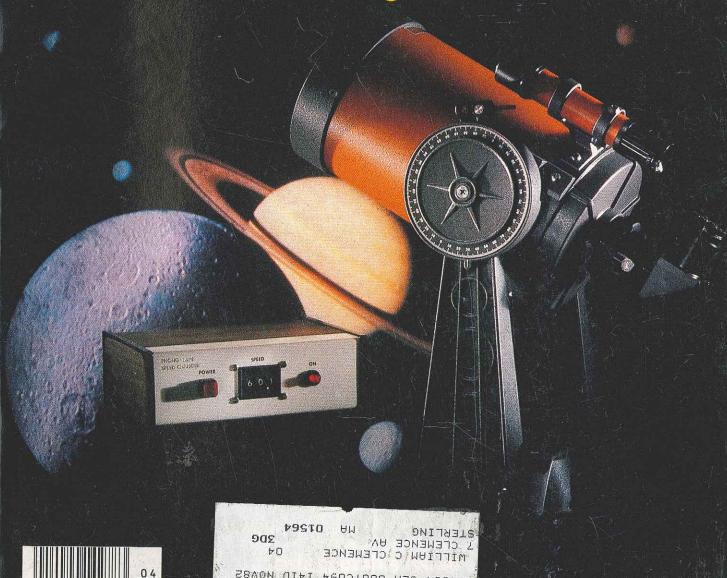
An Oscilloscope Buyer's Guide **Expanding Microcomputer Memories Build a Rumble-Cancelling Circuit** 

Speed Control for Synchronous Motors





Tektronix T922 Dual-Trace Scope

#### MANUFACTURER'S SPECIFICATIONS

CRT

Display area: 8 × 10 cm (rectangular) Phosphor: P31

Accelerating potential: 12.4 kV **Built-in graticule** 

Vertical amplifier

Deflection factor: 2 mV/div to 10 V/div, 12 steps, 1-2-5 sequence

Accuracy: +20°C to 30°C within 3%

0°C to 45°C within 4% Variable range: continuous between settings.

Extends deflection factor to at least 25 V/div.

Frequency response: dc to at least 15 MHz.

Risetime: 23 ns or less

Chopped mode: approximately 250 kHz Input impedance: approximately 1 M $\Omega/30$  pF Max. input voltage: 250 V (dc + peak ac)

500 V (p-p ac) at 1 kHz

Sweep Rate

Range: 0.5 s/div to 0.2 µs/div, 20 steps in 1-2-5 sequence.

Magnifier: X1 to X10

Accuracy (0° to +45°C): Unmagnified within 4%, magnified within 6%

X-Y operation

Deflection factor: X 10 magnifier approximately 100 mV/div, X1 approximately 1 V/div.

X-axis bandwidth: dc to at least 1 MHz.

Input impedance: 1 MΩ/30 pF

Phase difference between axes: 5° or less

from dc to 50 kHz.

Triggering Sensitivity: 0.5 div internal or 100 mV external from 2 Hz to 1 MHz, increasing to 1.5 div int. or 150 mV ext. to 15 MHz.

TV sync: composite sync 1 div internal or 100 mV external (approximately 2.3 div or 230 mV composite video).

External trigger: max. 250 V (dc+peak ac) or 500 V (p-p ac) 1 kHz or less.

Input impedance: 1 M $\Omega$ /30 pF. Level range: +0.5 to -0.5 V external,

+5 to -5 V external/10.

Power: 120/240 V, 50/60 Hz, 50 watts.

Environmental

Storage temp: -55 to +75°C,

Operating temp: 0 to +45°C.

Altitude: 50,000 feet.

**Physical** 

Weight: approximately 15 lb.

Width: 7.09 in.

Height (to top of handle): 10 in.

Depth: 18.7 in.

Accessories: 2 probes, clear filter, manual.

Optional Accessories: plain and rainproof covers, stand,

 $1 \times$  probe, switchable  $1 \times -10 \times$  probe, 100× probe, 1000× probe,

ac current probe, 10× dc to 35 MHz probe.

trigger syncs the sweep in accordance with the preset switches, NORMal means manual adjustment of the triggering, while TV selects an internal TV-like sync clipper as the source of sync pulses. This latter position is useful for TV servicing. Trigger SLOPE can be either positive or negative, with the triggering point determined by the LEVEL control.

Like the vertical attenuator, the time base SEC/DIV switch is also arranged so that only the range in use can be easily read. Coaxial with this switch is a redcolored knob that allows sweep time magnifications from X1 to X10 between each step-switch setting. This latter control is used in place of the usual fixed sweep magnifier.

Mounted on the rear of the chassis, the Z-axis connector can be used to modulate the intensity of the traces with a positive-going signal causing a decrease in trace intensity. Discretely molded into the front panel are a series of slots for an optional camera or protective front panel cover. Each of the two P6006 Probes that come with the T922 are of the ×10 type, having an input resistance of 10 megohms, and a voltage rating of 600 volts dc, or 600 volts ac peak-to-peak and dc combined.

Accompanying each probe is a 12" and 5" ground lead having an alligator clip, a plastic probe holder, BNC tip, banana plug, probe tip hook, spring tip, and a pincher tip. The last five items screw onto the probe.

Probe compensation is accomplished by connecting the probe tip to the scope front-panel PROBE ADJ connector, loosening the probe locking sleeve, then

twisting the probe body until a clean tradeoff for the writing speed. Never square wave is displayed. After compensation, the locking sleeve is tightened.

The manual accompanying the T922 is impressive and contains everything you need to know for initial start-up, adjustments, service, etc. It is profusely illustrated and contains complete schematics, board interconnections, and a detailed parts list.

Comments. The manufacturer's own specifications for the T922 are shown in the Table. The instrument was checked by the Lockheed Instrumentation Measurements Lab., against standards traceable to the Nation Bureau of Standards. The lab issued a certificate testifying that the T922 meets or exceeds its claimed specifications in all respects.

We found the T922 very easy to use, with all controls clearly identified. At first, the small knobs felt a little uncomfortable, but we soon got used to them. Triggering quality was excellent, even on very short duration waveforms. Even after several hours of use, the scope ran

The only flaw we found was a trace "ghost"—a faint defocussed image that accompanies each trace and produces a faint background haze. Tektronix informed us that this "ghosting" is due to the use of 12.4 kV on their post acceleration CRT, as compared to the 2 to 3 kV usually used in scopes. This very high voltage gives the T922 its excellent writing speed but also knocks secondary electrons out of the CRT faceplate mesh element thus causing the haze. From where we sit, the haze is a very small

does it seriously obscure the traces.

During our dozens of hours of T922 use, we found the beam finder very advantageous when the screen "went blank" due to excessive manipulation of the trace position controls. That single pushbutton has saved many hours of pot twisting in search of a missing trace. We also like the trace brightness when examining some rather fast waveforms, and have found the T922 excellent for examining some of the fast waveforms on a disc-controller board. With our old scope, we had to darken the room just to get a glimpse of what was happening, but the T922 lets us work in normal room light. Even at the high brightness, the focus remains excellent. We also found the T922 capable of rock-steady sync at low-amplitude high frequencies.

The clearly identified controls have positive detents to permit easy setting. We also found that keeping the frontpanel clean is a snap-all you need is a small sponge and warm water.

The relatively light weight of the T922 has allowed us to take the instrument into the field. It has withstood being bounced around in a van with no damage.

We find the T922 a well-balanced combination of accuracy, ruggedness, versatility, and human engineering. It is a bit more expensive than some of the "low-cost" dual tracers available, but the difference, in our opinion represents money well spent. Without a doubt, the instrument delivers value for its cost.

—Leslie Solomon.

CIRCLE NO. 104 ON FREE INFORMATION CARD

# COMPUTER

NCC Is Just Around The Corner

By Carl Warren

THOSE of you who live in the Chicago area will want to get ready to visit the National Computer Conference (NCC), to take place May 4-7 at McCormick Place. If you're unfamiliar with the show, it's the one where just about all computer companies in the industry get together to show their wares.

This year, the format of the show has been changed. Personal computers will no longer be separated; they will be part of the main exhibits.

Expect very heavy crowds and limited parking facilities. Those of you who may be coming from out of town will find that hotel space is at a premium, too, and you may have to stay quite a distance away if early hotel room reservations were not made.

Advance reports indicate that some of the real excitement at the show will be generated by the introduction of a number of personal computers from Japanese manufacturers. Expect to see units that are priced well under \$500, and possibly a new offering from Apple.

Should your interest be in innovative disk systems, you can expect to find very-high-density floppies. For example, Iomega (Ogden, UT) is planning to show a 10M-byte floppy system. The unit employs a unique cartridge-type design and a flying head. No pricing yet for the end user, but expect something in the \$3,000

While there, you will want to make a stop at Vector Graphic's booth, where you will see the Models 3005 and 2600 desk-top computer systems. Both are unitized systems each consisting of a CRT, a keyboard, a fourslot S-100 bus backplane that houses a Z-80 microprocessor-based singleboard computer, 64K RAM board, Flashwriter video board, and a dualmode disk controller board. The basic differences in the systems are as follows. The 3005 comes with a Seagate Technology ST-506 Microwinchester and a Tandom quad density 5.25-in. floppy. The Model 2600, on the other hand, comes with two floppy drives.

A nice feature of the 2600 is that it can be easily upgraded to the 3005 by simply buying the Microwinchester. The controller will support it and three floppies. Its software is already optimized to support it. The Model 3005 is priced at \$7,950; the 2600 at \$4,995.

Vector Graphics has some really exciting software. Specifically, its Memorite III word processing package, with a 33,000-word spelling dictionary, is very useful. In concert with this type application software, they are offering "Execugraph," which is a Visicalc-like (from Personal Software) tabulating system.

When I asked Robert Harp, the company's chief executive officer, if they were going to be offering any of the software separately, he gave a qualified no. Harp asserts that they would lose too much control and wouldn't be able to offer the same level of support for the software as they do when it's with their systems.

Follow this visit by heading to Hewlett-Packard to view the new HP-83 system. Interestingly, the HP-83 is not really a new system; its actually a downgrade of the popular HP-85. The 83 offers all the features of the 85, including graphics, but is minus the built-in printer and tape cartridge

HP officials said that they took this move since there was so much interest in the machine among computer hobbyists. However, a lower price was desirable and interest in the small printer and special tape cartridge system wasn't high. The HP-83 is priced at

Think PM. One of the many things users of computer systems seem to forget is preventive maintenance (PM). This is basically just taking care of your system to avoid costly breakdowns.

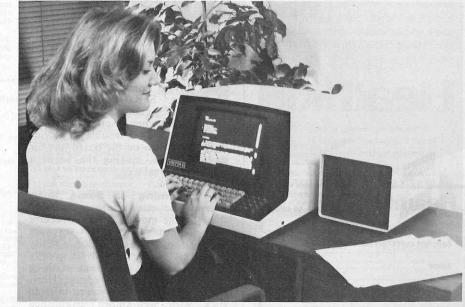
In reality, PM is cleaning the CRT screen, dusting off the keyboard, and cleaning out paper dust from the

Although this sounds simple enough, it is often forgotten. To assist you in keeping your system up to snuff, Inmac, a computer supply house, is offering specialized maintenance kits for around \$35 to \$50, depending on contents.

Typically, what you can expect to find in the helpful kits are: a screwdriver and nutdriver set, CRT cleaning solution, font cleaning paper, and canned air for blowing out dust in hard-to-reach places. Some of the kits will contain small vacuums, and other specialized PM items.

To introduce these items, Inmac will be providing a free little kit at NCC just to get you started. Don't write for one—they won't send it! You must stop by their booth.

Make a MODEM Choice. One category of products that seems to hold high interest, among peripherals is the MODEM. Microperipheral Corp. in Redmond, WA. recently added some exciting products to their line in this field. This includes the TRS-80 Connection; the RS-232C Connection, for any system with an RS-232C port, the Atari Connection; and even support for some European systems. The Connection Modems start at \$199.95 with an additional \$79.95 for the autodial/ autoanswer option. The MODEM's come complete with software, and you really only have to plug them in and compute. (Continued overleaf)



Vector Graphic's 3005 word and data processing system has 5-MB 51/4-inch Winchester disk and one 630-KB floppy disk for expanded capability.



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CIRCLE NO. 25 ON FREE INFORMATION CARD

Clean Your Dirty Head. To old Navy types, the lead-in to this paragraph may carry an interesting connotation, but for 3M it means keeping the heads on your floppy drives clean to avoid hard errors that may possibly ruin a valuable data diskette.

What 3M is offering is the Scotch brand 7400 and 7440 head-cleaning diskette kits. The 7400 is for 8-in. drives and the 7440 for 5.25-in. The \$30 kits consist of two head-cleaning diskettes and one 4-oz bottle of cleaning solution with a dispenser cap. All you do is put the solution on the exposed cleaning surface, insert the diskette in the drive and access it. About 30 seconds later you have a clean, smooth head. Alan Henaman, 3M's marketing communication manager, says if you use the cleaning system at least once a week, you can probably avoid some unforeseen problems. I have to agree. Since I started using the cleaning diskettes, some error problems I was having literally disappeared.

Extend Your S-100 Bus. A few weeks ago, I was experiencing some interfacing problems with my S-100 bus system. I knew that I really needed to look at what types of signals were showing up on the serial card, but I couldn't reach the pins to hang a scope on them. Therefore, I called my old friend Bob Mullen of Mullen Computer Products. I explained my problem to Bob and he asked if I was a proud owner of an extender card. To which I replied yes, though only for the Heath H-8 bus. The next morning I had a TB-4 A/T extender board with logic probe. He sent the \$79 assembled and tested version rather than the \$59 kit since I wanted to solve my problem as quickly as possible. Within about 10 minutes of opening the package and inserting the board in the bus with the suspect board in it, I had isolated the problem. And I did it with the attached logic probe.

Shortly after solving this problem I got the urge to add a parallel port to the system. As luck would have it, I didn't have a handy piece of Vector Electronics S-100 bus wirewrap board. I was about to abandon my urge to build when I noticed that Bob had gone to all the trouble of providing a kluge area on the board just for such purposes, making the board a sort of universal tool.

I'm Dreaming of Some Software. The question that seems to show up the most in letters I receive from PE readers is "What software should I buy?" The question is really a difficult one to answer. It greatly depends on what you want or think you want to achieve, of course. However, basically I think you're safer to stick with well-known established companies. Since they have already gone to all the trouble to figure out

what really is needed and works. There are lesser-known companies whose products may be super, of course, but risks are naturally higher in trying to choose the best ones.

Here are some software packages that I have used and consider good stuff. From Microsoft: BASIC interpreter, \$350; BASIC Compiler, \$395; COBOL-80, \$750; FORTRAN-80, \$500; MuMath, \$250; MuLISP, \$200 (the latter two packages offer engineers some marvelous possibilities, which I'll reserve for a later column); and EDit-80, \$120.

All of the foregoing packages come under the heading of system software, and are used for developing other software. Microsoft has put a lot of effort in their design.

Give Jim a Call. Recently, I was talking to Jim Blake, Heath's software honcho. Jim was saying that things are going well for the "Softstuff" department of Heath. They have a number of packages, from CP/M to CBASIC, and some pretty good applications including a fullscreen editor for the H-89 and H-19.

But Jim wasn't totally happy since he doesn't have all the software he would like. He wants things like a spooler, a tabulation program, business applications, and utility programs. Jim says he's interested in talking to competent programmers who can call him at (616) 982-3813.

While I was talking to Jim, I mentioned that I had just finished writing a book using Organic Software's Textwriter III (\$125), which gave me the ability to automatically create a table of contents and an index. I thought Jim might want Mike Poshn, its creator, to make it available to Heath users—which is possible if you

I told Jim that Mike had developed two other packages; Datebook for \$295, and Milestone for \$395. These are applications that allow a user to set up an appointment calendar and develop Pert or goal charts.

Up Your Apple II to 64K. Dottie Hall, Microsoft Consumer Products' product manager, called recently to tell me that the 16K RAMCard for the Apple II was ready. This \$195 add-on is designed to work in tandem with the Microsoft Softcard and



Hewlett-Packard's HP-83 personal computer.

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complete operating system, perfect for beginners, hobbyists

LEVEL "A" SPECIFICATIONS

Explorer/85's Level "A" system features the advanced Intel 8085 cpu, an 8355 ROM with 2k deluxe monitor, operating system, and an advanced 8155 RAM I/O ... all on a single motherboard with room for RAM/ROM/PROM/EPROM and S-100 expansion, plus generous

prototyping space.
PC Board: Glass epoxy, plated through holes with solder mask. • I/O: Provisions for 25-pin (DB25) consolder mask. • I/O: Provisions for 25-pin (DB25) connector for terminal serial I/O, which can also support a paper tape reader ... cassette tape recorder input and output ... cassette tape control output ... LED output indicator on SOD (serial output) line ... printer interface (less drivers) ... total of four 8-bit plus one 6-bit 1/O ports. • Crystal Frequency: 6.144 MHz. • Control Switches: Reset and user (RST 7.5) interrupt . . additional provisions for RST 5.5, 6.5 and TRAP interrupts onboard. • Counter/Timer: Programmable, 14-bit binary. • System RAM: 256 bytes located at F800, ideal for smaller systems and for use as an isolated stack area in expanded systems . . . RAM expandable to 64K via S-100 bus or 4k on motherboard.

System Monitor (Terminal Version): 2k bytes of deluxe system monitor ROM located at FØØØ, leaving ØØØØ free for user RAM/ROM. Features include tape load with labeling ... examine/change contents of memory ... insert data ... warm start ... examine and change all registers . . . single step with register display thange an registers . . . single step with register uspay at each break point, a debugging/training feature . . . go to execution address . . . move blocks of memory from one location to another . . . fill blocks of memory with a constant . . . display blocks of memory . . automatic baud rate selection to 9600 baud . . . variable display line length control (1-255 characters/line) . . . chan-nelized I/O monitor routine with 8-bit parallel output for high-speed printer . . . serial console in and console out channel so that monitor can communicate with I/O

System Monitor (Hex Keypad/Display Version): Tape load with labeling ... tape dump with labeling ... examine/change contents of memory ... insert data . . warm start . . . examine and change all registers .

☐ Explorer/85 Level "A" kit (Terminal Version)... \$129.95 plus

\$129.95 plus \$3 post. & insur.

Bk Microsoft BASIC on cassette tape. \$64.95 postpaid.

Bk Microsoft BASIC in ROM kit (requires Levels "B", "D" and

"E")... \$99.95 plus \$2 post. & insur.

Level "B" (\$-100) kit..., \$49.95 plus \$2 post. & insur.

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& insur.

☐ Level "D" (4k RAM) kit . . . . \$69.95 plus \$2 post. & insur.

☐ Level "E" (EPROM/ROM) kit . . . \$5.95 plus 50¢ p&h.

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☐ Fan For Cabinet ... \$15.00 plus \$1.50 post. & insur.

☐ ASCII Keyboard/Computer Terminal kit: features a full 128 character set. u&l case: full cursor control; 75 ohm video output; convertible to baudot output; selectable baud rate.

RS232-C or 20 ma. I/O, 32 or 64 character by 16 line formats.

RS232-C or 20 ma. I/O, 32 or of character by 10 me formats, and can be used with either a CRT monitor or a TV set (if you have an RF modulator)... \$149.95 plus \$3.00 post. & insur.

Deluxe Steel Cabinet for ASCII keyboard/terminal...

8 19.95 plus \$2.50 post. & insur.

New! Terminal/Monitor: (See photo) Same features as above, except 12" monitor with keyboard and terminal is in deluxe single cabinet; kit . . . \$399.95 plus \$7 post. & insur.

Hazelline terminals: Our prices too low to quote — CALL US

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\$19.95 plus \$2.50 post. & insur.

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Explorer/85 Level "A" ktt (Hex Keypad/Display Version)...

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Full 8" disk system for less than the price of a mini (shown with Netronics Explorer/85 computer and new terminal). System features floppy drive from Control Data Corp., world's largest maker of memory storage systems (not a hobby brand!)



single slep with register display at each break point . . . go to execution address. Level "A" in this version makes a perfect controller for industrial applications, and is programmed using the Netronics Hex Keypad/ Display. It is low cost, perfect for begin

HEX KEYPAD/DISPLAY SPECIFICATIONS Calculator type keypad with 24 system-defined and 16 user-defined keys. Six digit calculator-type display, that displays full address plus data as well as register

LEVEL "B" SPECIFICATIONS

Level "B" provides the S-100 signals plus buffers/ drivers to support up to six S-100 bus boards, and includes: address decoding for onboard 4k RAM expansion selectable in 4k blocks . . . address decoding for onboard 8k EPROM expansion selectable in 8k blocks
... address and data bus drivers for onboard expansion . wait state generator (jumper selectable), to allow the se of slower memories . . . two separate 5 volt regula

LEVEL "C" SPECIFICATIONS

Level "C" expands Explorer/85's motherboard with card cage, allowing you to plug up to six S-100 cards directly into the motherboard. Both cage and card are neatly contained inside Explorer's deluxe steel cabinet, Level "C" includes a sheet metal superstructure, a 5-card, gold plated S-100 extension PC board that plugs into the motherboard. Just add required number of S-100 connectors.



LEVEL "D" SPECIFICATIONS

Level "D" provides 4k of RAM, power supply regula-tion, filtering decoupling components and sockets to expand your Explorer/85 memory to 4k (plus the original 256 bytes located in the 8155A). The static RAM can be located anywhere from 2000 to EFFF in 4k

LEVEL "E" SPECIFICATIONS

Level "E" adds sockets for 8k of EPROM to use the popular Intel 2716 or the TI 2516. It includes all sockets, power supply regulator, heat sink, filtering and decoupling components. Sockets may also be used for 2k x 8 RAM IC's (allowing for up to 12k of onboard RAM). DISK DRIVE SPECIFICATIONS

8 "CONTROL DATA CORP.
professional drive.

SI controller.

SI controller.

SI controller. unformatted.

• Access time: 25ms (one

DISK CONTROLLER/ I/O BOARD

SPECIFICATIONS 2716 PROM socket included

 Controls up to four 8" drive
 1771A LSI (SD) floppy disk onboard data separator

generators to 9600 baud.
 Double-sided PC board

DISK DRIVE CABINET/POWER SUPPLY

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they keep a notebook of BUSS as a ready reference.

Answers to Questions. Since I get an unbelievable amount of a mail each month, I can't always answer each letter directly. So here are some short answers with questions implied.

No, Atari BASIC is not a Microsoft version. The reason that BASIC from the same software house, for the same processor, but for different systems, can look so different, is that the company making the system tells the software house what extensions they want and how they want them to work. Yes, you can do bit manipulation in BASIC, but you have to know what bit to toggle, and how logic AND, OR, and XOR operate.

Senior Technical Editor

#### Hardware

Atari RAM. The RAMCRAM can expand an Atari 400 system to 32K bytes and the Atari 800 to 48K bytes. In the 400, RAMCRAM replaces the Atarisupplied 8K module. This allows the 400 to use disks, printers, and other peripherals. Any 32K Atari 800 software will run on a 400 with RAMCRAM. Address: AXLON Inc., 170 N. Wolf Rd., Sunnyvale, CA 94086.

132 by 30 Terminals. The Displaymaster is a Z80-based terminal using a 13" by 7" P32 green phosphor CRT. It features 132 or 80 characters per line, 24, 27, or 30, lines, 16 programmable keys, numeric keypad, screen highlighting, addressable cursor, set-up mode, 129 ASCII characters, up to 19.2Kbaud rate, Hazeltine/Lear-Siegler/



DEC VT100 emulation, fixed tabs, 16K-byte display memory, auxiliary port, block mode, and line drawing. Options include separate keyboard, second 128-character set, 32K memory, graphics, and light pen. Address: GDS Inc., 1911 22nd Ave. South, Seattle, WA 98144 (Tel: 206-322-9330).

Hardware Catalog. Contains data on 6502 machines, power supplies, various Apple plug-ins, 2716 programmers, Z80 machines, A/D converters, and a number of bare boards. Address: John Bell Engineering, Box 338, Redwood City, CA 94064.

16-Bit Trainer. The TM990/189 University Module 16-bit trainer features a TMS9980A processor (16-bit), an on-board 45-key alphanumeric key-

board and 10-character display, a firmware debug monitor and symbolic assembler, a cassette interface, on-board user-addressable LEDs/speaker/displays, 16-bit programmable I/O controller with interrupts and timer, 4K bytes of ROM with 2K-byte expansion socket, 1K RAM, and optional EIA/20mA interface. \$299. The Memory and I/O Expansion Module expands the University Module by 8K, has sockets for 8K bytes of RAM, and 8K bytes of EPROM. It also includes an EPROM programmer for 2708/2716. \$299. The TM990/519 Power Supply provides all necessary voltages for University Module. \$65. Address: George Goode & Associates, Inc., 12840 Hillcrest Rd., Suite 113, Dallas, TX 75230 (Tel: 214-980-0730).

TRS-80 Add Ons. The AN-538 Analog Port Interface provides A/D and D/A conversion for the TRS-80. The unit also houses an interface with both latched 8-bit data output and 8 decoded device control lines. \$79.95. The AN-



511 Digital Port Interface provides 8 bits of input data, 8 bits of output data, 8 device control lines (decoded port addresses), and the 8-bit data bus at the front panel. \$79.95. The AN-551 EPROM Programmer can program either 2716 or 2732 EPROMS from a BASIC program in less than 300 seconds. \$89.95. The Digital Speech Processor provides voice interface for the TRS-80. Digitized voice data is saved in RAM or on diskette to create vocabulary files. \$89.95. Address: The Design Solution Facility, Box 1225, Fayette-ville, AR 72701 (Tel: 501-521-0281).

64K Apple. The RAMcard provides an additional 16K bytes of RAM to an Apple, making a 48K system (present maximum) into a full 64K system. With the Softcard, a full 56K CP/M environment is provided. \$195. Address: Microsoft Consumer Products, 400 108th Ave., NE, Suite 200, Bellvue, WA 98004 (Tel: 206-454-1315).

\$\$-50 Interface. The ACIA Interface Card occupies one slot in the SS-50 system to allow users to design and prototype RS-232, 20-mA, or TTL outputs from two 6850 ACIAs. Separate baud rate control for each 6850 is provided. The card supplies +5 volts to chips and

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user area, and the IRQ line is jumper programmable for one or both 6850 IRO outputs. \$8.50 for bare pc board and instructions. Address: Quality Research Co., Box 7207, Spokane, WA

#### Software

List Management The Ultimail Version 5 List Management System for the TRS-80 Model I with 48K requires two mini-disks or one 8" floppy. It uses ran-

dom disk files and stores 650 records on a mini or 1000 on the 8" diskette. Program routines include: data entry, database-record display, edit, delete, directory in alphabetic order, labels with zip code, and any number of labels printed per address. Each record consists of a zip code, alpha key entry for directory printouts, and 3 to 4 lines per address with the first up to 31 characters, second and third lines 29 characters, and fourth line 28 characters. Errors can be immediately corrected. \$124.95. Address: Computer Generated Data, 5541 Parliament Drive, Suite 208, Virginia Beach, VA 23462 (Tel: 804-497-1165).

Apple PASCAL. The PASCAL Utility Express Package contains four procedural units that simplify I/O formatting: access and/or change in the disk directory from a PASCAL program: perform integer, string, and real conversions: and support files of variablelength records. It also contains five sample programs of PASCAL demos with BASIC equivalents, a routine to view disk files in ASCII or hex, a text formatter for simple word processing, and a program to maintain a variable-length data file for the international traveler. \$45 on diskette. Address: Software Express, Box 50453, Palo Alto, CA 94303 (Tel: 415-856-9244).

Typing Tutor. Type-It is a typing tutor, a drill master, and a speed tester. It assumes the user knows nothing about typing, and is self paced. Runs on TRS-80 Model I, Level 2 or disk BASIC. Supplied on cassette or disk. \$14.95. Address: Bluebird's Inc., 2267 23rd St., Wvandotte, MI 48192 (Tel: 313-285-

New VisiCalc. The VisiCalc program, previously only available for the Apple, is now available for the Atari 800 and Commodore systems. The Commodore version automatically senses whether it is running in a PET with a 40-character screen, or the CBM 8032 with an 80-character screen. The Visi-Calc creates a 64-column wide, 254-row high matrix on screen. It speeds repetitious calculations like inventory planning, sales forecasts, financial analyses, and modelling of physical phenomena. Address: Personal Software Inc., 1330 Bordeaux Drive, Sunnyvale, CA 94086 (Tel: 408-745-7841).

Payroll Package. The Payroll System calculates complete payroll transactions including Federal tax returns for 300 employees. It permits up to four user-definable pay rates for each employee, and handles tips, bonuses, expense reimbursements, advances, sick pay, and vacation pay. It will calculate for any combination of pay schedules: weekly, bi-weekly, monthly or semimonthly. Three additional categories may be created for each employee. It will operate stand alone, or with the SSG General Ledger. Requires CP/M with 54K RAM, two disk drives, 132 column printer, 24 × 80 terminal, and 2.04 version of CBASIC. Address: Structured Systems Group, 5204 Claremont Ave., Oakland, CA 94618 (Tel: 415-547-1567).

PL/65 for AIM-65. The high-level system implementation language PL/65 is now available for the Rockwell AIM-65 computer. Control statements such as conditional execution (IF-THEN-ELSE) and conditional looping (FOR-TO-BY), coupled with simplified block capability, support structured program design techniques. It generates R6500 assembly language source code and allows assembly language instructions to



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Medical Software. The Medical Secretary, written for the Apple computer, is a complete administrative package that includes elements for appointment scheduling, patient registration, private patient billing, insurance claim preparation, and medical record preparation. The system requires one or two Apple II's (or Apple II Plus) with either two or three disk drives each and a 130-column printer. Comes on four diskettes. \$500. Address: Monument Computer Service, Village Data Center, Box 603, Joshua Tree, CA 92284 (Tel: 800-854-0561 Ext. 802; in CA, 800-432-7157).

TRS-80 Time Keeping. Timetrak is a utility for adding time intervals to a TRS-80. The start and stop boundaries in hours and minutes are entered via the keyboard. In operation, the program processes all start/stop time pairs and displays to five decimal places. An interval can be from one minute to 48 hours and up to 150 intervals can be entered. Applications include time charging, rental, equipment operating times, lab experiments, etc. Cassette is \$25, diskette is \$35. Address: Omni Systems Co., Box 29347, Minneapolis, MN 55430.

OS Business Package. The EIS GEN-200 is an accounting package designed for all Ohio Scientific disk-based systems. It contains journals, general ledger, statements, aging reports, and customer/vendor files. It can be integrated with an upcoming payroll and inventory system. Address: Electronic Information Systems, Box 5893, Athens, GA 30604 (Tel: 404-353-2858).

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