PRINTOUT

Joseph B. Sidowski

Products

Strip-Chart Recorders

Leeds and Northrup are marketing a series of strip-chart recorders. The Speedomax XL 683 Series X-Y Laboratory Recorder offers a combination of features in an electronic null-balance potentiometer for bench-top recording of either X-Y or X vs time applications. Calibrations are directly in millivolts or volts for testing and analysis and for use with a variety of sensors or analyzers. The XL recorder balances to a full-scale change in the measured variable on the X-axis (pen speed), within 0.5 sec; on the Y-axis (paper speed), within 0.7 sec; accuracy on either span is ±25% of span. Upon completion of a record, a pushbutton chart advance lifts the pen and advances the chart roll to a new "frame," in correct register with the Y calibration.

Whenever a continuous record of X vs time is desired, pushbutton selection from 1, 2, or 3 chart speeds, or thumbwheel selection of 10 chart speeds, is available. Weight of the unit is 34 lbs. Price: $1,195.

Leeds and Northrup
North Wales, Pennsylvania 19454

Portable Electric Keypunch

The Vari-Punch is a versatile key-punch which will punch and print on any standard 80-column tab card. Alpha characters can be punched through the use of the hold key and the condensed alpha keyboard. (Alpha is noninterpreted.) The Vari-Punch weighs only 14 lbs and allows an individual to create data in both man- and machine-readable formats simultaneously. At present there are four models. The Vari-Punch Model 401 (punching only) sells for $675, the Model 402 (punching and printing) sells for $795, the Model 403 (remote punching only) is $775, and the Model 404 (remote input punching and printing) may be purchased for $895.

VARIFAB, Inc.
1700 East Putman Avenue
Old Greenwich, Connecticut 06870

Incremental Linear and Rotary Encoders

The Teledyne Gurley Model 8706 incremental photoelectric linear encoder is designed for use wherever a linear change in position must be accurately determined electronically. The encoder is compact and has a variety of options in a standard reading head. Options include bidirectional sensing and one or two zero reference pulses. Either photocell or phototransistor sensing can be provided. Sense of direction is obtained by producing two signals in quadrature and is accomplished by inserting a phasing system in the optical portion of the system. The bidirectional capability and up to two separate zero reference points can be packaged within a 1-in. cube. The Model 8706 encoder is available with pulse counts of up to 1,000 pulses/in. Accuracy of ±.0002 in. is standard.

The Model 8602-69 Incremental Encoder is designed to permit the electrical measurement of length, angle, speed, or position. The unit weighs 2 oz and has a diameter of 1.375 in. Pulse counts available from standard disks range from 1 to 1,024 counts per revolution.

Teledyne Gurley
Troy, New York 12181

Digital Printer

The Model DM-400 Digiprinter is a medium-speed digital recorder with a capacity of 21 columns. The unit will accept data from up to three different sources and printout at up to 3 lines/sec (63 char/sec). A total of 50 alphanumeric characters and symbols may be selected for recording data. Interchangeable plug-in data channel modules are available with features such as floating decimal point, positive or negative logic input, data storage, multiplexing, and 10-line decimal input. A DM-400 with one DM-450 7-column programmable data channel module is $995. A 21-column independent-contacts data channel module costs $200.

Keltron Corporation
225 Crescent Street
Waltham, Massachusetts 02154

Regulated Power Supplies

Technipower has introduced the "Practicals," an all solid-state series of open construction power supplies priced at $49.75 for single units. The units feature six voltages (5, 6, 12, 15, 24, and 28), dependent on model, regulated ac-dc, remote sensing, short-circuit proof, optional overvoltage protection, and a 5-year warranty. Input voltage is 105-125 V, with an input frequency range of 47-420 Hz.

Technipower, Inc.
Benrus Center
Ridgefield, Connecticut 06877

Electromyograph

The DISA Type 14A21-2-Channel Electromyograph is a newly designed unit available in two versions. One version features a storage cathode-ray tube; the other features a conventional CRT. For each channel, four successive sweeps can remain on the storage monitor—automatically shifted in the vertical direction. A built-in stimulator supplies single, paired, and train pulses via a double-shielded transformer output. A latency dial, calibrated in milliseconds, permits measurement of conduction velocities for both sensory and motor nerves. The Electromyograph has a feature which allows for the automatic recording of knob positions directly on film. The camera uses 10-cm photographic paper and has 12 recording speeds with continuous or interrupted recording modes.

The London Company
811 Sharon Drive
Cleveland, Ohio 44145

Microtelemetry System

The micro AC preamplifier and the micro FM transmitter are used for chronic electrode recording from unrestrained animals. The single-ended ac-coupled preamp features greater than 100-megohm input resistance, less than 5-pF input capacitance, less than 5 microV noise, and 0.1-6.5 kHz frequency response, with the gain selectable at x10, x100, and x200. The preamp weighs 1 g and will mount on a mouse's head. The FM transmitter transmits to any standard FM timer with AFC. The preamp and transmitter operate for days on miniature hearing-aid batteries.

Transidyne General Corporation
462 Wagner Road
Ann Arbor, Michigan 48103

Galvanometer and Rotary Actuator

The Series G-700 and G-800 galvanometers are designed for strip chart recorder operations and, more particularly, for EEG or electrocardiogram recording monitors, where unattended operation for long periods of time are required. Movement is tangent oriented for edge writing on 50-mm chart width with heated stylus; damping is controlled electromagnetically to assure optimum square wave overshoot and frequency response. The Series G-700 galvanometers are of the open loop

type; the G-800 are closed-loop with position feedback. Drive amplifiers, available separately, provide dc offset, variable gain, and damping.

General Scanning, Inc.
80 Coolidge Hill Road
Watertown, Massachusetts 02172

Recording Audiometer

The Grason-Stadler Recording Audiometer is designed to implement simple, rapid, and accurate hearing tests in situations such as those created by employment screening and the ongoing monitoring of hearing acuity in hearing conservation programs. The unit provides fixed-frequency, pure-tone signal presentations and Békésy-type recording of the S's response. Unique features of the 1703 include variable-speed attenuation and automatic retest at 1 kHz.

To present the test, the operator merely places an audiogram form on the chart bed of the audiometer and pushes a START button. The unit then takes over, presenting the seven test tones in succession, first at the left ear, then at the right ear. At the termination of the testing, the right ear is rechecked at 1 kHz as a measure of the test validity. Total testing of both ears requires about 7½ min. If, at any point, the operator should wish to modify the testing procedure, he can depress a pushbutton which holds the test at its current frequency. The record of the S's threshold is obtained by a recording pen that moves along the hearing chart's X-axis as a function of time for each frequency. In the absence of a S response, an automatic attenuator associated with the S switch increases the sound level in the earphones (to +90 dB HTL max) and simultaneously moves the recording pen down along the chart's Y-axis. In the presence of a S response, the attenuator decreases the sound level (to −10 dB HTL min) and moves the recording pen up along the chart's Y-axis. Since, at the start of each test frequency, the sound level is changed more rapidly than it is after the S's approximate hearing threshold is reached, less time is spent attaining the threshold—with the result that the audiogram so produced contains more information about the threshold and is less subject to retest variation than audiograms produced by other techniques.

The Automatic Recording Audiometer is designed with special attention to reliability, simplicity of operation, and permanence of calibration. Its performance is well within the Audiometer Specifications of the American National Standards Institute, S3.6-1969.

Price: $1,495, f.o.b. destination, continental United States only (except Alaska). Quantity discounts on two or more units.

Grason-Stadler, Inc.
Concord, Massachusetts 01742

CRT Keyboard Terminal

The Model 310 CRT Keyboard Terminal can be used with most systems, on-line and off-line. The display features 132 characters in four lines of 33 characters each. A 5 by 7 dot matrix using a 63-character ASCII code set forms the characters. Serial transmission rate is 3,000 bits/sec; parallel rate is up to 75,000 char/sec. Indicator lights provide a visual means of ascertaining power, keyboard, bell, and line feed. Price: $995.

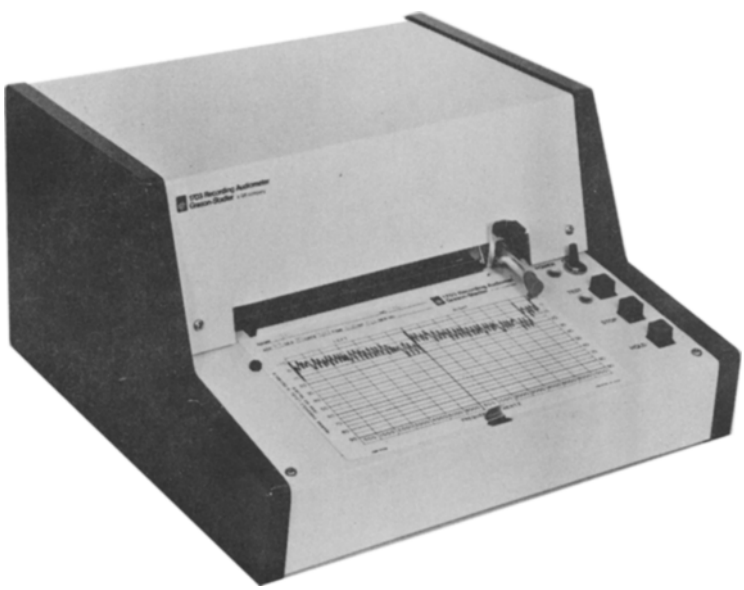

Fig. 1. Grason-Stadler 1703 Recording Audiometer described above.

Centronics
One Wall Street
Hudson, New Hampshire 03051

Biomedical Research Equipment

The Transidyne Window Discriminator for electrophysiological research includes a rack-mount regulated power supply frame with provision for up to eight discriminator circuit cards. Each card has an upper and lower voltage level control, a fixed time window (switchable in or out), and a 10-V 1-msec output pulse. An optional discriminator-pulse frequency card is available, which provides a 0- to 1-V analog signal proportional to the rate at which pulses are occurring.

The discriminator card has an input impedance of 1 megohm, dc coupled, and an input level of ±10 mV to 1 V. The time window is 1 msec, switch out on card. Frequency response is dc to 10 kHz. The output impedance is < 200 ohms. Dimensions: 5.5 x 6.5 in.; fits standard 22-pin edge connector. The 1261 discriminator card is priced at $150; the discriminator-pulse frequency card is $225; and the regulated power supply frame is $225.

Transidyne's Microtelemetry System has been designed for single and multiple unit recordings from unrestrained animals. The micro preamp is packaged in a TO-5 can and weighs less than 1 g. Input is single ended, ac coupled; input impedance is greater than 100 megohms; and input capacity is less than 5 pF. The output voltage is ±2 V, short-circuit protected, and the gain is x10, x100, x200, selectable. Noise is less than 5 microV RMS referred to shorted input measured over 10 Hz-10 kHz bandwidth. Power requirements: + and − 4.5 V, ±10%. Price of the 1114 Micro-ac-Preamplifier is $125.

FM Transmitter No. 1116 is priced at $125 also. Transmission range is up to 50 ft, and the frequency range is tunable over FM band 88-108 MHz. Frequency range for Input 1 is 1-100 kHz. Input 2 is an optional input for addition of external ac coupling for different low-frequency cutoffs. Size: 0.75 x 0.25 x 0.14 in. plus tuning capacitor and coil. Power requirement: 9 V.

The Transidyne Model MPS-15 Power Supply is a regulated ±15 V dc source capable of supplying 75 mA. Ripple and noise are less than 100 microV at 0-75 mA. The unit has current-limiting short-circuit protection and an electrostatically shielded transformer, as well as both

common and case ground connections. Either the positive or negative output may be connected to ground or the supply may be operated floating at up to 100 V off the power supply ground. Price: $74.50.

Transidyne also markets micromanipulators and micropositioners. The TVC 500 Micromanipulator provides three-dimensional movement with a single control. X-Y reduction is continuously variable from 500:1 to 100:1. The S10 Vertical Positioner adds a 10:1 vertical level reduction, 10-mm travel. The TVC 500/S10 Micromanipulator with tool holder is priced at $985. The DIOP Micromanipulator provides X and Y movements by use of a joystick with 10:1 reduction. The S10 provides vertical positioning as described above. The DIOP/S10 Micromanipulator is $197.

Transidyne General Corporation
462 South Wagner Road
Ann Arbor, Michigan 48103

Student and Research Apparatus

Lafayette Instrument Company recently released a new 160-page 1971 general catalog. Various student demonstration and research apparatuses are described.

Lafayette Instrument Company
P.O. Box 1279
Lafayette, Indiana 47906

Magnetic Card Processor for Minicomputers

The CPC 5500 Magnetic Card Processor has the following specs: words/card, 512 (1,024 characters); bits/word, 16; words/block, 128; blocks/card, 4; input hopper capacity, 500 cards; output stacker, 1,000 cards; read/write speeds (250 Hz), 128 words at 2.15 sec, 256 words at 2.80 sec, 384 words at 3.45 sec, and 512 words at 4.10 sec.

Data is stored on 16 tracks, and four tracks are read one at a time. Each block of four tracks has its unique address. The card is oxide coated on the data storage side, but the reverse side can be written or typed upon for identification. Price of the CPC 5500 with interface for the Data General Nova minicomputer is $5,000. A PDP-11 interface will be available shortly.

Computer Property Corporation
Seven Dey Street
New York, New York 10007

Cassette Loader for Minicomputers

The Infotec Tape Cassette Program Loader is capable of rapidly bootstrapping programs into core storage. With Infotec-supplied software, the device can search for specific programs from a program library which is always on-line. Standard programs supplied with the system and the manufacturers comparison of the average cassette vs ASR loading time are as follows:

	Cassette	ASR-33
ASSEMBLER	2 min	13 min
EDITOR	1 min	10 min
FOCAL	2 min	13 min
FORTRAN	3 min	25 min

The DEC-supplied series of diagnostic programs are available on cassette also.

The unit weighs less than 10 lbs and requires less than 5 min to connect. Cost, including interface and program library, is $400.

Infotec, Inc.
70 Newtown Road
Plainview, New York 11803

Multipurpose Perceptual Device

Research Media, Inc., is marketing a three-in-one perceptual device which can be applied to the demonstration of basic psychophysical methods. The unit allows for individual control of two light sources which makes it possible to determine the differential threshold for visual brightness discrimination, employing various intensities of the standard stimulus member of the comparison pair.

The *beta movement* can be demonstrated by controlling the light source intensity, proportions of light (ON) and dark (OFF) phase times. The device also allows for the study of critical flicker fusion frequency.

Cost of the multipurpose perceptual device, Model PR-27, is $435. The developer is Dr. R. Fried, Hunter College.

Research Media, Inc.
4 Midland Avenue
Hicksville, New York 11801

Blood-Pressure Transducer

The Model MP-10 Implantable Blood-Pressure Transducer is a miniature unit designed expressly for long-term chronic measurements in unanesthetized animals. The pressure range is −50 to 300 mm Hg; over pressure is 500% F.S. Input impedance is 1.5 k ohms nominal, and excitation level is 10 V. A skin button connector allows for easy application and simple interconnection to a recording system. The manufacturer and model of your recorder should be stated when ordering.

Micron Instruments, Inc.
1519 Pontius Avenue
Los Angeles, California 90025

Miniature 10-Channel Recorder

The Model 2755 Series Miniature 10-Channel Event Recorders weigh 4 lbs and require a panel cutout of approximately 3.58 in. square. The overall depth of the recorder is 9.10 in. A slide switch allows the user to select one of the two built-in chart speeds. High speed is six times the low speed. Interchangeable gearboxes are available which provide speeds from 20/120 mm/h to 600/3,600 mm/h. Other speeds may be ordered. A large selection of ac and dc pen drive voltages are available from stock. Motor drives are available for operation on as low as 2-3 V dc at 10 mA, up to 240 V ac, 60 Hz. Coated pressure-sensitive paper produces a red trace. Price of the unit, with two rolls of chart paper, is $175.

Simpson Electric Company
5200 West Kinzie Street
Chicago, Illinois 60644

Briefs

Alphanumeric Display

Madatron Corporation of Shippany, New Jersey, is marketing an alphanumeric display system capable of presenting an unlimited number of sets of numerals, symbols, and letters. Up to 128 10-letter words can be displayed in a 10- or 20-position array. The display module consists of a number of ¾-in. CRT units which provide characters ½ in. high. Life expectancy is advertised as 25,000 h.

Data input to each decoder is compatible with most logic systems. The character generator is a read-only memory drum preprogrammed for a standard character array. The generator produces 48 or 64 characters per CRT and can be used with a large number of CRTs. The memory drum weighs less than 1 oz and is listed as capable of operating continuously (without lubrication) for 10 years. The normal operating speed can be increased from 1,800 r/min to 2,250 r/min, which will increase character repetition rate to 37 r/sec from the normal 30 r/sec. Prices vary from $25 to $100 per CRT position.

Project-a-Lite

Where a source of intense light is needed, the Project-a-Lite enables the E to convert a Carousel Projector into a 500-W fiber optic illuminator in 30 sec. To convert, one needs simply to switch lens barrels. The adapter will accept any standard fiber optic light guide. Price with one adapter, one

base, and one FD4 3-in. light guide: $71.90.

DYONICS
71 Pine Street
Woburn, Massachusetts 01801

Tape Recorder/Reproducer

The Newell DI-100 C Digital Recorder features both incremental (500,000-word storage) and continuous modes (16,000,000-bit storage), and transfers data at 96,000 bits/sec. The unit has single character backspace capability, simultaneous two-track recording for error detection and correction, a 2-msec start time for incremental mode, and a 40-msec start/stop time (120 ips) continuous mode.

The DI-100C cartridge (3½ x 3½ in.) contains 430 ft of ¼-in. tape for the storage capacities noted above. Only one moving part, the capstan, provides tape drive power in both directions. Since the capstan rim is in direct contact with both tape rolls, no tape guides or tension arms are needed. Since there is only one driven wheel, supply and take-up rolls are merely idlers and require no power source. No extra motors, complex braking systems, or tape tensioning arms are required. Physical size is 8½ x 8½ x 22 in., with a complete weight of 30 lbs. Price: $2,500. Without digital read/write electronics, the unit is $1,650. All units carry a 1-year parts warranty.

Newell Industries
795 Kifer Road
Sunnyvale, California 94086

Electronic Shutter

The ES-100 Electronic Shutter System offers three unique functions: a power density or incident power monitor calibrated in microV/cm², an electronic shutter with continuous coverage from 1/128 to 2,048 sec, and an integrating exposure control system. The system will operate over the entire visible spectrum. The cost of the ES-100 system is $1,285, complete with shutter, detector, cables, stands, and electronics package. The Model ES-6 Electro-Mechanical Shutter sells for $195.

Jordon Engineering Associates
145 Enterprise Drive
Ann Arbor, Michigan 48103

Eye Movements

The Mirsky Eye-Movements Monitor consists of an eyeglass sensor assembly and an auditory monitor. The unit is sensitive to lateral eye movements for amounts as small as 2½ deg. Price: $325.

Stoelting Company
424 N. Homan Avenue
Chicago, Illinois 60624

Minicomputers

The popularity of minicomputers is accelerating abroad. Although a good share of the overseas market is dominated by American firms, a number of machines are "home-grown" and several are being marketed in the U.S.

Most of the foreign minicomputer manufacturers are listed below. Additional information covering the machines may be obtained by writing the firms directly.

Arcturus Electronics, Ltd.
21c Ashley Place
London, S.W.1, England

The 18-C has a 4k memory expandable to 64k with a 2.4-microsec add time. Basic word size is 16 bits; memory consists of 18 bits with parity.

Ateliérs de Constructions
Electriques de Charleroi (ACEC)
Div. ES
B. P. 4
Charleroi 1, Belgium

Model ACEC 92 is a 16-bit process control computer with 4-64k memory and 6-microsec add time.

A/S Norsk Data-Electronikk
Okernveien 145
Oslo 5, Norway

NORD-2B has a 4-16k core memory. Word size is 16 bits; add time is 2.4 microsec.

AEG-Telefunken
Industrielle Datenverarbeitung
Postfach 60
6453 Selingstadt, West Germany

The 60-10 process computer is upward compatible with the company's larger machines. Basic word size is 12 bits plus parity. Core memory is 4-32k and add time is 4.5 microsec.

Computer Technology, Ltd.
Eaton Road
Hemel Hemstead
Hertfordshire, England

Modular One has a core memory of 4k expandable to 56k and an add time of 0.95 microsec. Word size is 16 bits.

Digico Ltd.
St. Michael's House
Norton Way South
Letchworth
Hertfordshire, England

Digico Ltd. markets three minicomputers. The Digiac is a 16-bit drum storage unit with a 4k memory. The Micro 16 and the Micro 16P are 16-bit computers with basic 4k memories; the Model 16 is expandable to 64k, the 16P to 16k. Add time for the latter is 4 microsec; for the Micro 16, add time is 14 microsec for 2-microsec store and 20 microsec for 6-microsec store. A 1k ROM is available for the 16-P.

Elbit Computers Ltd.
P.O. Box 5390
Haifa, Israel

The Elbit 100 has a 1-4k memory with a 7.2-microsec add time. Basic word size is 12 bits.

Ferranti, Ltd.
Automation Systems Division
Simonsway
Wythenshawe
Manchester, M22 5LA, England

The Argus 600 has an 8-bit word size and a 1k memory expandable to 8k. Add time is 9.2 microsec.

Fijitsu Ltd.
Furukawa Sogo Building
6-12 Chome Chiyodaku
Tokyo, Japan

FACOM-R is a 16-bit, 1-32k machine with 6-microsec add time.

Heinrich Dietz
Postfach 48/8
433 Muelheim (Ruhr)
West Germany

The Mincal 513 is a fixed-programmed computer; the Model 523 is core-based. Basic word size is 19 bits plus parity with a core memory of ¼k (32k). Add time is 90 microsec. The Mincal Models 4E and 4N are similar but expansion capabilities differ, as do the prices.

Hitachi, Ltd.
International Sales Division
Computer Section
Nippon Building
6-2 2 Chome Otemachi,
Chiyoda-ku
Tokyo, Japan

HITAC-10 has a standard 4k core memory expandable to 32k with 2.8-microsec add time. Basic word size is 16 bits plus parity.

Krantz Electronik GMBH & Co. K.G.
Postfach 990
51 Aachen, West Germany

The Mulby is a 4-60k machine with 8-bit bytes. Core add time is 3 microsec; ROM add time is 0.5 microsec.

Marconi-Elliot Computer Systems Ltd.
Elstree Way
Borehamwood
Hertfordshire, England

Marconi-Elliot 903 has an 18-bit word size and an 8k memory expandable to 131k. Add time is 24 microsec.

Micro Computer Systems Ltd.
1 High Street
Godalming
Surrey, England

The Minic-M6901 has a 1k, 4k, or 8k memory expandable to 65k and an add time of 4 microsec minimum. Basic word size is 8-bit bytes.

Nippon Electric Co., Ltd.
Industrial Automation Division
33-7 Shiba 5 Chome, Minato-ku
Tokyo, Japan

The NEAC-M4 is byte oriented. Variable word lengths are 8, 16, 24, or 32 bits. The memory is 4-32k, with an add time of 4.5 microsec.

OKI Electric Industry Co., Ltd.
10 Shiba Kotohira-cho,
Minato-ku
Tokyo, Japan

Basic word size of the OKITAC-4300 is 16 bits plus parity. Add time is 3.84 microsec for a core memory of 4-32k.

Selenia S.p.A.
Automation Division
Via Tiburtina Km. 12,400
00131 Rome, Italy

GP-16 is a 16-bit-word machine with a 4- to 32k memory and a 4-microsec add time.

Siemens Corporation
Bereich Mess- und Prozesstechnik
Postfach 21-80
7500 Karlsruhe 21
West Germany

The Model 101 microprogram data word size is 12 bits, with instruction words at 18 bits. Add time is 9 microsec for the 12-bit word and the core memory is ½k expandable to 16k. Macro instructions are offered also. The computer is generally tied into the company's telemetry system.

Unicomp Gesellschaft
Sinnrain Strasse 15
7500 Karlsruhe 41
West Germany

The 201 is a 12-bit data-word/20-bit command-word computer with a ¼k expandable to 16k memory. Add time is 8 microsec (core) and 6 microsec (2 microsec ROM).

Yaskawa Electric Mfg. Co., Ltd.
Otemachi Building
Chiyoda-ku
Tokyo, Japan

Memocon-16 has a 4-16k memory, 16 bits, plus parity word size, and a 7-microsec add time.

Zuse K.G.
Grosse Industriestrasse 19/20
643 Bad Hersfeld
West Germany

The Z43 is a 16-bit-word machine with a basic 8k memory expandable to 64 k. A desk model is limited to 32k. Add time is 1.96 microsec.

Used Computers

The American Used Computer Corporation (15 School Street, Boston, Massachusetts 02108) is advertising used computer systems. The Digital Equipment Corporation PDP-10 is listed at 20% less than the original price.

Surface Charge Transistors

General Electric scientists have developed a surface charge transistor which stores information on a silicon chip at densities of a million bits/sq in. The semiconductor contains a source and a receiver electrode separated by a slit and a third electrode (transfer gate). The latter overlaps the slit and only a small charge on the gate can control much larger charges across the surface charge transistor. The unit is so small that a typed punctuation period could cover several hundred.

News from DEC

Digital Equipment Corporation of Maynard, Massachusetts, displayed their 10,000th DEC PDP-8 minicomputer at the recent Fall Joint Computer Conference in Houston. The machines were manufactured over a period of only 6 years. For the 60 days prior to the conference, the company announced that 700 DEC computers had been delivered.

Approximately 500 16-bit PDP-11 computers had been delivered over a 6-month period.

At the recent (1971) Physics Show in New York, DEC introduced a new group of options for computer logic training with either the PDP-12 or the PDP-8 computers. These consisted of an access panel, a connector block that enables students to test newly designed circuits, a laboratory guide, and a logic design laboratory. The laboratory contains electronic components and tools for students to assemble a series of computer interfacing modules.

The TD8/E is a relatively new DECtape control contained on a single quad flip-flop chip module. The unit plugs directly into the PDP-8/E Omnibus and handles the TU56M or TU56MH DECtape transports. TD8/E cost with a dual TU56M unit is $5,000. The listing is $3,000 with a single TU56MH transport.

The DEC terminal VT06 (alphanumeric) is a CRT display and keyboard with 1,800-character image area. The unit is designed for all PDPs and is listed at $4,900.

Transformer Color Coding

The EIA color-coding system is used for identifying lead wires of American-made transformers. Coding is as follows:

Audio Transformers

Red	- B+ or power
Blue	- Collector or plate
Brown	- Collector or plate
Green	- Base or grid
Black	- Ground or bias or v.c.
Yellow	- Grid or base or v.c.

Power Transformers

Black	- Primary
Red	- High voltage secondary
Red/yellow	- High voltage center tap (C.T.)
Yellow	- Rectifier filament
Green	- Tube filament
Green/yellow	- Filament C.T.
Brown	- Extra filament
Brown/yellow	- Extra filament

Minicomputer Semiconductor Memories

Some manufacturers of minicomputers are switching to semiconductor main memories to gain computational speed. Of course, one significant difference between semiconductor memory and core is that the semiconductor type is volatile. With minicomputers, data in core is sometimes expected to survive a shutdown, so most manufacturers offer a power-fail restart, often as an option. The power-fail restart controls an orderly shutdown if power is

turned off or if it fails. The restart resumes on the existing core content.

In spite of semiconductor memory volatility, manufacturers apparently foresee no serious difficulties and state that critical data can be written onto a nonvolatile medium with a planned shutdown. Where a need exists to protect main-memory content through an outrage, a mixture of core and semiconductor memory is suggested. Another approach is that used with large control computer systems, i.e. to provide short-term emergency power to capture crucial memory content.

A shuttlebox for use with rats

FRANK C. LEEMING
and
JOHN W. PILLEY*
Memphis State University
Memphis, Tennessee 38103

An ideal apparatus for the study of negative reinforcement in a discrete trial situation is the shuttlebox. The main problem encountered in the construction of this apparatus is to prevent S from escaping shock in ways other than that specified by E. The most frequent area of difficulty is in the barrier and gate separating the two compartments. The presence of the barrier is desirable since it increases the likelihood that S will make a relatively discrete response. The gate is necessary to prevent retracing and to assure the discrete trial nature of the situation. The problem lies in the construction of a barrier-gate combination which S cannot use to escape the shock. After numerous successive approximations, we have developed an apparatus which is easily constructed and has functioned well throughout work on several hundred animals. Ss have not learned techniques for using it to escape shock.

A diagram of the entire apparatus is presented in Fig. 1. The box is 66 cm long x 15 cm deep x 89 cm high. The back and ends are of wood, painted brass color; the front is of .63-cm clear Plexiglas. The back and ends of the box are covered with brass sheeting to a height of 23 cm above the grid. This serves to discourage Ss from standing on a single bar and leaning on the wall to escape shock. The grid floor, composed of .63-cm brass rods spaced 1.9 cm apart, center to center, is located 43 cm from the top of the box.

The box is equally divided into two compartments by a .16-cm stainless steel combination barrier and guillotine gate. A diagram of this unit is shown in Fig. 2.

The barrier-gate unit is constructed by first punching a 7.5 x 15 cm oval-shaped hole in a 15 x 91 cm piece of .16-cm stainless steel so that the

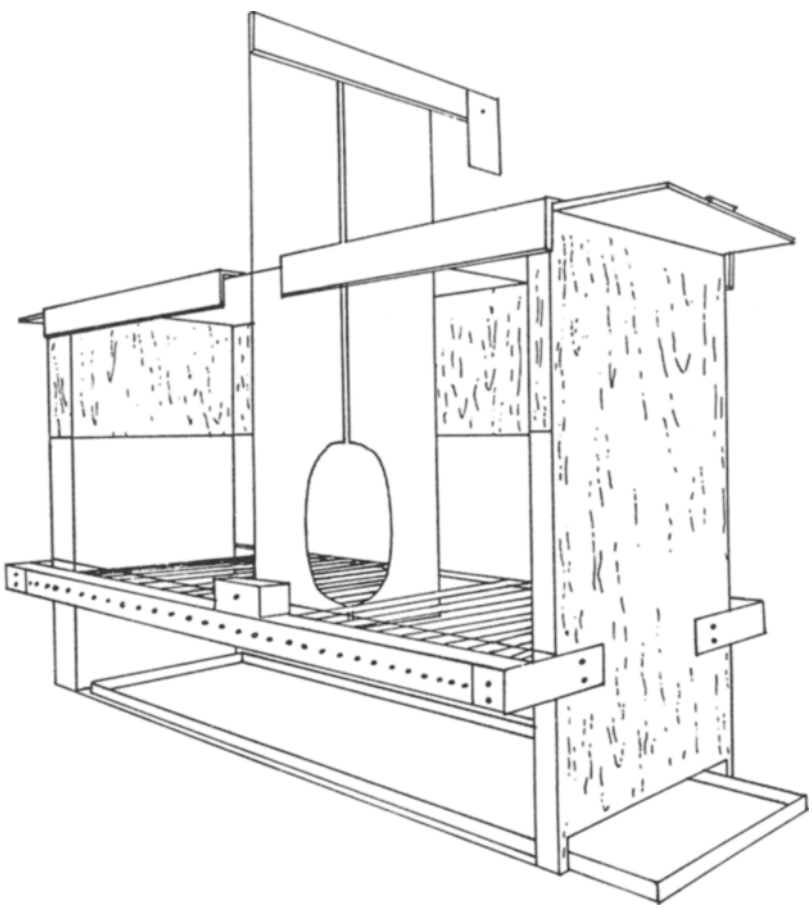

Fig. 1. A diagram of the shuttlebox with the barrier-gate combination in a partially raised position.

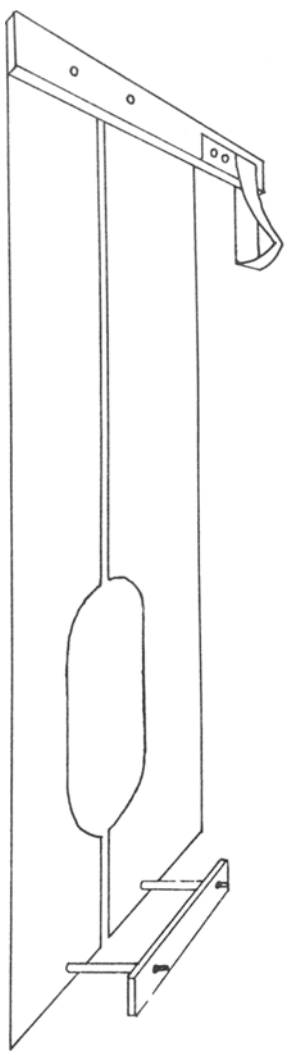

Fig. 2. A diagram of the barrier-gate combination.

*Now at Wofford College, Spartanburg, S.C. 29301.