orientation, they must first be heated; in the display one row of pixels is heated at a time by an electric heating current passed through heating elements in the panel. The heating places molecules into random orientations, allowing the dye to show up. Then, while all the molecules in the row are cooling down, the pixels that are to be restored to the blank state (i.e., dye not visible) are addressed along the appropriate column by pulses of current.

A unique property of the TAD display is the permanence of its images. Because the pixels must be heated for their states to change, they do not revert to blankness when not in use. You can unplug a TAD display from its control circuitry and keep it in a drawer for a year—and when you take it out, it will still show the image it contained when it was unplugged.

The TAD display is driven by a control module containing a Z80A microprocessor, 4K bytes of read/write memory, 16K bytes of read-only memory, and various other components; the control

$495.



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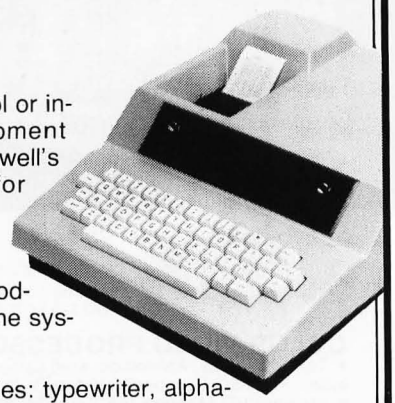

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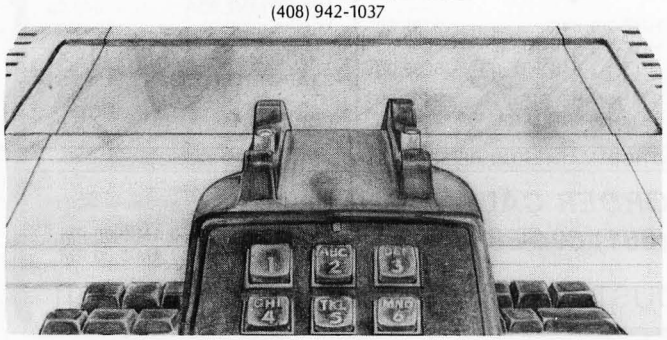

BYTELINES

module keeps track of the temperature of the pixel rows to keep the display operating within the most efficient range while using a minimal amount of energy.

The inventor of the TAD technology, Dr. Sun Lu, described his research in a paper delivered in May at a conference of the Society for Information Display. . . . **R. S. S.**

Video Games Battle in Court: Pac-man has replaced Space Invaders in computer-game popularity. In fact, Pac-man has generated nearly $1 billion in arcade sales. Atari is now selling Pac-man cartridges for its home units and expects sales to top that of the arcade version. Warner Communications, Atari's parent company, expects that Pac-man will gross more money than its *Star Wars* film. But there are problems. Magnavox is marketing a game called K.C. Munchkin that Atari claims is "a knock-off of Pac-man." Atari took Magnavox to court and succeeded in enjoining the latter from marketing the game on the basis of copyright infringement; however, a second ruling stayed the first ruling until a full trial could be held.

Pac-man was licensed from Namco of Japan by Bally Manufacturing Corporation, which also licensed the arcade version of Space Invaders (Atari sells the home cartridge version). Bally is now shipping *Ms. Pac-man* games to arcades, and this is expected in cartridge version also.

Apology Due: In my February 1982 BYTELINES column I reported on Condesin, a small research and development company using a new technology to develop a 4-megabit nonvolatile memory. I reported the company as being in Cupertino, California. I have been informed that the company has moved to Texas. As yet I have not been able to locate its new address.

Quote of the Month:
"There are eight different ways to insert a disk into a drive. . . only one of which is interesting."
Eddie Currie, Vice President
Lifeboat Associates

MAIL: *I receive a large number of letters each month as a result of this column. If you write to me and wish a response, please include a self-addressed, stamped envelope.*

Sol Libes
POB 1192
Mountainside, NJ 07092

BYTE's Bits

Graphics Printing System

If you are interested in the Graphics Printing System mentioned in the January and February 1982 BYTEs (see pages 443 and 222, respectively), please note that Progressive Software has gone into bankruptcy and will no longer sell or support the program. However, Crow Ridge Associates is selling and supporting the program. It should be noted that the system must be used with the Apple serial interface card with the P8A PROM (programmable read-only memory). It costs $109.95. Contact Crow Ridge Associates Inc., POB 90, New Scotland, NY 12127, (518) 765-3620. ■