

DCE**SATELLITE —
COMPUTER —
TEST EQUIPMENT —**

DISCRETE 70 MHz PLL — Replaces NE564 video demodulator without the need for an ECL divider. (70 MHz I.F.). Guaranteed tracking to 85 MHz. Wide bandwidth. Lower C/N, reduced 'tearing'. May be remotely tuned.

Kit (M82-010K) \$124.95
A & T (M82-010T) \$159.95

TUNABLE AUDIO DEMODULATOR — Tunes from 5.4 to 8.2 MHz. Switchable 5 KHz LP filter for Canadian birds. Tuning diodes included. Two of these and a couple op-amps required for stereo. (MTV)

Bare Board (M81-020B) \$24.95
Two Boards (M81-021B) \$39.95

CANADIAN AUDIO DESCRAMBLER — Tune in those 'chirping' sub-carriers and hear what you've been missing.

Bare Board (R82-010B) \$24.95
Kit (R81-010K) \$59.95
A & T (R81-010T) \$94.95

10—OHMS ADAPTOR — Adapts normal VOM or DVM to measure from .001 ohm to 5 ohms using single 9-volt battery. Super simple calibrations.

Bare Board (M82-100K) \$14.95
Kit (M82-100K) \$29.95
A & T (M82-100T) \$49.95

MODEM — Bell 103 (300 bps) compatible Answer/Orginate modem. No acoustic coupler required. RS-232 serial I/O.

Bare Board (R81-100B) \$24.95
Kit (R81-100K) \$69.95
A & T (R81-100T) \$99.95

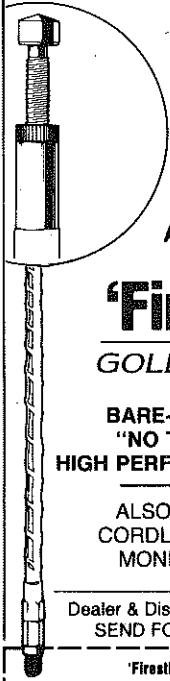
All prices include complete and comprehensive documentation, postage and handling. C.O.D. orders accepted. Call or write for catalog. Dealer inquiries invited.

DIGICOM ENGINEERING, INC.

P. O. Box 1656. KODIAK, ALASKA 99615
907-486-5118 907-486-6215
OPEN 10 AM TO 8 PM PST

**DESIGNS IN CONSUMER ELECTRONICS
DC TO LIGHT**

CIRCLE NO. 15 ON FREE INFORMATION CARD

SEE YOUR DEALER TODAY

FROM

**'Firestik'
ANTENNAS
ACCESSORIES****HERE'S A TIP
THAT'S PERFECT!****AM/FM AUTO RADIO
AND CB****'Firestik' II
GOLDEN SERIES****BARE-HANDS TUNABLE
"NO TOOLS NEEDED"
HIGH PERFORMANCE ANTENNAS****ALSO ANTENNAS FOR
CORDLESS TELEPHONES
MONITOR SCANNERS**Dealer & Distributor Inquiries Invited
SEND FOR FREE CATALOG'Firestik' Antenna Company
2614 East Adams/Phoenix, AZ 85034Name _____
Street _____
City _____
State _____ Zip _____Serving the CB and
Communications Market Since 1962.**5-YEAR REPLACEMENT WARRANTY**

CIRCLE NO. 20 ON FREE INFORMATION CARD

**SOLID-STATE
DEVELOPMENTS**

By Forrest M. Mims

New Power MOSFETs

IF YOU have purchased power MOSFETs, you know that they generally cost more than conventional bipolar power transistors. Recently, however, Siliconix, Inc. announced a series of new, low-priced MOSFETs. Designed specifically to interface logic circuits with power devices, the transistors can be driven directly by CMOS, TTL or MOS logic. Typically, they are used to drive high-speed lines, transformers, LED digit strobes, relays, or solenoids.

All these new power MOSFETs are priced between 32 cents and 85 cents each when purchased in quantities of 100. One unit, the VN0300M (80 cents) has a maximum on-resistance of only 1.2 ohms. Supplied in a TO-237 package, it's rated at 700 mA (I_D) and has a breakdown voltage (BV_{DSS}) of 30 V.

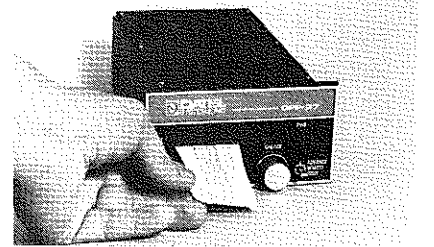
The VN0808M provides a BV_{DSS} of 80 V, an I_D of 350 mA, and an on-resistance of 5 ohms. It's also supplied in a TO-237 package, and it sells for 85 cents.

At 32 cents, the VN2222L is the lowest-priced transistor of this new line. Supplied in a TO-92 package, it has an I_D of 150 mA, a BV_{DSS} of 60 V, and an on-resistance of 7.5 ohms.

For more information about all nine of the power MOSFETs in this series, write Siliconix Marketing Services (P.O. Box 4777, Santa Clara, CA 95054). You may also wish to request a list of authorized Siliconix distributors.

Incidentally, if you want to begin experimenting with power MOSFETs immediately, you can buy the Siliconix VN10KM and VN67AF at Radio Shack stores. Radio Shack was apparently among the first major sources of electronic components for hobbyists and experimenters to recognize the importance of power MOSFETs. Let's hope other suppliers join the trend to this important new technology.

A Panel-Mounted Thermal Printer. The miniature solid-state thermal printer originally developed for use with compact calculators is finding many other



uses. One is the Datel Model DPP-Q7 Digital Panel Printer. Measuring only 5.25" wide by 2.82" high, the printer incorporates an inkless thermal printer capable of printing up to seven columns of BCD input data at four lines per second.

The DPP-Q7 is designed specifically as a hard-copy panel meter. For printing of the full ASCII character set of upper- and lower-case letters, digits, punctuation marks, etc., Datel makes the Model APP-20 20-column alphanumeric thermal printer. Similar in external appearance to the DPP-Q7, the APP-20 measures 4.44" wide by 2.70" high.

For more information about these thermal printers, write Datel/Intersil (11 Cabot Blvd., Mansfield, MA 02048). Both are expensive, but they're ideal for specialized applications requiring a hard-copy output.

A Fast Breaking Development. A group of scientists at Bell Laboratories has managed to create the shortest known pulse of light—an event lasting only 30 femtoseconds. Since a femtosecond is a millionth of a billionth of a second, 30 femtoseconds is 0.0000000000003 second (3×10^{-14}).

According to Charles V. Shank, one of the Bell Labs' scientists who worked to achieve this new accomplishment: "Words like 'split-second' and 'instantaneous' just don't mean too much in the microelectronics field. Relatively speaking, a second is an eternity. For example, in one second, a pulse of light can travel to the moon and back, but in 30 femtoseconds, light would travel no farther than one-third the thickness of a human hair."

Of course, light actually requires a little more than two and one-half seconds to make a round trip between the earth and the moon, but I'll not let that lapse take away from the importance of Shank's accomplishment. He and his team have provided physical, chemical, and biological researchers with a valuable new tool for examining exceptionally brief transient events. As Shank explains: "By using a series of these very short bursts of light, each timed precisely to follow the other, we can measure very subtle changes in a reaction far more precisely than we can using other techniques. He presented the results of his work with the laser at the April 1982 joint Conference on Lasers and Electro-Optics and Optical Fiber Communications in Phoenix. ◇

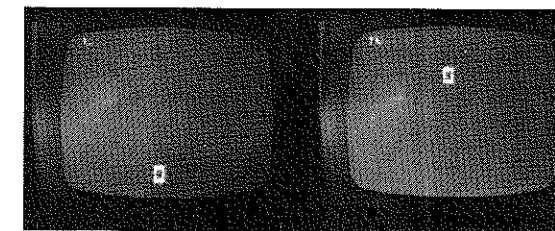
**PROGRAMMER'S
NOTEBOOK**

By Jim Keogh

Moving And Firing A Gun At Will

DEVELOPING your own personal computer games can be fun and a challenge. Although many of the commercial computer games are written in assembly or machine language, you can incorporate some of the same features found in "store bought" games in your own Basic programs.

In the "Programmer's Notebook" column in the June 1982 issue, we discussed a program module that displayed a computer "gun" and permitted the operator to fire the gun in almost any direction. Since that column appeared, we have heard from some of our readers who



wanted to see more flexibility built into that module. They wanted to be able to move the gun anywhere on the screen and fire it.

This month, we will give you some modules that will enable you to direct the movement of the gun from the keyboard. After the program is loaded into your mi-

TRS-80

```

5 REM CLEAR THE SCREEN
10 CLS
15 REM STARTING COORDINATES
   FOR GUN
20 A = 55
30 B = 20
35 REM DRAW GUN
40 FOR D = A TO (A + 6)
50 E = B
60 SET (D,E)
70 NEXT D
80 FOR E = B TO (B + 4)
90 D = A
100 SET (D,E)
110 NEXT E
120 FOR D = A TO (A + 6)
130 E = (B + 4)
140 SET (D,E)
150 NEXT D
160 FOR E = B TO (B + 4)
170 D = (A + 6)
180 SET (D,E)
190 NEXT E
195 REM OPERATOR INSTRUCTS
   COMPUTER
200 INPUT T
205 REM CLEAR SCREEN
210 CLS
215 REM THE COMPUTER DECIDES
   WHICH LINE TO EXECUTE
220 IF T = 1 THEN GOTO 270
230 IF T = 2 THEN GOTO 290
240 IF T = 3 THEN GOTO 310
250 IF T = 4 THEN GOTO 330
260 IF T = 5 THEN GOTO 350
265 REM MOVES THE GUN TO THE LEFT
270 A = A - 10
275 REM LOOPS THE PROGRAM AND
   DRAWS GUN IN NEW POSITION
280 GOTO 40

```

```

285 REM MOVES THE GUN TO THE
   RIGHT
290 A = A + 10
295 REM LOOPS THE PROGRAM AND
   DRAWS GUN IN NEW POSITION
300 GOTO 40
305 REM MOVES THE GUN TOWARDS
   THE TOP OF THE SCREEN
310 B = B - 5
315 REM LOOPS THE PROGRAM AND
   DRAWS GUN IN NEW POSITION
320 GOTO 40
325 REM MOVES THE GUN TOWARDS
   THE BOTTOM OF THE SCREEN
330 B = B + 5
335 REM LOOPS THE PROGRAM AND
   DRAWS GUN IN NEW POSITION
340 GOTO 40
345 REM FIRES THE GUN
350 FOR X = ((B + 6)/2) + 1 TO 2
   STEP -5
360 EE = A
370 SET (EE,X)
380 FOR Z = 1 TO 15
390 NEXT Z
400 RESET (EE,X)
410 NEXT X
415 REM LOOPS PROGRAM TO LINE 40
420 GOTO 40

```

APPLE II

```

5 REM CLEARS SCREEN
10 CALL -936
15 REM STARTING COORDINATES
20 A = 15
30 B = 20
35 REM DRAW GUN
40 HLINE A, (A + 6) AT B
50 VLINE B, (B + 4) AT A
60 HLINE A, (A + 6) AT (B + 4)
70 VLINE B, (B + 4) AT (A + 4)

```

```

195 REM OPERATOR INSTRUCTS
   COMPUTER
200 INPUT T
205 REM CLEAR SCREEN
210 CALL -936
215 REM THE COMPUTER DECIDES
   WHICH LINE TO EXECUTE
220 IF T = 1 THEN GOTO 270
230 IF T = 2 THEN GOTO 290
240 IF T = 3 THEN GOTO 310
250 IF T = 4 THEN GOTO 330
260 IF T = 5 THEN GOTO 350
265 REM MOVES THE GUN TO THE LEFT
270 A = A - 10
275 REM LOOPS THE PROGRAM AND
   DRAWS GUN IN NEW POSITIONS
280 GOTO 40
285 REM MOVES THE GUN TO THE
   RIGHT
290 A = A + 10
295 REM LOOPS THE PROGRAM AND
   DRAWS GUN IN NEW POSITION
300 GOTO 40
305 REM MOVES THE GUN TOWARDS
   THE TOP OF THE SCREEN
310 B = B - 5
315 REM LOOPS THE PROGRAM AND
   DRAWS GUN IN NEW POSITION
320 GOTO 40
325 REM MOVES THE GUN TOWARDS
   THE BOTTOM OF THE SCREEN
330 B = B + 5
335 REM LOOPS THE PROGRAM AND
   DRAWS GUN IN NEW POSITION
340 GOTO 40
345 REM FIRES THE GUN
350 FOR X = ((B + 6)/2) + 1 TO
   10 STEP -5
360 E = A
370 PLOT X,E
380 NEXT X
415 REM LOOPS PROGRAM TO LINE 40
420 GOTO 40

```

WE'LL LURE YOU WITH OUR PRICES... AND WIN YOU WITH OUR SERVICE!

ORDER TOLL FREE (800) 221-8180
IN NEW YORK (212) 752-8600

BLANK TAPES		VIDEO TO-GO	
VIDEO		VIDEO TO-GO	
ANY BRAND V-120 EXCEPT HG	\$11.95	ATARI Video Game Cartridge	\$184.95
ANY BRAND L-500 EXCEPT HG	\$11.95	MATTEL Intellivision Game	\$118.95
ANY BRAND L-750 EXCEPT HG	\$11.95	COLECO PAC-ALICE (Hard Head)	\$99.95
ANY BRAND L-850 EXCEPT HG	\$11.95	COLECO GALAXIAN (Hard Head)	\$99.95
ANY BRAND V-160 EXCEPT HG	\$11.95	ASTROVISION Video Game	\$238.95
ANY BRAND HT-120	\$14.95		
ANY BRAND HGL-500	\$14.95		
ANY BRAND HGL-750	\$14.95		

WE CARRY TAPES BY: MAXWELL, TOKI, SONY, SCOTCH, FUJI, HEMDEY, BASF, AMPLEX, JVC, PANASONIC, ZENITH

AUDIO		HOME VIDEO RECORDERS	
MINIMUM ORDER 12 TAPES		JVC HR-2500 (HS w/Tuner)	\$1979
MAXWELL L-500	\$12.95	PANASONIC PV-2000 (New Port VHS)	\$789
MAXWELL L-750	\$12.95	PANASONIC PV-2500 (New Port VHS)	\$919
MAXWELL L-850	\$12.95	ZENITH VR-2500 (New Port VHS)	\$1399
SONY SL-2000 / SONY TT-2000	\$1049	AKAI VPC-7550 (HS w/Tuner)	\$1945
HITACHI VR-400 (HS w/Tuner)	\$889	HITACHI VR-400 (HS w/Tuner)	\$889
QUASAR VP-5420 (Port. VHS)	\$619	QUASAR VP-5420 (Port. VHS)	\$619
QUASAR VP-520 (Prog. Tun./Timer)	\$169	SONY SL-5000 (Beta Recorder)	\$1589
RCA VCR-170 (New Port. VHS)	\$899	SONY SL-5100 (New Beta)	\$1589
SONY VHS-650	\$12.95	ZENITH VR-9500 (Beta)	\$499
SONY VHS-900	\$12.95	ZENITH VR-9500 (Beta)	\$499
		ZENITH VR-8775 (New Beta)	\$899

WE HAVE A LARGE SELECTION OF VIDEO DEK PLAYERS AND MOVIES AVAILABLE. PLEASE CALL FOR MORE INFORMATION.

VIDEO CAMERAS		SONY COLOR T.V.	
AKAI VCC1 (Auto Focus)	\$739	SONY KV-4000 (11" Screen)	\$455
RCA CCG95 (Camera)	\$739	SONY KV-3200 (9" Screen)	\$415
RCA CCG10 (Camera)	\$539	SONY KV-3000 (9" Screen)	\$415
RCA CCG11 (Camera)	\$625	SONY KV-2707 (12" Screen)	\$354
JVC CX-94 (Camera)	\$699	SONY KV-2370 (12" Screen)	\$319
JVC CX-94 (Camera)	\$749	SONY KV-2238 (12" Screen)	\$449
PANASONIC PK-750 (Auto Focus)	\$719	SONY KV-1815 (15" Screen)	\$399
PANASONIC PK-850 (Auto Focus)	\$719	SONY KV-1578 (15" Screen)	\$325
PANASONIC PK-850 (Auto Focus)	\$719	SONY KV-1568 (15" Screen)	\$479
HITACHI VAC-1000 (Auto Focus)	\$1399	SONY KV-1568 (15" Screen)	\$479
HITACHI VAC-800 (Auto Focus)	\$989	SONY KV-1568 (15" Screen)	\$479
HITACHI VAC-770 (Camera)	\$589	SONY KV-1515 (15" Screen)	\$439
TOSHIBA 1850-AP (Auto Focus)	\$849	SONY KV-1515 (15" Screen)	\$439

SEND FOR FREE 240 PAGE AUDIO/VIDEO CATALOG



25 PARK ROW, DEPT. PE9, NYC NY 10038
NEW YORK ORDER BY MAIL FOR PROMPT AND CONSIDERATE SERVICE. SHIPMENT, SEND MONEY ORDER, CREDIT CHECK, CASHIER'S CHECK, MASTERCARD/VISA (with card number). Interbank No. expiration date and signature. DO NOT SEND CASH, PERSONAL AND BUSINESS CHECKS MUST CLEAR 0-8 BANK BEFORE PROCESSING. Shipping, handling & insurance charge is 5% of total order with a \$3.95 minimum. WE SHIP TO CONTINENTAL U.S., ALASKA, HAWAII, PUERTO RICO, AND CANADA ONLY. Canadian orders add 10% shipping, with a 7.95 minimum charge. For shipments by air, please advise these charges. NEW YORK STATE RESIDENTS PLEASE ADD SALES TAX. ALL RESIDENTS SHIPPED BRAIN NEW. FACTORY FRESH AND 100% GUARANTEED.

CIRCLE NO. 27 ON FREE INFORMATION CARD

28K Commodore VIC \$299 Personal Computer

(60% more powerful than VIC-20)

FOR THE SPECIAL SALE PRICE OF \$299.00, you get the Commodore VIC-20 computer, plus we add 60% more programming power. This powerful full sized extra featured computer includes the 6502 microprocessor (LIKE APPLE), 20,000 bytes ROM with a 16K extended microsoft LEVEL 11 BASIC, 8000 bytes user RAM, plug in expandable to 32K RAM, 66 key typewriter professional keyboard with graphic symbols on keys, 16 colors with command keys, sound and music, real time, upper/lower case, full screen editing cursor, floating point decimal and trig functions, has high resolution graphics, 512 displayable characters, test display is 23 lines, 22 characters, will accept TAPE-DISK-PLUG IN CARTRIDGES. We have great games and many other programs. It has low cost, direct plug in peripherals, does not require an expensive interface board for modems, printers or floppy disks, connects to any TV, includes AC adapter, RF modulator, switch box, self teaching instruction book, 90 day immediate replacement warranty, comes in a beautiful console case for only \$299. (You can get a 41K COMMODORE VIC for \$379) We stock more VIC-20 programs than anyone!—Write for free catalog!

15 DAY FREE TRIAL. Return within 15 days complete and undamaged for refund of purchase price.

DON'T MISS THIS FANTASTIC SALE!! Phone 312-382-5244 to order and get delivery in 2 to 7 days, or send a certified check, money order or personal check to: **PROTECTO ENTERPRIZES, BOX 550 BARRINGTON, ILL. 60010.** WE HONOR VISA AND MASTER CHARGE, ship COD. Add 10.00 for shipping, handling, insurance. Illinois residents add 6% tax.

CIRCLE NO. 36 ON FREE INFORMATION CARD

computers

crocomputer and run, you will notice that the gun is drawn in the center of the display terminal. Not much of a gun, we agree, but with your artistic talent you can enhance its appearance.

In the upper left corner of the screen a question mark appears along with the cursor. You can move and fire the gun by typing one of the following codes:

Code	Function
1	Moves gun to left
2	Moves gun to right
3	Moves gun to top
4	Moves gun to bottom
5	Fires gun

After you input the code and press enter, you will notice that the gun moves in the direction you requested or, in the case of code 5, it fires a shot. The question mark and the cursor again appear in the upper left corner of the screen and wait for your next instruction.

If you study the program closely, you will find that the computer receives only two coordinates for drawing the gun (lines 20 and 30). To complete the outline of the gun, the program instructs the computer to add or subtract certain numbers from the starting coordinates until the complete image of the gun is drawn on the screen (lines 40 through 190).

The program then asks the operator for instructions (line 200). When the operator responds with a code, the computer will branch to the appropriate line of the program. It will then add or subtract certain numbers, which are used as the starting coordinates to draw the gun on the screen. The gun is then drawn at a new location on the display.

Something else happens each time an instruction is received by the computer. The values of the original coordinates (lines 20 and 30) change to become the coordinates of the new gun location. The program automatically establishes new starting coordinates each time a new instruction is received (except when the instruction is to fire the gun). By having the program reset the starting coordinates of the gun, the computer is actually executing an endless loop, enabling the operator to move the gun all over the screen.

When code 5 is received to fire the gun, the program executes lines 350 through 420. Line 350 finds the center of the gun while lines 360 through 410 fire the shot towards the top of the screen.

If you study this program module, you will realize that to move a gun around the screen is as easy as adding and subtracting numbers. You should be able to modify this module to include some of the features contained in previous columns or combine this subroutine with some of your own ideas and develop your own game programs.

Although programs contained in this column are designed for the TRS-80 and the Apple II, you should be able to compare command statements contained in these programs to similar command statements used by other versions of Basic. Then you should be able to modify the programs to operate on other computers besides TRS-80 and Apple II. ◇

COMPUTER SOURCES

By Leslie Solomon, Technical Director and Stan Veit, Computer Editor

Hardware

TRS-80 Printer Options. The TRS-80 Bidirectional Tractor Feed attachment (26-1447) permits use of fanfold continuous form paper with the Daisy Wheel II printer including multi-part forms, pressure-sensitive labels, and special data-processing forms. It provides complete roll-ahead/roll-back capabilities under software control. \$289.95. The Automatic Sheet Feeder (26-1448) feeds and stacks up to 200 sheets for the Daisy Wheel II printer. Initial installation is required. \$1495. The Acoustic Cover (26-1455) reduces noise produced by the Daisy Wheel II printer, even with the tractor feed attachment in place. The cover is hinged for easy access to printer and paper, there is a top window, and a built-in cooling fan. \$399. Available at Radio Shack Computer Centers and stores.

Hard Disk Kit. Marketed in kit form, this 5 1/4", 5-megabyte Winchester disk drive uses a Xebec S-1410 Intelligent



Disk Controller. It requires only "a few simple connections that can be performed in less than 10 minutes and requires no technical expertise at all." \$1299. Address: Xebec, 432 Lakeside Drive, Sunnyvale, CA 94086 (Tel: 408-735-1340).

Apple III Interface. The protocol III uses a parallel interface chip (6522) to allow the user to put custom circuits right on the board. No knowledge of the Apple III bus is required. Room is provided for either a 26-pin ribbon connector (supplied) or a 25-pin D-type connector (also supplied) for external connections. A software driver links the card to the language that uses the SOS Drivers. \$195. Address: Elcom Systems Peripherals, 439 Harrison St., Suite A, Corona, CA 91720 (Tel: 714-734-8220).

IBM Card. The DSI-ASYNC card is a dual asynchronous serial card for the IBM Personal Computer that allows dumb terminal emulation, serial printer interface, and printing with expanded tabs. It includes two I/O channels (one current loop or RS-232 selectable), one RS-232-C (DTE or DCE selectable), switch-selectable serial port addressing, and four software programs that the user can copy. Software includes a set-up program serial printer installation, full duplex terminal emulation, and a print program. Serial port addresses are switch selectable to avoid conflict with other equipment. \$199. Address: Davong Systems Inc., 1061 Terra Bella Ave., Mountain View, CA 94043 (Tel: 415-965-7130).

Speech Synthesizer. The Sweet Talker adds speech to a computer and features the Votrax SC-01A phonetic speech synthesizer chip. It speaks 64 phonemes with four levels of inflection and includes an on-board audio amplifier. An optional (\$35) software package contains a 6502 text-to-speech algorithm with patches to BASIC or machine-language programs. Model ST-01 (\$139) interfaces to any parallel port and Model ST-02 (\$149) is designed for the Apple II. Address: Micromint Inc., 917 Midway, Woodmere, NY 11598 (Tel: 516-374-6793).

Video Kit. The VDM-1 features optoisolation between a computer or video game and a TV receiver. It enables up to 80 character lines because of its direct connection to the video circuitry, bypassing the tuner and IF circuits. This removes the effects of moire, ghosting, color shifting, etc. \$64.95. Address: VAMP Inc., POB 411, Los Angeles, CA 90028 (Tel: 213-466-5533).

ZX81 Memory Expansion. The Memopak 64K is a RAM package that plugs into the rear of the Sinclair ZX81 and expands the memory by a further 56K. The unit is user-transparent and accepts such commands as DIM A(9000). The ZX81 has 8K of ROM from 0 to 8K, and 1K of RAM from 16 to 17K. This 1K is disabled and covered by 48K between 16 and 64K. At one limit the user has 15K below the 32K line, and 32K for arrays, etc. Or the user can have 45K to work in. \$179.95. Address: Memotech Corp., 7550 W. Yale Ave., Suite 220, Denver, CO 80227 (Tel: 303-986-0016).

Apple Scope. The Model 85 dc to 50 MHz digital memory oscilloscope module fits with an Apple II and uses the monitor screen and keyboard as the scope screen and control panel. Using BASIC or machine language, the Model 85 can be used for waveform processing such interesting functions as Fast Fourier Transforms, auto- and cross-correlation, power density spectra, integration, differentiation, etc. Fast sweep speed is 10 ns/div and at 1 ms/div or slower, the scope operates as a real-time A/D converter. Once acquired, waveforms are displayed on the software generated 8 x 10 division graticule. A cursor provides DVM readout for any specified point on the displayed waveform. Hard copy output is also provided. Requires Apple II, Disk II, 48K, and DOS 3.3. \$995. Address: Northwest Instrument Systems Inc., POB 1309, Beaverton, OR 97075 (Tel: 503-297-1434).

Software

TRS-80 Word Processor. SCRIPSIT 2.0 (26-4531), the latest version of SCRIPSIT, stores approximately 100 single-spaced pages on a single diskette, and permits printing while another text is being typed or edited. It includes automatic block moving and duplication, global search and replace, easy page numbering, 20 user-defined keys, 11 stored user-definable formats, and full headers and footers. \$399. Requiring a second drive, SCRIPSIT Spelling and Hyphenation Dictionary (26-4534) can be added for automatic proofreading. It contains a 100,000-word reference with room for 2000 user defined words. It checks and displays SCRIPSIT-prepared text, highlights misspelled words and allows correction. Automatic hyphenation is also available, and it provides total word count, and a count of words not found. \$199. Both are available at Radio Shack Computer Centers and stores.

Apple III COBOL. The release of COBOL for the Apple III has been certified by the U.S. General Services Administration's Federal Compiler Testing Center. It was rated as High Intermediate Level, a higher rating than many of the COBOL versions used in minicomputers. The ad-