PRINTOUT

JOSEPH B. SIDOWSKI

PRODUCTS

Infant Monitor

The ICAM uses visual and audible alarms to monitor infant's heart rate, oxygen concentration, body temperature, and respiration rate.

Instrumentation & Control Systems
129 Laura Dr.
Addison, Ill. 60101

Biomedical Equipment

EKEG will supply a 12-page catalog (No. 73) describing biomedical data acquisition systems, telemetry, respiration monitor, and temperature control units.

EKEG Electronics
P.O. Box 46199
Station G
Vancouver 8, B.C., Canada

Neonatal Equipment

Information on neonatal research and care equipment is available from Ohio Medical Products, P.O. Box 1319, 303 Airco Dr., Madison, Wis. 53701.

Pressure Transducers

Medical pressure transducers are available from Akers Electronics, 3191 Horten, Norway, for intracranial, gastric, and physiological application.

Ambulatory Monitoring, Inc.
731 Saw Mill River Rd.
Ardsley, N.Y. 10502

Temperature Control

EKEG is marketing a temperature control unit that may be of interest to physiological psychologists. The unit has continuous control, no hum, and is battery operated.

EKEG Electronics
P.O. Box 46199
Station 9
Vancouver 8, B.C., Canada

A/D Interface

Analogic Corporation of Wakefield, Mass., has introduced an A/D 12-bit data acquisition subsystem for minicomputers. The MP6912 modules provide scanning, signal conditioning, A/D conversion, and timing circuitry

needed for multichannel, high-speed operation. Plug-in modules are priced at \$695.

Motors

Synchronous motors, stepping motors, ac and dc generators, ac induction and torque motors, and commutators are available from Elinco, 272 E. Main Ave., Norwalk, Conn. 06851.

X-Y Data Tablets

The Scriptographer X-Y data tablets can be used with both inking styli and free cursors to generate up to 200 X-Y coordinate pairs in 1 sec. Resolution is ± 0.005 in.

Scriptographics Corp.
398 Kings Hwy.
Fairfield, Conn. 06430

Time-Delay Relays

The Series SAR time-delay relays may be generally substituted wherever mechanical, pneumatic, and thermal timers are used. Choice of fixed time delays range from $\frac{1}{2}$ sec to 5 min; remote operator-adjustable delays are 0.5-5, 0.5-30, 0.6-30, 1.2-120, and 3-300 sec. The relays are available in ac and dc models and for voltage values of 24-230 V ac or 12-110 V dc.

Syracuse Electronics Corp.
P.O. Box 566
Syracuse, N.Y. 13201

Tape-Cassette System

Zipper is a low-cost completely interfaced tape cassette system that provides a convenient way of handling computer data. It allows an entertainment-grade cassette recorder to function as a minicomputer peripheral. Available for DEC PDP-8 and DCC D-112 users of low-speed paper tape for program data I/O, Zipper can load a 4K system in less than 90 sec. A complete line of software is available. Price: \$500.

Progressive Systems
215 First St.
Ho-ho-Kus, N.J. 07423

Printer

The 4553 is a 15-Hz, 80-column serial page printer. It uses one print hammer and has few moving parts. The unit has drop-in rolls, and no paper threading is required.

Printout is made on pressure-sensitive paper. Characters are formed in a 5 x 7 dot matrix. Drive/control electronics are contained in two pc boards. Price: \$795.

Facit-Addo, Inc.
501 Windsor Dr.
Secaucus, N.J. 07094

Four-Color Graphics

The CPS-8001 color monitor offers computer graphics in four colors: red, orange, yellow, and green. Depending on intensity, there are a variety of spot sizes obtainable. Writing rate is 1.5 microsec on a 21-in. CRT.

CPS, Inc.
722 E. Evelyn Ave.
Sunnydale, Calif. 94086

Tape Memory for PDP-11

The CO-500 DA is a LINC tape system for the PDP-11 that offers transfer rates of 8,400 bps and storage of 335K bytes per drive. Tape loader, software, and keyboard are included. Price: \$4,500.

Computer Operations, Inc.
10744 Tucker St.
Bellsville, Md. 20705

Telemeter System

Series 6405 variable-frequency telemeter systems provide accuracies of 0.02% at 25°C. Long-term drift is less than 0.1% over 6 months after 100 h of initial operation. Frequency spans of 5-40 Hz are available.

RFL Industries
Boonton, N.J. 07005

Hard Copy Graphics

The BP-731 adapts the BP-721 graphics display interface output to provide buffered X, Y, and pen lift signals for an analog X-Y recorder. The BP-721 converts any X-Y oscilloscope or larger X-Y display into full-vector graphics display terminal for \$1,095. The BP-731 adapter produces a hard copy of the BP-721's oscilloscope display on an X-Y recorder from a single BASIC language subroutine.

Megatek Corp.
1526 W. 240th St.
Harbor City, Calif. 90710

Microcomputers

Four-bit microcomputers on individual printed self-contained unit circuit boards consist of central processing units, read-only and random-access memories, expandable universal I/O buses, and real-time clocks. CPU includes subroutine stack nesting to 3 levels, 4 program stack registers, and 16 index registers. Options

include RAM data storage expansion to 1,028 words in 80-word increments and ROM assembled program storage expansion to 8,192 words in 512-word increments.

Applied Computing Technology, Inc.
17815 G Sky Park Circle
Irvine, Calif. 92707

Digital Cassette and Cartridge Recorders

Manufacturers and distributors of digital cassette and cartridge recorders:

Analog Digital Data Systems
830 Linden Ave.
Rochester, N.Y. 14625

Anderson Jacobson, Inc.
1065 Morse Ave.
Sunnyvale, Calif. 94086

Bell and Howell Electronics
360 Sierra Madre Villa
Pasadena, Calif. 91109

Burroughs Corp.
460 Sierra Madre Villa
Pasadena, Calif. 91109

Canberra Industries
45 Gracey Ave.
Meriden, Conn. 06450

Chalco Engineering
15126 S. Broadway
Gardena, Calif. 90247

Cipher Data Products
7655 Convoy Court
San Diego, Calif. 92111

Cogar Information Systems
Cosby Manor Rd.
Utica, N.Y. 13502

Computer Automation
18651 Von Karman Ave.
Irvine, Calif. 92664

Conrac Corp.
Cramer Div.
Mill Rock Rd.
Old Saybrook, Conn. 06475

Data General Corp.
Southboro, Mass. 01772

Data Instruments Co.
1661 Roscoe Pl.
Sepulveda, Calif. 91343

Data Recording Systems, Inc.
795 Kifer Rd.
Sunnyvale, Calif. 94086

Datel Systems, Inc.
1020 Turnpike St.
Canton, Mass. 02021

Datum
170 E. Liberty Ave.
Anaheim, Calif. 92801

Delta Data Systems
Woodhaven Industrial Park
Conwells Heights, Pa. 19020

Digital Equipment Corp.
146 Main St.
Maynard, Mass. 01754

Dicom Industries
715 N. Pastoria Ave.
Sunnyvale, Calif. 94086

Digi Data
4315 Baltimore Ave.
Bladensburg, Md. 20710

Dytro Corp.
63 Tec St.
Hicksville, N.Y. 11801

EAI
West Long Branch, N.J. 07764

Echo Science
485 E. Middlefield Rd.
Mt. View, Calif. 94040

Electronic Processors, Inc.
5050 S. Federal Blvd.
Englewood, Colo. 80231

Hazeltine
Greenlawn, N.Y. 11740

Hecon Corp.
790 Hemmeter Lane
Mt. View, Calif. 94040

International Computer Products
P.O. Box 34484
Dallas, Tex. 75234

Incre Data Corp.
6405 Acoma Rd., S.E.
Albuquerque, N. Mex. 87108

Interdata
2 Crescent Pl.
Oceanport, N.J. 07757

Interdyne Co
14761 Califa St.
Van Nuys, Calif. 91401

Iomec Inc.
345 Mathew St.
Santa Clara, Calif. 95050

International Video Corp.
990 Almanor
Sunnyvale, Calif. 94086

Kennedy Co.
540 W. Woodbury Rd.
Altadena, Calif. 91001

Kybe Corp.
132 Calvary St.
Waltham, Mass. 02154

Livermore Data Systems
2050 Research Dr.
Livermore, Calif. 94550

Memodyne Corp.
369 Elliot St.
Newton, Mass. 02164

MI Data Systems
1356 Norton Ave.
Columbus, Ohio 43212

MFE Corp.
Keewaydin Dr.
Salem, N.H. 03079

Mohawk Data Science Corp.
781 Third Ave.
King of Prussia, Pa. 19406

Nuclear Data, Inc.
P.O. Box 451
Palatine, Ill. 60067

Progressive Systems
215 First St.
Ho-Ho-Kus, N.J. 07432

Raymond Engineering, Inc.
217 Smith St.
Middleton, Conn. 06457

Redactron Corp.
100 Parkway Dr. S.
Hauppauge, N.Y. 11787

Remex
1733 Alton St.
Santa Ana, Calif. 92705

Sycor, Inc.
100 Phoenix Dr.
Ann Arbor, Mich. 48104

Sykes Datatronics
375 Orchard St.
Rochester, N.Y. 14611

TEAC Corp. of America
7733 Telegraph Rd.
Montebello, Calif. 90640

Telectro Systems
96-18 43rd Ave.
Corona, N.Y. 11368

3M Data Products
300 S. Lewis Rd.
Camarillo, Calif. 93010

Telex
9600 Aldrich Ave. S.
Minneapolis, Minn. 55420

Tennecomp Systems, Inc.
Oak Ridge Turnpike
Oak Ridge, Tenn. 37830

TriData
800 Maude Ave.
Mt. View, Calif. 94040

Univac Communication & Terminals Div.
322 N. 21st W.
Salt Lake City, Utah 84103

A. R. Vetter Co.
Box 143
Redersburg, Pa. 16872

Digital Printer

Model 800 digital printer accepts up to 10 lines of IC-compatible BCD information and prints on a drum-type mechanism at 3 lines/sec.

Vanguard Systems, Inc.
441 Washington Ave.
North Haven, Conn. 06473

Line Printer

The Model 231X line printer system is designed for

most popular minicomputers. The 2311 is a 125-line/min system and the 2312 is 200 lines/min. Each system contains a line printer and interface. It has 132 columns, variable width form handling capability, prints up to six copies, and is equipped with an eight-channel VFU. The system is compatible with: Nova; PDP-11, 8/E/L/I; Honeywell 316/516; HP 2114, 2115, 2116, and 2100; Digital computer control D112 and D116; and Varian 620/73. Prices range from \$4,895 to \$5,795.

Media III
2454 E. Fender Ave.
Fullerton, Calif. 92631

Hybrid Computer (Desk-Top)

The MINI-HY 5 is designed to incorporate developments in ICs, MSI, and LSI circuits. The latest circuits may be plugged into sockets and the elements patched into the program. The computer features analog/hybrid and logic programming with the capability of being used as a breadboard. It can also be used as a mini-hybrid computer and as a trainer. Price is very reasonable.

Denelcor, Inc.
5975 Broadway
Denver, Colo. 80216

Floppy Disk for Minis

The MU100 series floppy disk cartridge performs I/O functions for terminals, calculators, and minicomputers. The disk has a self-contained, self-sealing design with fixed recording heads. Price: \$760.

Intelligent Memory Systems
5721 Arapahoe Ave.
Boulder, Colo. 80303

Strip Chart Recorder

The 255B provides pushbutton selection of four inputs: 10 mV, 100 mV, 1 V, and 10 V full scale. A variable scan capability is built in to allow expansion to 100 V full scale. Chart speeds of 10, 5, 2, 1, 0.5, 0.2, 0.1, 0.05, 0.02, and 0.01 in./min or cm/min are instantly selectable. High-impedance floating input provides better than 10^7 ohms input impedance with less than 10 nA bias current on 10-mV, 100-mV, and 1-V ranges. Factory assembled and calibrated, the SR-255 B costs \$335.

Heath/Schlumberger Scientific Instruments
Department 531-191
Benton Harbor, Mich. 49022

Optics

Surplus inventory clearance sale advertises substantial savings on new and used Reichert, other instruments, and optics. Request "Bargain in Optics."

Hacker Instruments, Inc.
Box 646
Fairfield, N.J. 07006

Esterline-Angus
Box 24000
Indianapolis, Ind. 46224

Bus Expander

A bus expander designed for PDP-8s provides 20 plug-in slots and is compatible with Omnibus. Price: \$450.

Douglas Electronics Inc.
718 Marina Blvd.
San Leandro, Calif.

Display Controller

The 304 display controller superimposes alphanumeric data on ordinary TV screens, CCTV, video tape recording, and annunciator applications. The unit features an alphanumeric display of 64 characters. Up to 16 lines with 32 characters per line may be displayed, and 512 characters are stored in the internal MOS dynamic shift register memory. The controller accepts either picture video or composite sync from the video source. Prices range from \$930 to \$1,155.

Ann Arbor Terminals, Inc.
6107 Jackson Rd.
Ann Arbor, Mich. 48103

Variable Speed dc Motor Control

The KBVC solid state speed control is designed for shunt and P.M. dc motors up to 1/3 hp. The unit has 20/1 typical speed ratio, acts as direct replacement for auto transformer/rectifier controls, and operates from standard ac power. Price: \$16 for prototype units.

KB Electronics, Inc.
5812 Foster Ave.
Brooklyn, N.Y. 11234

BRIEFS

Buy, Lease, or Sell Minis and Peripherals

Price listings on minicomputers, Teletypes, and peripherals may be obtained from: American Used Computer Corp., P.O. Box 68, Kenmore Station, Boston, Mass. 02215; EBM, 200 Harvest Ave., Staten Island, N.Y. 10310; National Teletypewriter Corp., 23 Caln Dr., Plainview, N.Y. 11803.

Sound Level Recorder

The self-contained package consists of a sound-level meter (No. 452) and an Esterline Angus millivolt recorder with a 4½-in.-wide chart. The meter meets specifications and measures 40-140 dB. The recorder plugs into the meter and operates on a battery-powered amplifier and a hand-wound spring chart drive.

Tiny Switches

The Nanoswitch Series NSPB-5000 pushbutton switches are claimed to be the smallest known devices of their kind. It is claimed that the switches have been incorporated into designs of solid-state liquid-crystal, and LED digital display wristwatches. The basic switches have a static rating of 50 V at 100 mA with a maximum switching voltage rating of 25 V.

Digital Time Products, Inc.
2700 Shames Dr.
Westbury, N.Y. 11590

Miniaturized Pressure Switch

A miniaturized, precision pressure switch is offered in a broad selection of ranges from 1 to 75 lb/in.². The unit is field adjustable with a simple screwdriver/spring movement. Contacts are gold.

Mobile Systems International, Inc.
395 N. Johnson Ave.
El Cajon, Calif. 92020

Servomotors

The companies listed below market servomotors. The type of motor manufactured (ac or dc) is noted in parentheses.

American Electronics, Inc. (ac)
1600 E. Valencia Dr.
Fullerton, Calif. 92634

Ameteks/Lamb Electric (ac and dc)
627 Lake St.
Kent, Ohio 44240

Applied Motors, Inc. (dc)
4801 Boeing Dr.
Rockford, Ill. 61105

B & B Motor and Control Corp. (dc)
96 Spring St.
New York, N.Y. 10012

Bodine Electric Co. (ac and dc)
2500 W. Bradley Pl.
Chicago, Illinois 60618

Bowman Instrument Corp. (ac)
800 Bluffton Rd.
Ft. Wayne, Ind. 46809

Clifton Precision (ac and dc)
Maple at Broadway
Clifton Heights, Pa. 19018

Curry Engineering Co. (ac and dc)
5655 Cahverga Blvd.
N. Hollywood, Calif. 91601

Control Data Corp. (ac and dc)
7801 Computer Ave.
S. Minneapolis, Minn. 55435

Dynetic Systems Corp. (dc)
8740 49th Ave.
Minneapolis, Minn. 55428

Eastern Air Devices, Inc. (ac)
Washington St.
Dover, New Hampshire 03820

Electric Inductor Co. (ac and dc)
272 Main Ave.
Norwalk, Conn. 06851

Electro-Craft Corp. (dc)
1600 2nd St.
South Hopkins, Minn. 55343

Floyd Drives Co. (ac)
2560 W. Barberry Pl.
Denver, Colo. 80204

Gammon Electromatic Corp. (ac and dc)
75 Sheer Plaza
Plainview, N.Y. 11803

General Electric Co (dc)
3001 E. Lake Blvd.
Erie, Pa. 16501

Harowe Servo Controls (ac)
West Chester Pike
West Chester, Pa. 19380

Honeywell Industrial Div. (ac)
1100 Virginia Dr.
Fort Washington, Pa. 19034

IMC Magnetism Corp. (ac and dc)
570 Main St.
Westbury, N.Y. 11590

Indiana General Div. (dc)
517 Walnut St.
Oglesby, Ill. 61348

Inland Motor Div. (dc)
Kollmorgan Corp.
501 1st St.
Radford, Va. 24141

Japan Servo Co. (ac)
51 Cliff St.
New Rochelle, N.Y. 10801

Kollsman Instrument Co. (ac)
575 Underhill Blvd.
Syosset, N.Y. 11791

Micro-Mo Electronics (dc)
3691 Lee Rd.
Cleveland, Ohio 58424

Micro Switch (dc)
11 W. Spring St.
Freeport, Ill. 61032

MPC Products Corp (ac)
4200 W. Victoria Ave.
Chicago, Ill. 60606

Novatronics (ac)
677 Erie St.
Stratford, Ont., Canada

Photocircuits (dc)
31 Sea Cliff Ave.
Glen Cove, N.Y. 11542

Pittman Corp. (dc)
Box 150
Sellersville, Pa. 18960

H. K. Porter Co. (dc)
Porter Bldg.
Pittsburgh, Pa. 15219

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

Rotamec Div. (dc)
Hathaway Industries
P.O. Box 45381
S.E. Station
Tulsa, Okla. 74145

Sawyer Industries (ac and dc)
5445 Peck Rd.
Arcadia, Calif. 91006

Scott Inc. (ac)
2525 Curtis St.
Downers Grove, Ill. 60515

Sequential Information System, Inc. (dc)
249 N. Sawmill Rd.
Elmsford, N.Y. 10523

Singer Company (ac and dc)
Kearfoot Div.
1150 McBride Ave.
Little Falls, N.J. 07424

Tachtronic Instrument, Inc. (ac and dc)
1500 N. Front St.
New Ulm, Minn. 56073

Teledyne (ac)
Industrial Park
Lewisburg, Tenn. 37091

Torque Systems, Inc. (dc)
225 Crescent St.
Waltham, Mass. 02154

Transicoil (ac and dc)
Worcester, Pa. 19490

Uriel Corp. (dc)
53 Union Ave.
Ronkonkoma, N.Y. 11779

Vernitech (ac)
Vernitron Corp.
300 Marcus Blvd.
Deer Park, N.Y. 11729

Yaskawa Electric America, Inc. (dc)
100 Bliss Dr.
Oakbrook, Ill. 60521

Data General Products

A new core memory that holds 16,384 words on a single 15-in.-sq printed circuit board has been introduced for its Nova 1200 line of computers by Data General Corp. The memories for the Nova 1200, Nova 1210, and Nova 1220 come in 4,096-word, 8,192-word, and 16,384-word units, and have a 1,200-nsec cycle time. Memories for the Nova 800 and 820 are available in 4K and 8K units. The new memories reduce the cost of larger scale 1,200- and 800-line computers. The 1,200-nsec memories cost \$1,800 for the 4K-word unit, \$2,000 for 8K, and \$3,500 for 16K, when purchased as add-on memories. The 800-nsec memories are priced at \$2,500 and \$3,200 for the 4K- and 8K-word memories, respectively, when purchased as add-ons. The memories are included in the purchase price when bought with a central processor. They can be added to existing Nova systems without modifications.

Nova users can now purchase a new, low-cost data conversion unit that allows both A/D and D/A converters to be mounted on a single 15-in.-sq circuit board. The new unit replaces a 3½-in.-high rack-mounted unit and fits inside the computer. The A/D subsystem is available in either a 10-bit model (75K Hz conversion rate) or a 12-bit (28K Hz conversion rate). The A/D can

handle from 1 to 32 channels in a single-ended configuration, or from 1 to 16 channels in a differential configuration. Sample and hold is standard. Options include a low-cost, four-programmable gain option, and an interface to the computer's direct memory access (DMA) channel. A 12-bit, 16-channel, single-ended A/D subsystem costs \$2,950. The D/A holds up to two 12-bit converters and an oscilloscope control. Output voltages of both subsystems are easily selected by using jumper wires.

A new Nova 2 computer has: a high-speed multiaccumulator 16-bit CPU, an I/O system with programmed data transfer, 16 levels of programmed priority interrupt, high-speed DMA, 4-slot mainframe, and 16,384 words of 1 microsec memory, expandable to 32K.

Data General Corporation
Southboro, Mass. 01772

Interactive Graphics

The PDS-4 is a minicomputer-based interactive, refreshed graphic display system with a 990-nsec memory cycle and executive time. Over 3,000 characters may be displayed on a 17-in. CRT, and up to 2,000 in. of vectors drawn with 1,024 x 1,024 resolution at a 40 frames/sec refresh rate. Byte manipulation and push and pop instructions are included in the 16-bit computer instruction set. An internal vector generator provides 2 vectors/word (short), 1 vector/word (medium), and 2 words/vector (long) formats. Standard features include fast data plotting with autoincrementing in either X or Y, and display subroutining hardware up to eight levels. Characters and symbols may be rotated 90, 180, or 270 deg. These are stored in rewrite memory, and all keyboard functions are software defined. This allows the assignment of any function to any key. Screen size is 17 in. diagonal. 21 in. is optional. System price: \$14,000.

Imlac Corp.
150 A St.
Needham, Mass. 02194

Terminals

Amalgamated Wireless of Arlington, Va., has introduced an intelligent CRT terminal with a 28 x 80 character screen capacity and 96 character ASCII subset.

Fairchild Camera and Instrument Corp. of Sunnyvale, Calif., has a teletypewriter terminal buffer complete with editing that allows transmission at speeds up to 1,800 bits/sec at a price of \$1,600 for 8K and \$2,200 for 16K.

Frederick Electronics of Santa Clara, Calif., offers an expandable teletypewriter buffer priced at \$1,595. The model 1300 A electronic storage unit operates at speeds up to 1,200 bits/sec with 2,560 characters of storage.

Tektronix (Beaverton, Oreg.) is marketing the 4014

computer display terminal and its companion APL version 4015. Both display up to 8,500 alphanumerics and more than 1 million graphics points, transmit in ASCII, and are supported by PLOT-10 software. Model 4014 is \$8,450; Model 4015 is \$8,950, plus options. The 4632 video hard copy unit (\$2,950) is a nonimpact printer that works with standard TV or digital video signals.

TEC of Tucson, Ariz., has announced a CRT terminal for less than \$1,000 (in OEM quantities). The Mini-Tec has an 80 x 12 character buffer, displays 63 ASCII characters, transmits at speeds from 110 to 9,600 baud, and has blink-protected display areas, field tab, and keyboard or computer control. Single units cost \$1,300.

BRS/LVE

BRS/LVE has been running an after-inventory sale with one-third off the original price for selected items. A listing may be obtained from BRS/LVE, 5301 Holland Dr., Bellsville, Md. 20705.

Relays, Timers, Counters, Switches

Relay Specialties Inc., 13-00 Plaza Rd., Fair Lawn, N.J. 07410, advertises itself as having the largest selection of relays, timers, counters, and switches in the world. A new 100-page catalog, GC 254, is available on request. Write to Department GC.

Measurement Systems, Inc.

Measurement Systems, Inc. (523 West Ave., Norwalk, Conn. 06850) has announced price increases on some of their products. The company markets tracking control products for the human operator.

Electronic Digital Stopwatch

The Cronus 1 is a battery-operated, electronic split-second stopwatch with a measuring range of 23 h, 59 min, 59.99 sec, with an accuracy of $\pm 0.0025\%$. Other features include: four optional functions (standard start/stop, Taylor/sequential, split, event/time-out); large, bright numerical readout; remote control capability; and a compact waterproof case. It is priced at \$195.

Intersil Corp.
10900 N. Tantau Ave.
Cupertino, Calif. 95014

CCD TV Camera

The first CCD (charge-coupled devices) commercial TV camera is from the Space and Defense Systems Division of Fairchild Camera and Instrument Corp. The unit is extremely small ($3\frac{1}{2} \times 1\frac{1}{2} \times \frac{1}{4}$ in., excluding the lens) and weighs just 6 oz. It dissipates 1 W of power and operates from light levels of direct sunlight down to 0.1 fc. The MV-100 can be operated from 115 V ac or from an optional 24-V dc rechargeable Ni-Cd battery pack. Fairchild expects to develop subsequent versions

in monochrome and color models.

Psychological Instruments

Coulbourn Instruments, Inc. (Box 2551, Lehigh Valley, Pa. 18100) recently introduced several new items. A new sound-attenuated 2-in. walled animal chamber is priced at \$150. The company also introduced the CI data-print ultra high-speed 16-channel serial/parallel printing counter. The unit is directly compatible with any 10- to 15-V logic system, and it may be used in existing CI, LVE, BRS 100, 200, or 300, LVE/BRS, and GS1200 systems with no modification or accessories. Pulses may be entered at any rate up to .1 MHz in any channel, with no external buffers required. The unit prints approximately 3 lines/sec. If print commands occur at least 325 msec apart, the data acquisition is continuous, with no loss and no external devices required.

CDC Minicomputer

CDC has developed a series of general-purpose miniature computer systems. The CDC System 17 is a minicomputer available with either 600- or 900-nsec semiconductor memory. Standard features of the basic system are hardware multiply and divide, 16 levels of programmed priority, vectored interrupt, A/Q and direct storage access channel connections, seven special and general-purpose hardware registers, and 7-level memory addressing. Main memory capacity is 4,096 to 32,768 words, with each 4K words contained on a single circuit board. An expansion enclosure is provided for up to 64K. The system is program compatible with CDC's 1700 line of small computers. Purchase price is \$13,500 for the 4K 900-nsec processor.

Control Data Corp.
Box 0
Minneapolis, Minn. 55440

Two New Interdata Minicomputers

Interdata is scheduled to introduce two new minicomputer systems in early 1974. The first is Model 7/16, a microprogrammed 16-bit machine that includes an 8-kilobyte, directly addressable core memory unit. The unit is microprogrammed around an 80-nsec LSI-bipolar ROM. Features include: 16 hardware registers (15 can be used for indexing); up to 64 kilobytes of directly addressable main memory; 255 input/output interrupts with automatic vectoring to service routines; and a set of more than 100 instructions. Data word length is 8, 16, or 32 bits; instruction word length is 16 or 32 bits. Typical executor time is 1.5 microsec for a 16-bit register-to-register add operation. Single unit price will be \$3,200.

The second mini is the 7/32, advertised as the first 32-bit mini priced under \$10,000 in unit quantities. The 32-kilobyte memory has an access time of 750 nsec. The machine has two sets of 32-bit registers (16 in each set).

One set of 32-bit registers is for the operating system and I/O; the other is for user programs. Execution time is 1 microsec for an add operation, register-to-register. The machine has more than 200 instructions.

NOTES

An inexpensive universal feeder*

JAMES L. FOBES, JAMES E. KING,
and CHARLES H. DAVISON

University of Arizona, Tucson, Arizona 85721

Those that have dared deviate from usage of Ss that reliably respond for uniformly shaped pellets have frequently encountered difficulties in dispensing appropriate reinforcers. One solution, although an expensive one, is a universal feeder. While such a mechanism permits distribution of a variety of rewards, including such irregularly shaped objects as brine shrimp, tokens, candy, raisins, or bits of fruit, the cost of this apparatus may be prohibitive (Davis Scientific Instruments, Universal Feeder Models 310, \$523; 320, \$737; and UF-100, \$610).

A universal feeder that will reliably dispense diversely shaped objects can be easily constructed, and its cost is negligible. The feeder described here was built with a salvaged typewriter, for a materials cost of \$20, and its performance is comparable to that of a Davis (Model 310) feeder that is also being used in our laboratory.

The typewriter (Fig. 1A) can be any scrapped manual or electric model that has its tabular stop system and carriage assembly intact and operative, although an extra wide carriage maximizes the number of reward-holding compartments. The dispensing tray (Fig. 1B) was constructed with a 3-in.-wide longitudinal section of a 6-in.-diam Plexiglas tube and is equal to the carriage in length. The tray's 54 reward-holding pockets are approximately 1.27 x 1.27 x 7.62 cm, with a liquid capacity of about 8 cc (36 pockets in the Davis Model 310). The pockets were built by cutting grooves in the tray into which Plexiglas separators were affixed. The center-to-center distance between these pockets equals the distance selected between tabular settings. Therefore, larger rewards may be accommodated in wider pockets with the appropriate distance between tabular stops. Since the distance between pockets is easily adjustable by changing the tabular stop settings, versatility can be obtained by using relocatable pocket separators. The tray was then mounted on the carriage assembly after removal of the platen. In addition to

Fig. 1. The universal feeder consists of (A) typewriter base, (B) dispensing tray with reward-holding compartments, (C) drive motor, (D) cycle cam, (E) dispensing brush, (F) cycle microswitch, and (G) cleaner bar guard.

automatic indexing, the tray may be moved manually by activation of either the carriage return or the carriage release lever.

Dispensing is accomplished by means of a motor-driven brush (Figs. 1C and 1E) that rotates through each reward holding pocket, brushing the contents over the edge of the dispensing tray. Commercial feeders include a brush cleaning bar which dislodges a reinforcer that momentarily adheres to the dispensing brush. Such a bar was fitted here, but it was soon noted that if a reward such as a raisin did stick to the brush, the reward frequently was dislodged at an erratic angle and did not drop down the tube to the animal. Therefore, the cleaner bar was enclosed in a plastic bottle (Fig. 1G) which appropriately guided the flying reinforcer.

Dispensing occurs when a pulse activates a holding relay which completes the circuit that operates the motor. In addition to the brush, the 60-rpm motor also turns a cam (Fig. 1D). At the end of the dispensing cycle, this cam causes a microswitch (Fig. 1F) to open the holding relay, thereby turning off the motor. Indexing is then achieved by solenoid activation of the tabular key. This entire dispensing-indexing cycle requires about 1.5 sec, with the reward delivered in about 0.5 sec, compared with 2.5 and 1 sec, respectively, for Davis Model 310. Apparatus vibration during indexing increases as a function of the distance the carriage travels between stops. In order to avoid potential disruption in the Ss' performance, the feeder and the testing apparatus should be mounted separately.

*Construction of this apparatus was supported in part by Training Grant MH-11286 from the United States Public Health Service.

(Received for publication September 25, 1973;
accepted October 5, 1973.)