PRINTOUT

JOSEPH B. SIDOWSKI

Products

Miniature dc Motor

This Swiss-made miniature dc motor has a diameter of 1.024 in. and a length of 1.634 in. No cogging, torque up to 3.5 oz in., speed up to 7,000 rpm, and a mechanical time constant of 19.6×10^{-3} sec.

Portescap U.S.
730 Fifth Ave.
New York, N.Y. 10019

Color CRT

CPS, Inc., of Sunnyvale, Calif. is marketing the CPS-8001 with high resolution, general-purpose graphics in red, orange, yellow, and green. Speed, light output, and contrast are compatible to black and white monitors. The Penetron 21-in.-diagonal CRT uses P22 red and P22 green phosphors with a high voltage range of 6-12 kV. Spot size is 0.015 to 0.025 in., depending on intensity. Picture size is 12 in. sq with all specs met within a 10-in.-sq area. The display package measures 21 x 26 x 36 in.; the switch package, $10\frac{1}{2} \times 12 \times 24$ in.

OEM Power Supplies

Designed for versatile mounting inside your equipment, the card-type OEM power supplies (4 to 32 V) sell for \$28.50. Overvoltage protection and voltage adjustment pot is available. The 5-V 1.5-A, 12-V .85-A, 15-V .74-A, and 24-V .51-A supplies are priced at \$28.50; ± 12 -V .42-A and ± 15 -V .37-A supplies sell for \$37.50.

The same company markets high-current power supplies at \$315 and \$245.

ACDC Electronics, Inc.
Oceanside Industrial Center
Oceanside, Calif. 92054

Computer Interface Printer for PDP-8 Series

A low-cost plug-to-plug I/O hard copy printer, the Holmes Tycom Model CSR-8E available to DEC PDP-8E and minicomputer users, employs an IBM Selectric typewriter, a baseplate, a power supply, and an Omnibus interface. Available from Tycom Systems Corp., Fairfield, N.J., the baseplate is factory installed on the customer-supplied typewriter and operates at 15 characters/sec, using standard DEC Teletype software. All 128 ASCH characters can be generated from the keyboard. Also displayed will be the Tycom 920 originate-only acoustic coupler.

Pin-Compatible Core Memories

Standard Memories announces a new family of pin compatibles. The Model "P" series offers 8K words in a direct plug-in replacement for DEC's PDP-11/05, PDP-11/10, PDP-11/40, and the 11/45. The "G" series is in 4K or 8K modules to replace Digital Computer Controls' DCC 112; "M" series form, fit and function replacement for EM & M's Micro-Memory 3000; the "A" series 8K modules are for General Automation's SPC-16.

Standard Memories, Inc.
2801 E. Oakland Park Blvd.
Fort Lauderdale, Fla. 33306

Floppy Disk Drive

The Diskette floppy disk drive sells for \$2,740 and provides all seek, read-write, error detection, and data formatting functions for up to eight Diskette drives. Plug-in interfacing is provided to all popular 8-, 12-, and 16-bit minicomputers. Power supply, limited diagnostics, and free and guaranteed installation of the first unit by Innovex at your site.

Innovex Corp.
Four Alfred Circle
Bedford, Mass. 01730

Golden Syrian Hamsters

Price list for hamsters from a colony that has been closed since 1959: 2nd week (16-39 g) or 3rd week (40-59 g) animals are \$.90 each; 4th week (60-74 g) \$.95; 5th week (75-80 g) \$1.01; 6th week (81-88 g) \$1.34; 7th week (89-95 g) \$1.46; 8th week (95 g average) \$1.57; 9th week (100 g and up) \$1.64. Pregnant Golden Syrian hamsters are \$4.75.

Con Olson Co., Inc.
Box 4021
Madison, Wis. 53711

Impact Printer

The Printec-100A full-character serial impact printer uses a 96-character font to provide uppercase and lowercase printout and employs the "multiple split helix" concept. The new machines include 70-cps print rate (equivalent to 26 lines/min at 132 columns/line), ability to print six-part forms on standard paper, disposable ink roller instead of conventional ribbon, as well as the inclusions of a two-channel vertical format

unit. The printing rate affords a fivefold edge over the IBM Selectric rate. Price: \$2,800.

Printer Technology, Inc.
Bldg. 3G
Sixth Rd.
Woburn, Mass. 01801

Digital Processor Interface

The processor, which digitizes incoming analog waveforms, interfaces the Tektronix 7704A scope to the PDP-11 minicomputer, stores digital data, and converts it to analog information for the scope's display, allows the 7704A scope to differentiate waveforms, extracts signals in noise by averaging, displays time as well as frequency spectra of signals by Fourier and inverse-Fourier transformations, and shows the convolution, deconvolution, and correlation functions of input signals.

The new system uses BASIC language for the software and can be adapted to the Data General NOVA minicomputer; however, no software support will be provided here by Tektronix.

Assuming a researcher already has the 7704A scope and a PDP-11, the interface costs \$5,200 plus \$650 or \$900 for either of two software packages and \$1,000 for a software interface.

Tektronix, Inc.
Box 500A
Beaverton, Oreg. 97005

Animal Care Systems

Almac is advertising fully automatic watering and dry waste removal rack systems for rodents, guinea pigs, rabbits, and primates. Racks are of tubular stainless steel construction and fully automatic, housing the mechanical drive and water manifold. The units can be factory-adjusted to receive most presently used cages. Two quick-disconnect couplings on each rack facilitate series hook-up without intricate room plumbing.

Almac Scientific, Inc.
16140 Raymer St.
Van Nuys, Calif. 91406

Guinea Pigs

Camm offers seven different strains of Camm-Hartley-derived or English short hair guinea pigs for research. Shipment within 24-48 h.

Camm Research Institute, Inc.
414 Black Oak Ridge
Wayne, N.J. 07470

The new Charles River COBS guinea pig is now being marketed. The Hartley guinea pig, caesarean-derived into germ-free isolators, served as the breeding nucleus.

Charles River Breeding Laboratories, Inc.
Wilmington, Mass. 01887

Hilltop markets English smooth hair and the Hartley varieties.

Hilltop Lab Animals, Inc.
P.O. Box 25
Chatsworth, Calif. 91311

Pressure Spray Cleaner

Hydro Blitz 600 is a pressure spray for washing, rinsing, and sanitizing. The unit uses cold or hot (180 deg) water and is safe for use with mild acids. It is compact and mobile.

Hydro Systems Co.
6240 Wiehe Rd.
Cincinnati, Ohio 45237

Aquarium Systems

Aquarium Systems' Instant Ocean Culture Systems and synthetic sea salts make possible the study of the marine environment in the laboratory. The systems provide control of temperature, percentage of oxygen saturation, removal of CO₂, oxidation of nitrogenous wastes, and continuous pH buffering. The Instant Ocean line of culture systems extends to 500-gal units.

Aquarium Systems, Inc.
33208 Lakeland Blvd.
Eastlake, Ohio 44094

Stainless Steel Feeders

Almac's stainless steel feeder snaps on and off of rat cages and is priced at \$1.87 each.

Almac Scientific, Inc.
16140 Raymer St.
Van Nuys, Calif. 91406

Hard Copy Recorder

Recorders provide hard copy from slow-scan TV, data, and CRT terminals. Prices are \$795 (Model 400) and \$2,500 (Model 600).

Alden Electronic and Impulse Recording Instrument Co.
Alden Research Center
Westboro, Mass. 01581

Stopcocks

PerfeKtum stopcocks are available in 43 styles, including flare type for small plastic tubing and complimentary tubing adapters for the biomedical laboratory.

Popper & Sons, Inc.
300 Denton Ave.
New Hyde Park, N.Y. 11040

Teklon Core Stopcocks (one- and three-way models) are available from:

United States Catheter and Instrument Co.
Box 787
Glens Falls, N.Y. 12801

Mouse Injection System

The Sure Shot laboratory injection system includes a disposable plastic cage holding a live mouse which seats snugly into the system's base. The animal's tail hangs free through a slot in a hinged door. An intense, directed light in the base has rheostatic control and is positioned under the mouse's tail; it clearly outlines the vein for visible, accurate injection. When the procedure is completed, merely slip cage containing mouse out of seated position and remove. Place another into position. A polypropylene mouse-cage tray carries eight disposable cages with mice inside and keeps them from slipping and falling.

Cost of the base is \$79; 500 disposable mouse cages are \$65; mix mouse-cage trays are \$24.

J. B. Bio-Instrument Corp.
P.O. Box 3876
New Haven, Conn. 06525

Twin Cassette-ASR Terminal

With the Silent 700 ASR terminals, Texas Instruments has combined magnetic tape cassette data storage with the proven features of keyboard data terminals. Data transmission rates up to 120 characters/sec; 30 characters/sec electronic printing. Phillips type digital-grade cassettes store 800 bits/in. for up to 310,000 characters storage per two-track cassette. Price: \$2,750.

Texas Instruments, Inc.
Digital Systems Division
P.O. Box 1444
Houston, Tex. 77001

Punched-Tape Reader

The Data Loader is designed for punched-tape reader application requiring reliable reading for sequential block loading. Data Loader operates synchronously at up to 150 cps. It is TTL/DTL/RTL compatible. The self-cleaning LED photoelectric read head can read any standard punch tape with 50% or more opacity.

Electron Engineering Co. of California
1441 E. Chestnut Ave.
Santa Ana, Calif. 92701

Miniature Relay

A miniature 4 PDT relay has been introduced that is 0.435 in. high and is capable of switching up to 3 A at 26 V dc. The Model 521 is supplied with high-pressure 4 PDT single or bifurcated (four Form C) 3-A contacts and is available in standard coil voltages from 6 to 115 V dc with an operate and release time of less than 6 msec.

American Zettler, Inc.
Costa Mesa, Calif. 92600

Disposable Pipet Tips

Available in three sizes and color coded in white, green, and yellow, pipet tips are guaranteed to be exact replacements for OEM Pipet Tips. Offered at a savings, these tips are molded of nonwetting polypropylene; for use with Oxford samplers.

Evergreen Scientific
2300 E. 49th St.
P.O. Box 58248
Los Angeles, Calif. 90058

Miniature Switch

The Series E22-85 HX miniature snap-action switch has 2-3/8-in. external aluminum actuator that operates by less than 2 g force, less pressure than a man's breath.

Cherry Electrical Products Corp.
P.O. Box 718
Waukegan, Ill. 60085

Pneumo-Plethysmograph

The dual channel Model DPP-11 pneumo-plethysmograph is a noninvasive method for assessing the state of the peripheral circulation. It is one of several instruments offered by the company for calibrated volume displacement plethysmography.

Electro-Diagnostic Instruments
819 S. Main St.
Burbank, Calif. 91506

FM Tape Recording System

The portable four-channel FM instrumentation tape recorder/reproducer records and reproduces EKG, EEG, etc., using 1/4-in. tape on reels up to 7 in. The Model 1400 has maximum bandwidth on FM of DC-2,500 Hz. Speeds: 1-7/8, 3 3/4, and 7 1/2 in./sec. Price: \$1,795, complete with all accessories.

Data, Inc.
P.O. Box 2074
Fort Collins, Colo. 80521

ECG Telemetry System

Self-contained wireless units are marketed by Laser Systems and Electronics, Inc., Medical Electronics

Division, P.O. Box 858, Tullahoma, Tenn. 37388.

Blood Flowmeter and Transducers

RC1000 Blood Flowmeter offers zero reference without occluding vessel in both acute and chronic studies while establishing stable baselines. Company has line of blood flow transducers.

Micron Instruments, Inc.
1519 Pontius Ave.
Los Angeles, Calif. 90025

Graphics System

Producing graphic displays with combinations of vectors and alphanumerics, IDIGRAF graphics display system has a buffered MOS refresh memory, stroke-writing hardware character and vector generators, a 17-in. screen, two intensity levels, and two character sizes. Approximately 3,000 characters, 3,000 in. of vector, or combinations of both can be displayed. Hardware for 2D scaling and translation is included. Price: \$7,000.

Information Displays, Inc.
333 N. Bedford Rd.
Mount Kisco, N.Y. 10549

Static Eliminator

The Chapman 62 static eliminating system is a compact, high-voltage ionizer-type eliminator designed to eliminate static electricity from insulative materials of any form. The bar can be adapted to several applications with the variety of accessories available. Price: about \$65 in single quantities. New in July 1973.

The Portland Co.
58 Fore St.
Portland, Maine 04112

Blood Pressure Instrument

New compact electronic audible (microphone) blood pressure instrument is available from Taiyo Bussan Co., 1-9 Kanda-Izumicho, Chiyoda-Ku, Tokyo, Japan.

Physiological Transducer

The Mikro-Tip transducer incorporates two pressure sensors for measuring pressure gradients in blood vessels, pulse velocity, heart sounds, esophageal mobility, etc. Active sensing surfaces on side of transducer are insensitive to flow and catheter whip.

Millar Instruments, Inc.
P.O. Box 18227
Houston, Tex. 77023

Counter Displays

These are planar seven-segment displays requiring 8 mA per segment and provide brightnesses of 700 fL at

5 V dc. Readouts are mounted on plug-in cards for easy maintenance and can be viewed at up to 20 ft. Inputs are TTL compatible and may be specified in binary or BCD formats.

Instrument Displays, Inc.
225 Crescent St.
Waltham, Mass. 02154

NOVA Printers

Two dot matrix printers with I/O interfacing and control logic are available for the NOVA series of minicomputers. Both print at a rate of 165 cps at 10 characters/in., 132 characters/line. Each has a full line buffer capable of receiving characters in parallel. One model employs a 5 x 7 matrix and is priced at \$4,500. Interface control costs \$1,600.

Data General Corp.
Southboro, Mass. 01772

Briefs

Aquatic Activity Monitor

LKB Instruments, Inc. has announced a new instrument, the "Aquamex Activity Monitor." The instrument is designed to measure and register the locomotor activity and behavior of fish and marine species. Movement is detected by an ultrasonic "wall" through which the species passes. The number of passages and the passage time are displayed on electronic counters and may also be automatically recorded. The activity monitor may be used in fresh or salt water, clear or polluted, warm or cold water. Accessory equipment includes external printing counters and pen recorders.

NOVA Floating Point Unit

A floating point processor to be used with FORTRAN 5 on all NOVA minicomputers is priced at \$4,000.

Data General Corp.
Southboro, Mass. 01772

Calculator Prints Japanese

The HP-9810A calculator now prints Katakana characters, a Japanese phonetic alphabet containing 47 major and 9 minor characters. In addition, the new plug-in block contains the 26 characters of the Roman alphabet and 31 numerals and symbols. Roman and Japanese characters can be printed in any combination on the paper tape. Called the Model 11250A Alpha/Katakana ROM, this new plug-in is used with any 9810A equipped with an optional printer.

Hewlett-Packard
1501 Page Mill Rd.
Palo Alto, Calif. 94302

Punched-Tape Reader Interface

This package consists of a photoelectric reader, a plug-in circuit module compatible with the customer's minicomputer, interconnecting cable, installation, and diagnostic test tapes.

Decitek
15 Sagamore Rd.
Worcester, Mass. 01605

Minicomputer Family

Microdata has probably built more microprogrammable minicomputers than all other companies combined, and its latest Series 3200 machines draw upon all the lessons learned in designing and marketing these machines both to OEM and end-user customers.

The basic machine is the 3200, which, to the outside world, appears as a 16-bit minicomputer capable of addressing up to 256K bytes of MOS memory that can be read in 300 nsec and written in 400 nsec. But down deep, in the 3200, it is a 32-bit machine for executing microinstructions from a 135-nsec ROM. Central to the 3200 architecture is the Monobus, an asynchronous high-speed bus through which all transfers between processors, memories, and I/O devices must pass. Memories on the 3200 can be read-only, programmable read-only, read/write, and intermixed if desired. Filling out the 3200 cpu is binary fixed-point arithmetic, 32 general-purpose registers, and instruction look-ahead. This machine is priced at approximately \$8K with 8K bytes of memory.

The 3230 is Microdata's previously introduced 821 minicomputer implemented in the firmware of the 3200, making the 3230 compatible with the 821 but yielding a 10:1 improvement in speed, it is claimed. This machine has 110 basic instructions, including those for decimal arithmetic, character/string manipulation, stack control, variable-precision arithmetic, and multiply/divide.

The last member of the new family is the 32/S. Here the stack architecture is used to support a subset of PL/1 called MPL (for Microdata Programming Language). This is the basic language of the computer—no assembler is needed. The MPL will accommodate both machine- and micro-level instructions.

All machines are available this summer in both desk-top cabinets or as pc boards for OEMs. Software is under development for the 32/S, including a real-time monitor with all I/O control, loaders, cross-compilers, and FORTRAN.

Microdata Corp.
Irvine, Calif. 92664

Modems (Data Sets)

Basically, modems (data sets) convert digital signals from a computer to analog signals for transmission over telephone lines. At the receiving end, the analog signal is

reconverted to digital signals by another modem. The term is an acronym for modulator/demodulator, which defines the basic task of the device.

Small Mechanical Parts

Small mechanical parts for research are listed in a free catalog available from Small Parts, Inc., 6901 N.E. Third Ave., Miami, Fla. 33138.

Speech Aid

Servox generates sound vibrations when pressed lightly against the neck and exposed to movements ordinarily employed in speaking. Device is fitted with separate volume and pitch regulators.

Siemens Corp.
186 Wood Ave. S
Iselin, N.J. 08830

Thin-Panel Television

Zenith Corp. research scientists have demonstrated a thin-panel television display which produced a picture 2.4 in. wide x 6.3 in. high with the same resolution as a color TV set. The panel is 0.63 in. thick and has a peak luminance of 8 fL with a contrast ratio of 40:1. It is not as bright as preset commercial sets, but the picture can be seen easily in a normally lit room.

A full line of cells in the panel is addressed at the same time. This is in contrast to the individual addressing of the phosphor dots in a CRT. The incoming video signal is stored in 80 capacitors that control current sources for each column. Modulating these currents produces a wide-range linear gray scale. Illumination time of the full line of gas discharge tubes is 60 microsec compared to the 100-nsec excitation time of each phosphor dot in CRT. In the thin panel, light is emitted from each cell only as long as current is applied; there is no persistence.

PDP-8 Debugging

PDP-8 minicomputer users can debug programs via a hardware approach by the CIS 110A Hardware Breakpoint Module. The 110A can halt PDP-8 programs at selected memory locations or breakpoints, similar to techniques used on larger mainframes, and offers advantages over software debugging packages. The unit plugs directly into any unused Omnibus slot and requires no modifications to the computer. Using either instruction or operand access as a criteria for breakpoints, the user can easily step through programs. The module is priced at \$485.

Computer Interface Systems, Inc.
Piscataway, N.J. 08854

Terminals

Computek of Cambridge, Mass. is producing its Series 300 CRT terminals that allow combined display

of vector graphics, alphanumerics, and television images. The terminals sell for \$3,900 each.

Ball Type Switches

Edwards Co. is marketing a ball-type switch priced at \$1.80 each. The switch operates when struck from any angle.

Small 16-Bit Minicomputer

A 16-bit minicomputer so small that it can be held in the palm of a hand has been developed for NASA by Teledyne Systems of Northridge, Calif. Only 0.1 in. high and 2.5 in. in diam, it weighs 25 g. The mini has a 47-instruction repertoire and 1,256 words of memory. Constructed on a three-layer ceramic substrate, it can add two 16-bit numbers in about 10 microsec according to the developers. The package contains about 35 integrated-circuit dice interconnected as a hybrid circuit. The unit has 120 edge-mounted terminals and is designed to fit in a planar configuration into a larger hybrid or printed circuit board. It will sell, according to Teledyne, for less than \$1,000 in large quantities and will come in several models. The present model is a parallel-processing microprocessor containing 256 words of RAM and 1,000 words of ROM. Multiplication time is 50 microsec.

ASR-38 Teletype

The RO Model 38 Teletype starts as low as \$937. The KSR Model 38 terminals begin at \$1,209. The ASR-38 terminals go for as low as \$1,452. For about \$200, any of them can be fitted with a built-in factory-tested modem.

Speed: 100 words/min is standard. Much faster speed is available. The Model 38 interfaces with the Teletype 4210 magnetic tape data terminal. It is also plug-to-plug compatible with the Model 33.

Teletype Corp.
Dept. 89N
5555 Touhy Ave.
Skokie, Ill. 60076

Inexpensive 16-Bit Minicomputer

Computer Automation has taken its Naked Mini/LSI, put it on a 15 x 16 in. printed circuit board, and priced it at \$990 with 4K memory (in quantities of 200).

16-Bit Microprocessor

National Semiconductor is claiming the first 16-bit microprocessor on a single card. Designated the IMP-16C, the system consists of a 16-bit microprocessor, clock system, I/O bus drivers, and 256 words of read/write memory on an 8.5 x 11 in. printed circuit card. The system is built from National's family of GPC/P (general purpose controlled/processor) LSI functional blocks. These building blocks are expandable for 4-, 8-, 12-, or 16-bit solutions, thus providing a

flexible alternative to solutions now presented by hardwired, fixed systems. IMP-16C can also be programmed. It uses a standard set of 42 instructions and can address up to 65,000 words of memory.

The microprocessor section consists of a register and arithmetic-logic unit (RALU) and a control and read-only memory (CROM). The RALU section has seven general-purpose registers and an arithmetic-logic unit. The logic can process a 4-bit slice of the total 16-bit functions. Four RALUs complete the 16-bit processing. The CROM stores the microprogram and the necessary control logic for the RALUs. It can implement the 42-microinstruction set.

The IMP-16C can interface with Teletype and control panels with software. Price: \$1,380 from National Semiconductor.

Notes

Ten-channel event recorder for long-term experiments*

HAROLD WAKELEY

*Life Sciences Research Division
IIT Research Institute, Chicago, Illinois 60616*

In operant experiments, it is desirable to obtain a graphic record of response performance. This permits equipment function to be checked rapidly and the development of progressive changes in response pattern to be followed. Although the cumulative recorder is the traditional choice for providing this information, a 10-station experiment concerning the self-administration of drugs by primates performing on a 24-h multiple schedule for several years produced more cumulative records than could be inspected. A more compact display was required for monitoring the experiments. A drum-type recorder that records up to 40 days of response from 10 stations simultaneously was devised.

CONSTRUCTION

As shown in Fig. 1, the recorder consists of 10 waxed paper, cold stylus event recorders mounted above a single drum that rotates once each 24 h. A carriage, consisting of a threaded rod driven by a one-revolution/day (RPD) motor and a bed made of an aluminum rod, transports each event pen a sufficient distance along the axis of the drum so that each day's response record lies directly adjacent to the previous day's record.

The recorder drum consists of a 9-in. Plexiglas cylinder with ¼-in.-thick Plexiglas ends held in place

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