PRINTOUT

JOSEPH B. SIDOWSKI

Services

Name Change

Scientific Data Systems (SDS) is now Xerox Data Systems (XDS).

Address Change

The new address for Herbach & Rademan, Inc., is 401 E. Erie Street, Philadelphia, Pennsylvania 19134. Phone: (215) 426-1700.

Psychological Equipment

A new catalogue dealing with psychological equipment has been issued by a British company, Behavioral Research & Development Limited. Products include event recorders, the Cambridge tachistoscope, and solid-state modular programming systems for operant conditioning.

Behavioral Research & Development Limited
124 Colne Road
Twickenham, Middlesex, England
Phone: 01-894 1649

Varian Expands

Varian Data Machines has opened a new computer training and service center on the East coast. Training covers hardware and software for the Varian 520/i and 620/i computers. The center is located in Cheverly, Maryland, near Washington, D.C.

Products

Miniature Micromanipulator

The "NARISHIGE" MM-3 Miniature Micromanipulator is available for immediate delivery at a cost of \$150 and can be obtained for either right or left hand use. Included is a metal rod assembly which consists of a vertical rod and screw threads on one end for tapping purposes and a horizontal cross member. A magnetic stand may be ordered for an additional \$25. The magnetic base holds the micromanipulator firmly to a steel or iron plate. Rotating a dial opens the magnetic path and releases the grip on the plate.

LABTRON Scientific Corporation
100 Smith Street
Farmingdale, New York 11735
(516) 293-4898

Subminiature Switch Modules

Cherry Electrical Products Corporation

is marketing two-, three-, four-, or five-gang switch modules that are thinner than standard subminiatures fastened side-by-side. The switches are double throw and available in light or standard force with every basic terminal configuration.

Cherry Electrical Products Corporation
1650 Old Deerfield Road
Highland Park, Illinois 60036
(312) 432-8182

Recording Oscilloscope

Honeywell recently introduced the Model 1806A Fiber-Optics CRT Visicorder. The unit is a single-channel, four-axes recorder with the capability of recording continuous or one-shot signals on 6-in. direct-write oscillograph paper.

With continuous mode of recording, X axis input vs time signals may be recorded longitudinally or transversely. High-frequency data may be recorded in the transverse mode without utilizing high paper speeds. The Model 1806A is also designed for recording one-shot, transient, or random phenomena. The paper drive will automatically start and stop with the application of an external trigger signal—thus, selected signals are recorded vertically along the paper as a function of time or other parameters. This allows for waveform analysis or comparison of repetitive information.

With both X and Y signal inputs, a single 3 x 5 in. or continuous record of X-Y plots and Lissajous patterns is possible. Video pictures can be presented (one frame at a time) as a continuous series of 3 x 5 in. rasters on the direct-record paper for immediate viewing.

Recordings are produced by means of a fiber-optic CRT, recording on standard 6-in. oscillograph paper.

The unit features: dc to 1-MHz response; 350-nanosec rise time; 11 paper and 19 sweep speeds; reference coordinates; record numbering; automatic record length control; automatic skew correction; and a signal monitoring scope.

Honeywell Test Instruments Division
4800 East Dry Creek Road
Denver, Colorado 80217

Miniature Transformers

Relcom is advertising a new line of miniature transformers packaged in either a high-temperature epoxy container or a hermetically-sealed package. Weight is

extremely low. The line features a frequency range of 0.1 to 700 MHz and an insertion loss of 0.5 dB. Six transformers are balanced with both the amplitude and phase balance specified. Four are single-ended; some have dc isolation.

Relcom
2329 Charleston Road
Mountain View, California 94040

Wireless Microphones

The PIEZO Wireless Model WX-127 microphone will operate up to 200 ft from the audio source when powered with two RM-625 batteries. The unit measures 4¾ x 1 x 1 in. and weighs 3½ oz. Described as static free and fully shielded, the microphone is also advertised as conforming to all FCC requirements as to power output, frequency tolerance, etc. Antenna is provided which performs coiled in a pocket or draped in clothing. Price: \$17.50 less batteries.

Mura Corporation
355 Great Neck Road
Great Neck, New York 11021
(516) 487-0430

Pre-Amp Kit

The Four Trace Pre-Amp Kit can be built into your scope or used with an optional custom cabinet. Sensitivity is limited only by the sensitivity of the scope; use one, two, three, or four traces. Features are: FET input, all solid state, works with any scope, and has centering and gain controls for each channel.

Bandwidth: 1 MHz/channel. Display time: 50 sec/channel. Transition time: 5 sec. Maximum output volts per channel: 0.5 V peak to peak.

Price: Model A1K—\$24.95; cabinet—\$4.98; etched and drilled circuit board—\$5.00.

Phase Corporation
Electronics Division
315A Boston Avenue
Medford, Massachusetts 02155

Small Digital Multimeter

The Digttest 500 is advertised as the world's smallest digital multimeter. Operating from 117-V 50- to 60-Hz line, and/or external 12-V source, the unit has a three-digit display with a moving decimal point, polarity indication, and overload indicator. A matrix switch provides for fast

selection of function and range. Six pushbuttons on the front of the 500 allow the operator to select the proper range. A row of four pushbuttons on the side allows for selection of the various functions. The unit weighs 2.5 lbs and can be carried in a briefcase or coat pocket.

Honeywell Test Instruments Division
4800 Dry Creek Road
Denver, Colorado 80217

Cassette Tape Recorder

The Model C200 Cassette tape recorder is priced at \$1,150 and uses standard or improved tape cassettes. The unit includes read-after-write and erase heads, file protect, BOT/EOT sensors, and control and drive electronics. The packing density is 1,600 bpi; other densities are available with external control. The recorder has read and write electronics for operation in read forward and reverse, and fast forward and reverse.

It is intended for continuous operation with a small buffer memory but incremental performance can be obtained with reduced tape utilization. A clock is generated from the optical encoders on the capstans and can be used to synchronize the input data to instant perturbations. Both the clock and the data can be recorded on the single track, thereby eliminating skew problems inherent in multiple-track heads.

Cipher Data Products, Inc.
7655 Convoy Court
San Diego, California 92111

Alphanumeric Digital Annunciator

The Mini-Digit series of digital annunciators display alphanumeric and numeric information on cold cathode display. The alphanumeric section can display all the letters of the alphabet, numerals 0-9, and special characters. The numeric portion, which has a built-in decimal point, decodes and displays 0-9 from 5-V BCD logic.

The display tube has 13 individual segments that can be illuminated. The characters appear as a bright red-orange neon glow, readable at distances up to 100 ft; numerics are readable at up to approximately 60 ft under proper viewing conditions.

All inputs and power requirements are brought in through a rear-housed single-edge connector.

The four models have 3-3, 3-4, 4-3, or 4-4 numeric and alphanumeric positions.

Instrument Displays, Inc.
18-36 Granite Street
Haverhill, Massachusetts 01830

Circuit Springboard

The Barry Springboard is used for developing a circuit and allows for fast and easy assembly, disassembly, and rearrangement of components. The springboard consists of 120 individually pocketed springs that hold up to nine leads each. A pointed tool is used to spread the coils, then the lead is inserted for an immediate, firm, and positive connection. Leads are removed the same way. No soldering is necessary and the springboards are reusable. Prices start at \$7.95, including a pointed tool and one bracket.

Barry Instrument Company
3772 Catalina Avenue
P. O. Box 252
Los Alamitos, California 90720
(213) 430-4913

Multiple Device Controller

The MC-16 Multiple Device Controller provides an interface between the MAC 16 Minicomputer and devices normally used in small computer systems. The unit features: control for one 60-channel A/D converter system under one device address; control for 8 addressable D/A converters or other parallel-data peripheral devices; 16 control lines (and 16 sense lines) expandable in groups of 16 to a maximum of 128, addressable in groups of 16, four coded interrupt lines under one interrupt level; and a general data channel for parallel I/O control of general devices. Prices: MC-16-0-000 Basic, \$650; MC-16-1-000 Basic plus D/A control and general data channel, \$745; MC-16-0-1XX Basic plus multiplex A/D control, \$850; MC-16-1-1XX Basic plus D/A with general data channel and multiplex A/D control, \$910.

Progress Electronics Company of Oregon
5160 N. Lagoon Avenue
Portland, Oregon 97217
(503) 285-0581

Minicomputer Display

DELTA 1 is a display terminal for minicomputers. The unit has a flexible, high-capacity party line I/O bus for HP 2116, DATA 620/i, PDP-8/i, Interdata Model 4, and NOVA computers. No software modifications are needed and closed-circuit TV can be superimposed, or TV monitors added at minimal cost. The DELTA 1 has a 12-in. diagonal screen with a 960-character display capability, and a selective blink that highlights selected data on the screen.

Delta Data Systems Corporation
Woodhaven Park
Cornwells Heights, Pennsylvania 19020
(215) 639-9400

Calculator Plotter

Hewlett-Packard is marketing the 9125A Calculator Plotter for use with the 9100A programmable Calculator. The Plotter makes permanent graphs of functions solved by the Calculator. The system takes 0.9 sec to plot each point, and plotting accuracy is advertised as within 0.03 in.

Plotting can be done as a series of dots, as a line between points, as dashed lines, or dot-dash lines. The Plotter can also trace straight lines between points at any angle so that curves are smooth. The operator can control transfer coordinates to the Plotter and an electrostatic paper holddown allows use of any paper of any size up to 11 x 17 in. Price: \$2,475.

Hewlett Packard
1501 Page Mill Road
Palo Alto, California 94304
(415) 326-7000

Analog-to-Digital Converters

Analog-to-Digital Converters may be obtained from the following:

Adage, Inc.
1079 Commonwealth Avenue
Boston, Massachusetts 02159

Airborne Accessories Corporation
1414 Chestnut Avenue
Hillside, New Jersey 07205

Analog Devices, Inc.
221 5th Street
Cambridge, Massachusetts 01242

Analogic Company
Division of Gordon Engineering Company
296 Newton Street
Waltham, Massachusetts 01254

Astrodata, Inc.
240 E. Palais Road
Anaheim, California 92805

Astrosystems, Inc.
6 Nevada Drive
New Hyde Park, New York 10040

Avco Electronics Division
2630 Glendale-Milford Road
Cincinnati, Ohio 45241

Beckman Instruments, Inc.
2500 Harbor Boulevard
Fullerton, California 92632

The Bunker Ramo Corporation
8433 Fallbrook Avenue
Canoga Park, California 91304

Burns & Towne
18-36 Granite Street
Haverhill, Massachusetts 01830

Burr-Brown Research Corporation
International Airport Industrial Park
Tucson, Arizona 85706

California Instruments Corporation
3511 Midway Drive
San Diego, California 92110

Cambridge Thermionic Corporation
445 Concord Avenue
Cambridge, Massachusetts 02138

Canoga Electronics Corporation
8966 Comanche Avenue
Chatsworth, California 91311

Cohu Electronics, Inc., San Diego Div.
Box 623
San Diego, California 92112

Computer Conversions Corporation
6 Dunton Street
East Northport, New York 11731

Computer Industries, Inc.
14761 Califa Street
Van Nuys, California 91401

Conductron-Ann Arbor
3475 Plymouth Road
Ann Arbor, Michigan 48105

Conrac Corporation
330 Madison Avenue
New York, New York 10017

Control Equipment Corporation
19 Kearney Road
Needham Heights, Massachusetts 02194

Control Logic, Inc.
3 Strathmore Road
Natick, Massachusetts 01760

Corning Glass Works
Houghton Park
Corning, New York 14830

Data Device Corporation
100 Tec Street
Hicksville, New York 11801

Data Systems Division
15000 Central Avenue SE
Albuquerque, New Mexico 87112

Data Technology, Inc.
65 Grove Street
Watertown, Massachusetts 02172

Datascan, Inc.
1111 Paulison Avenue
Clifton, New Jersey 07011

Datatron, Inc.
1562 Reynolds Street
Santa Ana, California 92707

Datawest Corporation
7503 E. Osborn Road
Scottsdale, Arizona 85251

Datum, Inc.
170 E. Liberty Avenue
Anaheim, California 92805

Digilin, Inc.
6533 San Fernando Road
Glendale, California 91201

Digital Equipment Corporation
146 Main Street
Maynard, Massachusetts 01754

Digital Products
Vernitron Corporation
59 Central Avenue
Farmingdale, New York 11735

Disc Instruments, Inc.
2701 S. Halladay Street
Santa Ana, California 92705

Discon Corporation
1150 Northwest 70th Street
Fort Lauderdale, Florida 33313

Doric Scientific Corporation
7969 Engineer Road
San Diego, California 92111

Dynamic System Electronics
1040 W. Alameda Drive
Tempe, Arizona 85281

Dynamics Instrument Company
583 Monterey Pass Road
Monterey Park, California 91754

DynaPlex Division
Teledyne Telemetry Company
Box 341
Princeton, New Jersey 08540

Nuclear Instruments Division
EG&G, Inc.
35 Congress Street
Salem, Massachusetts 01970

EMR-Telemetry
Weston Instruments, Inc.
Box 3041
Sarasota, Florida 33578

Electro-Mechanical Research, Inc.
P.O. Box 44
Princeton, New Jersey 08540

Electronic Associates, Inc.
Long Branch Avenue
Long Branch, New Jersey 07740

Electronic Engineering Company
of California
1601 E. Chestnut Avenue
Santa Ana, California 92701

EnTex, Inc.
119 Heritage Street
Friendswood, Texas 77546

Epsco, Inc.
411 Providence Highway
Westwood, Massachusetts 02090

Fairchild Instrumentation
974 E. Arques Avenue
Sunnyvale, California 94086

The Foxboro Company
Neponset Avenue
Foxboro, Massachusetts 02035

GAP Instrument Corporation
17 Brooklyn Avenue
Westbury, New York 11590

Garrett Corporation
9851 Sepulveda Boulevard
Los Angeles, California 90045

Instrumentation Division
General Devices Inc.
P.O. Box 253
Princeton, New Jersey 08540

Geodyne
Division of EG&G, Inc.
151 Bear Hill Road
Waltham, Massachusetts 02154

Geotech
A Teledyne Company
3401 Shiloh Road
Garland, Texas 75040

Gralex Industries, Inc.
28 Di Thomas Court
Copiague, New York 11726

Gulton Industries, Inc.
Metuchen, New Jersey 08840

W & L E Gurley
A Teledyne Company
514 Fulton Street
Troy, New York 12180

Halmar Electronics, Inc.
1544 W. Mound Street
Columbus, Ohio 13223

Hewlett-Packard
1501 Page Mill Road
Palo Alto, California 94304

Honeywell Test Instruments Division
4800 E. Dry Creek Road
Denver, Colorado 80217

Howell Instruments, Inc.
3479 W. Vickery Boulevard
Ft. Worth, Texas 76107

Information Instruments, Inc.
62 Enterprise Drive
Ann Arbor, Michigan 48103

Infotronics Corporation
7800 Westglenn Drive
Houston, Texas 77042

Intercontinental Instruments, Inc.
500 Nuber Avenue
Mt. Vernon, New York 10550

International Contronics, Inc.
1038 W. Evelyn
Sunnyvale, California 94086

Intronics
57 Chapel Street
Newton, Massachusetts 02158

Janus Control Division/Tyco
296 Newton Street
Waltham, Massachusetts 02154

Kearfott Products
General Precision
1150 McBride Avenue
Little Falls, New Jersey 07424

George Kelk Limited
48 Lesmill Road
Don Mills, Ontario, Canada

Kollsman Instruments Corporation
80-08 45th Avenue
Elmhurst, New York 11373

Lancer Electronics Corporation
1416 W. Main Street
Norristown, Pennsylvania 16101

Le Croy Research Systems Corporation
126 N. Route 303
West Nyack, New York 10994

Leeds & Northrup Company
Sumneytown Pike
North Wales, Pennsylvania 19454

Encoder Division
Litton Industries
20745 Nordhoff Street
Chatsworth, California 91311

Microwave/Systems, Inc.
1 Adler Drive
East Syracuse, New York 13057

Monitor Systems, Inc.
401 Commerce Drive
Ft. Washington, Pennsylvania 19034

Navigation Computer Corporation
Valley Forge Industrial Park
Norristown, Pennsylvania 19406

Non Linear Systems, Inc.
P.O. Box N
Del Mar, California 92014

North Atlantic Industries, Inc.
200 Terminal Drive
Plainview, New York 11803

Pacific Measurements, Inc.
940 Industrial Avenue
Palo Alto, California 94303

Pastoriza Electronics
385 Elliot Street
Newton Upper Falls, Massachusetts 02164

Phoenix Data, Inc.
3065 W. Fairmount Avenue
Phoenix, Arizona 85017

Pottermeter Division
Potter Aeronautical Corporation
U.S. Route 22
Union, New Jersey 07083

Preston Scientific, Inc.
805 E. Cerritus Avenue
Anaheim, California 92805

Princeton Applied Research Corporation
P.O. Box 565
Princeton, New Jersey 08540

RC 95
9 E. 38th Street
New York, New York 10016

RO Associates, Inc.
917 Terminal Way
San Carlos, California 94070

Control Division
Radiation, Inc.
Box 430
Melbourne, Florida 32901

Raytheon Computer Division
2700 S. Fairview Street
Santa Ana, California 92704

Redcor Corporation
7800 Deering
Canoga Park, California 91304

Republic Advanced Technical
Systems Group
9754 Deering Avenue
Chatsworth, California 91311

Northridge Engineering
Republic Corporation
18758 Bryant
Northridge, California 91324

The Roback Corporation
1000 Buck Road
Huntingdon Valley, Pennsylvania 19006

Rohde & Schwarz Sales Company
111 Lexington Avenue
Passaic, New Jersey 07055

Scientific Data Systems
701 S. Aviation Boulevard
El Segundo, California 90245

Sequential Electronic Systems, Inc.
66 Saw Mill River Road
Elmsford, New York, 10523

Shallcross
Division of Cutler Hammer
Preston Street
Selma, North Carolina 27576

Sigma Instruments, Inc.
170 Pearl Street
Braintree, Massachusetts 02184

Simpson Electric Company
5200 W. Kinzie Street
Chicago, Illinois 60644

Gertsch Division
The Singer Company
3211 S. La Cienega
Los Angeles, California 90016

Solid State Electronics Corporation
15321 Rayen Street
Sepulveda, California 91343

Space & Tactical Systems Corporation
1 Garfield Circle
Burlington, Massachusetts 01803

Sprague Electric Company
Marshall Street
North Adams, Massachusetts 01247

M. L. Stern Co., Inc.
P.O. Box 17816
Charlotte, North Carolina 28211

Straza Industries
790 Greenfield Drive
El Cajon, California 92021

Systems Engineering Labs, Inc.
P.O. Box 9148
Fort Lauderdale, Florida 33310

Systron-Donner Corporation
888 Galindo Street
Concord, California 94520

Techno Products Company
1128 N. Las Palmas Avenue
Los Angeles, California 90038

Teledyne Telemetry
9320 Lincoln Boulevard
Los Angeles, California 90045

Theta Instrument Corporation
Fairfield, New Jersey 07006

Time Systems Corporation
265 Whisman Road
Mountain View, California 94040

Towson Laboratories, Inc.
3500 Parkdale Avenue
Baltimore, Maryland 21211

Trump-Ross Industrial Controls, Inc.
266 Boston Road
North Billerica, Massachusetts 01862

Tyco Instrument Division
Tyco Labs
16 Hickory Drive
Waltham, Massachusetts 02154

Norden Division
United Aircraft
Street Road
Trevose, Pennsylvania 19047

Vidar Corporation
77 Ortega Avenue
Mountain View, California 94040

Weston-Transicoil
Trooper Road
Worcester, Pennsylvania 19490

Wireless headset

The unit consists of a transmitting adapter and a headset receiver which allow for listening at distances of 30 ft from the sound source. The adapter is plugged into the tape recorder or some other device that has an earphone jack. It then "sends" to the receiver built into the headset. The headset contains an on/off switch and a volume control. Two penlight cells in the headset and two in the transmitting adapter supply the necessary power.

Hitachi Ltd.
Tokyo, Japan

or

Marubeni-Lida (America) Inc.
42nd Floor, Pan American Building
200 Park Avenue
New York, New York 10017

Briefs

Tymnet

Tymshare, Inc., of Palo Alto, California, has created a new national time-sharing network, Tymnet, which uses Varian 620/i computers. A principal function of each of the Varian computers is to act as a data concentrator, interfacing between a number of relatively low-speed communication links and one or two high-speed lines between cities. Teletype links, data-phone links, and CRT terminals can all communicate effectively with the computer.

The Varian also performs error detection and correction, formatting, and telephone-line routing. If there is a breakdown on the direct line to the destination city, for instance, the 620/i automatically switches the circuit to a different route.

Varian's New Software System

Varian Data Machines is offering a new software system for the 620/i computer. The innovations have been incorporated into a single Master Operating System (MOS) that includes input/output control, system executive, system loader, assembler, FORTRAN IV compiler, and maintenance and debugging packages. The system is applicable to any existing Varian 620/i with a minimum of 8 K memory, a Teletype, and either a drum or a magnetic tape transport. The MOS package includes input/output drivers for such additional items as line printers, high-speed paper-tape reader and punch, card readers, and additional magnetic tape units.

For additional information, contact Varian Data Machines, 2722 Michelson Drive, Irvine, California 92664.

Educational Discounts on Minicomputers

Interdata Inc., of Oceanport, New Jersey, has announced a 10% discount on computers sold to recognized educational institutions. This announcement comes on the heels of IBM's decision to reduce the number of discounts offered to educational institutions.

The Blow Fly

For the interested investigator of animal behavior, the blow fly has several noteworthy attributes. Mature flies are large and easy to handle, they don't appear to fly too readily, and the creatures are easy to manage with a few minutes of chilling. Pupae hatch in about a week at 25°C in a moist environment. Sugar solutions can be used as incentives.

Blow Fly (*Sarcophaga bullata*) may be ordered from Ward's Natural Science Establishment, Inc., P.O. Box 1712,

Rochester, New York 14603. Order No. 87W6355 per culture: \$3.50; two or more, each: \$3.00.

Teacup-Sized Minicomputers

Control Data Corporation, Minneapolis, Minnesota, is expected to add a line of microcomputers before 1970; so teacup-sized machines appear to be less than a year away from the market. A family of midgets is being produced for space and military users. The 449 model packs logic and memory into a 4-in. cube and reaches only 9 in. in length with the addition of a battery and a manual input unit. The more advanced 469 stores 20 K, 24-bit words in the same space and adds in 2 microsec, with a multiply time of 8 microsec.

IBM has an operating computer in a 2-in. cube that contains 4 K of 24-bit word memory. IBM's marketing plans are reputed to be longer term than CDC's because of the potential impact that the micromachine might have on the present computer market.

Mag Tape Memory

Using tape guides identical to those of the IBM tape units, TMX tape memory systems are advertised as offering full computer compatibility and restriction-free programming. Featuring bidirectional programming, the system uses 8½-in. magnetic tape reels; packing densities are 200, 556, and 800 bpi and maximum tape speed is 12½ in./sec. The tape memories are designed for use in small on- and off-line systems such as minicomputers, printout stations, and keyboard-to-tape terminals. Price: \$2,000 to \$2,500.

Ampex Corporation
9937 W. Jefferson Boulevard
Culver City, California 90230
(213) 836-5000

Raytheon Minicomputer

The Raytheon 704 is a 16-bit, 1.5-microsec computer selling for less than \$10,000 basic. The 704 accommodates memory expansion up to 16 K as well as all central processor options such as automatic multiply/divide, direct memory access channel, automatic interrupt to 16 levels, and memory parity. Several card positions are available for special interfaces. The user is also offered optional utility cards with mounted IC sockets for easy implementation of special requirements.

Compatibility with Raytheon's 703 and 706 computers offers the user a library of over 300 programs, including 40 combinations of monitors and executives. The software package includes real-time FORTRAN IV, conversational FORTRAN,

a real-time disk operating system, symbolic assemblers, and a variety of editing and utility routines.

Raytheon Computer
2700 South Fairview Street
Santa Ana, California 92704
(714) 456-7160

Poly-Planar Speakers

Poly-Planar Speakers are thin and can be fit into spots where most other speakers cannot. They are also waterproof and may be used indoors or outdoors. Physical characteristics of the speaker allow the units to be hinged on walls, set into tables, flush doors, ceilings, etc. A 5-W full-range Poly-Planar speaker (P-5) is 13/16 in. wide x 4 1/2 in. deep x 8 1/2 in. long and weighs 10 oz.

The basic functions of the Poly-Planar loudspeaker are similar to the cone system. A magnetic structure produces a radial field within a closely spaced gap. A voice coil is immersed in the gap and electrical signals applied to the coil produce motor action with resulting acoustical output. In place of the conventional cone, however, is a rigid flat plastic panel that is only a fraction of the depth of the equivalent cone structure. The material is expanded polystyrene in a compacted bead structure. Since the beads are largely air, the mass is extremely low. To obtain the desired acoustic properties, the panel incorporates a combination of circular grooves in conjunction with special acoustic fill materials. This provides the proper balance of compliances and damping for wide response characteristics.

The flat rectangular panel allows for a larger piston area and, as a result, the length and width dimensions can be made smaller than the cone speaker. Conventional "spiders" or supporting structures are not required to maintain or center the voice coil in the magnetic gap because of the rigidity of the acoustic panel. The acoustic panel is supported directly by a frame made of similar polystyrene plastic that provides a similar coefficient of expansion. The physical characteristics of the acoustic panel also allow the supporting frame to be made shallow without detracting from the rigidity necessary to prevent low-frequency flexing. And a shorter magnetic gap is permitted because more accurate coil centering is feasible. This, plus, the smaller acoustical panel mass, allows the use of a lower magnet weight for the same power output.

The Magitran Company
311 East Park Street
Moonachie, New Jersey 07074

Fig. 1. The children interacting with the computer in a time-shared system. The pigeons are merely on display to show that the system may be used for the on-line real-time control of animal research.

Computer System for Behavioral Research

The recent Fall Joint Computer Conference showed a computer time-sharing system developed for the behavioral sciences by Lehigh Valley Electronics, Inc., using a NOVA computer. (Fig. 1.) The system permits the on-line monitoring of up to eight research subjects simultaneously.

Displayed at the conference was a time-sharing system of three pigeon test chambers connected through a control panel to the NOVA. (Fig. 2.) Control of testing and the gathering and processing of data was accomplished through ACT

(Automated Contingency Translator), the LVE English-oriented computer language. Three pigeons in special cages were run on different schedules. Information covering the INTERACT behavioral research system may be obtained from Lehigh Valley Electronics, Inc., Box 125, Fogelsville, Pennsylvania 18051.

Data General Corporation, Southboro, Massachusetts 01772 markets the NOVA and SUPERNOVA computers. Time-sharing BASIC may be run in either machine with at least 8 K of core memory to support eight users.

Fig. 2. Pigeons timesharing a NOVA computer through the LVE INTERACT control system.

Note

A table of Kamin CER ratios

PETER A. HOLMES and ROBERT E. BOARDMAN, *Eastern Michigan University, Ypsilanti, Michigan 48197*

The Kamin (1965) CER ratio is

computed by taking the number of responses made during any stimulus presentation and dividing it by the number of responses in an equal time period just preceding the stimulus presentation plus the number of responses during the presentation. A ratio of .500 indicates that there was no response suppression during the stimulus presentation, whereas a ratio

below .500 indicates suppression and a ratio above .500 indicates elation.

In Tables 1a and 1b, the correct ratio can be determined by locating the number of responses made during the prestimulus period in the rows of the table and then moving across the columns to the number of responses made during the stimulus period. For example, if there were 26

Table 1
Matrix of Kamin CER Ratios

A	STIMULUS RESPONSES																								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
1	.500	.667	.750	.800	.833	.857	.875	.889	.900	.909	.917	.923	.929	.933	.938	.941	.944	.947	.950	.952	.955	.957	.958	.960	.962
2	.333	.500	.600	.667	.714	.750	.778	.800	.818	.833	.846	.857	.867	.875	.882	.889	.895	.900	.905	.909	.913	.917	.920	.923	.926
3	.250	.400	.500	.571	.625	.667	.700	.727	.750	.769	.786	.800	.813	.824	.833	.842	.850	.857	.864	.870	.875	.880	.885	.889	.893
4	.200	.333	.429	.500	.556	.600	.636	.667	.692	.714	.733	.750	.765	.778	.789	.800	.810	.818	.826	.833	.840	.846	.852	.857	.862
5	.167	.286	.375	.444	.500	.545	.583	.615	.643	.667	.688	.706	.722	.737	.750	.762	.773	.783	.792	.800	.808	.815	.821	.828	.833
6	.143	.250	.333	.400	.455	.500	.538	.571	.600	.625	.647	.667	.684	.700	.714	.727	.739	.750	.760	.769	.778	.786	.793	.800	.806
7	.125	.222	.300	.364	.417	.462	.500	.533	.563	.588	.611	.632	.650	.667	.682	.696	.708	.720	.731	.741	.750	.759	.767	.774	.781
8	.111	.200	.273	.338	.385	.429	.468	.500	.529	.556	.579	.600	.619	.636	.652	.667	.680	.692	.704	.714	.724	.733	.742	.750	.758
9	.100	.182	.250	.308	.357	.400	.438	.471	.500	.526	.550	.571	.591	.609	.625	.640	.654	.667	.679	.690	.700	.710	.719	.727	.735
10	.091	.167	.231	.286	.333	.375	.412	.444	.474	.500	.524	.545	.565	.583	.600	.615	.630	.643	.655	.667	.677	.688	.697	.706	.714
11	.083	.154	.214	.267	.313	.353	.389	.421	.450	.476	.500	.522	.542	.560	.577	.593	.607	.621	.633	.645	.656	.667	.676	.686	.694
12	.077	.143	.200	.250	.294	.333	.368	.400	.429	.455	.478	.500	.520	.538	.556	.571	.586	.600	.613	.625	.636	.647	.657	.667	.676
13	.071	.133	.188	.235	.278	.316	.350	.381	.409	.435	.458	.480	.500	.519	.536	.552	.567	.581	.594	.606	.618	.629	.639	.649	.658
14	.067	.125	.176	.222	.263	.300	.333	.364	.391	.417	.440	.462	.481	.500	.517	.533	.548	.563	.576	.588	.600	.611	.622	.632	.641
15	.063	.118	.167	.211	.250	.286	.318	.348	.375	.400	.423	.444	.464	.483	.500	.516	.531	.545	.559	.571	.583	.595	.605	.615	.625
16	.059	.111	.158	.200	.238	.273	.304	.333	.360	.385	.407	.429	.448	.467	.484	.500	.515	.529	.543	.556	.568	.579	.590	.600	.610
17	.056	.105	.150	.190	.227	.261	.292	.320	.346	.370	.393	.414	.433	.452	.469	.485	.500	.514	.528	.541	.553	.564	.575	.585	.595
18	.053	.100	.143	.182	.217	.250	.280	.308	.333	.357	.379	.400	.419	.438	.455	.471	.486	.500	.514	.526	.538	.550	.561	.571	.581
19	.050	.095	.136	.174	.208	.240	.269	.296	.321	.345	.367	.387	.406	.424	.441	.457	.472	.486	.500	.513	.525	.537	.548	.558	.568
20	.048	.091	.130	.167	.200	.231	.259	.286	.310	.333	.355	.375	.394	.412	.429	.444	.459	.474	.487	.500	.512	.524	.535	.545	.556
21	.045	.087	.125	.160	.192	.222	.250	.276	.300	.323	.344	.364	.382	.400	.417	.432	.447	.462	.475	.488	.500	.512	.523	.533	.543
22	.043	.083	.120	.154	.185	.214	.241	.267	.290	.313	.333	.353	.371	.389	.405	.421	.436	.450	.463	.476	.488	.500	.511	.522	.532
23	.042	.080	.115	.148	.179	.207	.233	.258	.281	.303	.324	.343	.361	.378	.395	.410	.425	.439	.452	.465	.477	.489	.500	.511	.521
24	.040	.077	.111	.143	.172	.200	.226	.250	.273	.294	.314	.333	.351	.368	.385	.400	.415	.429	.442	.455	.467	.478	.489	.500	.510
25	.038	.074	.107	.138	.167	.194	.219	.242	.265	.286	.306	.324	.342	.359	.375	.390	.405	.419	.432	.444	.457	.468	.479	.490	.500
26	.037	.071	.103	.131	.161	.188	.212	.235	.257	.278	.297	.316	.333	.350	.366	.381	.395	.409	.422	.435	.447	.458	.469	.480	.490
27	.036	.069	.100	.129	.156	.182	.206	.229	.250	.270	.289	.308	.325	.341	.357	.372	.386	.400	.413	.426	.438	.449	.460	.471	.481
28	.034	.067	.097	.125	.152	.176	.200	.222	.243	.263	.282	.300	.317	.333	.349	.364	.378	.391	.404	.417	.429	.440	.451	.462	.472
29	.033	.065	.094	.121	.147	.171	.194	.216	.237	.256	.275	.293	.310	.326	.341	.356	.370	.383	.396	.408	.420	.431	.442	.453	.463
30	.032	.063	.091	.118	.143	.167	.189	.211	.231	.250	.268	.286	.302	.318	.333	.348	.362	.375	.388	.400	.412	.423	.434	.444	.455
31	.031	.061	.088	.114	.139	.162	.184	.205	.225	.244	.262	.279	.295	.311	.326	.340	.354	.367	.380	.392	.404	.415	.426	.436	.446
32	.030	.059	.086	.111	.135	.158	.179	.200	.220	.238	.256	.273	.289	.304	.319	.333	.347	.360	.373	.385	.396	.407	.418	.429	.439
33	.029	.057	.083	.108	.132	.154	.175	.195	.214	.233	.250	.267	.283	.298	.313	.327	.340	.353	.365	.377	.389	.400	.411	.421	.431
34	.029	.056	.081	.105	.128	.150	.171	.190	.209	.227	.244	.261	.277	.292	.306	.320	.333	.346	.358	.370	.382	.393	.404	.414	.424
35	.028	.054	.079	.103	.125	.146	.167	.186	.205	.222	.239	.255	.271	.286	.300	.314	.327	.340	.352	.364	.375	.386	.397	.407	.417
36	.027	.053	.077	.100	.122	.143	.163	.182	.200	.217	.234	.250	.265	.280	.294	.308	.321	.333	.345	.357	.368	.379	.390	.400	.410
37	.026	.051	.075	.098	.119	.140	.159	.178	.196	.213	.229	.245	.260	.275	.288	.302	.315	.327	.339	.351	.362	.373	.383	.393	.403
38	.026	.050	.073	.095	.116	.136	.156	.174	.191	.208	.224	.240	.255	.269	.283	.296	.309	.321	.333	.345	.356	.367	.377	.387	.397
39	.025	.049	.071	.093	.114	.133	.152	.170	.188	.204	.220	.235	.250	.264	.278	.291	.304	.316	.328	.339	.350	.361	.371	.381	.391
40	.024	.048	.070	.091	.111	.130	.149	.167	.184	.200	.216	.231	.245	.259	.273	.286	.298	.310	.322	.333	.344	.355	.365	.375	.385
41	.024	.047	.068	.089	.109	.128	.146	.163	.180	.196	.212	.226	.241	.255	.268	.281	.293	.305	.317	.328	.339	.349	.359	.369	.379
42	.023	.045	.067	.087	.106	.125	.143	.160	.176	.192	.208	.222	.236	.250	.263	.276	.288	.300	.311	.323	.333	.344	.354	.364	.373
43	.023	.044	.065	.085	.104	.122	.140	.157	.173	.189	.204	.218	.232	.246	.259	.271	.283	.295	.306	.317	.328	.338	.348	.358	.368
44	.022	.043	.064	.083	.102	.120	.137	.154	.170	.185	.200	.214	.228	.241	.254	.267	.279	.290	.302	.313	.323	.333	.343	.353	.362
45	.022	.043	.063	.082	.100	.118	.135	.151	.167	.182	.196	.211	.224	.237	.250	.262	.274	.286	.297	.308	.318	.328	.338	.348	.357
46	.021	.042	.061	.080	.115	.132	.148	.164	.179	.193	.207	.220	.233	.246	.258	.270	.281	.292	.303	.313	.324	.334	.343	.352	.361
47	.021	.041	.060	.078	.096	.113	.130	.145	.161	.175	.190	.203	.217	.230	.242	.254	.266	.277	.288	.299	.309	.319	.329	.338	.347
48	.020	.040	.059	.077	.094	.111	.127	.143	.158	.172	.186	.200	.213	.226	.238	.250	.262	.273	.284	.294	.304	.314	.324	.333	.342
49	.020	.039	.058	.075	.093	.109	.125	.140	.155	.169	.183	.197	.210	.222	.234	.246	.258	.269	.279	.290	.300	.310	.319	.329	.338
50	.020	.038	.057	.074	.091	.107	.123	.138	.153	.167	.180	.194	.206	.219	.231	.242	.254	.265	.275	.286	.296	.306	.315	.324	.333

prestimulus responses and 4 stimulus responses, the correct ratio would be .13. Table 1a should be used when the stimulus responses are between 1 and 25 and Table 1b when the stimulus responses are

between 26 and 50.

The matrix was computed by using a FORTRAN IV computer program.

REFERENCE

KAMIN, L. J. Temporal and intensity characteristics of the conditioned stimulus. In W. F. Prokasy (Ed.), *Classical conditioning: A symposium*. New York: Appleton-Century-Crofts, 1965. Pp. 118-147.

STIMULUS RESPONSES

	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
1	.963	.964	.966	.967	.968	.969	.970	.971	.971	.972	.973	.974	.974	.975	.976	.976	.977	.977	.978	.978	.979	.979	.980	.980	.980
2	.929	.931	.933	.935	.936	.939	.941	.943	.944	.946	.947	.949	.950	.951	.952	.953	.955	.956	.957	.957	.958	.959	.960	.961	.962
3	.897	.900	.903	.906	.909	.912	.914	.917	.919	.921	.923	.925	.927	.929	.930	.932	.933	.935	.936	.938	.939	.940	.941	.942	.943
4	.867	.871	.875	.879	.882	.886	.889	.892	.895	.897	.900	.902	.905	.907	.909	.911	.913	.915	.917	.918	.920	.922	.923	.925	.926
5	.839	.844	.848	.853	.857	.861	.865	.868	.872	.875	.878	.881	.884	.886	.889	.891	.894	.896	.898	.900	.902	.904	.906	.907	.909
6	.813	.818	.824	.828	.833	.838	.842	.846	.850	.854	.857	.860	.864	.867	.870	.872	.875	.878	.880	.882	.885	.887	.889	.891	.893
7	.788	.794	.800	.806	.811	.816	.821	.825	.829	.833	.837	.841	.844	.848	.851	.854	.857	.860	.863	.865	.868	.870	.873	.875	.877
8	.765	.771	.778	.784	.789	.795	.800	.805	.810	.814	.818	.822	.826	.830	.833	.837	.840	.843	.846	.849	.852	.855	.857	.860	.862
9	.743	.750	.757	.763	.769	.775	.780	.786	.791	.795	.800	.804	.809	.813	.816	.820	.824	.827	.830	.833	.836	.839	.842	.845	.847
10	.722	.730	.737	.744	.750	.756	.762	.767	.773	.778	.783	.787	.792	.796	.800	.804	.808	.811	.815	.818	.821	.825	.828	.831	.833
11	.703	.711	.718	.725	.732	.738	.744	.750	.756	.761	.766	.771	.776	.780	.784	.788	.792	.796	.800	.804	.807	.810	.814	.817	.820
12	.684	.692	.700	.707	.714	.721	.727	.733	.739	.745	.750	.755	.760	.765	.769	.774	.778	.782	.786	.789	.793	.797	.800	.803	.806
13	.667	.675	.683	.690	.698	.705	.711	.717	.723	.729	.735	.740	.745	.750	.755	.759	.764	.768	.772	.776	.780	.783	.787	.790	.794
14	.650	.659	.667	.674	.682	.689	.696	.702	.708	.714	.720	.725	.731	.736	.741	.745	.750	.754	.759	.763	.767	.770	.774	.778	.781
15	.634	.643	.651	.659	.667	.674	.681	.688	.694	.700	.706	.712	.717	.722	.727	.732	.737	.741	.746	.750	.754	.758	.762	.766	.769
16	.619	.628	.636	.644	.652	.660	.667	.673	.680	.686	.692	.698	.704	.709	.714	.719	.724	.729	.733	.738	.742	.746	.750	.754	.758
17	.605	.614	.622	.630	.638	.646	.653	.660	.667	.673	.679	.685	.691	.696	.702	.707	.712	.717	.721	.726	.730	.734	.738	.742	.746
18	.591	.600	.609	.617	.625	.633	.640	.647	.654	.660	.667	.673	.679	.684	.690	.695	.700	.705	.710	.714	.719	.723	.727	.731	.735
19	.578	.587	.596	.604	.612	.620	.627	.635	.642	.648	.655	.661	.667	.672	.678	.683	.689	.694	.698	.703	.708	.712	.716	.721	.725
20	.565	.574	.583	.592	.600	.608	.615	.623	.630	.636	.643	.649	.655	.661	.667	.672	.677	.683	.688	.692	.697	.701	.706	.710	.714
21	.553	.563	.571	.580	.588	.596	.604	.611	.618	.625	.632	.638	.644	.650	.656	.661	.667	.672	.677	.682	.687	.691	.696	.700	.704
22	.542	.551	.560	.569	.577	.585	.593	.600	.607	.614	.621	.627	.633	.639	.645	.651	.656	.662	.667	.672	.676	.681	.686	.690	.694
23	.531	.540	.549	.558	.566	.574	.582	.589	.596	.603	.610	.617	.623	.629	.635	.641	.646	.652	.657	.662	.667	.671	.676	.681	.685
24	.520	.529	.538	.547	.556	.564	.571	.579	.586	.593	.600	.607	.613	.619	.625	.631	.636	.642	.647	.652	.657	.662	.667	.671	.676
25	.510	.519	.528	.537	.545	.554	.561	.569	.576	.583	.590	.597	.603	.609	.615	.621	.627	.632	.638	.643	.648	.653	.658	.662	.667
26	.500	.509	.518	.527	.536	.544	.552	.559	.567	.574	.581	.587	.594	.600	.606	.612	.618	.623	.629	.634	.639	.644	.649	.653	.658
27	.491	.500	.509	.518	.526	.534	.542	.550	.557	.565	.571	.578	.585	.591	.597	.603	.609	.614	.620	.625	.630	.635	.640	.645	.649
28	.481	.491	.500	.509	.517	.525	.533	.541	.548	.555	.563	.569	.576	.582	.588	.594	.600	.606	.611	.616	.622	.627	.632	.636	.641
29	.473	.482	.491	.500	.508	.517	.525	.532	.540	.547	.554	.561	.567	.574	.580	.586	.592	.597	.603	.608	.613	.618	.623	.628	.633
30	.464	.474	.483	.492	.500	.508	.516	.524	.531	.538	.545	.552	.559	.565	.571	.577	.583	.589	.595	.600	.605	.610	.615	.620	.625
31	.456	.466	.475	.483	.492	.500	.508	.516	.523	.530	.537	.544	.551	.557	.563	.569	.575	.581	.587	.592	.597	.603	.608	.612	.617
32	.448	.458	.467	.475	.484	.492	.500	.508	.515	.522	.529	.536	.543	.549	.556	.562	.568	.573	.579	.584	.590	.595	.600	.605	.610
33	.441	.450	.459	.468	.476	.484	.492	.500	.507	.515	.522	.529	.535	.542	.548	.554	.560	.566	.571	.577	.582	.587	.593	.598	.602
34	.433	.443	.452	.460	.469	.477	.485	.493	.500	.507	.514	.521	.528	.534	.541	.547	.553	.558	.564	.570	.575	.580	.585	.590	.595
35	.426	.435	.444	.453	.462	.470	.478	.485	.493	.500	.507	.514	.521	.527	.533	.539	.545	.551	.557	.563	.568	.573	.578	.583	.588
36	.419	.429	.438	.446	.455	.463	.471	.478	.486	.493	.500	.507	.514	.520	.526	.532	.538	.544	.550	.556	.561	.566	.571	.576	.581
37	.413	.422	.431	.439	.448	.456	.464	.471	.479	.486	.493	.500	.507	.513	.519	.526	.532	.537	.543	.549	.554	.560	.565	.570	.575
38	.406	.415	.424	.433	.441	.449	.457	.465	.472	.479	.486	.493	.500	.506	.513	.519	.525	.531	.537	.542	.548	.553	.558	.563	.568
39	.400	.409	.418	.426	.435	.443	.451	.458	.466	.473	.480	.487	.494	.500	.506	.512	.519	.524	.530	.536	.541	.547	.552	.557	.562
40	.394	.403	.412	.420	.429	.437	.444	.452	.459	.467	.474	.481	.487	.494	.500	.506	.512	.518	.524	.529	.535	.540	.545	.551	.556
41	.388	.397	.406	.414	.423	.431	.438	.446	.453	.461	.468	.474	.481	.487	.494	.500	.506	.512	.518	.523	.529	.534	.539	.544	.549
42	.382	.391	.400	.408	.417	.425	.432	.440	.447	.455	.462	.468	.475	.481	.488	.494	.500	.506	.512	.517	.523	.528	.533	.538	.543
43	.377	.386	.394	.403	.411	.419	.427	.434	.442	.449	.456	.462	.469	.476	.482	.488	.494	.500	.506	.511	.517	.522	.527	.533	.538
44	.371	.380	.389	.397	.405	.413	.421	.429	.436	.443	.450	.457	.463	.470	.476	.482	.488	.494	.500	.506	.511	.516	.522	.527	.532
45	.366	.375	.384	.392	.400	.408	.416	.423	.430	.438	.444	.451	.458	.464	.471	.477	.483	.489	.494	.500	.505	.511	.516	.521	.526
46	.361	.370	.378	.387	.395	.403	.410	.418	.425	.432	.439	.446	.452	.459	.465	.471	.477	.483	.489	.495	.500	.505	.511	.516	.521
47	.356	.365	.373	.382	.390	.397	.405	.412	.420	.427	.434	.440	.447	.453	.460	.466	.472	.478	.484	.489	.495	.500	.505	.510	.515
48	.351	.360	.368	.377	.385	.392	.400	.407	.415	.422	.429	.435	.442	.448	.455	.461	.467	.473	.478	.484	.489	.495	.500	.505	.510
49	.347	.355	.364	.372	.380	.387	.395	.402	.410	.417	.424	.430	.437	.443	.449	.456	.462	.467	.473	.479	.484	.490	.495	.500	.505
50	.342	.351	.359	.367	.375	.383	.390	.398	.405	.412	.419	.425	.432	.438	.444	.451	.457	.462	.468	.474	.479	.485	.490	.495	.500

PRE - STIMULUS RESPONSES