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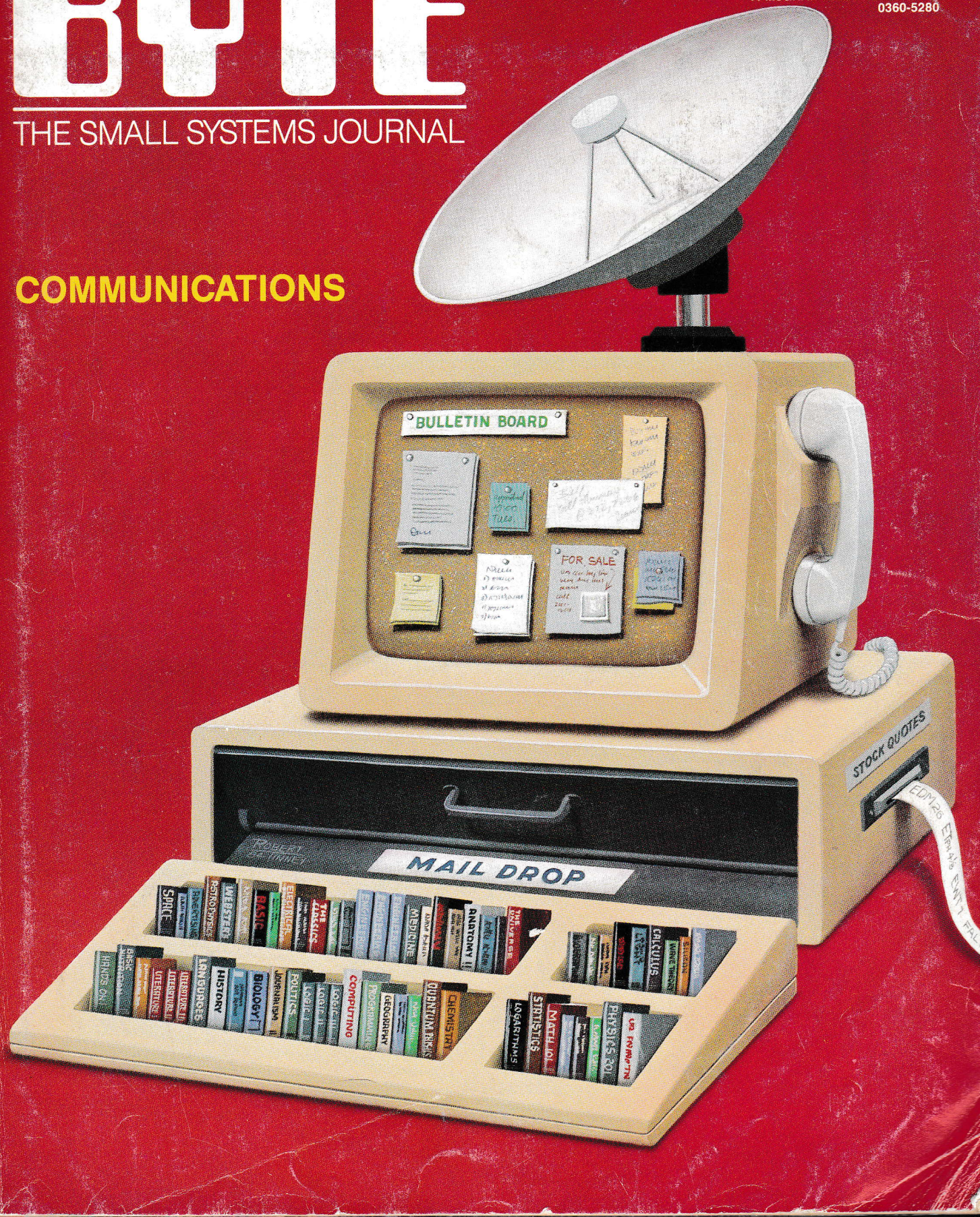


BYTE December

VOLUME 9, NUMBER 13, 1984

TK!Solver *by Alan R. Miller* **263**
A "spreadsheet" for scientists.

WordPerfect *by Ricardo Birmele* **277**
A word processor for the IBM PC.

The Epson LQ-1500 *by Ken Sheldon* **293**
A high-resolution dot-matrix printer.

Review Feedback **301**

KERNEL

Introduction **305**

Computing at Chaos Manor: Home Again *by Jerry Pournelle* **307**
Jerry admires the HP LaserJet printer and starts a quest for a clock board while Alex Pournelle takes a look at the TI Professional Computer.

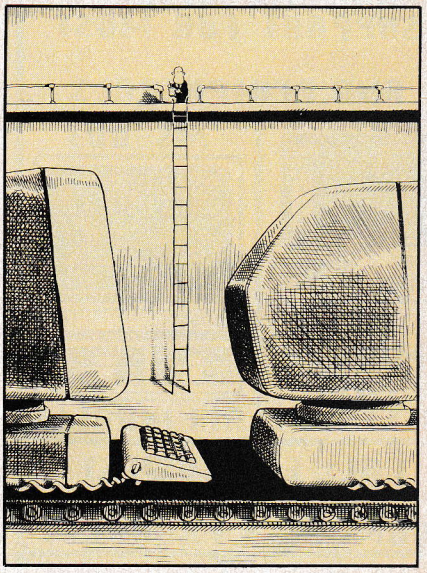
Chaos Manor Mail *conducted by Jerry Pournelle* **335**
Jerry's readers write, and he replies.

BYTE West Coast: Happenings *by John Markoff and Ezra Shapiro* **343**
Two BYTE editors report on LAN standards, Concurrent PC-DOS, and IBM's acquisition of Rolm Corporation.

BYTE U.K.: Prolog on Microcomputers *by Dick Pountain* **355**
Logical propositions replace computer-oriented instructions.

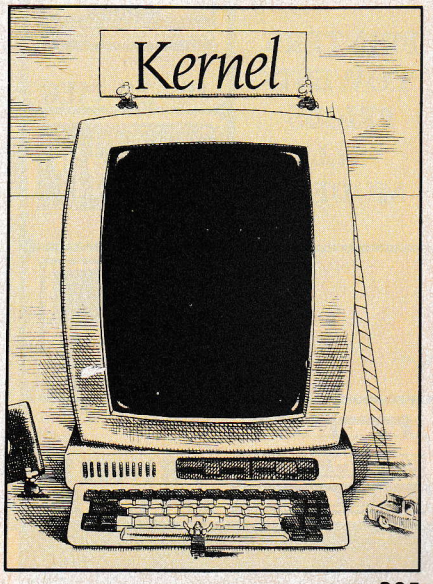
BYTE Japan: Hand-held Computers and MSX Standards *by William M. Raike* **365**
Hand-helds, the Big.APL portable, and MSX computer standards are in the news.

Circuit Cellar Feedback *conducted by Steve Ciarcia* **375**
Steve answers project-related queries from readers.



234

Editorial: Looking Back: 1984 . . . . **6**
Microbytes **9**
Letters **14**
Fixes and Updates **33**
What's New **39, 432**
Ask BYTE **48**
Clubs & Newsletters **59**
Book Reviews **65**
Event Queue **83**
Application Note **411**
Books Received **416**
Unclassified Ads **491**
BYTE's Ongoing Monitor Box, BOMB Results **494**
Reader Service **495**



305

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ABC

SECTION ART BY MICHAEL WITTE

Hand-held Computers and MSX Standards

Epson HC-88/-80
Ampere Big.APL
MSX Machines

WILLIAM M. RAIKE

In the October BYTE Japan column, I wrote about the inexpensive, RS-232C-equipped Brother EP-44 portable electronic typewriter/printer/terminal. I decided to buy it instead of a hand-held computer, and I'm still delighted with it; when I'm not traveling, it's my backup printer. It now looks like there's another good reason for having postponed buying a portable: some interesting new machines are available, and more will be coming along.

Hand-held Computers from Epson

Hand-held computers are proliferating these days, with hot competition among Hewlett-Packard, Epson, Apple, Tandy, Sharp, NEC, and others. On the Japanese scene, Epson has released the new HC-88 and its companion, the HC-80. The HC-88 incorporates extensive Japanese-language processing features: large Japanese-character dictionaries are implemented in ROM (read-only memory), and it has a new, efficient method for entering Japanese characters from the keyboard. In addition to the *katakana* and *hiragana* phonetic alphabets, you can enter any of the 725 most frequently used characters using only two keystrokes, while the remaining 1800 require only three keystrokes. Lots of different systems exist for converting keyboard entries to Japanese-character displays, but this is just about the simplest and fastest one yet, and it is supported at the operating system level.

The HC-88 uses the CP/M operating system, stored in ROM. Standard applications software, also ROM-based, includes a Japanese-language word processor called "Portable Symphony Word," plus "Portable Supercalc" and BASIC.

The HC-88 (and the HC-80) is a triple-processor machine; the main processor is a Z80-equivalent CMOS (complementary metal-oxide semiconductor) microprocessor running at 2.45 MHz. For external storage, it has a built-in microcassette drive, similar to those in other Epson portables like the HC-40 and HC-20. Main memory consists of 64K bytes of CMOS RAM (random-access read/write memory), and an additional 64K bytes of RAM are configured as a RAM disk, backed up by a nickel-cadmium (nicad) battery. The liquid-crystal display (LCD) operates in three modes: a 480- by 64-dot graphics mode, an 8-line by 80-character alphanumeric mode, and a 3-line by 30-character Japanese-character mode. The built-in RS-232C interface operates at speeds ranging from 75 to 19,200 bits per second (bps), and a separate high-speed serial interface works at up to 38,400 bps. You also can buy a portable 3½-inch, 360K-byte microfloppy-disk drive as an option; list price for the microfloppy (which works through the high-speed serial interface) is about $425. The HC-88 itself lists for about $1225. That seems a bit steep in comparison to the HC-80, which offers just about all the features of the HC-88 except for the Japanese-language capabilities and carries a list price of only about $825. Epson says that WordStar and SuperCalc also are available (in ROM) as options for the HC-80, but I haven't had the opportunity to try out either of them.

APL Takes Wing

Not long ago I had a chance to get an advance look at an engineering prototype of a beautiful and unconventional new hand-held computer, the Big.APL. Since the appearance of the October What's New item, I've talked to Ampere about the specifics. I hope to have a chance to give one of the production prototypes a workout sometime soon; although the machine was expected to be in production by November, no one has actually confirmed a fixed date.

Ampere is a medium-sized company, based in Tokyo, that in the past has produced communications equipment, in-circuit emulators, and custom integrated cir-

(continued)

William M. Raike, who holds a [illegible] mathematics from [illegible] University, has taught [illegible] research and computer [illegible] in Austin, Texas, and [illegible] California. He holds a [illegible] voice scrambler and was [illegible] an officer of Cryptext [illegible] in the United States. In [illegible] went to Japan looking for [illegible]MSs. He has been there [illegible] as a technical translator and a software developer.

cuits, in addition to software development activities. Its president, Takashi Kusanagi, talks about the APL language with missionary fervor and is understandably enthusiastic about the Big.APL.

Very few computers are visually distinctive; this one looks like a cross section of an airplane wing or, with the cover/display screen open, like a graceful futuristic chair (see the photos in the October BYTE, page 42). The case for the Big.APL was designed by Kumeo Tamura, whose design credits include the Datsun 280Z.

The rest of the Ampere computer is just as unconventional and as intriguing as its appearance. It's built around the powerful 32-/16-bit HD68000 microprocessor, running at 8 MHz. The heart of the machine is the software environment, which is an APL interpreter. The custom operating system, called Big.DOS, is APL-based, supports one foreground and one background task, and provides some windowing capabilities.

Although I haven't yet seen it, an integrated software package, written in APL and stored in ROM, will be supplied with the computer. Ampere says it will include a word processor, spreadsheet, and database handler, plus a communications package.

APL is a programming language that has proven extremely popular within the IBM mainframe community, particularly among scientific and academic users; it provides a concise way to state many numerical and statistical algorithms and is also suitable for text manipulation. The character set is very large and, at first, very confusing; instead of keywords like WRITE, FOR, etc., as in conventional languages, APL has unique characters for mathematical operations like finding the maximum, minimum, or sum of an array and for producing the transpose of a matrix, as well as for input/output operations. Usually interpreted instead of being compiled, it is subject to many of the same limitations (and advantages) as all interpreters. There are relatively few implementations of APL for personal computers; one is APL.68000, which I saw operating on the Sord M68, a 68000-based desktop computer. As far as I know, Ampere will be the first to use APL in a portable computer; its version of APL is an adaptation of APL.68000.

The Big.APL has lots of memory. Basic system RAM is 64K bytes, and 128K bytes of ROM is standard. Ampere reports that the RAM will be expandable to 512K bytes. In addition, it has three RAM/ROM cartridge slots; each cartridge can hold 64K

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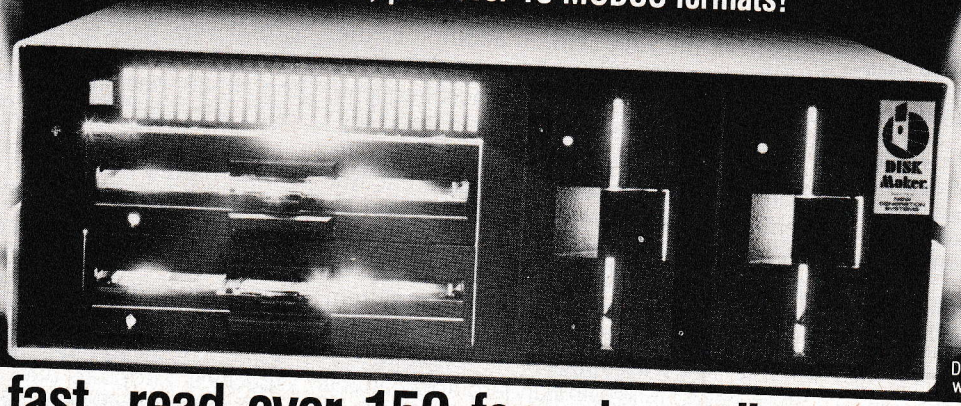

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bytes of RAM or a megabyte of ROM. The internal 16-bit bus configuration is a standard Motorola VME (virtual machine environment) bus. Peripheral interfaces include a Centronics printer port and two RS-232C serial ports capable of speeds ranging from 75 to 19,200 bps. One of the serial ports is equipped with a built-in auto-dial 300-bps modem. No disk drive will be available initially, but the company says it's developing a portable 1-megabyte, 3½-inch microfloppy-disk drive as a companion to the Big.APL.

The display is an LCD panel built into the hinged cover, along with membrane-type function keys. The screen displays 25 lines by 80 characters in character mode and 200 by 480 dots in graphics mode, an upgrade from the planned 120- by 480-dot display and a respectable graphics performance for a hand-held.

The Big.APL contains a built-in microcassette drive, but the storage and transfer-rate specifications were not firm at the time of publication. In addition to the data storage, a separate voice track is provided on the cassette, and the computer includes a built-in microphone and speaker. The potential for educational applications is enormous—in fact, Ampere estimates that about 25 percent of the market will be in that area—and the possibilities for using voice instructions to provide a friendly but nonpatronizing user interface are also good. The availability of a voice track, combined with the built-in modem, also lets you use the computer as an intelligent telephone terminal and/or answering machine, capable of transmitting and receiving voice or data.

No price has been set, but a figure in the neighborhood of $2000, rather than $1500, seems more likely. I hope to be able to report on this machine again after I've had a chance to give it and its software a good workout.

MSX Machines

As I mentioned in last month's BYTE Japan, the IBM PC-compatibility issue has barely touched the Japanese personal computer market. But at the low end of the computer market here, as measured in terms of price, there's another standard: the MSX standard. The prices of MSX computers range from a little over $200 up to about $415 (not including a monitor), with most of them clustered near the bottom figure of the price range.

Introduced last year by Microsoft, MSX is a hardware and software standard for computers that are based on the 8-/8-bit Z80 microprocessor and that incorporate Microsoft BASIC in

(continued)

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32K bytes of ROM. All MSX machines have a standard cassette-tape interface and can accept standard ROM cartridges; all have 256- by 192-dot color graphics and 24-line by 40-character displays. Most models have built-in RF (radio frequency) modulators in addition to a composite video output, so that an ordinary television set can be used as a display, and provide an 8-bit parallel printer interface (Centronics-type). The amount of main memory varies from 16K bytes up to 64K bytes; most models incorporate an additional 16K bytes of video RAM for graphics, along with 8-octave sound generators, dual joystick interfaces, and other features. None of the machines I've seen yet has RS-232C serial interfaces, although several vendors have announced that RS-232C interface cartridges and/or expansion units will be available Any Day Now.

Well over a dozen MSX machines are on the market now; several new ones were introduced at this year's Microcomputer Show (see the September BYTE Japan). A separate magazine caters to owners of MSX machines, and a mammoth supply of games is available, both on tape cassettes and in ROM cartridges. Sadly, the marketing approaches to these machines are all targeted at the teenage and preteen market and the parents who buy such "toys." The idea that these computers might actually be useful for something besides game playing, generating sound effects, or learning to program in BASIC doesn't seem to be very widespread yet, judging from the fact that "software" has been nearly synonymous with "game" for MSX users up to now.

One development that could change the MSX image from frivolous to utilitarian is the coming availability of MSX-compatible 3½-inch microfloppy-disk drives. Although at this point Sony is the only manufacturer from which you can buy one (list price for a single 360K-byte drive is about $375), Microsoft has already developed an operating system called MSX-DOS that supports them. (Toshiba supposedly has a drive on the market, but I couldn't find a dealer that knew anything about it; Sanyo and Mitsubishi will release their drives Any Day Now.) As an operating system, MSX-DOS is file-compatible with MS-DOS in that it uses MS-DOS file formats, and Microsoft claims that it provides an environment that allows you to run "nearly all" CP/M-based programs directly.

With the wide range of available CP/M applications software, MSX machines could become appealing to a whole new class of users; in the MSX price class, the limited Japanese-language support and the 40-column screen format may not be severe limitations. (Although they don't provide Japanese-character support, the extended ASCII [American Standard Code for Information Interchange] character sets do include either the *hiragana* or *katakana* phonetic alphabets.) Also, limited Japanese-character support and (fairly primitive) Japanese-language word processing are available on ROM cartridges; however, they cost between $100 and $200 instead of being in the typical $12 to $20 game-cartridge range.

Some typical MSX models are described below, with approximate list prices and individual features.

1. Canon V-10 and V-20. 16K and 64K bytes of RAM, and priced at $225 and $270, respectively. Two slots for ROM, RAM, and/or interface cartridges. Available in two colors: black or white.
2. Toshiba HX-10S and HX-10D. 16K and 64K bytes of RAM, and priced at $230 and $275, respectively. One cartridge slot. No printer interface, but the HX-10DN has one and costs about $10 extra. Available in three colors: red, white, or black.
3. Victor (JVC) AV Personal Computer HC-6. 32K bytes of RAM, $270. For about $120 extra, a "superimpose adapter" is available that lets you superimpose computer-generated titles or games over ordinary television or video images.
4. Sanyo "Wavy" MPC-5, MPC-10, and MPC-11. Priced at about $225, $310, and $415, respectively. The MPC-5 has 16K bytes of RAM, while the other two have 32K bytes. The MPC-11 has a separate RGB (red-green-blue) video output and video-superimpose capability; both the MPC-10 and MPC-11 include a light pen. Japanese phonetic keyboard.
5. Pioneer PALCOM PX-7. About $370. Separate RBG video output and video-superimpose capability. Extended P-BASIC in addition to MSX BASIC. Two cartridge slots. A videodisk controller is built in, and Pioneer supplies various games on videodiscs. A video input and a video output are provided. Stereo input and output for audio.
6. Sony "Hit Bit" HD-55 and HD-75. About $225 and $290, respectively. The HD-55 has 16K bytes of RAM; the HD-75 has 64K bytes. Available in various color combinations. Japanese phonetic keyboard.
7. Hitachi H1. The model MB-H1 has 32K bytes of RAM, while the HB-H1E has 16K bytes and does not include an RF video output; they are priced at about $225 and $260, respectively. Both have two cartridge slots. Japanese phonetic keyboard. Requires a separate power supply.
8. Yamaha YIS503. About $270. Two slots, 32K bytes of RAM. An extensive range of music synthesizers and associated software is available. Japanese phonetic keyboard. The YIS303 with no printer interface, only 16K bytes of RAM, and a cheaper keyboard costs only about $205.
9. Fujitsu FM-X. About $205. 16K bytes of RAM and one cartridge slot. No printer interface.
10. Mitsubishi ML-F120. About $270. 32K bytes of RAM, two cartridge slots.
11. Matsushita CF-2000 and CF-3000, about $270 and $330 for 16K and 64K bytes of RAM, respectively. The CF-3000 has a separate keyboard and a superimpose option is available. Japanese phonetic keyboard.

Coming Up

The January BYTE Japan will cover the latest on integrated circuits, a new hand-held from NEC, and a high-tech printer from Casio, as well as my most recent computer purchase and the serious issue of software piracy. ■