The Small Computer Magazine

kilobaud™

Understandable for beginners . . . interesting for experts

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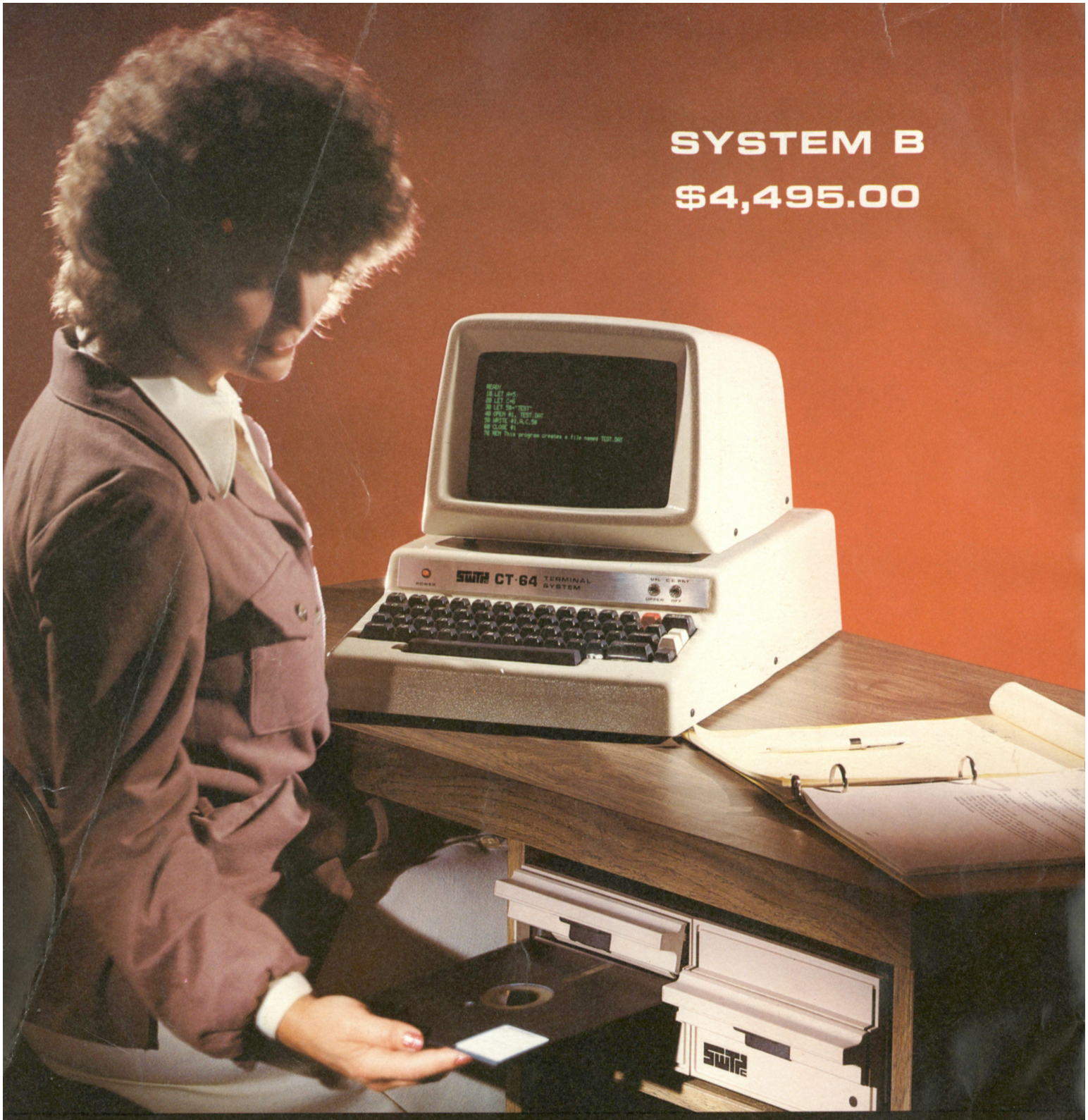

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TERMINAL—Upper-Lower case and full control character decoding

SWTPC

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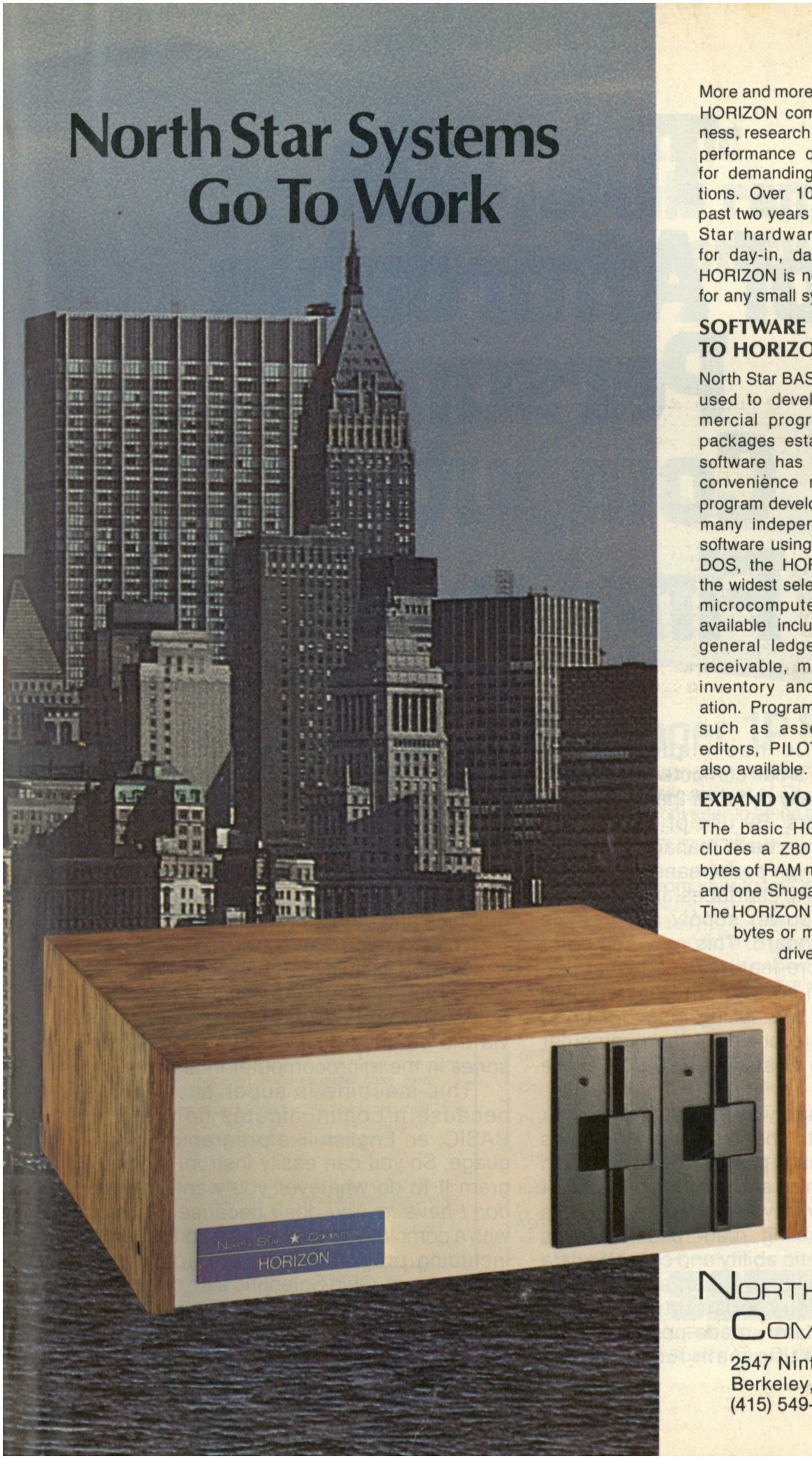
North Star Systems Go To Work



More and more, you see the North Star HORIZON computer at work: in business, research, and education. Its high performance qualifies the HORIZON for demanding professional applications. Over 10,000 users during the past two years have proven that North Star hardware has the reliability for day-in, day-out computing. The HORIZON is now a serious candidate for any small system installation.

SOFTWARE IS THE KEY TO HORIZON MATURITY

North Star BASIC and DOS have been used to develop hundreds of commercial program packages. These packages establish that North Star software has the completeness and convenience necessary for serious program development. Because of the many independent vendors offering software using North Star BASIC and DOS, the HORIZON owner now has the widest selection of software in the microcomputer industry! Software available includes: word processing, general ledger, accounts payable/receivable, mailing list processing, inventory and income tax preparation. Program development systems such as assemblers, debuggers, editors, PILOT and FORTRAN are also available.

EXPAND YOUR HORIZON

The basic HORIZON computer includes a Z80 microprocessor, 16K bytes of RAM memory, an I/O interface and one Shugart minifloppy disk drive. The HORIZON can be expanded to 60K bytes or more of RAM, three disk drives, and three I/O interfaces. Performance can be enhanced by the addition of the North Star hardware floating point board. Also, S-100 bus products from other manufacturers may be used to expand the HORIZON.

For more information, contact your local computer store.

NORTH ★ STAR COMPUTERS

2547 Ninth Street
Berkeley, California 94710
(415) 549-0858

The Age of Affordable Personal Computing Has Finally Arrived.

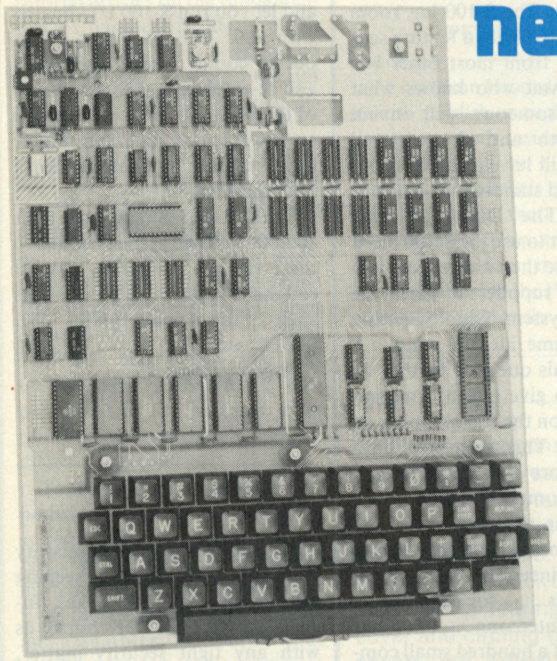
Ohio Scientific has made a major breakthrough in small computer technology which dramatically reduces the cost of personal computers. By use of custom LSI micro circuits, we have managed to put a complete ultra high performance computer and all necessary interfaces, including the keyboard and power supply, on a single printed circuit board. This new computer actually has more features and higher performance than some home or personal computers that are selling today for up to $2000. It is more powerful than computer systems which cost over $20,000 in the early 1970's.

This new machine can entertain your whole family with spectacular video games and cartoons, made possible by its ultra high resolution graphics and super fast BASIC. It can help you with your personal finances and budget planning, made possible by its decimal arithmetic ability and cassette data storage capabilities. It can assist you in school or industry as an ultra powerful scientific calculator, made possible by its advanced scientific math functions and built-in "immediate" mode which allows complex problem solving without programming! This computer can actually entertain your children while it educates them in topics ranging from naming the Presidents of the United States to tutoring trigonometry — all possible by its fast extended BASIC, graphics and data storage ability.

The machine can be economically expanded to assist in your business, remotely control your home, communicate with other computers and perform many other tasks via the broadest line of expansion accessories in the microcomputer industry.

This machine is super easy to use because it communicates naturally in BASIC, an English-like programming language. So you can easily instruct it or program it to do whatever you want, *but you don't have to.* You don't because it comes with a complete software library on cassette including programs for each application stated above. Ohio Scientific also offers you hundreds of inexpensive programs on ready-to-run cassettes. Program it yourself or just enjoy it; the choice is yours.

Ohio Scientific offers you this remarkable new computer two ways.



Superboard II $279

For electronic buffs. Fully assembled and tested. Requires +5V at 3 Amps and a video monitor or TV with RF converter to be up and running.

Challenger 1P $349

Fully packaged with power supply. Just plug in a video monitor or TV through an RF converter to be up and running.

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- Assembler/editor and extended machine code monitor available.

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PUBLISHER'S REMARKS

Wayne Green

The S-100 Mystique

When Mits came out with their 100-line bus there was a lot of bitching. Connectors were very expensive; it had more lines than were actually needed; it both generated radio hash by virtue of being wide open and it was very susceptible to interference from radio or other noise. In general, it left a lot of unhappy engineers.

Then came Imsai and their pseudo-Altair, also using the 100-line bus. Then PolyMorphic, Processor Tech, S.D. Sales, Godbout, Seals . . . and the first thing you know we had a standard: the S-100. This was one of the better things that happened to microcomputing because it made it possible for many small firms to design interface boards that would work with a wide variety of systems . . . providing music, graphics, art, telephone interconnect, speech, voice recognition, plotting, control of high-power devices, etc.

The time it would have required to custom design each of hundreds of interface boards to fit each new microcomputer system brought out would have put board prices out of sight and thus allowed the support of only a very few systems.

The first to fight this standardization was Sphere, and this undoubtedly contributed much to their collapse. Then came The Digital Group. Is there any serious question that their refusing to use the S-100 bus held their sales down substantially? Only the very limited accessories they themselves provide are available to expand a system. This is terribly limiting.

Why would a firm oppose the S-100 bus structure?

Since most of the original complaints against the bus have been taken care of, the main reason for not using the standard bus today seems to be the manufacturers' desire to force customers to buy their peripherals and not be able to use those of other firms. Depending on which side of the pocketbook you are on, this can be explained as practical marketing or greed.

First, in case there are some new readers who are not really sure what a bus is, a few words on that. Most electronic equipment is designed linearly, with perhaps a very weak oscillator generating a signal at one end, going through many steps of amplification and modulation, finally reaching the antenna. About all the many stages in these systems have in common is a power supply, so the bus is simple . . . plus and minus. Computers are generally built around a whole set of interconnecting wires (a bus) and each of the stages involved plugs into this bus. Signals sent over the bus turn on or off each of the modules. Thus it is possible to have a video terminal, a printer, a cassette tape system and several other input/output devices all connected to a computer and all sharing the same wires. (For more information about buses, see Erich Pfeiffer's article on p. 94.)

The S-100 complaints were loud and bitter at first . . . and rightly so. The Altair system just barely worked (on a good day) because this bus system was so noisy. Often, by the time you got out toward the end slots of a motherboard, things would go berserk.

Gripes about connector prices dropped off as more and more systems used the 100-pin monster. Costs of production generally drop about 15 percent for every doubling of production, so S-100 connector prices dropped and dropped, eventually bringing them below those of much smaller connectors. So much for that beef.

George Morrow and Harry Garland tackled the noise problems and both came up with nicely designed motherboards that were well shielded and greatly tamed the wild bus. Morrow's is in his Thinker Toys Wunderbus and the Godbout motherboard, which he also designed . . . Garland's is in his Cromemco systems.

George also came up with a dandy termination scheme (also in the Extensys) that helped keep signals from bouncing back and forth on a bus line. These evolutions of the S-100 made it possible to greatly extend the upper frequency limit for the system, allowing it to work with the higher speed Z-80 systems.

The S-100 bus is far from perfect, yet it would not seem to have any serious disadvantages as compared to a 40-, 44- or 50-pin bus. Higher frequency signals will eventually mean stripline techniques or coax systems, not fewer lines. The S-100 has room for further growth, a feature sadly missing from most other bus systems. And who knows what interface someone will invent next month and the external cables it will have to use because the bus had standing room only?

When The Digital Group decided not to use the S-100 bus it was because they wanted to try to be the sole suppliers of hardware for their system. Ohio Scientific had the same idea in mind . . . carrying this one step further by refusing to give out information to anyone on the signal timing on their bus. This seems to have worked since there are few (if any) OSI-compatible accessories. This means that the owners of OSI equipment have to wait for OSI to engineer and bring out all I/O boards . . . for music, art, telephone interconnect, etc. Thus the work of a hundred small companies has to be tackled by the mainframe manufacturer . . . a formidable task.

With perhaps 90 percent of the systems on the market S-100 oriented—and that's the way it was in the summer of 1977—the nonstandard bus systems were having a very difficult time. Then came the Heath H8 and their own bus system. Heath agonized over this and was relieved to hear that Commodore had avoided the S-100 bus with their PET. Actually, Heath celebrated a bit early on that one since their kit systems were hobbyist oriented and the PET was not.

It would surprise me if Heath wouldn't have sold many millions of dollars' more of H8 systems if they had gone the S-100 route. It wouldn't have made that much difference in PET sales. The appearance of the Radio Shack system with still another bus, though it may have comforted Heath, did not help Heath sales.

As we approach the end of 1978, with TRS-80 sales greater than those of all other systems combined, there is some reason to wonder if the TRS-80 bus system may not become the de facto standard. Maybe. For some reason the small manufacturers have been slow to adapt to this new bus. Perhaps they have not recognized the wallop of the TRS-80 on the market. Perhaps it has been the usual engineering delays. But at this time, the S-100 is still the best bet for someone who wants to be able to use a system for a large number of purposes.

Radio Shack has a TRS-100 board coming . . . supposed to be out in September. This will plug into an S-100 motherboard and let you run S-100 I/O boards with your TRS-80. When this is out it could change everything and re-emphasize the importance of the S-100 system . . . and save an awful lot of time and money on re-engineering boards to work with the TRS-80.

With Radio Shack and their 100,000 TRS-80 systems added to the S-100 bus line, times may get rougher for maverick bus systems such as the Apple, Heath, OSI, SWTP, etc.

Any arguments?

What Is TI Up To?

Despite Pentagon-like security measures, word has been seeping out about the new Texas Instruments project. Of course, as with any tight security matter, there is always the likelihood of bum dope being passed along to confuse things.

At any rate, it does appear that TI has a 16-bit microcomputer based upon the 9900 chip being readied for consumer sale. This will be selling for under $300, complete with its keyboard and BASIC. There is a strong possibility that it will also support PASCAL, which is a matter of policy with TI.

The 9900 microprocessor has not seen much use in microcomputers so far, so many computerists are not all that aware of its possibilities. This chip is particularly well suited to interfacing with the outside world and should be a natural for controlling things. It has a register that is able to keep track of time without interfering with other operations of the system. It also has the ability to sit dormant, drawing very little power until an interrupt starts it in action.

Although there has been little use for the benefits of a 16-bit processor in microcomputing applications so far, the extra speed of the 9900 certainly is not going to hurt. Remember that an 8-bit processor must take two cycles for the address and one for data, while the 16-bit system addresses in one cycle and loads or retrieves two bytes in one cycle . . . which

adds up to about six times the work in the same time.

More Tutorials Needed?

A recent letter from a software service offering I'm not sure what pointed up the need for more tutorial articles on the fundamentals of computers. Many of us have a long, long way to go before we can even read the ads and understand what is being offered.

Just to break the accepted computer code of ethics and offer a specific example of what I'm talking about, this letter is offering APL (or APL.SV) as an interpreter because of its dynamic allocation properties. Huh? Then it helpfully goes on to offer PASCAL and informs me that traditionally PASCAL is implemented in the language of a pseudo stack machine. Golly, I didn't know that!

Then the letter suggests that perhaps I need a disk operating system with virtual memory mapping. Would that put an end to my troubles? Will I ever find out? Even more exciting is the offer of an assembler generator that would allow me to generate families of assemblers . . . and this gem includes recursive macros.

The letter was enthusiastic, so it may well have a cornucopia of wonders for me . . . if only I knew what it was talking about. Let's get some articles written that will help us decipher this gobbledygook. It only takes a few paragraphs to explain these esoteric terms and give specific examples that all of us can relate to our experience. The sad part is that the writer of the letter was unaware that he was unreadable.

PET Papers

At one time I hoped I would be able to publish enough information about each system available so there would be no need for user groups and their newsletters. That was when there were only two or three computer systems. Today, with four major newsletters devoted to the PET, such a concept is obviously ridiculous. There is just far too much information to exchange.

We have the "PET Gazette," already in issue #4, running 40 pages. The address is 1929 Northport Drive, Room 6, Madison WI 53704. The subscription is free. Then there is "The PET Paper," Box 43, Audubon PA 19407, at $15 for ten issues . . . 30 pages last issue. Also "PET Users Notes," Box 379, South Bound Brook NJ 08880. There is some ambiguity on the address, so write before sending money. Another is "SPHINX," running 19 pages last issue and existing on donations. Write Milt Lee, 1348 Rudgear Rd., Walnut Creek CA 94596.

These newsletters let you know about available software, hardware, modifications, fixes for problems, pertinent books, etc.

Reader Responsibility

One of your responsibilities, as a reader of *Kilobaud*, is to aid and abet the increasing of circulation and advertising, both of which will bring you the same benefit: a larger and even better magazine. You can help by encouraging your friends to subscribe to *Kilobaud*. Remember that subscriptions are guaranteed—money back if not delighted, so no one can lose. You can also help by tearing out one of the cards just inside the back cover and circling the replies you'd like to see: catalogs, spec sheets, etc. Advertisers put a lot of trust in these reader requests for information. To make it even more worth your while to send in the card, a drawing will be held each month and the winner will get a lifetime subscription to *Kilobaud*!

The above notice tells the story. This month's winner of a lifetime subscription to *Kilobaud* is M. Bernstein of Cambridge MA.

AROUND THE INDUSTRY

Radio Shack To Open 50 Computer Centers

Radio Shack plans to open 50 computer sales and service stores in 1978-79. "While some will be located within new or existing Radio Shack stores, most will be separate entities and all are expected to be in major markets," said Lewis Kornfield, president of Radio Shack.

"They will be called Radio Shack Computer Centers, and their purpose will be to assist area Radio Shack stores in answering computer questions and closing sales, and to develop quantity sales, principally of Radio Shack TRS-80 microcomputer systems and peripheral equipment, to businesses and institutions.

"The stores will provide market area service on Radio Shack computer products, thus extending to nearly 100 the number of service facilities operated by Radio Shack in this country, and will include classroom areas where the company can teach computer use and programming to its customers and prospects."

In addition, the new Radio Shack Computer Centers will display and sell "a variety of pieces and parts, as well as packaged software and, possibly, hardware items of makes other than Radio Shack," Kornfeld continued.

"In respect to the significant number of TRS-80 personal computers we have sold, we believe the time is right to quickly expand our ability to keep them in top working order and provide solid local know-how for our customers and employees alike.

"We have converted the former Tandy Computer store, located in Fort Worth, into a Radio Shack Computer Center, and are in the process of indentifying the other 49 or so cities and exact locations.

"To date we have selected our

(continued on page 128)

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NEW PRODUCTS

Edited by Dennis Brisson

IRC's Miserly Mainframe

If you are looking for an S-100 bus mainframe without frills, solidly built and ready to go, take a look at Integrand Research Corporation's Model 800 Miserly Mainframe. These enclosures come complete with a 15-slot motherboard (connectors optional), plastic card guides, a choice of two different capacity power supplies, fan, line cord, fuses, EMI filter and front panel power and reset switches. The Model 800 comes in desk top and rack mount versions, with an option of two color schemes (light blue/dark blue or beige/brown).

The entire unit comes assembled, wired and tested. The power supply is dismounted after testing and shipped in a separate container via UPS. Reassembly consists of mounting the power supply and plugging it into two wiring harnesses.

The chassis is constructed of heavy gauge aluminum, to which high-quality industrial enamel is spray-painted. Interior surfaces are coated with an irridite finish to resist oxidation.

In the rack mount version, the Miserly Mainframe is priced at $200; the desk top version costs $235. The heavy-duty power supply option, which includes a 110 cfm fan instead of the standard 70 cfm fan, is $85. The standard power supply is conservatively rated at 15 A; the heavy-duty power supply will easily handle a load of 30 A. Both ratings are for the 8 V dc line. Integrand Research will install 100-pin connectors for $6 each, or you can buy them for $5 each and install them yourself.

Other options provided include rear panel cutouts for EIA-type DB-25 connectors. The first four are standard; the next eight cost $2 each. They will also provide a voltage monitor board ($30) which generates a relay closure when the ac supply level falls below predetermined limits (great for driving an interrupt to stop processing during power fluctuations, or whatever!).

The extras that are included in the basic price of the Miserly Mainframe, coupled with the fact that it comes assembled and tested, make it the most cost-effective S-100 bus enclosure I've seen. Add to that the options that are available and floppy-disk drive covers, cabinets and power supplies, and you have the most attractive basis for a system on the market. After they did all that for the S-100 bus, they went one step further and added an SWTP-compatible motherboard. Fantastic!

For more information, or to order, contact Integrand Research Corp., 8474 Avenue 296, Visalia CA 93277, (209) 733-9288.

Ron Burris
Associate Editor

Double and Quad Density

North Star Computers, Inc., announces development of a new controller board that can record in double density on the new Shugart SA-400L (single-sided, double density) and SA-450 (double-sided, double density) minifloppies. The controller board formats the SA-400L for 180K bytes (ten 512 byte sectors on each of 35 tracks) and the SA-450 for 360K bytes (same as SA-400L, but with two sides). Thus, a three-drive system with SA-450 minifloppies can access more than a megabyte on-line. North Star's double and quadruple density expands the performance and information storage of the North Star Horizon computer and Micro Disk System. A quad density (SA-450) version of the North Star Horizon and MDS systems will be available in January 1979. This quad version will be offered for $200 additional or $1799 for Horizon-1 kit and $899 for MDS-A kit. Additional drives for quad capacity will be $499.

The new controller board can control any combination of SA-400L and SA-450 drives in single density or double density. It can read diskettes previously written in single density. Also, it permits the attachment of single-density SA-400L drives previously acquired for the original North Star systems.

North Star is upgrading its popular BASIC and DOS to accommodate the increased capacity and the performance of the SA-400L and SA-450 disk drives. Programs developed on the original single-density North Star software will run in double density with little or no change. A quad capacity additional drive may be added to a double-density system at any time.

North Star Computers, Inc., 2547 Ninth Street, Berkeley CA 94710.

Arian System for North Star Disk

The Arian Assembly Language Programming System is designed specifically for North Star Disk users. With Arian, you may save and load both source and object files to disk. With Arian's dynamic file creation, saving a program is simply a matter of typing 'SAVE <FILENAME>'. Arian creates the file on disk if it does not already exist and saves the program. From Arian, you may list the disk directory (DDIR), rename a disk file (DNAM), delete a disk file (DDEL) and recover a deleted file (RCVR).

Editing is a breeze with Arian's input line editor. You may enter text (without the need for irksome line numbers), insert (INS) and find a string (FIND). Intraline editing is supported by a full complement of features: skip to end of line, insert characters, delete characters, replace (direct substitution) and press the space bar to move character by character through the line.

Arian also supports many capable features and subroutines which are nested inside and are callable by the user. Arian maintains two separate symbol tables —one for the system and one for the user. However, the user may use the system symbols without restriction. The system supports redirectable I/O, conversion of ASCII to hex, and vice versa, print a line of text, output a CR, call the input line buffer, plus many others. Up to eight breakpoints can be used at one time, and all registers are preserved.

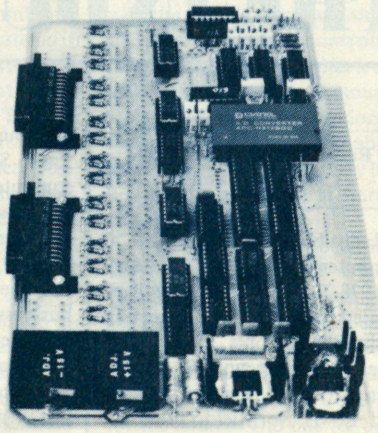
A special feature of Arian is its 'CUSTOM COMMAND' capability, by which you may define a command, name it and then call it simply by typing the command name. This is especially useful if you are testing programs. The price ($50) includes one disk and a 51-page User's Manual.

Supersoft, PO Box 1628, Champaign IL 61820.

The S-100-Compatible AIB

The AIB (analog input board) is an S-100-bus-compatible analog input subsystem that accepts multiple low-level analog signals, multiplexes and converts to digi-

North Star's new controller board.



SL's analog input board.

tal format with 12-bit resolution and throughput rates up to 8 kHz. The standard AIB accepts eight differential/16 single-ended inputs and is optionally expandable to 16 differential/32 single-ended.

Other AIB options include computer programmable gain, 4-20 mA current inputs and super low drift. The AIB is priced at $495 in small quantities and deliverable within 30 days.

Signal Laboratories, Inc., 202 N. State College Blvd., Orange CA 92668.

Interpreter for the 8080 and PDP-11

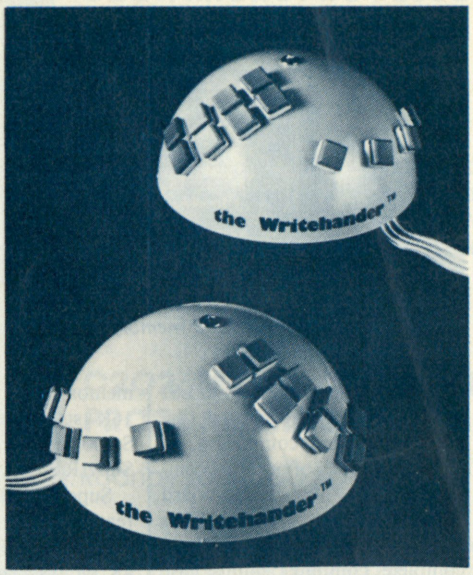
An interpreter for a subset of the C-structured programming language, which runs on both DEC PDP-11 and Intel 8080 processors, is available from Tiny-c Associates, PO Box 269, Holmdel NJ 07733. The tiny-c Owner's Manual includes a complete reference description of the language, a tutorial walkthrough of a training program, lots of sample programs, including comments on their programming style, and a description of the Program Preparation System. It also includes commented source code listings of both the 8080 and PDP-11 interpreters and a chapter on how the interpreter works.

Tiny-c, intended primarily for the education and hobbyist markets, handles integer and character data and arrays of either type. Other features include compound statements, if-else and while statements, global and local variables, pointer variables and functions which may have arguments and may return results. Recursion is allowed. The interpreter also recognizes calls to functions written in machine language. These, too, may have arguments and return results. A minimum of 16K bytes of memory is recommended to run tiny-c.

The package includes a Program Preparation System (PPS) with which the user can write, edit, run, debug, store, recall and link tiny-c programs. The PPS includes a standard library of tiny-c software tools. The PPS is written in tiny-c; thus, it serves as an example of a significant use of tiny-c and is also easily adapted to a user's or operating system's requirements.

The Owner's Manual is available for $40; machine readable copies of the interpreter are available separately on several formats of tape and disk.

Tiny-c cornucopia.



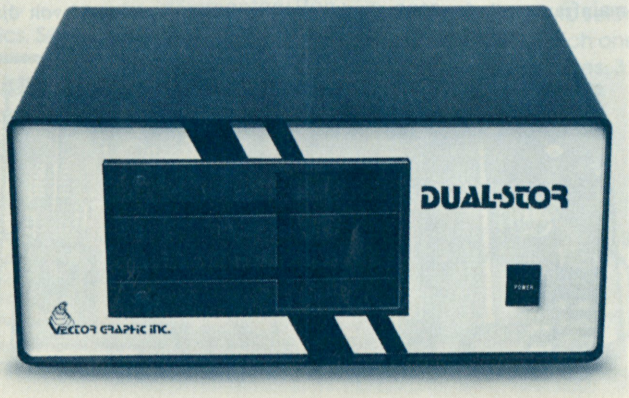
The NewO Writehander.

Dual Floppy-Disk System

Dual-Stor, a fully integrated, dual floppy-disk system designed specifically for microcomputer systems, comes complete with controller and dual floppy-disk drive in a cabinet that matches the Vector 1 microcomputer. The Dual-Stor disk system has a storage capacity of 243K bytes per 8-inch diskette and utilizes the standard IBM-compatible recording format. Using programmed data transfer, the Dual-Stor operates with both static and dynamic memories at a data rate of 250K bits/seconds.

Completely compatible with the S-100 bus, the disk system features the Reset-and-Go function on power up. Other features include state-of-the-art technology, extensive testing and reliability. Tested and assembled, the Dual-Stor comes complete with disk controller board, DOS, BASIC compiler, assembler, string-oriented editor and debug software. Suggested retail price is $2300.

Vector Graphic, Inc., 31364 Via Colinas, Westlake Village CA 91361.



Vector Graphic's Dual-Stor.

One-Hand-Typing Keyboards

Computing is a simple, one-handed task with the Writehander keyboards. Available for either right or left hand, these small new keyboards provide characters for computers, terminals, displays and other 128-character ASCII- or ISO-coded devices. The new model features snap-action switches, improved circuitry and keypressed signals as well as strobe pulses to signal that data is available.

The Writehander keys are mounted on a rugged five-inch diameter hemisphere that conveniently accommodates the human hand. The shape and key locations have been designed so that the fingers and thumb naturally fall on the appropriate switches.

The small keyboard is finding wide application for touch typing and data entry where a free hand is needed, such as for telephone orders, computer programming and for astronomy and microscope observations. Pencil notes may be written with one hand while typing data with the other.

The keyboard code is easily learned by blind people and those with a disabled hand. When connected to portable equipment, the Writehander allows inventory or field survey data to be conveniently entered with one hand.

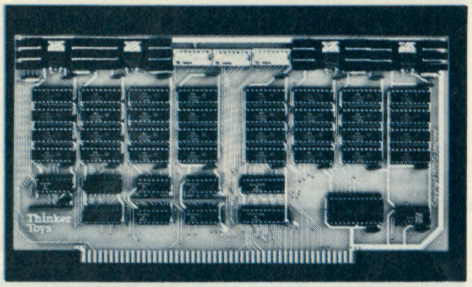
The Writehander can be interfaced with any computer, terminal, printer or other device that will accept parallel 7-bit code signals and provide the nominal power required.

NewO Company, 246 Walter Hays Drive, Palo Alto CA 94303.

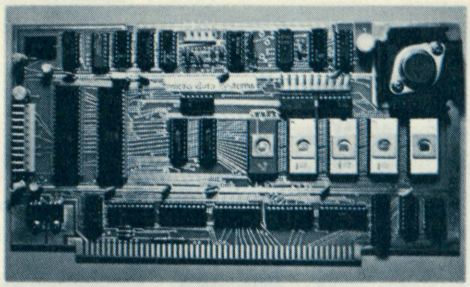
OSI Introduces Single-Board Concept

Ohio Scientific has just developed the world's first complete computer system on a board incorporating a standard computer keyboard, fast microcomputer, video display interface with graphics, audio cassette, 8K BASIC-in-ROM, up to 8K of RAM and power supply on a single printed circuit board.

This single-board concept, made possible by Ohio Scien-



Morrow's new 16K static memory board.



Microdasys' MD-690A CPU board.

tific's six proprietary custom LSI circuits, drastically reduces the parts count and complexity, as well as the price, of personal computers. The new single-board concept will be used in OSI's Super Board 2, which will be a complete computer minus case and power transformer, and in the 600P, which is a fully packaged personal computer system.

Projected prices are $225 to $279 for the Super Board 2 and $329 to $379 for the 600P. Both models are in pilot production now and will be available in the fall of 1978.

Ohio Scientific, 1333 S. Chillicothe Rd., Aurora OH 44202.

CP/M for Micropolis and North Star

Now Micropolis and North Star Disk users can join the software bus. Without any hardware changes, CP/M can be run with all the features available to the users of the two systems on standard floppy disks. These features include dynamic allocation of diskette storage, relocatability of system in memory, intrinsic commands to save, rename, erase and display directories of files and complementary context editor, assembler and dynamic debugging program.

The software package for either Micropolis or North Star includes: CP/M (Version 1.4), $145; Microsoft FORTRAN-80, $400; Microsoft Disk Extended BASIC, $300; CBASIC Compiler/Interpreter BASIC, $95; MAC Macro Assembler, $100; SID Symbolic Instruction Debugger, $85; BASIC-E Compiler/Interpreter BASIC, $30.

Lifeboat Associates, 164 West 83rd St., New York NY 10024.

SuperRam 16

George Morrow, designer of the ECONORAM 4K static memory, has introduced a new 16K static memory board for S-100 microcomputer systems, SuperRam 16.

SuperRam 16 is a complete kit featuring four independently addressable and write-protectable 4K blocks. The design uses just 11 ICs to keep the board uncrowded and trouble-free. The board was designed to meet the proposed IEEE Standard for the S-100, ensuring full compatibility with all S-100 systems. All signals are fully buffered, including address and data lines. Morrow's 16K static RAM retails for $299.

Thinker Toys, 1201-10th St., Berkeley CA 94710.

S-100-Compatible 6802/09

Added features of the MD-690A CPU board over the capability of the MD-690 include: 6809 compatibility, 10K PROM space and RS-232 interface provision. The new MD-690A combines the computing power and software compatibility of the 6802 processor with the hardware compatibility and widespread support of the S-100 bus. This processor has internal 16-bit arithmetic, 8×8 multiplication, 18 addressing modes (the 6800 has six) and five times the throughput of the 6800 (making it three times faster than a 4 MHz Z-80).

The MD-690A comes complete with MONBUG, a 1K PROM monitor program which is software compatible with the standard Motorola MIKBUG monitor; however, it is designed to interface with most memory-mapped video and graphics cards for ultrafast I/O. The board can accommodate up to 10K of 2716 EPROM, which may be used for 8K BASIC or other firmware.

The processor card also features an on-card 2400 baud Manchester cassette interface, interrupt-driven keyboard input for fast I/O and provision for an RS-232 interface. It provides you with 16 I/O ports and DMA capability; there is 1K RAM. The board is high quality, double-sided, plated through, solder masked and silk-screened.

The suggested retail price for the S-100 bus/MC6802/09 CPU board, complete with the 2400 baud cassette interface, 1K monitor and 1K RAM, is $198 in kit form, or $258 assembled and tested. Complete documentation, including assembly and troubleshooting instructions, and a comprehensive user's guide are provided.

Microdasys, PO Box 36051, Los Angeles CA 90036.

ECT Mainframes and CPU Board

Electronic Control Technology's 10-slot Table Top Mainframes are of sturdy construction (similar to ECT's industrial ECT-100 19-inch rack mount card cages). The TT-10 Table Top Mainframe consists of an industrial quality card cage; the MB-10, an S-100 bus motherboard with bus termination and ground plane to reduce noise; a full set of 10 connectors and guides; a 15 A at 8 V, 1.5 A at +16 V and 1.5 A at −16 V power supply, which mounts inside the card cage; a clear satin finished front/bottom plate with a reset switch and power indicator LED; a whisper fan and a vented textured blue cover. Assembled, the mainframe sells for $395; the kit costs $325.

ECT also announces its 8080 CPU, an S-100 bus 8-bit processor board based on the 8080A microprocessor IC. The clock is crystal controlled and digitally generated for optimum system performance. 74LS244 bus drivers are utilized to provide low power with higher drive capability. M WRITE is generated on the board and a switch-selectable 'JUMP' on Reset circuit is provided for use in systems without a front panel. Low-profile sockets are provided for all ICs. The board has solder mask, silk-screened legend and gold-over-nickel plated fingers. Kit, $120; assembled $175.

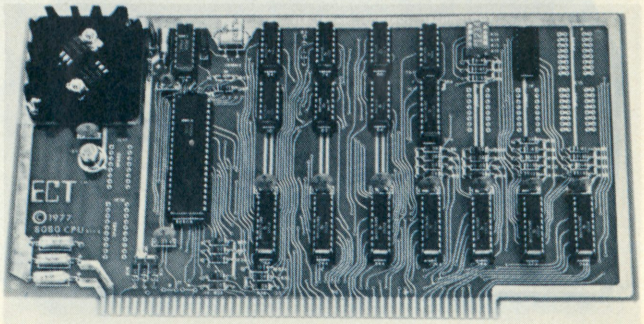
Electronic Control Technology, 763 Ramsey Ave., Hillside NJ 07205.

UMB Universal Printed Board

Looking for a truly universal printed circuit board? Whether you're a design engineer evaluating a new circuit or a representative of a company that manufactures custom and specialty systems, the UMB Universal Printed Board is for you.

Other universal boards do not accommodate both analog and digital components on one board without time-consuming wire-wrapping or other modification . . . whether you're working with microprocessors or other dual in-line packages. UMB is a practical solution to many breadboarding and production problems. Its unique, two-sided interlacing foil pattern incorporates four independent power planes, each one bused to all 264 pad positions.

This design allows you to use both analog and digital components on one board. For example, in mixed analog/digital circuits, one side of the board provides zero and +5 volt distributions, and the other side of the board provides −15 and +15 volt dis-



8080 CPU board with "JUMP" on Reset.

BOOKS ... ADDICTIVE?

C201: MICROPROCESSORS: From Chips to Systems

Rodnay Zaks, 416 pp, $9.95

A complete, progressive, educational introduction to all aspects of microprocessors, and the assembly of a system: basic concepts, internal operation, the chips, system interconnect, programming, system development.

This book has been qualified as 'best text ever written on microprocessors.'

C202: MICROCOMPUTER PROGRAMMING:6502

Rodnay Zaks, 250 pp, $9.95

A step by step introduction to microcomputer programming, using the 6502 microprocessor, with a detailed analysis of all basic programming techniques, from arithmetic to Input-Output, including interrupts.

Also available: 6502 APPLICATIONS BOOK

C207:MICROPROCESSOR INTERFACING TECHNIQUES

A.Lesea & R.Zaks, 416 pp, $9.95

How to interface a microprocessor to the external world, including all common peripherals: dynamic memory, keyboard, LED, floppy disk, CRT display, cassette.
Includes the standard busses: RS232, IEEE 488, S100.

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TO MICROPROCESSORS (2.5 hrs) ref. S1, $29.95
TO PROGRAMMING (2.5 hrs) ref. S2, $29.95
COMPREHENSIVE (6 hrs) ref. SB1, $59.95

SPECIALIZED
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BIT-SLICE (6 hrs) ref. SB5, $49.95
INDUSTRIAL (4.5 hrs) ref. SB6, $49.95
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Z10-APL IMPLEMENTATION $25.00
X1-MICROPROCESSOR LEXICON $1.95
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WARNING: Readers have Determined that C-series Books May be Addictive. Please let us Know.

C200:AN INTRODUCTION TO PERSONAL AND BUSINESS COMPUTING

Rodnay Zaks, 250 pp, $6.95

A comprehensive introduction to personal computers, for home or business use: the hardware, the software, the peripherals, the costs. BASIC. How to fail with a business system. How to select a system. Will it be sufficient? Which one to buy.
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Esmark's new video integrated electronic tracking pen.

tributions. This arrangement presents low characteristic impedances to the power supply system and, for most applications, minimizes crosstalk between the analog and digital distributions.

Two aspects of the UMB make it especially suitable for prototyping and evaluating microprocessor or interface circuits: (1) the grid of 792 holes available for components are aligned on .100 inch centers in both X and Y axes, (2) none of the component pads are tied to any of the power planes; power planes are bused beside every pad position and require only short jumper wires to make a connection. Dual in-line packages as large as 66 pins may be accommodated on the UMB, and smaller dual in-line packages may be positioned in a variety of configurations to suit the requirement of a circuit or system.

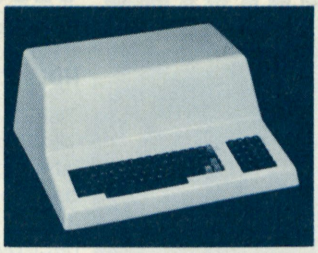
The UMB's construction allows soldered circuits to be changed without destroying plated pad areas. Hole diameters are .043 inch, large enough for almost any component, and all holes are plated-through. Positions for board isolation capacitors are provided near the power entry points. The board measures 4.5×4.0 inches. Price is $15.15 each.

Midgard Electronics, 175 California St., Newton MA 02158.

Vidiet-Stik

Vidiet-Stik, a light-pen compatible with virtually all mini/microcomputer systems, has recently been developed by Esmark, Inc., 507½ E. McKinley Hwy., Mishawaka IN 46544.

Vidiet-Stik (video integrated electronic tracking) can be used for: keyboard substitution with real-time redefinition of key positions; interactive games; educational drills for preschoolers; menu selection; joystick substitution; electronic music keyboard replacement. The package includes the assembled and tested pen, complete computer interface instructions, operating documentation, as well as checkout and game software listings.



TPC's Model 101 case.

Vidiet-Stik software is compatible with all 8080- and Z-80-based systems; it is easily adapted to all other mini and microcomputer systems. The pen's hardware interface requires only three electrical connections: +5 V, ground and a single TTL level signal to any parallel input port. The pen's control software is relocatable to any address and occupies less than 1K of contiguous memory. The Vidiet-Stik is available for $39.95 (plus $1.50 for postage and handling); allow 4-6 weeks for delivery.

Enclosures for Home-Built Microcomputers

Want to add the "professional" touch to your home-built computer? Now you can with the new line of enclosures for home-built microcomputers and terminals from Technical Products Co., PO Box 12983, Gainesville FL 32604.

Constructed of molded fiberglass, the case measures 20×18×8 inches and can support a video monitor or portable TV on top. The keyboard area (20×6 inches) can accommodate both a full-size keyboard and a hex-pad (not included with case).

The case is finished with textured polyester resin and is available in beige, white or black. Cutouts (not provided) are easily made with an ordinary saber saw. Cast-in brackets are provided for mounting to a base. The price of the case is $59.95. A matching fiberglass clamshell-type base (one inch deep) is available for $12.95. Matching expansion modules for peripheral devices will be available in the near future.

Two-Part Computer Music

"Americana Plus" music software is now available for use with the Model 6 and Model 68 Music Boards, Newtech's S-100 bus and SWTP-compatible Music Boards. "Americana Plus" contains more than a dozen precoded tunes, ready to load and run, including five American favorites arranged for two voices. Each voice can have a different sound quality, and two music boards can be used for stereo.

The MD-1NS disk for the North Stark Micro Disk system and the MD-1SW disk for the SWTP MiniFLEX Disk System (both $19.95) also feature "Jukebox," a user interactive BASIC program that permits easy selection of any tune. The MC-1SW cassette ($15.95) for the SWTP AC-30 interface contains the same tunes as the MD-1SW disk. An audio demo cassette with the above songs is also available. Model 6 and Model 68 Music Boards, assembled and tested, are available for $59.95.

Newtech Computer Systems, Inc., 230 Clinton Street, Brooklyn NY 11201.

Software from Software Industries

You can start and maintain your own mailing list with a general-purpose mailing label program from Software Industries, 902 Pinecrest, Richardson TX 75080. Mailing List operations include: Add, Delete, Search, Sorted List, Modify and Sequential Printout.

You have the option of a Remark Field up to 64 characters long for any additional information, which can then be used to sort or retrieve information. You can also set up and change default printing formats controlling the exact placement of up to five labels across a page, whether or not to print the Remark Field and the placement of the zip code.

The program is designed to be easily used without any prior knowledge of computers. Written in Disk BASIC for a PolyMorphic Systems 8810 or 8813, it comes complete on diskette or as a hard-copy list for $40.

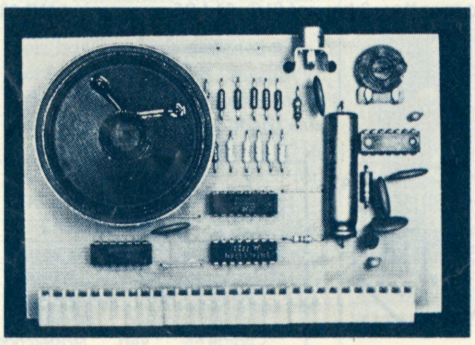
Supersoft Software

Supersoft, PO Box 1628, Champaign IL 61820, introduces two new software packages for North Star Disk. These packs are part of Supersoft's line of 'LOAD AND GO' software.

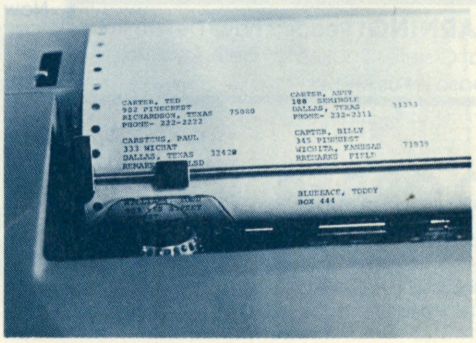
The Investment Pack contains many programs covering the full range of investments, including options analysis, bond analysis, intrinsic value of stock (Molodovsky method), a complete portfolio management system, as well as a two part macro-analysis system. Several programs are disk interactive.

The Family Pack is Supersoft's answer to the gap between hobbyist software and the strictly business programs. The Family Pack is aimed at the home and is full of programs that range from family/home budget analysis to full-fledged mail and phone lists, as well as tutorials in math and spelling and a simple method of writing perfect letters.

The Investment Pack and Family Pack are $25 each.



Newtech's Model 68 Music Board.



SI's Mailing List program