FIRST ISSUE OF VOLUME IV

A C S NEWSLETTER

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TENTH ANNIVERSARY

The first ACS Newsletter was published in August 1966, ten years ago this month, and has seen many changes in the field of hobby computers, especially the flood of kits in the last year and a half. Until then, it was all home-brew, and although many of us are still building from scratch, the emphasis today is on kits, which certainly do help cut down on time.

KIT ROSTER (PART IV)

Although I thought the list was pretty much up to date with Part III, several more microkits have turned up, including several that were introduced in Atlantic City at the end of this month.

43. The Sol Terminal Computer, by Processor Technology (6200 Hollis St., Emeryville, Calif. 94608), is based on a single Altair-bus-type board that includes an 8080 MPU, 1k RAM, UART, video display circuit (identical to PT's VDM-1), parallel I/O port, keyboard input port, audio-cassette interface, and a PROM/ROM stored-program "personality module" with up to 2k words. A CONSOL program in PROM permits simple terminal operations. The optional second level is the SOLED editing terminal. A third PROM, SOLOS, turns Sol into a stand-alone computer, with BASIC included. The Sol-PC board alone is $475. Sol-10, with cabinet, power supply and 70-key keyboard, is $795. Sol-20 is Sol-10 plus 8 more amps of power, five-slot expansion chassis and card frame, 15 more keys (arithmetic keypad). The SOLED or SOLOS modules can be added to Sol-PC, -10 or -20 for $100, if bought at the same time.

44. The Quay 80A1 uses the Z-80 MPU, with a 2.5-MHz clock, "so you can run Altair 8800 software." The kit includes the Z-80, PROM monitor, 1k static RAM, parallel port, EPROM programmer, sockets for up to four 8k EPROMS, parallel ASCII keyboard, and interfaces for RS-232C and 20-mA current loop; $450 kit, $600 wired.

Quay also has a Q-8Ø OEM micro, on a larger board, with 4k dynamic RAM, on-board expansion room for memory, I/O ports, counter timer, DMA controller; $695 wired. Quay is at P.O. Box 386, Freehold, NJ 07728. (That's Quay Corp.)

45. OSI's Challenger uses their 400-series boards in a case with only one switch. The 65-1K model, with 6502 MPU, serial interface, 1k memory, is $439 wired; 65-4K, $529; 65V-4K, with video board, $675. The 68-1K, with 6800 MPU, is $439; 68-4K, $529. (OSI, 11679 Hayden St., Hiram, Ohio 44234.)

46. CGRS Microtech (P.O. Box 368, Southampton, PA 18966) offers the µ-PUTER, with 6502 MPU, as bare boards, kits, and wired units. The complete system, at $539.95, includes CPU board, control panel with 7-segment hex displays, mother board with 7 connectors, I/O module, power supply, wooden cabinet.

47. The Veras F8 (Veras Systems, Div. of Solid State Sales, Inc., Box 74D, Somerville, MA 02143) has a CPU that includes the F8 MPU, Fairbug monitor, programmable timer, 20-mil loop and/or RS-232 interface, 1k RAM. The CPU, plus buffered

motherboard, power supply, and cabinet, is $429 kit, $679 assembled (after Sept. 15, $459 kit, $709 wired). Motherboard accepts four 4k static RAM boards, at $149 kit each. Under development: UV PROM board, DMI and DMA board, cassette, modem, video board.

48. Three 6800 evaluation boards from AMI (American Microsystems, Inc., 3800 Homestead Road, Santa Clara, CA 95051), feature a built-in EROM programmer: EVK100 kit, with PC board, minimum of parts, $295; EVK200 kit, with 512-byte EROM, $595; wired EVK300, with 2k EROM and Tiny BASIC, $950.

The EVK99, advertised by Advanced Micro Computer Products, is the same as the EVK100 but with less to it, made for hobbyists and computer stores, sold only in quantity to computer clubs and stores.

49. EPIC 2, from Burkeshire Systems (P.O. Box 512, Mountain View, CA 94040) features a board with 8080 MPU, 2k RAM, 256-byte PROM bootstrap, 16 I/O lines, video interface, cassette interface, programs including monitor, text editor, Life, blackjack; separate keyboard; $775.

50. Intercept Jr. from Intersil (10900 North Tantau Ave., Cupertino, CA 95014) is an all-CMOS "low-cost tutorial system" using Intersil's IM6100 CMOS MPU and related CMOS devices; it recognizes the DEC PDP-8/E instruction set. Basic module is a 10-by-11-inch double-sided PC board, with multifunction alphanumeric keyboard, two four-digit LED displays, resident micro-interpreter, and battery power; $281 wired. Memory can be extended up to 12 non-volatile IM6518 1024x1 CMOS RAMs; $145 per RAM module. A power-strobed PROM module supplies up to 2k words of user program; $74.65. Serial I/O module with both RS-232 and Teletype interfaces is $81.70. Terminals permit using external 5- or 10-volt power supply.

51. The Data Handler from Western Digital Systems (3650 Charles St., Suite Z, Santa Clara, Calif 95050) uses the MOS Technology 6502 MPU and a single 13.75-inch by 11.5-inch PC board. "The Data Handler is plug-in compatible" with the Altair 8800; "even the 8800 CPU will plug right in." The bare-bones kit, with PC board, 26 switches, wooden stand, is $79.95. The complete kit includes this plus a full set of ICs, 1k RAM, resistors, capacitors, LEDs and 1-MHz 6502. The Data Handler can directly address 65k of memory. There is an "easy to use full-function hardware-controlled front panel."

"The Data Handler has dual interrupt lines (one maskable), slow-down circuitry for slow memories, DMA (direct memory address), and also contains one 8-bit parallel-input port, one 8-bit parallel-output port, separate I/O address control and memory-control lines, single voltage, and cycle times to 250 nsec."

52. The Apple-1, from Apple Computer Company (770 Welch Road, Suite 154, Palo Alto, CA 94304) is an assembled board using the 6502 MPU, comes with video generator, 4k bytes of RAM (board will hold 8k), monitor in PROM, breadboard area; $666.66. Also available: cassette interface, which includes a tape of pseudo-compiled Apple BASIC; $75. 4k RAM expansion, $120.

53. Gnat Computers (8869 Balboa, Unit C, San Diego, CA 92123), offers a dozen boards, and five assembled systems, based on the 8080 MPU. System 1, with CPU, 1k RAM, 512 words of ROM, Gnatbug, serial and parallel interfaces, hardware package (power supply, card rack with motherboard and five connectors); $925. System 2, "minimum

system for hardware checkout," has CPU, 1k RAM, front panel, hardware package; $985. System 3, PASIC-oriented, has CPU, 8k RAM, 768 ROM words, Gnatbug monitor, interface, hardware package with 6 connectors; $1695. System 4, "minimum for PROM programming," has CPU, 1k RAM, 1k ROM, Gnatbug, interfaces, PROM programmer, hardware package; $1695. System 5, the "complete development system," has CPU, 16k RAM, RAM/ROM for floppy-disk drivers, 4k ROM for monitor, interfaces, front panel, 19-inch cage, cabinet; $2995. Adding to System 5 a Lear Siegler ADM-3 terminal, Teletype 40, iCOM floppy-disk system and high-speed paper tape reader brings the total system to $10,320.

54. BABY! is a wired micro in an attache case, from STM Systems (P. O. Box 248, Mont Vernon, N.H. 030-57), using the 6502 MPU, comes with 2k RAM, 512-byte bootstrap loader and monitor in PROM, DMA, video interface, audio cassette interface, 63-key keyboard with upper and lower case (plus Greek with control key), power supply, speaker, audio cassette tape with dump program, text editor, three games, music program, for $850. Same with 4k RAM, $1000. Optional video monitor, $150. Floppy diskette with power supply and controller, $750. Maintenance contracts available!

55. The SC/MP PC-board kit from National Semiconductor uses the SC/MP MPU (ISP-8A/500D), features static operation, 46 instruction types, single- and double-byte operation, 512 bytes of ROM with "Kitbug" monitor and debug program, 256 bytes of RAM, crystal clock, TTY interface, 62-pin edge connector, at $99.

56. The PS-810 from Pronetics Corp. (P.O. Box 28582, Dallas, Texas 75228), is an assembled PC board, 4.5" x 6.5", with 1k RAM, 1k firmware (Fairbug monitor), 32 bidirectional latched I/O ports, Teletype interface, $179.

57. The M-8 Educator, from Technical Communications, Inc. (11495 Lenexa Dr., P.O. Box 306, Olathe, Kansas 66061) uses an F8 MPU, has 4k bytes of RAM (expandable to 16k), 2k bytes of RAM for CRT refresh, 1k Fairbug monitor, with CRT, keyboard and electronics in plastic housings. The 12-inch CRT has 31 lines of 64 characters each; keyboard has 53 keys. Serial 20-mA loop for Teletype, 300-baud I/O for mag tape, parallel port for high-speed tape reader. Optional: resident assembler in 3k ROM; ROM board has space for additional 5k. Price: $1895.

58. The Intecolor 8001 kit, from Intelligent Systems Corp. (4376 Ridge Gate Drive, Dulugh, Georgia 30136), although advertised as an 8-color intelligent terminal, is actually a computer, based on the 8080 MPU, with 25 lines of 80 characters each on a 19-inch 8-color CRT, 4k RAM/PROM software, baud rates up to 9600 baud, ASCII keyboard; $1395. Options include RAM to 32k, 48 lines of 80 characters each, light pen, limited graphics mode, background color, special graphics characters. Later this year they'll offer check-balancing and inventory programs, and will advertise the 8001 as a personal computer.

CHANGES IN THE COMPUTER ROSTER

There are some changes and corrections to be made to the computer rosters in the last three issues of Volume III.

The PolyMorphic Micro-Altair name was changed to Poly-88, not Micro-88, as reported in the June 1976 issue, item #36.

A couple of computer companies may be out of business, or relocating:

Systems Research, Inc. (SRI-1000, #17, Nov. 1975 Newsletter, and SRI-500, #20, Feb. 1976 NL) has a disconnected phone. Techtra (TMC 112, #24, Feb. 1976 NL) is having its phone number changed, new phone not in yet....

One of the very first microcomputers was the RGS 008A (#12, Nov. 1975 NL), which is now available only on special order, as RGS is now working on a new system, using many of the same boards, such as for RAM and ROM, but with new CPU boards, for the 8080, 6800, 6502, 1802 (COSMAC). Availability date depends on capitalization.

Computer #38, the 8080+, listed in the June 1976 NL as coming from the Computer Shack, is actually the MSC 8080+, a product of Monolithic Systems Corp. (14 Inverness Dr. East, Englewood, Colorado 801-10), and is one of the best-looking micros available, with a very neat and functional-looking control panel. This wired-only two-board (stacked) micro has a big brother, a four-board OEM and evaluation-type system, which adds to the 8080+ an OS board (static RAM with battery, and strapped write-access) and a 16k memory board; $1976.

PERSONAL COMPUTING '76

The two-day Consumer Trade Fair, Aug. 28 and 29, at Atlantic City, New Jersey, was hectic, crowded, and had 80 or more booths crammed with computer goodies. Between 3000 and 3500 people attended, and nearly 40 papers were presented, ranging from "The KIM System" to "Software for Speech Synthesis."

Multiprocessing with Microprocessors

This paper, by Mike Cheiky of OSI, was about the new 460Z CPU expander board, which allows a user to "run 8080, Z-80 and 6100 (PDP-8) software on his 400 system without modifying the software." Inserted in the 400 bus between a 6502-based 400 board and the rest of the 400 system, the 460Z contains both a Z-80 and Intersil 6100 MPU, with room for a third MPU. The "executive" 6502 controls each line of the Z-80 and 6100, monitors system signals, and permits multiprocessing.

Cheiky said that the reason to go to multiprocessing is to protect against obsolescence, since "any processors you use today and in the future can be run under the executive of the extremely fast 6502." The 6502, which is the fastest MPU available, due to its pipeline processing, which increases speed by overlapping operations, will be superseded by an even faster MPU, the 6502C.

Talking Computers

Both Votrax and Computalker exhibited computer-controlled speech synthesizers. The Votrax takes 8 bits to select one of 61 phonemes, which are the individual sounds that make up words. The word "and" takes six bytes, and is coded as 2/PA1, 1/AE1, 1/EN3, 1/I3, 1/N, 1/D. The first byte is a pause; the numbers before the remaining slashes are stress levels, with the highest number indicating the principal stress in the word. Votrax has a "dictionary" of words with their codings, which would have to be stored in a table.

The Hobbyist Standard

Some manufacturers decided to find a short name for the 100-pin bus that has become known as the "Altair/Imsai/PolyMorphic/Sol bus." They picked "S-100," meaning the Standard 100-pin bus. However, MITS says they have that bus patented, and will not advertise in any magazine that uses "S-100" instead of just plain "Altair bus," which is what

MITS insists on. Well, it's short.

Me-Too Boards for the SwTP 6800

Until recently, anybody who was making only the boards for a hobby computer, would make them for the Altair 8800 bus; an example is the Vector prototype board. But now you can get prototype boards for the Southwest 6800 system, in CPU/memory size at $19.95 and I/O size at $9.95, from Personal Computing Co., 3321 Towerwood Dr., Suite 107, Dallas, Texas 75234.

Case for the CT-1024

If you need a case for your Southwest CT-1024 terminal (or for any similar keyboard terminal), a fine metal one, with welded joints, is available from E,S, & L Industries, Inc. (867 Rose Place, Anaheim, CA 92805). There are 8 models, from $45 to $55; you choose the one that fits your particular keyboard and which has, if you need it, a cutout for a 5-key or 12-key pad for cursor control or numerics. Send for the info sheet, which also shows line drawings of their computer stands and the console.

Expansion for All-On-One Board

Several of the companies that make "computer-on-a-board" machines, with keyboard and display on the PC board, are now offering expansion units.

MOS Technology has, to expand the KIM-1 computer, a KIM-2 4k static RAM memory board ($170), KIM-3 8k static RAM memory board ($298). In the works are a resident assembler, full BASIC, 2k EROM board.

EBKA will soon have an expander board for its 6502 Familiarizor, or for any 6502 or 6800-based micro, with all sorts of options: PROM programmer, 4k RAM, parallel interface, baud-rate clock, serial interface, dual cassette interface, plus connecting cables. The whole works, complete, is $495 kit, $575 assembled. Up to eight of these boards may be daisy-chained together, for a total of 33k of RAM.

The E&L Mini-Micro Designer (same as the Radio-Electronics Dyna-Micro) now has a plug-in accessory board, with extra RAM (1k supplied, 2k capacity), Teletype and audio-cassette interfaces, paper-tape controller, room for more PROM or ROM (none supplied). $175 kit; $225 assembled and tested.

Digital Group Case

A case will soon be available for all those Digital Group boards; a prototype was shown, with space for a dozen cards or so, no front-panel switches or lights other than for power and reset. CPU boards now available include Z-80, 8080A/9080A, 6800, and 6502. A complete four-board Z-80 system, with 10k memory, power supply, motherboard and cabinet, is $895 kit, $1295 wired; same with 18k, $1095 kit, $1545 wired. Similar 8080 or 6800 systems are $50 cheaper; the 6502 system is $100 cheaper.

Altair Kit-A-Month

First I'd seen of an easy-payment plan, offering the 8800b at $107 per month for 8 months, 8800a at $79 a month for 7 months, 680b at $95.20 per month for 5 months.

KIM-1 Power Supply

For those who don't have a ready source of +5 and +12 volts, a power supply is available at $50 (plus $2.50 handling and shipping; NJ residents add 5% sales tax) from Scarpa Laboratories, Inc., 46 Liberty St., Brainy Boro Station, Metuchen, New Jersey 08840.

BASIC Tutorial

The Amateur Computer Society is open to all who are interested in building and operating a digital computer.

For membership in the ACS, and a subscription of at least eight issues of the Newsletter, send $5 (or a check) to:

Stephen B. Gray
Amateur Computer Society
260 Noroton Ave.
Darien, Conn. 06820

The Newsletter will appear about every two or three months.

Wave Mate, manufacturers of the Jupiter II and IIC computers, are planning to offer a BASIC tutorial on cassette.

COMING COMPUTER SYSTEM

Godbout may be on the way toward the computer he's been talking about for some time, He's now advertising a 16-bit PACE CPU board, although "not soliciting orders (yet), so please don't write us just now. When we have a complete system, available off-the-shelf, you'll see it in our ads. Hang in..." They do have a Naked RAM board, 4k, with 40-pin connector; $88. And Econoram, 4k Altair-compatible, $99.95.

VECTOR 8800V BOARD

Vector's 8800V universal microprocessor board is the same size as Altair and Imsai boards, prepunched for DIP ICs. Power and ground planes are on opposite sides of the board. Two heat-sink positions; one heat-sink supplied; $19.95 each.

IN PRINT

A unique publication is the 1½-inch thick "Bug Book III, Micro Computer Interfacing: Experiments using the Mark 80 Microcomputer, an 8080 System," $14.95 from E&L Instruments (61 First St., Derby, Conn. 06418). The Mark 80, also known as the Micro-Designer System (Nov. 1975 NL), has two SK-10 breadboard sockets, permitting the use of a wide variety of "LR Outboards," modular electronic circuits that "each perform a single digital function," such as LED display, pulser, timer, clock, line driver/receiver, UART, etc.

After a long section on the 8080, there are dozens of experiments, some involving running simple programs, others that use outboards and simple programs.

Sylvania Technical School Manuals

One of the ACS members says he learned everything he knows about computers from the Computer Lab Books published by the Sylvania Technical School (63 Second Ave., Waltham, Mass. 02154).

The Computer Phase III Student Handout/Lab Book ($3.23) is a 212-page primer that examines the basics of Boolean algebra, truth tables and logic circuits, combinational logic, timing diagrams, numbering systems and conversion, binary arithmetic, and logic families, and is a workbook with many blanks for the student to fill in.

The Computer Phase IV Integrated Circuit Handout/Lab Book (not seen) is $4.36. The Computer Phase V PLC-1 Computer Operations Lab Book ($4.50) is a manual for a pre-MPU teaching computer, an 8-bit, single-address, bus-transfer-organized, parallel processor with ROM control.

The books "may be bought on the premises through the School Book Store, if someone lived nearby. Other arrangements might possible be made." If you don't live nearby, you might write to the Book Store....

KIT ROSTER
PART V

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KIT ROSTER (PART V)

There's just no end to the procession of microprocessor kits (and wired units): 18 were listed in the Nov. 1975 Newsletter, 16 in Feb. 1976, 8 in June 1976, 16 in Aug. 1976, and here we go again:

59. The Iasis 7301, from Iasis, Inc. (815 W. Maude Ave., Suite 13, Sunnyvale, Calif. 94086), is an all-on-one-board computer, wired only, with 8080 MPU, 1k RAM, 2k PROM, 24-key keyboard, eight 7-segment readouts, Iasis-developed monitor in 1k of the PROM; $450. Accompanying the "ia7301" is a 250-page programming course. Both computer and course are contained in a three-ring binder. Iasis also has a $7.95 Microcomputer Applications Handbook.

60. The COMPAL-80 computer, from Computer Power & Light (12321 Ventura Blvd., Studio City, Calif. 91604) is an assembled system "for homes and small businesses for only $1863." The system includes a computer with only two front-panel switches, separate keyboard, and 9-inch TV monitor. Uses 8080A MPU, two serial I/O ports, 12k words of RAM, 16-line by 64-character video display, and extended BASIC residing in 10k, including formatted PRINT, double precision, etc. Options include additional memory up to 32k, dual floppy-disk drive, hard-copy devices, disk BASIC, applications programs in BASIC (payroll, inventory control, general ledger, etc.). The typical business system, including disk and printer, is under $9000. In a letter, CP&L said, "We use modified versions of boards manufactured by PolyMorphic Systems and by Processor Technology. Our CPU board is essentially that provided by PolyMorphic in their Poly 88, with the exception that the resident monitor on PROM is addressed at E000 hex, and that we perform a hardware jump to this address upon reset. Also, our monitor includes some features not found in other microcomputers...."

61. The Motorola MEK6800D2 Evaluation Kit has everything on one board, except power supply. The $235 kit features 16 hex keys, 8 function keys, 6 hex LED displays, 256 bytes of RAM, room for more RAM (or ROM or PROM), wire-wrap area for up to 20 16-pin ICs, ACIA for cassette interface, PIA for keyboard and display, second PIA for user, J-BUG monitor in ROM (examine and change memory & registers, set up to five breakpoints, trace one instruction, etc.), crystal-controlled clock. Motorola started shipping the D2 this month.

62. First offered about a year ago, the Motorola MEK6800D1 design evaluation kit consists of PC board, 6800 MPU, PIA, ACIA, two 128-byte RAMs (room for 4 more on board), 1k ROM with Mikbug monitor, $149. The additional required ICs, sockets, resistors, etc., cost around $75 more (not available from Motorola).

The J-BUG in the D2 is like the KIM (Keyboard Input Monitor) in the KIM-1; the Mikbug in the D1 is for use with Teletype or RS-232 interface; these are two incompatible systems.

63. The Microkit-8/16 MOD 8080 and MOD 6800 are from Microkit Inc. (2180 Colorado Ave., Santa Monica, Calif. 90404), which says "Don't be

misled by our name, our system comes fully assembled, fully tested...." The two "Microcomputer Development Systems" are identical except for the MPU. Each includes a black-box computer (with only a power switch), keyboard, TV monitor, and two cassette-tape units, at $3850 each. Other features include an interactive debugger, editor, and resident assembler. Options include 8080 and 6800 in-circuit emulators ($1250 each), conversion packages for adding a 6800 to the 8080 system and vice versa ($950 each). printers and floppy disk, additional 8k dynamic RAM memory ($800), prototype board, PROM/RAM board, PROM programmer, BASIC interpreter ($900), word processor for text editing ($100), and terminal simulator and PL/M loader. This isn't really a hobby item, but it's interesting....

64. MicroMind, from ECD Corp. (196 Broadway, Cambridge, Mass. 02139) is based on the 6512A MPU (second-generation 6502), with character and graphics generator, I/O interface, rf modulator, power supply, 80-key keyboard. Software includes interactive editor, assembler, monitor, cassette-based file system, an extended form of BASIC called notsoBASIC, and "many games and utilities." Has sockets for 16k of memory, with 8k supplied. A memory-mapping option allows addressable memory space to be extended to 64 megabytes; 32k-byte memory expansion boards are available. Each of the 128 possible characters is software-defined, can be changed in real time, for detailed graphics. The cassette interface operates at a transfer rate of 400 8-bit bytes a second. Assembled only, $987.54. The notsoBASIC seems to be a version of Tiny BASIC, as floating-point is an option. Black-and-white graphics is included; 16-color graphics is optional.

65. The Gemini-68 from M&R Enterprises (P.O. Box 61011, Sunnyvale, Calif. 94088) consists of several assembled boards. The $279.95 stand-alone CPU board, with 6800 MPU, 384 RAM bytes, serial I/O, DMA, dual 22-pin edge connector, is about the same as the M&R Astral 2000 CPU board, except that Gemini uses the Mikbug monitor while Astral uses a 2k custom monitor; the PROM and ROM boards are the same. An 8k RAM board, $269.95; 8k EPROM board, with all ICs except the 5204 EPROMs, $89.95. There's also a CPU board with only 128 RAM bytes for $259.95. World-wide distribution rights have been assigned to James Electronics (1021-A Howard Ave., San Carlos, Calif. 94070); M&R will handle only OEM orders for 100 or more. The Gemini boards fit one of the Vector cabinets; if the volume of orders warrants it, M&R may provide a backplane. M&R advertising emphasis is now on the Gemini-68; presumably M&R has had the same trouble with the Astral 2000 that most other computer-kit manufacturers are having: many phone calls requesting assistance, and many PC boards sent in "all screwed up," as one company puts it.

66. In addition to the 1801-based Microtutor (#34, Feb. 1976), RCA now has the CDP18S020 Evaluation Kit with 1802 MPU, PC board, byte input and byte output ports, terminal interface, 512-byte ROM with "utility programs of commonly required functions," 256-byte RAM (room on-board for 4k max.), LED display, $249.

67. Cromemco (One First St., Los Altos, Calif. 94022), famous for the "TV Dazzler," has an assembled-only system using the Zilog Z-80 MPU, along with 8k RAM, PROM programmer, monitor in PROM, RS-232 interface, and mainframe with 22 slots. Actually, the mainframe is an Imsai. The price is a little beyond the usual hobby range: $2495.

This is justified by calling the Z-1 a "microprocessor development system."

HOBBY COMPUTERS: TWO DIRECTIONS

Two trends dominate hobby computers today. One is for computer freaks, and involves advanced hardware. Such as an Altair-compatible board that will store digitized versions of your voice in "training" mode, and then, in speech mode, when it recognizes your voice speaking one of the previously recorded words, will cause that word to be printed. (this is coming up in 1977). There are already computer boards that synthesize speech from stored vocabularies (August 1976 Newsletter, p 4). So it won't be long before computer freaks will be trying to get one computer to talk to another, not through wire, but by voice!

Other computer-freak areas involve advanced graphics, computer music, interfacing to a breadboard, digitizing the output of a TV camera, etc. So much time is spent on getting these devices to work, that very little time is actually spent by these hobbyists on computing. The emphasis here is on gadgeteering, on a constant search for the far-out and complex.

The other trend is more and more toward the average consumer's use of hobby computers. This means a certain amount of using all-on-one-board machines such as the KIM-1, EBKA 6502 Familiarizor, and EPA-68, programmed in assembly language. There are more of these all-on-one-board type of hobby computer than any other, one reason being that it's the simplest complete computer in a single package, with a minimum of parts, and is thus much easier for a manufacturer to design and produce than the more complex multi-board machines such as the Imsai 8080 or Digital Group system. For the manufacturer, there's very little labor involved, no sheet-metal work, no point-to-point wiring, and no construction manual to have to supply. A KIM-1 offers the hobbyist the cheapest way to get his feet wet, to learn the basics of computing at minimum cost, without the need for an external keyboard, or connection to a TV set or printer.

Some of these all-on-one-board computers are so simple and cheap that they'd be hard to expand, and are fine for the person who's quite sure all he wants is to learn the elements of computing without havint to put too much money into a machine he might not use much after he figures out how it works.

For those who think they may want to expand their computer so as to be able to write longer programs, or to hook on an alphanumeric keyboard or cassette memory system, etc., several of these "compacts" have add-on boards. KIM-1 owners can buy the KIM-2 4k RAM memory board, or KIM-3 8k memory. KIM-4 is a 6-slot motherboard with all connectors and a regulator. And further KIMs are in the works. The EBKA expander board, which will "expand any 6502 or 6800-based microcomputer," can be bought as an empty board, or with any or all of seven options, including kits for a PROM programmer, 4k RAM, 2k PROM, baud-rate clock, and interfaces for serial, parallel and dual-cassette operation.

But a much more important trend is to the wired-only computer that can be programmed in BASIC. As the hobby market appeals to more and more non-technical people, it will have to provide this high-level language, since such people will be interested in programming, and not at all in assembly language, which is too tedious and time-consuming

for all but the computer freak. As it turns out, incidentally, there are very few hobbyists who are really into heavy assembly-language programming; most of them use BASIC.

Aimed directly at the mass computer-hobby market is a $495 BASIC computer, with CRT and keyboard, scheduled to be shown in prototype at the January 1977 Consumer Electronics Show in Chicago, and made by a calculator manufacturer that recently bought an IC manufacturing company. Another calculator manufacturer is said to be working on a similar home computer, although more expensive: with 32k, $2,000.

This is where the major hobby-computer market of the future lies, not in the far-out hardware, but in an all-in-one-box computer that sells for less than $1000. The user won't care if the MPU is a Zilog Z-80 or an Intel 4004. He wants to program, and he needs to be supplied with plenty of software and with plenty of tutorial material to teach him how to use the software and to write his own programs. A couple of the larger hobby-computer manufacturers are already considering hard-wired BASIC computers. This means a BASIC interpreter in some form of read-only memory. A couple of hobby-computer manufacturers have BASIC in ROM now; one has 4k, 8k and 12k BASIC in firmware, but at prices that make his complete BASIC machine too expensive for the mass market. However, 1977 should see several new BASIC machines, assembled only, ready to run, for less than $500.

MICROPROCESSOR IN AN FM TUNER

The first use of a microprocessor in hi-fi tuners is in the Sherwood Micro/CPU 100, a synthesized digital FM tuner. The entire tuner is said to be "controlled by a mini computer circuit, which all but eliminates tuning errors (accurate to .0024%), stringing dial cords and all mechanical functions." The tuner reads out the tuned-station call letters on a separate display, which can be programmed to display any four alphanumeric characters in place of the call letters. And there's also a display of the frequency tuned. Four stations can be called up from memory by simply toucing one of four pairs of electronic touch-switches. There is no dial pointer; LEDs indicate the relative position on a standard linear scale, in analog fashion. Other touch-switch controls allow scanning up or down the FM band. The memory is "non-volatile." And the price is about $2,000.

PUBLICATIONS

End of "Microtrek"

One of the half-dozen hobby-computer magazines has already ceased publication. The first issue of Microtrek was published in August 1976, and the second in December. It has since merged with Personal Computing, and will become a "special section" in that magazine.

Computer Music Journal

The People's Computer Company (PCC), which publishes Dr. Dobb's Journal, has announced a "Computer Music Journal," which "will be devoted to the development of computer systems which are capable of producing high-quality music." Topics to be covered include synthesis of tones, design of real-time playing instruments, real-time controllers, reviews of hardware components, composition of music using a computer, digital filtering, envelope generation, etc. A one-year subscription (6 issues) is $14 (first issue due Jan. 1977), from PCC, Box E, Menlo Park, Calif. 94025.

More Magazines on the Way

In addition to Byte, Personal Computing, Kilobaud, Interface Age, SCCS Interface, Creative Computing, Dr. Dobb's Journal, and People's Computer Company, two more hobby-computer magazines are said to be in the works for 1977: ROM, originally planned by New York magazine, and due in June 1977; and a Hearst magazine, as yet unnamed.

HARDWARE

Zilog Boards

The Z-80 company, Zilog, has introduced a set of three boards. The MCB is a CPU board using the Z-80, with 4k bytes of RAM, sockets for up to 4k bytes of ROM, PROM or EROM, -5 volts power, four programmable counter-timer circuits; $415 kit, $475 assembled.

The Disk Controller board, MDC, permits storing and retrieving data from up to four floppy disks, and contains 12k bytes of RAM; $745 assembled.

Third is the RMB memory board, for expanding memory up to 65k in 16k increments of RAM; $750 assembled. As an option, Zilog offers a system including card cage, chassis, power supply, two floppy disks and a front panel, at $6990.

Imsai Terminal and Printer

Imsai now offers a keyboard terminal and a printer. The ASCII-encoded 53-key keyboard terminal has two-key rollover with audio feedback, and a display panel with indicator LEDs for the shift and control key as well as the ASCII bit pattern. Assembled only, $199.

The 44-column dot-matrix printer interfaces to an 8-bit parallel-output port with handshaking, and offers multiple-copy printing by using carbon or NCR paper. Kit $399, assembled $549.

FROM OUR READERS

Need Help on the Mark-8?

From Ron Carlson: "I got my MARK-8 running last year and have been rapidly developing a system around it. In addition to advancing my own computer, I have helped several other local MARK-8 users get their machines debugged and up. From my experiences I have been asked to be the "MARK-8 Coordinator" for SCCS (Southern Calif. Computer Society) and I have accepted. I have several things to offer to MARK-8 users at this time: Some rather simple programs to play music and some very nice test programs, maybe my operating system in the near future (inquire with a SASE); and a MARK-8 corrections/mods package.

The MARK-8 package is the culmination of a lot of work and finishes up the design of the system. It fixes over 50 errors in the schematics, the interrupt structure, clock phases, buffered CPU, open inputs, LED drivers, etc. There is a complete set of redrawn, corrected schematics and an instruction booklet of 10 pages. A parts kit is also included, with even a drill-bit to allow one to make the mods or corrections as neatly as they wish. The price is $10 to cover costs and postage, from

Ronald E. Carlson
14014 Panay Way #255
Marina del Rey, Calif. 90291

Any questions or troubleshooting inquiries are welcome."

Printers

R. David Vednor (RDV Engineering, 14914-D Newport Ave., Tustin, CA 92680) writes: "I have three Centronics 306C printers for $2000

The Amateur Computer Society is open to all who are interested in building and operating a digital computer.

For membership in the ACS, and a subscription of at least eight issues of the Newsletter, send $5 (or a check) to:

Stephen B. Gray
Amateur Computer Society
260 Noroton Ave.
Darien, Conn. 06820

The Newsletter will appear about every two or three months.

each. These are new and have never been installed. Also, I am in the business of manufacturing Interdata-compatible interfaces. I have some used items, and know of several used system components available for someone with the money."

COMPUTER-STORE ROBBERY

The Computer Store at 55 West 39 St. in New York City was robbed over a weekend several months ago, by burglars who knew exactly what they were after. As the store manager put it, "They took two of everything that was useful and not tied down," including a color TV set, two Altair 8800a computers, an Altair 680 computer, oscilloscope, two disk drives, at least three Design Mates, two 16k memory-board kits for 8800, several 4k memory, two CRTs, four Superscope cassette recorders, and a few assorted odds and ends.

PROBE AND MONITOR

Speaking of Design Mates (made by Continental Specialties Corp., 44 Kendall St., P.O. Box 1942, New Haven, Conn. 06509), the same manufacturer makes a couple of interesting and very useful test instruments.

The LP-1 logic probe ($44.95) is five inches long and an inch wide, with three LEDs and two switches. One switch is set for the type of logic being checked out, TTL/DTL or CMOS. The other switch has PULSE and MEMORY positions. When the switch is set to PULSE, frequencies up to 10 MHz will cause the PULSE LED to blink on and off at a 3-Hz rate, due to a pulse-stretcher in the probe. If a single pulse is to be detected, the MEMORY position permits the event to be stored indefinitely. The HI and LO LEDs blink on and off, tracking the one and zero states at square-wave frequencies up to 100 KHz. Clip leads connect to the circuit's power supply.

The logic probe is fine for tracing signals through one IC pin at a time. But if you need to check out an entire IC all at once, just clip on the LM-1 logic monitor. Hinged something like a clothespin, it clips over any DIP IC up to 16 pins, automatically locates the power leads and feeds them to the LM-1's internal circuitry. Each of the 16 contacts connects to a level detector that drives a numbered high-intensity LED, so you know right away which pins are high and which are low. The LM-1 is $84.95.

ARE YOU A SOFTWARE WRITER?

Is anybody out there good at writing about hobby-computer software, such as an article on how to set up a hifi-LP inventory system, going into flowchart, record format, and a program in BASIC? (This is for a hobby-computer magazine that pays for contributed articles, and which has asked me to help look for such a writer.)

If you've assembled anything other than an Altair 8080, please write in about your comments and opinions.
