PRINTOUT

JOSEPH B. SIDOWSKI

Products

Power Supplies for Op-Amps

Acopian power supplies for op-amps are 2.3 x 1.8 x 1 in. modules, with tracking outputs of ± 15 V, with regulation of $\pm 0.1\%$ and ripple of 1 mV. The Model D15-03 (25-mA outputs) costs \$24. The Model D15-05 (50-mA outputs) is priced at \$39.

Acopian Corporation
Easton, Pa. 18042

Tape Controller for PDP-11

The Series 1X 15 is a tape-memory controller interface to the PDP-11 computer. The controller handles up to four transports (seven- or nine-track) with a simple I/O cable interface. Minimal software intervention is needed, and I/O driver subroutines are supplied. Cost: \$3,040.

Information Products, Inc.
4202 Directors Row
Houston, Tex. 77018

Minicomputers

The XLO-8 minicomputer has a core memory of 4,096 bytes expandable to 32,768, a 64-byte ROM expandable to 32,768, and seven I/O ports. Each of the latter can transmit and receive data at bursts of 500,000/sec. Furnished software is a complete operating package. Also included are power supplies, real-time clock, general purpose display-status register, operator console, and TTY interface. Price: \$2,500 and up.

XLO Computer Products
850 Ladd Rd.
Walled Lake, Mich. 48088

The DC 6024/5 has a 24-bit word length and can directly address 32K words or indirectly address up to 65K. Cycle time is 1.0 microsec with standard 592 hardware operating codes. Basic price of \$10,900 includes 4K of memory, five general purpose registers, hardware multiply/divide/square-root functions, four levels of external-priority interrupt, display panel, and power supplies.

Data Craft Corporation
1200 N.W. 70th St.
Ft. Lauderdale, Fla. 33307

Tape Reader

A complete solid-state LED/sensor/amplifier subsystem for tape and card reading combines matched light-emitting diodes and sensors and is ready to install. The standard PP900 has nine channels and is compatible with DTL/TTL logic; it is capable of operating at speeds in excess of 1,000 characters per second. The unit operates at 5 V and 120 mA max and is priced at \$100.

Centralab Semiconductor
4501 N. Arden Dr.
El Monte, Calif. 91734

Add-On Memory

The Ecom F-11 is a plug-compatible add-on core memory extension for the PDP-11 minicomputer and offers any capacity of 4K to 32K in 4K increments. The unit has a 750-nsec cycle time and is priced at \$4,500 for 4K or \$8,500 for the 16K capacity.

Standard Memories, Inc.
15130 Ventura Blvd.
Sherman Oaks, Calif. 91403

Bidirectional Counter

The new Model GO-431 bidirectional counter is designed to accept positive and negative pulses (even simultaneously) without missing or jamming. Two solenoids are used with a true-differential mechanism to prevent miscounting. The display is six-digit and 5/32 in. high. The unit operates on 6 to 220 V, ac or dc. Counter speeds are available at 10 to 25 counts/sec.

Hecon Corporation
31 Park Rd.
New Schremsbury, N.J. 07724

Pushbutton Timer

The Model 1402 provides fixed-time intervals from 1/30 sec to 1 month. The timer combines a Bristol Sync-Lock synchronous timing motor and an enclosed snap-action switch. These are linked together by a heavy duty plastic cam to create the controller. The 10-A switch operates both motor and load.

Bristol Saybrook Co.
90 Coulter Ave.
Old Saybrook, Conn. 06475

Digital Printer Module

The Series 7840 digital printer

stores, displays, and prints. The unit has 10 columns with 12 or 16 char/column. More than one line/sec is printed from paralleled entry 4-bit binary code, and it is TTL compatible. Prices start at \$700.

Veeder Root
70 Sargeant St.
Hartford, Conn. 06102

Programmable Timer/Counter

The Tenor Series 67 includes four basic models: two timers for measuring elapsed time and time remaining, and two counters for counting up and down. The units are designed for multiple-timing applications in which several preset values are involved. Seven time bases: 50 Hz, 60 Hz, .1 sec, 1 sec, .01 min, .1 min, 1 min. The unit is programmable by BCD inputs.

Tenor Co.
17020 W. Rogers Dr.
New Berlin, Wis. 53151

Power Supplies for Information Displays

The new Series 700 power supply units are used to power "glow-type" information displays. The units include regulated and unregulated models requiring dc voltages of 5, 9, 12, or 15 V. OEM prices start at \$5.65.

Endicott Coil Co.
24 Charlotte St.
Binghamton, N.Y. 13905

Miniature Event Recorders

Miniature event recorders are available in 4- and 8-channel models for operation on a wide range of dc or ac sources. Yes/no or on/off responses are recorded in an inkless mode in 1/10 sec with a special stylus on pressure-sensitive paper. Prices begin at \$119.

Esterline Angus
Box 24000
Indianapolis, Ind. 46224

Interfaces

The Dataspan 410 coupler converts instrument decimal or BCD output directly into computer, terminal, or teletypewriter language. Programmable line formatting is standard (up to 10 digits per word and 10 words per line). Input level is DTL/TTL compatible.

The unit accommodates either high or low time logic and is priced at \$995.

Ambient Systems, Inc.
3020 Scott Blvd.
Santa Clara, Calif. 95050

A new interface control unit enables the Tycom 35/37 teletypewriter unit to operate on the external I/O bus of the PDP-8, Nova, and almost all other standard series minicomputers. Programmed data transfers in 92-character modified ASC II code occur at 15.5 cps. The Tycom 35/37 terminal including ASC II interface control is \$1,070.

Terminal Equipment Corporation
750 Hamburg Tpk.
Pompton Lakes, N.J. 07442

Tape Transport System

A seven- and nine-track tape transport and controller is compatible with the PDP-8 and the D-112 minicomputers. The controller can handle up to eight tape transports, odd and even parity, and bit densities of 200, 556, or 800 bits/in. The controller operates through a direct memory access feature and provides longitudinal and vertical parity operation and checking. The tape guidance system insures compatibility with IBM 729, 2401, or 2402 mag tape units. Operating speed is 45 in./sec. Price of controller and one tape unit: \$8,500. Additional transports are \$5,500 each.

Digital Computer Controls, Inc.
12 Industrial Rd.
Fairfield, N.J. 07006

Core Memory Modules for PDP 8-I

These add-on core memory modules can upgrade PDP 8-I minicomputer systems. A PDP 8-I with 8K memory can be expanded at a price of \$6,400 for the first additional 8K and \$3,132 for each 4K thereafter up to the 28K limit.

Information Control Corporation
9610 Bellanca Ave.
Los Angeles, Calif. 90045

Chart Recorder

The Astro-Med two-channel chart recorder is 3½ in. high and weighs less than 8 lbs. Linearity is 1% for the full 50-mm channel width. High torque assures good signal reproduction at frequencies up to 125 Hz. Standard chart speeds: 25 and 35 mm/sec.

Astro-Med
Atlan-Tol Industrial Park
West Warwick, R.I. 02893

Tektronix Storage Display
The Tektronix storage display

includes an 11-in. CRT and is priced at \$2,200; a hand copy output unit is available. The unit is for low-cost computer applications and provides high information density and good resolution, without drift or flicker.

Tektronix, Inc.
P.O. Box 500
Beaverton, Oreg. 97005

Stepper and Driver

The Rapid Syn Challenger System at \$99 includes a stepper (Model 34 H-599) and driver (Model M-21). The stepper has the following specs: input, 24 V dc, 20 W; stall torque, 150 oz in.; dynamic torque, 120 oz in.; bidirectional response, 550 PPS. The driver specs are: type, 4 phase TT2 compatible; input, 24 V dc; pulse, positive 2 V/min; current rating, 3-A max; switching rate, 10,000 max. Steppers are available in Sizes 8, 11, 15, 18, 20, 23, and 34, with step angles of 1.8, 5, 7.5, 15, 45, and 90 deg.

Computer Devices Corporation
of California
11901 Burke St.
Santa Fe Springs, Calif. 90670

Ultralow Pressure Sensor

The surplus ultralow pressure sensor is a tiny electrical switch activated by only 0.02 psi air or ½ in. or less water pressure. Single pole, normally open, 10-mA dc contact rating, 30 V ac/dc (usual loads require sensitive relay or solid-state control). Can be used as control, switch, counter, or edge guide. Weight: 10 g. Cost: \$3.95 (original cost was \$11.50). Stock No. 41,623 DA.

Edmund Scientific Corporation
300 Edscorp Bldg.
Barrington, N.J. 08007

Color Videotape Recorder

The VTR-1100 ½-in. color videotape recorder by Concord sells for \$1,295 and features automatic color lock and gain control. Compatible with the proposed EIAJ Type II and existing Type I tape, its automatic color lock holds even when shifting into the still-frame mode. Resolution is 300 lines (black and white) and 240 lines (color), and S/N ratio is 4 dB (black and white) and 36 dB (color).

Concord Communication Systems
40 Smith St.
Farmingdale, N.Y. 11735

Mini System for Education

The Data General Corporation Seminar series of minicomputer systems is designed around Basic language. Systems range from single-

to multi-user program swapping units that handle up to 16 users simultaneously. Seminar 1 has an 8K computer and teletypewriter and is priced at \$8,500; a single user can write programs in Basic. Seminar 5 is the largest system, with 24K words of core memory, five teletypewriters, a fixed head disk with 262K word capacity, and a 1.2-million-word moving head disk. Cost of Seminar 5 is \$50,975.

Data General Corporation
Route 9
Southboro, Mass. 01772

Core Memory Board

Data General Corporation has introduced an 8,192-word 16-bit core memory mounted on a single 15-in.-sq circuit board. The maker states that reliability is increased in the 8K boards because the one subassembly board, one core slack, and fewer discrete components result in a lower parts count and fewer connections. The 8K board is priced at \$4,100 for the 1,200-nsec version and \$4,400 for the 800-nsec model.

Data General Corporation
Route 9
Southboro, Mass. 01772

Reconditioned Scientific Equipment

All types of reconditioned scientific equipment are available including spectrophotometers, gas chromatographs, centrifuges, microscopes, and electronics. Catalog may be obtained from Western Scientific, Box 2076, Colorado Springs, Colo. 80901.

Animal Automatic Drinking Valves

Automatic drinking valve systems for all animals are available from Edstrom Industries, Inc., Waterford, Wis. 53185. All feature the pivoting stem valve.

Briefs

Components/Materials

Richco Plastic Co. is offering a free sample board containing physical samples of 24 of the most popular fastener and holding components. The board includes such items as PCB supports and guides, spacers, clamps, clips, bushings, wire ties, grommets, and idler pulleys.

Richco Plastic Co.
5825 N. Tripp Ave.
Chicago, Ill. 60646

Reed Relays

Reed relays are not new (developed at Bell Telephone Labs in 1938), but they have performance characteristics

that top solid-state relays in many designs. Reeds have excellent isolation between input and output (coil and contacts) and offer a number of advantages. For example, compared to solid-state relays, reed relays, at this printing, have very low resistance with contacts closed, better performance over a greater temperature range, a wide choice of multiple-contact setups, and better tolerance of temporary overloads. Compared to electromechanical relays, reed types have a minimum of mechanical parts, generally faster switching, economical coil power, longer life, and sealed contacts. Reeds, however, suffer from sticking (as do other traditional types), and erosion of contacts. Also, the exact timing sequence for multiple contact cannot be guaranteed, contact forces are low, and long time delay operations require external circuitry. So the overall performance of reed relays straddles the fence between electromechanical and solid-state except for very specific type operations. A selected list of reed relay suppliers is cited below:

A D Data Systems
830 Linden Ave.
Rochester, N.Y. 14625

Adams and Westlake
1025 N. Michigan St.
Elkhart, Ind. 46514

Allen Bradley Co.
1201 S. Second St.
Milwaukee, Wis. 53204

Allied Control Co.
100 Relay Rd.
Plantsville, Conn. 06479

Babcock Electronics Corporation
3501 N. Harbor Blvd.
Costa Mesa, Calif. 92626

C. P. Clare & Co.
3101 W. Pratt Ave.
Chicago., Ill. 60645

Compac Engineering, Inc.
845 Commercial St.
San Jose, Calif. 95112

Computer Computents, Inc.
88-06 Van Wyck Expressway
Jamaica, N.Y. 11418

Computer Products, Inc.
P.O. Box 23849
Ft. Lauderdale, Fla. 33307

Coto-Coil Co.
65 Pavillion Ave.
Providence, R.I. 02905

Cutler-Hammer, Inc.
4201 N. 27th St.
Milwaukee, Wis. 53216

Datron Systems, Inc.
88 Clinton Rd.
Fairfield, N.J. 07006

Dormeyer Industries, Inc.
3418 N. Milwaukee Ave.
Chicago, Ill. 60641

Douglas Randall Division
6 Pawcatuck Ave.
Westerly, R.I. 02891

Elec-trol, Inc.
26477 N. Golden Valley Rd.
Saugus, Calif. 91350

Electrothermal, Ltd.
6 Roosevelt Ave.
Roslyn, N.Y. 11576

Electronic Applications Co.
2213 Edward Ave. S.
El Monte, Calif. 91733

Electronic Specialty Division
18900 Sandy Blvd.
Portland, Oreg. 97220

Essex International, Inc.
1601 Wall St.
Ft. Wayne, Ind. 46804

Fifth Dimension, Inc.
P.O. Box 483
Princeton, N.J. 08540

Frederick Controls Division
East Church & Second St.
Frederick, Md. 21701

Frost Controls, Inc.
26 Pearl St.
Bellingham, Mass. 02019

GTE Automatic Electric
400 N. Wolf Rd.
Northlake, Ill. 60164

General Automatic Corporation
1055 S. East St.
Anaheim, Calif. 92805

General Electric
316 E. Ninth St.
Owensboro, Ky. 42301

General Electric
Waynesboro, Va. 22980

Grigsby-Barton, Inc.
3000 Industrial Dr.
Rolling Meadows, Ill. 60008

Guardian Electric Co.
1552 W. Carrol Ave.
Chicago, Ill. 60607

Hamlin, Inc.
Lake & Grove Sts.
Lake Mills, Wis. 53551

Hathaway Instruments, Inc.
5250 E. Evans Ave.
Denver, Colo. 80222

ILC Technology
164 Commercial St.
Sunnyvale, Calif. 94086

Juidinger Mfg. Co., Inc.
1921 W. Hubbard St.
Chicago, Ill. 60622

Kahl Scientific Corporation
P.O. Box 1166
El Cajon, Calif. 92022

MKC Electronics
454 E. Donovan Rd.
Kansas City, Kans. 66115

Micronex Reed Relay
24248 Crenshaw Blvd.
Torrence, Calif. 90505

Midtex, Inc.
10 State St.
Mankato, Minn. 56001

OKI Electronics
500 S.E. 24th St.
Ft. Lauderdale, Fla. 33316

Potter & Brumfield
1200 E. Broadway
Princeton, Ind. 47670

RLC Electronics
83 Radio Circle
Mt. Kisco, N.Y. 10549

Self Organizing Systems
P.O. Box 9918
Dallas, Tex. 75214

Stromberg-Carlson Corporation
100 Carlson Rd.
Rochester, N.Y. 14603

Struthers-Dunn, Inc.
Lambs Rd.
Pitman, N.J. 08071

Tech Serv, Inc.
5451 Holland Dr.
Beltsville, Md. 20705

Texas Instruments
34 Forest St.
Attleboro, Mass. 02703

Trompeter Electronics
8936 Comanche Ave.
Chatsworth, Calif. 91311

Universal Relay Corporation
42 White St.
New York, N.Y. 10013

Optoelectronics
Various types of optoelectronic devices are listed below.
LEDs (light-emitting diodes):
Infrared emitters are tabulated

according to continuous output power level, visible emitters by wavelength at the peak of spectral distribution. In citing specs, for maximum dc input, continuous radiant power is given. Total beam width refers to the entire angle of the emitted cone included between half power points; PRV is the peak reverse voltage and is the maximum that can be applied to the LED in reverse. Spectral bandwidth refers to a measure of how narrow spectrally the LED output is. The value is described as the half width in wavelengths at half the peak amplitude of the spectral distribution curve.

Bulk-effect photoconductors: Photoconductor cells are of cadmium sulfide (CdS), cadmium selenide (CdSe), and cadmium sulfoselenide (CdS₂Se). If you combine these materials, a variety of spectral responses are obtained. Used as optical switches, these devices have a finite resistance when closed; so the "on" or light resistance is an important parameter that determines the amount of power and current that can be switched through the cell. Dark resistance determines the degree of isolation provided by the photocell switch when it is opened; it is specified as the resistance 5 sec after an illumination of 2 fc has been removed.

Photodiodes: There are four ways of forming these junction devices—the pin junction, the avalanche detector, the PIN high-speed device, and the Schottky barrier photodiode. Sensitivity of photodiodes is generally defined as microamps of current produced per mW/cm² light input. All of these devices operate with a bias voltage so the current produced with no light impinging is the dark or leakage current (mA at a particular bias voltage).

Photovoltaic detectors: Most photovoltaic detectors are silicon devices; some selenium cells are available. Silicons are p on n, n on p, and Schottky barrier devices featuring a thin layer of metal over a silicon substrate. Photovoltaics are detectors that generate a potential when activated by light. They are made active by areas 10-100 times larger than those for photodiodes.

PhotoFETs: With photoFETs, the light is focused by a lens directly into the gate junction of a field effect transistor. With light falling on the gate junction, gate current starts to flow through the gate resistor which causes a change in gate voltage. This, in turn, produces an increase in drain current. Drain current increases when light incident on the gate increases.

PhotoSCR and SCS: With photoSCRs and photoSCSs, a light at a given threshold triggers a silicon controlled rectifier to change from a

low to a high conductance state. Threshold is specified in fc or mW/cm² at a given value of the cathode gate resistor. "Holding current" refers to the current (in forward direction) that must be maintained at a specific value to keep the switch "on." Otherwise, if the switch is "on" forward current can be increased up to maximum current.

Phototransistors: These devices are generally more sensitive than photodiodes (a function of built-in gain) unless the latter are combined with amplifier circuits. Of course, phototransistors are slower in responding and have higher dark currents. Light current is the major parameter for comparing phototransistors. It is generated for a given mW/cm² of light input from a tungsten lamp at 2870K. The acceptance angle of lens and phototransistor is defined as "the total angle to half response points."

Infrared: The near infrared region is covered by silicon photodetectors (this is the region below 1 micrometer), so the term infrared as applied to detectors is often defined as the radiation at wavelengths of 1 micrometer to 1 mm. In comparing infrared detectors, detectivity expresses rms signal/noise voltage ratios obtained per watt of radiant power independent of the detector. If the detectivity value is high, a better detector is indicated.

Brain Cooling

Akro-Medic Engineering is marketing a machine (the Bycks-Jennings Brain Cooling System) that monitors and maintains temperatures affected by the probe. Metering of the flow of coolant permits temperature control to within 0.2°C. In standard configuration, the unit is supplied with a dry ice/ethanol/heat exchange.

Testing Psychological Stress

The PSE-I Psychological Stress Evaluator records and displays psychological changes in people by electronically analyzing components of voice. Data sheets may be obtained from Dektor Counterintelligence and Security, Inc., 5508 Port Royal Rd., Springfield, Va. 22151.

Blood Pressure

Ultrasonic blood pressure measurements may be made with premature and newborn infants with the noninvasive Arteriosonde 1010. The unit is marketed by Medical Electronics Div., Hoffman-LaRoche, Inc., Cranbury, N.J. 08512.

Skin Transducer

Newvitronics, Inc., of Wichita,

Kansas, has developed a skin transducer that can be triggered to produce a distinct feeling on any skin area. The device is essentially a gated blocking oscillator that produces bipolar pulses, a 50-microsec pulse with an amplitude of up to 100 V, followed by a pulse of opposite polarity and longer duration. Representatives of the company state that bipolar pulses are necessary to cancel the chemical effects often associated with electrostimulation. These pulses are applied to a conducting element that acts as an interface between the skin and the device. The conducting element can be an electrode, or any material that is an electrical conductor. The interface, when attached to the Newvitronics device, results in a tingling feeling when current is applied to skin.

Possible applications include communicating with skin divers, gas warning devices, and as a device to let deaf individuals know that a phone is ringing. The unit sells in quantity at \$12-\$15.

Analog Multipliers

The output of an electronic analog multiplier is the product of two variable input signals. Multipliers and operational amplifiers can be combined for extracting square root and division.

When multiplying, both inputs have time varying signals applied, and the product of the signals is output. For division, an operational amplifier is included in the circuit, and the multiplier is placed in the feedback loop. The circuit for square-root extraction is similar to that used for division, since the multiplier is used in the feedback loop of an operational amplifier. The difference is that the input terminals of the multiplier are connected.

The analog multiplier has a number of other applications. Connecting the inputs together in a multiplying mode can obtain the square of a signal.

As a function generator, the multiplier is used in the feedback loop of an integrator and Schmitt trigger in series. The operation is as follows: the multiplier determines the voltage into the integrator; the integrator outputs a ramp signal. The ramp controls the Schmitt trigger, and a step is produced which is fed back to the integrator through the multiplier; the integrator input reverses polarity. A triangular wave results at the integrator output. At the Schmitt trigger output, a train of square waves results.

Multipliers are used with low-pass filters to detect the phase difference between signals. They are used also for obtaining mean square values, voltage-controlled filters, and other

purposes. Equations covering some of these uses may be found in an article by J. H. Pepper in the June 1972 issue of *Instruments and Control Systems*.

Light-Emitting Numerals

Some investigators may be interested in an article entitled "Comparative studies of the legibility of light emitting numerals" by H. Radl-Koethe and E. Schubert in the *SID Journal*, 1972, 1, 6-10. Legibilities of several readout technologies are evaluated, with the following parameters considered predominant: (1) technical parameters (electronic control devices, reliability, energy dissipation); (2) optical parameters (spectral luminance, contrast, luminous density, spatial and temporal distribution of luminance); (3) viewing condition (visual angle, incident light); and (4) subjective parameters (accuracy of legibility, thresholds).

Subhuman Primates

The March 31, 1972, issue of *Medical World News* reports that the United States now holds a simian population of about 40,000, represented by eight primate families and 62 different species in various labs and primate centers. The rhesus (*macaca mulatta*) is the most popular, with approximately 23,300 in 38 colonies.

A/D Converter with Differential Input

Function Modules, Inc. has developed a module combining an instrumentation amplifier with an input voltage drift of less than ± 1.0 microvolts/ $^{\circ}$ C, CMRR of over 130 dB and 100-M Ohms input impedance, and a 3 $\frac{1}{2}$ -digit integrating A/D converter in a single package. The unique Model 115 differential input

A/D converter is a 2 x 4 x 0.1 in. module priced at \$159 in single quantities.

Function Modules, Inc.
2441 Campus Dr.
Irvine, Calif. 92664

Sound Reading

A new reading aid identifies letters by producing a different sound for each. Reports indicate that the technique allows individuals to read printed or typed material at up to 60 words/min. The device was developed for the VA by Mauch Labs of Dayton, Ohio and consists of a 1 by 10 array of photoresistors controlling 10 oscillators, which operate between 440 and 3,520 Hz to produce 10 tones. These tones are combined to form a distinct sound for each letter.

Operations are as follows: A wand containing the optics and photoarray is moved across the printed material, and the image of each letter is projected onto the photoarray. This activates individual elements and oscillators depending on the letter read. The tones resulting from this operation are then amplified and led to two earphones. Letters with upward excursions (b, d, and l) are detected by the right ear; letters with downward excursions (g, j, and p) are detected by the left ear. This occurs after selectively amplifying signals controlled by the photoarray, so that signals produced by the highest elements in the array (b, d, and l) are amplified loudest for the left ear. Amplification is decreased with each element in the array. For the other ear, the reverse occurs.

COMPUTER PROGRAM

(The following information for this Briefs section was supplied by Clay

Burrows and Morris K. Morgret, Washington State University, Pullman, Washington.)

A computer program is available to analyze data produced by the aggression monitoring procedure developed by Morgret (1972) and Morgret and Dengerink (1972). The program was written in FORTRAN and originally used on the IBM-360. The capabilities of the program include the following: (1) Data is printed out in frequency distribution form—one distribution for each day or any combination of days, one distribution per group. (2) Data can be summed across any number of days for any individual hours and printed in frequency distribution form. (3) Random or selected days can be drawn and summed together. Essentially, the program will sum across days and/or hours in almost any combination and print the results in frequency distribution form in which the vertical axis is number of counts and the horizontal axis is hours of the day.

Although the program performs no statistical procedures, it provides a data output which would greatly simplify any desired statistical analyses.

A copy of the printout can be obtained by writing to M. K. Morgret, Department of Psychology, Washington State University, Pullman, Washington 99163.

REFERENCES

- MORGRET, M. K. An apparatus for detection and counting of mouse squeals. *Behavior Research Methods & Instrumentation*, 1972, 4, 21-23.
MORGRET, M. K., & DENGERTINK, H. A. The squeal as an indicator of aggression in mice. *Behavior Research Methods & Instrumentation*, 1972, 4, 138-140.