

# New Systems Debut at SJCC

## Kopp Named V.P.

### Finance and Administration

W. Brewster Kopp has been named vice president — finance and administration at DEC. Kopp, formerly senior vice president of the First National Bank of Boston and formerly assistant secretary of the Army for financial management, assumed his new duties on June 16.

As DEC's vice president — finance and administration, he is the company's chief financial officer, and his responsibilities include treasury, control functions, budgets, legal matters, data processing, planning, international banking relations and stockholder relations.



At his desk Monday morning, Kopp assumed his duties of vice president—finance and administration.

Kopp started his business career as an investment securities analyst, and subsequently, for many years was employed by the American Can Company, in New York City. Among positions he held at American Can were division controller and corporate manager of financial planning and budgets. He entered Government service in 1965, leaving in 1967 to join the First National Bank, where he has helped the bank to pioneer in the application of profit center accounting, profit planning and other planning and management techniques.

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The interaction of man and computer was the theme of DEC's participation at this year's Spring Joint Computer Conference. Highlighting the company's presentation was the first public showing of the medium-scale PDP-15, DEC's newest computer offering.



SJCC was a high point in DEC's trade show involvement. Several systems were highlighted at the show.

Selected to represent the PDP-15 line was the PDP-15/20, one of four configurations of the the 18-bit computer being offered. Exhibited were the PDP-12, a computer system designed specifically for the laboratory, and the PDP-8/L, the company's smallest general purpose machine. Also featured were eight time-sharing terminals, six on-line to PDP-10 time-sharing systems throughout the country, and two on-line to a Time-Shared 8 at the company's Maynard plant.

## PDP-15 Hardware/Software Introduced Simultaneously

The PDP-15's introduction marked one of the first times that both hardware and software have been introduced simultaneously. A variety of program packages have been designed for the new system and will be available with first deliveries.

The computer itself will have several easily expandable configurations and will be competitive with a variety of other computers, from top of the line 16-bit machines to large computing systems. In all cases, the new computer is expected to have a price/performance advantage. Among the features of the new machine are a separate input/output processor that works parallel to, but independent of the central processor, the extensive use of integrated circuitry and a memory cycle time in the 800-nanosecond range. Core memory will be expandable from 4K to 128K.

For more information, check customer service box #1.

## DIAL for PDP-12 Shown for First Time

DEC's newest entry into the laboratory market, the PDP-12, was also seen at SJCC. The system includes a 12-bit central processor with memory expandable from 4K to 32K, two magnetic tape units, a cathode ray tube display, a 16-channel A/D converter and multiplexer, a data terminal, a teletypewriter and a paper tape reader/punch.



PDP-12 Product Line Manager Ed Kramer demonstrates his system's capabilities. The PDP-12 is the successor to the LINC-8 laboratory computer.

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## Business Language Added To PDP-10

A COBOL (COmmon Business Oriented Language) programming package, which will add a commercial data processing capability to the PDP-10 time-sharing system, is currently being developed by DEC. COBOL will be available in the Spring of 1970.

In making the announcement, Robert Savell, PDP-10 product line manager said, "The development of COBOL should be viewed simply as another response to a market requirement for an additional computing capability for our product. Our long-standing commitment to our traditional markets will be maintained. The addition of this widely-used, easy to understand business language makes the PDP-10 a truly general purpose time-sharing system.

Savell added that COBOL should enhance the PDP-10's already favorable position in the time-sharing computer market. There are some 70 PDP-10 systems presently being used world-wide by commercial time-sharing utilities, industrial firms, universities and research organizations.

He noted that the COBOL language would be of significant importance particularly to time-sharing utilities using the PDP-10 as they would now be able to offer both engineering and business services on the same computer in either the on-line or batch processing modes. Savell also commented that the addition of COBOL "bolsters the PDP-10 as a prime choice for university computing centers and industrial firms which are looking for a superior time-sharing computer for engineering purposes, but which must also be suitable for administrative functions."

The new COBOL package joins an already extensive list of programming languages for the PDP-10 such as FORTRAN and BASIC and a comprehensive library of other programming aids. DEC also supplies a complete line of peripherals for its PDP-10 including mass data storage units, magnetic tape units, printing devices, card handling equipment and display hardware.

PDP-10 COBOL is based upon the latest U.S.A. Standards Institute language specifications. Expandable to use the full 262K 36-bit word memory capacity of the PDP-10, COBOL will require a minimum of 16K user core area, disk storage in excess of 100,000 words and a suitable input device.

The COBOL package is comprised of a compiler, operating system, source library maintenance, and sort/merge package.



**COBOL will give the PDP-10 a commercial data processing capability. Built on flexibility, performance, and economy-factors which allow it to perform time-sharing (simultaneous operation by many different users), batch processing (processing vast amounts of data with extreme rapidity), and real-time operations (solving problems with no apparent time delay), the PDP-10 offers the best price/performance ratio in the industry.**

Among other features, PDP-10 COBOL will allow FORTRAN or MACRO sub-routines to be called, will have an on-line compilation and execution capability and will offer an optional map and object program listing. PDP-10 COBOL will be reentrant and will provide reentrant object programs.

For more information, check customer service box #2.

## UNIVAC Uses DEC Logic

UNIVAC, the industry's senior commercial manufacturer of computers, is using DEC logic in testing equipment at its Core Manufacturing facility here for electronic tests on all magnetic cores used in their own computers and cores sold to OEM's.

According to Engineering Superintendent Manfred Felsner, DEC K-Series and M-Series modules were selected because of their proven reliability and off-the-shelf availability.

In addition, engineers from DEC's Philadelphia office worked closely with UNIVAC engineers in developing the test systems.

## New K Series Modules/Hardware

Several new K Series industrial control modules and associated pieces of hardware have been introduced recently.

The line, first introduced in 1967, was developed specifically for instrumentation and control applications. K Series logic has proven itself ideal for interfacing computers to industrial machines and processes. It has also been incorporated into DEC's recently introduced PDP-14 solid state machine controller. K Series modules feature low speed and noise immunity ideal for on-line production applications.

Included among the new K-Series modules and available as off the shelf items are:

K028 And/Or Gate Expander	\$ 7.00
K124 3 And/Or Logic Gates	14.00
K323 3 One-Shots	35.00
K501 4 Schmitt Triggers	20.00
K596 EIA Input Converter	16.00
K696 EIA Output Converter	44.00

K940 Mounting Bracket	\$ 3.00
K941 Mounting Support	6.00

For more information, check customer service box #3.

## Tea by Computer

They have mated tradition with modern technology in England. A computer is being used to sort and distribute tea.

A new tea warehouse opened recently in London by Buchanan's Warehouses is using a system developed by Sortrac of Avonmouth, Bristol, to automatically sort tea chests. The chests are unloaded from ships at the wharf in a random manner. The system, under the control of a PDP-8/I computer, sorts the chests into batches of 168 different types of "breaks." It weighs the chests, arranges them on pallets, and passes the loaded pallets to an automatic pallet conveyor.

The PDP-8/I controls the passage of the tea chests through the sorter and monitors the position of individual chests in their storage lanes. Sensors in each lane indicate the completion of pallet loads, feeding the information back to the PDP-8/I to enable the appropriate decisions to be made.

# Decus Biomedical Highlights

"The use of computers in Biomedicine and their impact on Health Care Delivery" was the topic of a keynote speech by Dr. Cesar A. Caceres, Biomedical Chairman of the Digital Equipment Computer Users Society (DECUS) Spring Symposium, held on May 12 and 13 at the Colonial Statler Hilton Inn, Wakefield, Massachusetts.

Dr. Caceres, who is Chief of the Medical Systems Development Laboratory, United States Public Health Service, Washington, D.C., was addressing the attendees of the "COMPUTERS IN BIOMEDICINE" General Session, one of five workshops held at the Symposium for the presentation and discussion of biomedical applications of computers.

According to Dr. Caceres, computers in biomedical environments are playing an increased role in four separate areas: Utilization of manpower in medical care; economic utilization of machines; adapting industry as a working partner of those in the health fields; and, increasing the quality of medical care through standardization techniques.

The Biomedical Sessions were organized by the Biomedical Marketing Group and DECUS with the aim of increasing communication among all interested in "Computers in Biomedicine." The participation and attendance of DEC users, users of other manufacturer's equipment, and those who have not yet computerized their work, were encouraged.

Additional papers presented at the General Session included Multiphasic Health Screening, Biochemistry, Computer Processing of Medical Signals, Biological Simulation, Speech Radiography, and Human Problem Solving.



State of the art and technology are always prime subjects for discussion at DECUS.

The NEUROPHYSIOLOGY-PSYCHOPHYSIOLOGY Session, chaired by Dr. Charles F. Stroebel, Director, Laboratories for Experimental Psychophysiology, Institute of Living in Hartford, Connecticut, was devoted in part to a presentation and discussion of the basic concepts of the LINC (Laboratory Instrument Computer), and its successors the LINC-8 and the PDP-12. Severo M. Ornstein, Computer Specialist at Bolt Beranek & Newman, Inc. and one of the originators of the classic LINC computer at Lincoln Laboratory around 1960, explained the concepts behind the design of the original LINC. Richard J. Clayton, PDP-12 Production Manager at DEC, discussed how these concepts had been improved and modified in the LINC-8 and PDP-12 computers.

Presentations on medical applications utilizing LINC-type computers were then made. Classic LINC computer usage was illustrated by brief presentations by William R. Goff, Ph.D., Neuropsychology Laboratory, V.A. Hospital, West Haven, Conn., and Dr. William H. Sheriff, Jr., Neurological Diseases & Stroke, National Institutes of Health. Dr. Goff described his research with the LINC concerning cerebral evoked responses. Dr. Sheriff illustrated use of the LINC in studying family interactions of schizophrenics.

LINC-8 applications also included presentations by Anthony Sances, Jr., Ph.D., Marquette Univ. School of Medicine, Milwaukee, Wisconsin, and Dr. Charles Stroebel. Dr. Sances discussed one of his LINC-8 uses, in the quantitative evaluation of the Parkinson's Disease Syndrome while Dr. Stroebel discussed the LINC-8 computer as an aid in the Biologic Rhythm Laboratory.

The CLINICAL LABORATORY AUTOMATION Session was attended by approximately 200 people, reflecting the wide interest in developments within this field. Dr. Paul A. Raslavicus of Framingham Union Hospital, Framingham, Mass. was the Chairman of this session, which consisted of several presentations, followed by panel discussion.

Aspects of DEC's LINC-8 Clinical Laboratory System were discussed by John A. Lott, Ph.D., Ohio State University Hospital, Columbus, Ohio; Sidney A. Goldblatt, M.D., Conemaugh Valley Memorial Hospital, Johnstown, Pa.; and John Smith, Mercy Hospital, Urbana, Illinois. Dr. G. Phillip Hicks of the Univ. of Wisconsin Medical School provided the audience with details on the patient file oriented on-line computer system utilizing the LINC-8 Computer, and a status report of LABCOM, Version 5.



LINC, LINC-8, and PDP-12 computer discussions at the Neurophysiology-Psychophysiology Session were led by Dr. Charles F. Stroebel. . .

Presentations on Clinical Chemistry Automation and Administration using the PDP-8/L were made by S. Sondov and B. Eldridge of Berkeley Scientific Laboratories, Inc., Berkeley, Calif. "Utilization of a LINC-type Computer in Daily Laboratory Operation." and "Use of a LINC-type Computer for Information from Surgical and Autopsy Pathology" were presented by W. R. Kirkham, M.D., Ph.D., and Hugo C. Pribor, M.D., Ph.D., both of Perth Amboy General Hospital, Perth Amboy, N.J.

Dr. Thomas C. Hartney, Pathologist, Tampa, Florida completed the formal presentations with a discussion of source document data processing, using a new device, the "Templapunch", manufactured by the Entwistle Company, Providence, R.I.

Positive patient identification, and the nature of source documents were discussed by panel members, following the above presentations.

Dr. Paul G. Hugenholtz, Professor of Cardiology, Univ. of Rotterdam, was Chairman of the PATIENT MONITORING Session which included a wide variety of presentations concerning instrumentation in this field. John H. Reed, Jr., M.D., Ph.D., of Automated Medical Systems, Inc., Salt Lake City, Utah delivered the keynote speech which opened the workshop.

Dr. Hugenholtz pointed out that there is now only a small group of physicians who are willing to incorporate the practical methods which computer instrumentation can offer in the patient monitoring field. He also stated that developments in implementing computers in patient monitoring must proceed slowly and carefully. There is a need for communication and understanding in this field, and this session was a step in meeting this need.

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## SJCC (Cont. from Pg. 1)

Priced from \$14,900 to \$27,900, the PDP-12 is designed for simplicity of operation and programming for laboratory use in biomedicine, oceanography, chemistry, physics, education and a variety of industrial environments.

The PDP-12, with its built-in magnetic tape transports and display, is being shown for the first time with a new display-based operating system software package called DIAL. DIAL is composed of an editor, assembler, file storage and retrieval system.

DIAL is normally in the editor mode, awaiting input information from the Teletype, magnetic tape or paper tape. The DIAL command structure allows simple and straightforward commands for such operations as source program editing, program storage and retrieval and program assembly. The editor features real-time display monitoring of the editing process. The assembler is a two-pass program called from the editor.

For more information, check customer service box #4.

### Time-Sharing Capability Stressed

DEC's capability in the fast evolving time-sharing market was also demonstrated with a number of terminals at SJCC on-line to PDP-10 systems and a low-cost Time-Share-8 system located at customer sites. There are now some 70 of the 36-bit PDP-10 computers installed worldwide in such environments as commercial time-sharing, banking, manufacturing and the sciences. The TSS-8, introduced last year, provides a low-cost (from \$45,000), multi-language time-sharing capability for as many as 32 users simultaneously.



A chance to input questions to time-sharing computers located in various cities was not missed by many at SJCC. PDP-10 terminals at the show were on-line to computers at a number of customer sites.

For more information, check customer service box #5.

## PDP-8/L/KV Graphics Display Scope Demonstrated

The small, powerful PDP-8/L system demonstrated included 8,192 words of core memory and the recently announced KV Graphics display package. The display assumes the roles of an alphanumeric terminal, graphical output device and interactive graphics terminal. As an alphanumeric display, it responds to up to 20 text editing commands. As a graphical output device, various geometric designs are presented, showing the device's circle generation capability. Logic designs and the generation of linear and circular vectors are presented in the interactive graphics terminal demonstration. A FO-CAL demonstration also was shown.

For more information, check customer service box #6.

## PDP-9/ PDP-10 Interfaced To EAI 680

PDP-9 and PDP-10 computers can now be combined with Electronic Associated, Inc. EAI 680 Analog/Hybrid Computer to form powerful and economic hybrid systems. Owners of either of the DEC systems or the EAI 680 can easily expand to a hybrid facility by simply adding the EAI interface as well as the complementing analog or digital computer.

Pennsylvania State University owns one such combination, a PDP-10/EAI 680. Doctor William S. Adams, head of the Hybrid Computer Laboratory, recently announced a hybrid seminar in June of this year. "I was quite surprised at the response", Doctor Adams said. "We received many more applications than we could accept and from all over the country. We use our PDP/680 for demonstrating hybrid computing techniques to undergraduate and graduate students as well as for graduate hybrid simulation projects."

Another hybrid installation is at Carnegie Mellon University, a PDP-9/EAI 680. Dr. Jon C. Strauss is Director of the Hybrid Computation Laboratory. He is a leading authority on hybrid computation, chairman of SCI's "Simulation Software Committee", and a member of ACM and IEEE. "Our hybrid is used primarily for graduate studies in virtually all engineering and science disciplines", Dr. Strauss said, "Particularly for research involving advanced, complex, dynamic physical systems."

For more information, check customer service box #7.

## Kopp (Cont. from Pg. 1)

He has continued to serve the Department of Defense as a consultant.

An honors graduate of Harvard College and Harvard Business School, Kopp received his bachelor's degree in economics as a member of the class of 1947 and his master's degree in 1949. He is a member of the Financial Executives Institute, The American Institute of Banking, The Association of the U.S. Army, The Greater Boston Chamber of Commerce and The Harvard Club of Boston. He is a governor of the Harvard Business School Association of Boston and a director of the Cambridge and Boston Councils of The Boy Scouts and is chairman of The Cambridge Council's membership drive.

Born in Rochester, N.Y., Kopp was raised in Newark, N.Y. and currently resides with his wife and three sons in Cambridge, Mass. He also has a summer residence in Norfolk, Conn.

## Chase Brass Implements Logistics Management System

The final phases of an expanded computer-based logistics management system designed to monitor all manufacturing functions are now being implemented at Chase Brass & Copper Company's Blue Dot<sup>tm</sup> brass rod plant in Montpelier, Ohio. When completed in mid-year, plant management will have instantaneous access to production data via a PDP-10 time-sharing computer system.

The new computer, which replaces an older DEC computer used primarily for production scheduling, is being interfaced to virtually all manufacturing and materials handling points in the 116,000 square foot plant built five years ago. According to Dick Ryan, plant manager, this Chase facility was designed with a computer in mind.

"The functions of the original computer system were primarily processing of orders and scheduling shipments. As we developed more expertise in using the computer we decided to install the larger DEC PDP-10 to not only assume this function, but to provide us with a means of collecting all pertinent production information which we could use to achieve greater operating efficiencies, improved customer satisfaction, and on-line control of the casting shop," Ryan said.

In basic operation, a clerk enters, via a teletypewriter, incoming orders, for

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## Chase Brass (Cont. from Pg. 4)

which the computer provides either a production schedule, based on stored historical data, or a direct shipping notice if the desired material is in inventory.

Reporting functions are kept at a minimum. "We don't feel we need reams of computer printout on a regular basis," notes Ryan. "The computer generates a daily, one-page production report; all other information is provided on a demand basis."

All interaction with the system, including file updating, is on an on-line basis via teletypewriters or wired directly to data collection transducers. Ryan noted that "there has never been a punched card in this installation and we do not anticipate seeing any in the foreseeable future."

There are some two dozen stations on the production floor which the computer monitors. These include, the truck scale (incoming raw material), holding and melting furnaces, billet saw and inventory, extrusion press, finishing machines and finished product scale. Information is converted from analog-to-digital format, reduced to usable form, and stored by the computer for a reasonable period of time.



**Computer system at Chase Brass and Copper Company's Montpelier, Ohio Blue Dot<sup>T.M.</sup> brass rod plant features this PDP-10 time-sharing computer. The final phases of a logistics management system are now being implemented.**

In addition to its on-line monitoring functions, the computer provides an in-house time-sharing facility for plant personnel. "We have about 15 Teletypes which are used by administrative and plant personnel for routine inquiries or for research and engineering functions."

The PDP-10 system at the Chase site consists of 32K and 36-bit word memory, one-half million word disk, a 20-channel data acquisition and A/D conversion system, special interfacing to various production machines and a line printer. A CalComp plotter is also interfaced to the PDP-10.

The DEC system was chosen according to Ryan, "because this system provided us with the performance we needed at a price we could afford, and because of the historical reliability of the previous DEC computer."

## Nuclear Data Displays DEC Based Systems

Two models of Nuclear Data Inc.'s Series 50/50 data Storage and display units performed pulse height analysis and data manipulation using two DEC computers at the Physics show.

The units are capable of acquiring data from A/D converters, from any transducer capable of generating either digital signals or signals capable of being digitized, and from other computers. Each provides a continuous and flicker-free display on a 14-inch oscilloscope, 24-bit binary storage, 4096 data channels, and direct display manipulation.

Data may be displayed in a three-dimensional (X,Y,Z), contour (X,Y), or flat (X,Z or Y,Z) manner. Displayed data may be expanded or divided, intensified, and manipulated in a variety of ways without destroying any of the data. Either acquired or computer data may be displayed.

One unit uses 12-bit PDP-8/L with 4,096 words of core memory. The other is equipped with a 18-bit PDP-9/L, also with 4K of core memory. Both computers, which are smaller versions of the PDP-8/I & PDP-9/I computers, were introduced by DEC last year.

Software included in the systems provides integration, peak centroid location, energy calibration, buffer tape storage (magnetic tape storage of related addresses), restriction gates, region of interest, normalization, stripping, automatic programming, selected area readout, on-line monitoring, and much more. Program flexibility is provided by the computers for those interested in developing special software.

Detailed application and specifications literature is available from Nuclear Data, Inc., P.O. Box. 451, Palatine, Illinois 60067

## Yokogawa Uses PDP-8 Based Control Systems

An industrial process control system manufactured by Yokogawa Electric Works, Ltd., in Tokyo, Japan is using PDP-8 family computers as central processing units to streamline and enhance the operations of mining and chemical firms in Japan.

The control system, designated CCS-8000 by Yokogawa, is used both for control and sampling. In the mining industry, it is used to evaluate samples via an X-ray scanning technique.

According to a company spokesman, Yokogawa decided to build their industrial system around the PDP-8 computer because of its high reliability, high performance and relative low cost.

## Decus Biomedical Highlights (Cont.)

Other presentations included in the session were as follows: F. John Lewis, M.D. of Northwestern Univ. Medical School discussed "Automatic Monitoring of Postoperative Patients" with a DEC PDP-9 Computer. Gerald A. Masek, Ph.D. of Presbyterian-St. Luke's Hospital, Chicago, Illinois presented his application using a satellite computer, a PDP-8. Additional presentations were made by Dr. Howard K. Thompson, Jr. of Duke University Medical Center; Dr. Ramon L. Lange of Marquette University School of Medicine; and Charles L. Feldman, of Worcester Polytechnic Institute, Worcester, Massachusetts.

Mr. Edward M. Kaplan, Staff Analyst of Harvard Univ. Computation Center, and Dr. Charles A. Sanders, Chief of the Cardiac Catheterization Unit, Mass. General Hospital concluded the presentations by discussing their requirements and future plans for a computer in an intensive coronary care environment.

PSYCHOLOGY applications were featured in a session with Dr. Bernard Weiss of the University of Rochester as Chairman. The session directed itself to both module and computer instrumentation in the Psychology fields today, and a discussion of the effectiveness of this instrumentation.

Dr. Daniel Forsyth, formerly of the Harvard Center for Cognitive Studies and presently with the University of Vermont, discussed Time Sharing in Psychology Applications, and Dr. Arthur G. Snapper of the F.D.R. Veterans Administration Hospital in Montrose, N.Y. spoke on a multi-purpose logic module for behavioral experiments.

Mr. Steven J. Stadler of Grason-Stadler Co., Inc. presented details on SCAT, a complete hardware and applications software system for applications in psychology. Dr. Douglas Anger of Western Michigan Univ., Kalamazoo, Michigan and Dr. Joseph Markowitz of Bolt Beranek & Newman, Inc. also contributed to the program.

Attendance at the DECUS Spring Symposium reached a new peak with approximately 600 registrations. In addition to the Biomedical Sessions, meetings were held on Interactive Systems and Computer Graphics, Education, Physics, and Digital Signal Processing. Various product line workshops were also held.

For more information, check customer service box #8.

## Community College Develops Unique Program

Full exposure to the intricacies of the computer are guaranteed each engineering student at Mercer County Community College in Trenton, N.J. next fall as a result of a unique training program now in final stages of development.

"The computer is not something in the future: It is with us now, and its uses are growing everyday," Prof. Irving Engelson, Chairman of the Electrical Engineering Department at the two-year institution and the man responsible for the program, said in discussing why such a program was developed. "Unless a student engineer knows at least the 'A,B,C's' of the computer, he just is not ready."

Prof. Engelson's program is not one designed to make computer programmers out of the 300 to 400 students who will take part in it, but it is meant only to give them exposure. "They will learn something about programming," he said, "but little more than the variety of languages available. If they want to go deeper into the subject, they can use the computer on their own time. We plan to qualify each student so he can do just that."

In formulating plans for the program, the professor realized that he could best accomplish his goals by having his own computer. "The system in the school computing center is more oriented to business," he said. "We need a machine more accessible to the students. Also, having their own machine helps to remove any fear they might have of computers."

In order to secure the computer he desired, a small PDP-8/I, Prof. Engelson worked overtime to get the necessary funds from the National Science Foundation. The result was the largest grant given any two-year college in the United States this year.



Chairman of the Electrical Engineering Department at Mercer County Community College, Irving Engelson, checks printout from a PDP-8/I computer, left rear. Prof. Engelson plans to use the PDP-8/I, the analog computer in the left foreground, and the digital logic teaching devices to the right of the PDP-8/I in a unique course that will give each engineering student at Mercer County exposure to the intricacies of computers.

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According to the professor, the PDP-8/I was selected for its physical size (it would be dwarfed by the large system in the school's computing center) and because there are so many in use in education that a wide variety of programs is available. "I was also influenced by my association with DEC computers at Worcester Polytechnic Institute, where I am doing post-graduate work in electrical engineering," he added.

Starting with a basic PDP-8/I at \$12,000, Prof. Engelson has added such things as more core memory, an oscilloscope, a 32,768-word disk storage unit, an analog-to-digital and digital-to-analog converter and two Teletype input devices. In its present configuration, the computer costs approximately \$40,000 and is large for a system of this type. Explaining its size, he said, "The disk storage unit allows us to store a variety of programs, ours and those developed by students. The larger core memory and two Teletypes will permit two students to use the computer simultaneously, with the DEC-developed conversational programming language, FOCAL<sup>R</sup>. This means we can do more things more quickly."

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## Summer Deliveries for PDP-14

Production deliveries of the recently announced PDP-14 solid state machine controller will begin this summer, according to John Holzer, PDP-14 Product Manager.

Priced at \$4,900 for a basic configuration, the PDP-14 is designed for control of machines used in repetitive, long run, mass production processes versus numerically controlled, limited run and high precision processes. Consisting of a control unit, input/output interfacing to the machinery and a hard wired memory containing user-defined commands, the PDP-14 is a flexible alternative to magnetic relays and static solid state presently used for such control functions.

Complimenting the PDP-14, DEC is using a PDP-8/L to demonstrate a special software package designed to convert Boolean equations into a language understood by the PDP-14. The end product of the program is a punched paper tape from which the controller's memory is constructed. This was demonstrated at the ASTME show.

For more information, check customer service box #9.

## University Ties Computer To Accelerator

Researchers in the Physics Department at the State University of New York at Stony Brook have linked two DEC computers through a common magnetic tape storage unit as a low cost method of gathering and analyzing data on the nuclear structure of materials.

Total cost of the system, which includes the two medium scale PDP-9 computers; two analog-to-digital converters, each with 4,096 channels; two display scopes; two Teletypes; and a plotter, is approximately \$150,000. Both 18-bit PDP-9s have 8,192 words of core memory and share the one million words in the magnetic tape storage unit. Similar systems, using other types of computers, cost one-half million dollars or more.

The system is interfaced to a High Voltage Engineering Super King Tandem Van de Graaff<sup>R</sup> accelerator for the low energy experiments. It is used by both graduate students and faculty and present plans call for its employment in teaching.

Currently, a maximum of eight detectors in a four-telescope array and other background detectors are used with the accelerator. This enables researchers to identify energy from the scattered particles and get the ratio of primary energy to total energy, giving a signature unique to each particle.

Lawrence Polsky, research associate and assistant to the department director Dr. Linwood Lee, said that the two PDP-9s provide researchers with all the necessary versatility. One computer controls the experiment, takes data from it, displays it and calculates signature ratios, all "on-line." Then, this "on-line" data is put on magnetic tape, where it is fed to the second PDP-9 for "off-line" analysis.

During "off-line" analysis, the data is plotted, using DEC pulse height analysis software, and researchers are given a complete printout of experiment results. The second PDP-9 also can be used for program preparation, while the first is analyzing data and controlling the experiment.

In discussing the dual PDP-9 system, Polsky said that it has proven ideal for the needs of the department. He said other approaches to data analysis, such as time-sharing, have proven unsuccessful. Designing a time-sharing system takes too long, and the software is difficult to develop, he pointed out, adding that researchers have little faith in time-sharing software presently available.

# Quickpoint-8 Software Package at ASTME

Modifications providing increased precision and flexibility to its Quickpoint-8 numerical control tape preparation system were announced by DEC at the 1969 ASTME International Engineering Conference and Tool Exposition held in Chicago on May 5-9. Introduced last year, and being demonstrated at the DEC exhibit, Quickpoint is a software package designed for PDP-8 family general-purpose computers. It allows the user to define random and/or geometric patterns such as grids, bolt-like circles, and various arrays with symbolic definitions and store and recall these at any location on piece part.

Among the modifications is the fractional input feature which allows the programmer to mix fractional and decimal quantities freely in a command line equation. The new Quickpoint also will permit a user to add and subtract while defining geometric as well as coordinate commands.

The system's character editor has also been modified to simplify programming corrections by eliminating the need for complete line erasure when correcting typing errors.

Additional modifications have been made in Quickpoint pattern repeats, error messages, maximum number of computations, Z-axis input, offset commands, and NRT commands.

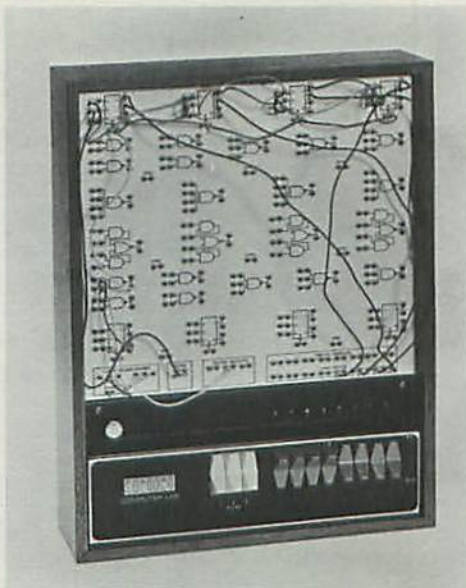
Quickpoint-8 is particularly suitable in the sheet metal or machine shop. A Quickpoint-8 system outputs a punched paper tape for virtually any point-to-point machine tool. Quickpoint avoids the need for additional manual programmers and saves tape preparation time on very simple jobs through its editing and calculating capabilities. It also virtually eliminates the need for manual computation of point coordinates.

In addition, the Quickpoint system has a larger buffer area and memory capacity to accommodate large NC program preparation.

For more information, check customer service box #10.

## COMPUTER LAB Sales near 1,000 Mark

More than 900 COMPUTER LABS, an educational package for teaching the fundamental concepts of digital computers, have been sold by DEC.



Priced at \$445, the COMPUTER LAB comes complete with a 10-experiment self-teaching workbook, which provides up to fifty hours of laboratory training in digital logic fundamentals. The unit and workbook are supplemented by an instructor's guide which includes detailed course plans, answers for all questions in the workbook, additional pictorial wiring diagrams, test questions, and additional instructional text.

Workbook material is prepared on four levels of instruction: binary arithmetic, principles of digital logic, two-state memory devices, and Boolean algebra. Also included is a general discussion on digital computing systems.

The COMPUTER LAB is completely self-contained, compact, portable, and easy to use. Each of the internal basic digital functions is represented on the front panel by a logic symbol in standard symbology. All connections for each experiment are made on the front panel with patchcords provided with the device. The student can test a logic design he has wired by utilizing a series of three manually-operated switches which provide signals to the logic, or a clock that automatically supplies test signals at any point in the system.

The COMPUTER LAB is widely used by industry for training technicians and engineers in electronics and computer fundamentals, and by technical and vocational schools, junior colleges, and universities.

Among the users of COMPUTER LAB are:

Sylvania Electronic Systems, in its Waltham, Massachusetts Training Program, for courses in digital fundamentals;

Raytheon, Inc., in its Andover, Massachusetts Training Section, to update technician skills for computer control equipment;

The United States Army Air Defense School, Digital Technology Branch, at Fort Bliss, Texas, for courses in military standard logic;

The Electronic Training Center of New Jersey and Pennsylvania for courses in basic electronics and computer electronics;

University of Alabama, Tuscaloosa, Electrical Engineering Department, for courses in switching theory and fundamentals of digital computers.

Harvard University, Cambridge, Massachusetts, Electrical Engineering Department, for an introductory course in logic design.

For more information, check customer service box #11.



The new fifth edition of the LOGIC HANDBOOK, available free, is a complete guide to DEC's modules and associated hardware and also contains applications information. This 416-page, thoroughly illustrated paperback offers an introduction and general characteristics of DEC's M Series, K Series and A Series positive logic modules, complete with descriptions of power supplies, hardware and accessories and a discussion on how to use these items.

For a LOGIC HANDBOOK, check customer service box #12.

# First 680/I Communications System Delivered

First delivery of a new line of computer-based multi-purpose communications controllers has been announced by DEC. The 680/I Data Communications Control System represents the latest development in more than 10 years of DEC experience in communications environments and is designed around the PDP-8/I computer.

The first of the new devices was shipped to Pillsbury-Occidental Corporation's CALL-A-COMPUTER Division, the nation's third largest time-sharing utility. It will be used in CALL-A-COMPUTER's Corona Del Mar, Calif., facility as a data concentrator. CALL-A-COMPUTER currently uses six DEC's 680 predecessor systems, built around the PDP-8, in its nation-wide network.

Besides the substitution of the lower priced PDP-8/I with integrated circuitry, other design improvements have increased the performance of the 680/I over the 680 by 100 per cent. Price of a typical 32-line controller is \$20,000, a reduction of about \$7,000 from earlier models.

The 680/I requires only one-half per cent processor time per 100 baud line as compared to one per cent for the 680 system it succeeds. The 680/I permits random scanning of communication lines, allowing the user to configure lines of the same speed in any order. He also can change the speed and format of a line under program control.

The system can be applied to a variety of communications data handling tasks. It can serve as a low-speed concentrator, a message switcher, a terminal data collector or a communications controller for a large computer system. The basic system can accommodate up to 64 lines with add-on line charges set at \$50 each, a 50 per cent reduction over the 680 system. The basic 4,096-word core memory of the PDP-8/I in the 680/I system is expandable to 32,768 words. The system also can be equipped with disk storage for storing the large volume of data handled in such applications as store and forward and message buffering.

For more information, check customer service box #13.

## Financial Highlights

### Nine Month Earnings Reported

Operating Results for Nine-Months Ending:

	March 29, 1969	March 30, 1968
Net Sales	\$58,269,000	\$37,646,000
Income Before Taxes	12,163,500	8,595,000
Provision for Income Taxes	6,152,300	4,126,000
Income After Taxes	6,011,200	4,469,000
Income Per Share*	2.01	1.53
Shares Outstanding	2,993,701	2,913,311

\*Based on an average number of shares outstanding at end of each period.

New orders received during the period again exceeded shipments. For the nine-month period ending March 29, 1969, volume on sales was 55 per cent higher than for the corresponding period last year while profit was 42 per cent higher than for the same period last year.

### Three-To-One Stock Split Announced

Digital Equipment Corporation's Board of Directors announced approval for a three-to-one stock split on May 12, 1969. The record date for the split was May 23, 1969 with the payment date being June 27, 1969.

### Expansion Plans Noted:

Plans for new plants and plant expansion in several areas were announced by DEC in news conferences held in Maynard, Massachusetts on May 23, 1969.

Digital announced:

—The signing of an agreement to lease a 60,000 square foot building now under construction in the Leominster Industrial Park, Leominster, Mass.

—The signing of an agreement to purchase a 240-acre site on Route 202 in Westfield, Mass., where it expects to construct a 150,000 square foot plant.

—The signing of an option to purchase a 137-acre site near Route 2 and Harvard Street in Leominster for a 250,000 square foot plant. (Purchase of the site is contingent on approval of a petition to rezone the land for industrial use.)

—Plans to occupy a 58,000 square foot plant now being built in San German, Puerto Rico. The building, scheduled for completion in January, will replace three small buildings which Digital is now occupying in San German.

## DEC Delivers 1,000th PDP-8/I

DEC has delivered its 1,000th PDP-8/I small computer. The milestone was reached less than a year and a half after the PDP-8/I was first introduced.

The 1,000th machine was shipped to Teradyne, Inc., of Boston, Mass., and will be incorporated into that company's J



259 computer-operated circuit test system. Teradyne, a major user of DEC small computers, also was the recipient of the 1,000th PDP-8, the predecessor of the PDP-8/I. The principal difference between the two is the extensive use of integrated circuits in the PDP-8/I, an advancement that lowers its base price to \$13,300, reduces the cost of peripheral devices and improves the computer's reliability.

The J 259 is a versatile automatic measuring system for testing multi-terminal electronic circuits, such as integrated and hybrid circuits, discrete-component modules and a variety of other devices.

DEC has delivered more than 3,500 PDP-8 family computers and is the leading manufacturer of minicomputers in the world, in terms of installations.

**1,100th PDP-8/I computer is given an operational check as it comes off the assembly line in the company's Maynard, Mass. plant. The computer was delivered to Teradyne, Inc., of Boston for use in that company's J 259 computer-operated electronic circuit testing system.**