

Z-80 COMPUTER CORNER

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Radio-Electronics

THE MAGAZINE FOR NEW IDEAS IN ELECTRONICS

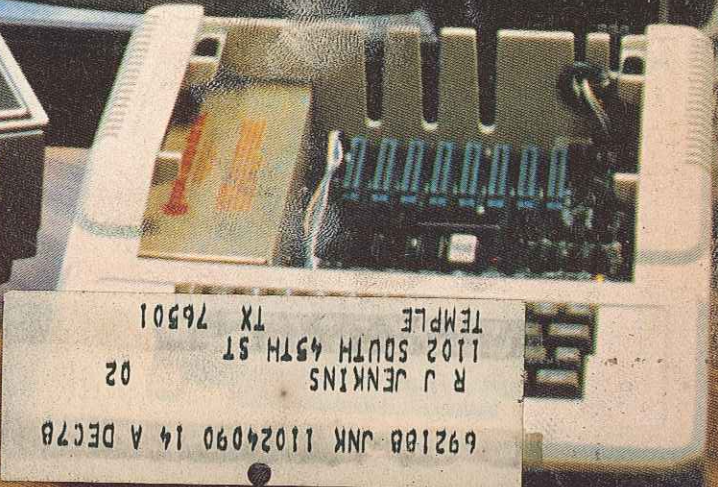
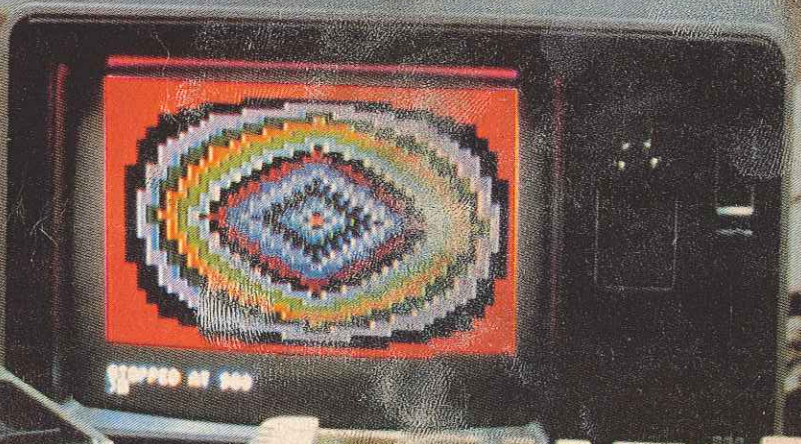
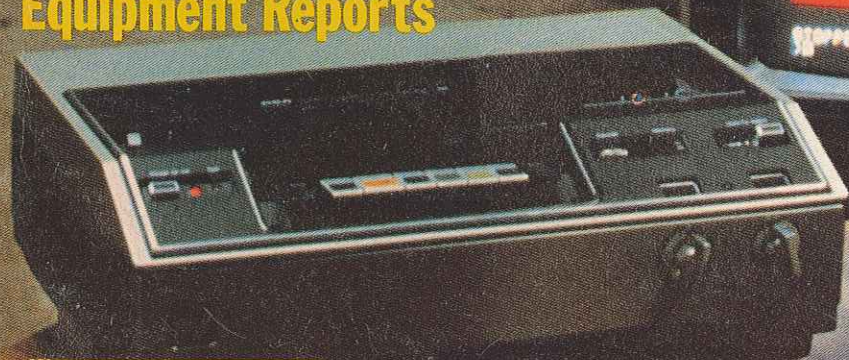
Know Before You Buy
VIDEOTAPE RECORDERS
What's Available Today

Be A Musician, Build
PROGRAMMABLE DRUMS

Build A Digital
BICYCLE SPEEDOMETER

Own Your Own
PERSONAL COMPUTER
Mainframes For Hobbyists

PLUS:
The Missing Transistor Clues
Dolby FM
Two Hi-Fi Lab Test Reports
Hobby Corner
Jack Darr's Service Clinic
Equipment Reports



A
GERNSBACK
PUBLICATION

RETAILER: SEE PAGE 97 FOR
SPECIAL DISPLAY ALLOWANCE PLAN

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R J JENKINS
1102 SOUTH 45TH ST
TEMPLE TX 76501
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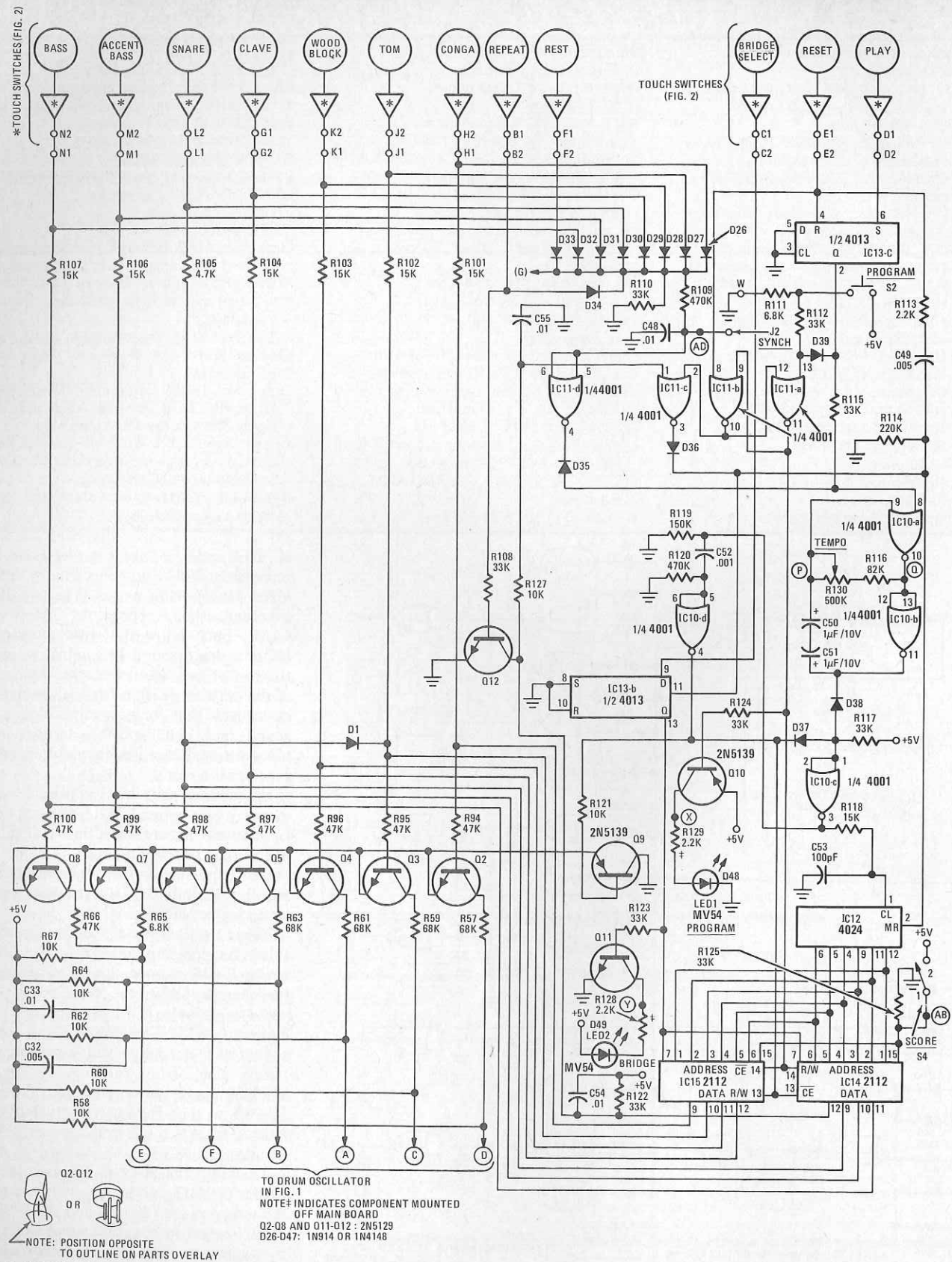


FIG. 4—LOGIC AND CONTROL circuitry. Memory is provided by two 2112-type RAM's.

in the memories at the location specified by the address lines to appear at the output of the memories and are fed to transistors Q2-Q8.
 If the data stored is for a drum sound, one of the transistors Q2-Q8 is turned on, providing an activating pulse to the drum oscillators. If the data stored is a

repeat, this data (a logic 0) is applied to the collector of Q12 (which will be cutoff under these conditions) and through R127 to one of the IC11-c inputs, causing this gate's output to go high. This produces the same effects as the RESET pad except that the Play flip-flop (IC13-a) is not reset.

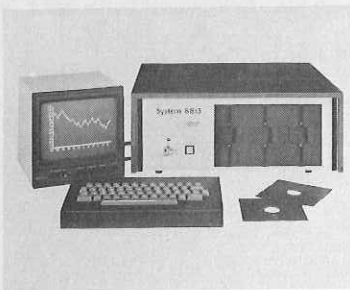
If the BRIDGE-SELECT pad had been touched at the time the repeat data occurred, the output of bridge-select flip-flop IC13-b would have changed state, selecting the page of memory corresponding to the setting of the front-panel SCORE switch S4.

continued next month

Hobby Computer Main-Frames

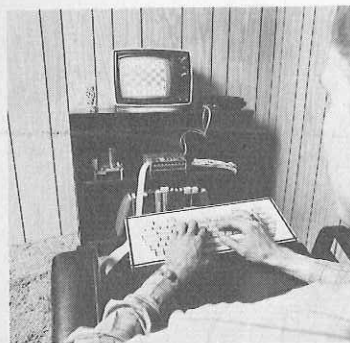
main-frame/'mān-,frām/ *n*: COMPUTER; *esp*: a cabinet housing the computer itself as distinguished from peripheral devices connected with it: a cabinet containing a motherboard and power supply intended to house the CPU, memory, I/O ports, etc., that comprise the computer itself.

CHESTER H. LAWRENCE



IF A HOBBY COMPUTER HAS A HEART, IT MUST BE the main-frame. And when we started to assemble this story we were going to cover only main-frames. But once we got started we found that if we followed our original premise we would have to omit many popular and interesting machines and accessories. Therefore, we have taken some liberties and stretched the definition to include other devices and systems. What we have ended up with is a directory of hobby computer manufacturers and a condensed listing of items each one makes.

Wherever possible we have included model numbers and prices. In all instances we have provided the manufacturer's address. Write him for more information and when you do, tell him you read about his product in *Radio-Electronics*.



Apple Computer

Two completely assembled systems. Apple I with 4K RAM \$475; with 8K RAM \$575. Cassette interface board \$75. Variety of tape cassette programs available. Apple II with 6502 CPU operates at 1 MHz includes 8K RAM, molded plastic case, keyboard, power supply, game paddles, carrying case, cords and cables, with 4K RAM \$1298, with 8K RAM \$1398; with 12K RAM \$1498; with 16K RAM \$1698 in steps up to maximum of 48K RAM \$2638. Color graphics capability. Apple Computer Inc., 20863 Stevens Creek Blvd., Cupertino, CA 95104

Artisan Electronics

Model 85 microcalculator for use with 8-bit microprocessors has scientific calculation capabilities for scientific, engineering, mathematical or statistical problems. When combined with microprocess a programmable scientific calculator is formed, \$189. Artisan Electronics, 5 Eastmans Road, Parsippany, NJ 07054

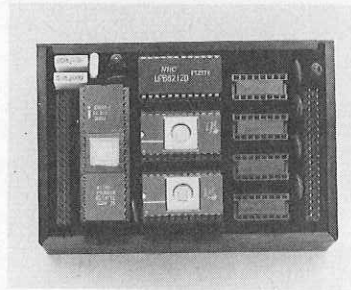
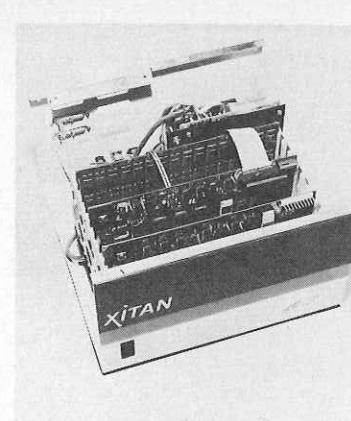
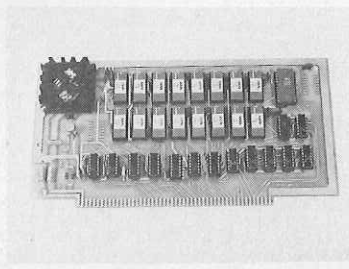
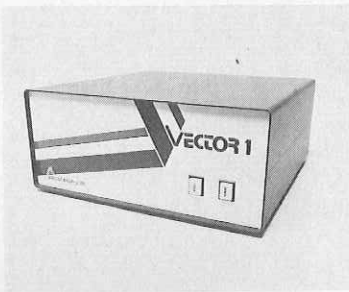
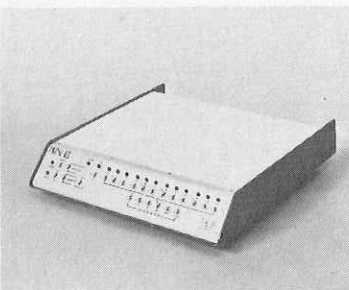
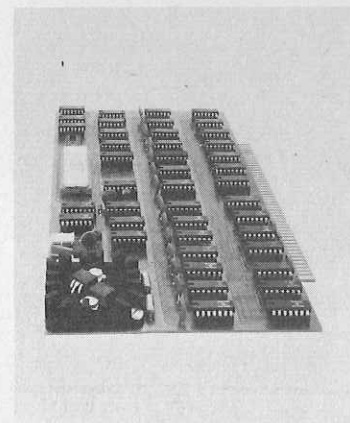


Canada Systems Inc.

No main-frames here, but there are four S-100 compatible circuit cards. If your system needs to know what time it is try the CL2400 real-time clock board. It's a self-contained time keeping unit. No processor time is required. Kit \$98, assembled \$135. Then there's the PC3200 power control system that allows microcomputer control of AC power line switching. The system has three elements; PC3202 single outlet power logic control unit kits \$39.50, assembled \$52; PC3216 16-channel control logic interface kit \$189, assembled \$240; PC3232 32-channel control logic interface, prices not available. That's Canada Systems Inc, (Formerly Comptek), 1353 1/2 Foothill Blvd., P.O. Box 516, La Canada, CA 91011

Compucolor

Makes the 8001 8-color personal computer. It consists of a stand alone CRT and microcomputer with both computation and graphics capabilities. Comes assembled only, uses Intel 8080 CPU, has 34 I/O ports and a color display with a 75-MHz bandwidth. Price \$2750. Available options include light pen, floppy tape and mini disk. Compucolor Corporation, P.O. Box 569, Norcross, Georgia 30091



Computalker

A speech synthesizer that is a high-quality voice generator designed for S-100 I/O bus configuration used in Altair, Isai and Polymorphic computers. Synthesizer is controlled by 9 acoustic phonetic parameters transmitted on the microcomputer data line. CT-1 Speech Synthesizer \$395 including users manual, monitor and data tapes. Demonstration Cassette \$2.95. Computalker Consultants, P.O. Box 1951, Santa Monica, CA 90406

Cromenco

Microcomputers and peripherals. Z-1 computer system uses Z-80 with a 4-MHz clock rate. S-100 bus. Comes with 8K RAM, 8K PROM, 1K resident monitor, power supply, capacity for 21 boards; assembled only \$2495. Z-2 computer system; 4-MHz Z-80, 21 card slots, s-100 bus; kit \$595, assembled \$995. Joystick console with speaker; kit \$65, assembled \$95. TV Dazzler turns color TV into display system; kit \$215, assembled \$350. TU-ART interface has two serial I/O ports, two 8-bit parallel I/O ports and 10 independent interval timers; kit \$195, assembled \$295. Multichannel analog interface; kit \$145, assembled \$245. 16K PROM card with address anticipation and bank select; kit \$145, assembled \$245. Bytesaver memory board and PROM programmer; kit \$145, assembled \$245. 16K RAM card with bank select; kit \$495, assembled \$795. 4K RAM card with address anticipation and bank select; kit \$195, assembled \$295. Cromenco Inc., 2400 Charleston Rd., Mountain View, CA 94043

The Digital Group

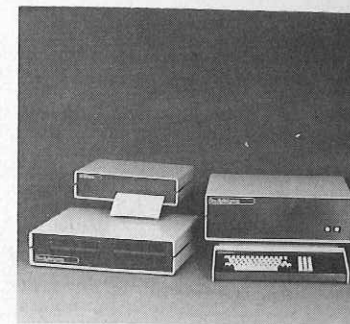
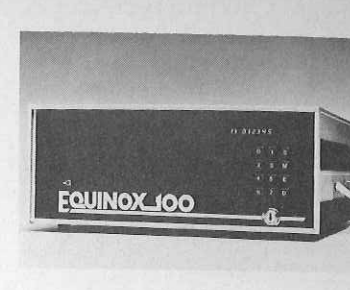
Everything from software to systems. Compatible system with plug-in boards. Users choice of Z-80, 8080A, 6800 or 6502 CPU—each a plug-in board. Four board Z-80 system includes 10K memory, 12-amp power supply, standard motherboard and cabinet; kit \$895, assembled \$1295. Three other system packages also available. Seven system package options. If system selected with 8080A deduct \$50. With 6800 deduct \$50. With 6502 deduct \$100. I/O card; kit \$65, assembled \$95. TV readout and audio cassette interface; kit \$130, assembled \$195. 64 X 64 color graphics interface; kit \$175, assembled \$225. Digital cassette storage drive \$115 assembled. monitor \$175 assembled. 96-column printer and interface; kit \$495, assembled \$595. Four power supplies, nine cabinets, assorted accessories and documentation. The Digital Group, P.O. Box 6528, Denver, CO 80206

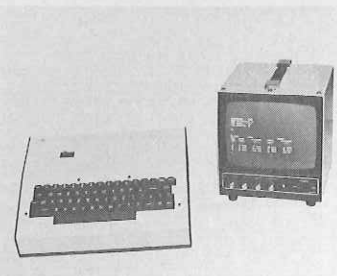
Dynabyte

Six items, all circuit boards, all assembled, all S-100 bus. There's a 16K dynamic RAM module for \$399; two 16K static RAM modules — one for \$555, the second for \$525; two 32K static RAM modules — one for \$995, the other for \$925; a naked terminal module at \$350 completes the line. Dynabyte Inc., 4020 Fabian Way, Palo Alto, CA 94303

Franklin Electric

S-100 I/O interface and memory boards. I/O kit provides 3 serial, 1 parallel port; kit \$150, kit with sockets \$165, assembled \$235, without sockets \$235. 8K static RAM memory. 450-nS; kit \$249, with sockets \$235. Assembled \$295 with sockets, \$280

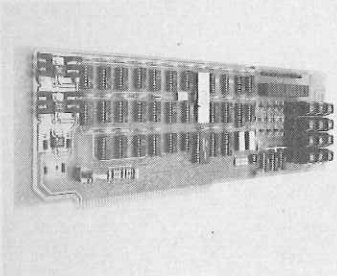




without. 250-nS kit \$275, with sockets \$289. Assembled \$330, without sockets \$315. Franklin Electric Company, 733 Lakefield Road, Westlake Village, CA 91361

Heath Company

Two computer families plus a substantial line of accessories. All items in kit form. H8 computer has 8080 CPU and intelligent front panel \$375. Requires at least one memory board. H8-1 8K memory board supplied with 4K static RAM \$140. Expansion memory kit H8-3 \$95. Serial I/O and cassette interface \$110. H-11 computer with LSI-11 16-bit CPU \$1295. Accessories for H-11 include H11-1 4K memory expansion module \$275. H11-2 parallel interface \$95. H11-5 serial interface \$95. H11-6 extended arithmetic chip \$159. For both systems there's an H-9 video terminal \$530. H-10 paper tape reader/punch \$350. DEC Writer II keyboard Printer Terminal \$1495. Software kits, manuals kits and cassette recorder also available. Heath Company, Benton Harbor, Michigan 49022



Infinite

Microprocessor designed for use as training device. RCA COSMAC processor. UC1800 kit \$389. Assembled with cabinet \$495. Infinite Inc., 1924 Waverly Place, Melbourne, FL 32901

Info 2000

Info 2000 adapter for S-100 bus systems to interface PERSCI disc drives; \$120 kit, \$195 assembled. \$40 optional 1K RAM. \$120 optional EPROM 3K. INFO 2000 adapter for Digital Group Z-80 computers same prices. Add \$90 for optional RS-232 port. Add \$70 for second optional RS-232 port. INFO 2000, P.O. Box 3196, Culver City, CA 90230



IOR

VDS2K video system, S-100 compatible, circuit card. Produces 30 lines of 64 characters. Kit \$399. IOR, Box 28823, Dallas, TX 75228

Kent-Moore Instrument

S-100 circuit cards. Alpha-video display module generates 16 lines of 32 characters upper and lower case, \$107. Also available RAM memory boards for S-100 bus; 4K boards \$107, 8K RAM \$197, 8KZ (fat) RAM - 250-nS \$217. Kent-Moore Instrument Company, P.O. Box 507, Industrial Avenue, Pioneer, Ohio 43554

Matrox Electronic Systems

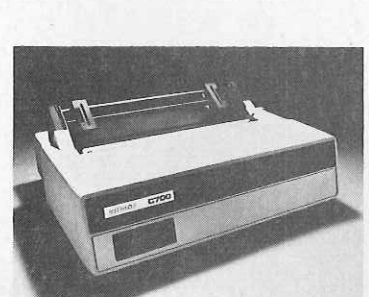
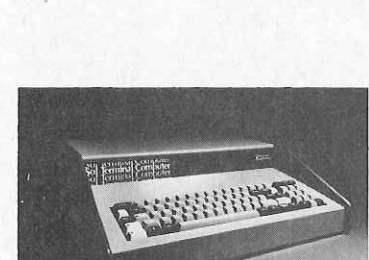
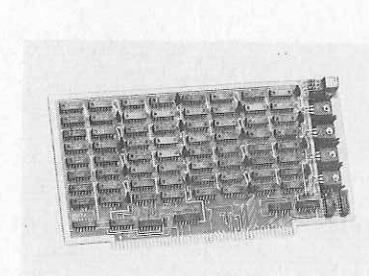
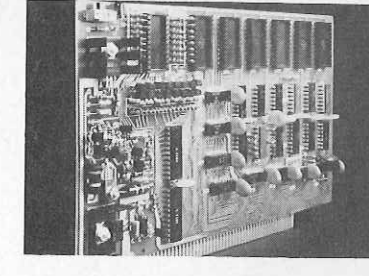
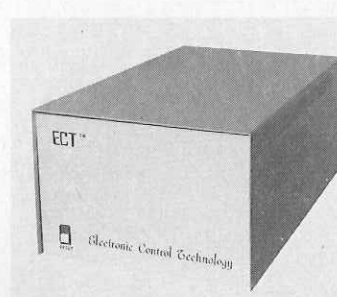
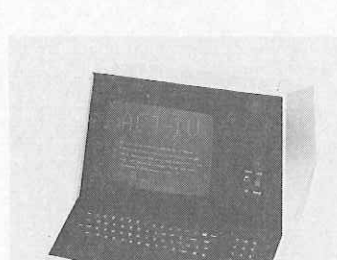
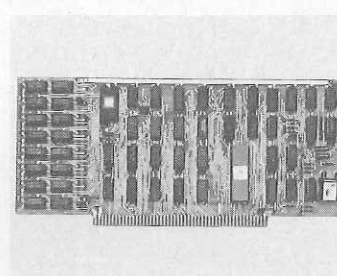
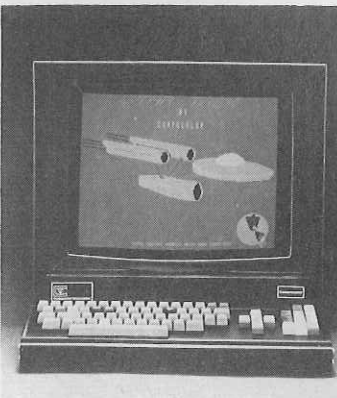
A line of S-100 peripherals includes two TV CRT controllers. The ALT-256 a 256 x 256 high resolution graphics controller \$395 assembled. ALT-2480 a 24 line x 80 character alphanumeric controller \$295 assembled. Matrox Electronic Systems, P.O. Box 56, Ahuntsic Stn, Montreal, Que Canada, H3L 3N5

Microtronics

Paper tape reader Byte Reader has LED data bit indicators, Lite Optimizer senses intensity of external light and adjusts sensitivity of photo transistors; kit \$69.95, assembled \$84.50. Microtronics, P.O. Box 7454N, Menlo Park, CA 94025

Micronics

S-100 compatible Better Bug Trap to speed software debugging. \$160 assembled. Micronics Inc., P.O. Box 3514, Greenville, NC 27834



Midwest Scientific Instruments

6800 computer system. SS-50 bus compatible with SWTP 6800 system. Computer system kit including chassis and hardware, power supply, mother board and connectors, CPU board and monitor, 8K RAM memory board, interface adapter board and serial interface board; \$595, assembled system \$895. Additional 8K RAM; \$225, assembled \$335. B-100 terminal; kit \$1400, assembled \$1400. HSP-1 printer \$1195. FD-8 floppy disk memory system single drive kit \$1150. Dual drive kit \$1950. Single drive floppy assembled \$1395. Double drive assembled \$2295. Midwest Scientific Instruments, 220 West Cedar, Olathe, KS 66061

Mijobe

Altair 8800 power supply replacement kit. Just under \$60. Mijobe Corp., 657 N. Benson, Upland, CA 91786

MiniTerm Associates

Merlin Video Interface system, an ASCII/Graphics video interface for S-100 bus microcomputer systems. Super dense graphics board for use with the Merlin graphics system displays up to 64,000 graphics dots in a 320H x 200V array. Keyboard interface kit, Minifloppy interface plus lots of software. Merlin; kit \$269, assembled \$349. Super dense; kit \$39, assembled \$54. Keyboard interface; kit \$20. Minifloppy interface; kit \$260, assembled \$329. Shugart SA400 minifloppy drive \$390. Dual minifloppy \$499. Assorted software from \$25 to \$40. MiniTerm Associates Inc., Dundee Park, Andover, MA 01810

Mits Division of Pertec

This is the company that started it all by manufacturing and producing the first hobby computer. Today they offer a complete line of hobby computers, peripherals and accessories. Here are the highlights of their 14-page catalog. Main-frames: Altair 8800B includes CPU boards, interface buffer board, case power supply, fan, front panel, memory not included; kit \$750, \$995 and \$1070 assembled. Altair 680B with CPU board, case, 1K static RAM, 256 bytes of PROM, ACIA serial interface port, front panel and power supply; kit \$395, assembled \$495.

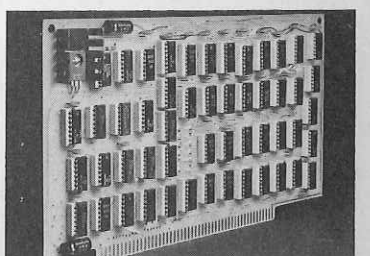
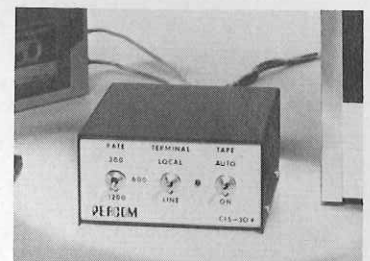
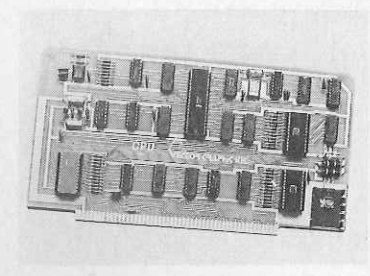
There are nine mass storage items from a disk controller and drive for \$1430 kit, assembled \$1750; to a hard disk controller at \$7995 assembled; to a cassette interface kit at \$114, assembled \$195.

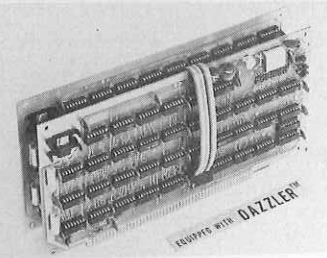
In memory there are five items from a 4K RAM board; kit \$155, assembled \$255; to a 16K static RAM board; kit \$680, assembled \$785.

Then there are all kinds of I/O boards, terminals and printers, and software. Mits, 2450 Alamo SE, Albuquerque, NM 87106

MPI

Printers are their specialty. The MP-40 is a self contained matrix printer that has a print line capacity of 40 characters at 12 characters per inch. It will crank out 75 lines a minute. \$425 assembled for the parallel ASCII version. \$359 for the parallel LCP and \$575 for the serial SSP. Interface boards are \$125, \$150 and \$275. In kit form a naked printer consisting of the print mechanism and interface/power





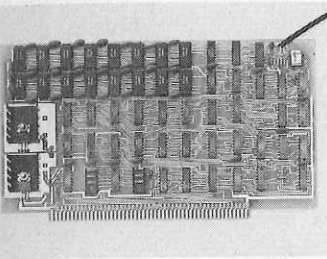
supply board and all electronic components packaged as a KP-40 is \$179. A case is \$89 additional. MPI, Micro Peripherals Inc., P.O. Box 22101, Salt Lake City, UT 84122.

Mullen Computer Boards

Two special-purpose board kits for the S-100 bus. First an opto-isolator/relay control board kit for \$117 that permits your computer to interface with all kinds of control applications — motors, alarms, lights, audio signals, etc. Second an extender board with built-in logic probe \$35. Both from Mullen Computer Boards, Box 6214, Hayward, CA 94545

National Multiplex Corp

Universal 8, a computer main-frame with a 25-amp power supply and input port available from front panel switches. Can be used with S-100 bus or SWTP 6800 bus (SS-50). Main-frame kit, less mother board \$200. Other boards for this main-frame include Z-80 MPU; kit \$150, assembled \$200. 8080 MPU; kit \$120, assembled \$170. 8085 MPU; kit \$140, assembled \$190. 8K RAM S-100, 250-nS mother board \$35. For SWTP \$40. National Multiplex Corp. 3474 Rand Avenue, Box 288, South Plainfield, NJ 07080



North Star Computers

Horizon-1 includes a Z-80A processor, 16K RAM, minifloppy and 12-slot S-100 mother board with serial interface; kit \$1599, assembled \$1899. Horizon-2 is same system with dual disk drive; kit \$1995, assembled \$2349. Additional S-100 boards include a hardware floating point at \$259 kit, assembled \$359. 16K RAM boards at \$399 kit, assembled \$459, with optional parity check and additional serial and parallel I/O ports at \$39 kit, assembled \$59. North Star Computers Inc., 2465 Fourth Street, Berkeley, CA 94710

Objective Design

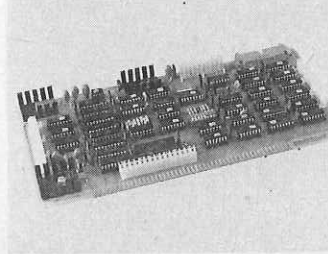
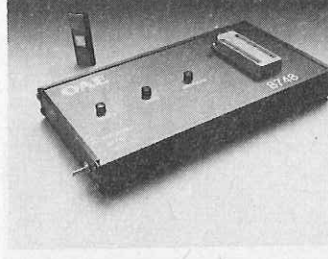
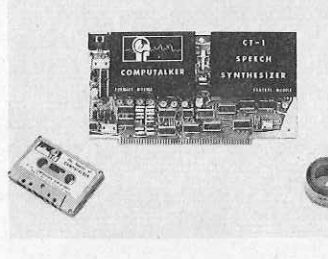
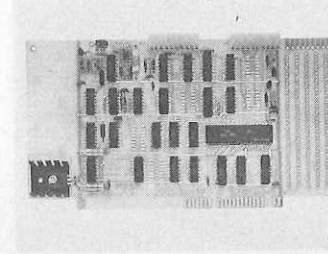
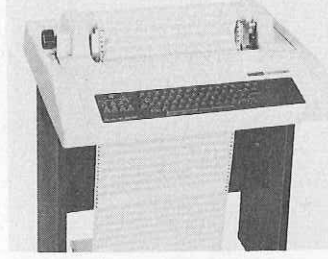
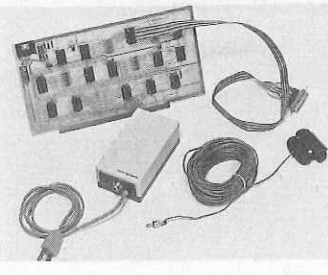
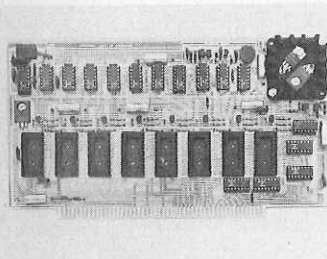
A programmable character generator for S-100 computers that permits the generation of any special characters required by the user. Includes keyboard interface and dual joy-stick interfaces. Magnetic tape controller for S-100 computers on a single card, available in several different versions. S-100 cardframe panel set of front and rear panels with instructions for assembly of a 12 and a 22-slot cardframe. Objective Design Inc., P.O. Box 20325, Tallahassee, FL 32304

Ohio Scientific

Model 500 is a 6502 running a 1 MHz with 512 bytes of PROM, 8192 bytes of ROM containing 8K basic and 4096 bytes of RAM for user programs. Boards only \$298. 500-1 computer with case, power supply, reset switch and terminal connectors \$429. 500-8 same board in a 8-slot case with power supply \$629. Also complete Challenger computer system including main-frame with 16K RAM, serial interface, system monitor PROM and bootstrap PROM, single drive floppy, monitor and keyboard. \$2599, without terminal \$2099. Ohio Scientific Instruments, 11679 Hayden Street, Hiram, Ohio 44234

Oliver Audio Engineering

A line of support "tools" for 8080-based



computers. The CA-80/48 cross assembler an 8K assembler that makes it easy to compose, edit, print and store programs for 8048 computer modules. The PP-2708/16 PROM programmer for \$249 kit, assembled \$299. And the PP-8748 programmer \$249 kit, assembled \$299. Oliver Audio Engineering, 1143 North Poinsettia Drive, Los Angeles CA 90046

Parasitic Engineering

Equinox 100 kit includes power supply, front panel/CPU board, busboard, fan, cabinet, 2 edge connectors plug 2 hardware kits with handle, cord storage, tilt-up stand, hinged top panel, wiring channel and 18 edge connectors. \$799. Available separately, without CPU/front panel board. Complete line of Thinkertoy Products fit and complement the Equinox main-frame. Parasitic Engineering, P.O. Box 6314, Albany CA 94706

Percom Data

Cassette interfaces. CI-812 is both a cassette and RS-232 data terminal interface that plugs into S-100 bus. 300-baud rate can be extended to 2400-baud; kit \$89.95, assembled \$119.95. Another unit is made for the SWTP 6800. It's the model CIS-30; kit \$69.95, assembled \$89.95. Percom Data Company Inc., 4021 Windsor, Garland, TX 75042

Processor Technology

Computer systems and subsystems. Subsystem B for S-100 computer systems includes a memory module, three I/O modules, a general purpose memory and software. There is a choice of three memory modules 4K RAM, 8K RAM or 16K RAM. A VDM-1 module interfaces the computer with a TV monitor. The Computer Users Tape System module interfaces with a cassette recorder. Also available is complete SOL computer system. Processor Technology Corp., 6200 Hollis Street, Emeryville, CA 94608

Quay

Microcomputer kit for the hobbyist. Single board system is complete with Z-80 microprocessor, 2.5-Hz clock, PROM resident monitor, 1024 static RAM, parallel I/O, sockets for up to four 1024 X 8 EPROMS, EPROM programmer board, sockets, documentation; kit \$450, assembled \$600. Quay Corporation, P.O. Box 386, Freehold, NJ 07728

Radio-Shack

Low cost TRS-80 system available assembled only. Consists of video terminal, keyboard housing Z-80 computer main-frame with 4K memory (expandable to 16K), cassette interface, cassette recorder and power supply. \$599.95. Keyboard computer alone less video display and cassette recorder \$399.95. Radio-Shack, Forth Worth, TX 76107

Smoke Signal Broadcasting

A broad line of products for the SWTP SS-50 bus. An abbreviated rundown shows a BFD-68 Single Drive disk system for \$795. A triple drive BFD-68-3 disk system for \$1479. An 8K EPROM board for \$179, a PS-1 power supply kit for \$24.95. A 16K static memory system for \$529. A super editor for \$29. You'll want the whole catalog. Smoke Signal Broadcasting, Box 2017, Hollywood, CA 90028

