PRINTOUT

JOSEPH B. SIDOWSKI

Products

CRT Terminal

The VT06 alphanumeric display terminal is designed for use with all DEC computers. The unit is also compatible with other computers that are designed to support terminals using USA Standard Code for Information Interchange (ASCII). The terminal includes a 97-character keyboard, a 1,800-character display, a blinking cursor, an EIA RS-232B compatible communication interface, and split high-and-low-speed transmit/receive rates. Price: \$4,900.

Digital Equipment Corporation
Maynard, Massachusetts 01754

Digital Plotters

The Series 1430, 14-in. digital incremental plotters have factory selectable step sizes of 0.010 in., 0.005 in., 0.2 mm, or 0.1 mm. The plotters operate at 300 steps/sec (250 for the 0.010-in. unit). The 1450 series operate on-line to scientific computers and are compatible with plotter interfaces designed for 200 or 300 steps/sec. The 14-in. plotters are portable (45 lbs) and are suitable for small computers. Price: \$4,300.

University Computing Company
14761 Calita Street
Van Nuys, California 91401

Tape Readers

The CMC Series 18 tape reader features a solenoid drive, operates unidirectionally, 30 cps, and is panel-mounted (3½ x 7 in.). The unit reads all standard perforated 5-, 6-, 7-, or 8-channel tapes with all grades of paper or plastic tapes. Price of the unit is \$215. Options include 6- or 8-channel advanced feed hole (\$25) and an end-of-tape switch (\$15).

The Series 8 tape readers do not include a drive. This model is designed for direct mechanical coupling to other equipment. The unit is bidirectional, panel-mounted, with a 30-tooth sprocket. Price: \$155.

The Series 60, priced at \$355, is categorized as 60/70 cps, bidirectional, with magnetic pick-up.

Computer Mechanisms Corporation
493 Washington Avenue
Carlstadt, New Jersey 07072

Disk Memory Controller

Applied Magnetic's M-200 series of

disk memory systems can be interfaced to most families of minicomputers by the Series MC-400 Disc Memory Controller. The MC-400 can interface up to four disk memories with the Mac 16, Varian 620/I, PDP-8s, PDP-11s, the Nova and Super Nova, and Honeywell H-316 machines. Built-in circuitry is supplied for check-sum generation and verification. Price of the MC-400 starts at \$3,985.

Applied Magnetics Corporation
75 Robin Hill Road
Goleta, California 93017

Digital Printer

The Esterline Angus P-500 20-column digital printer is priced at \$1,095. The unit has 2.5 lines/sec print speed and DTL logic input compatibility. Input functions that the printer can record include shaft encoders, DVM outputs, digital output pressure transducers, and virtually any other BCD signal source.

Esterline Angus
Box 24000
Indianapolis, Indiana 46224

Sound Dampeners

Sound dampening cases are marketed by Van San Associates to quiet noise from IBM communications terminals and Teletype machines. The units are priced at \$150 each.

Van San Associates
32 S. San Gabriel
Pasadena, California 91107

Motor Speed Control

The Model PB series (B & B Motor & Control Corporation, 96 Spring Street, New York, New York 10012) motor-speed controller has an internal adjustable potentiometer. When set, the pot controls acceleration and deceleration to the required speed every time a button is depressed. Price of the four-pushbutton type is \$190 for 1/8 hp.

Function Generators

The Model FG-1 function generator provides sine, square, and triangle waveforms. Dynamic frequency is 1.0 Hz to 1 MHz. Output signals: MAIN—200 MV to 20 V peak to peak, at 50-ohm output impedance; SYNC-IV peak to peak at 50 ohms. Price: \$290.

The Model F-2 offers an additional ramp waveform with a dynamic

frequency of .005 Hz to 1 MHz. Output signals: MAIN—200 MV to 30 V peak to peak. All waveforms are simultaneously available at independent connectors.

EL Instruments Inc.
61 First Street
Derby, Connecticut 06418

Oscilloscope System

Tektronix is marketing a new 5103 N oscilloscope system. The low-frequency system has nine low-cost plug-ins to choose from, including six vertical amplifiers and three time bases. The vertical amplifiers include a 1-mV/div single-trace unit and a 1-mV/div dual-trace unit, both with dc-to-2-MHz bandwidth. Two other amplifiers have high-gain differential inputs with 50-microV/div deflection factors, CMRR as high as 100,000:1 and dc-to-1-MHz bandwidth. There is a single sweep and a delayed sweep time base with sweeps to 100 nsec/div. There is also a choice of single beam (\$540), a dual beam (\$870), a single-beam storage (\$1,020), and a dual-beam (\$1,370) storage module. Each has a 6½-in. CRT with 8 x 10 divisions.

Tektronix, Inc.
P.O. Box 500 A
Beaverton, Oregon 97005

Magnetic Tape Systems

The 640-9/15 magnetic tape system is compatible with the DEC PDP-9 and PDP-15 computers. Brief specifications are: 7- or 9-track, 556 or 800 bpl, and 24 or 37.5 ips.

Eclectic Computer Corporation
2830 Walnut Hill Lane
Dallas, Texas 75229

New Logic Gate for Ortec Modules

Ortec Inc. of Oak Ridge, Tennessee, has introduced a versatile all-solid-state logic gate as the latest module in its Series 4600 program-control and stimulator system for life-science experiments.

The Model 4612 logic gate consists of an AND and an OR gate that can be used singly or in combination to provide a wide variety of logic-signal outputs. These outputs are then used to control other modules within a system.

Either or both of two inputs of Logic 1 will produce a Logic 1 output

at the OR gate. One AND-gate input can be selected to be either the duration of Input A or the interval from Input A to Input B. The second AND-gate input is obtained from either the output of the OR gate or a constant dc signal.

Minimum input pulse width is 100 nsec; maximum repetition rate is 4 MHz. Any pulse up to +1 V produces a Logic 0 output; any pulse greater than +2 V produces a Logic 1 output.

The 4612 is provided in a single-width Nuclear Instrument Module standard format.

Ortec Inc.
445 F Midland Road
Oak Ridge, Tennessee 37830

Digital Servos

The Digi-Torque digital servos provide resolutions limited only by present-day encoder technology, these being in the order of 2^{19} per turn, or approximately 2 arc/sec. Digital-to-analog system techniques permit positioning and repeatability to $\pm 1/2$ bit with virtually no drift or overshoot. Dynamic range of the system is a direct function of the number of bits of control circuitry if a shaft encoder is selected which has greater increment resolution than the system requirement. Velocity or positioning controls are not necessarily internal but may be remote controls such as digital switches or a computer operating in real time. The digital servo may be treated as a conventional computer output terminal. Digital control options: computer output buss; digit switches (local, remote, multiplexed); Teletype; tape (punch or magnetic). Data input period: 700 nsec (typ), serial data option available, computer-compatible. Data store period: 300 nsec (typ), computer-compatible. When used as an output terminal, maximum information rate may be obtained through use of the "done flag," a feature generally not available in analog servos.

Astro Mechanics Inc.
P.O. Box 9498
Austin, Texas 78757

Pressure-Sensitive Transistors

The PITRAN is a silicon NPN planar transistor that has its emitter-base function mechanically coupled to a diaphragm. A differential pressure or a point force applied to the diaphragm produces a large reversible change in the gain of the transistor; i.e., the PITRAN's output is modulated by the mechanical variable. The transistor can provide a linear output voltage, amplify or switch other electrical

signals, or be used as the active element in an oscillator for FM or PWM outputs. Prices vary, depending on specs. A PITRAN mounted in a holder plus Model 861 electronics sells for \$168 or \$178, depending on the transistor selected. The 861 electronics package is used where frequency or/and amplitude of pressure changes must be measured. The 861 consists of a biasing section, a dynamic bias stabilization loop, and an IC operational amplifier. Output of the unit is insensitive to long-term, slowly varying pressure signal inputs, but will respond to rapid pressure changes.

Stow Laboratories Inc.
Kane Industrial Drive
Hudson, Massachusetts 01749

Pressure/Electric Switch

The de Hart pressure/electric switch, Model 505-3, facilitates pneumatic to electric interfacing. Two input tubes for 1/16-in.-i.d. tubing enable switch activation by pressure, vacuum, or differential pressure. The model is also available either normally closed or normally open. Switching speed is 125 cps, and life expectancy is over 100 million cycles. Activating pressure is 1.0 ± 0.2 in. H₂O. Maximum operating pressure is 10 psi (continuous). The unit weighs 4 g. Price: \$5.

de Hart Manufacturing Company
2 Noble Street
Norristown, Pennsylvania 19401

Rat Chamber, Lever, and Pellet Feeder

The Predco rat chamber is priced at \$50-\$55 without lamps or manipulanda. Rat food pellet feeders are \$80 each, with a 300-mg, 7.5-mm-diam banana pellet unit priced at \$90. The rigid stainless steel lever is \$25. Operational force may be varied by means of an adjustable counterweight. The same company designs and manufactures pigeon equipment.

Predco
202 Temple Road
Waltham, Massachusetts 02154

Human Shockers

Farral Instruments is advertising several human shockers for aversive conditioning. The Model AR-3 is an improved version of a wireless shocker with a range of 75 ft indoors and 300 ft outdoors. The control unit is a small hand-held device; the receiver-shocker is a small unit housed in a leather case and is usually attached to the S by a belt around the waist. Price of the unit is \$425.

A visually keyed shocker consists of a slide projector attached to a shock

generator. The edges of shock slides are marked with ink which is read by a phototransistor which reads the mark and triggers the shock. Neutral slides are unmarked. Model AV-2 is priced at \$985; the Model AV-5 (available in July 1971) is \$550.

A series of personal shockers is designed around a four-transistor pulse circuit. The self-shocker is battery powered with a shock potential adjustable from 0 to 800 V. The pulse is 1-2 msec in duration with a 10- to 20-Hz rate. These "take-me-along" units are priced at \$50.

The same company advertises a patient monitor instrument (a battery-operated resistance bridge with meter indicator and audio frequency converter to indicate audibly changes in resistance) for measuring GSR or skin temperature at \$129 without transducers.

An item that may be of interest to some researchers or behavior modifiers is Accessory Kit PM-1P. It allows one to hear changes in penile expansion for an additional \$30.

Farral Instruments Company
P.O. Box 1037
Grand Island, Nebraska 68801

Digital Printing Systems

The Model 810 Digital Printer provides a 9-column printout for \$845. The printer has the following features: floating decimal point; accepts IC and high-voltage logic inputs; special character wheels are available; used with Model 880 tape perforator attachment; provides computer input capability and a print command timer option. Keyboard and tape punch attachments are also available.

Novatronics Company
P.O. Box 516
Montgomeryville Industrial Park
Montgomery, Pennsylvania 18936

Brain Microstimulator

The CIRCON MS7000 Brain MicroStimulator is a radio-controlled system consisting of three major elements: a radio transmitter which commands a sequence of stimulation, a microminiature receiver/stimulator which receives the command and generates a 100-Hz pulse train, and a bipolar electrode which delivers the pulse train. An antenna, power supply, detector, tuned circuit, potentiometer, multivibrator, and transistor switch are all packaged in a cylinder, 1.90 cm in diam and 1.00 cm high, weighing 3 g. Waveform is biphasic. The built-in potentiometer allows for the adjustment of peak-to-peak voltage from 0 to 8 V. The receiver/stimulator unit is mounted on a removable plug

so that it can be used on different animals. Electrodes consist of two strands of 15-ga insulated stainless steel wire twisted together and are 4 cm long. The two 0.018-in.-diam male pins of the receiver/stimulator are inserted into the female plug and fixed into position by a threaded collar. The complete MS7000 MicroStimulator System is priced at \$750 and includes the MS7010 receiver/stimulator (\$350), the MS7020 transmitter (\$300), 10 MS7041 bipolar electrodes and dust caps (10/\$25), 24 batteries, and one each of three antennas (15 cm sq at \$25 each sold separately, 30 cm sq at \$35, and 60 cm sq at \$45).

CIRCON Corporation
Santa Barbara Airport
Goleta, California 93017

Photoelectric Control

The Phopac 101 responds to the making or breaking of a light beam to start, stop, or change direction of the controlled output. Range is 12 ft using a bare 20-W bulb. Speed: 1,200 cycles/min. Contacts: isolated SPDT 2A resistive. The unit is priced at \$24.50 and is sealed in a case that is 2½ x 3½ x 1½ in.

The Phopac 201 general-purpose light source is adjustable in any direction from mounting surface (0-180 deg) and is priced at \$4.90 with bracket and bulb. Range with the Phopac 101 is 6 ft. Power: 6.3 V, .6 A (No. 64 bulb). Diameter: 1 in.

The Phopac 202 is a sealed light source with a range of 20 ft and beam width of 3 deg + 1 in. Diameter is 1.04 in. Price: \$8.20 with bracket.

The Phopac 20X transformer is priced at \$3 and is mountable on the light-source bracket.

CMC Electronics
150 Wells Avenue
Newton, Massachusetts 02159

Noise Meter

The Noise Survey Meter is a hand-held pocket-size unit (5½ x 2-3/8 x 1-1/16 in.) designed by the Noise Abatement Society, London, England. Meters now stocked cover decibels on the A scale in increments of 80, 85, 90 dB (\$49.50) and 70, 80, 90 dB (\$49.50). A more sensitive meter to measure noise levels of 50, 60, and 70 dB A scale is available at \$62.20.

R-DEck, Inc.
12 Dale Street
Waltham, Massachusetts 02154

Converters

The microverter DACs (digital-analog converters) are

completely self-contained and include digital interface buffers, current switches, network, internal reference, and output amplifier. All models are DTL/TTL compatible. Both binary and BCD input coding are offered; binary units feature selectable output voltage accomplished by simple pin strapping, plus straight binary and two's complement coding. The units are priced at \$19 (8-bit) to \$39.

The analog-digital converters (ADC) are priced at \$49 (8-bit) to \$69 (10-bit). Each ADC contains analog-to-digital conversion control, clock, comparator, switches, ladder network, and precision reference. Parallel binary output provides computer interfacing.

Zeltex Inc.
1000 Chalomar Road
Concord, California 94520

Oscilloscope Camera

The Scope-Mate Model SC02 oscilloscope camera set fits either inside or outside 3-, 4-, and 5-in. round or rectangular CRTs and captures either one-shot or recurring trace data. The unit has a low distortion auxiliary lens system and is used in conjunction with the standard Polaroid Colorpack II or III. The electronic shutter control allows shutter speed variations from infinite to shorter than 1/100 sec. The Model SC02, including a Colorpack II camera, is available for \$139.50.

Integrated Controls, Inc.
P.O. Box 17296
San Diego, California 92117

Regulated Power Supplies

OR Electronics is marketing regulated dc power supplies at \$25 each with voltages of 10 or 20 V dc. Output current is 100 mA; ripple and noise is less than 0.1 mV rms. The units have short circuit and input transient protection. The supply will withstand a 10-A pulse on output line for 10 msec without degradation. Size: 1½ x 1½ x 3½ in.

OR Electronics, Inc.
P.O. Box 456
Piscataway, New Jersey 08854

Multiplex/Coupler

The DigiTem BAC multiplex converts BCD data to ASCII format and provides an output suitable for driving Teletype equipment so that both printed and machine-readable outputs are obtainable from laboratory instruments. With a print time of 1.6 sec, the data obtained can then be used for computer analysis. The multiplex/coupler includes an eight-digit data field with decimal point location and units indication, a

choice of three BCD codes, single Teletype lines for each data field, up to four inputs, and a parallel ASCII output for driving peripherals. The unit is priced at \$995 and up.

DigiTem
1 Adler Drive
East Syracuse, New York 13057

Cassette Tape Systems

The Interdata Cassette Tape System has a dual transport with a single controller combined in a single package with a built-in power supply. Transfer rate is 300 bytes/sec. Other features include 250 kbytes of storage per cassette (300 ft), 800 bits/in. data packing density, and 3 in./sec read/write speed. Price: \$2,500 with interface.

Interdata Inc.
2 Crescent Place
Oceanport, New Jersey 07757

The TP-1372 Double-Dek cartridge-loaded magnetic tape includes a single controller, two transports, and software at a price of \$3,590. The total capacity of the system is 512 K words. Normal operation is via program interrupt, one byte at a time. The unit features encoding and automatic track select as standard features. Interfaces are available for several minicomputers.

Tennecomp Systems, Inc.
795 Oak Ridge Turnpike
Oak Ridge, Tennessee 37830

Cartridge Disk Drive

The Iodisc 1001 is a cartridge disk drive for minicomputers with a 11-million-bit capacity and a standard single-disk removable cartridge as the storage medium. The unit is also available as a complete data storage system with minicomputer interfaces, power, cabling, and packaging. Prices start at \$5,000.

Iomec Inc.
345 Matthew Street
Santa Clara, California 95050

Light Pens

The LP 200 light pen has a 3-microsec response time and incorporates a touch activator switch on the barrel of the pen rather than mechanical switch activation. Price of the unit is \$795.

Information Control Corporation
9610 Bellanca Avenue
Los Angeles, California 90045

DEC is marketing a light pen, with 400-nsec throughput rate, which utilizes a foot-operated activator

switch. The pen can be used with the Graphic-15 systems and is priced at \$700.

Digital Equipment Corporation
Maynard, Massachusetts 01754

Video System

Ampex Corporation advertises the Instavision system as the smallest, lightest, most compact cartridge video system to date. The unit weighs less than 16 lbs with batteries and measures 11 x 13 x 4½ in. in size. Instavision includes autosearch, cartridge loading, portable battery or ac operation, 50-min minimum play or recording, two independent audio channels playback (single-channel audio record), slow motion and stop action. Prices are approximately \$800 for a monochrome player, \$900 for a monochrome recorder/player, and \$1,000 for a color recorder/player. Any model may be modified for color or recording capability after purchase, with the addition of single plug-in modules. A companion recording monochrome camera is offered for \$400; blank tape cartridges are approximately \$13 for 30 min of recording at Type I Standard, or 60 min in an extended play mode.

Ampex Corporation
2201 Estes Drive
Elk Grove, Illinois 60007

Briefs

Pocket Calculator

Mostek Corporation engineers have designed a calculator with the complete logic fitted onto a tiny silicon chip the size of three rice grains. The package measures 0.6 x 2 in. and contains over 2,100 transistors, 360 logic gates, and 160 flip-flops. This replaces all of the conventional calculator internal circuitry. The IC is connected to the power supply, readouts, and keyboard. The machines can add, subtract, multiply, and divide up to 12-digit numbers in length. The calculators also have floating point entry, four-place selection for the decimal point, and leading-zero blanking for the digital display. The calculator is made by the Nippon Calculating Machine Co.

Another pocket-size calculator, the Sharpe, has been on the market a year or so. This unit measures 4 x 6¼ x 3 in. The circuitry consists of four LSI packages, with each LSI unit containing 1,875 transistors, resistors, diodes, and capacitors.

Multiplex Switch

Siliconix Inc. (1140 East Evalyn

Avenue, Sunnyvale, California 94086) is marketing a new monolithic 8-channel multiplex switch. The SI3705K IC provides TTL-compatible logic input lines and includes a one-out-of-eight decoder. The unit is usable in A/D conversions, multiplexing, and similar applications.

Teletype Lease

RCA is leasing Teletype equipment. The Model 33 ASR is \$50 per month; the Model 33 KSR is \$37.

Minicomputers

Varian Data Machines (2722 Michelson Drive, Irvine, California 92664) has introduced the 620/L as a successor to the 620/i. The 620/L is fully compatible with the i but will be priced at \$5,400 (4K) compared to \$9,900 for the earlier machine. Additional increments of 4K words will sell for \$2,300.

Datacraft Corporation (776 N.E. 40th Court, Fort Lauderdale, Florida 33307) has introduced a 24-bit minicomputer, the 6024/5, with a 1.2-microsec cycle time and 4K memory expandable to 32K. Because of word length, 582 instructions (op code) are offered. Instructions in the machine's repertoire include multiply (9.6 microsec), divide (18 microsec), and square root (16.8 microsec). Up to 14 channels are accommodated at the I/O section, with each channel having up to 16 devices or device controllers. Priority interrupts: 2-16 levels. The \$15,500 basic price includes the above features as well as software and parity.

Digital Computer Controls, Inc. (Fairfield, New Jersey 07006) has announced the new D-126 minicomputer, which is advertised as hardware- and software-compatible with the DEC PDP-11. The D-126, however, is priced at \$2,600 for the basic central processing unit. The 16-bit machine has 4K words of read-write memory expandable to 28K; read-only memory is optional. The computer has a 1.2-microsec cycle time, four main levels of priority interrupts, eight registers, and direct memory access capabilities.

The CIP/2100 minicomputer (Cincinnati Milacron, Lebanon, Ohio 45036) has been redesigned. In the new version, one monolithic read-only memory takes the place of three printed circuit board ROMs. Debugging is aided by display of the 8-bit data bus, 10-bit ROM address, and 16-bit core memory address. The price is \$4,915.

The Electronic Processors, Inc. (5050 So. Federal Boulevard, Englewood, Colorado 80110) EPI-118 new minicomputer has a 900-nsec cycle time, 18-bit words, a 4K memory expandable to 32K, and four

hardware registers. A specially designed power supply supplies high immunity from line interference and static. The basic 4K system is priced at \$5,900 with selected peripheral device interfaces.

Texas Instruments, Inc. (12303 Southwest Freeway, Stafford, Texas 77006) has announced price reductions on the Models 960 and 980 minicomputers. The single-unit price for the 960 has been cut from \$14,500 to \$8,450 and the 980 has been repriced from \$16,700 to \$9,580. (See the review of minicomputers in this journal Vol. 2(6), 1970, for the specs of these and other machines.)

IC Memories

Signetic Memory Systems, Inc., recently announced a 4,096-bit bipolar read-only memory selling for as low as 1½ cents per bit with a typical access time of 55 nsec. The ROM is organized in a 1,024 by 4 bit matrix and will be priced at approximately \$100 each in small quantities. The marketing department of Signetics note that the number of circuits required in microprogramming applications are reduced with the use of ROMs. A 4K-bit ROM can eliminate 114 ICs, which saves approximately \$120 in cost, 8.5 W of power, and 100 cu in. of physical volume.

Computer and Genetics

Scientists at the Caltech Jet Propulsion Laboratory have devised a computerized system whereby pictures of chromosomes in the human blood cell can be analyzed in 3 min. Commercial production of the system is expected in a year or two.

Conversion Table for Optoelectronics

To Convert From	To	Multiply By
angstroms	nanometers millimicrons	0.1
angstroms	microns micrometers	0.0001
nanometers millimicrons	angstroms	10
microns micrometers	angstroms	10,000
nanometers millimicrons	microns millimeters	.001
microns micrometers	nanometers millimicrons	1000

Tracking

The 1971 edition of the *Bibliography on Tracking Controls* is in preparation and should be ready soon for distribution. Write Morton H.

Medical Electronics

Steps are being taken that might lead to federal standards and compliance testing of medical electronic equipment. The Federal Food and Drug Administration is now carrying out an inventory of medical devices in order to identify those devices that might be exempted from standards, those that will require evaluation and test because of present lack of standards, and those that can be tested for compliance by existing criteria. A study carried out at the University of New York's Downstate Medical Center revealed that approximately 40% of the equipment delivered failed to meet the Center's safety requirements or the manufacturers' specifications.

Notes

Modified nontraumatic headholder*

GABRIEL P. FROMMER
Indiana University
Bloomington, Indiana 47401

Erickson (1966) has described a simple nontraumatic headholder for small mammals, that is easy to build and simple to use. It consists of a pressure bar that clamps down onto the animal's nose and a mouthpiece milled and drilled out of brass rod to fit the animal's incisors and molars. This note describes a modification of the mouthpiece to permit it to accommodate variations in head size which otherwise result in an improper fit and consequently an improper orientation of the head for stereotaxis.

Figure 1a shows a top view of the modified mouthpiece for the rat mounted on a block which fits directly onto a Kopf cat-monkey stereotaxic instrument in place of the plate bearing the cat-monkey infraorbital clamps and mouth bar. Figure 1b shows a side view of the headholder with the pressure bar over the mouthpiece. The rat's mouth is slipped over the rounded end of the mouthpiece, care being taken to keep the corners of the mouth from catching on the sides of the mouthpiece. The incisors fit into Hole I, and the molars fit inside the flanges created by milling out a

Figure 1

13/32-in.-wide depression in the mouthpiece. Sharp edges on the flanges should be rounded off. The basic modification of Erickson's design is the cut, C, down the middle of the mouthpiece to Hole H, and the two 3-48 screws, S₁ and S₂, on the side of the mouthpiece. The hole for S₁ is threaded only on the side opposite its head; tightening this screw pulls the flanges closer together to fit rats with smaller than average heads. Tightening S₂ spreads the flanges apart to accommodate larger than average heads.

When the mouthpiece is oriented in the horizontal plane of the stereotaxic instrument, the brain is positioned reasonably closely to the coordinate system used by König and Klippel's (1963) atlas of the rat brain. The bregma (intersection of the coronal skull suture and the sagittal or midline suture) can serve as the zero point. This point lies approximately in the 7,190-micron frontal plane of this atlas, about 5.5-6.0 mm above its horizontal plane. Because the skull sutures vary from animal to animal and because this atlas is based on rather small animals, the coordinates obtained by using this combination of atlas and head positioning system must be considered approximate, subject to modification based on anatomical

verification of electrode tracks aimed for the structures of interest. Specifically, the rostro-caudal dimensions of the atlas appear to be shorter than the brains of the 300- to 500-g albino rats used in this laboratory. That is, electrodes aimed for the midbrain and posterior thalamus, according to coordinates derived from the atlas using bregma as zero, are found to lie rostral to their intended position.

It is also possible to use this headholder with the DeGroot (1959) coordinate system. If the mouthpiece is kept in the horizontal plane, the 15-deg tilt of the skull in this coordinate system must be taken into account trigonometrically or graphically from the sagittal plates. The mouthpiece can be tilted at a 15-deg angle to orient the brain directly in this system. The Pellegrino-Cushman (1967) atlas provides coordinates referred to the bregma as well as to the earplug-incisor bar headholder.

REFERENCES

- DeGROOT, J. The rat forebrain in stereotaxic coordinates. *Verhandelingen der koninklijke Nederlandse Akademie van Wetenschappen, AFD. Natuurkunde*, Tweede Reeks, 1959, 52, 1-40.
- ERICKSON, R. P. Nontraumatic headholders for mammals. *Physiology & Behavior*, 1966, 1, 97-98.
- KÖNIG, J. F. R., & KLIPPEL, R. A. *The rat*

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