DATAMATION 62

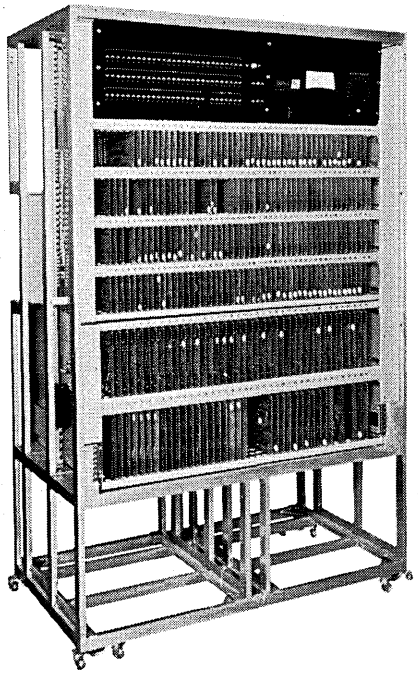
January

outlook '62

EVERY-
BODY
TALKS
ABOUT
1.5
MICRO-
SECOND
CORE
MEMORIES

1.5

AMPEX SHIPS THEM



Truth is stranger than fiction. And here's the honest truth about the world's fastest, commercially available, random access core memory.

Ampex is delivering production line models of the new LQ ferrite core memory. The LQ executes a complete memory cycle in 1.5 microseconds. (Access time 1.0μ sec.) Capacity of standard models is 8192 or 4096 words up to 56 bits in length.

Bear in mind that the LQ is no hand-built mock-up, locked away in an R&D lab. Production line units, specifically designed, tested, rated and priced for commercial computer applications, are running, on line, in existing computer systems.

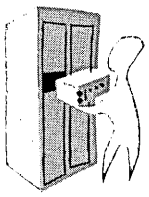
Right now Ampex is quoting deliveries of the LQ. Better write today for complete specifications and descriptive literature: Ampex Computer Products Co., P. O. Box 329, Culver City, Calif.

AMPEX 0/1 T.M.

AMPEX COMPUTER PRODUCTS COMPANY

CIRCLE 1 ON READER CARD

NEW: DDP-19, THE FASTEST MEDIUM-SIZED COMPUTER FOR REAL-TIME ENGINEERING APPLICATIONS!!



This new, high-speed DDP-19 (**Digital Data Processor**) is a single address, parallel, binary, 19-bit computer with a magnetic core storage of 4096 to 8192 words!

DDP-19's fully buffered input permits continuous intake of data! DDP-19's up to 16 program addressable input/output channels (operable in both **busy** or **interrupt** mode) allow asynchronous connection to any existing system!

DDP-19's extremely flexible analog input/output units permit **immediate** tie-in to any real-time man-machine simulation! DDP-19's modular construction using 3C's customer-proven S-PAC digital modules provides ample room for expansion! Compiler, assembler, and subroutines are available!

DDP-19 HIGH-SPEED CHARACTERISTICS

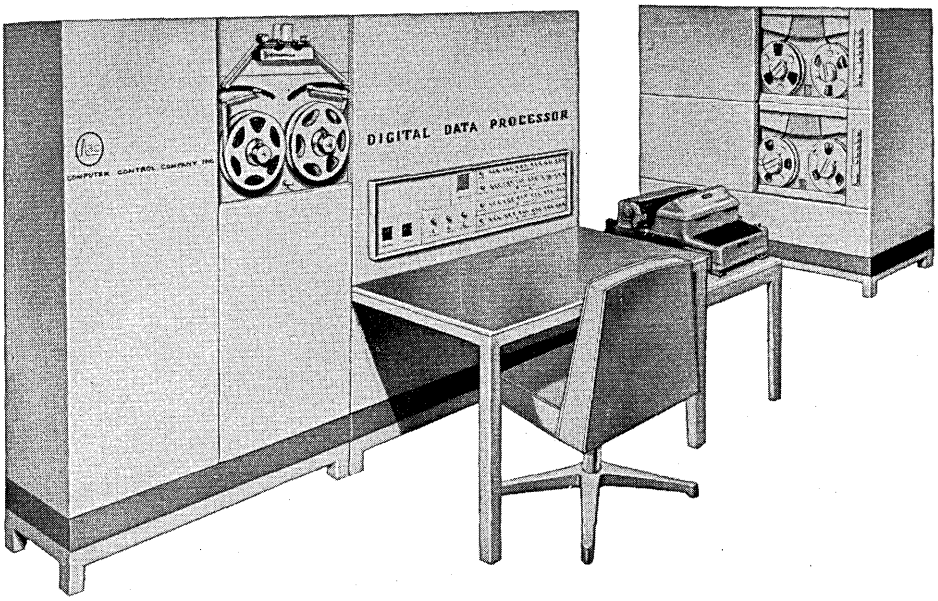
Memory cycle time
5 microseconds

Add: successive operations with instruction and operand address
10 microseconds each

Average multiply
.36 microseconds

Divide
57 microseconds

Input-output
200 KC word transfer rate

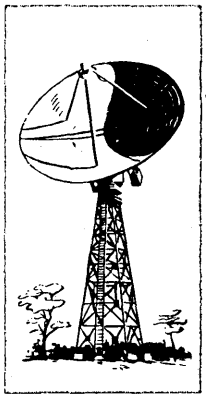


VERSATILE
(It outperforms any computer in its price range!)

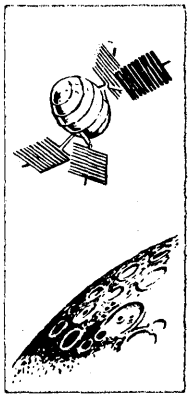
HIGH-SPEED
(It handles complex on-line data reduction faster than any comparable machine!)

ECONOMICAL
(It replaces expensive, custom-built systems and large scale computers!)

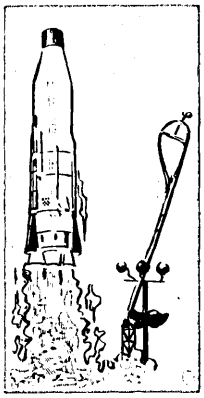
A few applications of this versatile, high-speed DDP-19 computer include . . .



. . . use as a control computer for the precision tracking of high-speed targets . . .



. . . use for real-time data acquisition and the presentation of scaled and digitally filtered results . . .



. . . use in real-time simulation problems involving analog and digital equipment and sub systems . . .

For more comprehensive DDP-19 information, please call or write to:

SYSTEMS DIVISION

COMPUTER CONTROL COMPANY, INC.

EASTERN PLANT: 983 CONCORD STREET/FRAMINGHAM/MASSACHUSETTS
WESTERN PLANT: 2251 BARRY AVENUE/LOS ANGELES 64/CALIFORNIA

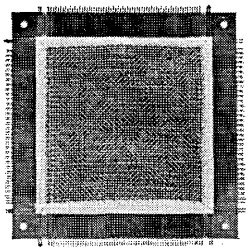
CIRCLE 4 ON READER CARD

MEETING THE COMPUTER INDUSTRY'S NEED FOR STANDARDIZED MEMORY COMPONENTS

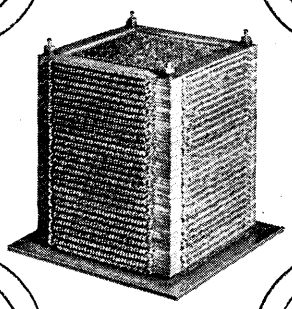
NEW FERROXCUBE 4-WIRE COINCIDENT CURRENT MEMORY PLANES AND STACKS

OFFER UNMATCHED RELIABILITY☐ COMPACTNESS☐ AVAILABILITY & ECONOMY

Many are the features that set Ferroxcube memories apart from all others; unquestionably, the most noteworthy is **reliability.** All array terminal connections are multiple wire wrapped and dip soldered to eliminate the fallibility of hand soldering. All memory cores are 100% precision tested on all electrical parameters both before and after assembly in the matrix. **Compactness** of design—achieved by wafer construction and by wiring memory cores on 50 mil centers—makes for substantial reductions in stack dimensions. **Availability** is continuously assured by Ferroxcube's unmatched manufacturing capabilities. **Economy** follows as a result of Ferroxcube's high volume production, highly adaptable frame construction and the elimination of costly hand soldering. For complete information write for Bulletin PS-161.



64 x 64,
4-WIRE,
COINCIDENT
CURRENT
MEMORY PLANE.



COMPACTNESS
OF MATRIX
REDUCES STACK
DIMENSIONS.

FOREMOST
IN THE FIELD
OF FERRITE

FERROXCUBE CORPORATION OF AMERICA ■ SAUGERTIES, N.Y.

CIRCLE 5 ON READER CARD

DATAMATION 62

the automatic handling of information

volume 8, number 1

EDITORIAL OFFICES

10373 W. PICO BLVD.,
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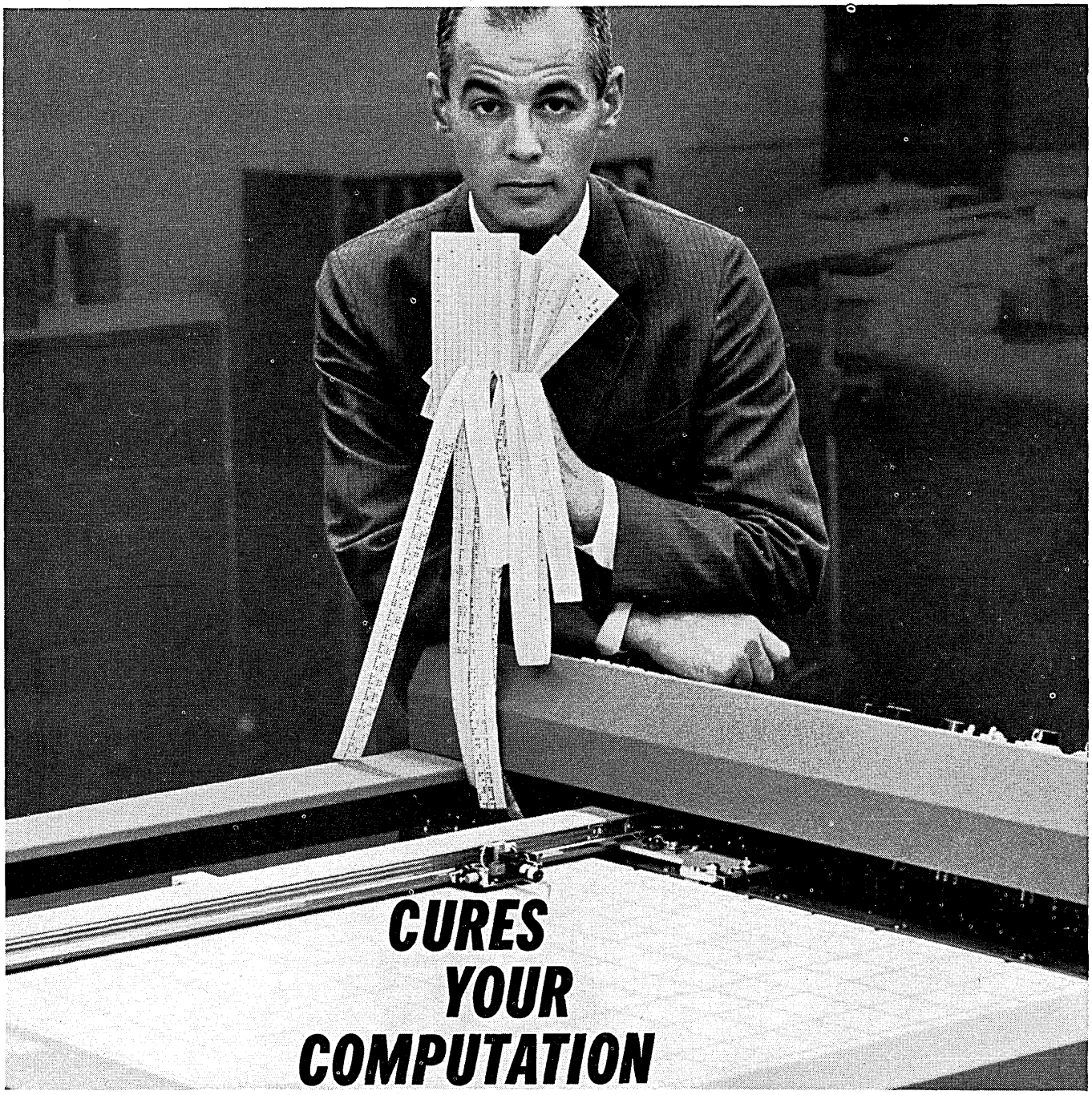
Outlook '62: A Special Section

Articles

THIS ISSUE — 40,077 COPIES

Departments

DATAMATION is published monthly on or about the tenth day of every month by F. D. Thompson Publications, Inc., Frank D. Thompson, president. Executive Circulation and Advertising offices, 141 East 44th St., New York 17, N.Y. (Murray Hill 7-5180). Editorial offices, 10373 West Pico Blvd., Los Angeles 64, Calif. (BRadshaw 2-0817). Published at Chicago, Ill. Accepted as controlled circulation at Columbus, O. Form 3579 to be sent to F. D. Thompson Publications, Inc., 201 N. Wells St., Chicago 6, Ill.



CURES YOUR COMPUTATION INDIGESTION

Here is how to reduce the overwhelmingly voluminous output of a digital computer to a useful form. You need a convenient, rapid and accurate way to plot curves and charts automatically and accurately—such as the EAI DATAPLOTTER®3300. This superb plotting machine reduces digital information to Cartesian coordinates in X and Y, in point or line, on paper size up to 30x30 inches. Plots up to 80 points a minute with accuracy of .05% of full scale. There are many accessories and a wide variety of other plotters if the 3300 does not fit your needs. Write for information to Dept. DA-1.

EAI

Career Opportunity for Engineers — Graduate or advanced degrees in EE, Physics, Math — call or write Gordon Strout, Director-Personnel

ELECTRONIC ASSOCIATES, INC. *Long Branch, New Jersey*

Leader in Analogics Analog/Digital Computers Data Reduction Process Control Instruments Computation Service

CIRCLE 12 ON READER CARD

Dress by Pauline Trigere

Quiet, please. Our computer is talking

It's a UNIVAC® 490 Real-Time Computer talking. A new device named Unicall makes computer conversation possible for the first time.

Applications? Scores of them. Stock quotations; credit references; sales reports; inventory control data; airline, hotel and car rental reservations, to name just a few.

How do you open a conversation with a computer? Ask it a leading question of up to 40 alpha-numeric digits by positioning levers on the Unicall set. Then use the adjacent telephone to dial the computer in Chicago, New York, or Kalamazoo—wherever you install it. Unicall automatically scans and transmits the message at the rate of 20 characters per second. The UNIVAC 490 Real-Time Computer then selects the correct reply from its unique voice drum and sends it right back over the telephone to you.

Hundreds of Unicall sets, installed thousands of miles apart, can hold simultaneous conversations with the same Univac computing system.

Versatile, compact, and easy to use, Unicall requires no matrixes, inserts, or slides. It fits neatly on a desk or counter. Installed in only 15 minutes, Unicall rents for less than $40 a month.

But our Unicall and UNIVAC 490 Real-Time Computer like to speak for themselves. We'll gladly arrange a talk.

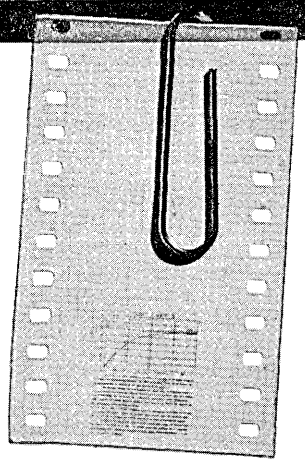
UNIVAC

DIVISION OF SPERRY RAND CORPORATION

NOW

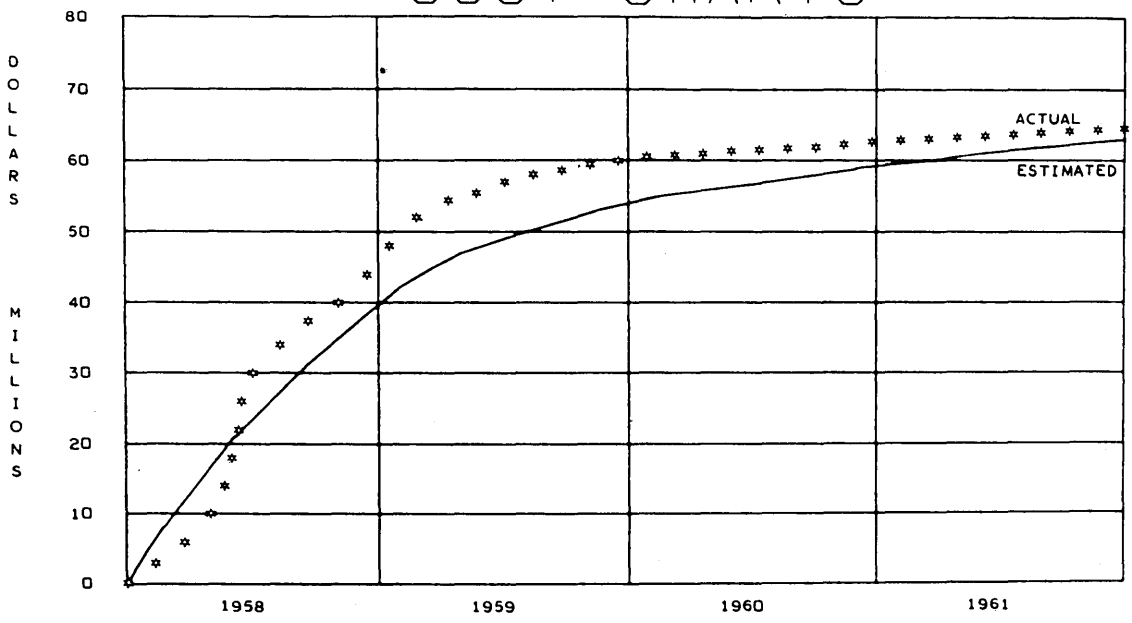
Computer curve plotting and tabular recording on both microfilm and paper in seconds with the S-C 4020* High-Speed Recorder

* For information about the S–C 4020 Recorder write to Dept. C–10, General Dynamics | Electronics, PO Box 2449, San Diego 12, California



GENERAL DYNAMICS | ELECTRONICS

COST CHARTS



THIS ACTUAL PAGE SAMPLE DEMONSTRATES THE VERSATILITY AND SPEED OF THE GENERAL DYNAMICS | ELECTRONICS' S-C 4020 HIGH-SPEED RECORDER. THE CHART, VECTOR-DRAWN TITLES, AND THE PRINTED TEXT YOU ARE READING WERE ALL PRODUCED IN JUST THREE-QUARTERS OF ONE SECOND.

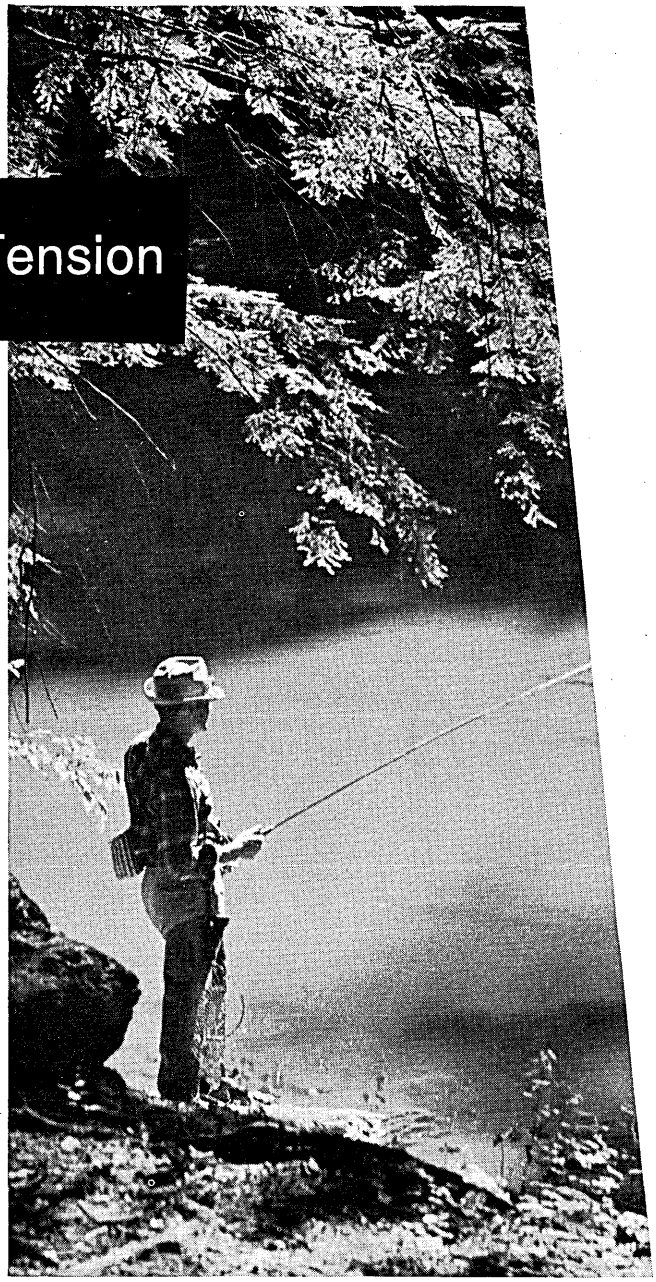
THE EQUIPMENT PROVIDES THE LEAST EXPENSIVE AND FASTEST METHOD OF TRANSLATING SCIENTIFIC COMPUTER LANGUAGE INTO ALPHANUMERIC PRINTING, PLOTTED CURVES, AXIS AND VECTOR LINES, OR A COMBINATION OF THESE OPERATIONS, AND RECORDS THE INFORMATION ON 35MM MICROFILM AND/OR PHOTORECORDING PAPER. THROUGH THIS COMBINED MEDIUM OF RECORDING, PAPER COPIES MAY BE PRODUCED FOR IMMEDIATE USE AND THE MICROFILM STORED FOR PERMANENT RECORDS.

THE S-C 4020 IS ADAPTABLE TO NUMEROUS SCIENTIFIC, ENGINEERING AND BUSINESS APPLICATIONS. IT CAN BE USED FOR AIRCRAFT, MISSILE AND SPACECRAFT DESIGN STUDIES, PERT, PEP, SCANS AND OTHER CRITICAL PATH CONTROL PROGRAMS, AND COMPUTER DRAFTING OF MULTIVIEW OR CROSS-SECTION DRAWINGS.

SUBSTANTIAL SAVINGS IN TIME, PRINTING COSTS, STORAGE SPACE, PAPER, AND SHIPPING COSTS ARE EFFECTED BY UTILIZING THE S-C 4020. FOR FURTHER INFORMATION CONCERNING THE S-C 4020 HIGH-SPEED RECORDER CONTACT INFORMATION TECHNOLOGY DIVISION, GENERAL DYNAMICS | ELECTRONICS, P.O. BOX 2449, SAN DIEGO 12, CALIFORNIA.

S-C 4020 Samples

Say "Good-bye" to Tension



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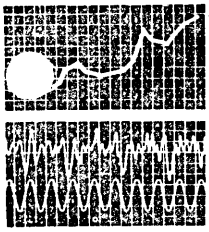

BUSINESS &

GE PLANS LARGE SCALE THIN FILM COMPUTER*

Having decided to end its long held semi-silence, General Electric's Computer Department is beginning to talk about its accomplishments and future plans. The 225, which stands as the attractive mainstay in the GE line, is in competition with IBM's 1401-1410. Forty-one 225's have been shipped and 100 more are on order. Many of the installations are within the company since the 225 was sold internally for nine months before public announcement. Most of the current orders are external. Sales in 1962 are expected to double, and 225 production will reach 10 per month in the newly doubled Phoenix plant.

The closing months of 1961 saw orders for 16 of GE's 210 systems, most of them from existing users. Forty-five 100's and 210's have been shipped. Early this year, the Phoenix plant expects to complete the current contractual obligation with NCR, under which GE has manufactured the 304A and B.

While GE's plans for future hardware announcements are indefinite, their next step forward will be toward the third generation, with small (G-15 price class) and large scale (7090 to Stretch range) systems. The latter will definitely be thin film. The main reason for delay in setting announcement dates is GE's determination to 1) narrow the waiting period between announcement and delivery, and 2) to deliver tested software with the hardware.

Having cornered a good piece of the bank market, GE now intends to capitalize on its experience as the world's largest commercial computer user by tackling the manufacturing industries. Other areas of concentrated effort will include scientific and engineering (the 225 is proving a sleeper here) and government markets.

New peripherals are in the works, including high-speed card readers and punches, OCR, etc. The GE Computer lab in Sunnyvale, California is digging into magnetic thin films, cryogenics, electro luminescent photo conductive devices (EL-PC), and thermoplastic recording (TPR). GE has high hopes that the latter will be the mass storage medium of the future.

General Electric's common language general computer GECOM, which embraces COBOL, ALGOL and TABSOL, is now in the users' hands and programs are being debugged.

*In DATAMATION's opinion, the preceding report represents a genuine "breakthrough" in publication-

JANI

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73	74		

manufacturer relations. After concluding two days of interviews at GE Phoenix and another morning at Sunnyvale, DATAMATION submitted a carbon copy of a short news report (as a normal courtesy) to GE's P.R. department containing marketing data and a statement of plans for GE's thin film computer. It was fully expected than an urgent reply would follow to "kill" the article and the usual hassle would begin over what was or wasn't on-the-record information. In this case however, GE not only encouraged publication of the article but added several important facts.

It is certainly worthy of note when a major computer manufacturer is willing to publicly voice its advanced planning in an effort to cooperate fully with a publication's sometimes overly inquisitive nature. They are to be highly commended.

C-E-I-R ADDS MEGABUCKS OUT WEST

More than $17-million in computing power will be installed at C-E-I-R's Los Angeles offices this year in an effort to corral the time buying market in Southern California. All equipment will be purchased including a STRETCH, 7090, 1604, 2 1401s, and a 704.

"Very competitive pricing" and substantial discounts for large quantities of time purchases will key the C-E-I-R sales approach. Prices are as follows: less than $300 per hour for 1604 time (the computer will also be used as a service center by CDC); $450 for 7090 time; $175 for the 704 and under $1,500 per hour for STRETCH.

The 704 was acquired in an agreement with Marquardt Corp. for the use of a full shift on the machine. Marquardt was formerly using a 704 and will return it.

10 HOMES FOR STRETCH

Following IBM's spring announcement of a 40-50% reduction in the price and power of STRETCH, and the first installation at Los Alamos, there was an understandable moratorium on publicity for the super-sized computer. However, a total of ten, $8-million machines will comprise the STRETCH population and their homes as well as scheduled delivery dates are well worth noting:

1) Los Alamos, operational since May 13, 1961; 2) Livermore AEC, delivered October, 1961; 3) IBM internal, scheduled for April, 1962; 4) AWRE (British AEC in Harwell), May, 1962; 5) U.S. Naval Weapons Laboratory (also known as the David Taylor Model Basin, May, 1962; 6) U.S. Weather Bureau, June, 1962; 7) The MITRE Corp., August, 1962; 8) C-E-I-R, Los Angeles, November, 1962; 9) C-E-I-R, Boston, July, 1963;

10) The HARVEST or 7950 is considered a STRETCH configuration and will be delivered to a top security agency of the U.S. government. No delivery dates are available.

Of interest in this tabulation is the concentration of computing power soon to be available on the East Coast which may shift the emphasis of total computing power away from the West. Another noteworthy observation is the fact that the MITRE Corp. has obtained a STRETCH delivery date prior to C-E-I-R and will also sell time for business applications which indicates that MITRE has won a recent political hassle over this matter.

THE 3600: CDC's 1604 SUCCESSOR

Due early this Spring, Control Data's large scale successor to the 1604 will be designated the 3600 and will be introduced as a competitor to the IBM 7090I (the 7090 successor), also scheduled for announcement during '62. Both machines will feature close to a one microsecond core memory, and compatibility with their respective predecessors. The 3600 will not be sold as a replacement for the 1604 but rather as advanced hardware with additional capacity and speed.

Although specs have not been frozen as yet, the 3600 will probably feature twice the capacity of the 7090's 32K memory and will operate at about four to six times the speed of the 1604's 6.4 microsecond cycle time. It will incorporate advanced logical extensions to the 1604 including single cycle data transfer and some of the features expected to appear in the 6600. The 3600 will be priced slightly higher than the 1604 although less than IBM's 7090I. Delivery dates of both machines will be early in '63.

RCA LOSES FIRST 604 CONTRACT

In the November issue of DATAMATION (page 10), it was reported that RCA had received its first 604 contract (a 601 with high speed tapes) from Cal Tech. At that time IBM competition for the order was evident but it was felt that the contract was firm. It wasn't!

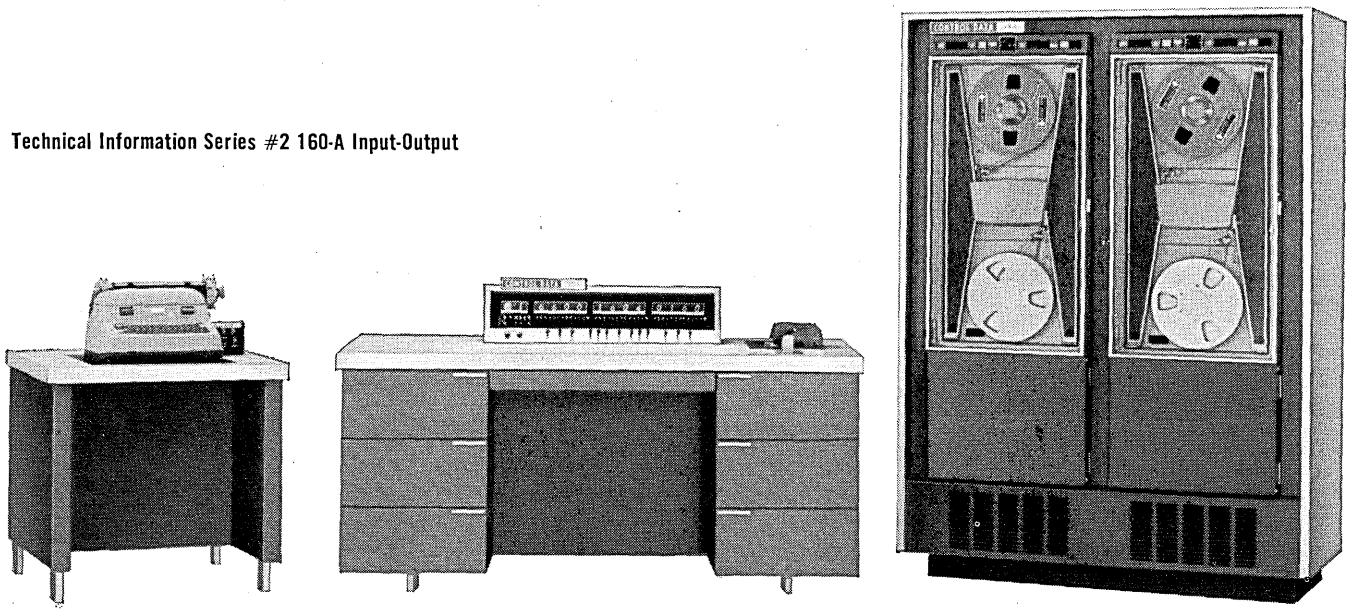
Lack of software, production problems and sundry sales machinations have resulted in the loss of the order, cancellation of virtually all work on the 604 and most important, another 7090 contract for IBM. The 90 is being given to Cal Tech at a 60% discount off the rental price.

BETTER THINGS FOR BETTER LIVING

From Westinghouse comes a report of plans for a 22-acre Tele-Computer Center to be located near Pittsburgh this year which will link 265 company locations in 188 cities. The computer scheduled to handle this giant workload is a Univac 490 real time system and programming will be in COBOL.

Says Robert Cheek, director of the Center, COBOL "will allow any medium or large computer in the company to 'converse' with another machine of comparable size . . . Westinghouse computers will be able to accept programs from one another because all programming will be done in exactly the same manner."

(Editor's Note: What was that year again?)



NEW CONTROL DATA 160-A COMPUTER

Desk Size Computer with Large Computer Capabilities

In most computer evaluations, the flexibility and capability of the computer to handle input-output operations is of special importance. No other small scale computer on the market today has the input-output features that are standard on the Control Data 160-A Computer.

For example, the 160-A exchanges data with input-output devices at any rate up to 70,000 12-bit words per second. The 160-A also has the capability of buffering data while computing... or while the operator manually enters data (whether the computer program is running or stopped). This input-output flexibility is combined with the following 160-A features:

- **Internal and external INTERRUPT**
- **8192 words of magnetic core storage (expansible to 16,384; 24,576; or 32,768 words)**
  6.4 microseconds..... memory cycle time
  12.8 microseconds..... basic add time
  15.0 microseconds..... average execution time
- **Flexible repertoire of 130 instructions**
- **External multiply-divide unit (optional)**
- **Completely solid state**
- **Low power requirements: 16 amps, 110 volt, 60 cycles**

There are two input-output channels in the 160-A: a *buffer channel* and a non-buffer channel called the *normal channel.* Both can be used simultaneously for any combination of input-output operations.

During an input-output operation via the *normal channel,* computation is halted temporarily while the operation is carried out. However, once an input-output operation is initiated on the *buffer channel,* the 160-A either continues computation or performs some other I/O operation on the normal channel.

The Control Data 350 Paper Tape Reader and the BRPE-11 Teletype Paper Tape Punch—standard equipment on the 160-A—are connected to the normal channel and are not buffered. Other peripheral devices can be connected either to the normal channel or buffer channel.

When a peripheral device is connected to the normal channel, data is transmitted between the 160-A and the peripheral device via the normal channel only. However, when it is connected to the buffer channel, data can be transmitted between the 160-A and the peripheral device via *either* the buffer or normal channels. In this case, the normal channel is utilized at any time the buffer channel is not engaged.

A desk-size computer, the Control Data 160-A has the speed, capability, and flexibility of many large-scale computers. For more detailed information write for Publication No. B12-61.

CONTROL DATA CORPORATION
COMPUTER DIVISION
501 PARK AVENUE, MINNEAPOLIS 15, MINNESOTA

"why we chose the NCR computer"

Hycon Manufacturing Co., Monrovia, California

"We chose the NCR 390 Computer for three basic reasons:

"ONE..." Dealing primarily with government contracts, we have daily need for the ability to get our accounting and statistical data quickly organized and recorded in a visible form for ourselves and government personnel to utilize. Since the NCR 390 is a computer which employs conventional business-type records, it will permit us to accomplish this first requirement in an extremely fast, efficient, and economical manner.

"TWO..." It is absolutely essential that our records be accessible, sometimes for years, for audit and reference by ourselves as well as government personnel. With the NCR 390, our records will be constantly available, in human-language form, to satisfy this second requirement. And, since these same records will store data in the electronic-language of the computer, they will be constantly available for high speed processing.

"THREE..." The NCR 390 will up-grade our reporting abilities. It will contribute greatly to the needs we have for more timely factual data at every level of management, which is so essential in a highly competitive market.

"With these many abilities, we are sure our choice of the NCR 390 Computer was a highly-profitable decision."

Trevor Gardner
Chairman of the Board and President
Hycon Manufacturing Company

NCR PROVIDES TOTAL SYSTEMS—FROM ORIGINAL ENTRY TO FINAL REPORT—
through Accounting Machines, Cash Registers or Adding Machines, and Data Processing
The National Cash Register Company—1039 Offices in 121 Countries—78 Years of Helping Business Save Money

NCR®

CIRCLE 13 ON READER CARD

important DATES

• Thirty papers on programming and computer design will be presented at the AIEE's Winter meeting scheduled for Jan. 29-Feb. 2 at the Statler Hilton Hotel, New York City.

• The Office of Naval Research, Information Systems Branch, is sponsoring a symposium on Redundancy Techniques for Computing Systems which will be held on Feb. 6-7 in the Dept. of Interior Auditorium, Washington, D.C.

• Management of Science Information Centers will be the theme of the Fourth Institute on Information Storage and Retrieval to be held Feb. 12-16 at The American University, Washington, D.C. For information contact Dr. Lowell H. Hattery, Director, Center For Technology & Administration, The American University, 1901 F. St., N.W., Washington 6, D.C.

• The New York Management Symposium of the Assoc. of Data Processing Service Organizations will be held on Feb. 19 at the National Cash Register Computing Center in New York City. For information write to W. H. Evans, ADPSO, 1000 Highland Ave., Abington, Pa.

• A Symposium on Interactions Between Mathematical Research and High Speed Computing will be held April 16-18 at the Chalfone-Haddon Hotel, Atlantic City, N.J. It is sponsored by the American Mathematical Society and the ACM. For information write to Prof. John Todd, Chairman, Organizing Committee, California Institute of Technology, Pasadena 4, Calif.

• The Spring Joint Computer Conference (formerly known as the Western Joint Computer Conference) will be held May 1-3 at the Fairmont Hotel, San Francisco. Conference chairman is G. A. Barnard, Philco Corp., Palo Alto; vice chairman is H. D. Crane, Stanford Research Institute, Palo Alto and program chairman is R. I. Tanaka, Lockheed Corp., Palo Alto.

• The 1962 IFIPS Congress is scheduled for Aug. 27-Sept. 1 in Munich, Germany. For information write to Dr. E. L. Harder, Westinghouse Electric Corp., East Pittsburgh, Penna.

EDITOR'S READOUT

Outlook for '62

To lend a measure of clarity and definition to the coming 12 months, DATAMATION presents on the following 23 pages, an expository profile of the computing industry. By invitation, experts in various facets of the profession review, project and subjectively analyze the state-of-the-art for 1962.

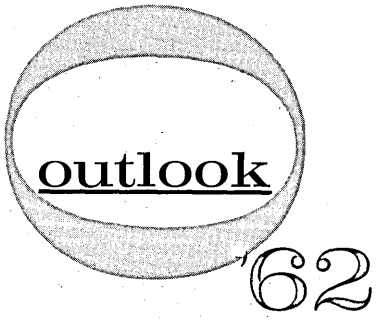
Subjects selected represent a broad, horizontal spectrum including the role of AFIPS, the outlook for hardware, software, business and sciéntific applications, the government's posture, computing abroad, progress in standards, computing education, the changing role of the consultant, the population explosion, the military scene, and the general market for computing power.

In order to provide the authors of this issue with maximum freedom of expression and because their opinions do not reflect national committee or corporate policy, present affiliations are not included in their by-lines. However, since invitations were extended on the basis of intense experience in a particular area as well as widely recognized professional competence, biographies and affiliations in most instances, would appear superfluous to the main intent of the issue: a reflection and prognostication on the growth of the computing industry.

As is customary in DATAMATION, an iconoclastic attitude was encouraged in the preparation of material, and while readers may profess sharp disagreement with many of our authors' conclusions or for that matter, their implied statements of fact, it is precisely through disagreement and its expression, that sound progress can be affected.

To this end, DATAMATION will devote the balance of its issues during the coming year to provide a forum for intelligently presented arguments and interpretative analysis of progress in computing.

The specific approach will be vertical in organization with special sections of each issue devoted to new areas of application such as the bio-sciences; automated teaching; social research, and management information systems. Technical progress will be mirrored in such areas as data transmission, process control, and a components issue debating the advantages of tunnel diodes, thin films and cryogenics. The economics of computing will be analyzed in special studies on the cost of conversion from card equipment to computing; trends in leasing vs. purchase of hardware, and a survey of programming costs both at the manufacturer and user levels.



Continued emphasis of the Joint Computer Conferences as well as the national ACM conference will be featured in DATAMATION's April, August and November issues.

Of principal importance however, will be the flexibility of the publication serving as a proper media for the airing of dissent as well as agreement and as a reflection of our readers' interests, activities and abilities in furthering their professional competence during the coming year.

The Role of AFIPS

planning over, work ahead

by WILLIS H. WARE

The American Federation of Information Processing Societies was created at the 1961 Western Joint Computer Conference in Los Angeles. The last seven months of 1961 was a period of organization, formulation of program, consolidation, and dealing with immediate problems, principally related to conferences. As of year end, AFIPS is well in hand, has its complete complement of operating committees, and can now function as an integrated organization. We see 1962 as our first year at full-scale activity.

Information processing as a technique for handling the information flow problems in a wide range of business and industrial activity, is impacting on larger and larger segments of the population. Sometimes in a new application, the new machines and the new ways of life that they bring are regarded with suspicion or distrust – if not fear. This is a natural reaction because job security may appear to be at risk, or personal behavior habits have to be changed, or the authority of supervision felt in a different way. The social consequences which widespread application of information processing will force we do not fully understand, nor can we identify all of the problems which will arise. However, it is clear that the professional people of the field—and their technical societies—have a very real obligation to provide appropriate informational and educational materials to facilitate the acceptance of the techniques and devices which we have created.

The AFIPS is the society of societies which represents the information processing community of the United States. We have established ourselves with the general and technical press, and with the technical societies in that role. Through our public relations program, we plan in 1962 to inaugurate such things as a program of informative talks for service clubs, general pamphlets on information processing for use by various organizations, taped lectures for radio use, and material about computing in the United States for use at the international Congress-62 in Munich.

To our own technical people we have the continuing responsibility for sponsoring the Computer Conferences. Traditionally, they have been called the Eastern and Western Joint Computer Conferences, but they are now called the Spring Joint Computer Conference, and the Fall Joint Computer Conference. In another year or so, we will probably eliminate the "Joint" from the name. In 1962, the Spring Conference will be May 1-3 in San Francisco; the Fall Conference in December at Philadelphia. In May 1963, the Spring Conference will be in Detroit, and thereafter the Fall Conferences will be in the west, the spring conferences in the east.

Many operational policy matters—such as procedures for admitting new members, financial responsibility—have been resolved and incorporated into our by-laws. We are actively considering new areas into which AFIPS should perhaps move; for example, educational programs in the public schools, a speaker's bureau, consolidated abstracting or review services. We are keeping a watchful eye on the progress of information processing and its impact on society; we want to be ready with information.

We hope that these things will all come to fruition in 1962. The Board of Governors, the officers, and the committee chairmen of AFIPS intend to push as fast as we can.

outlook '62

The Hardware Transition

toward on-line real time

by J. PRESPER ECKERT

It is hard to speak with any authority on what hardware will be actually announced for sale in 1962 for obvious competitive reasons. Further, there are always uncertainties in the announcement of frontier developments which make pinning matters down to a particular year difficult. The following developments seem to be coming rapidly, however.

Mass Storage: Units which can store 50 to 1,000 million characters and have access times in the 25 to 200 millisecond range are going to be increasingly common. These units will not only rival tape unit storage in overall speed in solving a problem but by displacement of many tape and card units otherwise in a system will, in the longer pull, lower costs. We already have enough data (from the operation of the stepperdrums of UNIVAC LARC Computing System) to know that mass storage units can outstrip magnetic tapes not only in speed but in reliability as well. LARC drums at over 300,000 characters per second were many times faster than their contemporary tape units and are still considerably faster than available tape units. Improved mass storage and tape units depend in large measure on high density recording which in turn depends on a dust free environment. Obviously this can be achieved in a closed box more effectively than in a tape unit cabinet which must be opened and closed frequently. Mass storage units, if properly designed, can provide not only sequential processing speed faster than tape units but provide this with random access ability as well. This combination is not only more powerful than tapes alone can provide but opens up a new era of system arrangements.

Tape Units: The one flaw of mass storage—its finite memory capacity—can be easily overcome by still including one or two simple tape units in a system. These tape units provide for rapid filling of the mass storage from another system or from special off-line input units and also provide long term storage of infrequently used data or date preserved as a protection against system failure. Such tape units can be simple and low in cost since speed of operation and rapid stop-start ability is not needed for this purpose. All processing runs, except initial entry and final withdrawal of data, would take place without tape using only the mass storage system. The infrequent tape transfers would use giant blocks of data thus removing the need for rapid stop-start.

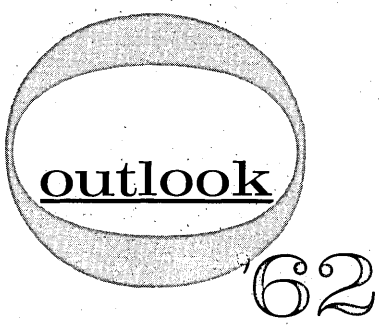
Internal Memory: Further breakthroughs in magnetic plated or evaporated film memory elements are taking place, and a continued replacement of ferrite core memories will certainly take place. Methods are being found to raise signal levels and lower driving circuit cost. As a result 1962 will see much faster memories, more than ten times faster than present ferrite memories. I feel that in the years to follow film memories will be less expensive than ferrite core memories except perhaps when no more than a few thousand bits of storage are involved and the speeds are not excessive. While cryogenics offer possibilities for improved memories as well, the problems of manufacture and the cost problem of the refrigeration system make evaluation at this time favor the magnetic approach.

Circuits: Most noted of the circuit advances in 1962 will be the higher speeds and lower costs made possible by improvements in transistors. The epitaxial

outlook '62

transistor, both silicon and germanium, is largely responsible for this. High speed switching transistors have already become five times as fast and have dropped to one fifth of their former cost in the last five years. While other circuit fabrication costs have not dropped as much, it is clear that more than ten times the circuit performance per dollar will be available in 1962 and beyond. In 1962 we will see practical forms of microelectronics (Fairchild Semi-Conductor Corp.), improved forms of magnetic thin-film paramatrons and higher speed, almost all magnetic, ultra reliable logic (Sperry Gyroscope's MAG-LOC). Thus 1962 will be a banner year for circuit hardware.

On-Line Real Time Systems: All these improvements add up to a new potential in computing and data processing systems. The fully on-line real time approach is already a reality in the larger systems (Univac 490 - Real Time System). However, this approach has not yet reached the medium and small size area. It should start in 1962. Most of all it takes lower cost, but not faster, mass storage. It puts a greater burden on the speed and memory size of the computer or central processor. Directly connected keyboards for input and verification, printers, mass storage, a few simple tape units, and in many cases telephone lines, card readers, character readers, voice drums, and even card punches will be all directly on-line. There will be a great need, even in small and medium size systems, for internal processing speeds and memory sizes once thought of as only needed in larger systems. The mass storage is the main element which makes this new concept possible. On-line or telephone line verification by directly connected keyboards would hardly be practical with tape units alone unless there was a tape unit for each keyboard. Thus without mass storage the basic savings of simple keyboards would be more than offset by added tape unit costs. The large drum or disc size, the high pulse densities, and the high rotating speeds required in a modern mass storage unit pushes up the information transfer rate per channel into the megacycles. Economies result from the few channels required in the electronic equipment. Good use of the speed of modern film memories and modern circuit advances is possible. Actually rather modest memory sizes are possible considering the effective processing rates and the number of "electronic balls" kept in the air at any one time by the computer. This is possible due to the high instantaneous transfer ratio between a modern mass storage unit and the memory. It allows small data blocks and in spite of the latency time of the mass storage unit achieves the needed processing data transfer speed. Such on-line, real time mass storage oriented systems by further eliminating punched card and magnetic tape handling make the system now almost entirely automatic. In so doing more pressure than ever will now be focused on making input and output more automatic. Character readers and spot code readers will move to the foreground. Printers will grow faster and in all likelihood the use of carbon paper will start to decrease. Reports will be printed out in final page sequence directly from mass storage for as many as are required—all "originals". Voice drums, such as Univac's Uni-Call will talk directly to people. Special input machines for department stores and banks (Univac's Unisaver) will become more commonplace. The communication of people with machines by improved software will, of necessity, be improved. Hopefully a machine that can understand our spoken language will receive fuller attention.



The Software Turmoil

nine predictions for '62

by DANIEL D. McCRACKEN

Software, as I understand the use of the term, includes all the programming systems required for the effective utilization of the hardware of a computer. A new management support plus rapid advance in the software art itself have resulted in a great turmoil in the software business recently, a state of affairs that clearly will continue during 1962.

I will make nine predictions on software-62, beginning with a couple of pretty safe ones.

1. The scope of software support will increase. It used to be that an off-hand assembler was *the* software for a computer; today, almost every machine has half a dozen major packages, and the trend isn't finished. Furthermore, manufacturers are increasingly taking responsibility for application programming. This last could very well be the sleeper in software, with a real chance of overshadowing compilers and sort-merge generators before too long.

2. A lot of processors are going to be late. Add up all the computers announced in the last year or so, multiply by the number of programming systems promised for each, multiply by the number of good people needed to produce each in the time available — and you get a large number. In fact, there aren't that many experienced people around.

3. Worse, because of the pressure to meet promise dates, some hastily-written processors are going to turn out inefficient object programs, leading to loud I-told-you-so's from people who don't know the difference between a bad language and a bad processor. (Also from those who *do* know the difference; it hurts either way.) This could set the software art back several years, until burned fingers heal.

4. We may hope during 1962 to see the beginning of a more sensible attitude toward compiler languages. It would be nice if everyone would realize that no one or two advantages are the *whole* reason for using them. The major systems are justified by a combination of a modest saving in programmer time and training, a significant but not stupendous saving when converting to a new machine, and a very sizable but not colossal improvement in communication and documentation. We are still living down the early claims of the zealots.

5. The present furious experimentation in languages will continue, and I'm all for it. FORTRAN, COBOL, and ALGOL are not the whole story; no one should

outlook '62

ever expect that one or two languages will be adequate for all applications and never need improvement. It might be wished, though, that the experimenters talked to each other a little more, to eliminate duplication of effort and to take quicker advantage of demonstrated improvements.

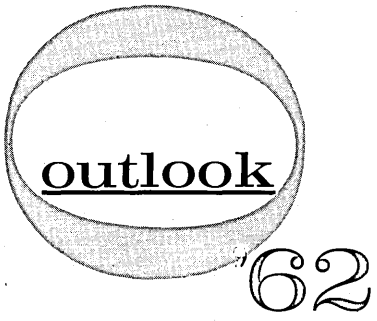
6. COBOL will take hold steadily. The benefits of such a language are beginning to be demonstrated by actual experience, but various factors will prevent overnight acceptance: human inertia, disillusionment caused by using the system improperly, and possibly the limitations of early processors.

7. Despite its demonstrable advantages as a computer language, ALGOL will gain acceptance slowly (but steadily). Acceptance would be much more rapid if users were willing to believe that a) ALGOL has not already been engraved in granite, never to be changed, and b) it will not change so drastically every two years that processors will be continually obsolete. It would also help, of course, to hear a little more enthusiasm from the direction of White Plains. Maybe we will have to wait for FORTRAN to evolve into ALGOL, as it already appears to be doing. (Statements on this subject have a way of being misinterpreted; let me say explicitly that I am an enthusiastic ALGOL supporter.)

8. Perhaps in 1962, likely later, manufacturers will begin to provide two versions of every processor: one that compiles at the greatest possible speed and ignores object program efficiency, and another that sacrifices compiling speed to produce a very good object program. In the past we have mostly had only the latter, which is fine for large production programs but terrible for checkout or for things like student programs.

9. If I may broaden the definition of software a bit, I will predict that during 1962 manufacturers will begin to realize that for a new company, training is just as important as good computers and good programming systems. They may also come to realize (which means to budget accordingly) that more and better written materials can help to reduce the staggering load of formal courses. A major step in the right direction would be universal acceptance of Howard Bromberg's idea (Datamation, September, 1961) that there should be three manuals for every system: a beginner's expository manual, an expert's reference manual, and a maintenance manual.

This will be an exciting year in the software world. Not everything that happens will represent progress, but significant advancement will be made, and a foundation will be laid for solid achievements in later years.



The Government
a $1.5-billion factor

by CHARLES A. PHILLIPS*

The Government ends 1961 with over 800 computers installed and 200 more on order. Operating costs in 1961 (rentals, amortization, personnel, etc.) were approximately $475 million and probably will increase to $550 million or more in 1962. Today, over 45,000 people are in positions related to management or operations of computers in the Federal Government. These figures exclude classified and military operational applications, which would probably boost the costs well over $1.5 billion per year.

The importance of computers and their operation has been recognized at the highest levels. The Bureau of the Budget, with Presidential approval, sponsored a seminar on computers for top level government executives, including those of Cabinet rank, on December 15, 1961. The Budget Director, an Assistant Secretary of Defense, and other Government officials spoke to this select gathering, after which they visited over twenty exhibits (including ten "main frames"), held over from the EJCC.

The Interagency Data Processing Committee was revitalized in 1961, its membership enlarged to over 45 government agencies, and given an ambitious program for 1962. Under chairmanship of BoB, this group will consider such areas as: development of courses in systems analysis; establishing computer "sharing" plans in geographic regions; developing alternative approaches for the continued computer operations in the event of attack, or other emergency; establishing a "library of applications" for sharing procedures and experience in computer operations, and similar problems common to several agencies. Many of these projects should reach action stage in 1962.

Further evidence of top-level interest — a recent Circular issued by the Executive Office of the President (No. A-54, October 14, 1961) established government-wide policies on selection and acquisition of automatic data processing equipment. These policies are intended to insure a sound approach to the installation of new systems and broaden competition among equipment manufacturers. The Circular requires that consideration be given to all acquisition methods available, with purchase indicated as the preferred method under certain conditions. The need for such government-wide policies had been recognized for some time and recent inquiries by Congressional Committees emphasized the importance of this action. There is much speculation as to probable results, but one thing is certain — the effect of the Circular will be felt in 1962.

During 1961 a general trend was noted in most Government agencies to recognize the importance of computer operations by raising the organization level of the function, or establishing new positions or units at higher levels. As examples: the Post Office established a new super-grade position in the Office of the Deputy Postmaster General, with responsibility for automation on a department-wide

outlook '62

*According to the regulations of the U.S. Office of Public Information, the preceding article was prepared by Mr. Phillips as a reply to a DATAMATION initiated inquiry, "What Is The Government's Role in Computing For 1962?"

government

basis; the Air Force set up an Assistant for Data Automation, with General Officer rank, and Internal Revenue established an Assistant Commissioner for Data Processing. These new units, or the increase in stature of older groups, will give new impetus to computer operations. There is even a good chance that the "total systems approach," long a dream but seldom (if ever) a reality, may break the barrier of organizational jealousy in 1962 through this top-level understanding and support.

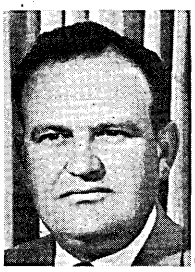
1962 should see a rapid extension of the practice of exchanging data in machine language between government agencies and with private industry. Social Security is accepting data on payroll deductions on punched cards and magnetic tape from government agencies and private industry; prototype operations in military departments using machine language media to exchange data with contractors on shipments, contract changes, etc., appear successful and may be adopted as standard procedure; agreements between States and the Federal Government may go into effect next year involving transfer in machine language of tax information, driver's license revocations and other State-Federal matters of data interchange. Potentials of cooperative action of this kind have only recently gained recognition – Treasury and the military departments now sort checks by state or city before delivering them to the Post Office; Internal Revenue Service recently decided to use Social Security numbers for income tax identification, thus opening up many additional interchange possibilities. Watch this area in 1962.

Last, but possibly first in importance, is the high interest and support of the government in programs to establish standards in the computing field. Both GSA and Defense are represented on the American Standards Association X-3 Sectional Committee (logical and physical standards for computers) while Commerce and Defense are represented on the recently formed ASA X-6 Sectional Committee (electrical computer characteristics). Government representation is either present or planned on all the subcommittees and working groups of these Sectional Committees. Independent, but contributing heavily, is the government's support of programs which developed COBOL and ALGOL. Other important standardization efforts are: a military department program to develop physical standards for magnetic tape; widespread government interest in standardizing flow-charting symbols; action by the Air Force to develop standard "data elements;" adoption by Defense of a standard military procedure for requisitioning and issuing supplies (MILSTRIP). This last mentioned action, with a target date of July 1962, is a real milestone in the standardization program and will have a far reaching effect in the computer field. While most standardization programs are usually slow to mature, 1962 will feel a real impact from Government.

The Military Market

emphasis on big systems

by S. DEAN WANLASS



Historically, the government, and more particularly the military, has been the single largest developer and user of computer technology. 1962 will doubtless see an acceleration of this trend with continued emphasis being placed on "big systems" and with continued recognition being given to the limitations of human beings.

The importance of the military market to the development of new computer technology is based on two factors. First, as we are all aware, at least 60% of the money spent in this country each year on research and development comes out of U.S. Treasury; second, the military value of improved computer characteristics historically has warranted (and will continue to warrant) the support of new R & D projects which the computer industry would consider as too speculative for the expenditure of private funds.

Among the R & D projects that could find support during 1962, is a new type of "space computer," which provides an interesting contrast to the historic emphasis that has been placed on speed. This type of computer will be characterized by a very slow computation speed with prime emphasis being placed on low power consumption and high reliability. (Characteristics consistent with the relatively large amounts of time consumed by space missions.) Future versions of such machines might even incorporate an "in-flight repair" characteristic.

1962 should also provide many striking evidences of successfully concluded R&D projects. One such technological breakthrough has been in the area of high speed memories. Computer speeds have traditionally been limited by internal memory access time. In spite of the great strides made by our industry in increasing the speeds of toroidal core memories, it seems unlikely that speeds much in excess of one megacycle are practical. However, the future should see fairly widespread use of multiaperature ferrite memories with speeds approaching 10 megacycles, and of thin film memories an order of magnitude faster. Due in large part to government sponsorship, these memory achievements will enable computer designers to achieve better internal balance in their fast machines. These memories will also doubtless lead the way to a new generation of government sponsored ultra high speed computers.

Each year finds increased emphasis on peripheral equipment. One new entry in this field which will be in evidence during 1962 is a comprehensive line of display equipment designed for group as well as individual viewing and capable of displaying almost any form of data—graphic or tabular. Such equipment in the form of multi-colored displays incorporating the latest electronic and optical techniques should begin to be fairly commonplace in the next few years. Application of these advanced display techniques to industry should follow. It is almost certain the "Display Systems" will form the basis for a new multi-million dollar industry.

In addition to the continued widespread use of computers in weapon systems and defense systems, 1962 should see increased emphasis placed on their application to planning, automatic check-out, and spaceborne functions.

The use of computers for military planning and gaming has received some consideration during the past few years and 1962 should see a considerable increase in this application. The aforementioned "display systems" will be a key element of such war gaming complexes. We can also expect to see the development of a great deal of other special digital equipment.

1961 saw the first application of digital computers to the automatic check-out of spacecraft. During 1962 we can expect to see considerable emphasis placed on computer controlled automatic check-out equipment for missiles and space vehicles.

Finally during 1962, spaceborne computer development will receive increased support consistent with the large expenditures budgeted for manned space missions and planetary exploration missions.

outlook '62

The Population Problem

inexperience will dominate

by DON MADDEN

A year ago, there were about 4500 general-purpose, electronic digital computers installed throughout the United States. Currently, there are about 6000, and by the end of 1962 there will be over 8000. Each of these computers must be attended by its own crew of information processing specialists, most of whom are programmers. While a large computer may require the services of hundreds of programmers, the smaller (and more numerous) computers each require only a handful. Thus, a recently published survey supports (or at least does not contradict) the estimate that the average number of programmers required for a computer is ten. Although the new programming languages promise to reduce the number of programmers required per machine eventually, they have not reached the degree of usage (and in some cases development) where they can be expected to reduce materially this ten-to-one ratio in the near future. The obvious conclusion is that the computing industry will require more than 20,000 new programmers this year alone. The question, then, is — where will these 20,000 new programmers come from?

Some, of course, will be recruited from the universities, especially from those with computing facilities where programming classes are offered as part of the curriculum. This supply, however, will make a very small contribution to the total requirement. There is a tendency for companies embarking on new EDP installations to recruit and train most of the necessary technical personnel—including programmers—from within their own organizations. This may be, in part, merely a reflection of the current scarcity of experienced programmers, so that a company faced with inexperienced applicants may prefer those who are at least familiar with the procedures to be automated. There is growing evidence that this approach is as satisfactory as that of hiring a complete crew of experienced programmers from outside.

Many companies are forced to hire inexperienced people and train them as computer programmers, and it is to be expected that the major proportion of the year's crop of new programmers will enter the profession this way. The importance of this training activity is indicated by the organization of a special interest committee on programmer training within the ACM. Less than half of the companies that acquire new programmers in this fashion require that they have college degrees, and some companies don't require any college education from their programmer trainees. Many such companies do, however, prefer a background in mathematics or accounting. Even though mathematics knowledge is not exploited directly in many computing applications, it is felt that success in the study of mathematics represents a valuable criterion in choosing applicants most likely to succeed.

The foregoing suggests that in 1962 many computer installations will be occupied with training inexperienced people to do programming work and that for experienced programmers the "Applicant's Market" will prevail over the "Employer's Market."

outlook '62

The University

leadership abdicated

by HERBERT M. TEAGER

Universities play a comprehensive and highly diverse role in computing, and there thus can be no simple evaluation of performance, either among the many diverse universities or within any one of them. It would be comforting to point with pride to the early leadership asserted in the development of hardware, programming, and applications and the present remarkable proliferation of computation facilities which has resulted in widespread usage of computation in research and as a vehicle for training large numbers of new programmers at universities. In the opinion of this writer, this picture might be comforting but is highly misleading, for it seems that the university has largely abdicated its leadership in the development of "Computation Science" per se, and is instead concentrating on exploiting and teaching the present, inadequate standard techniques.

Universities are not only customers for large scale computation facilities but are also in the rather unique position of applying and teaching computation techniques developed for research areas in science, engineering, business and the humanities. They are also interested in advancing the state of the art in the hard- and software aspects of information processing itself, hopefully to such a point that computation can be a widespread and active intellectual partner in the development of new knowledge.

On the positive side of the ledger, computers are being brought more strongly into the research and educational activities of a larger number of schools each year. Due to the foresight of manufacturers and the support of government agencies, such as the National Science Foundation, computers are being made available to universities on reasonable terms. As a result, most schools can now boast of at least a moderate amount of computation capacity on campus. Most of these schools have introduced computation courses, even at the freshman level, so that at some schools, a large fraction of the students are exposed to programming at some stage of their undergraduate careers.

On a research level, computers are being used for data reduction and numerical simulation in many separate fields of science and engineering, and within many fields, graduate courses have been organized around the highly-specialized computer techniques that have resulted. It would appear, however, that to the great majority of the theoretical and experimental researchers at universities, the computer is still a high-speed desk calculator; a device that is only applicable to a small percentage of their problems, and then only if eager students can be found to do the "dog-work" of programming. Given the present state of the "Computation Science" art, their conclusions are not unsound.

This present attitude is not due to either ignorance of the researchers or to a lack of missionary zeal on the part of computer specialists. It would appear that the intense preoccupation over the past few years with the latest syntactic wrinkles of

outlook '62

university

ALGOL and "generalized" symbol manipulation programs have blinded many people to the fact that these languages are still at far too low a level and are congenitally unsuited for the input-output needs in describing or solving the problems of a researcher or teacher whose primary interest is not programming.

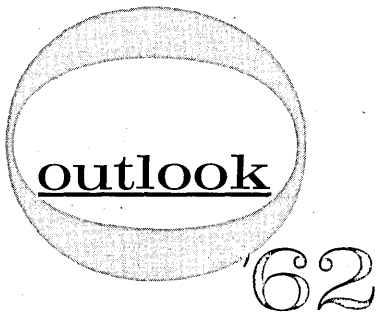
On the hardware side, there is no longer much point in attempting to beat industry at its own game of building cheaper, faster or more reliable computers of the standard von Neumann type. It could, however, be strongly argued that it is within the province of the universities to develop and explore theories of computer organization and information processing which might, in turn, lead to entirely different machines and programming systems. For that matter, industry can hardly be expected to pioneer in the development of novel or radical input-output devices and languages, while supplying a highly competitive military and commercial market. Comparatively little work of this kind has emerged.

It is, however, mainly in the areas of non-numeric information processing, sometimes covered by the all encompassing and imposing title of "artificial intelligence," that the abdication of scientific leadership on the part of the universities has been most strongly felt. It is, of course, both interesting and popular to speculate about and perhaps satisfying to experiment at random with ever larger computers on such general problems as "information retrieval," "pattern recognition," "learning machines" and "self-organizing machines." These terms are so broad and general, however, as to have almost no meaning in any operational sense, particularly as a definition of a tractable problem. It is also fun to play games with machines and of interest to show that machines can do complicated "intellectual" tasks. If this work is to have a broader applicability, however, there must also be criteria and standards, rather than elaborate expositions, so that research results and theories can be tested, compared and evaluated, and general knowledge accumulated from the work that is done. There are many able people working at universities on artificial intelligence problems, and many areas being explored. Considering the magnitude of the problems, however, there are far too few such workers.

Information processing, and particularly that of non-numerical information, is a field that is in its infancy, and as such, can hardly claim to be a science. Like Alchemy, it also is searching for philosophers' stones to transmute metals into Gold. It is time, however, to take a more modest look at specific and definite problems within "artificial intelligence," for there is no shortage of very real and pressing problems that need to be solved.

Many of these problems are interdisciplinary in scope. For example, the problem of retrieval of information within a specific field requires knowledge of the structure of the subject matter, as well as the psychological needs of the user. However, once the non-information processing aspects of the over-all problems have been isolated, it should then be possible to define reasonable underlying problems.

If interesting, tractable and well-defined problems can be posed, there will be far less difficulty in attracting more high calibre people at universities and elsewhere to work upon the science of computation. It is up to the universities to provide the leadership.



Secondary Education

exploring the basics

by FRED GRUENBERGER

Pioneering efforts in teaching computing at the high school level started in 1960. By the end of 1961, courses (mainly in programming, coding, and answer-getting) were becoming widespread, and a few secondary schools had acquired machines. By far the most successful efforts (both in quality and quantity) were those of Richard Andree at the University of Oklahoma and George Heller at Bethesda, Maryland. Each of these men are currently introducing the subject to some 300 high school students per year.

The movement into the high schools is almost exactly a decade behind the movement into the colleges. That latter movement was unplanned and haphazard, resulting in a strange mishmash of "computing" courses given in departments like Dairy Sciences, Astronomy, and Soil Physics, often by men who were more eager than knowledgeable.

There are some 11,000 high schools in this country with a student population over 1,000. Under certain assumptions, the introduction of computing technology and the computers themselves into our secondary schools stands a good chance of being orderly.

1. Courses will be given under the sponsorship of the mathematics or science departments.

2. Suitable textbooks will be available. At least two texts, aimed at the high school level, are in progress.

3. The instructors will be trained. At the very least, the training of the high school teacher will probably be better than was even *possible* ten years ago for the college man. He will probably have some experience with an actual machine.

4. The machines used, though probably old, will be mass-produced, with a wealth of software behind them. In addition, each teacher can seek expert help, if needed, from local industry.

The real wave of such courses will probaby not come until 1963 or later. It is already quite clear, however, that this is not a fad. For one thing, an introduction to computing might properly belong at the secondary school level —there seems to be a strong analogy to the learning of a foreign language and it has become obvious that the latter subject is best taught to the young. For another thing, since computing skills cut across every discipline, we can reason that we owe it to the college-bound student to prepare him for intelligent use of this tool prior to his college freshman year.

What can we expect to happen in this area during 1962? Quantity will surely increase; more courses will be given at more schools (sheer bandwagon effects, if nothing else). But we can also expect to see much more intelligent effort devoted to the fundamental problems. Committees, both in the educational world and in computing circles, will be exploring pertinent questions:

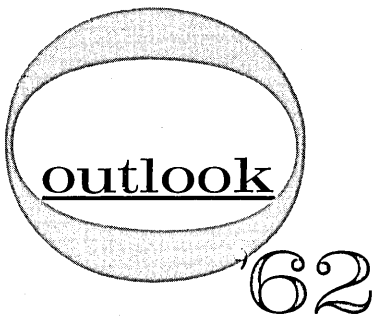
1. What should we teach, and to whom? Do we want to furnish, say, the college-bound youngster with answer-getting ability (e.g., FORTRAN), or is he better served with overall knowledge of computers, basic programming, and an introduction to numerical analysis?

2. How shall we go about training the required teachers?

3. What steps are required to keep the process (the introduction of computing and computers to the high schools) orderly? We would want to avoid, it seems to me, a duplication of the events of a decade ago, wherein computers were all too often used as a money-making device, with training and research subservient, if non-existent.

4. How is the program best financed? Is government subsidy at any level necessary or desirable?

Since the movement is inevitable, these questions will be answered. Whether we arrive at answers we will be proud of in 1971 depends on the efforts applied in 1962.



The Consultant

a new competence filter

by GEORGE J. VOSATKA

The rapid growth of the computer industry has fostered a similar expansion in the field of consulting – if not in total size, certainly in the number of individual consultants and consulting organizations.

Historically, pioneers in this field assumed a direction determined by the broad and immediate needs of the industry, rather than by special in-house talents. As a result, such activities as equipment feasibility studies, computer surveys, etc., were of prime interest. These have phased out as the major consulting activity because industry and industrial users have attained a degree of sophistication obviating the need for a great amount of assistance in these areas. Hardware characteristics are no longer the only criterion used in the selection and application of equipment, for the computer user is now becoming increasingly concerned about associated services.

Industry growth, the demands for area experts, and the inappropriateness of manufacturers providing all the necessary help have led to the growth of consulting and, concurrently, to considerable specialization. This trend is evidenced by the degrees of specialization now practiced by consultants, i.e. PERT and PEP systems, manual preparation, LP codes, computer comparison charts, systems design, operations research, etc. Patterns of this kind occurred in both the medical and legal professions as these arts expanded and it became impossible to know all there was to know about the field.

If this is the direction to be taken by the consultant, what will be his responsibilities in the forthcoming year? It can be safely said that he will play a greater and more important role, though more restricted to his individual field of activity. This restriction will be necessary if he is to survive in an industry daily growing increasingly complex. The "broad picture" man, much in demand during the formative years of the computer industry, will disappear—to be replaced by the expert or group of experts. With the growth of the computer industry, this type of talent will be in greater demand and, as a result, additional specialists will enter the field. The consultant will be required to not only advise and train but also "do," or at least stay around until the task is performed; a responsibility quite frequently overlooked in the past. This requirement to "do" will undoubtedly serve as a competence filter to separate the professionally reliable and productive organizations from those that feel a smattering of knowledge is enough to "get a contract" and whose creed is based not on service but on being "sales oriented."

The past ease with which staff-less, talent-less companies have been born poses a real problem for the consulting profession and certainly for those in need of consulting services. The only available means of evaluation open to a company in need of help is through past performance and the in-house talent offered by the consulting service.

Industry, experiencing shrinking profit margins, will look more than ever to the computer manufacturer and to consultants for methods of profitable employment of computers as a means of cutting costs. The consultant will be called upon to recommend realistic, practical ideas and to support these by a proven record of success. The value of the consultant will certainly increase in the future as client management becomes more capable of defining the task to be performed and more aware of what to expect as a result.

outlook '62

Scientific Computing

three significant trends

by FRANK WAGNER

This year, three significant trends in scientific computing will be evident. One of them will be in its terminal stages — the phasing out of Symbolic Assembly Languages for applications programming. The second trend will become well defined — the use of large semi-random-access storage. The third tendency will only be embryonic — the visual output revolution.

Very soon we will see the climax of a trend that became clear in 1958, the dominance of Problem Oriented Languages for applications programming. In 1962, it will be indeed a rare Manager of Applications Programming who will not acknowledge that Symbolic Assembly Languages are obsolescent. Even die-hard machine language coders will capitulate, and withdraw to the ivory tower reserved for programmers of utility systems. For general purpose work, FORTRAN will continue to maintain its supremacy. It will have little competition, except in universities, from any of the ALGOL variants. Most applications programmers will realize that FORTRAN is more than "just algebraic language," and can be used, albeit clumsily, in ways far beyond the intentions of its original designers. Nevertheless, special purpose POL's will continue to be developed. However, they will not proliferate in proportion to the need for them, because their implementation is still a formidable task. Thus we can look for an increased pressure for the incorporation into FORTRAN of features permitting the easy development of special-purpose POL's within the FORTRAN system. If FORTRAN does not rise to meet this challenge, it is possible that the pendulum may swing to one of the dialects of ALGOL. JOVIAL is the most likely candidate.

From the days of the 512-word BINAC, applications programmers have yearned for just a little more space in the primary storage. When scientific routines or their data have exceeded the primary store, small drums and tapes never have been really satisfactory. 1962 will see a strong effort to free the user from his storage prison. A new generation of large semi-random-access stores is promised by all the major manufacturers. Very large capacity disk storage now can be ordered for almost every large computer. Several systems will feature high-performance, high-capacity drums. Of course, these leave much to be desired in both access time and transfer rate. If they are used in *conventional* ways, they may very well prove to be useful only for operating systems, for the storage of library routines and frequently used applications programs and data. If they are connected to input/output devices, as well as to the computer, the manual handling of a job in the machine room can be drastically reduced, resulting in a major improvement in service. But this is

outlook 62

scientific computing

small comfort to the programmer, pining for an infinite primary store. It seems probable, therefore, that there will be a vigorous attempt at a breakthrough in integrating the disks or drums with the primary storage. The goal will be to make the machine look *to the user* as though it had a one-level store. This is promised by the Ferranti "Atlas" operating system, which organizes all storage, primary and secondary, into 512-word "pages." In a heuristic way, the system is expected to keep the primary store refreshed with those pages of the program *and the data* that are needed at any given time. Skeptics may chuckle, but the demand for this feature is great enough that it will be tried on most other machines that have enough semi-random secondary storage. If it works, a new era will begin in applications programming, in which the physical world will be simulated much more accurately by vast tables of data. Programs can be made truly intelligent, since their designer need not worry about the size to which they may grow. (We may have to retire to a few old-time programmers, who cannot learn to THINK BIG!!)

The most fascinating trend to be in gestation this year will be the exploitation of modern graphical output systems, such as the GD/E 4020, and the Recordac DACOM. These devices herald the dawn of the "output revolution." Indeed, they may force a complete re-evaluation of the fundamental philosophy of applications programming.

What is the basic purpose of scientific computing? It is *not* to produce tons of paper covered with columns of numbers. It is, rather, *to assist in the making of scientific and engineering decisions*, and to help record them in the form of reports, specifications, or drawings. The current output of scientific programs achieves this purpose very poorly. Vast quantities of information are printed; what is conveyed to the human mind is quite another matter. The honest scientist, his desk piled high with printed output, mutters to himself, "I wish I had the time to understand all this." Visual presentation, in the form of curves, charts, pictures, (and formats as yet uninvented!) eventually will provide him with the kind of intelligible facts that he needs. Indeed, graphical output should provide, as well, those final evaluations which will become a part of the scientific report or engineering drawing. The subject has further profound implications. At the beginning of a programming project the basic question is "*What is this new program supposed to do?*" If the *first* planning is for the design of a satisfactory graphic output, methods of solution which are otherwise inconceivable, may be discovered. The pressures are increasing; next year's end should see the first dim outlines of the "output revolution" beginning to appear.

Business EDP
on the threshold

by BURTON GRAD

When the electronic computer was introduced to the business world some ten years ago, it was acclaimed by many as a panacea for the mounting clerical paperwork problem. But in spite of this potential business leaders, somewhat awed by these "giant brains," insisted on a conservative step-by-step approach to reducing clerical overhead. They used expressions such as:

- **"You have to crawl before you walk."**
- **"You can't automate a mess."**
- **"A new system must be built one application at a time."**

Nevertheless, the computer industry has grown dramatically over the past decade as manufacturers have provided new equipment to fill the ready applications market for mechanizing payrolls, inventory control, etc.

Only in the last two years, however, has business management begun to wonder whether or not it was really taking full advantage of these new characteristics of speed, memory, long distance transmission, etc. Searching questions have been asked:

- **Are bills of materials and blueprints really needed in a computer-directed factory?**
- **Do we have to record every warehouse stock withdrawal?**
- **Can we consolidate all customer bank records for savings, checking accounts, loans, and mortgages?**

Virtually all existing business systems were designed to accommodate human limitations. When mechanized, they are simply performing the same tasks with the same procedures, but using a computer. Alert managements are now unwilling to accept these restraints; instead they demand computer systems that live up to their real potential. They want systems designed to achieve the goals and objectives of the enterprise; systems designed not just to reduce clerical costs, but to lower inventories, shorten delivery cycles, reduce accounts receivable, and increase sales.

Business computing, then, is at the crossroads—on the threshold of new system concepts taking full advantage of the capabilities of electronic data processing while carefully eliminating human restrictions. There are already a few examples where good systems work has resulted in advanced business system concepts, and their natural consequence—improved business operation.

Process control systems have been installed in the oil and chemical industries and represent a high level of systems sophistication. The techniques are now

outlook '62

being applied to process-type manufacturing industries. The juxtaposition of various hardware improvements have made such a plan practical:

- **Economic measurement of physical events.**
- **High performance reliability for on-line use.**
- **Less expensive, more accurate remotely operated control devices.**

Automated design engineering, after years of experimental investigation, is finding initial practical use. Its economic feasibility has been established because of hardware and software advances:

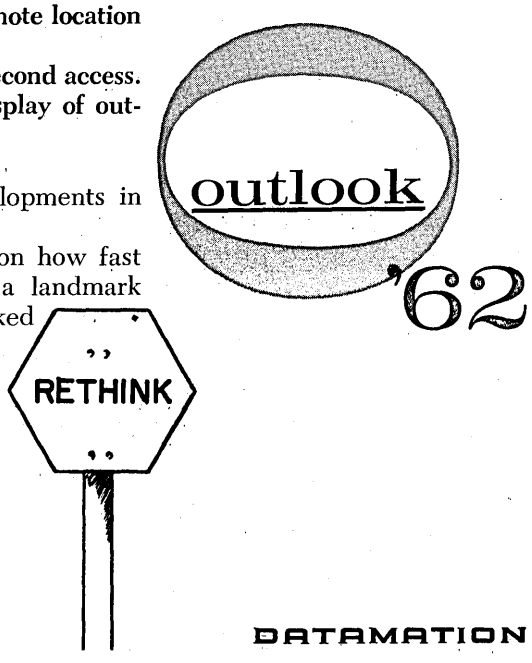
- **Ability to store and randomly retrieve large programs.**
- **Lower computing cost per unit calculation.**
- **Ability to express the complex logic of product design engineering in new forms such as decision tables.**

Airlines reservations systems, which are becoming fully operational on a nationwide basis, will lead the way for stock exchanges, railroads, insurance companies, and others, to exploit major advances in computer systems:

- **Accurate, long distance transmission bringing even the most remote location within instantaneous reach.**
- **Storage of hundreds of millions of characters with less than ½ second access.**
- **Effective terminal device for efficient input and convenient display of output.**

These three concrete examples point the way for the future developments in business computing.

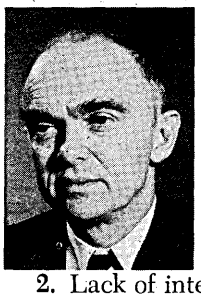
The continued healthy growth of the computer market depends on how fast these new approaches and concepts are developed. 1962 can be a landmark year for business computing if we take the right road—the road marked



The Standards Outlook

objectives set

by RICHARD F. CLIPPINGER



Every industry as it develops in a free world is presented with series of situations where there are several possible directions in which it can move. The result is that different manufacturers frequently choose different paths and the customer faces a bewildering variety of products among which to choose. This result is not in the best interests of the customer.

1. Products produced in small volume are unnecessarily expensive. A particular manufacturer may not make ends meet and stop producing his equipment.
2. Lack of interchangeable parts means poor service.
3. Interface problems: Use of variety of gear from different sources may require creation and use of otherwise unnecessary hardware (e.g. magnetic tape converter).

In nearly every industry this has led inevitably to standardization in varying degrees. In many industries the manufacturers didn't begin to make a profit and the consumer did not consume enthusiastically until this happened.

A standard is an arbitrary solution to a recurring problem and derives its merit from the reduction in complexity which it causes. No industry has greater need for some standardization than the Information Processing Industry. For this reason the International Standards Organization decided in 1960 to form a committee: TC-97 on Computers and Information Processing whose scope:

> "Standardization of terminology, problem description, programming languages, and communication characteristics of computers and information processing devices, equipments, and systems."

was adopted in an organizational meeting held in Geneva in May 1961. ISO gave the Secretariat to the United States via the ASA which in turn recognized BEMA (formerly OEMI) as the sponsor. The American ASA Sectional Committee X3 was formed in 1960 to develop proposed draft standards both for the U.S. and for the world.

Nearly simultaneously with the ISO formation of TC-97, the International Electro-Technical Commission decided to form TC-53 to propose standards related to the electrical characteristics of Information Processing Equipments. The IEC also gave the Secretariat for this work to the ASA which selected the EIA as sponsor and it formed the ASA Sectional Committee X6 to handle this work. Aside from noting that it is not always easy to decide whether a particular area of IP falls within the scope of TC-97-X3 or TC-53-X6 and that consequently, despite all the good will in the world, there will occasionally be awkward overlaps, this discussion will be limited to the work of TC-97-X3 emphasizing expectations for 1962.

In order to break its work down into pieces of manageable size, X3 has working six subcommittees. The first of these is X3.1 on Character Recognition. X3.1 has deliberately limited its attention to Optical Character Reading. As an example of the amount of work going into formulation of DP standards, X3.1 has

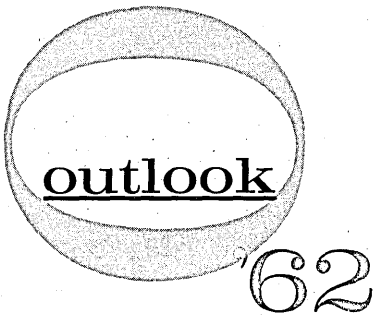
outlook '62

met a dozen times in its first year of existence. Furthermore, it has three Task Groups on Font Development, Printing and Application, and Format. These Task Groups have met approximately as many times as X3.1 itself. During the first year of work X3.1 has made much progress in selecting characters for which to develop initial font specs (principally decimal digits and a few others) in developing tentative shapes for the selected characters. There has been much discussion of whether there should be one or two sizes recommended and there is no unanimity on this point yet. It is my expectation that the careful spadework of the X3.1 committee will permit certain font specs to become a draft proposal and that after public discussion and perhaps some adjustment of the proposal it will become the first or second DP standard. We have no experience yet in the DP business with the magnitude of the process of arriving at a *consensus* which is required by ASA rules before a standard is adopted. X3.1 has had to move very carefully because a bad proposal would not be adopted or, if adopted, would cost some manufacturers heavily. A good standard, on the other hand, would be a boon to the OCR business which may spurt forward. OCR is a good example of a situation where a balance must be achieved between the choice of optimum parameters for two interrelated sets of hardware: in this case the imprinter and the reader. It will probably be after 1962 before any draft standards are proposed for the letters and other characters.

X3.2 Character Sets and Data Formats. X3.2 has taken as its main goal for 1962 the determination of a set of nested character sets suitable for the exchange of information between DP systems, and between DP systems and associated equipment. Using a 19 point set of criteria, the subcommittee is close to agreement on a 128 character set, a 64 character subset, and a 16 character subset which will probably be incorporated in a draft standards proposal early in 1962. Substantial agreement on collation sequence also seems close. Future work by X3 and X6 in 1962 and later will include some expansion of the originally adopted sets; draft proposals for specific media like paper tape; magnetic tapes. Plans include provision for iterating consideration of seven related objectives as long as necessary.

X3.3 Data Transmission. There is considerable overlap between X3.3 and EIA's TR-27.3. The two groups plan to work closely together. X3.3 has created five Task Groups: Liaison, Glossary, Description of (Communication Encoder, Decoder) Equipments, Identification of Interfaces, and System Performance. The work of X3.3 in 1961 has been limited to gathering information. Presumably the work will accelerate during 1962 and 1963.

X3.4 Programming Languages. An important area for standardization, programming languages are certainly the most difficult. Reflecting the common User desire for such standardization, three languages, which are to some extent machine independent, have sprung up: FORTRAN, COBOL, and ALGOL.



FORTRAN, originally designed for one machine, became so useful that it has been implemented for 26 machine types. Needless to say, partly because of different machine parameters (memory size, number of tape transports, etc.), partly because the original standardizing body SHARE was set up for a single machine family, there is tremendous variation in these various FORTRANS. Only with FORTRAN is the body of experience significant.

X3.4 is addressing itself, with great respect for the difficulty of the task to the job of standardizing Programming Languages. It has several task groups of which ALGOL and COBOL are too young. Such experience will become available during 1962 and 1963. 15 manufacturers are implementing COBOL for 35 machine types. The first has the function of specifying how to specify a language. A paper by its Chairman, Saul Gorn, illustrates the variety of approaches that could be used. The second is charged with selecting certain languages of broad utility and proposing them as standards. ALGOL and COBOL have already been selected to start with. It is expected that during 1962 and 1963 an iterative process will be applied to these two languages. It is planned to define levels of these languages suitable to different classes of machines. For each level it may be necessary not only to rigorously define the language but also test problems to be used as measures of the processors. A variety of manuals for different classes of users may have to be defined. The mechanism for working with the COBOL committee and the ALGOL committee is yet to be worked out. Clearly, hard work and good intentions will not suffice to arrive at satisfactory standards in a short time.

A third task group is working on Processor Methodology. It is too soon to guess where this will lead.

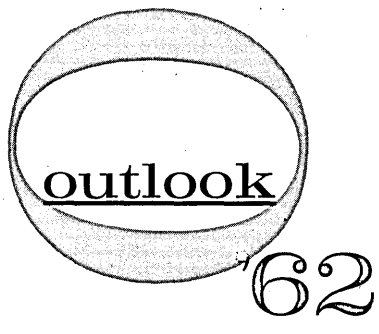
A fourth task group acts as the Secretariat for the International Working Group E on Programming Languages of ISO TC 97. In preparation for the next meeting in Nice in late 1962, it is surveying existing languages of broad utility and planning a program of work to lead eventually to the creation of draft proposals for some International Programming Languages.

X3.5 Glossaries. X3.5 suggests that each of the other X3 subcommittees create their own glossaries and X3.5 will merge them. Presumably during 1962 and 1963 a comprehensive DP glossary should result from these activities.

X3.6 Problem Description and Analysis. This work probably will not flower in less than a year. The emphasis at the moment is on flow charting symbols.

X3.7. As standards are proposed by X3 or X6 it is hoped that Users will try them out and help us accelerate the process by early constructive feedback.

The groups responsible for the MICR-E 13 B font have been invited to participate in X3 activities as a separate X3 subcommittee to make de jure a de facto standard, primarily for processing through to the international level.



Computing Abroad

a banner year projected

by ISAAC L. AUERBACH

Computer progress abounds overseas in every facet of the industry. In fact, the rate of growth of the information technology industry in Western Europe and Japan is equal to or greater than within the United States at present.

This phenomenal growth is due to several factors. First, men with proven technical competence to develop, design and build computers have become more available to overseas manufacturers. This is evidenced by the development of over forty different computers in Western Europe alone. These computers have introduced some new ideas such as the system concept of France's BULL Gamma 60 and the hardware and software concepts of England's Manchester/Ferranti Atlas computer. The Gamma 60 system concepts have already been widely adopted. The newer Atlas offers the computing world concepts in the organization of internal memories and their control by "learning" programs, in the logical structure of the arithmetic unit, and the fixed ferrite-rod memory.

Another factor in the growth of the overseas computing industry, and without a doubt the more important one—is the growing demand for electronic data processing systems, both scientific and business, throughout Western Europe and Japan. This demand for products is pushing the overseas computing industry into the step growth portion of the economic "S" curve.

In England, the development of EDP systems is second only to that of the United States. However, the market to date has been more for scientific and industrial computers than for business systems. In 1962 the demand for business EDP systems will strongly emerge and continue to expand. By contrast, in Italy business application of EDP equipment overshadows science and industry.

Sweden, a country of only 7 million people, has already developed a significant EDP industry. There are three electronic data processor manufacturers—FACIT, Saab and ABN. IBM is setting up a laboratory in Stockholm and is a principal supplier of EDP equipment in Sweden.

The computers being produced overseas are not limited to the small and medium scale as one might have expected. Large-scale computers are becoming commonplace products; for example, France's BULL Gamma 60 and England's EMI 2400 are in production. Germany's Telefunken TR-4 and England's Ferranti Atlas, ICT 1301, STC Stantec and Elliot 503 should be operational in 1962.

In England, Germany and Japan, the manufacturers of components have vastly improved the reliability of their products. Computer components such as transistors, diodes, ferrite cores and magnetic tapes of high reliability are being produced for both domestic and export uses. It is to be expected that computers of greater reliability and lower cost will result.

During 1962 there will be a growing number of United States companies that will be entering the world market by either export, establishment of manufacturing facilities overseas, or through business arrangements with European or Japanese companies. Licensing agreements are starting to flow both ways. FACIT has licensed the Autonetics Division of North American Aviation to manufacture their Carousel memory and punched paper tape readers. IBM World Trade predicts that the rate of growth of the markets outside of the United States will be of such a magnitude that they anticipate the World Trade organization equaling in size the domestic corporaton by 1970.

The developing countries of Africa, Asia and South America are looking to the use of EDP as a means for them to achieve a "giant leap" in their industrialization. Data processing techniques supplement the shortage of skilled managerial and white collar labor in these countries. Many of these countries have strong centralized governments which control the public utilities for which computers enable tighter overall control. 1962 will see a larger number of sales to these countries and this number is bound to increase in the late 60's.

When the entire picture is surveyed, the dominant theme that emerges is that 1962 will be a banner year for the EDP industry in Europe and Japan and in the developing countries of Africa, Asia and South America.

outlook '62

The Market in '62

retrenchment & new strategy

by HAROLD BERGSTEIN

While computing will undoubtedly retain its position as one of the country's most promising industries for investment purposes, a more prudent awareness of the distance of economic reward may sharply curtail both the quantity and nature of manufacturers' announcements during the coming year.

Evident in the latter part of '61 and most probable for '62 is a general decline in the number of new hardware announcements. Emphasis on selling a current line of equipment prior to outdating transistorized advantages with third generation contenders is foremost in the thinking of corporate management.

More important perhaps is the shift in investment from r&d to applications in order to fulfill current commitments rather than taking further steps in extending main frame development without comparable advances in software.

Peripheral equipment will most likely take the well-heated glare away from hardware as manufacturers lean more heavily on developing home-grown and higher speed tape units, card readers and mass storage devices as opposed to a continuing reliance on suppliers.

Reappraisals of marketing strategy will receive widespread attention during this year of what may be termed cautious, internal retrenchment. A feeling of "Let's spend less and lose less," is not uncommon.

What will this "new" strategy produce?

First, a merging of the distance between hardware announcements and delivery dates probably to nine months or less.

Second, a concentration on specific areas of specialization as opposed to the earlier buckshot approach of selling to any and all markets.

Third, increased attention at selling "systems" including application studies and a variety of suitable peripheral gear as opposed to a lonesome main frame.

Fourth, a much more conservative and competitive jockeying for position as contrasted with earlier attempts to capture a market with breakthrough announcements.

Fifth, lower prices through more liberal lease arrangements and heavily discounted machines for certain "prestige" installations.

During the coming 60 weeks the number of computing installations will double (from 6,000 to 12,000), while the bulk of the sales will remain of course, tightly in the grip of IBM with its 1401-1410. The card walloping market will continue as the fattest slice of the computing pie with RemRand holding the second healthiest cut and Burroughs third.

In the large scale field, CDC will continue to step modestly into the 7090 market with its successor to the 1604 (the 3600) and most probably, formal announcement of the frequently discussed 6600. Although heavily admired, it is not likely that the Ferranti Atlas will be installed in the U.S. and while IBM's successor to STRETCH will eventually be announced, it is doubtful that it will be introduced in '62. Also far in the background is Burroughs' superscale D850 and GE's large thin film computer.

The fate of the RCA 601, RemRand 1107 and B5000 will become more evident

outlook 62

market

in '62 with manufacturers' expectations considerably diminished. Despite the lateness of FACT, H-800 sales are excellent and may be expected to increase substantially next year.

In the medium-priced bracket, the 1410 will find little impressive competition but virtually all manufacturers confidently expect to double currrent sales in the next 12 months. Their expectations however, may not bear fruit since the capacity of the industry is input limited by its ablity to train even inexperienced personnel.

A conservative projection is that most manufacturers will sell 1½ times their '61 quota and while profit corners may not be turned next year, losses will be substantially decreased and optimism somewhat sustained.

Two factors influence this projection:

First, a larger percentage of government purchases of main frames as opposed to lease arrangements is expected due to a recent Bureau of the Budget memorandum.

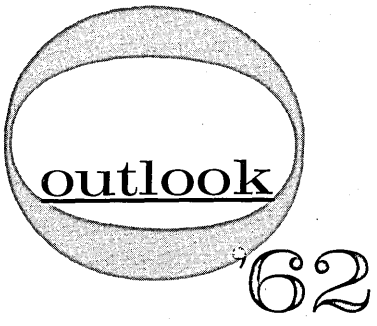
Second, the growing fields in which new applications will require substantial additions in mechanization in '62 such as IR (an increase of 78% in equipment acquisitions); medical and bio-sciences (an increase of 80% in additional hardware); automated teaching and school administration (a 45% increase in computing power), and process control (an 87% growth in main frame installations).

In the broad categories of business and scientific applications, the business area will experience the more substantial growth with an increase of 150% in number of computing installations. Scientific and engineering computing power is expected to climb by at least 70% over '61.

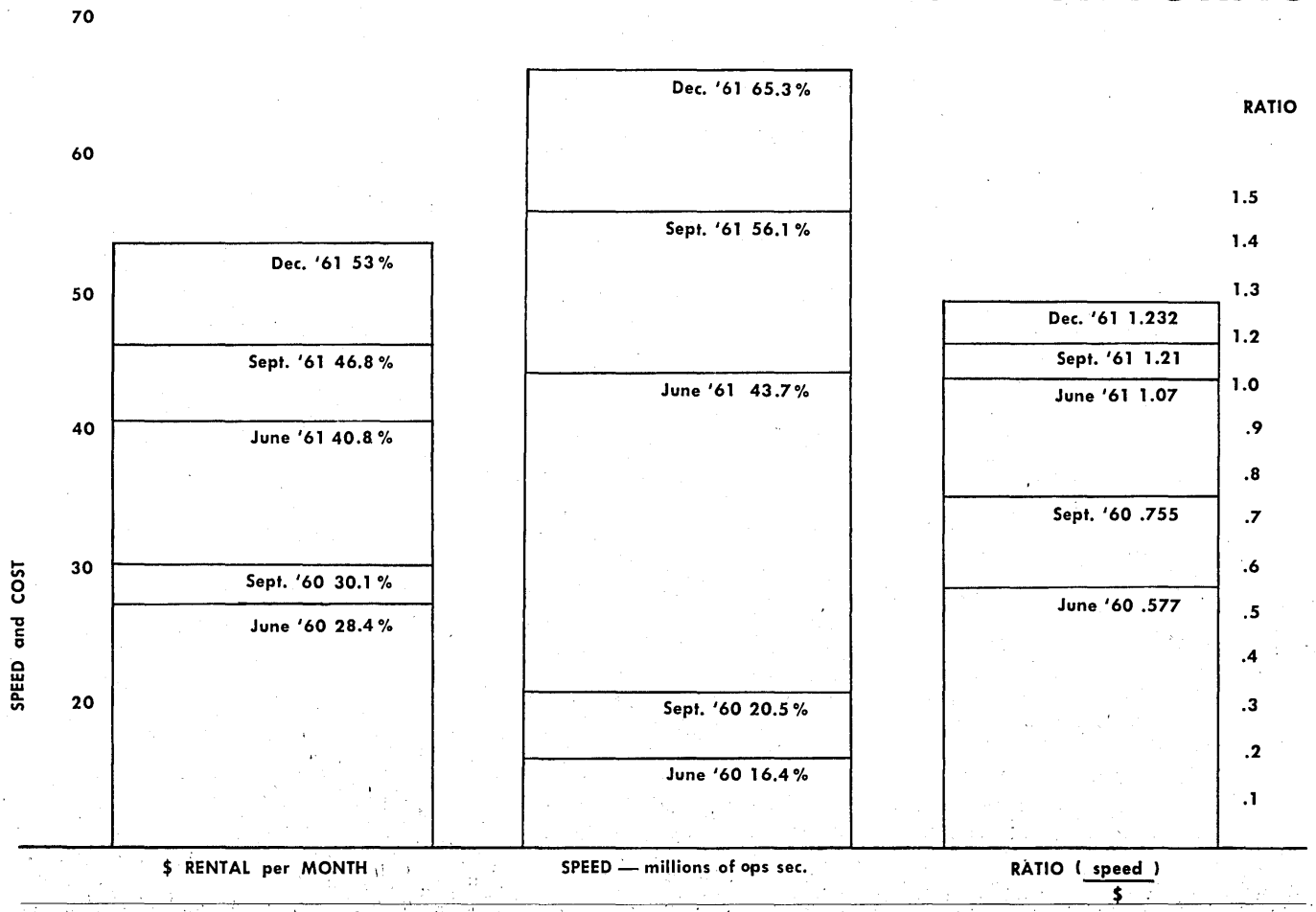
Despite all apparent signs of austerity by computer manufacturers, it is not likely that any major firms will leave the market this year. On the contrary, all indications are that recent newcomers such as Minneapolis' ASI and Computer Control in Los Angeles will reinforce their position with several early sales.

And while IBM will face additional competition next year, there will be no sacrifice of its 80% of the total market. The current debate to be continued throughout the year is whether to compete for an area in which IBM may be weak or dive headlong into a market with virtually the same equipment at a lower price, and hope for a small fraction of the plush rewards streaming toward White Plains.

Obviously, there is no clear-cut answer to improving one's economic posture in computing. Encouraging however, is the fact that answers are being earnestly sought with a growing backlog of experience focused on the frantic moves and counter-moves of the '50s and most important, the mistakes of inexperienced management which hopefully, will not be repeated in the year ahead.



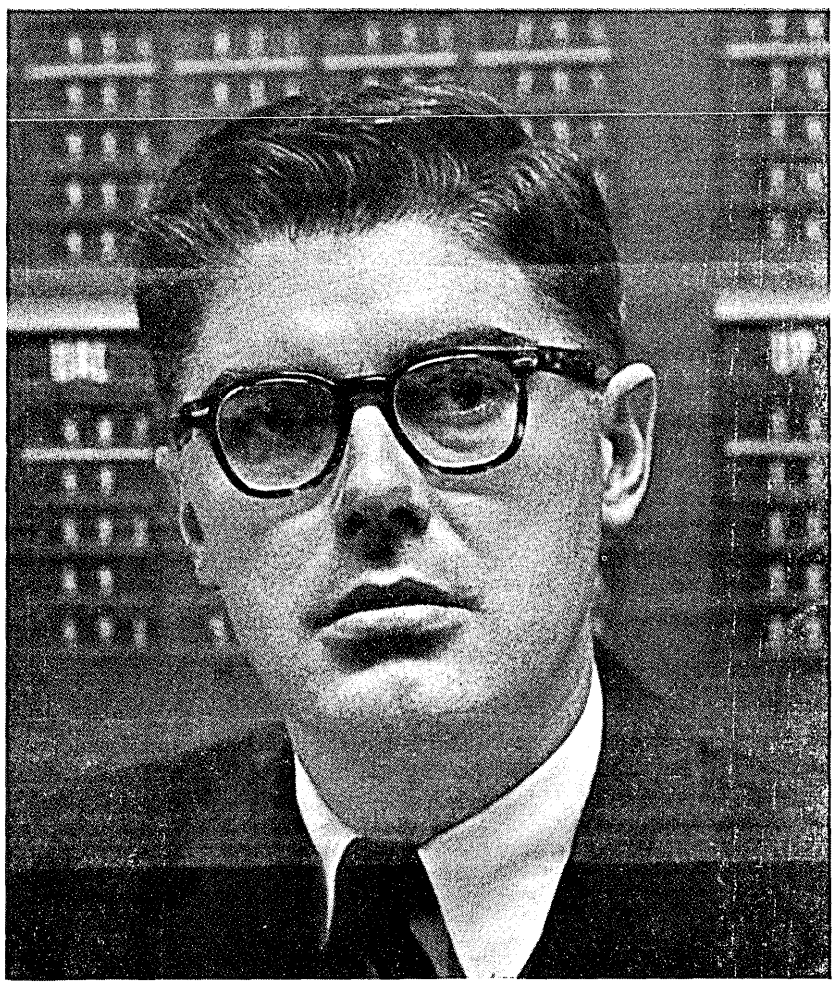
DATAMATION'S QUARTERLY INDEX OF COMPUTING



At Allegheny Ludlum
· · · Goodbody & Co.
· · · Wyeth Laboratories

RESPONSIVENESS TO CUSTOMERS' NEEDS WAS ANOTHER REASON FOR CHOOSING RCA ELECTRONIC DATA PROCESSING

At Allegheny Ludlum Steel Corp., Mr. W. A. Kirkpatrick, Controller, was impressed by the quantity and quality of assistance delivered on site, and by the way this aid continued without interruption on into the post-installation period. RCA not only gave flexible and knowledgeable assistance in systems analysis, site planning and programming, but also conducted informational meetings on EDP for over 200 people including the important middle management group.



At Goodbody & Co., one of the nation's prominent brokerage firms, Mr. Joseph F. Neil, Jr., Partner, found that the teamwork between his staff and RCA's support personnel was smooth and productive. The Goodbody staff concerned with punched card operation was trained in EDP. New systems were developed for brokerage accounting. New management reports were created, as well as a new, more concise confirmation stub that speeded service. The RCA 501® at Goodbody now handles heavy volume days with ease and eliminates the confusion and cost of overtime operations due to hectic stock exchange activities.

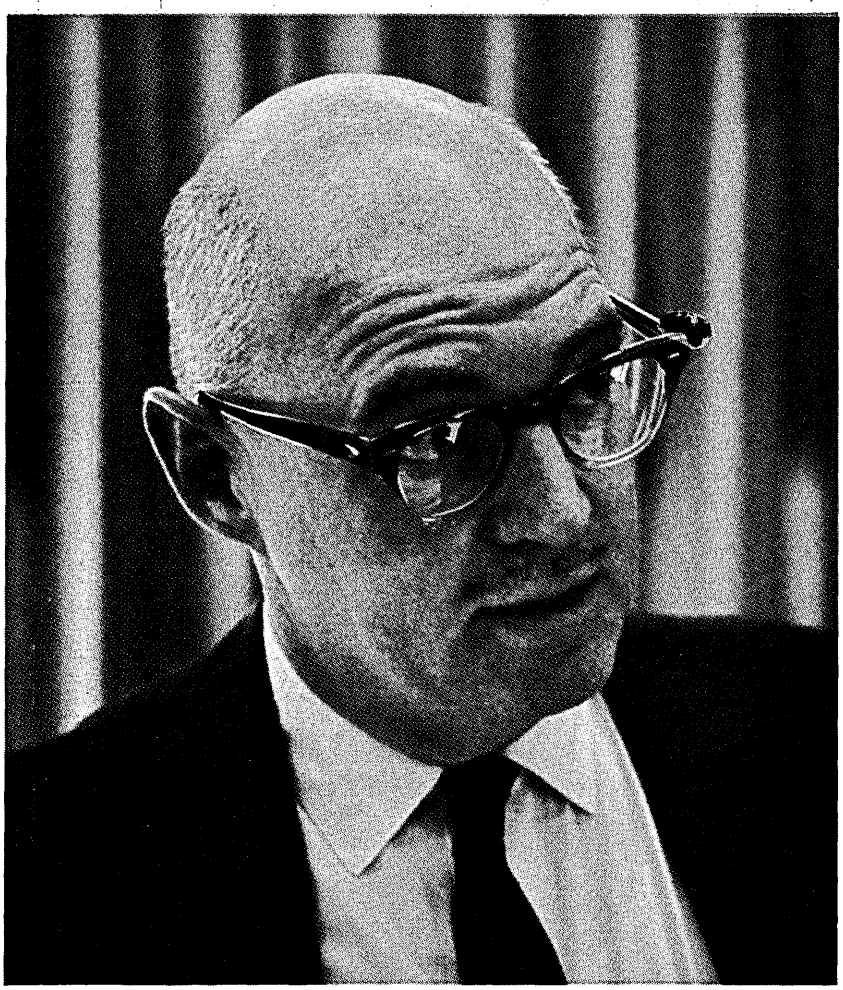
There can be but one justification for installing any electronic data processing system . . . to get the *specific* results *you* want.

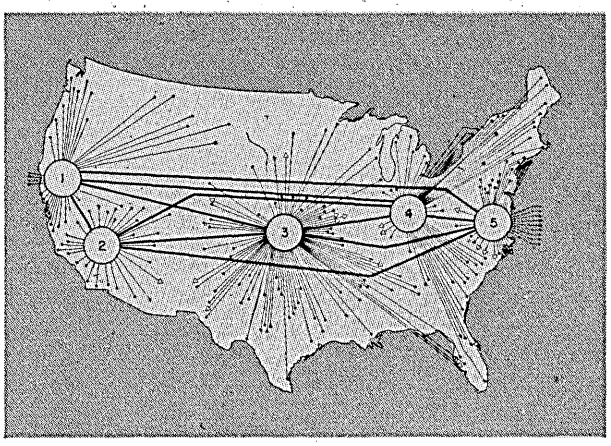
How are these results accomplished? Customers credit the caliber of RCA specialists and the performance of RCA equipment.

Over and over again, they have taken the trouble to tell us they consider RCA's training personnel, programmers, systems analysts and service technicians among the best in the industry. The competent RCA team has a deep appreciation not only for working towards better results but also for saving money by arriving at those results fast.

Moreover, RCA's practice of matching combinations of units to results required has consistently produced high levels of efficiency at minimum expense. Our aim is to make certain that the RCA system that goes to work for you is as individually yours as the name on your letterhead.

Just how well this "responsiveness" works in actual practice is illustrated by the many major companies who are upgrading their data processing operations with advanced RCA Electronic Systems. Before you decide on any EDP system, why not talk to some RCA customers and find out what their experience has been or write RCA ELECTRONIC DATA PROCESSING, Camden 8, New Jersey.





INNOVATION AFTER INNOVATION

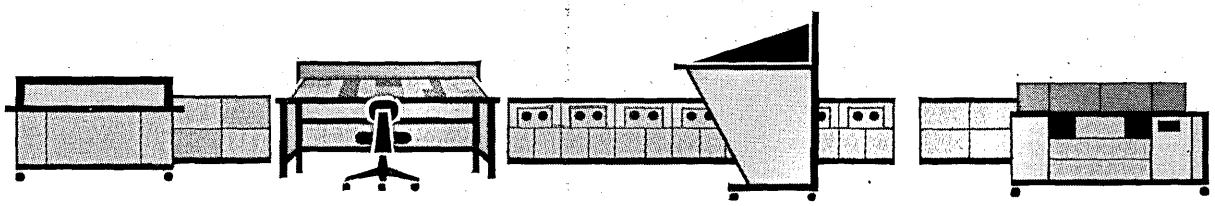
COMLOGNET (Combat Logistics Network), new data communications achievement in which RCA has a major role, will provide the Air Force with the world's fastest information handling and circuit switching system. ComLogNet stores and dispatches digital data and messages between 350 Air Force facilities, with planned links to scores of manufacturers and suppliers. The system accepts punched cards, paper tape, or magnetic tape input/output. Capacity: 100 million words daily!

RCA®

The Most Trusted Name in Electronics

RADIO CORPORATION OF AMERICA

At Wyeth Laboratories, a leading producer of prescription drugs, Treasurer Frank Hoffmann has ample evidence that RCA's responsiveness is a policy expressable in concrete, money saving terms. Months before delivery of the RCA 501, a major Wyeth application had been completed on RCA's Cherry Hill EDP System, thus making the Wyeth 501 productive at the moment of installation. RCA and Wyeth analysts functioned as a smooth working team in the preliminary systems studies which produced this happy result at Wyeth, and this relationship continues to open new avenues for EDP utilization.



CIRCLE 15 ON READER CARD

EJCC DRAWS 3,900

exhibits, politics and movies overshadow uninviting papers

In one of the crowded hotel corridors at the recent (Dec. 12-14) Eastern Joint Computer Conference, an appropriate although fanciful suggestion was tendered:

"At future conferences, papers should be selected as usual; proceedings published; a room arranged in which the general sessions may be held; a sign posted outside the room which reads, 'General Sessions Now Open,' and the door to the room bolted firmly from the inside."

The objective of this fantasy is to maintain the usual conference dignity without imposing a functional obligation upon some registrants to attend the sessions.

Considering all of its many faces however, the 1961 Eastern Joint could be termed successful. While there was no band, no nominations and President Kennedy (although invited) didn't make it as keynote speaker, the conference displayed all of the blustering excitement, coffee-soaked caucusing and political in-fighting traditional in a national political convention.

Despite airport-closing fog and sub-freezing temperatures 3,900 delegates were officially registered and total attendance at Washington's Sheraton Park Hotel (including unregistered visitors and exhibitors) was estimated over 4,500, the largest figure ever recorded at a computer conference.

And common to any good political convention, the most widely publicized center of attraction namely, the General Sessions, captured little attention with the exception of an occasional "star" performance.

The keynote speaker, Dause L. Bibby, president of RemRand Univac, told delegates that the computing field was growing substantially, that the Russians were generally behind the U.S., that we are better than the Russians subjectively speaking, and that the Russians could take the lead if we don't keep up the good work.

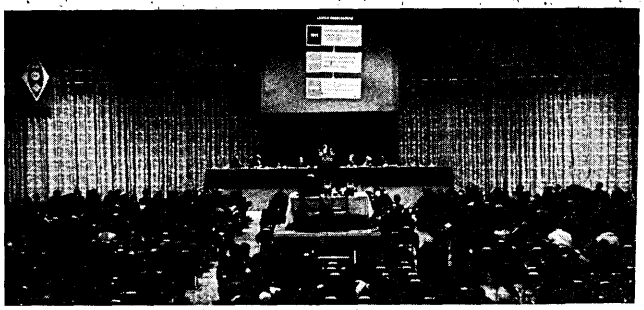
In an effort to sustain the attendance at the General Sessions, the conference planners and paper pickers decided on a single session (as opposed to parallel sessions), and completed 961 reviews or 4.2 reviews for each of the 242 submitted papers. They selected a total of 29 technical papers for presentation at the conference.

In the main, their efforts went unrewarded. Attendance with one or two notable exceptions, averaged less than 300. A facetious comment heard at the conference was "If these papers truly represent the state-of-the-art, Bibby is wrong! The Russians must be ahead of us!"

While the majority of the papers presented were bland and uninviting, it should be noted that program chairman Bruce Oldfield and his committee are entirely competent and made a tiring and conscientious effort to select papers of the highest quality from among those submitted. If an accusing finger must be pointed, it should be directed at the many capable professionals in the industry who couldn't find the time or the corporate encouragement and insistence to submit a report on stimulating and important work. Of course, the existence and publicity provided the conference theme "Computers – Key To Total Systems Control" may have limited the scope or freedom of selection of the program committee.

In addition, there were other events strongly contending for the attentions and presence of delegates.

First, the exhibits were eye-fetching, well-arranged and



there were more operating computers to be seen than at any previous conference (see report on the opposite page).

Secondly, a new innovation titled "Science Theatre" featured a series of films on computing aimed primarily at laymen but drawing SRO crowds in excess of 500 professionals. Many of the films such as "Donald In Mathmagic Land," "To Hare Is Human" (shows how Bugs Bunny uses Univac to foil the big bad wolf) and other more serious films (i.e., SDC's "Computer Programming") were rerun twice during the conference drawing repeat audiences equal to or greater than their initial showing.

Thirdly, recruiting activities were unusually heavy although reportedly less successful than at previous conferences. The distribution of recruiting literature was virtually unrestricted in the hotel despite the efforts of the conference committee to control the situation. Mail boxes were stuffed each day and the door cracks outside of private rooms and suites were jammed with the latest career opportunity. In the areas adjoining the registration desk, pamphlets were distributed freely and some initial employment interviews conducted. A conference bulletin board in the main lobby was literally glutted with recruitment notices.

Finally, the conference *Proceedings* were attractively hardbound and readily available prior to the General Sessions. The numerous off-the-record sessions in the corridors, suites, coffee shops and bars were obviouly not available in any form of binding.

The major attraction for the General Sessions was 17-year-old David Malin's presentation on "Conceptual Thought Random Net Simulation." Over 1,000 attendees gathered in Sheraton Hall and they were rewarded with a concise, interesting presentation.

In contrast to Malin was a panel discussion on "Programming Language Standardization" which appeared as potentially, the most exciting session of the conference. Moderated by Herb Bright and with panelists Charles Phillips, Al Perlis, R. E. Utman and R. F. Clippinger, the session was well organized but generally unexciting. While most of the 1,000 attendees remained for the beginnings of the standardization session which followed Malin's paper, less than half were present at its conclusion.

On the positive side, the data transmission session served a useful function in bringing together the viewpoints of users, hardware suppliers and communications personnel. The final afternoon session on programming and applications offered some interesting progress in character recognition, computing in the medical sciences, and development of large scale systems.

Specific criticism of the papers centers on the fact

that much of the material presented had been previously discussed or published (i.e., IBM's Project Mercury). Other papers represented product reviews of equipment which has been commercially available for many months (i.e., NCR's CRAM and Ferranti's ATLAS). Finally, a number of papers were just uninteresting (i.e., Gruman's Combined Analog-Digital Simulation).

It was suggested that the subject matter of the sessions could be improved by a larger number of invited papers of a more controversial bent, and brief summaries of the text of a paper could be given followed by a question period (the entire text being readily available in the published *Proceedings*).

In addition, the "show business" element evident in the exhibit area could be introduced in the General Sessions through the medium of more attractively prepared slides and the injection of occasional moments of levity from the podium. The formal decorum dominant in the presentations was apparent even in the remarks of Al Perlis which seemed to reflect only his academic viewpoint as opposed to Perlis' more customary, highly spiced opinions.

Certainly if a single General Session is to be continued (and the concept has considerable merit), a reevaluation of the method of attracting papers should be considered. While the presentations have been relegated to secondary importance, they could become an impressive stimulant to attendance as well as a primary contribution in the exchange of inter-disciplinary knowledge. ■

EJCC EXHIBITS

an exciting, operative attraction

Devoid of major, new announcements, the four exhibit areas at the recent EJCC nevertheless offered the most outstanding contribution to the three day conference.

In quantity alone, there were more exhibitors represented than at any previous conference. Eighty-seven manufacturers of main frames and peripheral gear displayed their wares attractively and whenever possible, in operation.

Traffic was exceptionally heavy at all times of the day and even after the exhibit areas were formally closed, large groups were seen walking through the show. Some delegates reported as many as 12 repetitive visits to the exhibits.

When a display of operating hardware was not feasible such as with very large scale systems, exhibitors generally did not resort to miniaturized mock-ups but rather furnished a photograph and some promotional literature while concentrating their exhibit on another product in their line which could be transported to the show.

By far the largest and most dramatic exhibit was presented by RemRand Univac with two 1206 computers, Digital Trainer, and Solid State 80, all in operation and surrounded by a generous offering of peripheral gear including six tape drivers, card punches and readers, etc.

The Univac display was well-timed in conjunction with RemRand president Bibby's keynote address and was considerably more impressive than any previous effort by the company at a joint computer conference.

Other notable trends included a large selection of operating small computers such as the LGP-30, RPC 4000, CDC 160A, IBM 1401, Recomp II and III, RCA 301, Burroughs 200 series, G-15, PB 250, PDP-1, Underwood Mercator, etc.

Many of the main frame manufacturers implemented the operation of their computers with additional attractions such as CDC's hookup of a Data Display scope to a 160A and the PDP-1 producing an amusing pipe organ effect.

A trend noticeable at last year's WJCC toward displays of slow speed, low cost data transmission was far more evident at the EJCC. Tally Register, Digitronics, IBM and RCA all featured demonstrations in this area. Others such as Bell Telephone, and Teletype represented the communications field.

Two exhibits in Information Retrieval captured sizeable audiences. The Armed Services Technical Information Agency (ASTIA) displayed their system for retrieval of r&d documents on the Univac SS 80, and the Defense Systems Department of General Electric operated an engineering prototype of the G. E. Search Comparator which retrieves and disseminates from a magnetic tape memory and reportedly may be operated by untrained personnel with less than 15 minutes of instruction.

Because of the proximity of the conference to governmet buyers, a heavy preponderance of analog equipment was evident throughout the exhibit. Electronic Associates introduced the PACE TR-48 and Computer Systems signalled the debut of its 5800 Dystac computer. Other analog exhibitors included GPS Instruments, Applied Dynamics, and Comcor Denver.

Announcements of new equipment were restricted largely to the peripheral and component areas. Of course, many of these "announcements" were made prior to the show and the equipment was demonstrated for the first time.

In addition to those already mentioned, announcements were made by Telex of a new mass memory system with a capacity from 9 to 620 million bits; and a T-3300 line printer operating at 300 lines per minute and selling for a comparatively low price. NCR demonstrated CRAM (Card Random Access Memory) for the first time; Harvey-Wells Electronics showed a gp computer selling for under $20,000; General Kinetics introduced three products designed for preventive maintenance on magnetic tape; a tape tester, cleaner and tension tape winder; Datronics displayed a symbol generator and associated display equipment for the first time; Dashew demonstrated its DASHArecorder system; and OMNI-DATA offered the first public showing of its Electrostatic Paper-Tape Recorder.

Twenty-two hardware manufacturers were invited to remain in the exhibit area an additional day for a private showing to federal executives sponsored by the Bureau of the Budget.

In its total effect, the exhibit area indicated an increasing interest and sophistication on the part of manufacurers in putting together a first rate show. The delegates' response was both substantial and gratifying. ■

Honeywell EDP Presents:

A FEW QUICK FACTS ON SOFTWARE

Software is a new and important addition to the jargon of computer users and builders. It refers to the automatic programming aids that simplify the task of telling the computer "hardware" how to do its job. The importance of software lies in the fact that programming a computer can be an arduous, time-consuming and costly operation and the quality of automatic programming aids has become virtually as important as equipment specifications in evaluating the total capability of a data processing system.

Generally, there are three basic categories of software: 1) Assembly Systems, 2) Compiler Systems, and 3) Operating Systems.

Assembly Systems

The basic element of any assembly system is a programming language that uses simple, easy-to-remember codes or terms to represent the various machine instructions. Code names are also used to represent entire fields of information stored in the computer memory. Under control of an assembly program, the computer translates these terms into the appropriate machine-language instructions.

Most good assembly systems include an extensive library of re-usable routines that can be combined into a group or inserted as part of a program by a computer. This way, routines for repetitive functions do not have to be re-written each time they are required. A sophisticated assembly program also includes routine generators that require only definitive parameter information to yield detailed sorting routines and input or output editing routines. Assembly systems also include routines for housekeeping functions such as controlling end-of-file conditions and the flow of data to and from the computer memory, tape-labeling to check and update the identifying information recorded on every magnetic tape, and other controls as opposed to data processing functions.

Compilers

Compiler systems differ from assembly systems in that they translate from a source-language into a machine-oriented language. The source-language of a compiler is based on the nature of the work to be done — business terms for business compilers, mathematical terms for scientific compilers — rather than on symbolic machine-language. When a problem stated in compiler (or source) language is fed into the computer, the compiler program translates the source-language program into detailed machine-language or assembly-language instructions that tell the computer how to carry out the desired work.

Compilers vary widely in sophistication and usefulness. The more advanced types produce programs with as little as 1/10th of the human effort required using an assembly system, or 1/100th of the effort that manual machine programming would require. Because so much of the detailed work is done by the computer, there are fewer opportunities for logical or human errors.

An added plus is the fact that the programs in this form provide readable documentation, including the latest changes, of the data processing procedures.

An advanced compiler can generate sorting routines, create files, generate printed reports, and edit and check data. If compilers do not have all these capabilities, the gaps have to be filled in using assembly or machine language. Obviously this dilutes much of the original value of the compiler.

Operating Systems

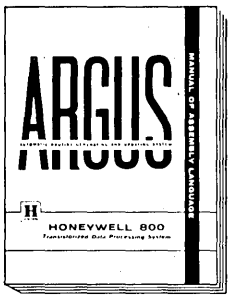
The terms assembly and compiler systems pertain principally to the language in which a program is written and the means of translating this language into machine-language programs. In addition, there are systems for monitoring the operation of the machine-language program and for operating these programs in varying modes. For example:

Program diagnostic systems can help make good use of computer time by permitting "batch" checkout without human intervention. Special outputs can be tailored to the programmers' needs to tell them what they want to know about their programs. This testing technique can speed program checkout by enormous factors.

Simulator Programs can be written to make one computer act like another. During conversion periods, for example, programs written originally for an outmoded computer can be run directly on the new computer with a simulator program. This permits immediate operation on the new system without reprogramming, and new programs, designed to utilize the capabilities of the new computer with maximum efficiency, can be written unhurriedly.

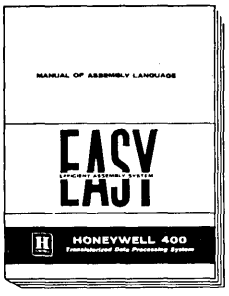
Monitor routines increase the efficient utilization of equipment by controlling the selection and sequencing, starting and stopping of programs, and thereby removing much of this detail from the duties of the computer operator.

With every electronic data processing system, Honeywell provides an unusually complete and powerful package of automatic programming aids. Here are some of the Honeywell innovations in the above three areas.



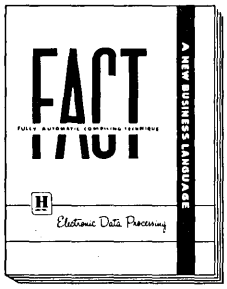
Honeywell ARGUS

An assembly program for the Honeywell 800, called ARGUS, includes an easy-to-use assembly language, a library of routines and generators, and all the operational programs that simplify program writing, reduce errors, and keep the need for human intervention to a minimum, thus utilizing the computer in the most efficient manner. There are versions of ARGUS for both punched-card and magnetic-tape systems.



Honeywell EASY

EASY is the name of the assembly system for the Honeywell 400. EASY includes all the elements of a powerful assembly system including powerful editing instructions for input and output operations and the ability to incorporate thoroughly tested routines into a program. Programs written in EASY language can be checked out and run on Honeywell 800 as well as Honeywell 400 systems.



Honeywell FACT

An advanced business compiler for the Honeywell 800, called FACT, is the acknowledged leader in its field. It is the first compiler to take into account all facets of data processing including editing input information, sorting, creating files, processing variable-length records and generating output reports. Due to the exceptional breadth and power of FACT, an unprecedented percentage of business operations can be programmed for a Honeywell 800 with this system — and in a fraction of the time previously required.

Honeywell Algebraic Compiler

This Honeywell compiler aids the creation of scientific and mathematical programs. The programming language is the same basic terminology used by several computer manufacturers and the sub-routine library consists of routines commonly used in solving scientific and engineering problems. Algebraic compilers are being offered for Honeywell 400 and Honeywell 800 data processing systems.

Honeywell COBOL

Considerable effort has been expended by the computer industry in an attempt to develop a universal problem-oriented programming language that can be implemented for all computers. One such business-language compiler is called COBOL (Common Business-Oriented Language). Both Honeywell 400 and 800 are being equipped to accept programs written in COBOL language.

Honeywell Executive System

Maximum use of the ability of Honeywell 800 to run programs in parallel is achieved through an automatic programming aid called Executive System. The executive system assists the human planner in preparing and executing a daily production schedule which optimizes utilization of the system's available equipment configuration and parallel processing ability. It controls program loading, turning on and off of programs, provides restart facilities in case of program failure or operator error and communicates with the operator, keeping him informed of progress of the run, and accepting his control instructions in case the schedule has to be modified at production time.

Honeywell Program Test System

Efficient machine utilization is the primary benefit of the Program Test System which permits programs to be batched and tested at high computer speeds without human intervention. Programmers receive whatever output information they require to evaluate their efforts and make necessary changes and improvements.

Honeywell Library Addition and Maintenance Program

The utility of a library of re-usable routines is directly dependent on the extent of provisions for adding, deleting or merely selecting routines for use. A special Honeywell program called LAMP handles these functions automatically.

Honeywell Scientific Routines

An important part of the library of routines furnished by Honeywell are the various scientific programs for computing trigonometric functions, exponentials, logarithms and other transcendental functions; performing matrix multiplication and matrix inversion, interpolation curve fitting, solving ordinary differential equations, linear programming problems and others.

Sort and Collate

A unique series of sort generators has been designed for use with Honeywell data processing systems. These generators require only basic parameters to develop sorting or collating routines utilizing special advanced sorting techniques developed by Honeywell specialists. These new techniques take advantage of the high-speeds and multiple-duty capabilities of Honeywell EDP systems.

THOR

To minimize the amount of manual tape-handling procedures necessary in the operation of Honeywell 800 systems, a special routine called THOR has been devised. Under the direction of operator-devised parameters, THOR handles all tape positioning, copying, correcting, and editing of recorded information. THOR also helps locate information on tape, compares the contents of two tapes for discrepancies, and performs general tape maintenance.

Simulator Systems

Among the extensive Honeywell automatic programming aids available are simulator programs that facilitate changeover from outmoded systems to Honeywell systems. These simulators enable programs written for other computers to be run directly on a Honeywell 800 without modification, often at speeds as much as four times faster than on the original system.

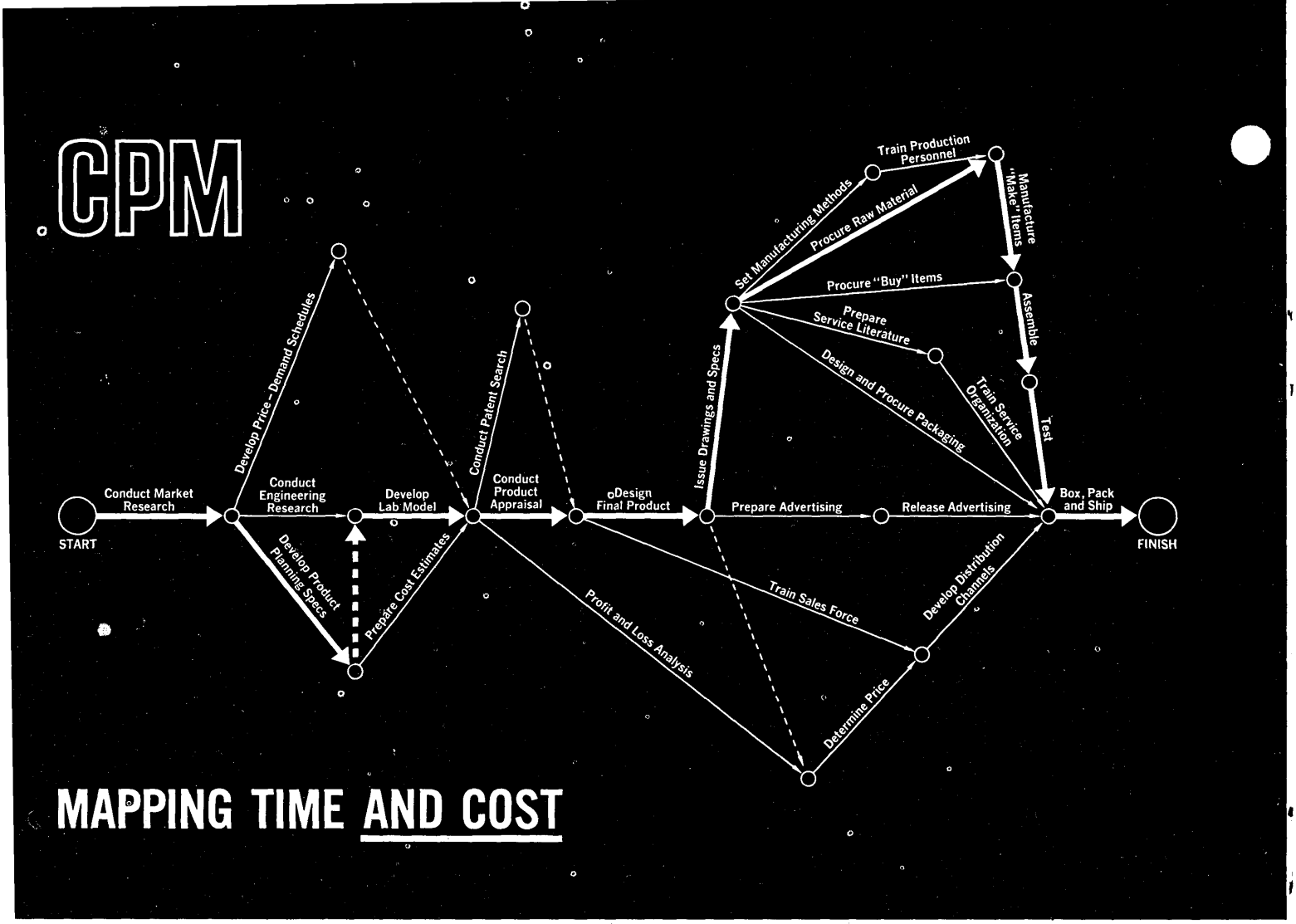
Want More Information?

For more hard facts on Honeywell "Software" (and hardware, too), contact your nearest branch office or write Honeywell EDP, Wellesley Hills 81, Massachusetts. In Canada, Honeywell Controls Limited, Toronto 17, Ontario.

Honeywell

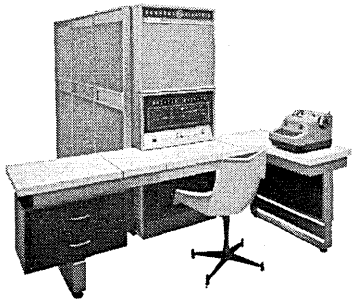
Electronic Data Processing

CIRCLE 16 ON READER CARD



A new and powerful project-planning tool from General Electric

You are looking at a dramatic new idea in project planning and control... the Critical Path Method*. General Electric's CPM program can be applied with equal benefit to the set-up of distribution channels, the planning of a missile program, the building of a skyscraper, or as in this case, to the development of a new product. The object is to select the optimum time-cost relationship. To find the answer, the job sequence is first defined in the form of an arrow diagram (above). Then a word description of each activity is added, plus estimates of "normal" and "crash" time and cost, and a job priority weighting factor. Feed this information to the GE-225 Information Processing System and within minutes you have a printed table of the project duration time and least total investment for a complete selection of alternative work schedules, ranging from all normal to all crash programs. You are made aware of those jobs that are critical ... when they must be completed... how to plan for labor and materials and to avoid bottlenecks. You know the status of the project at all times in relation to the scheduled completion date, and what effect a delay in one activity will have on the entire project. CPM and the GE-225 give you the facts for decision-making without guesswork, and can be applied wherever there is a need for timely and cost oriented selection from alternate courses of action. Write today for Bulletin CPB-185, General Electric Company, Computer Department, Section 2J1, Phoenix, Arizona.



GE's CPM PROGRAM PROVIDES: *1 or 3 types of time-estimate options • Non-linear cost approximation • Fixed milestone capability • Automatic renumbering • Optional time-cost summary • Detailed schedule selection*

* *Developed by Mauchly Associates, Inc.*

Progress Is Our Most Important Product

GENERAL ELECTRIC

CIRCLE 17 ON READER CARD

THE 7040 & 7044

new, modular hardware from IBM

A new family of modular, intermediate to large-scale systems designated the 7040 and 7044 and designed for scientific users was announced by IBM late last month.

The new systems range in power and size between the 1620 and the 7090 and can be linked to such input sources as microwave transmitters, radar, telemetering equipment and analog-to-digital convertors.

The 7040 and 7044 have storage capacities of 4K, 8K, and 16K with memory access time of eight microseconds in the 7040, and 2.5 microseconds in the 7044 as well as 32K memory. By comparison, the 7090 has a memory access time of 2.18 microseconds, and the vacuum tube 704 and 709 have memory access times of 12 microseconds. Data is represented internally in binary format with 37 bit words (36 bits plus a parity bit).

Additional features of the 7040-7044 include single and double precision floating point arithmetic, storage protection prohibiting alteration of programs and subroutines, a core storage clock-interval timer and extended performance instructions.

Programming systems provided by IBM for both systems will include COBOL, FORTRAN, symbolic system, 7040-7044 language processor, I/0 control system, Sort, 7040-7044 monitor, 7090 support package, utility programs, 1401 packages, 650 simulator, and various mathematical subroutines.

Both systems are adaptable to a wide range of I/0 configurations which can have devices from a low-cost card read-punch to a bank of high speed magnetic disc units (the 1301) with storage capacity up to 280,000,000 characters for each unit.

The basic 7040 and 7044 system has one data channel but up to four channels can be added which permit internal processing and I/0 to proceed simultaneously.

When linked to the basic 7040-7044 system with a single channel, the 1622 card read-punch unit reads 250 cards per minute and punches 125 cards per minute. When used as an on-line satellite system, the 1401 performs I/0 functions for the 7040-7044 system. The 1402 card read-punch can be linked to the system or to the on-line 1401 to read cards at speeds up to 800 per minute and to punch cards at 250 per minute.

The 1403 printer can also be linked to either system and can print up to 600 lines per minute of alphanumeric data and up to 1,285 lines per minute of numeric data. Up to 10 tape units can be linked, in any combination, to the 7040-7044 system permitting read-write speeds ranging from 20,000-90,000 cps.

Other I/0 configurations include the 1009 data transmission unit, the 1014 remote inquiry unit, 1011 paper tape readers, telegraph I/0, 1301 disc storage, and direct data connection.

A combination of a 4K 7040 and 1403 as a card system rents for $10,470 per month and sells for $626,700. A card-tape system consisting of an 8K 7040, 1402, 1403 and five 729V magnetic tape units rents for $16,760 monthly and may be purchased for $915,725. The tape-disc system combines a 16K 7040 with two additional data channels, eight 729V tape drives, a 1301 and a 1622 and rents for $27,115 per month and costs $1,440,850.

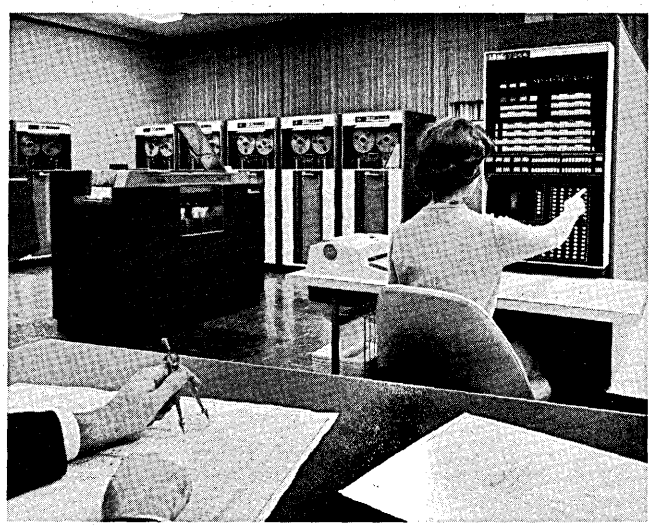
A 7044 tape-disc system combines a 32K 7044, 1301, eight 729V tape drives, two additional data channels and a 1622. This system rents for about $38,615 per month and can be purchased for $2,180,850.

Also, a 1401 with 16K positions of core memory can be linked to a 32K 7044 which is equipped with four additional data channels, a 1301, 1402, 1403 and 14 tape units for a monthly rental of $47,020 and a purchase price of $2,479,400.

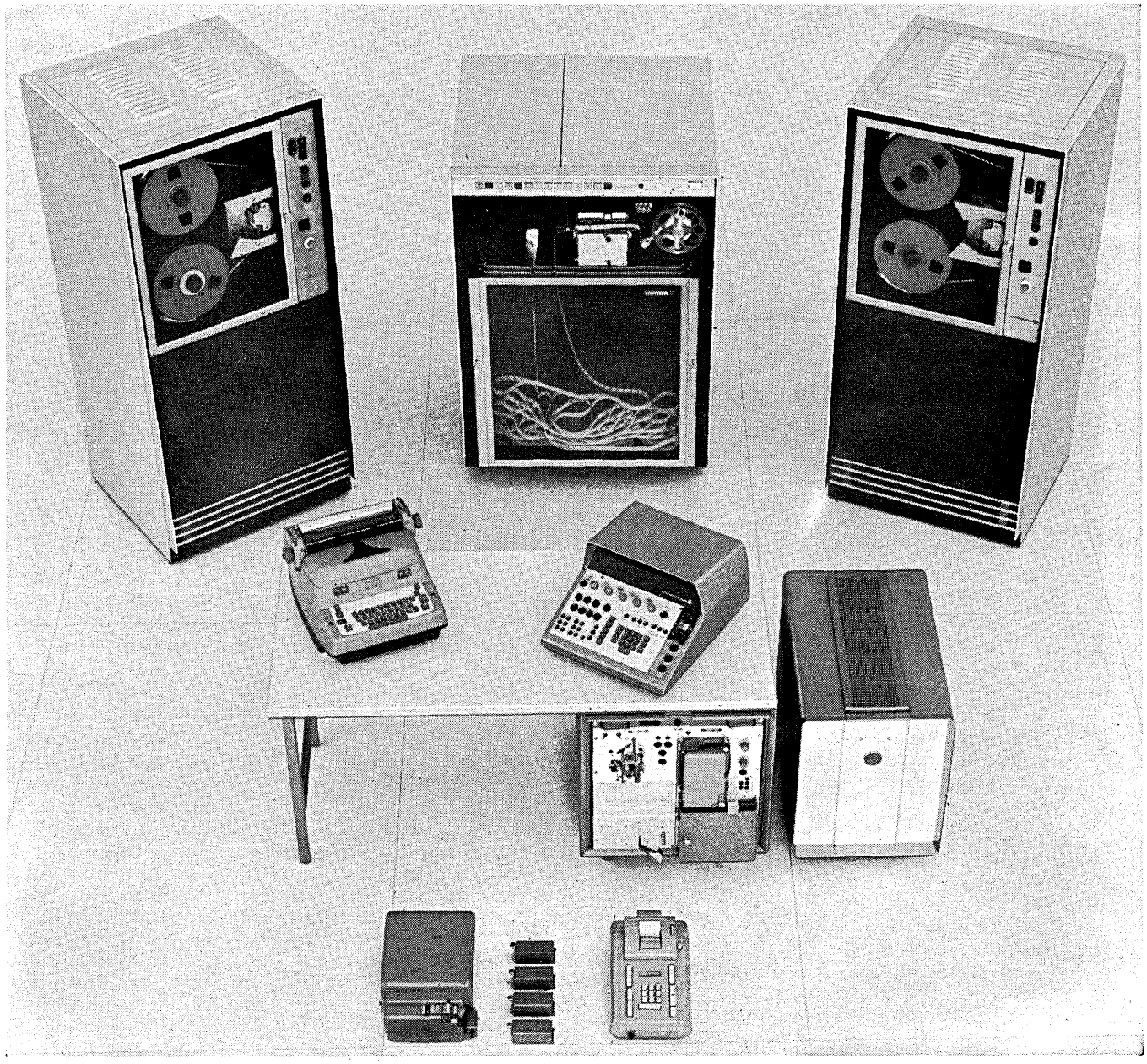
IBM will begin delivery of the 7040 and 7044 in the second quarter of 1963. ■

FOR 7040 CIRCLE 140 ON READER CARD

FOR 7044 CIRCLE 141 ON READER CARD



The 7044 is shown equipped with tape drives, printer and card read-punch. It may be enlarged with the addition of up to five disc files and the 1401. A design model of the operator's console is seen at the right and is similar to the 7040.



Recomp II and accessory equipment.

This machine makes money.

It's a computer.

Like all computers it makes money by solving problems, saving time.

But that's where the similarity between the computer shown and all others ends.

For this is a Recomp® computer. And while Recomp computers are competitively priced—you can lease one from $1,495 to $4,500 a month—they have some distinct money-making advantages over others.

In the medium scale computer field, Recomp II is the only one with built-in floating point. In the small scale field, Recomp III offers the largest word size and largest memory. Recomp's accessory line and software advantages are the most up-to-date in the computer industry. And an extensive programming library is available without charge.

How do we know of Recomp's money-making ability? A feasibility study done by a prospective customer (now a satisfied user) showed that Recomp could save — or make — almost $70,000 more than its nearest competitor on a given project.

There are a number of small and medium scale computers on the market today. Only a few are really outstanding. Recomp is one of them.* For the full story, write:

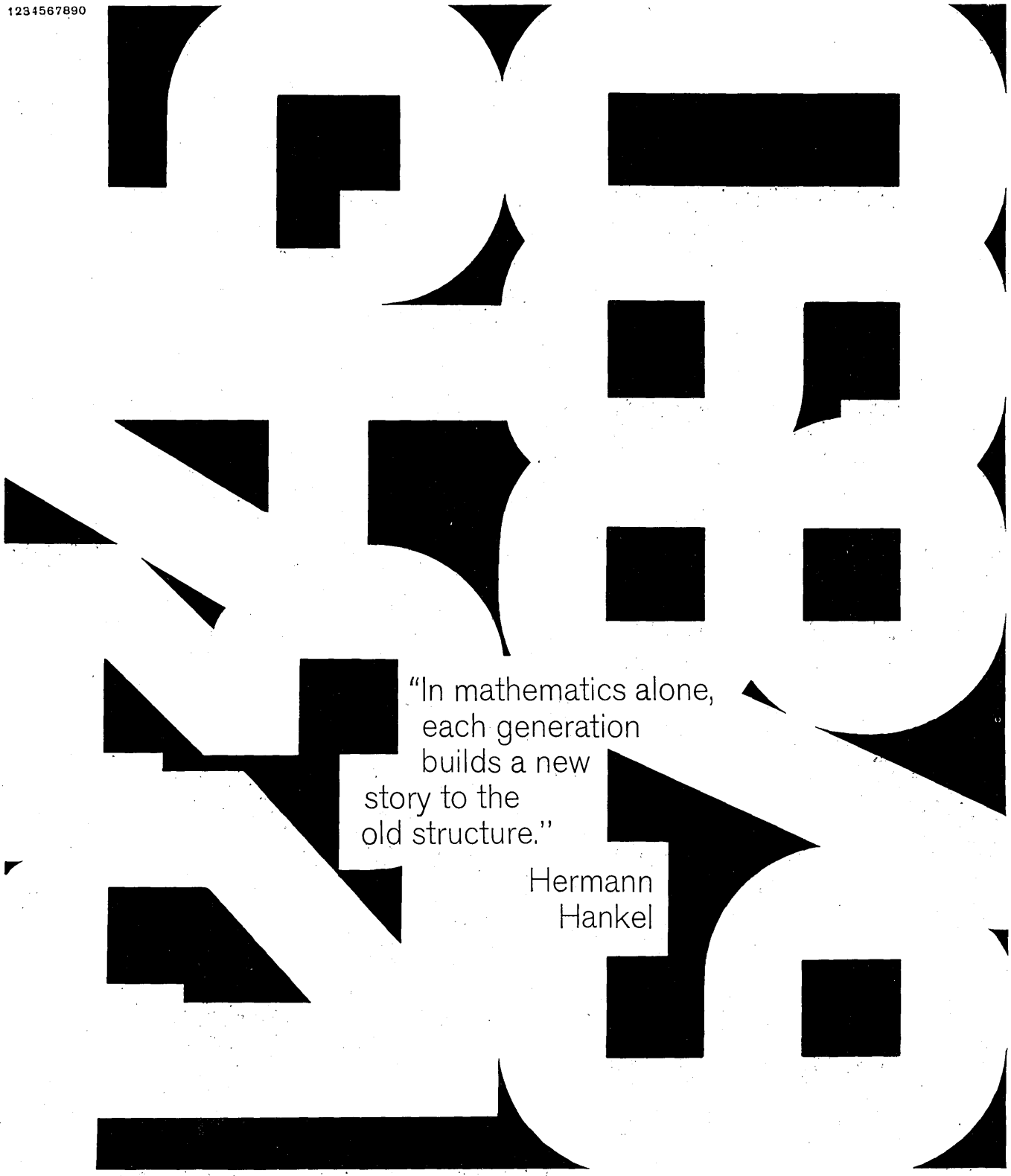
AUTONETICS Industrial Products
Department 61, 3400 E. 70th Street, Long Beach, California.
Autonetics is a Division of North American Aviation.

Recomp

*No computer feasibility study is complete without Recomp.

CIRCLE 18 ON READER CARD

1234567890



IBM mathematicians and programmers are doing work today that will still have meaning years from now.

They are, for example, teaching computers to work out proofs for theorems in Euclidean geometry. They are applying new techniques to problems in symbolic logic originally outlined by Russell and Whitehead. They are crossing into frontier territory in the fields of automatic storage allocation . . . design automation . . . multi-programming...lexical processing...and in almost every other area of applied and applications programming.

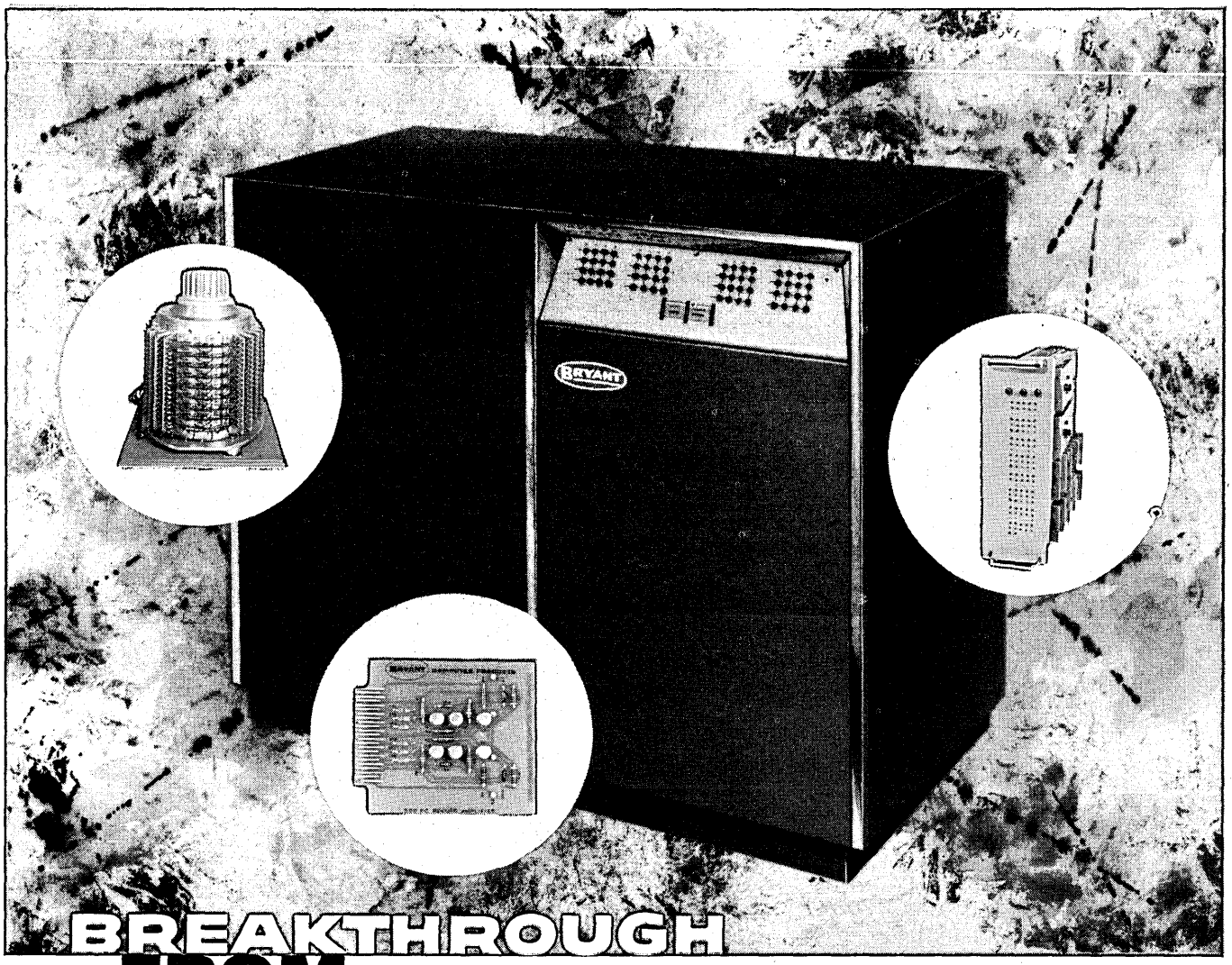
IBM regards programming and programming research as essential to its future growth. At IBM, mathematicians and programmers have at their disposal the machine time they need for the full development of their ideas. And they have before them unusual opportunity for professional growth and personal advancement.

If you'd like to know more about the stimulating and rewarding work at IBM, we'd like to hear from you. All applicants for employment will be considered without regard to race, creed, color or national origin. Write to:

Manager of Technical Employment
IBM Corporation, Dept. 701 N
590 Madison Avenue
New York 22, N. Y.

IBM

CIRCLE 93 ON READER CARD



BREAKTHROUGH FROM BRYANT

Now, from Bryant . . . leading supplier of magnetic memory drums and disc files . . . complete memory systems, and a full line of modular read, write, selection, and interface circuitry . . . designed and delivered by Bryant systems engineers . . . proven in commercial, government, and military service. Memory system features include:

NEW "PLUG-IN" MEMORY SYSTEMS AND CIRCUITS

"Plug-In" Capability
Compatible with user logic levels
Self-contained power supplies
Standard rack mounting
Choice of recording modes

Design Flexibility
Frequencies to 1 MC
Serial and parallel operation
Selective alteration of data
Custom units for every requirement

Built-In Reliability
Complete solid state designs
Derated components, Mil-approved connectors
Glass epoxy printed boards
Overload protection

Circuit Availability
Individual circuits available include: read, write, selection, clock read, driver, inverter, flip flop, multiple gate, and power supply modules.

Whether you require a complete "black box" memory, or individual circuit modules . . . contact your local Bryant representative, or write direct.

BRYANT COMPUTER PRODUCTS
Disc File and Magnetic Drum Memories for Every Storage Application
852 Ladd Road • Walled Lake, Michigan • MArket 4-4571
A DIVISION OF EX-CELL-O CORPORATION XLO

61-39 CP

CIRCLE 37 ON READER CARD

secretary's desk?

No... a complete data processing system from Monroe for only $700 a month!

A fully transistorized, desk size, electronic computer, the new Monrobot XI is the least expensive complete data processing system yet devised. This is not a component. It is the entire system.

Data processing that every businessman can afford arrived with the advent of the Monrobot XI. For the large corporation, it allows decentralization . . . saves time . . . can be tied into large-scale systems. For medium and small sized businesses, its low price makes feasible—for the first time—the cost saving economies of automatic data processing. It is a particularly valuable piece of equipment for a service bureau.

No larger than a desk—requiring no special flooring or air conditioning—the Monrobot XI is unparalleled for efficiency and economy in doing general ledgers, profit and loss statements, subsidiary ledgers, cost accounting, and payroll.

For example, on a typical weekly payroll, it writes checks for eight-hundred employees in an eight-hour day, performing all operations automatically. With the addition of input-output devices that cost less than $200 a month, it prepares the payroll journal and employees earnings record—distributes costs to labor classifications—accumulates columnar totals by departments—sums columnar totals for the entire payroll run—and updates individual earnings records . . . *all in a one pass operation.* Yet it is no larger than a secretary's desk and can be used by any competent typist.

It substantially reduces processing time on almost any general business function . . . sales analysis, billing, inventory control, job costing, product scheduling, accounts payable—*you name it.* What's more it handles special jobs—everything from route accounting for bakeries, dairies, and the like, to stock and bond confirmations for brokerage houses—with unparalleled accuracy and economy. *It is the least expensive complete data processing system ever devised.*

At this low price—$700 a month to rent, $24,500 to buy—the Monrobot XI almost demands investigation. For information, write to: Electronic Computer Division, Monroe Calculating Machine Company, Orange, New Jersey.

MONROE

GENERAL OFFICES: ORANGE, NEW JERSEY • A DIVISION OF LITTON INDUSTRIES

CIRCLE 19 ON READER CARD

NEWS BRIEFS

FOURTH I.R. INSTITUTE AT AMERICAN UNIVERSITY

The Fourth Institute of Information Storage and Retrieval will be held February 12-16, at the American University, 1901 F St., N.W, Washington 6, D.C. The theme of the program will be Management of Science Information Centers.

Lecturers will discuss topics including Selective Dissemination of Information; Operation of Technical Information Centers; Decision-Making Processes; Guidelines to Technical Library Automation; Management Control Systems; Relationship between Information Storage and Retrieval and Data Processing; and Where We Are Now and What is Coming in Information Storage and Retrieval?

USIA SPONSORS OVERSEAS COMPUTING LECTURES

The United States Information Agency is sponsoring a series of lectures on the progress, contributions and stature of the United States in the field of information processing. The lectures will be presented in several countries abroad by leading scientists in the field and will also demonstrate the intention of the U.S. to aid other nations in the utilization of the new science.

The first lecture series was begun in Madrid, Spain, in October, 1961, by Isaac L. Auerbach whose talks were on "The Impact of Information Technology on Society," "The Use of Computers in Digital Communications Systems," and "The State-of-the-Art of Digital Computer Techniques." The lectures were of both popular and technical nature and were presented to highly developed nations as well as newly emerging ones.

GPL AWARDED CONTRACT TO STUDY NERVOUS SYSTEM

General Precision's Librascope Division has been awarded two contracts by the Air Force Office of Scientific Research for basic studies in the behavior of nervous systems. The research is part of a program involving intelligent machines and self-adaptive mechanisms directed toward the design of advanced computers and includes an examination of the relation of classical association psychology to data processing and digital computers.

RCA COMPUTERS EVALUATE DATA PROCESSING NEEDS

RCA has developed an automatic system program which involves computer evaluation of all the factors in a data handling job and which provides potential data system users with an electronically-determined analysis of their equipment needs. The optimum equipment complement for a particular job and a list of alternate configurations and what can be expected of them is provided by the computer. Utilizing this new concept, a complex data processing application involving 50 runs can be checked out against 10 different RCA computer system configurations in 16 minutes.

CIRCLE 115 ON READER CARD

ONR SEMINAR REVIEWS PERCEPTRON RESEARCH

The Office of Naval Research Data Processing Seminar, held late last month in Washington, D.C., highlighted current studies in Perceptron research. The informal program presented representatives from Cornell University, Armour Research Foundation, Aeronutronic, IBM, Cornell Aeronautical Laboratory, M.I.T., Stanford Research Institute, Stanford University, Astropower, Inc., and Navy Management Office.

RENSSELAER DEVELOPS "CLASSMATE" LANGUAGE

CLASSMATE, a "Computer Language to Aid and Stimulate Scientific, Mathematical and Technical Education," has been devised by Dr. Jack Hollingsworth and his associates at Rensselaer Polytechnic Institute. The language includes 20 brief terms for orders, the complete alphabet, numbers from zero through nine, and eight signs such as plus, minus, and equal. Sophomores taking courses in differential equations will use CLASSMATE this year as will students in numerical analysis and computer programming.

"EDP & THE LAW" READY FOR FEBRUARY FORUM

"Legal and Practical Problems Involved in the Use of EDP in Business, Industry and Law" will be the subject of a three day "Forum on Electronic Computers" to be held at the Statler-Hilton Hotel in Los Angeles, February 1-3. Under the sponsorship of the Joint Committee on Continuing Legal Education of the American Law Institute and the American Bar Association, the forum will feature the functions, future and shortcomings of computers in relation to their legal implications as well as the impact of edp on the law.

For further information on the

DAVID MALIN RECEIVES FIRST DATAMATION JUNIOR ACHIEVEMENT AWARD AT EJCC

David Malin, a 17-year-old from Bestheda, Maryland was the recipient of DATAMATION's first Junior Achievement Award presented at a general session of the recent Eastern Joint Computer Conference.

Basis for the award was Malin's paper, "CONTRANS – Conceptual Thought, Random Net Simulation" which he presented at the EJCC Wednesday session on "System Simulation." The paper was a result of two years of study in an attempt to integrate the principles of heuristic programming with those of neural net simulation.

Presented by DATAMATION's editor, the award was three-fold: a David Malin book shelf of 30 texts on the computing profession given to the Walter Johnson High School in Rockville, Maryland, where Malin attends his junior classes; a joint DATAMATION and System Development Corporation award of a film on "Computer Programming" given to the Rockville Board of Education, and an inscribed wrist watch presented to Malin.

NEWS BRIEFS . . .

forum, contact John E. Mulder, Director, Joint Committee on Continuing Legal Education, 133 S. 36th St., Philadelphia 4, Penna.

APPLIED DATA OFFERS 7090 PROGRAM ANALYZER

Applied Data Research, Inc., has developed a program analyzer which examines all instructions in an IBM 709-7090 program and produces a list, cross referencing each operand address with the instruction and location affecting it. The analyzer locates errors during program checkout and makes changes to instructions and constants during and after debugging. An entire 32,000 word memory can be analyzed at one time at output speeds of 640 instructions per minute.

CIRCLE 116 ON READER CARD

ADPSO SCHEDULES N.Y. MANAGEMENT SYMPOSIUM

The Association of Data Processing Service Organizations will hold a Management Symposium in New York City on February 19th at the New York Center of the National Cash Register Co., 660 Madison Ave. T. R. Bitterly, Manager Data Processing Centers, National Cash Register Co., Dayton, Ohio, and R. L. Ferrari, Manager, Commercial Applications, Bendix Computer Div., New York, have been appointed co-chairmen.

● Autonetics Industrial Products has established an educational discount program whereby accredited schools in the United States may qualify for a 33⅓ per cent discount on either the lease or sale of all RECOMP computers and peripheral equipment. The program was designed to increase the use of computers at all levels of education.

CIRCLE 117 ON READER CARD

● Students at the University of Houston are now using as a new required text, "A Computer Primer For the MAD Language," by Elliott I. Organick, since the school has adopted MAD as its primary computer language. The primer was completed this summer as a result of efforts in the Ford Foundation Sponsored Computer Project at the University of Michigan College of Engineering where MAD is also being used.

● RCA has been awarded a $3,000,000 contract by the U.S. Navy for final stage development of devices and techniques for the production of

G(J+1)=(G(J)*EXPF(-4.0*HY*(ALPH+HY)))+(FACT*HY*(V(1)+4.0*V(2)+V(3))/3.0)

an ultra-high speed, miniaturized computer. The contract is an extension of the Project Lightening under which RCA has been working to perfect a billion-cycle computer for the Bureau of Ships.

● Over $150,000,000 worth of Univac Solid State computers have been delivered since their introduction by Remington Rand in 1958. The 400th Univac to be built has been installed for the Colorado Fuel and Iron Co.

● IBM World Trade Corporation plans to build a new plant near New Delhi, India, for the manufacture of punched card equipment. Production is expected to begin around the middle of 1963.

● A TR-10 gp analog computer has been sold to Monash University, Victoria, Australia, by Electronic Associates, Ltd. The TR-10 will be used for instructing undergraduate engineering students in analog computer techniques.

CIRCLE 118 ON READER CARD

● Control Data Corporation is now developing techniques and hardware for a new self-contained navigation system for manned space flights. General purpose computers will be used for functions such as navigation, guidance, and processing of television on various planets, according to CDC researchers.

● An RCA 501 and an Interstate Electronics Corporation data gathering unit are aiding in accelerating the flow of solid fuels for rockets and missiles to ships at sea and Naval bases around the world. Navy officials have stated that this ADACC system accepts information directly from a rocket motor in the firing bay and at the same time analyzes the firing characteristics of the motor.

● A $327,500 contract has been awarded to Thompson Ramo Wooldridge Inc., RW Div., by the Electronic Systems Division of the Air Force Systems Command for fabrication and installation of computer communication consoles and associated buffering equipment.

A new $6,500,000 high speed computer and data processing system, Teleflite, has been ordered by Trans-World Airlines. The new system, a product of The Teleregister Corp. of Stamford, Conn., will handle inter-

NEWS BRIEFS . . .

continental reservations, and is scheduled for operation within the next year.

CIRCLE 119 ON READER CARD

● A GE 225 will prepare the classified section for cold-type offset publication and will handle billing for the entire advertising operation of The Arizona Journal, one of the nation's newest metropolitan daily newspapers.

CIRCLE 120 ON READER CARD

● Mediametrics, a new analytical tool to aid advertising media men in buying time and space most efficiently through the use of computing power and linear programming, has been developed in a joint research program by C-E-I-R and Batten, Barton, Durstine and Osborne (BBD&O).

CIRCLE 121 ON READER CARD

● The Bendix Corporation's Systems Division has made plans to open a computer center in Ann Arbor, Michigan this spring. The system used in the center will be designed around a Bendix G-20.

CIRCLE 122 ON READER CARD

● A $3,500,000 Data Processing Center has been opened in Paramus, N.J. by International Telephone and Telegraph Corp. but will be under the management of International Electric Corp.

CIRCLE 123 ON READER CARD

● An IBM 704, using PERT, will be utilized to assist producers of a new Broadway show in reducing costs and errors in planning the production.

CIRCLE 124 ON READER CARD

● A new technique which utilizes a digital computer for evaluating the acoustics of a proposed auditorium before the hall is actually built has been devised by Dr. M. R. Schroeder, a Bell Labs scientist.

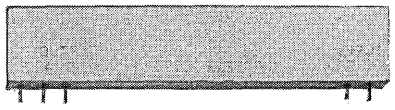
● The Electronic Engineering Company of California plans to establish a service bureau for the conversion of computer tapes at their Santa Ana plant in April 1962.

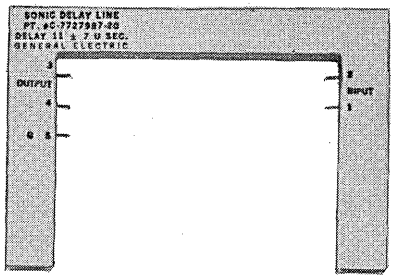
CIRCLE 125 ON READER CARD

● Two Honeywell 800s, valued at approximately $2,500,000, will be installed at the First National Bank of Boston early this year.

CIRCLE 126 ON READER CARD

● The first IBM 1401 to be installed in the United States is on the air at William S. Morris and Co., Wall Street bond dealers.





G.E.'s Wire Sonic Delay Lines . . . Lower Input Losses, Increased Reliability

You can obtain lower insertion losses and increased reliability with wire sonic delay lines from General Electric's Specialty Devices Operation.

For example, a typical line of 1 millisecond fixed delay, 1 megacycle PRF has a loss of only 30-35 db. To achieve this unique performance, G-E delay lines utilize piezoelectric transducers and a delay medium of special alloy wire.

Increased reliability is assured—even under severe military conditions—because G-E delay lines are completely passive devices. They are designed with a minimum number of components and have no moving parts. And they will operate in vibration environments up to 20Gs, perform reliably through extreme temperature variations.

General Electric engineers will custom-design these low-loss delay lines to your exact specifications. ***Specialty Devices Operation of Defense Electronics Division, General Electric Co., Lemoyne Avenue, Syracuse, N. Y.***

Let us tell you all about them.

CIRCLE 23 ON READER CARD

Section 171-02 General Electric Co., Schenectady, N. Y.

☐ Please send me the specification sheet for G-E Wire Sonic Delay Lines.

☐ Please send me specification sheets for complete line of G-E Integrated Electronic Devices.

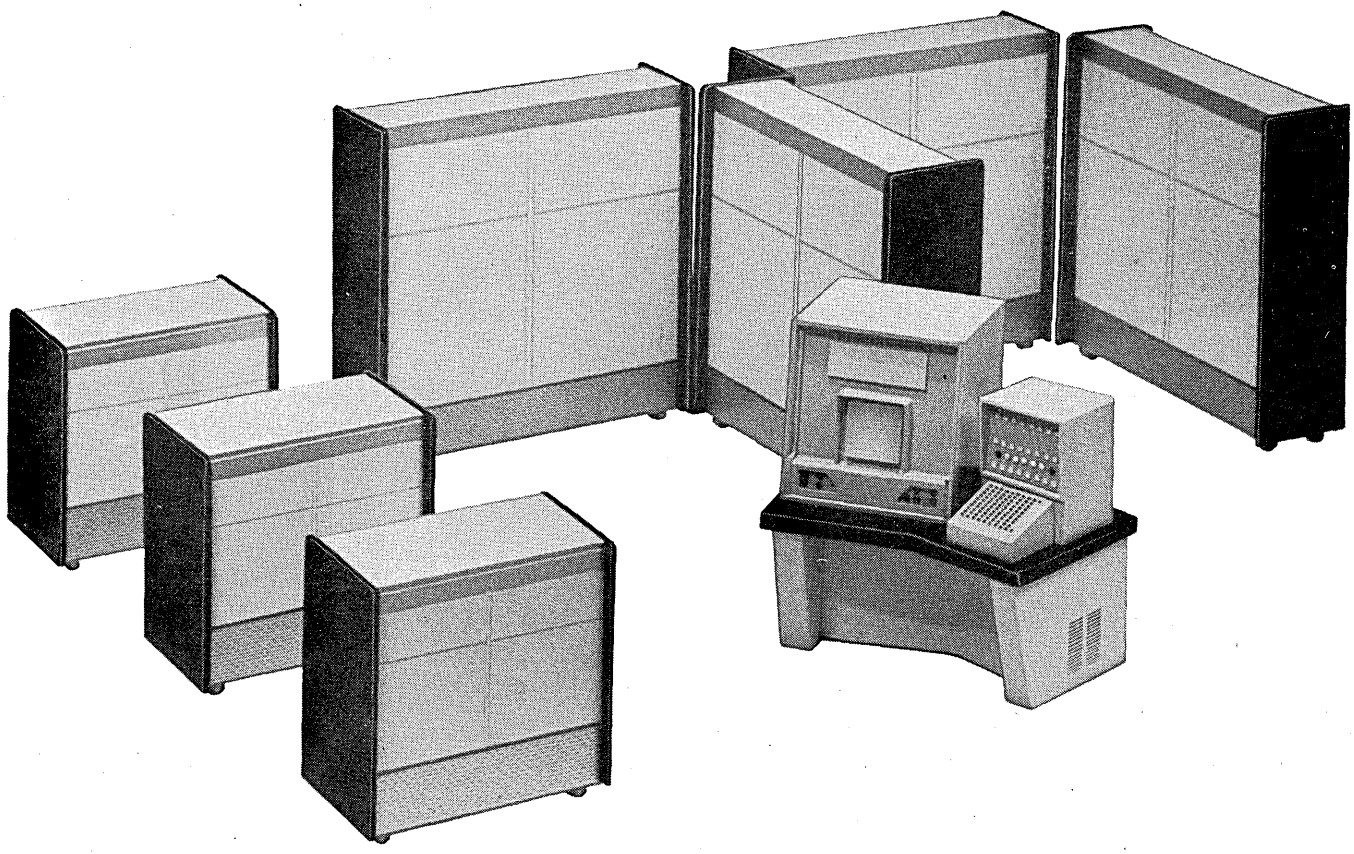
NAME_____ **TITLE**_____

COMPANY_____

CITY_____ **STATE**_____

GENERAL ELECTRIC

LFE's new RD-900 system--



. . . provides a random access file of up to 495 million bits with access to information in less than 3/10 of a second.

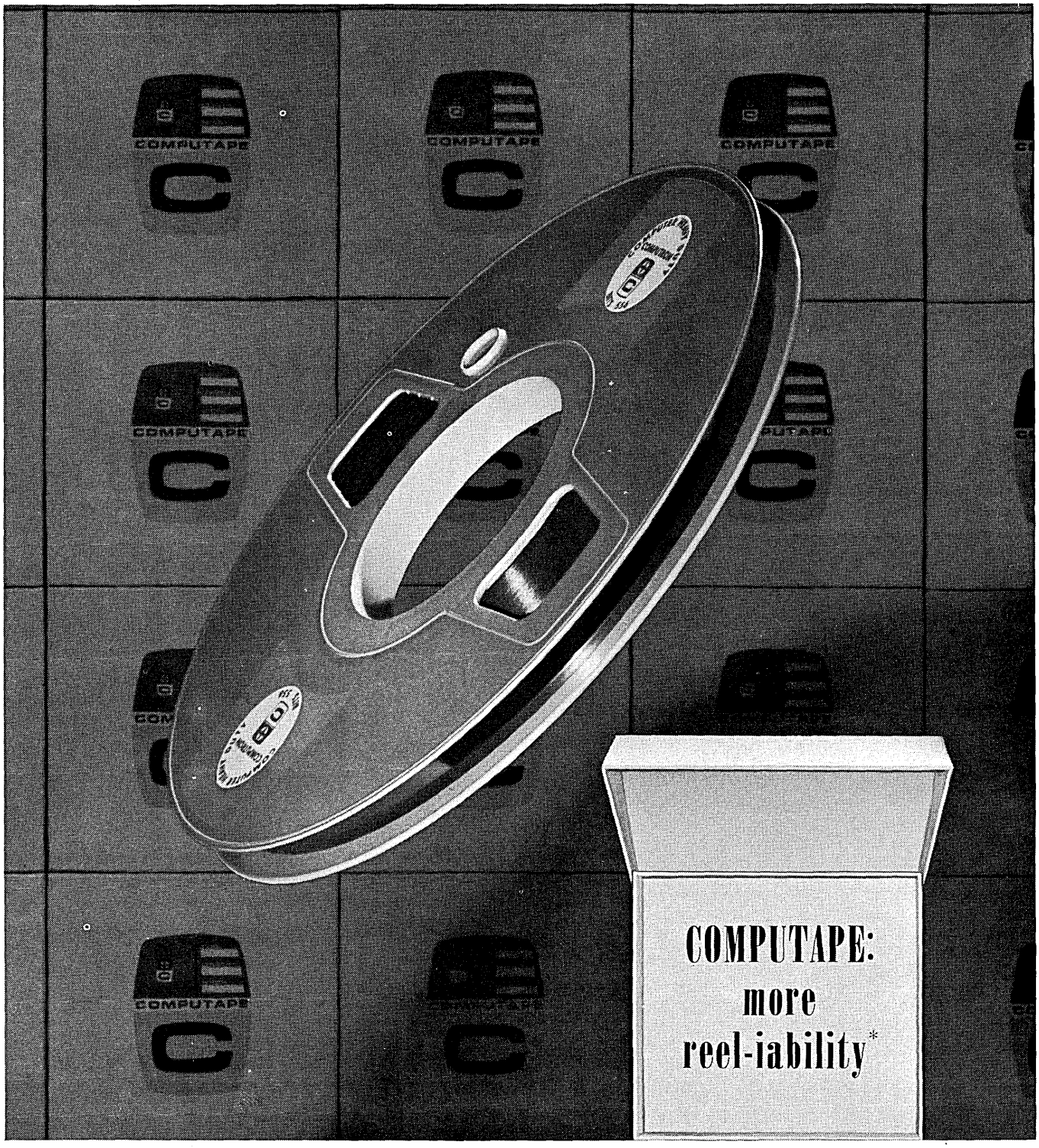
. . . may be operated with all standard general purpose digital computers, or as an independent storage, access and display system.

The RD-900 Random Access Storage and Display System, consists of from 1 to 33 high density, magnetic, file drums, each with a storage capacity of 15 million bits. A Symbol Generator converts coded characters into a visual message as fast as they are read from the file. One Symbol Generator is used to drive any number of output display devices. These include 21″ console displays and large screen projection displays . . . each capable of displaying up to 12,800 characters, symbols or a composite of both. In addition to alphanumeric characters the system can display arbitrary or abstract symbols, schematic or logical drawings, graphs, charts, and maps. Applications include military and industrial systems where information retrieval and display must be simultaneous for instant decision making. For a complete description and specifications write Dept. 101.

LFE
COMPUTER PRODUCTS DIVISION

LABORATORY FOR ELECTRONICS, INC.

1079 COMMONWEALTH AVE. • BOSTON 15, MASSACHUSETTS



***REEL-IABILITY** — that quality in tape which reduces computer down-time and operating costs . . . which guarantees (repeat, guarantees) 800 bits per inch with no dropouts in your severest applications. This kind of reliability (no matter how you spell it) you find only in new Computape, a truly premium quality heavy duty computer and instrumentation tape.

COMPUTAPE: the facts

Computape utilizes a new, heavy-duty coating applied to proven Mylar* backing. This revolutionary formulation combines extra heavy duty usage with minimum of wear products. Highly conductive coating prevents accumulation of static charges. Magnetic properties are specifically designed for high density, high resolution data recording, with binders carefully selected to assure non-aging.

Manufactured start-to-finish in completely controlled dust-free facilities (our plant is, as far as we know, the world's newest) Computape is the product of the only company devoted exclusively to the manufacture of quality tapes for data processing and instrumentation.

Investigate Computape today. Better still, immediately.

COMPUTRON INC.

122 Calvary Street, Waltham, Massachusetts

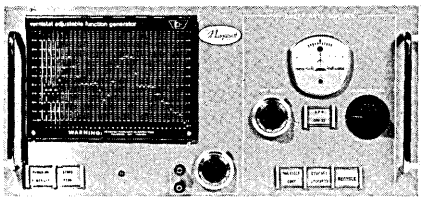
*T. M. DUPONT

CIRCLE 25 ON READER CARD

NEW PRODUCTS

automatic programmer

The TM5 programmer allows automation of any existing control system which uses a set point potentiometer and provides a continuous output which can be any time variable function. The standard model has a range



from six seconds to 108 minutes per cycle, and the low speed model has a range from one minute to 1080 minutes per cycle. THE MARQUARDT CORP., 16555 Saticoy, Van Nuys, Calif. For information:

CIRCLE 200 ON READER CARD

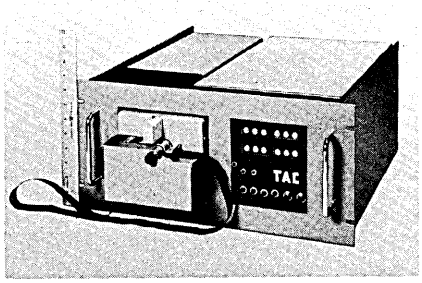
digital control equipment

A new line of digital control equipment transmits information from digital transducers to a central multiplexer which in turn relays addressed information to a controller or data recorder. The line includes pressure to digital transducers, temperature to digital transducers, shaft position to digital transducers, parallel to serial converters, and sampling multiplexers. DIGINAMICS CORP., 2525 E. Franklin Ave., Minneapolis 6, Minn. For information:

CIRCLE 201 ON READER CARD

automatic control unit

The Transistorized Automatic Control (TAC) features computational ability from internally-stored information, one-plus-one command structure, and low component count and parity checking of all memory operations. The unit operates on 28-bit words at



a maximum rate of 8,300 operations per second and has a memory storage capacity of 500 words. DALE'S ASSOCIATES, 5615 Centinela Blvd., Culver City, Calif. For information:

CIRCLE 202 ON READER CARD

remote readout

A remote readout, any number of which can be hooked up to a transistorized digital voltmeter, accepts binary-coded-decimal 8421, gives decimal visual readout and supplies

NEW PRODUCTS . . .

binary-coded-decimal and decimal data outputs. The assembly, with storage and decoder cards, uses standard output level and has a built-in power supply generator for 110 volts. ELECTRONIC ASSOC., INC., Long Branch, N. J. For information:

CIRCLE 203 ON READER CARD

computer drive motor

A 40 frame DC precision motor for computer drives, model 4026-4, is applicable where operation is almost entirely under a stalled condition. The motor operates on an input voltage of 50V with an output rated at 500 ounces torque at zero rpm, and a no-lead speed of 15000 rpm. EICOR DIV., INDIANA GENERAL CORP., 517 W. Walnut St., Oglesby, Ill. For information:

CIRCLE 204 ON READER CARD

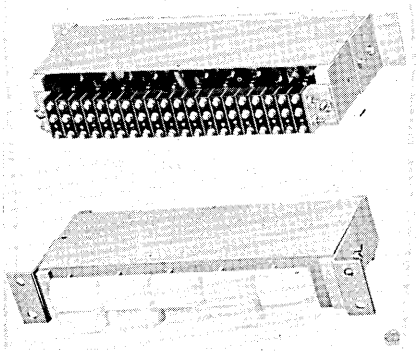
modular in-line switch

The series 7300 Digiswitch, available in back-mounted assemblies or front-mounted configuration, has a digital dial setting that converts directly to electrical outputs corresponding to computer codes. Standard setting wheels provide 8, 10, or 12 dial positions and internal lighting, spacer modules, special dials and special codes are featured. THE DIGITRAN CO., 660 S. Arroyo Pky., Pasadena, Calif. For information.

CIRCLE 205 ON READER CARD

ultra-switch

Two new standard lines of manual-mechanical switches, the 1000 series Ultra-Switch, is available for computer and instrument systems. The 1000-V has a single row of keys mounted vertically and the 1000-H has a double

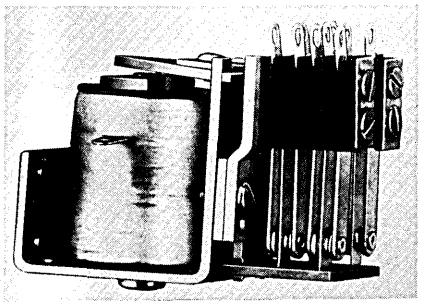


row of five keys each mounted horizontally. Both lines are 10 key units and are available at SPDT or DPST models rated at five amps at 125 and 250 VAC by UL. ULTRASONIC SYSTEMS CORP., 7300 N. Crescent, Pennsauken, N. J. For information:

CIRCLE 206 ON READER CARD

miniature relay

Series GT relay is a miniature telephone type relay designed for uses in communications, computers, and programming. The relay can be supplied



in a variety of contact arrangements and for various modes of operation. LINE ELECTRIC CO., 249 River St., Orange, N.J. For information:

CIRCLE 207 ON READER CARD

x-y graphic recorder

A 30″ square recording area is featured on a new X-Y graphic recorder, Autograf model 7. The recorder, priced at $6,500, has better than ±.1% of full scale accuracy and maximum pen speed is 20″/second for each axis. The instrument can be adapted for time base operation, AC signal acceptance, curve follower operation with either magnetic or optical followers, etc. F. L. MOSELEY CO., 409 N. Fair Oaks Ave., Pasadena, Calif. For information:

CIRCLE 208 ON READER CARD

magnetic tape dataplotter

A high-speed, high accuracy magnetic tape X-Y Dataplotter, series 3440, automatically reduces digital data to graphic form and offers complete facility for off-line plotting of digital information as ink plots on 30 x 30 inch or smaller graphic sheets. ELECTRONIC ASSOCIATES, INC., Long Branch, N.J. For information:

CIRCLE 209 ON READER CARD

new diodes

EIA types 1N690, 1N692 and 1N693 are high current switching diodes which have a high forward conductance and fast recovery time. EIA types 1N925, 1N926, 1N927 and 1N928 are fast switching silicon diodes with low capacitance. COMPUTER DIODE CORP., 250 Garibaldi Ave., Lodi, N.J. For information:

CIRCLE 210 ON READER CARD

power supply system

A new power supply system developed for RCA's 601 uses transistor-driven magnetic amplifiers to regulate six critical voltage levels for the computer to within as little as ¾ of one per cent of rated output. The system is the first of its size to handle a total

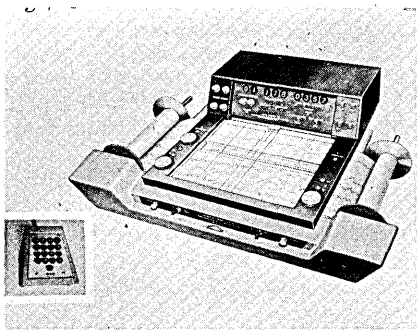
NEW PRODUCTS . . .

load of 13 Kw with its regulation of each power level supplied. AIRPAX ELECTRONICS, INC., 6601 N.W. 19th St., Ft. Lauderdale, Fla. For information:

CIRCLE 211 ON READER CARD

digital data reader

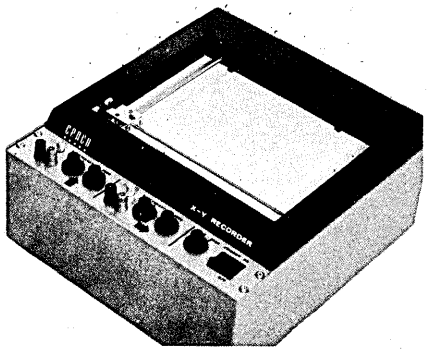
A new digital data reader which consists of an X-Y reading head, 16 inch paper or film transport, and keyboard, features handling of multiple channels, each with a different scale factor and zero reference; lampbank display for channel count, coordinate values; and patchboard programming. The basic system costs $4,975. THE GERBER SCIENTIFIC INSTRUMENT CO., P.O. Box 305, Hartford 1, Conn. For information:



CIRCLE 212 ON READER CARD

x-y recorder

A new low-cost null-seeking, servo type recorder is applicable where two variables must be plotted simultaneously. Two models are available; one with a sensitivity of one millivolt per inch, and the other with 10 millivolts per inch. CENCO INSTRUMENTS CORP., 6450 W. Cortland St., Chicago 35, Ill. For information:



CIRCLE 213 ON READER CARD

core handler

A high speed ferrite core handler, model CH-70, is designed to operate at a rate of 36,000 cores per hour in conjunction with electronic grading equipment for production testing of ferrite cores. RESE ENGINEERING INC., A & Courtland Sts., Philadelphia 20, Pa. For information:

CIRCLE 214 ON READER CARD

AIEE MEETING TO FEATURE 30 COMPUTER PAPERS

The Winter General Meeting of the American Institute of Electrical Engineers will be held January 29-February 2, at the Statler Hilton Hotel in New York. Four special sessions will feature Gigacycle computers and another special session will highlight problem solving procedures with problem-oriented languages.

The Computing Devices Committee will present a paper, edited by R. M. Kalb of RemRand, summarizing the significant trends in the computer field during 1961 and describing the implications for future computer designs.

E. J. Schubert of Beckman Systems will be chairman of the first session on Logical Design which will include discussions on "A Map Approach to the Solution of a Class of Boolean Functional Equations," "Design of N-Valued Logic Networks," "A Four-Megacycle, 18-Bit, Checked Binary Counter," and "The Automation of Backwiring Design and Topological Layout."

Heading the second session on Computer Systems and Devices will be R. Ferguson of Westinghouse. Topics will include "Magnetic Hysteresys Function Generator," "Significant Developments and Trends in the Computing Devices Field During 1961," "Transducers as Supplementary Devices to Direct Current Network Analysers," and "Control Equipment Used With A Digital Computer For Automated Production of Deposited Carbon Resistors."

Session three, headed by R. House, Battelle Memorial Institute, is billed as a Tutorial Session For Non-Computing Engineers and will include papers on "The Programming Hierarchy," "How to Use COBOL, A Problem Oriented Data Processing Language," "Using Decision Tables for Product Engineering," and "A Program Sympathetic Computer."

Speakers on computer programming include Burton Grad, manager of systems engineering services, IBM; Dr. Grace Hopper, director of programming research for Rem-Rand; Ivan Flores, consultant, and Dr. Edward L. Glaser, Burroughs Corp.

The topic of sessions four, five, six and seven will be the Gigacycle Computer, chaired by Samuel Levine of Teleregister Corp., G. G. Hoberg of Tele-Dynamics Division, George F. Cramer of IBM, and Douglas Hogan from the Department of Defense, respectively. The discussions for these sessions will highlight "An Introduction to Gigacycle Computers," "Gigahertz Computer Circuitry," "Applications of Gigacycle Computers," "Piecewise-Linear Switching Analysis of a Bistable Tunnel-Diode Logic Circuit," "Transformer-Coupled Tunnel Diode NOR Circuits," "Generation of a High Speed Clock Using a Travelling Wave Oscillator," and "Logical Design and Implementation in a Pumped Diode-Transistor Logic System."

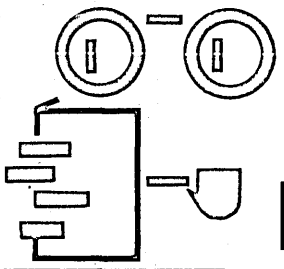
The last two sessions on this topic will include "The Organization of a Multi-List Type Associative Memory," "Problems in the Logical Organization of a Kilomegacycle Computer," "Guides for the Organization of Computer Systems Using Multiplexed Equipment," "Considerations in the Design of a Computer with High Logic-to-Memory Speed Ratio," "Ultra-High-Speed Memory Design Considerations," "Reliability in Non-Repairable Kilomegacycle Computers," "Automatic Utilization of Hierarchical Memories," and "Scaling and Thermal Noise Considerations of a Kilomegacycle Computer Design."

The eighth and final session will be on Computer Input-Output Devices during which papers will be presented on "A Development Study of the Print Mechanism of the IBM 1403 Chain Printer," "Digital Circuit Techniques for Speech Analysis," and "High Accuracy Analog to Digital Converter." ■

NEXT MONTH IN DATAMATION

Prominently featured in a February return engagement is the unusually well-balanced trio of Grosch, Granholm and Patrick. Chapel Hill ACMers will take special cognizance of Dr. Grosch's sharpened quill, while Jackson Granholm wades into the rhyme and occasional reason in "How To Design A Kludge!" Finally, baritone Bob Patrick depicts the excitements involved in "Contracting For Consulting Services."

Other readable explorations for the coming month include: "How To Make a Computer Appear Intelligent," by GE's Joe Weizenbaum; an explanation of PERT by Herbert Gross (unrelated to the aforementioned) of NCR; more on the standards outlook; a most unusual description of "A Documentation Generator," and a design study of ASI's new hardware.



NEW LITERATURE

THE PERCEPTRON: The report on Perceptron Applicability to Photointerpretation describes an electronic eye which reacts to specific stimuli and can be used for detecting targets of military significance from aerial photos and for diagnosis of medical symptoms. For a copy of this report send $1.50 to OTS, U.S. DEPT. OF COMMERCE, Washington 25, D.C.

COMPUTER BIBLIOGRAPHY: This bibliography deals with computers and their applications, and highlights the areas of information storage and retrieval, data processing and programming, computer research in medicine, human engineering, and learning machines, computers, magnetic recording systems and machine translations. For a copy of this report send 10¢ to OTS, BUSINESS AND DEFENSE SERVICES ADMINISTRATION, U.S. DEPT. OF COMMERCE, Washington 25, D.C.

2000 SYSTEMS: A new brochure describes all major components of the 2000 systems, how they operate and their speeds. PHILCO CORPORATION, COMPUTER DIVISION, 3900 Welsh Rd., Willow Grove, Penna. For copy:
CIRCLE 130 ON READER CARD

G-20 SITE SELECTION: This booklet recommends methods of selecting the proper site and preparing for the installation of the G-20 computing system. Included is a discussion of requirements and specifications for nine basic elements of the G-20 system, environment and protection. BENDIX COMPUTER DIVISION, 5630 Arbor Vitae St., Los Angeles 45, Calif. For copy:
CIRCLE 131 ON READER CARD

SHIFT REGISTER: This four-page brochure describes a complete line of standard magnetic shift registers. Charts and illustrations are included. EPSCO INC., 275 Massachusetts Ave., Cambridge, Mass. For copy:
CIRCLE 132 ON READER CARD

COMPONENT CATALOG: This eight-page condensed catalog gives information on perforated tape readers, perforators, accessories and tape systems. Details are given on the Mark system concept. TALLY REGISTER CORP., 1310 Mercer St., Seattle, Wash. For copy:
CIRCLE 133 ON READER CARD

NEW FIRMS & mergers in DP

Computer Dynamics Corp. has been formed in Silver Springs, Md. by Vincent R. Grillo, Jr., and Joseph E. Sberro, formerly with C-E-I-R, Arlington. Services to be offered by the new firm include application analysis and feasibility studies, equipment evaluation, system design, programming and post-installation system audits. The firm plans branch centers in New York, Boston, Chicago, Los Angeles and San Francisco.

CIRCLE 100 ON READER CARD

National Data Processing Corporation has been acquired as a wholly owned subsidiary of Remington Rand. The firm will continue to operate in Dallas as a part of the Univac coordinated computer operation with no changes in present management or personnel.

Control Data Corporation has acquired a 25 per cent interest in Scientific Computers, Inc., a company dealing with the application of digital computers, systems-analysis, operations-research and programming. The interest was obtained through an exchange of stock.

Data Systems, Inc., a new Minneapolis firm, has purchased a SS 80/90 which will be operative next year. The firm will sell time on the computer to local businesses and is currently negotiating for a business site to locate their edp center. Harold Okinow is president of the company.

CIRCLE 101 ON READER CARD

Pennsylvania Research Associates, Inc. is a newly formed Philadelphia company. A study of advanced computer design and data handling techniques for real-time high-data-rate equipment simulation, are among the firm's current projects. Areas of activity include analysis, research and consulting in computers, programming techniques, and analog and digital simulation.

CIRCLE 102 ON READER CARD

Walter R. Anderson and John C. Haughey have founded Commercial Computers Inc., of Watertown, Mass., for the manufacture of computers for business and industrial applications that will sell for as low as $500. CCI plans to concentrate on the development of "low cost, compact computers" that will fill the gap between present desk calculators and the lowest cost digital computers.

CIRCLE 103 ON READER CARD

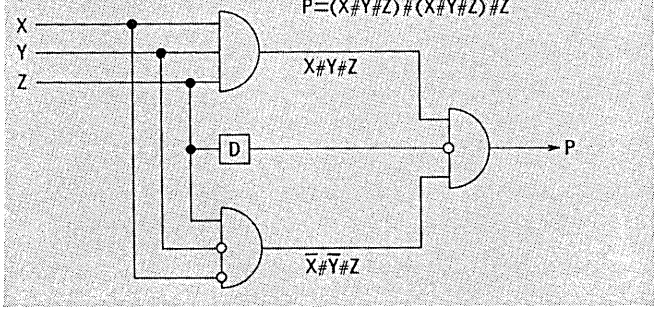
DERIVING MAJORITY LOGIC NETWORKS

FUND THM: $f(X,Y,Z) \equiv (X\#Y\#f_{x\bar{y}})\#(\bar{X}\#\bar{Y}\#f_{\bar{x}\bar{y}})\#f_{xy}$

DEFINITIONS: $X\#Y\#Z \equiv Maj(X,Y,Z);\ f_{xy} \equiv f(X,X,Z);\ f_{x\bar{y}} \equiv f(X,\bar{X},Z)$

DERIVATION: Let f(X,Y,Z) be even-parity function P.
Then $f_{xy} \equiv \bar{Z}$ and $f_{x\bar{y}} \equiv Z$ so

$P = (X\#Y\#Z)\#(\bar{X}\#\bar{Y}\#Z)\#\bar{Z}$



The fundamental theorem of majority-decision logic, a typical product of Univac's Mathematics and Logic Research Department, has practical as well as theoretical interest. The even-parity checker derived above from the fundamental theorem can be treed to determine the parity of 3^n bits in n logic levels using only $\sum_0^n 3^i$ three-input majority gates.

Qualified applicants will find at Remington Rand Univac a scientific climate tuned to the intellectual curiosity of the professional man. The opportunity and the incentive for advancement are waiting for you in highly significant positions at Univac. You are invited to investigate them immediately.

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COCOA BEACH, FLORIDA

A new data processing center is being established in the Cocoa Beach, Florida, area to service the Atlantic Missile Range. Qualified applicants interested in a Florida location can be offered very challenging work on essential range problems. Openings include the following:

• **PROGRAMMERS** • **SYSTEMS ANALYSTS** for correlation of radar tracking data and programming techniques for data handling and data reduction.

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Rem. Rand Univac
P.O. Box 500
Blue Bell, Pa.

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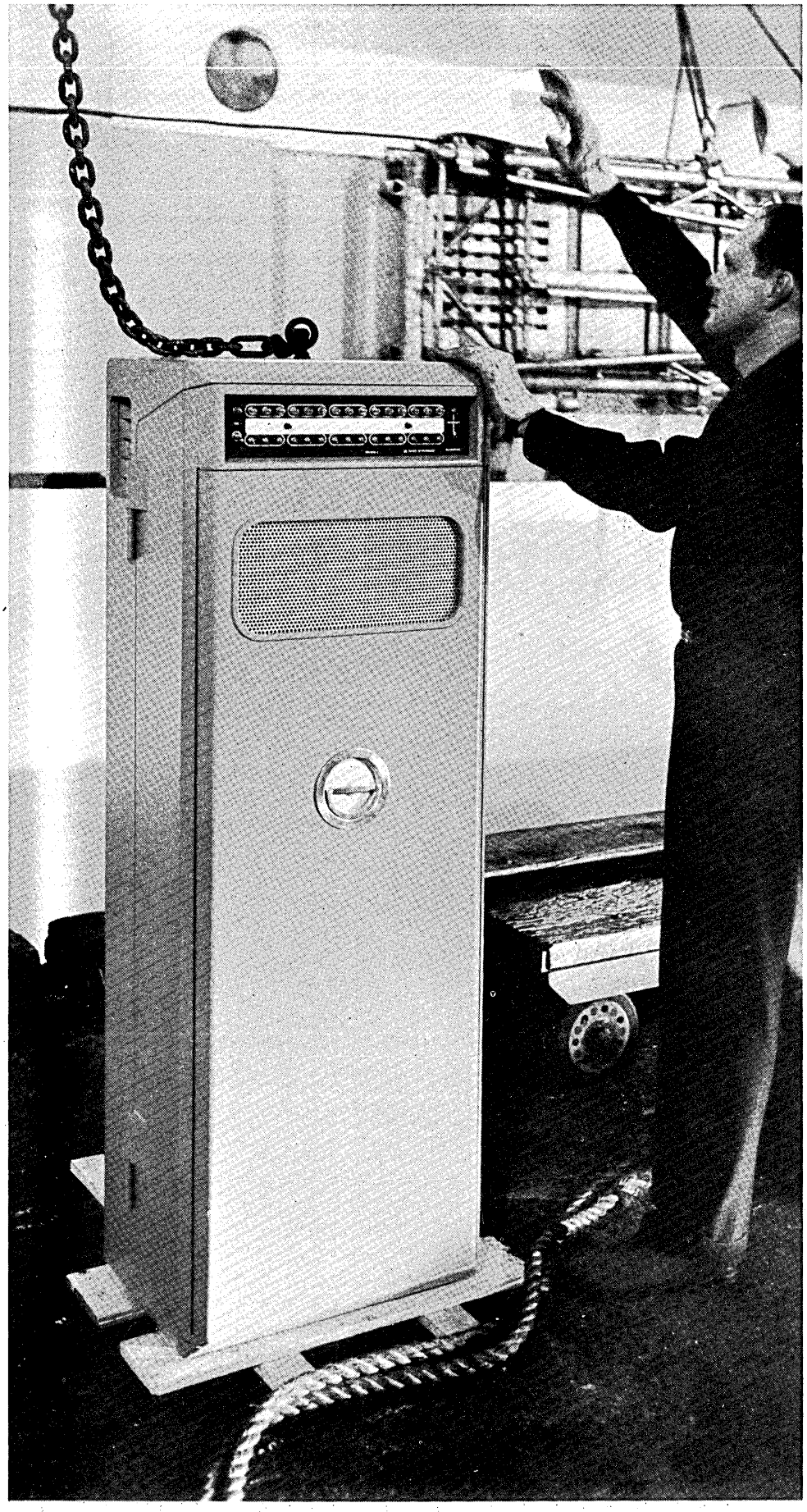

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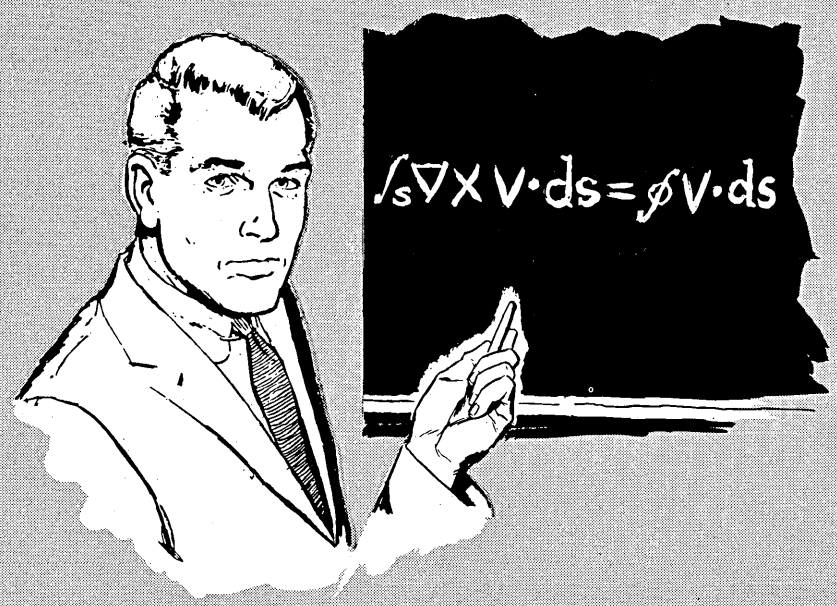
RW Division
8433 Fallbrook Avenue
Canoga Park, Calif., Diamond 6-6000

RW means Computer Technology Leadership



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- Photo-Information Processing
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- Microwave Data Transmission
- Polymer Chemistry Synthesis
- Linear Programming and Queueing Theory
- Complex Systems Integration
- Diagnostic Programming Techniques
- Control Logic, Buffering & Arithmetic
- Solid Logic and Thin Films
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- Magnetic Device Analysis
- Advanced Systems Planning
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- Symbolic Logic
- List Processing Techniques
- Information Retrieval
- Symbol Manipulation
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- Operations Research
- Automatic Programming

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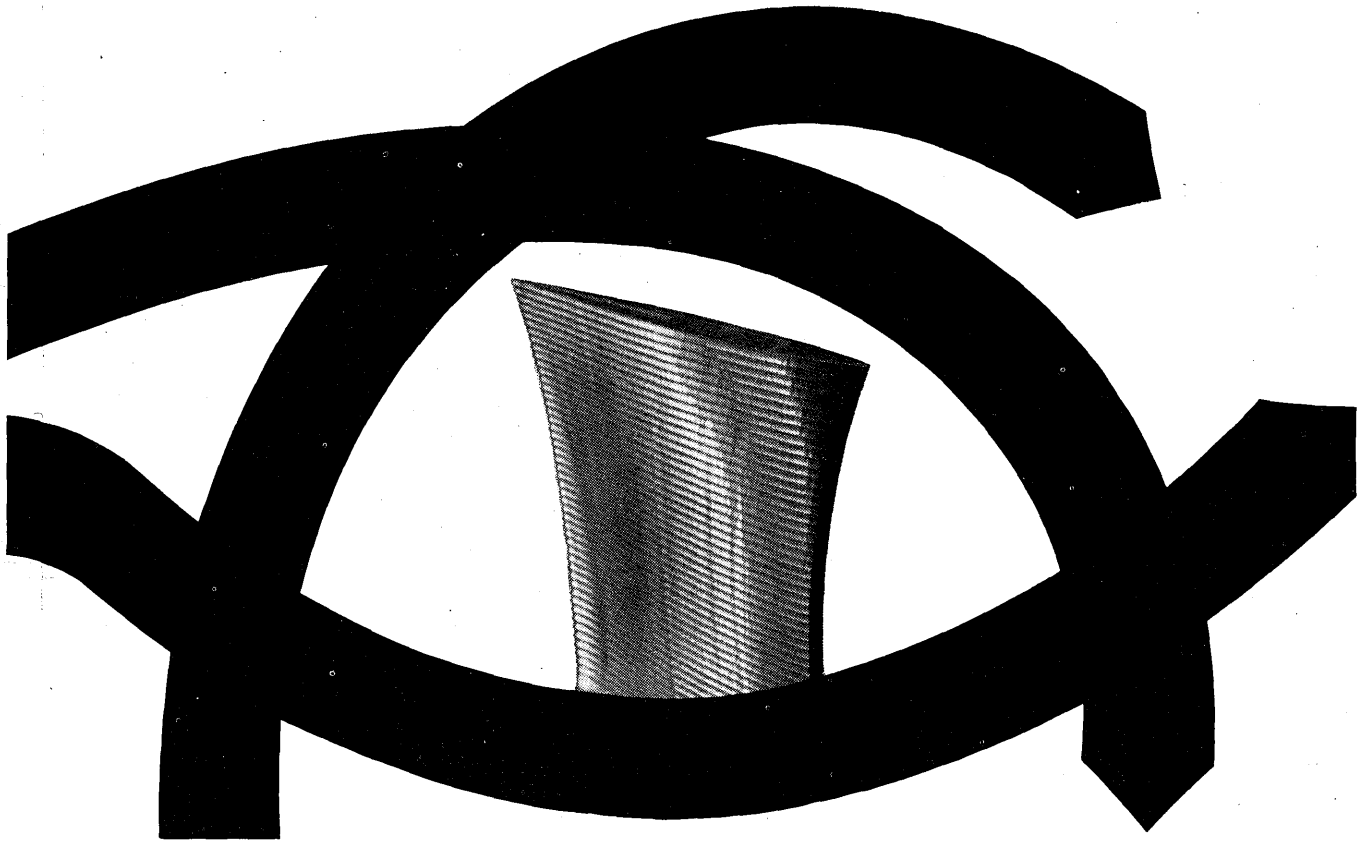
OPPORTUNITIES AT THE OUTER EDGE OF COMPUTER SCIENCE...



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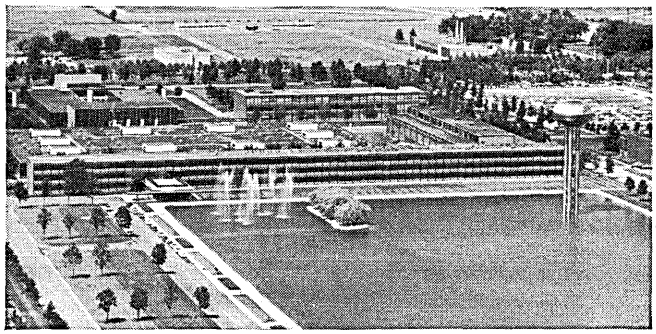

Mr. J. B. Sparhawk, Personnel Staff

General Motors Research Laboratories

WARREN, MICHIGAN

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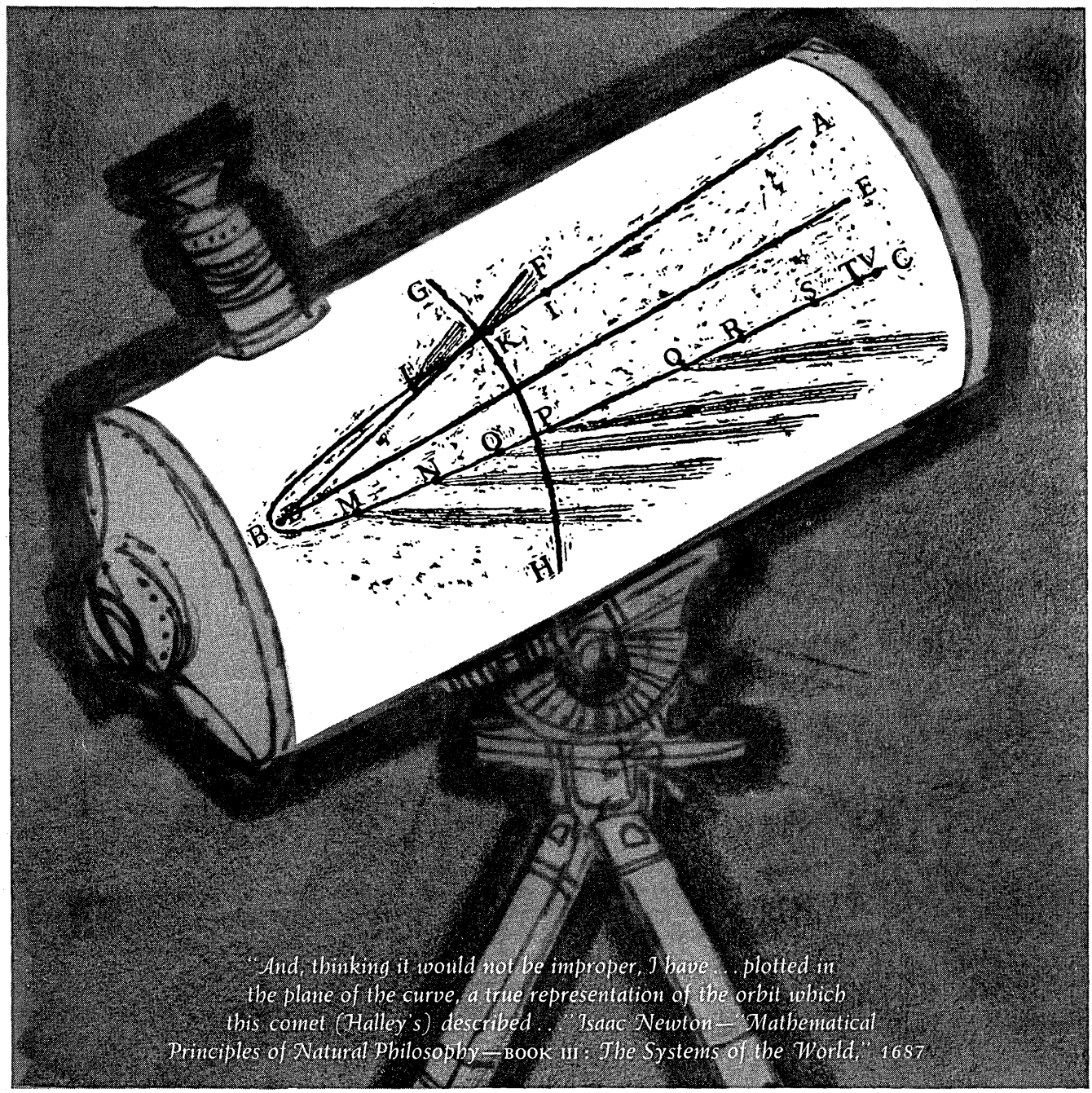
Scientific programmers for **S**pace **T**echnology **L**eadership



*"And, thinking it would not be improper, I have . . . plotted in the plane of the curve, a true representation of the orbit which this comet (Halley's) described . . ." Isaac Newton—"Mathematical Principles of Natural Philosophy—*BOOK III: *The Systems of the World," 1687*

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DEVELOPMENT ENGINEERS: For design, development, and evaluation of Analog to Digital and Digital to Analog converters, servomechanism, and associated input/output equipment. EE degree and a minimum of two years experience in Analog and Digital conversion techniques. Experience with input/output equipment and logic for digital computers will be considered.

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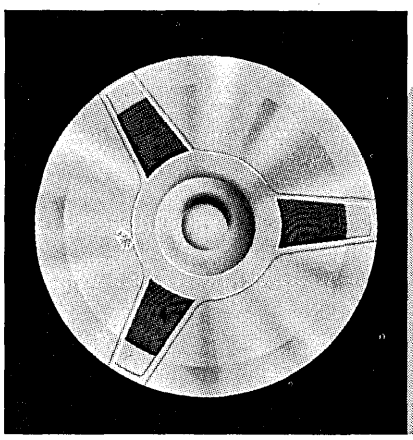

Careers in COMPUTERS

Mathematician Programmer (Sr.)

Analysis and preliminary design of computer-oriented information processing systems. Apply data processing/handling techniques to complex weapons system; statistical and numerical analysis, linear programming, design of system simulation and evaluation of results. Should have M.A. in Math or Physics and 4-7 years in computer programming for scientific applications, particularly communication, ECM, or radar systems. Experience should include most of the following:

1) Writing program specs 3) Flow charting
2) Block diagramming 4) Writing operating procedures
5) Familiar with real-time programming, compiler techniques and large scale program systems

Operations Research Analyst

Senior Engineer with 5-7 years experience in some of the following areas:

1) Application of Game Theory 3) Model Construction
2) Monte Carlo Techniques 4) Linear Programming
5) Radar

Should have M.A. in Math or Physics. Will conduct operations research studies in the areas of Weapons System Evaluation and Electronic Countermeasures.

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Professionals who wish to participate in advancing the state of the art, with experience or training in:

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Automatic Programming
Artificial Language Construction
Non Numerical Mathematics
Symbolic Manipulation
Game Playing
List Processing Techniques
System Design
Language Analysis
Information Retrieval
Artificial Intelligence
Operations Research
Symbolic Logic

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Desire a background in physics and/or electronics. Must have an advanced degree, preferably a Ph.D. plus experience. Initial assignments and openings are in one of the following areas. Study High Density Recording methods and means of achieving ultra-high density on tape and also consider mechanical and electronic scanning and reading. Or conduct Storage Media Studies in achieving ultra-high random access in various media. Or conduct research in other basic areas of computing techniques.

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Experienced in Telegraph Systems, Data Transmission, Switching Systems, Transmission Systems, Communications Planning, to work on the development of new large-scale, communications based data processing systems for unique business and industrial applications.

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To design industrial control programs for use in chemical, plastic, electronic and steel industries, or to work on the design automation of logic and production techniques. Other openings exist in design of commercial programs and design of test and diagnostic programs. A minimum of one year's experience is desired.

Data Processing Engineer

Engineer with B.S.E.E. degree and experience in programming. Statistics experience would be helpful. Will consider a Math degree if applicant is engineering orientated. Will be utilized in data processing area, including file maintenance, random access storage, etc.

Programmers

Experience to include programming on large scale equipment with programs and applications of a Business, Scientific or Engineering nature. 7090 experience preferred.

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Will participate in digital computer system development studies and will have eventual responsibility for managing system contracts and/or in-house projects. Should have extensive experience in system design, particularly in memory and display areas. M.S. in E.E. preferred.

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Knowledge of accounting and government cost principles, also manufacturing and engineering procedures, methods and systems. Must know the capabilities and application of office and communications equipment including data processing equipment.

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Experienced in machine organization and design of multi-terminal business systems with particular emphasis in communications. Will specify optimum configurations of system components to solve actual and hypothetical problems. Degrees in Electrical Engineering, Mathematics or Physics.

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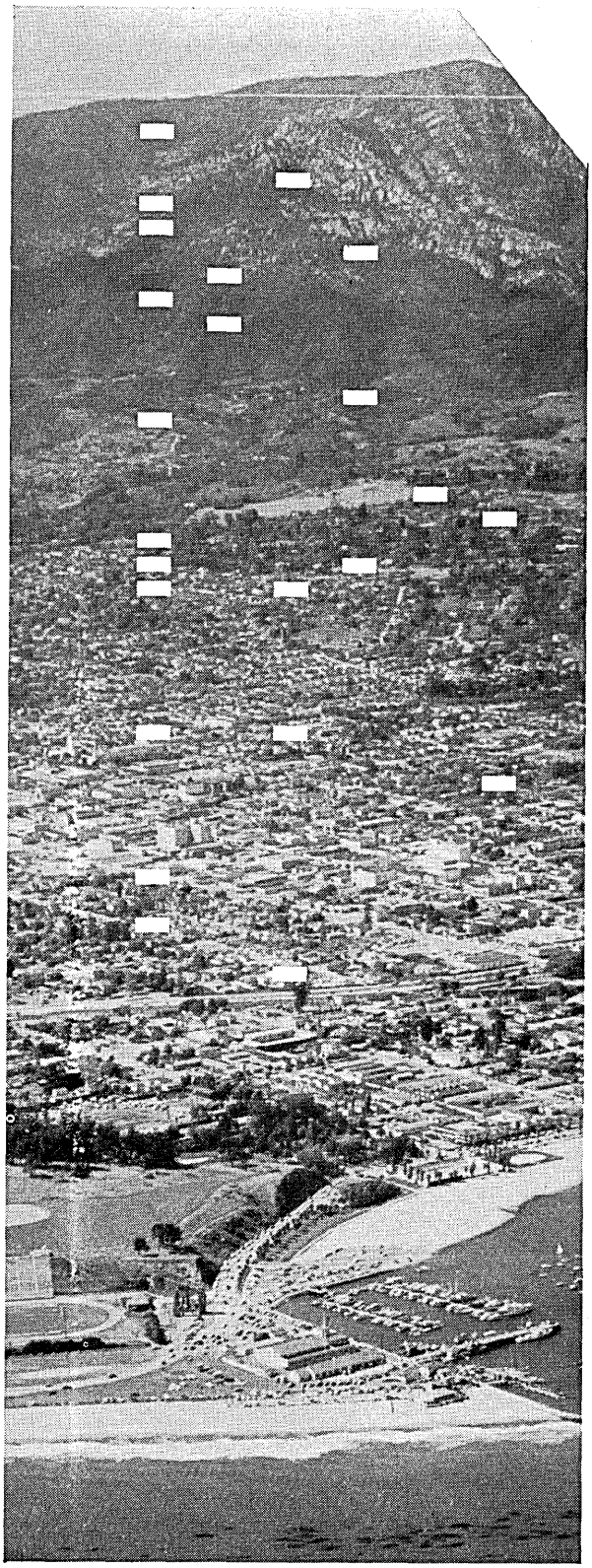

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General Electric Opens New Computer Center in Santa Barbara, California

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Education: Recent Doctorate degree in Mathematics or Physical Science.

Experience: Formulation and development of mathematical models of scientific and engineering problems.

Responsibilities: Analyze problems involving entire physical environment including engineering systems, econometrics, biological sciences. Simulate problems through formulation of mathematical models for application to computer.

PROGRAMMER ANALYSTS

Education: BS/MS in Mathematics or Physical Science.

Experience: Application of high speed digital computers to scientific and engineering problems.

Responsibilities: Analyze scientific and engineering problems and mathematical models to determine appropriate machine language instructions required for computer processing. Develop programs for computer solutions. Prepare detailed flow charts of various digital programs.

Installation is under way of a 704 computer to be followed by a G.E. 225 computer, both for use as research tools at *TEMPO*, General Electric's center for the long-range study, synthesis and evaluation of future military weapon and electronic systems.

The Computer Sciences activity will provide the essential research capacity for *TEMPO* as well as additional mathematical services for numerous engineering and related requirements by other firms in the Santa Barbara area including processing of test data from the Pacific Missile Range as a part of G.E.'s Space Systems Operation.

For information on Computer and other professional positions, contact:

Mr. Robert N. Dyruff, Dept. 56-A
TEMPO, General Electric Co.

735 State Street, Santa Barbara, California

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DATAMATION'S FEATURE INDEX-1961

JANUARY

The Path Ahead For Computing pg. 9
by D. D. McCracken, Graham Jones, Ascher Opler and Allen Newell

Four articles in this special section represent statements of present and future trends in staffing, programming, hardware and applications in the computing field.

Analyzing Election Computing 1960 pg. 35

Four reports survey the outcome of a 7090, RAMAC, 501, and Univac I's performance in the prediction of the 1960 Presidential election.

RemRand Announces "Third Generation" 1107 pg. 42
by Dr. H. R. J. Grosch

This report describes the logical design features of the 1107 and includes a description of the component thin-film magnetic memory.

New Computing Facility Combines Analog and Digital Techniques pg. 44
by Herbert Levy

A three-page report deals with integration of analog and digital units at the Aeronautical Structures Laboratory, Naval Air Material Center.

FEBRUARY

From Philco's 2000 Series—The 212 pg. 24
by Robert E. Steele and Richard A. Groton

A four-page report on the Philco 212 discusses the 2000 series, logical organization, the instruction, indexing and arithmetic units, four-way processing, instruction catalog, and software.

COBOL and Compatibility pg. 30
by Howard Bromberg

This discussion includes background information, the organization of CODASYL, the structure of COBOL, compatibility, the government and industrial programs and a forecast for COBOL development.

MARCH

Optical Scanners pg. 22
by Vin Wentworth and George W. Vogler

Six reports include information on character recognition standards by ASA, the introduction of the Farrington scanner, IBM's 1418, and NCR's conventional approach to its optical reading program.

The Sylvania View—More Comments On COBOL pg. 33
by Jean E. Sammet

A further critical analysis of COBOL.

Another Autonetics Entry, Recomp—From II to III pg. 35
by Richard F. Musson

The similarities, differences and improvements of the Recomp III are compared with the Recomp II.

APRIL

Computers For Education pg. 18
by Harold Bergstein, Don Englund, Don Estavan and Marc Bendick

Teaching by computers is the topic of three articles. Plans for broadening this research at Systems Development Corp. are discussed.

Irresponsible Reporting and How To Combat It pg. 25
by Daniel D. McCracken and Fred Gruenberger

A five-point program is presented as a solution to inaccurate computer reporting. Specific reference is made to a LIFE magazine article on the computing industry.

Linkage System Permits Combinations of Analog, Digital pg. 31
by Donald Block

The combining of analog and digital devices into a hybrid system is the subject of this two-page article. A specifications chart is included.

Around The World In Computing pg. 56
by G. Patrick Anderson and Etienne Guerin

A four-page discussion on various computers native to West Germany, Czechoslovakia, Great Britain, China and USSR is the subject of this feature.

MAY

Design Trends For Large Computer Systems pg. 20
by Charles W. Adams

New approaches to internal logic operation for large computer systems are analyzed.

The Atlas Computer pg. 23
by C. H. Devonand and J. A. Fotheringham

This article describes the main features, and provides specifications of the jointly designed Atlas by Ferranti Ltd. and Manchester University.

Design of the B5000 System pg. 28
by William Lonergan and Paul King

Design objectives and criteria, system organization, operating modes, master control program and features of the B5000 are discussed.

A Stored Logic Computer: R-W's AN/UYK-1 pg. 33
by H. M. Semarne and R. E. Porter

Interpretive systems, stored logic concept, and logic commands are discussed in this four-page article. A description of the AN/UYK-1, its modes of use and specifications are highlighted.

The Gap In Programming Support pg. 37
by Robert L. Patrick

A one-page commentary is concerned with the current lag in diagnostic programming.

JUNE

Computer Simulation of Human Thinking and Problem Solving pg. 18
by Herbert A. Simon and Allen Newell

The first of a two-part article deals with the present status in artificial intelligence; a discussion and description of the General Problem Solver.

The In and Out of Computing pg. 22
by Toni Schuman

A humorous survey of the passé and expedient in computing.

On-Line Processing pg. 23
by Sherman C. Blumenthal

A discussion of on-line processing and suggestions for its improvement are presented in this two-page article.

SDC's Procedure-Oriented JOVIAL pg. 29
by C. J. Shaw

A brief review of programming languages highlights JOVIAL's history and advantages in this five-page article.

JULY

Tabular Form In Decision Logic pg. 22
by Burton Grad

This report sketches the historical background of the development of tabular form and indicates its possible advantages. Diagrams and tables are included.

How To Lose Money In Computing pg. 30
by Jackson W. Granholm

This humorous satire describes what not to do in the design, production and sale of equipment.

Software In Sickness and Health pg. 32
by Dr. H. R. J. Grosch

A perceptive view of the failure of software to keep pace

with hardware design and development. Five suggestions for improving software progress are offered.

CODASYL O.K.'s Publication of COBOL-61 pg. 40
Highlights of the publication of COBOL-61 are given as well as a schedule for the development of COBOL-61 compilers.

AUGUST

Computer Components—1961 pg. 36
A profile of tomorrow's computer technology set in the main frame of a few of today's most advanced areas of research and development are presented in these five pages.

Design of a Large Scale Cryogenic Memory pg. 41
by D. R. Young
This paper presents the feasibility of using superconducting devices in the area of moderate speed, large scale cryogenic systems to replace magnetic cores.

A Survey of Microsystem Electronics pg. 44
by Peter B. Meyers
The background of microsystem electronics and integrated circuitry are described. Evolution, reliability, definition, size, speed and future speculation are included.

Interconnection Techniques For Semiconductor Networks pg. 48
by J. S. Kilby
This article points out the advantages of using semiconductor material to perform a complete circuit function and discusses an interconnection technique for the networks.

Magnetic Devices For Digital Computers pg. 51
by Duncan H. Looney
This five-page article proposes and discusses a number of magnetic components for use in dp systems. Tables and charts are included.

SEPTEMBER

ALGOL-60, A Status Report pg. 24
by J. H. Wegstein
ALGOL maintenance, usage, a definition of ALGOL 60, publications of algorithms, and compiler implementation are the topics of this discussion.

What COBOL Isn't pg. 27
by Howard Bromberg
A practical approach to and evaluation of COBOL implementation.

Bull's Rule In Europe pg. 30
A four-page article, with illustrations, surveys the size, activities and growth of the Bull Machine Company of Paris.

Computer-Related Sciences (Synnoetics) At A University in 1975 pg. 34
by Louis Fein
An eight-page presentation of an address and question and answer session by a university president to an alumni group, projected into the year 1975.

Computers, Unemployment and Responsibility pg. 45
Part I of a transcript of the 1961 RAND Symposium.

OCTOBER

Information Retrieval pg. 19
by Eugene Miller, Ben Cheydleur, Allen Kent, Gordon Barhydt and Paul L. Garvin
This special section includes a survey of information retrieval for 1961, a projected appraisal for 1966, IR studies at Western Reserve University and an evaluation of progress in linguistic data processing.

ALGOL: A Critical Profile pg. 41
Part II of the transcript of the RAND Symposium.

Computer People and Their Culture pg. 51
by Dr. H. R. J. Grosch
The responsibility of computerites in relating morality to their profession is described.

Cottage Computing pg. 53
by Charles W. Adams
Harnessing recent and potential advances in monitoring, multi-programming and teleprocessing for a solution to the open vs. closed shop quandary is the basis for a hypothesis voiced in this article.

You Notice How No One Ever Uses Things Anymore? pg. 56
by Jackson W. Granholm
Ambiguous communications about computers and computing are lampooned in this satirical paper.

NOVEMBER

EDP Standardization pg. 25
by R. E. Utman
Progress in the field of standardization is the subject of these two articles. The first report deals with presentations at the ASA National Conference and the other describes the development of language standards.

Monster Marketing pg. 29
by Dr. H. R. J. Grosch
This two-page article deals with the problems, support and marketing of giant computers.

TRW: A Posture and Potential pg. 31
by Harold Bergstein
This five-page interview with Dr. Simon Ramo provides an insight into executive thinking of Thompson Ramo Wooldridge and presents Dr. Ramo's view of the potential of the computing industry.

Audio Technique Cuts Coding Time pg. 36
by Robert L. Patrick
An experiment to determine the feasibility of using audio means to communicate program instructions to a gp computer is the subject of this two-page report.

Computer Characteristics Revisited pg. 88
by Norman Statland
This report includes a complete, revised chart of available computer systems and their newest characteristics. Main headings feature solid-state systems, special industry computers and vacuum tube machines.

DECEMBER

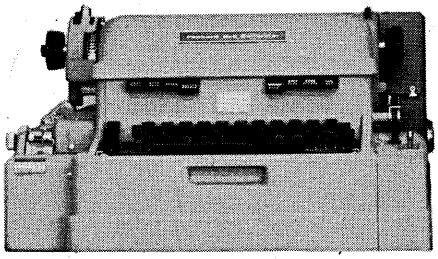
BALGOL At Stanford pg. 24
by Bob Forest
This three page article deals with the use of BALGOL on a Burroughs 220 at the Stanford University Computation Center and includes a test comparison chart of BALGOL, MAD, FORTRAN and ALTAC compilers.

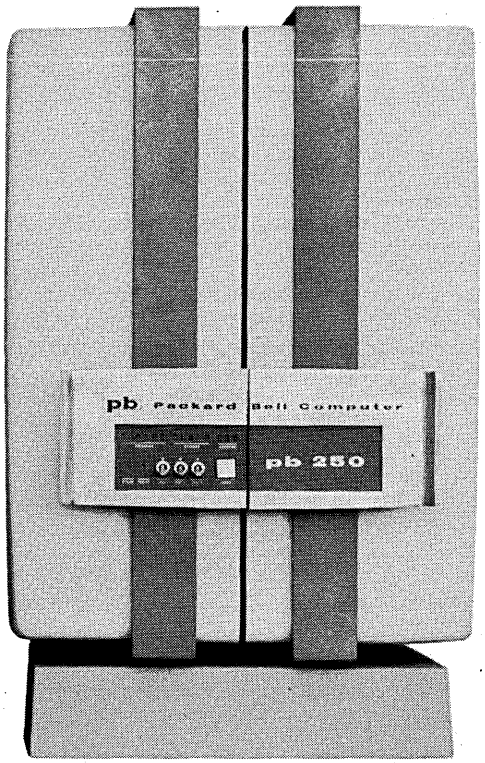
MAD at Michigan pg. 27
by Bruce W. Arden, Bernard A. Galler and Robert M. Graham
This report discusses the functions and features of MAD in use at the University of Michigan. Examples of MAD as well as comparisons to other languages are given.

Basic ALGOL pg. 29
by Daniel D. McCracken
This one-page article conveys some basic advantages and features of ALGOL 60 with FORTRAN used for comparison.

How To Make Money in Computing pg. 32
by Harold Bergstein
An interview with William C. Norris, president of Control Data Corporation, presents the current posture of and management expectations for CDC.

The Thought Process pg. 47
by P. M. Beatts
This four-page article highlights the mutual need of the fields of data processing and psychology to help one another in the achievement of a definition of "thinking."





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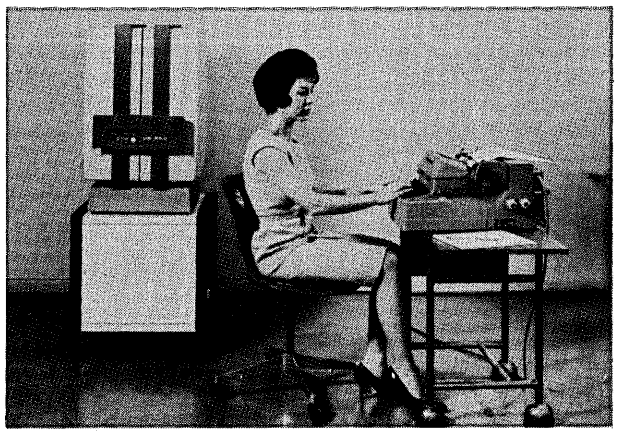

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