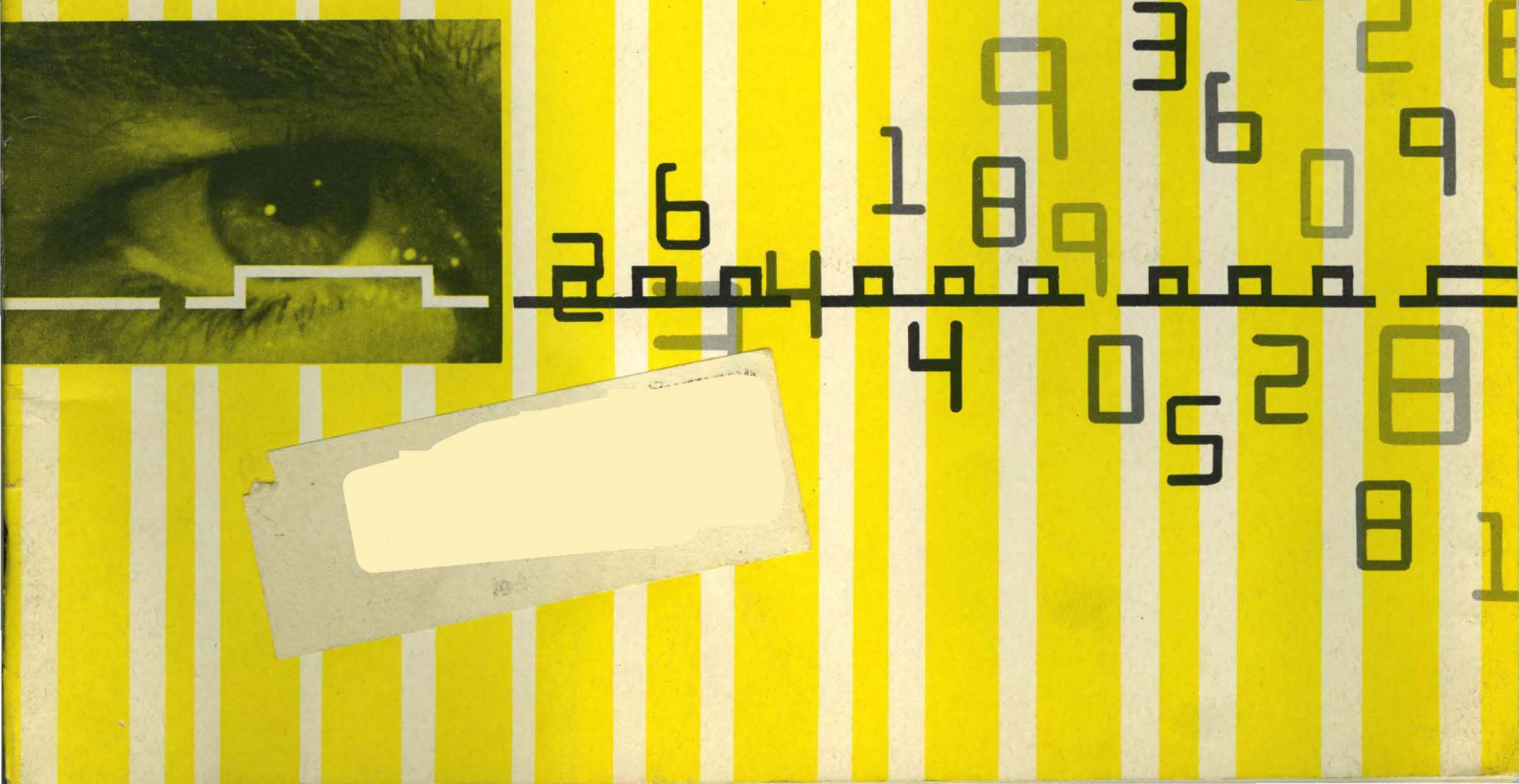
DATAMATION 61

March

OPTICAL RECOGNITION—
THE BREAKTHROUGH IS HERE



Ampex's second-generation TM-2 uses design principles already proved the hard way — *in on-site computer use.* And with these proved principles, it gives performance far exceeding any available industry standards: tape speed to 150 ips; closely controlled 2.0 ms start/1.5 ms stop times; up to 200 Kc net character transfer rate (1" tape). *Ampex* **performance standards** *set the pace in maximum system thru-put.*

Ampex — the world's largest corporation devoted solely to magnetic tape technology — has sold over 3,500 digital tape transports. Experience encompassing design, development and production of virtually every type of head and tape transport has evolved the present use-proved principles. Fifteen of the world's leading computer manufacturers specify Ampex because Ampex systems reflect unmatched knowledge and specialized experience, besides offering new industry performance standards and world-wide service. **User acceptance** *is the true measure of Ampex's contribution to maximum system thru-put.*

For TM-2 details and specifications please write:

AMPEX COMPUTER PRODUCTS COMPANY

BOX 5000 • REDWOOD CITY, CALIFORNIA

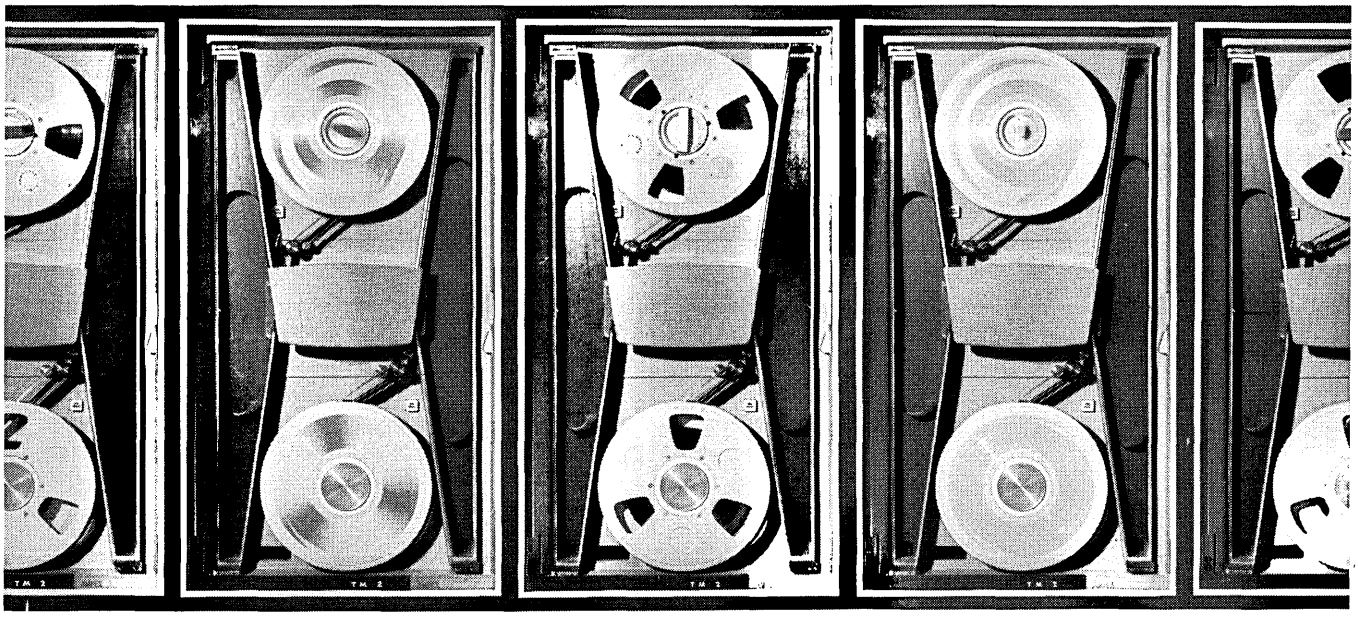
AMPEX

$$(\text{TM-2}) = \frac{Q_{max}}{\$}$$

WHERE (TM-2) = AMPEX TM-2 MAGNETIC MEMORY SYSTEM

Q = ACTUAL SYSTEM THRU-PUT

$ = MAGNETIC TAPE TRANSPORT INVESTMENT



CIRCLE 1 ON READER CARD

Mathematical computation: vital element of **S**pace **T**echnology **L**eadership

The rapid solution of ever-more complex problems is indispensable in converting physical concepts into specifications for advanced space and ballistic missile systems. Space Technology Laboratories employs the modern, high-speed digital computer as an integral part of systems engineering. At STL's Computation and Data Reduction Center, computing specialists are daily expanding the wide potential of modern computing devices, as well as solving problems arising in advanced space technology. The Center, a modern, flexible facility, has a capability including two IBM 7090's and IBM 1401 auxiliary equipment. Continuing expansion of STL's activities in this vital area now creates the need for additional specialists with B.S., M.S., or Ph.D. in Mathematics, Engineering or the Physical Sciences, and related experience. Those capable of contributing within the environment of Space Technology Laboratories are invited to contact Dr. R. C. Potter, Manager of Professional Placement and Development. Their resumes and inquiries will receive meticulous attention.

SPACE TECHNOLOGY LABORATORIES, INC. P.O. BOX 95005Y, LOS ANGELES 45, CALIFORNIA

a subsidiary of Thompson Ramo Wooldridge Inc.

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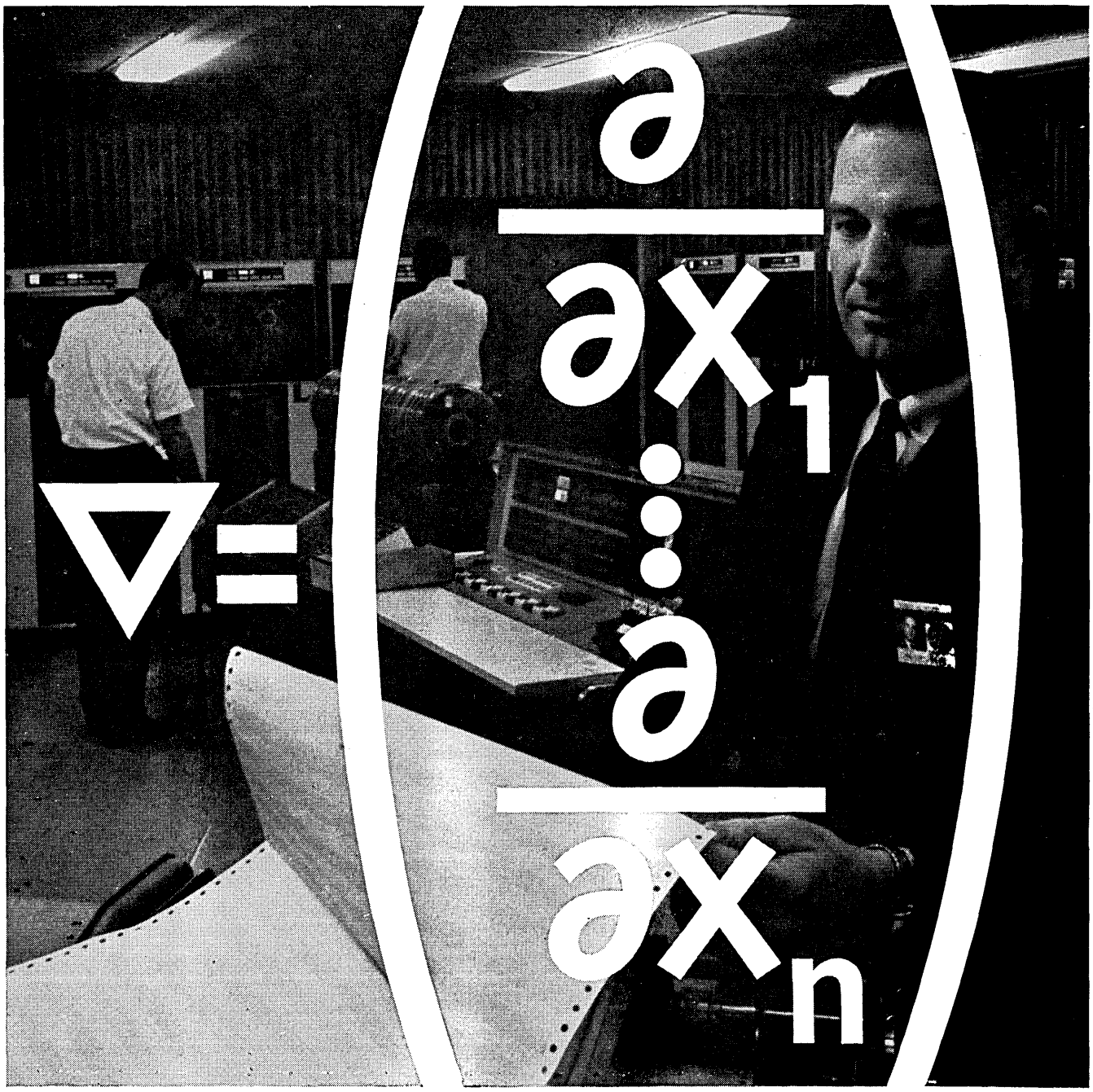
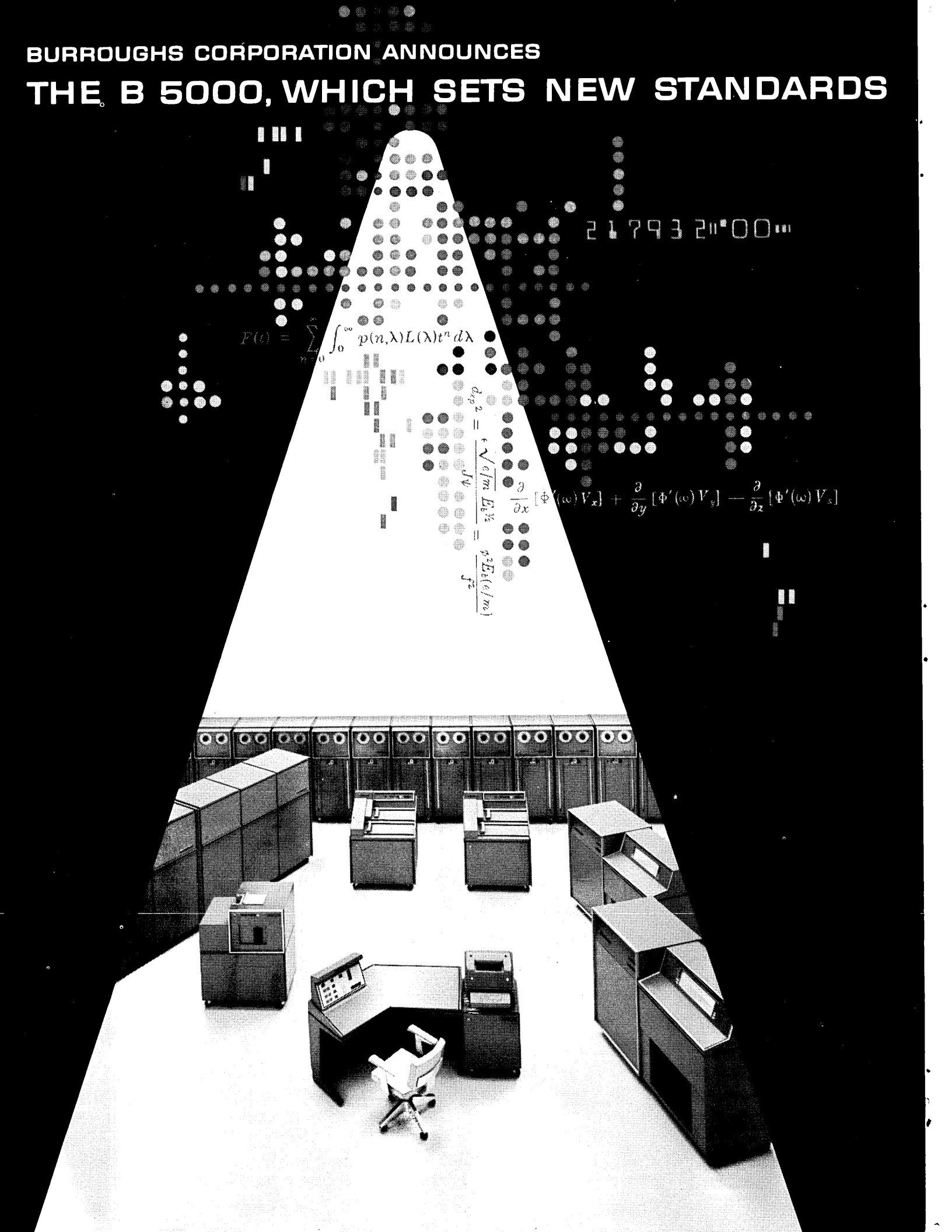


BURROUGHS CORPORATION ANNOUNCES

THE B 5000, WHICH SETS NEW STANDARDS



IN PROBLEM SOLVING & DATA PROCESSING

The new Burroughs B 5000 Information Processing System is a decided departure from conventional computer concepts. It is a problem-oriented system. Its markedly different logic and language are in large part dictated by the characteristics of ALGOL and COBOL. And it incorporates a complete set of operating, monitoring and service routines.

Additional operational features include an average add execution time of three microseconds, and a memory cycle time of six microseconds. Both character- and word-oriented, the B 5000 operates in binary *and* alphanumeric modes; a single set of arithmetic commands operates interchangeably on both fixed-point and floating-point numbers.

More important than these features is the fact that they combine with compiler-oriented logic and language to provide a new concept in computing—an integrated hardware-software system which sets:

NEW STANDARDS OF PROGRAMMING EFFICIENCY

Incorporating logic and language designed to take advantage of modern compiler techniques, the B 5000 permits straightforward, efficient translation of common-language source programs. And it brings a new high in compilation speeds—20 to 50 times faster than those possible on conventional computer systems.

NEW STANDARDS OF AUTOMATIC OPERATION

A Master Control Program, incorporating the automatic operating, monitoring and service routines, is pre-stored on a fast-access drum. It automatically schedules work according to pre-assigned priorities; allocates memory and input/output assignments; and maintains maximum-efficiency use of all components through a comprehensive interrupt system. As a result, human intervention is minimized, system efficiency maximized.

NEW STANDARDS OF PROGRAM-INDEPENDENT MODULARITY

Availability of multiple, functionally independent modules provides the B 5000 with excellent system flexibility and expansibility. The system may include one or two independent processors; up to eight core memory modules with a total capacity of 32,768 48-bit words; and one or two fast-access bulk storage drums, each with a capacity of 32,768 words. Up to four independent input/output channels control a maximum of 26 input/output units, including up to 16 standard-format magnetic tape units. Additional input/output units include card punch and reader, two types of printer, plotter and keyboard.

NEW STANDARDS OF EFFECTIVE MULTI- AND PARALLEL PROCESSING

The Program Independent Modularity of the B 5000, combined with the automatic scheduling and control features of the Master Control Program, permits multi-processing—the B 5000's normal mode of operation. The addition of a second functionally independent processor provides true parallel processing ability.

NEW STANDARDS OF SYSTEM COMMUNICATION

The new B 5000 permits simultaneous on-line/off-line operation. It features completely flexible communication among all of its units. A central processor communicates with all memory units. Any input/output channel communicates with any peripheral equipment and any memory module.

NEW STANDARDS OF THROUGH-PUT PER DOLLAR

All of these B 5000 features combine to provide an important new standard of through-put—the maximum amount of work in the shortest possible time, using the fewest possible components. The result is large-scale performance in the medium-price range.

For details in depth on the B 5000, call our nearby office. Or write for a copy of "The B 5000 Concept" to Data Processing Division, Burroughs Corporation, Detroit 32, Michigan.

Burroughs—TM

Burroughs

Burroughs Corporation

"NEW DIMENSIONS / in electronics and data processing systems"

CIRCLE 4 ON READER CARD

DATAMATION 61

the automatic handling of information

volume 7, number **3**

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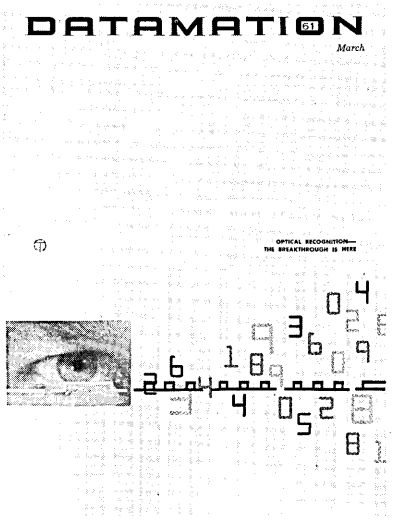
THIS ISSUE — 35,000 COPIES

Cover



". . . the production facilities of more than ten major electronics manufacturers will be required to meet the optical scanning needs of American industry," a Farrington vice president states in this issue. Special treatment of an important input medium begins on page 22.

Circulation audited by Business Publications Audit

BPA

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NBP

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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 publication at Waseca, Minn.

OPERATION CATNAP?

binary

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FETCH $\bar{R}_s$ GUSP 8269

$T_i \rightarrow SQRT(a, \frac{1}{2}[x + \frac{a}{x}/e^{\frac{1}{2}x} \text{---} \Sigma_i$

$\Diamond_{ij} \Sigma_1^m \{\Psi_i + \Delta, * \oplus\} \simeq \in \Lambda_{(eval)} / \beta LA_j \leq P_m \Phi$ --- end

--- WHAT NEXT . . : : : ↘ ‼

and

YOUR

PROGRESS?

ADVANCED PROGRAMMING
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Our client, a top company in the data processing field, has immediate openings for creative minded programmers — professionals who wish to participate in advancing the state of the art in a stimulating atmosphere. Permanent assignments exist in prime locations — East, Los Angeles, Midwest.

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QUALIFICATIONS:

Candidates must be strong technically, but primarily interested in systems applications, as the project areas involve a great deal more than just computers or hardware. Specifically, applicants must possess college degrees plus a minimum of three years of sophisticated large scale programming experience with commercial or military systems orientation.

Please submit detailed resume including salary information
All inquiries will be answered promptly and treated confidentially

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576 Fifth Avenue
New York 36, New York

11749½ Wilshire Blvd.
Los Angeles 25, California

to the editor . . .

Dear Sir:

Graham Jones apparently had a bug in his arithmetic logic when he stated in "Trends in Computer Hardware", DATAMATION, January, 1961, that today's fastest equipment (e.g. IBM STRETCH or UNIVAC LARC) could do eight years of UNIVAC I work in twenty-four hours. This infers a speed-up factor of 2920 to 1.

A consideration of execution time produces the following:

EXECUTION TIME PER INSTRUCTION (excluding I/O)	*MICROSECONDS*
1. UNIVAC I (average)	*424*
2. UNIVAC LARC (quoted)	*4*
3. IBM STRETCH (quoted)	*1*

When Input/Output effective speeds are compared, the speed-up factor is significantly less. Programs dealing with the updating of low percentage activity files (e.g., Insurance Premium Master Files) could be only 5-10 times faster when the hardware of 1961 is compared to the hardware of 1952.

By no stretch of the imagination, even considering additional core memory sophisticated instruction codes, floating point hardware, indexing, multi-programming, multi-channels, etc., can one expect to accomplish the work of a UNIVAC I on today's equipment in 1/2920th of the elapsed time.

Maybe Tomorrow!

MARTIN A. GOETZ
APPLIED DATA RESEARCH, INC.

Dear Sir:

The January 1961 *issue of "Datamation" was, as usual, quite interesting. However, I must object to the superior attitude assumed by Daniel D. McCracken in his article "The Human side of Computing." I agree that professional status should be given to "computer people," if by this unscientific expression he means scientists and technicians who work with computers.*

But in his statement on page 10, *that this professional status will be impossible to obtain "as long as anyone with ten dollars can join the ACM and proclaim himself a professional computer expert," is a slap in the face to myself and many others who have been members of the ACM for several years . . .*

Long ago I became convinced that

Electronics were going to have an important bearing on the Accounting profession and Business Administration and, as you know, my assumption has been proven correct.

Therefore, my reasons for joining the ACM and subscribing to several technical magazines are not "to proclaim myself a professional computer expert," but to learn all I could about computers and other equipment which could and will be applied to business administration, including applications to small businesses and Public Accounting offices. So much for the unwarranted attack by D. D. McCracken on myself and probably many other members of the ACM.

There is one point I wish to bring to your attention, namely, the education in the computer field. I should have said; the lack of educational facilities and on this point I agree with D. D. McCracken when he says that "we must prepare for an intensive education effort." . . .

I am sure that I am speaking for a large group of professional and business people, who would like to learn more about Automation in all its applications. Computers, I.D.P., Systems and Procedures, etc. but who do not know where to turn for this education . . .

H. C. VOORHOEVE
Accredited Public Accountant
Proud Member of the ACM
North Vancouver, B. C.

Dear Sir:

Could you answer for me the question as to what in the eyes of industry constitutes a "qualified" programmer? What education, experience, etc. are considered to satisfy the "qualified" status.

My second question is: "if an individual is not qualified unless he has four years of large machine programming experience, and industry will not hire a person with small machine experience because he is not "qualified", then how does the small machine individual ever enter the ranks of being "qualified"; how does he get the qualifying experience, if he cannot be hired unless he already has it?

These two questions pose a real problem to the individual who seeks to jump into the large machine programming area from the status of small machine programming. They amount to self-generating roadblocks to the individual desirous of making the jump . . .

JOHN J. CALLAHAN, JR.
Reading, Mass.

Design changes double power of Honeywell 400

Internal speed increased to 10,000 three-address operations a second; new independent console, FACT business compiler, optional off-line printing, more optional tape drives.

Honeywell's EDP Division has greatly broadened the application of Honeywell 400 — and extended the benefits of electronic data processing to more companies — by incorporating into this System a number of outstanding new features. These new developments, a result of Honeywell's continuous research, have further enhanced the pre-eminence of Honeywell 400 in its class. And, except for the new optional features, *there has been no increase in cost.*

Internal speed jumps — The internal speed of the Honeywell 400 is now approximately 10,000 three-address operations per second — the equivalent of 20,000 one-address operations. Multiplication is about twice as fast as before, and division about four times as fast. Multiply time for a six non-zero digit multiplier is 1.9 milliseconds. Division times range from 1.6 to 8.6 milliseconds.

FACT business compiler available — Now, in addition to the EASY assembly program, the FACT compiler is available with Honeywell 400. FACT, a widely acclaimed, highly efficient automatic programming system, is unique in that it can be applied to *all* typical functions of business data processing with ease and uniformity. This includes input editing, sorting, processing of variable-length records, and report writing.

New independent console — Included in the basic system price of $8,660 a month is a new independent console equipped with a keyboard, printer, and breakpoint switches. This new console enables Honeywell 400 operators to communicate more easily with the System.

Optional off-line printing — Now organizations such as public utilities and insurance companies can print bills or premium notices in huge volume without attenuating the important processing work going on inside their Honeywell 400.

An off-line printing configuration consisting of a printer, high-speed magnetic tape unit, and electronic control equipment is now available at a rental of $3,500 per month.

More tape drives may be connected — The maximum number of magnetic tape units which may be used with the Honeywell 400 has been increased from six to eight. (Basic system includes four tape units.)

Expansion now easy, economical — By vastly increasing the processing power *without increasing the price,* and by making new optional equipment available, the new Honeywell 400 gives users power to spare for the years of growth ahead. It also makes easy and economical the possible future jump to Honeywell 800, the most powerful of all computers in the Honeywell family.

The outstanding performance of Honeywell 400 in the areas of storage and high-speed manipulation of large volumes of data make it exceptionally efficient at sorting and file maintenance.

SUMMARY OF KEY FEATURES

Basic package: Includes central processor, four high-speed magnetic tape units, console and console printer, high-speed printer and card reader.

Price of basic package: Monthly rental — $8,660 per month. Price — $390,000.

Options: Various input-output devices including off-line printing, up to four additional tape units, card punch (100 or 250 cards per minute), paper tape input and output units.

EQUIPMENT SPECIFICATIONS

CENTRAL PROCESSOR:	
Speed	10,000 (approx.) 3-address operations per second.
Memory	1,024 words of core memory (approx. 10,000 characters).
Checking	Internal parity checking.
Features	Simultaneous read-write, special automatic editing provisions, high-speed sorting ability.
Options	Multiply-divide, print storage for simultaneity with other operations, additional memory.
MAGNETIC TAPES:	
Speed	96,000 decimal digits per second.
Features	Identical to Honeywell 800 tape units. Orthotronic Control (automatic error detection and correction).
PRINTER:	
Speed	900 lines per minute.
Horizontal span	120 columnar positions.
Features	Up to 10 clean carbons, rugged construction, fully checked.
CARD READER:	
Speed	650 cards per minute.
Feature	Fully checked.
CONSOLE:	
Features	Printer and keyboard for both input and output, breakpoint switches.
AUTOMATIC PROGRAMMING AIDS:	
	EASY Assembly Program.
	FACT Business Compiler.

If you have any questions about this new and more powerful Honeywell 400, just write Honeywell EDP, Wellesley Hills 81, Mass. Or Honeywell Controls Limited, Toronto 17, Ontario.

Honeywell

Electronic Data Processing

CIRCLE 7 ON READER CARD

In Computer Applications, you need PRECISION ...and that's the word for ARNOLD BOBBIN CORES

For use in shift registers, coincident current matrix systems, pulse transformers, static magnetic memory elements, harmonic generators and similar equipment, Arnold Bobbin Cores meet the most exacting requirements.

Quality and uniformity? *You'll find them no problem*—because, as a fully integrated producer with highly modern facilities, we're able to maintain close control over every step.

Arnold Bobbin Cores are available in a wide range of sizes, tape thicknesses, widths and number of wraps. Magnetic materials usually employed are Deltamax and Permalloy, in standard gauges of 1, ½, ¼ and ⅛ mil, in widths from 1/32" through ¼". Core properties include quite rectangular hysteresis loops, relatively low coercive values and high saturation densities, plus the ability to shift in a few micro-seconds from negative remanence to positive saturation, and vice versa, under conditions of pulse excitation.

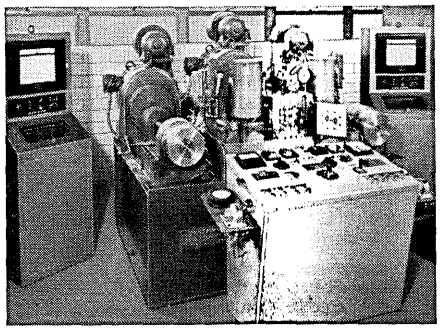
Let Arnold supply your requirements for Bobbin Cores—or other tape-wound cores, powder cores, permanent magnets, etc.—from the most complete line of magnetic materials in the industry. ● Just address *The Arnold Engineering Company, Main Office and Plant, Marengo, Ill.*

ASK FOR BULLETIN TC-108A

Includes essential data on applications and properties, fabrication and testing of Arnold Bobbin Cores; lists standard sizes, etc.

ADDRESS DEPT. D-3

CIRCLE 8 ON READER CARD



Ultra-thin tape for bobbin cores is rolled to high precision standards for thickness and finish on our own 20-high Sendzimir cold reducing mill, beta-ray controlled.

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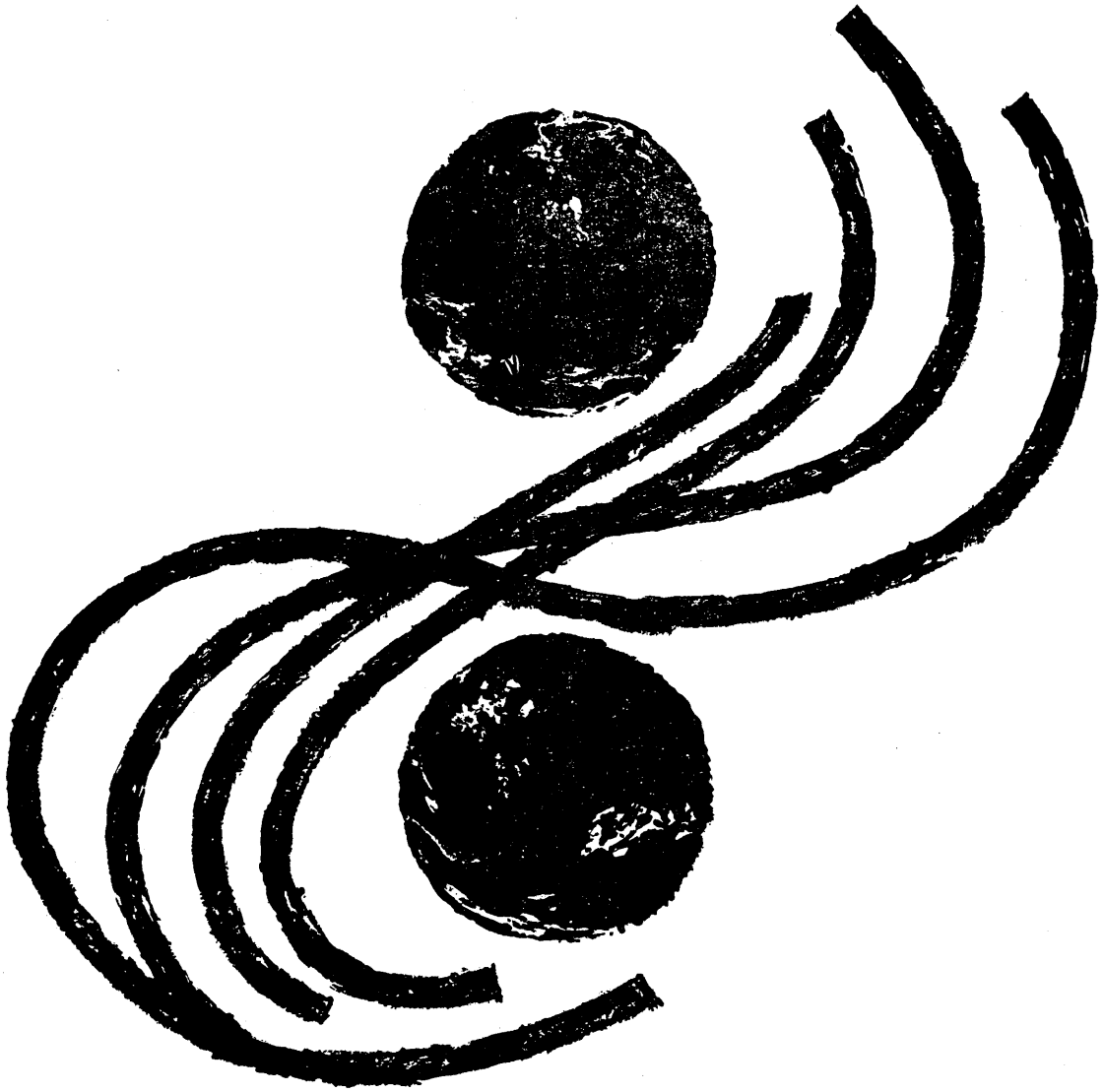


Said Johann Kepler: *"The planets move in elliptical orbits about the sun; and the square of their periods of revolution are proportional to the cube of their mean distances from the sun."*

With interplanetary voyages fast becoming a reality, complete information regarding the velocity requirements for travel between planets is of vital importance. With these data available, it is possible to analyze propulsion requirements, plan ultimate system configurations, and conduct feasibility studies for any particular mission.

Lockheed Missiles and Space Division scientists have actually evolved a rapid-calculation method, utilizing a high-speed computer. This has produced literally thousands of orbits, velocity requirements, and elapsed time, for design studies of trips to and from both Mars and Venus—every tenth day from now until January, 1970.

More simple to analyze are many factors which make Lockheed Missiles and Space Division a wonderful place to live and work. Located in Sunnyvale and Palo Alto, California, on the beautiful San Francisco Peninsula, Lockheed is Systems Manager for such programs as the DISCOVERER and MIDAS satellites and the POLARIS FBM. These, together with research and development projects in all disciplines, make possible a wide diversity of positions for creative engineers and scientists in their chosen fields.

Why not investigate future possibilities at Lockheed? Write Research and Development Staff, Dept. M-14 B, 962 West El Camino Real, Sunnyvale, Calif. U.S. citizenship or existing Department of Defense industrial security clearance required.

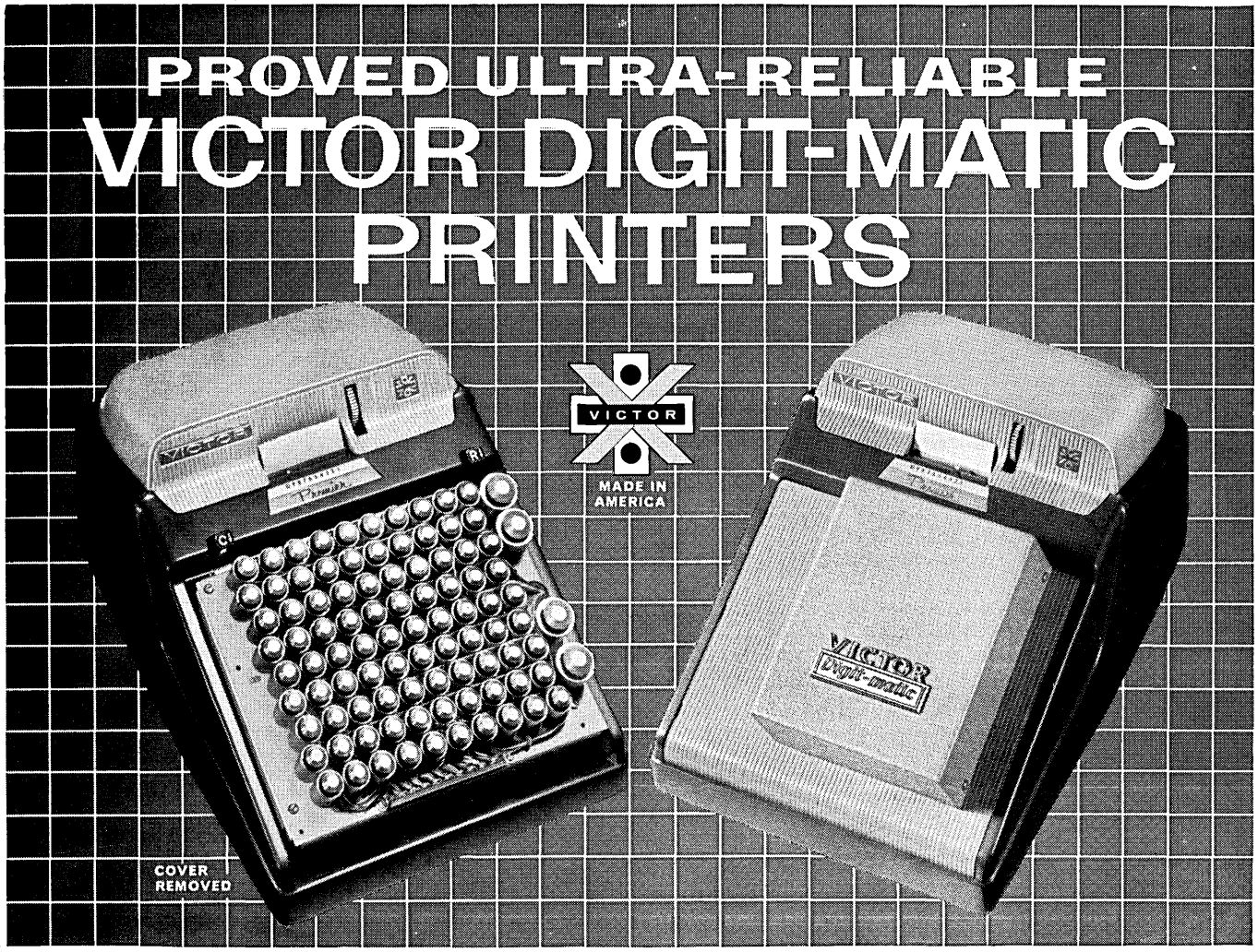
Lockheed / MISSILES AND SPACE DIVISION

Systems Manager for the Navy POLARIS FBM and the Air Force AGENA Satellite in the DISCOVERER and MIDAS Programs

SUNNYVALE, PALO ALTO, VAN NUYS, SANTA CRUZ, SANTA MARIA, CALIFORNIA • CAPE CANAVERAL, FLORIDA • HAWAII

When responding, a mention of DATAMATION would be appreciated.

PROVED ULTRA-RELIABLE VICTOR DIGIT-MATIC PRINTERS



160,000,000 digit impressions without failure

Rugged, Trouble-Free—Digit-Matics are specially built to stand the strain of continuous operation. In a durability test, over 160 million digit impressions were made without breakdown or need of adjustment. The machine tested operated continuously, eight hours per day until 160 million digit impressions were made. During this period only normal lubrication and cleaning were performed.

Parallel or Serial Entry — Automatic and unattended, solenoid-activated Digit-Matics print out alpha-numeric data from remote equipment. High speed parallel entry models accept up to 10 digits at a time, print up to 4 lines per second. Serial entry models accept 1 digit at a time, up to 11 per line.

Two-Color Printing — Positive values in black, negative values in red. Ideal for "accept-reject" sequences, testing applications, accumulating data from two sources on one Digit-Matic, and many other uses.

Adaptable to Your Specific Needs — Line includes listers, accumulators and calculators. Versatile units can handle degrees, minutes, seconds, fractions. Other modifications: superimposed keyboard for manual use, time readings, counters, etc.

Immediate Field Service — 70 factory service branches and service representatives in over 600 cities assure uninterrupted operation. Victor offers 30-day delivery on most Digit-Matics. Mail coupon now for product data and application information.

VICTOR

ELECTRONICS DIVISION

Victor Adding Machine Co., Chicago 18, Illinois
Victor Adding Machine Co., (Canada) Ltd., Galt, Ont.

Manufacturers of Digit-Matic Printers, Scanning Printers, Electrical Keyboards, and Digit-Matic Data Punches

D-3

Victor Adding Machine Co.
Chicago 18, Illinois
Send full information on Victor Digit-Matics.

My application is_____

Name_____ Title_____

Company_____

Address_____

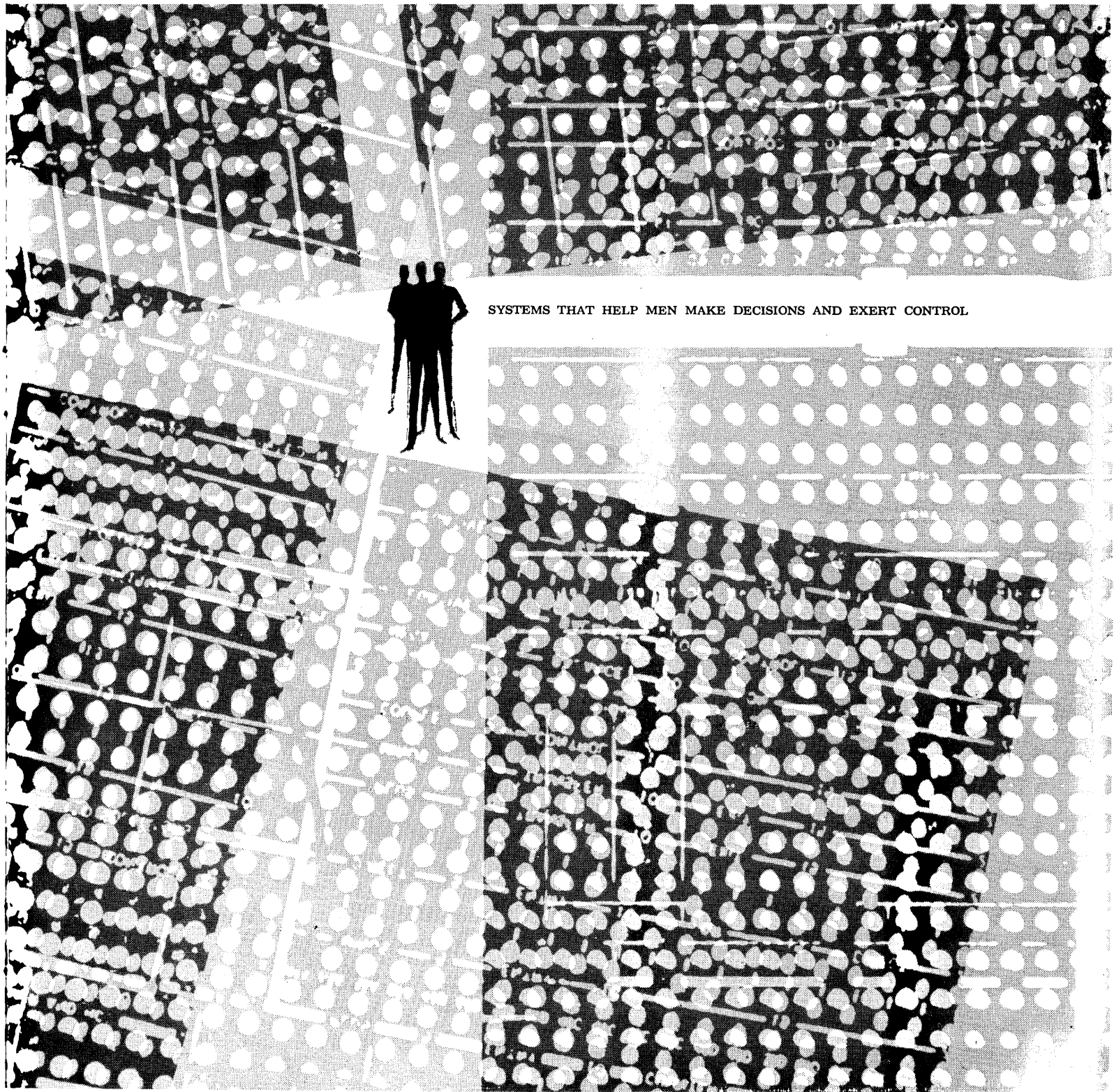
City_____ State_____

CIRCLE 10 ON READER CARD

CIRCLE 71 ON READER CARD →

Today's governmental leaders and military commanders must cope with vast amounts of information in controlling continental and world-wide forces. To master the maze of facts involved in their decisions and control, command groups make use of systems which provide automated information-processing assistance. Developing these systems is our work at System Development Corporation. □ We have two new, extremely large systems in their first stages of development. In addition, we are a major contributor to the SAC Control and SAGE Systems. Our chief concern is with the analysis and synthesis of such systems, training men for their use, instructing great computers on which these systems are based – and research into future generations of these systems. □ We have created a close interdisciplinary science in system development consisting of Computer Programming, Engineering, Human Factors and Operations Research. Those who wish to contribute to the development of these systems are invited to write Mr. R. L. Obrey, 2401 Colorado Avenue, Santa Monica, California, concerning new positions in our expanding programs at Santa Monica, Calif., Washington, D. C., Paramus, N. J.

SDC



SYSTEMS THAT HELP MEN MAKE DECISIONS AND EXERT CONTROL

IBM, RCA, GE MOVE TOWARD CONTROL FIELD

Three of the information processing industry's leading firms seem to have decided that the grass in the control field is green enough for cutting and are moving up their big mowers with hopeful hearts. IBM, RCA and GE say they have plans and will travel.

General Electric announced formation of an industrial process control computer business to be part of the Industrial Control Dept. GE control computers had been manufactured and marketed by the Computer Dept. but the company undoubtedly feels the growth potential is great enough in both the IP and control fields to warrant the spin-off. R. C. Berendsen has been named general manager of the process computer activity. The Computer Dept. and the new operation will continue to function in Phoenix.

RCA says demands for their control computers and devices have outstripped estimates. "The industrial computer control business is expanding," says an official, "and we are taking the necessary steps to grow with it." Initially, the "steps" include an additional 10,000 sq. ft. to double manufacturing and testing space at Natick, Mass. RCA's Industrial Computer Systems Dept. is currently producing the 110 computer, the 130 information transmission link and other equipment.

IBM has announced transfer of the process control systems program to the General Products Division Development Laboratory in San Jose, Calif. from Peekskill, N. Y. The San Jose installation will develop and manufacture "systems (which) provide the direct physical connection between systems hardware and a customer's process," a release reads. Meanwhile, IBM and Du Pont have, for some time been involved in a joint research program to investigate advanced concepts of computer control systems.

The above information is undoubtedly not news to firms already producing general and special purpose process control machines and the whole picture adds up to a hot, competitive computer race in the plants, refineries and factories.

GEN. DYNAMICS FORMS NEW ELECTRONICS DIV.

General Dynamics/Electronics is a new division in the parent corporation which will provide a means of consolidating electronic activities formerly spread among many divisions. Stromberg-Carlson, San Diego, will now be known as Information Technology Division of General Dynamics/Electronics.

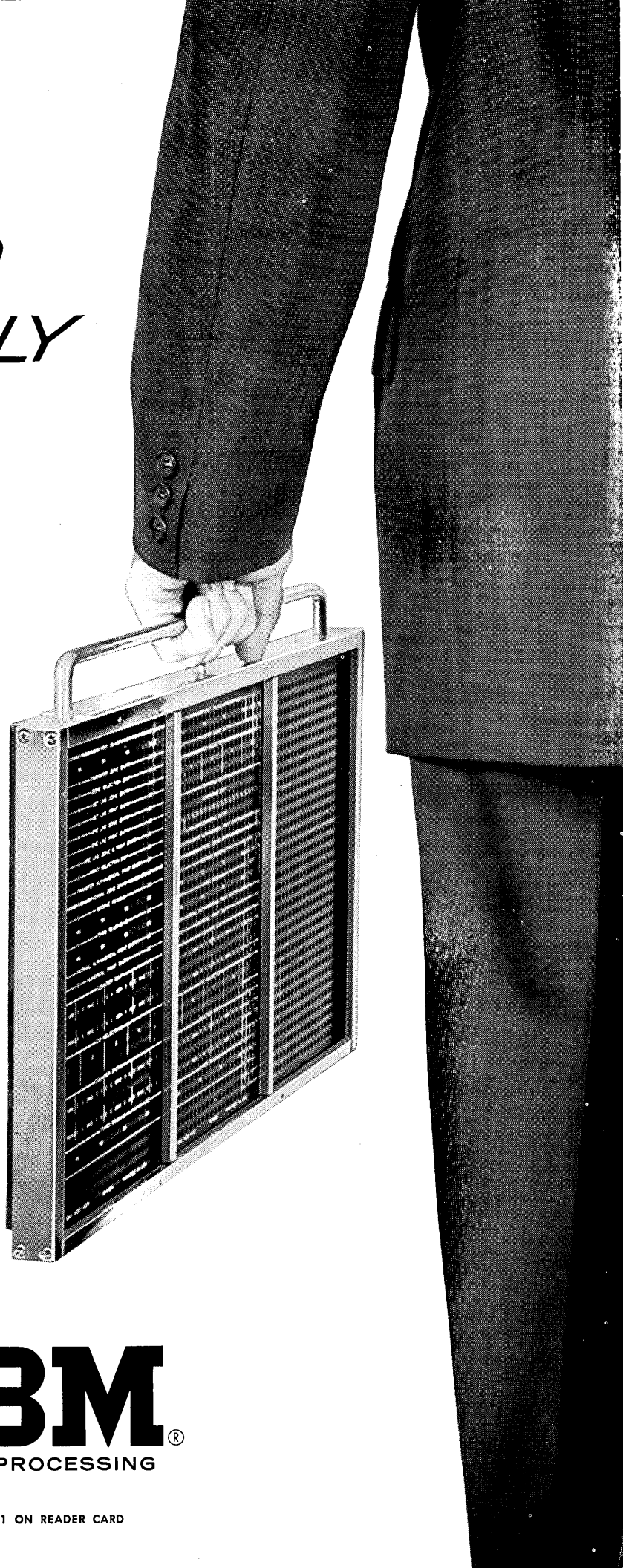
SDC'S 2000 WILL BE ON AIR MAY 9TH

The Philco 2000 which System Development Corp. is purchasing will probably be delivered before May 1 and will be installed and on the air in time for the Western Joint Computer Conference beginning May 9. The machine, which will be used primarily by SDC's Systems Simulation Research Laboratory, will be fully operational by September. An SDC-developed realtime input/output transducer, the RL-101, will be available with the system.

Now...IBM Control Panels

DELIVERED IMMEDIATELY

..from your local IBM office



NOW . . . IBM CONTROL PANELS are available at all of our 192 branch offices. A phone call . . . and your panel literally comes off the shelf to meet your emergency need.

Call With Confidence . . . because IBM alone carries the complete line of control panels.

Behind The Panel . . . is IBM's liberal trade-in policy. In addition, IBM control panels may be returned for credit if obsoleted by the installation of a more advanced IBM system.

With The Panel . . . you get IBM quality and engineering know-how . . . and, most important, IBM service. This service is provided by men with an intimate knowledge of your IBM equipment and systems . . . so they can be genuinely helpful on panel problems.

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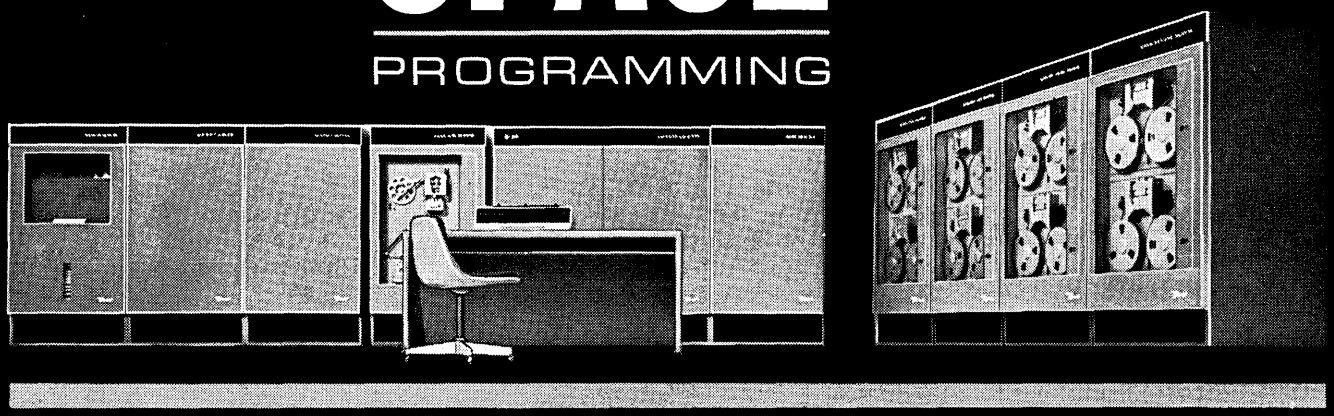
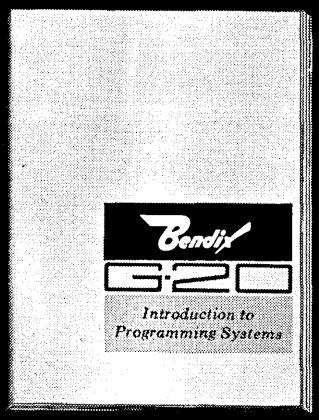
BENDIX
G-20 COMPUTER
'SPACE'
PROGRAMMING





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← CIRCLE 12 ON READER CARD

CIRCLE 13 ON READER CARD

1961 IMPORTANT DATES

• The IRE National Convention will be held at the New York Coliseum and the Waldorf-Astoria Hotel, New York City, March 20-23, 1961.

• The annual meeting of POOL, the LGP-30 and RPC-4000 computer users group, will be held on March 27-30, at the Jung Hotel, New Orleans.

• The annual meeting and Convention of the National Microfilm Association will be held April 4-6, 1961 at the Hotel Sherman in Chicago, Ill.

• The 7th meeting of CO-OP, the 1604 user's organization will be held at the Shoreham Hotel, Washington D.C., on April 12-13.

• The Cincinnati Section of the IRE and the Southern Ohio Section of the ARS will hold its 15th Annual Spring Technical Conference April 12-13 at the Hotel Alms in Cincinnati. For information contact R. P. Schlemmer, Engineering Specialties, 8115 Camargo Rd., Madeira. Cincinnati 42. O.

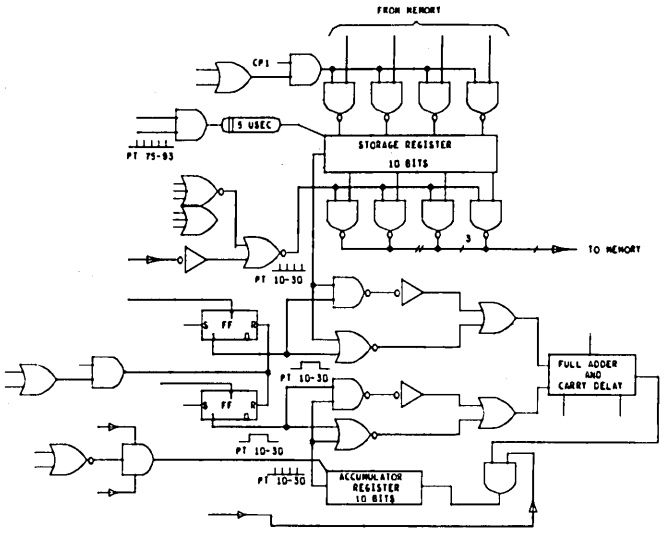
• The UNIVAC users association Spring Conference is scheduled for the Statler Hilton Hotel, Los Angeles, April 13-14. For information contact Donald Houghton, Secretary, UNIVAC Users Association, Westinghouse Electric Corp., 3 Gateway Center 15-West, Pittsburgh 22, Penna.

• The USE Meeting will be held in El Paso, Texas, April 18-21, 1961. For information contact James W. Nickitas, 315 Park Ave., N.Y.C.

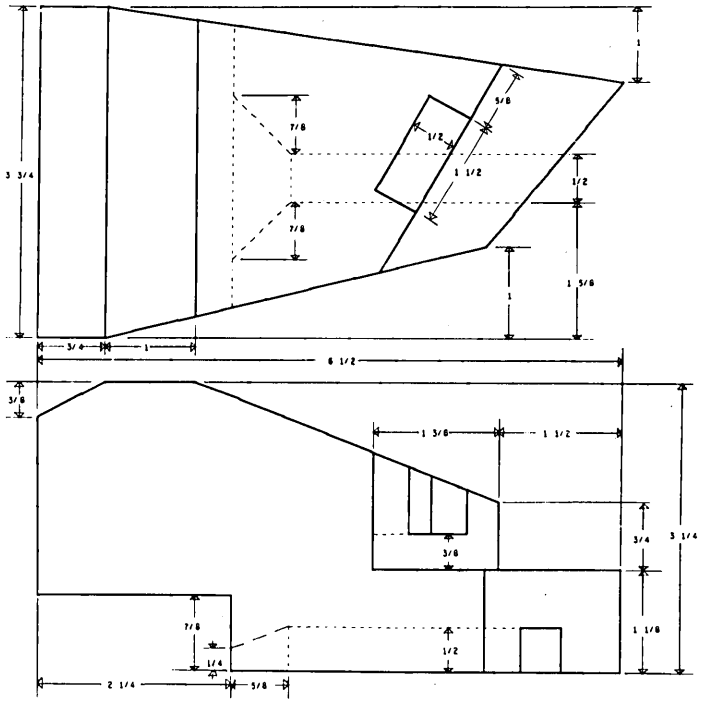
• The 5th CUE Meeting will be held in April, 1961 in Chicago, Ill.

• TRANSAC Users Group Meeting No. 8 will be held in Hartford Conn., in May 1961.

• The Western Joint Computer Conference is scheduled for Los Angeles' Ambassador Hotel, May 9-11, 1961. For information contact Dr. W. F. Bauer, Ramo-Wooldridge Co, 8433 Fallbrook Ave., Canoga Park, Calif.



Actual drawings produced by the S-C 4020 High-Speed Microfilm Recorder



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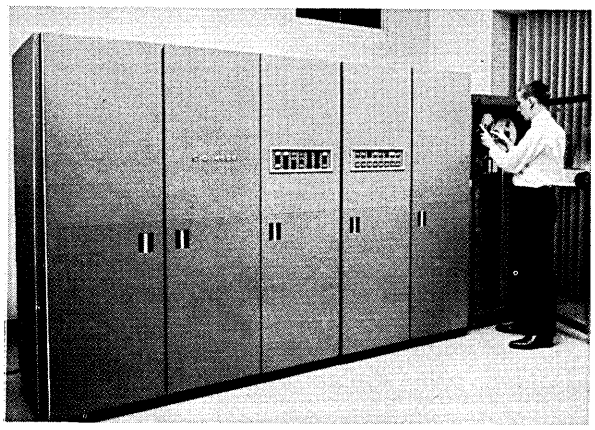

The S-C 4020

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A computer is programmed with the contours and specifications of the part to be designed, using APT (Automatically Programmed Tool) language. The computer operates the S-C 4020 Recorder which makes multi-view mechanical drawings of the part in a fraction of a second. After the drawings have been checked, output of the computer can be used to operate a numerical control tool and produce the part. Capabilities of the S-C 4020 include recording data on microfilm at 17,500 points per second, plotting graphs on microfilm at 12,500 points per second, recording complex logic circuit drawings, tabular printing and forms projection. Write for more details to Stromberg-Carlson-San Diego, Dept. B-20, P. O. Box 2449, San Diego 12, California.

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A DIVISION OF **GENERAL DYNAMICS CORPORATION**

COBOL'S LOT — BOTTLENECKS & BRICKBATS

A discussion of COBOL is hardly ever a casual thing. It would be difficult to think of another topic in the field of information processing which can evoke as much controversy and wrath. (ALGOL debaters operate on a scientifically high level.) Rarely is such a discussion an organized thing. The COBOL picture changes faster than you can turn a kaleidoscope.

DATAMATION has long since abandoned the thought of taking a firm COBOL stand because, frankly, we wonder if anyone really knows what, if anything, is wrong and what can be done about it.

We have therefore decided to restrict ourselves here to asking a few loosely connected questions and volunteering a few limited observations . . . all of which will undoubtedly stimulate an enthusiastically unfavorable response from both pro- and anti- COBOL groups.

Could the whole effort have been better organized from the start? After reviewing the short but stormy CODASYL record, one is forced to answer in the affirmative. But who except the DOD came forward? Where were the professional societies? The manufacturers' groups? The user groups? Where was the National Joint Computer Committee?

Has CODASYL handled things well? Perhaps as well as could be expected. But why were deadlines set and hardly ever met? Why were some manufacturers so closely identified with the CODASYL executive committee so early in the game? Why were so many reasonable ideas summarily rejected? And why were the manufacturers allowed to use COBOL in advertising and press releases almost before it even existed and certainly before there was any sign that it could ever become a truly common business language?

On the other hand, we can ask if all opposition to COBOL has been reasonable and if all opponents have the best interests of the industry at heart. For whatever else might be said, CODASYL is trying to come up with a business language which will allow easy communication between computers of different make.

Are manufacturers who oppose COBOL attempting to protect their own compilers developed after a tremendous investment in money and man years? Do users opposing COBOL see it as some kind of a threat to their secure and highly specialized positions? And could it be possible that there are some manufacturers who are somewhat less than enthusiastic about seeing a Great Equalizer, in the form of a common language, enter the competitive scene?

What lies ahead for COBOL is also in question. The fact that the language's chief architects still make a "Required COBOL" and an "Elective COBOL" distinction sits none too well with prospective users. For to some this still means "Adopt what you like and what is best for your machine and reject the rest."

In the midst of this rippled picture, a group has proposed that the Data Processing Group of OEMI sponsor the COBOL effort as a full time assignment. Even should CODASYL agree, when one considers the loaded political factors, the still-hot controversy, the rumors of legal action by some manufacturers against CODASYL and, generally, the quantity of water over the dam, we can expect an extremely careful decision.

OPTICAL RECOGNITION

THE BREAKTHROUGH IS HERE

AN AMERICAN STANDARD for optical character recognition covering numeric font and printing specifications is being developed. Progress on this project was reported by Brian W. Pollard, chairman of the American Standards Association Subcommittee on Character Recognition Standards (X3-1). The Subcommittee's schedule for completion of its work is the end of 1961 and it will submit a recommendation for an American standard to the ASA in early 1962.

The Character Recognition Standards Subcommittee is concerned with developing printed character sets – a numeric or alpha-numeric font – that can be read or recognized by the average person without special knowledge or prior instructon. The character sets also must be capable of being recognized, identified, and utilized by data processing systems.

In developing methods of reading such a font by machine, the Subcommittee is concentrating on the "optical method." In this method, a character is scanned by a beam of light and the reflected light, whose intensity varies, is detected by a light-sensitive device and converted into electrical wave shapes. These waveforms, in turn, are analyzed and converted into signals appropriate to the data processor.

In exploring optical character recognition, Subcommittee X3-1 has three task groups in action to determine: a suitable font or fonts; printing requirements and printer capabilities; format and applications. A total of 48 representatives from 18 companies are active in this work.

The data processing industry – because of its youth and its amazing rate of growth – probably has one of the most difficult standardization problems of any of the technological industries. There is no firmly established hard core of practice and experience from which standards may be derived. Standards, therefore, must evolve concurrently with the development of techniques and with the determination, by practical experience, of what the user of data processing equipment desires.

As in many areas of data processing, the principal problem in character recognition is not the technical "how" but the economic "how." To determine the economic "how," it is essential not only to explore the best techniques for today but to develop techniques which will lead to the best methods in the future. In attempting to determine standards, great care must be taken not to burden one part of the total system so heavily that it becomes uneconomic. For example, it would be possible to specify type standards so loosely that virtually every known printing mechanism could achieve these standards, but the cost of a reliable reader would almost certainly be impractically high. On the other hand, type standards could be set so high that it would not be difficult to design a low-price reader. In such a case, however, very precise and expensive printing mechanisms would be required. To evolve a satisfactory standard, detailed analyses must be made so that the resulting standard will permit adequate performance – reli-

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ASA Subcommittee on Character Recognition Standards (X3-1)

INDIVIDUALS INVOLVED in the X3-1 work are listed below. Names of the chairmen and secretaries of the subcommittee and the three task groups and the scope of each of these bodies are included.

X3-1 CHARACTER RECOGNITION

Chairman: Mr. Brian Pollard, Burroughs Corporation

Secretary: Mr. George L. Fischer, Jr., Farrington Electronics, Inc.

Scope: Input and output media to data processing systems for interchange of information between data processing and associated equipment.

Members: C. W. Allen, IBM Corporation; A. M. Angel, National Cash Register Co.; C. T. Deere, Addressograph-Multigraph; R. W. Green, Standard Register Company; C. C. Heasly, Jr., Farrington Electronics, Inc.; G. A. Hedden, Jr., Briggs Associates, Inc.; Brooks Lyman, Pitney-Bowes, Inc; G. M. Miller, General Electric Company; W. L. Poland, Remington Rand Univac; Bernard Radack, Department of Defense; F. J. Rex, United Shoe Machinery Corp.; A. A. Sargent, Moore Business Forms, Inc.; I. M. Sheaffer, Jr., Burroughs Corporation; H. F. Sherwood, Touche, Ross, Bailey & Smart; William Smith, UARCO, Inc.; R. A. Wallace, Radio Corp. of America.

X3-1 TASK GROUP 1 FONT DEVELOPMENT

Chairman: Mr. I. M. Sheaffer, Jr., Burroughs Corporation

Secretary: Mr. F. C. Schiller, National Cash Register Company

Scope: Font Development, measurements, specifications and terminology.

X3-1 TASK GRP. 2, PRINTING

Chairman: Mr. A. M. Angel, National Cash Reg. Co.

Secretary: Mr. A. A. Sargent, Moore Business Forms

Scope: Tabulation of printer data, determination of means of copying samples for evaluation and discussion, establishment of printing capabilities and parameters of applicable printing devices in conjunction with transfer media and machine techniques.

X3-1 TASK GROUP 3 APPLICATIONS AND FORMAT

Chairman: Mr. H. Sherwood, Touche, Ross, Bailey & Smart

Secretary: Mr. Frederick J. Rex, United Shoe Machinery Corporation

Scope: Statement of retail requirements and priorities; evaluation of other applications for similarity and differences; identifications of various types of format.

TYPE FONTS FOR
OPTICAL CHARACTER RECOGNITION

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In working toward standardizing on a single type font, Farrington, IBM, NCR, RCA, Remington Rand, Burroughs and General Electric have submitted the existing and proposed fonts shown above. Each font is presented in its actual size.

ability, general appropriateness of characteristics, speed – at minimum cost.

Studies being made by Subcommittee X3-1 will result in basic concepts which will permit the development of overall Optical Character Recognition systems which are well-balanced; that is, they will not demand excessive standards of performance from any one unit in the system.

criteria established

Criteria for beginning design on a numeric-symbol font were established at an X3-1 meeting held in San Francisco on February 14 and 15. Application areas have been expanded from two (retail and government) to nine. The seven added are finance, transportation, utilities, manufacturing, insurance, petroleum, and communications. A decision has been made to use the following criteria in the design of character shapes:

(a) Characters will be constructed on a 5 by 9 grid.
(b) Characters will have uniform width.
(c) Characters will have strong right edges.
(d) Characters will contain a minimum of serifs and non-critical radii.
(e) They will be usable with 10 per inch printing.
(f) They will be restricted to two sizes and in proportion.
(g) Abstract symbols will be unaltered by 180° rotation and will not resemble alphabetical characters.
(h) Strokes of each character will be uniform and critical horizontal and vertical strokes will not occur in adjacent matrix rows or columns.

Discussing the full implication of standardization in the field of character recognition, Subcommittee Chairman Pollard explained, "By developing standards, the data processing industry will have a base from which to develop the wide range of equipment needed to meet the requirements of the users. At a time of critical technical manpower shortage, the industry will avoid unnecessary duplication of effort in the determination of basic parameters and concepts. By standardization, it will be possible for equipment manufactured by the various companies to communicate with one another. Technical progress will be speeded up and there will be less likelihood of equipment being made obsolete by major changes in basic concepts. Thus, by adequate industry-wide planning for accepted standards, we could look to a steady and economic evolution of the requisite data processing systems."

The American Standards Association data processing standardization programs are sponsored by the Data Processing Group (DPG) of the Office Equipment Manufacturers Institute. Actively engaged in industry standardization activities, the Data Processing Group – composed of 22 member companies in the data processing industry – devotes itself to the dissemination of non-competitive information on new or improved methods and equipment.

the big one!

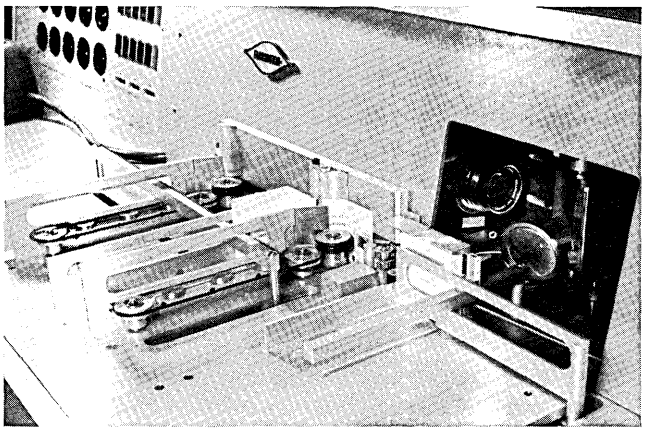
FARRINGTON HAS OPTICAL SCANNING LEAD

by VIN WENTWORTH,
Farrington Electronics, Inc.

BY THE END of 1961 electronic character recognition will have become a key tool in the accounting procedures of many major utility companies.

The experience of Atlantic City Electric Company, Arizona Public Service Company, New York Telephone Company and Ohio Bell Telephone Company, first to adopt scanning as an integral part of their data processing machinery, has led five more large utility companies to order the installation of Farrington Optical Scanners this year.

The new lessees are: Detroit Edison, Commonwealth Edison of Chicago, Cleveland Electric Company, Southern California Edison and Consumer Power Company of Jackson, Michigan.



Another major market to be breached in the coming months is the insurance industry. To speed the handling of premium stubs in much the same manner as utility bill stubs are processed, Mutual Benefit Life Insurance Company, Newark, New Jersey, St. Paul Fire and Marine Insurance Company, Northwestern Mutual Life Insurance Company, Milwaukee, Wisconsin., Mutual Life Insurance Company of New York and the Franklin Life Insurance Company, Chicago, Illinois, will receive early delivery of the Farrington equipment.

Some of these firms will obtain advanced models able to read agents' identifications, commission rates, due rates and other statistical information codes in addition to policy numbers and amounts due.

This impressve roster, however, represents only a scratching of the surface. **It is my firm belief that in the foreseeable future the production facilities of more than ten major electronics manufacturers will be required to meet the optical scanning needs of American industry.**

The state of the art of character sensing has progressed to the point where we can safely declare that the automation loop can now be closed. Optical scanning is a practical reality.

So much has been written and said on the subject of theoretical optical character recognition that it is important to emphasize that the techniques used in Farrington Optical

Scanners were first tried out in the secure confines of the laboratory before being put to the test in field installations. Field experience has enabled us to improve some aspects of these techniques and forced us to discard others. However, it has been conclusively proved that the basic techniques we started with ten years ago were sound. They have stood up under the wear and tear of daily use.

how does optical scanning work?

When a document is presented to the scanner (see fig. 1) the image of a numeric or alphabetic character on the document is illuminated. The optical system picks up the image and projects it upon a disc, which is rotating at a speed of 10,000 RPM.

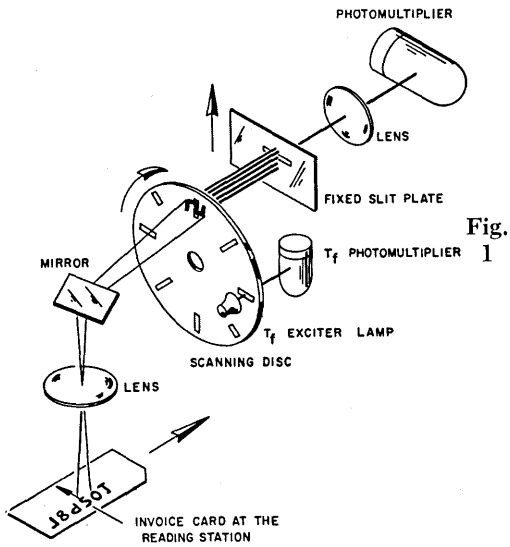


Fig. 1

The radial slits in the disc allow only a portion of the character to get through to the fixed plate at any one time. This fixed plate, in turn, can contain one or more slits which allow only a segment of the image, or light energy, to bombard the photoelectric cell which converts the light segments into electronic pulses.

The motion of the document or the sweep of the optics and the rotation of the disc gives us two directions in order to scan the entire character, the entire word, and the length of the line of information.

The problem of character recognition is not merely the problem of character shape identification. Were this true, many of the character recognition schemes advanced in the past might have been practical.

Shape recognition is only part of the problem. It must be taken into account that typewriters, adding machines, cash registers, bookkeeping machines, etc., are not notably precise in their rendition of intended character shapes. Highspeed printers often sacrifice legibility for rate of output.

All computers users – in any industry – are trying to minimize their input problem, either by using input devices which produce input media as close to the point of origin as possible (i.e. gasoline station credit card imprinters) or by creating output documents which may later be used in the input process – so-called "turnaround" documents, prepared by highspeed business machines.

The common oil company card features an embossed account number. When a credit purchase is made, the service station attendant places the card in his imprinter. The stiff top copy which he sends to company headquarters, because of the arrangement of the carbon paper, bears the account number impression on the reverse side as well as on its face. It is found that this reverse impression is far more legible than the other, and the optical scanners in the oil industry are adjusted to read from a mirror reflection, to compensate for the characters being turned around. The scanners accept the invoice as a punch card, and make the holes which render the document ready for sorting into the file of the customer whose account number it bears.

improvement coming

We plan soon to make a vast improvement in this process by placing in the hands of the service station operators a new-type imprinter; one which will register the amount of the sale as well as customer identification, making the entire billing process fully automatic.

National Biscuit Company compiles its daily sales reports on 450 regionally-dispersed adding machines. In its effort to achieve automated accounting, Nabisco first considered outfitting each of these adding machines with accessory "add-punch" devices. The individual machines, it was planned, would produce punched tape, to be rushed to the computer system in New York for consolidation.

There was one substantial obstacle: cost. It would have meant an outlay of $1,500 per adding machine, or $675,000 in all, to activate this program.

Instead, a Farrington scanner reads the original adding machine sales report for a small fraction of this amount, at the New York office.

The "turnaround" application is especially appropriate to the utility companies. Though each installation may vary in some small respect, in substance bill stubs are scanned and the amount and customer identification converted into punch card or punched tape form. The term "turnaround" characterizes the process in which the original bill – or at least the stub – which goes out for payment and returns to the company for data processing.

Selfchek numeric type is widely employed in connection with optical scanning, and a special alphabetic type font has been designed for use with the new page reading equipment now coming on the market (see companion piece, "Letters, Symbols, Punction Read.")

Selfchek is a Farrington development aimed at overcoming the problems engendered by the poor quality of much business machine printing. Selfchek type font was not designed to make scanning possible.

Selfchek type face has the ability to do two things. First, to improve the readability of characters over a wide range of variation and, secondly, to take care of the borderline cases in which a character is unrecognizable. Without proper safeguard in this second instance the possibility exists that the scanning equipment could mistake one character for another.

Thus this special type font, economically installable in existing business machinery, is designed so that at least two of the strokes making up a particular character must change before it can become another character. (See fig. 2)

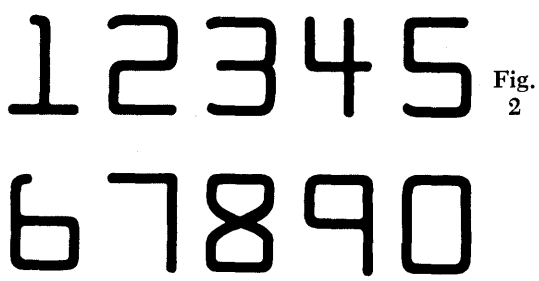


Fig. 2

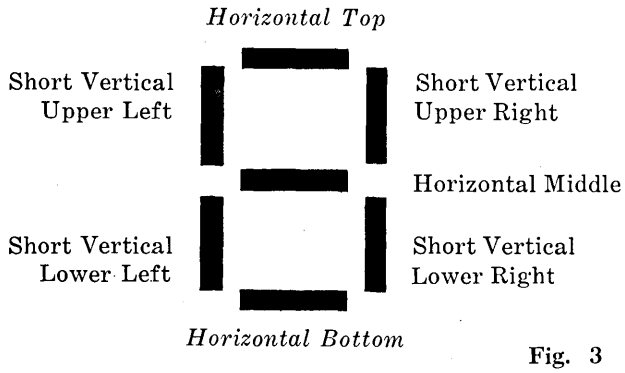


Fig. 3

selfchek in action

A good example is seen in the shape of the Selfchek figure "5." It is should somehow be filled in with an extra stroke in the lower left area it would appear to the human eye as a "6." However, the Farrington scanner knows that a Selfchek "6" has no stroke across the top of the character. Similarly, should the "5" acquire what appeared to be a vertical stroke in the upper right hand corner, the scanner would recognize it as a faulty "5" rather that as a "9," because the Selfchek "9" has no stroke across the bottom. There are at least two stroke differences between all ten characters in the numeric set.

Selfchek is actually a bar code built into the character set. The bars, shown dark in the center (see fig. 3) are the portions of the character that the scanner is really interested in to recognize the "8."

In designing Selfchek two thing were done: the characters were spread out, so they would occupy as much character space as possible, helping to prevent smudging in case of heavy printing; secondly, the strokes were made as bold as possible to compensate for light printing when it occurs. The range of print quality can be appreciated by the fact that printers in some of our field installations produce stroke widths varying as much as 5 to 1.

While Selfchek is readily available for typewriters, adding machines, embossers, tabulators, cash registers and highspeed printers, there are cases where completely successful performance has been achieved without it. First National City Bank of New York with three optical scanners reading the serial numbers of redeemed Travelers' Checks, continues to print the check numbers in a standard manner with an old gothic type font. The scanner has proved capable of recognizing the different numerals with a high degree of accuracy despite folding, crumpling or overstamping of the checks themselves.

When the character set is expanded beyond the numerics obviously the strokes or shape functions to be sensed must become more subtle. In an alphabetic program, features such as sloping lines, curved lines, descending and ascending strokes are used.

Strokes like these are quite powerful because they occur in more than one character. Some strokes, however, are useful simply to separate one pair of characters. For example, the tail on the capital "Q" is unique. The logic to identify this must be present, but it serves only to distinguish it from the capital "O."

It is perhaps apparent that the white areas contain a great deal of information. Occasionally it becomes useful to work from the white area. A prime instance would be in the distinguishing of a figure "8" from a capital "B."

For this reason, Farrington's specially developed alphabetic type font, a modified financial gothic, has proved itself markedly useful. The distinguishing feature becomes the ratio of the enclosed white areas.

No area measurement would be reliable over the impression range, but the ratio is reliable. This feature points up the great flexibility of our stroke anaylsis techniques.

CIRCLE 100 ON READER CARD

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newest scanner

LETTERS, SYMBOLS, PUNCTUATION READ

FARRINGTON has introduced the world's first alphanumeric optical scanner capable of reading entire pages of typewritten copy. The new device was demonstrated late in January at a seminar for Government data processing experts in Washington, D.C.

Fully transistorized, it is the first commercial adaptation of a scanner originally developed for the Air Force. The first two production models are consigned to TIME, Inc., to speed subscription fulfillment.

This Farrington page reader scans ordinary business documents at the rate of 240 characters per second, converting raw information into punched paper tape form. When modified to accommodate magnetic tape, the operating speed increases to 300 characters per second.

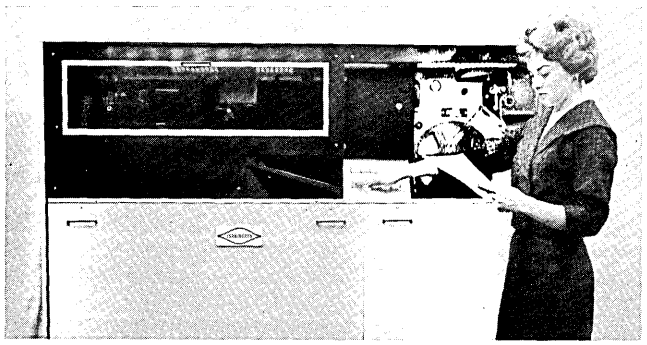
The machine reads letters of the alphabet, numerals, common punctuation marks and symbols. While the particular model demonstrated was limited to reading uppercase letters, company officials stressed the capacity of the page reader to handle a wide variety of input without change in its basic design. Know-how exists to cause the advanced Optical Scanner to put Russian or Chinese into business machine language if desired. The page reader in its present form is especially appropriate to the handling of insurance policy applications.

The Air Force employment of the page reader was in the area of communications, and the technique of sending and routine messages through scanning equipment is soon to be applied commercially.

The Farrington company plans development of an automated sales, inventory and customer accounting system. It is designed to take over the routine paperwork of the store's accounting department to the point where the entries made by the salesclerk on the floor will be electronically processed from that point on.

The salesperson writes on a triplicate sales check the description of the item purchased – "1 shirt . . . $5.95" – imprints the customer's name and account number with a portable imprinter, imprints the total amount of the sale with the cash register and makes a simple check mark if the purchase is to be gift wrapped, sent by airmail, etc. Manual paperwork stops there.

The sales check becomes a tabulating punch card, punched by an optical scanner. By ten o'clock the following morning the store manager has before him a complete report of the day's business, including cash over and short, sales clerks' commissions and total receipts, charge or cash. Customer accounts are automatically brought up to date.



CIRCLE 101 ON READER CARD

OPTICAL SCANNING of CUSTOMER ACCOUNTS

by GEORGE W. VOGLER, data processing manager
Atlantic City Electric Co.

ATLANTIC CITY Electric Company, serving a fast-growing area of 377 communities in the southern third of New Jersey for more than 75 years, faces an immediate future in which the needs of many new customers will combine with the expanding use of electric power by the 231,900 homes and businesses already connected.

A key link in the super-efficient handling of 12,000 customer accounts per day is a Farrington Optical Scanner 9DP1.

Optical scanning is typical of the various processes by which manual accounting is being cut to the minimum, with consequent improvement in speed, reliability and economy of time and space. Literally **reading** the bill stubs submitted with each payment, the Farrington "eye" accomplishes work previously done by eight tapewriter operators in 1/20 the time. This includes everything, from adjustment of the machine to the preparation of the bill stubs for scanning. There is a single operator, and the entire scanning department is easily contained in a glass-walled enclosure no larger than the average bedroom.

As for reliability, there is no problem whatsoever with the eye itself. Roughly 2 percent of the stubs placed in the scanner land in the "unreadable" pocket, but this is due either to faulty printing or mutilation of the stub by the customer. A quick adjustment of the optical scanner often results in the acceptance of these stubs on a second or third pass. It never has made an error.

A description of our present customer accounting cycle most naturally begins with the visit of the meter reader to the meter box and his notation of the kilowatt hours consumed.

When his meter book is forwarded to the Data Processing Center his entries are transcribed onto a punched paper tape and fed into the main frame of the RCA 501 computer.

Simultaneously the computer is receiving the other data from which it will distill the information to be placed on the bill. This data is contained on two separate reels of magnetic tape.

First is what we term the "master file" reel. (Each reel covers 12,000 customer accounts, and these 12,000 customers' bills will be rendered and mailed on the same day each month.) In the master file are the customers' names and addresses (both service address and billing address if they differ) and account numbers. Additionally the master file reel contains a record of the previous meter readings, the so-called "meter constant," statistical information to aid in market study and any customers' back balances.

Each "master file" reel is, of course, brought up to date before entering the computer, to take account of change-of-address, etc.

On the second magnetic tape reel is the record of recent payments, in which the Farrington optical scanner plays its part, having been busy processing the bill stubs which have come into the Center in a daily flow as a result of complete or partial payment made to one of the company's twelve district offices.

In other words, after receiving the information on the paper tape reel (meter readings) and the two magnetic tape reels the computer is prepared to produce a third magnetic tape reel in which will be contained all the information required for billing – full identification of the account, the period covered, electricity consumed and amount due.

Cash stubs and payments are received by the cashiers in the 12 District offices. Here the stubs are batched in groups of 200 and an adding machine tape prepared for each batch.

This tape serves two purposes; first, the total of all of a day's tapes are used to balance the office cash drawer; second, the individual tapes serve as batch controls when the stubs reach the EDP. In the meantime the District Offices have deposited the payments in local banks and have prepared a daily cash transmittal report which serves as the overall cash control in EDP.

Upon reaching the EDP by company messenger the batched stubs go to the Farrington Optical Scanner along with the adding machine controls tapes. It should be noted that no change in District Office procedure was required to accommodate the new scanning system, because this phase of the application follows the standard operating procedures previously established.

Having loaded the sanner with a fresh reel of seven-level paper punch tape, the operator sees the dials of the accumulator set back to zero and selects a batch of bill stubs, placing them in the magazine of the scanner and pressing the button which activates the mechanism. One by one, but at a rate of 100 per minute, the stubs whip past the oscillating mirror reflecting the image of the digits to be read into the lens. The stubs may contain up to 22 digits, including the account number, the check-number and the amount of the bill.

Those stubs which are immediately read by the machine are channelled into one slot while the pertinent information they contain is punched into the tape and the accumulator registers the amount of the payments.

unreadable stubs

The scanner may scrltinize a stub up to a dozen times before deciding it is unreadable, and this is done with lightning speed – unreadable stubs pass into the special pocket where the operator may examine them personally. No punching of the paper tape occurs, until the scanner has decided a stub is readable.

Looking at a rejected stub the operator can usually determine if it is "salvagable" and capable of passing successfully through the scanner. Data of poor quality is often accepted on subsequent scans at an increased scan rate. Sometimes a few strokes with a common eraser will succeed in obliterating extraneous markings which have interfered with the scanning; occassionally digit which has been slighted by the highspeed printer can be rendered more legible by judicious touching up with a pencil. And while the eventuality is remote in the extreme, should the operator err and, for example, substitute an "8" for a "3," the scanner would preceive the discrepancy and refuse to accept the altered stub.

This perspicacity is built-in. Utilizing the Luhn method of number checking in which an extra digit is added to each account number by the computer, the scanner knows instantly when any tampering, intentional or otherwise, has taken place.

Management is pleased with the new automated accounting system on many counts. Accuracy, speed and reliability, elimination of waste motion and needless expense are obvious advantages. Perhaps, however, the factor of better **control** of bill preparation is the most significant, and in this area the optical scanner has carved a wide niche for itself.

typed, printer data read

IBM's OPTICAL READER PROVIDES DIRECT ENTRY

IBM's 1418 optical character reader, introduced last September, is the first to be linked directly to a computer system. The solid-state 1418 reads conventionally typed and printed business information from paper or card documents and automatically translates the data into machine language for direct entry into an IBM 1401 computer.

With an IBM 1418 optical reader connected to a 1401 computer, a complete data processing cycle is possible for the first time. Notices, coupons, bills, and other automatically-printed forms can be sent to customers and returned for direct entry through the 1418 into a 1401 system without any intermediate conversion steps.

In its wide range of uses, the optical character reader can handle input documents of various sizes and thicknesses. The standard machine reads documents anywhere from 5⅞″ to 8¾″ wide by 2¾″ to 2⅔″ high. Their thickness can vary from that of bond paper to regular IBM card stock. Punched cards and continuous-card forms, most premium notices, imprinted charge slips, coupons, telephone bills and tax notices—among others—are within these dimensions. Some special orders have been accepted for 1418 machines reading other size documents.

Possibly the most significant feature of the IBM optical reader is its ability to read "normal" numbers rather than specially designed figures which require highly controlled conditions of printing. The 1418 reads numbers printed up to ten characters to the inch in a standard IBM type used by 407, 408 or 409 accounting machines, the 1403 printer or an electric typewriter. It can also read numbers in the elongated 407 type style—commonly used by credit card imprinters. In addition, the machine can be equipped to read vertical markings made with ordinary pencil or dark inks to represent specific information.

The 1418 reads at rates up to 480 characters a second from as many as 400 documents a mintue. The basic unit contains one optical reading station, which reads a single type style from any line on the document. A second reading station or a mark-reading station can be added to scan a second line. With two reading stations, the 1418 can read any two lines—either in the same or different type styles—in one pass of a document through the machine. In place of a second read station, a mark-reading station can be installed to read pencil or ink marks from the document.

As documents feed into the 1418, they are separated and aligned, one at a time. Each form then feeds individually onto a revolving drum, where it is held flat by a vacuum. As the drum revolves, the complete surface of the form passes under a lens system. The characteristics by which each number is recognized are contained within the solid-state circuitry of the reader. The light image of a character is converted into electrical impulses which are compared and matched with internal logic patterns. Numerical characters are individually recognized in this way and transferred one at a time to the magnetic core memory of the 1401 computer for processing.

Once in storage, the data from the typed or printed forms is processed and the results produced as punched cards, magnetic tape or printed reports by the 1401. The documents from which the information was read are fed into appropriate sorter pockets in the 1418. While the 1418 is reading, the 1401 can perform independent operations, such as magnetic tape to printer functions, thus making the computer available for other vital operations during the optical reading procedure.

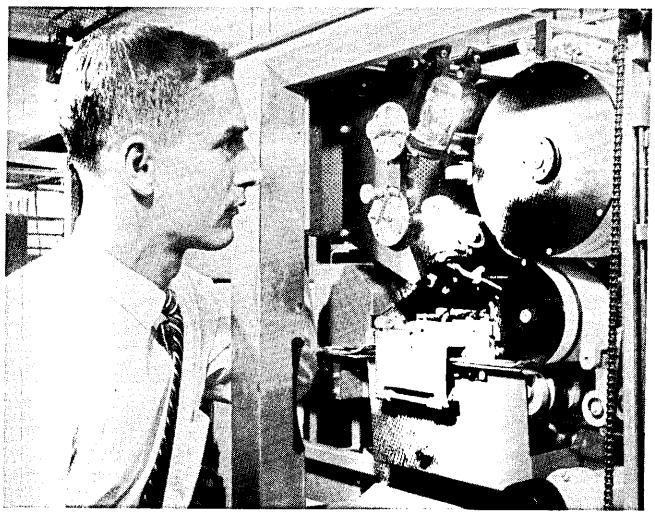
The 1418 reader can be used with any magnetic tape model of the 1401, including a tape system with high-capacity RAMAC storage. It is available in two models—Model 1 with three sorter pockets and Model 2 with thirteen pockets. When not in use with the 1401, the Model 2 reader can be used for independent optical sorting of printed forms and cards.

Initial deliveries of the IBM 1418 are scheduled to begin in the first quarter of next year. It will be installable in the plant or on a 1401 in the user's office. The Model 1 unit rents for $2,600 a month and sells for $120,300. The monthly rental for the 1418 Model 2 is $2,900, with a purchase price of $133,800. An optical reader adapter feature for the 1401 rents for $100 a month and sells for $3,750. A second read station rents for $125 a month and sells for $5,450. The monthly rental for a mark-reading station is $125, with a purchase price of $5,950.

The 1418 is designed for a wide range of uses in many industries where the high-speed direct processing of printed source and re-circulating documents can mean greatly increased speed and efficiency. Typical areas and applications where the IBM optical character reader offers great economies in time and costs are: airlines, in passengers revenue accounting; retail credit applications; in compensation, registration, licensing and tax operations of state and local governments; finance, where installment loan accounts can be handled directly; motor freight revenue accounting, insurance, in handling premium and claims payments; and in public utility customer accounting and meter reading work. Orders for the 1418 have been placed by firms or oganizations in each of these fields.

CIRCLE 102 ON READER CARD

IBM engineer inspects 1418 reading station.



conventional approach

OPTICAL CHARACTER READING AT NCR

HE GREAT POTENTIAL of optical character reading lies in providing faster, more efficient and more complete data processing. This new principle should enable businesses to capitalize further on their investments in conventional cash register, accounting and adding machine systems.

Data processing systems, with their ability to digest large volumes of data at high speeds, require such information to be fed to them in machine language. To date, this has meant that information, usually in printed form, has had to be converted to machine language before it could be fed to the data processor. Conversion from the human to a machine has in many cases so increased the cost of the total system that the resulting processing efficiencies have not been warranted on a dollar-and-cents basis. Optical character reading represents a dramatic breakthrough in solving the problem of converting or translating human readable language to machine language.

NCR believes that utilization of present equipment is of vital importance if the potential economies promised by optical reading techniques are to be realized. An optical reading system, if it is to be practical for other than the applications where print quality can be carefully controlled, must be able to read print provided by existing business machines.

NCR's basic objective in its optical reading program dictated that the scanner be able to read figures printed by the company's conventional cash registers, accounting and adding machines.

Basically, two approaches can be taken in designing optical reading equipment:

1. Design and build a reader and specify the type and quality of printing that it must have in order to yield good performance.
2. Determine the print quality that can reasonably be achieved with conventional machines and then design and build a reader capable of reading this print.

NCR, to achieve its prime objective of providing a reliable and economical input from conventional business machines to data processing systems, chose the second approach.

NCR has been building and servicing printing mechanisms for almost the entire period of the Company's 75-year history. This fact, coupled with the company's extensive experience in the exacting magnetic ink printing techniques required in bank automation programs, has been of immeasurable help in developing an optical reading system designed from the ground up to best serve the user's needs.

In exploring the many possible techniques for reading optically, NCR engineers adopted the true direct character reading approach, because it permits the use of present business machines for printing. There would be no problem, as with some code techniques, in getting both machine and human language on the typewheels.

The simplicity and the tolerance for relatively poor print of the code-reading techniques, however, could not be overlooked. Yet NCR found that by changing only slightly the shape of conventionally printed Arabic characters, it would be possible to achieve the advantages of both techniques.

A recognition system has now been developed by NCR based on optically reading a simple machine recognizable code. The code is uniquely different for each character, making possible complete self-checking.

This code "within the characters" achieved the goal of combining two languages in one. The machine reads only a code while the human reads conventionally printed characters slightly stylized.

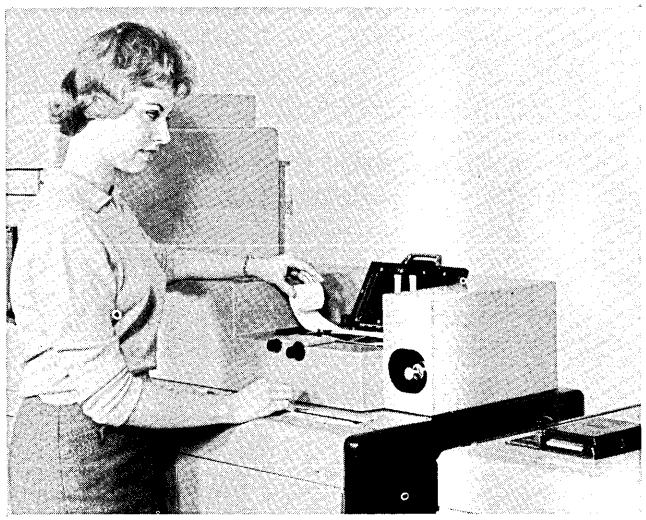
The system has a remarkable tolerance for relatively poor printing. The rejection rate can be correspondingly lower because line width and print density, critical in some systems, have only a minimum effect on this recognition system.

There are many other advantages to this approach. The machine can be simply constructed. Because it is designed to read a code, it does not require the expensive electronic sophistication normally associated with direct character reading.

It is a reliable system as well as being a compact unit. The techniques employed also provide another advantage, that of high speed. This is important because the reader will be communicating with other fast devices. It must be remembered that an optical reader is only a translating device. By itself it cannot provide the desired end-result reports. These come from the processing system, and the reader must be capable of communicating with such devices. As in all automation, effective utilization can be attained only if the processing equipment can be operated at optimum speed. Otherwise, the advantages offered become too costly for justification. **NCR's reader has an instantaneous reading rate of approximately 11,000 characters per second.** In actual practice, rates are slower than this because of the difficulty of moving paper documents at speeds permitting such fast reading.

CIRCLE 103 ON READER CARD

Cash register tape is inserted in NCR reader.



THE COMPUTER AND THE SERVICES

CONTROL DATA CORPORATION

The 1604 Computer

In terms of dollar savings, field-proven performance, and associated computer services, you can't buy a better computer than the 1604.

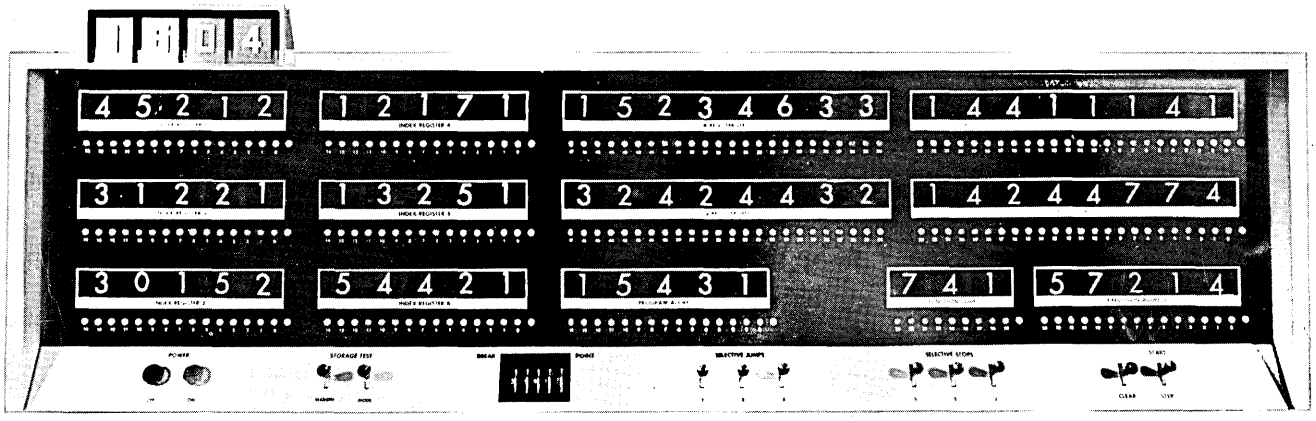
In the first place, the 1604 Computer costs as much as $900,000 *less* than other computers in its class. It is also available on lease at a 40% dollar savings. Yet the 1604 offers outstanding advantages, many of which are not even included in computers costing nearly twice the money. What are these outstanding features?

The 1604 uses advanced, all-transistorized circuits and a magnetic core memory. All circuit modules are pluggable, and a high degree of circuit standardization is employed to facilitate ease of maintenance. For example, only two power supply levels are used throughout the 1604 Computer: +20v and −20v.

The large magnetic core memory holds 32,768 words. The 1604 memory is controlled by a 2-phase timing system, each phase controlling one half the total memory. All *odd* numbered addresses refer to one half the memory, all *even* numbered addresses the other half. Thus, the memory cycles of the two halves overlap each other in the execution of a program. This results in an effective cycle time that is reduced to 3.2 microseconds when addresses of alternate memory banks are referred to. The average effective cycle time for random addresses is approximately 4.8 microseconds for a representative program.

The 1604 Computer has the advantage of a 48-bit word length for floating point and fixed point numbers. This 48-bit word length, of course, is a feature which provides a significant advantage over computers using only a 36-bit word length or less . . . both in increased accuracy as well as in the number of significant digits possible in the results. Still another advantage is the fact that two 24-bit instructions are combined in each 48-bit computer word. Thus, the number of memory references for instructions is halved, while at the same time the instruction capacity of the 1604 is doubled.

The 1604 also offers the advantage of an integrated input-output system. It provides the facility for two modes of communication, in which an entire 48-bit word can be transmitted to or from the 1604 in 4.8 microseconds. For normal transmission of data between the computer and peripheral devices, independent control is provided for the transfer of data. This is effected via *three* 48-bit buffer input channels and *three* 48-bit buffer output channels . . . asynchronously with the main computer program. For high-speed communication, one



48-bit input transfer channel and one 48-bit output transfer channel are also standard features. This entire system of buffered input-output and high-speed transfer channels is an integral part of the computer logic, provided at no extra cost. In the 1604 Computer, no "black boxes" or additional peripheral devices are required to build up this capability.

The 1604 provides the programmer with a powerful list of data processing and logical instructions. Other 1604 programming features also of great value to the programmer are the 6 index registers, indirect addressing, program interrupt, external function, and the special SEARCH and TRANSFER instructions.

The operating speeds of the 1604 are extremely fast. Over 100,000 instructions can be executed by the 1604 in one second.

While these features of the 1604 *are* impressive, just as outstanding is the fact that the 1604 has already proven its performance capabilities on the job. In fact, *it has set a new high performance standard among large-scale computers.*

PERFORMANCE

An advanced, large-scale computer, the 1604 has already been earning customer acceptance for over a year. For example, the first 1604 was delivered to the U. S. Naval Postgraduate School, Monterey, California, in January 1960 . . . where it is being operated with an uptime of 98.5%.

At the Postgraduate School, the 1604 is being used in the NANWEP project (Navy Numerical Weather Prediction), for weather prediction for the Pacific Fleet, and for handling data processing for the Pacific Missile Range. In addition, students in nearly all curricula of the Postgraduate School receive course and laboratory work in the application and operation of the 1604 and peripheral equipment.

PROGRAM OF INDIVIDUALIZED COMPUTER SERVICES

Not all the advantages of the 1604 Computer are realized in its "hardware" features alone, however impressive these are. In utilizing the computing power and capacity of the 1604, the customer can take advantage of Control Data's "Program of Individualized Computer Services." Included in this Program is a wide scope of computer services designed specifically to benefit the individual customer . . . the kind of services tailored to his particular requirements.

Some of these services provide customer consultation, in which the customer is assisted in planning his system and in analyzing the applications required. Other services help the customer in utilizing the computer by providing him with computer programs, simulators, and compilers . . . as well as custom programming. In Control Data's classrooms, your personnel are trained in the use of programming systems, computer programming, maintenance, and operation of the 1604. Account servicing, in which customer assistance is continued after the computer has been installed, is also a part of this Program. Still other services include free computing time that enables the customer to debug programs prior to the installation of his computer.

A large number of existing programs are immediately available to new users of the 1604. These include standard service library routines, debugging routines, mathematical functions written in both fixed point and floating point arithmetic, input-output packages, tape handling routines, maintenance programs, assemblers, and simulators.

The Control Data FORTRAN I-II Compatible Compiler System is also supplied with the 1604. This System provides for the compilation and execution of programs written in FORTRAN I-II language. Run on the 1604 Computer, the Compiler Program compiles at least 15 times faster than those now being run on vacuum tube computers. Control Data's ALGOL Compiler is nearing completion and will soon be ready for 1604 users.

Computer time is made available to customer programmer personnel in Control Data's powerful Computing Center. Here they can perform preliminary check-out of programs prior to the installation of their computer. In addition to the 1604, this Computing Center is equipped with the desk-size 160 Computer and a complete family of peripheral devices for both on-line and off-line operations. Customer programmers will also receive valuable assistance in the assembly, check-out, or timing of their programs.

For users of the 1604 Computer, a CO-OP User's Organization exists as a means for coordinating the efforts of its members in achieving the maximum in computer utilization. Through this organization an exchange of mutually beneficial programming and operational information is realized. In addition, the organization provides a medium for collecting and disseminating information regarding equipment, techniques, and procedures.

The 1604 Computer and the Services

In summary, the 1604 is an all-transistorized computer with many advanced features, a number of which are not to be found in other large-scale computers. The 1604 has been customer operated for over a year, during which time it has set a new high performance standard among large-scale computers. The 1604 costs as much as $900,000 *less* than other computers in its class; it is available on lease at a 40% dollar savings.

Control Data's "Program of Individualized Computer Services" provides the kind of services tailored to the individual customer's requirements.

For further information about either the 1604 Computer or the "Program of Individualized Computer Services," contact the Control Data representative in your area . . . or write to:

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

DM (161) CS

More Comments On COBOL

the Sylvania view

by JEAN E. SAMMET,
Sylvania Electric Products

INCE THE CREATION of the Short Range Committee of CODASYL, the establishment of a common business oriented language has been a very controversial issue. The submission of the Short Range Committee report, followed several months later by the distribution of the Government Printing Office report, Maintenance Committee action, and individual company statements, all have been milestones along the way.

It is somewhat unfortunate that during the past year such a battle should have been waged both publicly and privately about a project which is generally accepted as being very important to the computing industry. It is not surprising that after the initial enthusiasm, different manufacturers might have different views towards the COBOL effort.

Those companies who were not involved in the original development can, of course, legitimately look at the early work done by their colleagues, and have a certain smug attitude of "I could have done it better." Similarly, those companies who created the original report and are still being represented by the same individuals, naturally have a certain technical pride of ownership that makes them less than enthusiastic about complaints and criticism. Furthermore, these companies have invested heavily in the implementation of COBOL, and made delivery commitments to their customers on the basis that others were likewise acting in good faith, since that was certainly the basis on which the Short Range Committee was created. However, there are several cases in which **individuals** who were not involved in the original effort have taken the same attitude that the new **companies** have taken — namely that "I could have done it better", and these individuals have convinced their superiors of this point.

Finally, to add to all the other divergence of opinions, there are manufacturers who have invested heavily in developing English language data processing systems which are not COBOL; naturally these companies wish to change COBOL to make it as similar to their system as possible. In summary, it might be said that only a few companies (including Sylvania) have maintained a consistent company policy with regard to COBOL and its best interests.

What is perhaps more surprising than the divergence of opinion among the manufacturers is a similar problem among the users. There are some who feel that the most important characteristic of COBOL should be its compatibility across computers, and these users have publicly stated that they are willing to sacrifice object program efficiency for the overall benefits gained through the use of a common language. There is a different group of users — primarily those with only one type of machine at present — who are less concerned with the problem of compatibility, but are vitally interested in the establishment of as powerful a language as is possible.

In addition to the differences of opinions indicated above, there is another type of divergence, and this cuts across both users and manufacturers. There is one group that feels that no language should be published until it is completely specified, and is guaranteed to produce the compatibility, power, and sophistication of language hoped for in the COBOL effort. This group feels that neither users (nor manufacturers) can afford to write programs (or compilers) for a language that does not satisfy completely all of their goals. Unfortunately, the proponents of this view never mention anything about a time element — presumably they will take as long as necessary. The contrary view to this position is held by those who feel that a common business oriented language must be approached gradually and cannot be legislated into existence at some future point in time. It is technically impossible to write complete language specifications without implementing them; that is, feedback from the implementation is necessary to point out ambiguities and to indicate features which are too impractical to implement. A similar type of feedback is needed from the users in order to insure maximum benefit from experience.

results of "let's wait"

The proponent of the "Let's wait until it is perfect" view would argue that this feedback should be obtained on a small scale and that vast sums of money should not be invested in an incomplete product. The difficulty with this viewpoint is twofold: One has to do with the concept of freezing, while the other has to do with the development of a large number of systems which are very similar but still differ. Any technical effort that has ever been made has had to be frozen by its designers before they were satisfied with it. To pursue an illusive goal of perfection seems foolhardy, since it may never be achieved or may be obsolete by the time it is. Technical people always have "good, bright ideas" as soon as the drawings have gone to the factory. Similarly, language designers have better ways to do things as soon as the implementation specifications have been frozen. Without a time scale and a specific budget (in this case representing the delivery dates and costs of the compilers), little more theoretical work can be done.

One of the arguments against standardization is the fact that it stifles improvements. The point is legitimate, but not very applicable to the use of 4 or 5 different words to mean the same function. Nothing in the COBOL effort precludes individual users or manufacturers from developing new and better ways to do things. The significant factor is that since the entire COBOL effort is somewhat in the nature of an experiment, it is undesirable to keep changing while the current method is still being tried.

public, users misled?

There are some people involved in the COBOL effort who truly feel that the general public and specific users are being mislead. These people feel that the users are being promised something which does not and cannot exist at this point in time. I would maintain very strongly that any

person who has taken the trouble to understand the full situation is not mislead. It is certainly true that COBOL has ambiguities in it; it fails to cope with some types of problems; and complete compatibility has not yet been achieved. However, as with any product, it is possible to obtain maximum or minimum benefit from it. The user has the choice of looking for the doughnut or for the hole. He can achieve machine compatibility — if this is his desire—with the possible sacrifice of some running time efficiency. If the overall benefits of standardization are sufficiently important to him, the loss of machine time is a small price to pay. It is certainly possible for a user to write programs that cannot possibly run on more than one computer; however, it is equally possible for him to write programs that **do** run on more than one machine.

By the time this paper apears, it is fairly certain that the same non-trivial COBOL program will have been used to obtain identical answers from radically different computers, without changing anything in the program except the ENVIRONMENT DIVISION (which is incompatible by definition). Furthermore, this will undoubtedly have been achieved for several programs, thus providing that compatibility of a non-trivial level can be achieved.

In any discussion of COBOL, people must keep in mind the distinct difference between the language and the compilers which implement it. This distinction is perhaps only of theoretical interest to the user, but must nevertheless be kept in mind during any evaluation of COBOL. If an implementor places a restriction on the language in his compiler, then, in general, the criticism or complaints should be leveled against the implementor rather than COBOL. However, in some isolated cases, there are ambiguities in COBOL which the implementor must resolve for himself in order to get a working system.

One point which has caused some confusion because of inaccurate statements is the type of compatibility under discussion. More specifically, the only items which were ever intended for reuse were the programs. Obviously data tapes cannot be interchanged unless they can physically be handled on more than one machine. Furthermore, this problem cannot be solved by programming, and was never intended to be handled within the scope of COBOL.

some conclusions

I feel very strongly that the achievement of a true common business oriented language is vital to users. I feel equally strongly that this can best be achieved by converging gradually on the final product. The lack of completion of final and complete COBOL specifications is due primarily to certain companies and individuals who have refused to work from the present language and prefer to "start all over". These persons and their companies have done a great disservice to the COBOL effort by refusing to face the fact that the present specifications do exist, are being implemented, and are being used to write and run successful data processing problems. The fact that the specifications have some ambiguities and are not perfect hardly seems sufficient reason to throw away a large amount of very good and useful work so that a "better" common language can be achieved. There is no proof whatsoever that starting over would yield any better results than those now existing. Sylvania (as well as several other companies) has consistently taken the position that steady growth and improvement is essential, but that changes should only be made after careful consideration of the effect on the users whose programs would be invalidated, and the increased cost (indirectly borne by the user) caused by constantly having to revise compilers. Furthermore, changes based on personal taste should generally be disallowed, and "bright, new ideas" should be incorporated into the framework of the present language on a systematic basis.

None of the above remarks should be taken to mean that we oppose programs — on the contrary, we feel it is essential. However, we feel that there is a difference between ignoring what has been done previously because a better way of doing something has been found, and building on a system until sufficient time and experience has elapsed to make a brand new structure necessary.

At a given point in time, the user who is primarily interested in compatibility can achieve it by restricting his use of the full scope of COBOL to that which has been implemented for all of his equipment. The availability of "full COBOL" for each user is a function of how rapidly each manufacturer implements it.

It is the firm opinion of the author that COBOL, will eventually prove to be a major step forward in the computing industry. It is greatly hoped that those who now oppose COBOL — either actively or passively — will stop condemning it long enough to give it a chance to succeed.

NEXT MONTH IN DATAMATION

Detailed coverage of the Western Joint Computer Conference (Ambassador Hotel, Los Angeles, May 9, 10, 11) will be presented in a special section in next month's issue. An automated teaching project will get major feature treatment and a new series entitled "Computing Around the World" will begin. Many other feature articles and our not-so-usual departments will round out DATAMATION in April.

another Autonetics entry

RECOMP —

by RICHARD F. MUSSON,
Autonetics Div., North American Aviation

THE GROWING FAMILY of RECOMP computers built and marketed by Autonetics Industrial Products stems from early experience gained in the field of digital computers by its corporate parent, North American Aviation, Inc. It was in 1949 that North American Aviation introduced NADAN, the first digital differential analyzer and first of the computers to feature a rotating disk instead of a conventional magnetic drum memory.

Experience of the Autonetics division with NADAN's solid state logic, printed circuits, and logic boards, and ensuing experimentation through the years, resulted in the 1957 introduction of RECOMP II, the first solid state, medium-sized computer on the market. Recently evolved is the new RECOMP III.

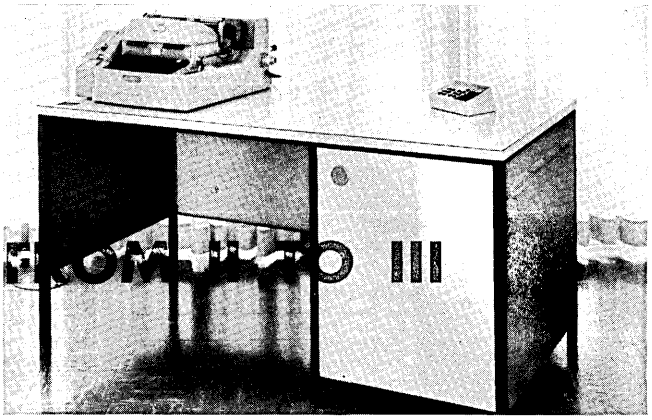
Success of the first entry by Autonetics into the commercial field led to research on the second computer which would retain much of the power and performance similar to the RECOMP II – and with the added appeal of lower price. Features to keep, and features to modify, features to eliminate or initiate, had to be weighed and decided.

End result was RECOMP III which leases for $1495 a month. At the same time, due to increases in production, Autonetics lowered the lease cost of RECOMP II to $2495 per month.

The identical disk memory was used in the new computer, although the logic was made almost completely different from that of the RECOMP II. The design engineers introduced multiple use of hardware wherever possible.

Similarities of the new RECOMP III and the established RECOMP II are many. Coming from the same family, both have a magnetic disk memory which rotates at 3450 rpm, each has a memory of 4096 words, two 8-word high-speed loops, with 40-bit word, and each word contains two commands. Both are small and easily movable, requiring 115 volts AC, single phase, and 3.5 amperes.

Differences in the two computers point out basic purposes in their design. Where RECOMP II has a 400-character-per-second photoelectric tape reader, RECOMP



III has a 10-character-per-second mechanical reader using the Flexowriter as its standard input-output device. Input on RECOMP II can be performed additionally through a typewriter and through the keyboard console, and output through a 20-character-per-second punch. High-speed input and output devices are optional with RECOMP III. (Both machines offer the optional FACITAPE 150-character-per-second punch and 600-character-per-second reader.) RECOMP II offers magnetic tape as an optional accessory.

RECOMP III has programmed conversion and optional floating point.

A major difference between Autonetics' computers lies in the structure of commands and codes. While RECOMP III's command list differs from that of RECOMP II, programming ease has not been compromised in the command list for the new computer shown below.

RECOMP III Programming advantages include an index register for the more routine use. Such commands as long left and right shifts increase the versatility of the programs and are invaluable in double-precision operation. RECOMP III commands that deal with the arithmetic registers, such as Clear A to Plus O, Change Sign of A, set A Positive, Complement A, and Round A, simplify any logical operation.

RECOMP III uses a simplified and more limited control console in contrast to the extremely versatile RECOMP II console.

RECOMP III will be supported by a standard library of subroutines, both fixed and floating point, an interpretive program, and an assembly program, and plans include the early availability of a compiler.

RECOMP II & III

1. CLA
2. CLS
3. ADD
4. SUB
5. MPY
6. DIV
7. ALS
8. ARS
9. XAR
10. EXT
11. TMI
12. TRA
13. TOV
14. TZE
15. STO
16. STA
17. CTL
18. CTV
19. CFL
20. FAD
21. FSB
22. FMP
23. FDV
24. FNM

RECOMP II

1. ADM
2. CFV
3. DIS
4. DSL (M)
5. DSR (M)
6. DVR (M)
7. DVM
8. FCA
9. FCS
10. FSQ
11. FST
12. HTR
13. FAM
14. FSM
15. FDM
16. FMM
17. MPR
18. PNC
19. PNW
20. PTC
21. PTW
22. RDY
23. RDZ
24. SAX
25. SQR
26. SQM
27. TPL
28. TSB
29. TSC
30. TSD
31. TYC
32. TYW

RECOMP III

1. SAC Shift & Count
2. HLT
3. STR
4. LLS
5. LRS
6. TLB Tra Low Bit
7. NOP
8. ICH
9. OCH
10. CAZ + 0 → A
11. CSA − A → A
12. SAP 1A1 → A
13. CAR A → R
14. CMA Complement
15. RND
16. COM Compare
17. LDI
18. STI
19. TIX

COMPUTER CHARACTERISTICS CHART

Supplementing the initial, well-received presentation of Charles W. Adams Associates' Computer Characteristics Chart (see DATAMATION, pages 13-17, November/December, 1960) are the following new systems announced late last year.

During 1961, the EDP chart will be published quarterly in March, June and September, and will include the first delivery date of each system, as well as minimum and maximum prices.

For March distribution, data will be listed on three new computers: Remington Rand M-490, Univac 1107, and Autonetics Recomp III.

The chart is being made available both as a pocketsized booklet with plastic cover and on 8½ x 11" sheets, suitable for notebooks and wall mounting.

All inquiries as well as subscriptions to the quarterly publication of the chart should be addressed to Charles W. Adams Associates, 142 The Great Road, Bedford, Mass. A yearly subscription costs $5.

CIRCLE 105 ON READER CARD

SYSTEMS ANNOUNCED DURING AUGUST-NOVEMBER 1960

	GENERAL CHARACTERISTICS					INTERNAL SPEED		MAGNETIC TAPE				PERIPHERAL EQUIPMENT						SPECIAL FEATURES				
												Input			Output							
	Average Monthly Rental	Solid-State	Storage Capacity and Type	Word Size	Instruction Addresses	Add Time	Average Access Time	Thousands of Characters per Second	Input-Output Channels	Buffering	Maximum Tape Units	Cards per Minute	Paper Tape Characters per Second	Cards per Minute	Paper Tape Characters per Second	Printer Lines per Minute	Index Registers	Indirect Addressing	Floating Point Arith.	Console Typewriter	Random Access File	Random Inquiry
2A SYLVANIA 9400	$67,000	√	16-32K core	37b	1	8μ	4μ	90	4[1]	MRWC	64[1]	100-2000	270 1000	100 250	100	900	7		√	O	√	√
	Up to 64 input-output devices are available for each of the four independent input-output processors, thus permitting a total of 256 devices to be on-line. A real-time channel allows priority program-interrupt and an input-output rate of 250,000 characters per second. Random-access file (42m to 158m average access) can be connected to I/O processor. Magnetic tape features are scatter, gather and key-search.																					
4A RW 400	$50,000[1]	√	9K core[1]	26b	2	14μ[1]	10μ	62	9[1]	MRWC	24[1]	2000	300	√	√	900	√			I/O	√	√
	A modular data system which employs concurrent processing. Speeds, capacities and costs above refer to a representative system. The system can be small or greatly expanded by adding modules, those available being computers, data buffers, tapes, drums, card readers, printers, display buffers, and peripheral buffers. Data buffers act as independent modules for tape control and search. A complete set of on-line displays is also available, and a comprehensive interrupt and inter-module communication system is included.																					
25A NCR 315	$8,500	√	2-40K core	2a	1[1]	42μ	6μ	24-60	7	none	8	400	1000	100-250	120	680-900	32			I/O		
	A modular computer system with expandable internal memory capacity which can be used in decimal (3d word size) or alphanumeric format. The demand interrupt feature permits simultaneous operation of a number of peripheral units. Up to four magnetic character sorter-readers may be used for input while up to four printers and card punches may be used for output. Add time assumes a three-character field.																					
26A IBM 1410	$8,000	√	10-40K core	1a	2[1]	110μ[1]	4.5μ	7.2-62	2	RWC	20	800	500	250		600	15	√		I/O	√	√
	A variable-length instruction logic features a table-search command and 64 data-movement commands. The tape drives can be a combination of 7330 (7,200 characters per second), 729 II (15,000 or 41,662 characters per second), or 729 IV (62,500 characters per second). Random access discs with a capacity of up to 100 million characters and an average access of 500m are available. Add time assumes a five-character field.																					

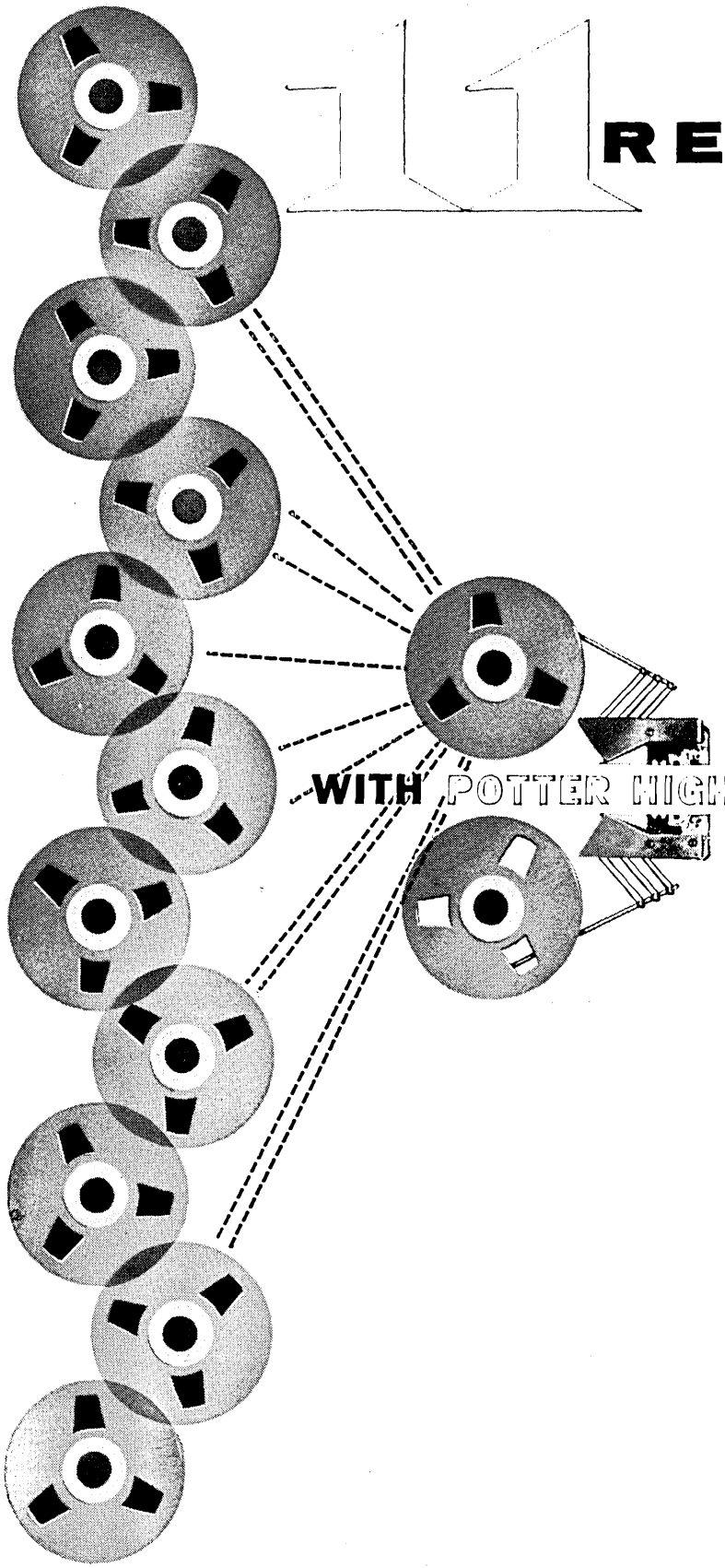
MAGNETIC LEDGER CARD SYSTEMS NOW INCLUDED

30A BURROUGHS 251 (VRC)	$3,975	√	4.8K core	1a	3	777μ	10μ					100										
	In this Visual Record Computer, magnetically-encoded ledger cards can be read through the machine at 180 cpm, and magnetic ink-imprinted documents can be read into the core storage at up to 1,560 documents per minute. The add time for this variable-word length computer assumes two five-character fields.																					
35A NCR 390	$1,850	√	200 core	12d	4	11.3m	1.2m					15	400	15		110				I/O		
	The magnetic ledger card stores data (about 200 characters) in magnetic tape strips on the back of the form while necessary printed information is on the front of the form. A programmable printer allows for any columnar arrangement on multiple forms and reports.																					

MANUFACTURERS' CHANGES IN SYSTEMS

(Changes are underlined)

16 BENDIX G-20	$20,000	√	4-32K core	32b	1	15μ	6μ	120	6	MRWC	500	800[4]	500[4]	250[4]	100[4]	1000	63	√	√	I/O		
26 GENERAL ELECTRIC 225	$8,000	√	2-16K core 8-32K drum	20b	1	40μ	20μ	15 55	7	MRWC	64	400	100 1000	100	60	600	3		√	O		
28 IBM 1401	$6,500	√	1.4-16K core	1a	2[1]	230μ[1]	11.5μ[1]	7.2-62	1	none[1]	10	800	500	250		600	3					
37 IBM 1620	$1,600	√	20-60K core	1d	2	560μ[1]	20μ					250	150	125	15		0	√		I/O		
28,26A IBM 1401 IBM 1410	Peripheral devices are available to read magnetic-ink characters at a rate of 950 per minute and to optically read numeric characters at a rate of 480 per second from paper documents.																					



11 REELS IN 1

WITH POTTER HIGH DENSITY RECORDING

With the revolutionary new Potter High Density Recording System, each reel of 1-inch tape holds as much data as 11 reels recorded by the most widely used computer tape system.

For highly reliable computer applications, Potter High Density recording can give you data transfer rates of 360,000 alphanumeric characters per second or more, at densities to 1500 bits per inch on 1-inch tape. Sixteen parallel channels can be accommodated on one-inch tape. Because Potter has made the information channels self-clocking, no separate clock channel is needed, and multichannel data can be read out in true parallel form, despite interchannel time displacement.

In production units delivered by Potter, this dramatic new technique makes recording so reliable that in 40 hours of continuous operation, less than 2 seconds re-read time are required to recover information lost through transient error. Dropouts are fewer than 1 in 10^7 at densities up to 1500 bits per inch. More than 20,000 passes of the tape can be made without losing information or significantly increasing the dropout rate.

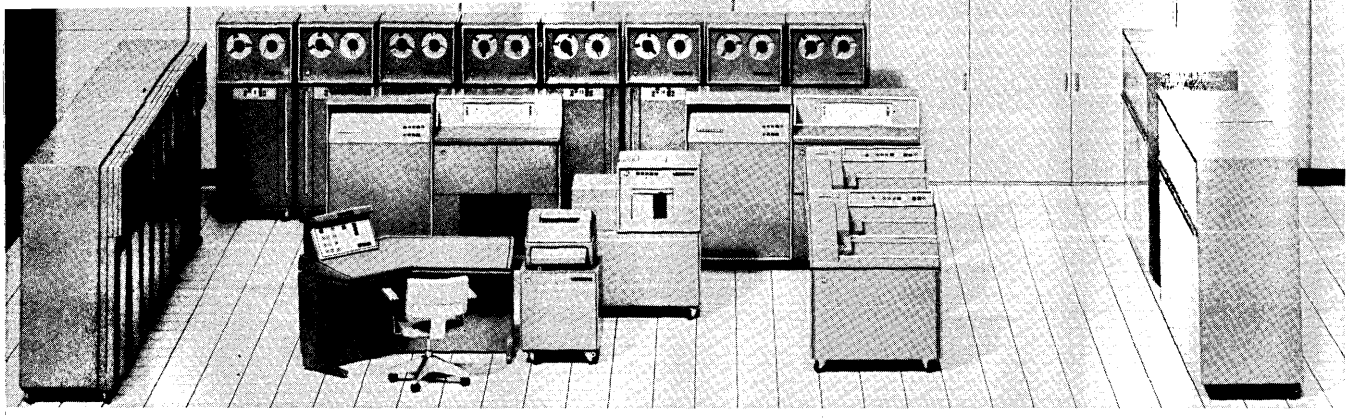
Tested and proven in computer systems, Potter High Density Recording is presently available in the Potter 906II High Speed Digital Magnetic Tape Handler, and will be available in other Potter Tape Systems.

Write today for details on how High Density Recording can be applied to your data handling problem.

See us at the IRE — Booths 3405-3407

POTTER INSTRUMENT COMPANY, INC. • SUNNYSIDE BOULEVARD, PLAINVIEW, NEW YORK

CIRCLE 15 ON READER CARD



Finally hatched

BURROUGHS ANNOUNCES THE B5000

IT WAS A LONG TIME COMING – but the Burroughs Corporation B5000, that firm's first entry in the solid state computer field, promises to be an interesting addition to the industry.

Featuring an add time of three microseconds and a six microsecond memory cycle, a maximum system may include up to eight memory modules, each containing 4,096 49 bit words.

An interesting feature of the machine lies in the fact that two central processors may be employed simultaneously for what Burroughs calls "true parallel processing."

B5000 will rent from $13,500 to $50,000 a month. The sale price range is $540,000 to $2,000,000. A more detailed article on the B5000 will appear in an early issue of DATAMATION.

SPECIFICATIONS

processor

One or two parallel, independent, solid stage processors may be installed. Each has a 1 megacycle clock rate with average add execution time of 3 microseconds. Processors operate on 49-bit words (48 bits plus parity bit) which may be interpreted in binary or alphanumeric form with common fixed-point and floating-point number representation. Instruction format: 12-bit operators or addresses, packed 4 to a word, executed sequentially with unlimited indexing ability. Internal operaton is word and/or character oriented.

memory

One to eight high speed, coincident-current, magnetic core modules may be installed with read access time of 3 microseconds and 6 microsecond memory cycle. There are 4096 49-bit words per module. Each memory module has its own access address register, permitting simultaneous access by processors or input/output control channels.

input/output

Bulk Storage

One or two magnetic drums provide fast random access bulk storage. One drum (capacity 32,768 49-bit words) is standard with one processor. A second independent drum may be added to a system. Read-write rate: 8.1 microseconds per character.

Input Output Control Channels

One to 4 independent input/output control channels may be used. Any of these channels may interconnect any memory module and any input/output device. With 4 channels in use, 4 input/output operations may be performed simultaneously with computation.

Input Output Devices

Magnetic Tape Transports: Up to 16 units may be installed. Operating speed: 66,660 or 24,000 characters per second, reading backward or forward at 120 inches per second. Rewind speed: 340 inches per second. Packing density: 555.5 or 200 character frames per inch. Reel capacity: approximately 24 million alphanumeric characters. Dual-gap read-write heads provide longitudinal and vertical parity checking. Data may be either in single-frame alphanumeric or binary form. Tape and format are completely compatible and interchangeable with IBM Model 729–11 and 720–IV Magnetic Tape Units.

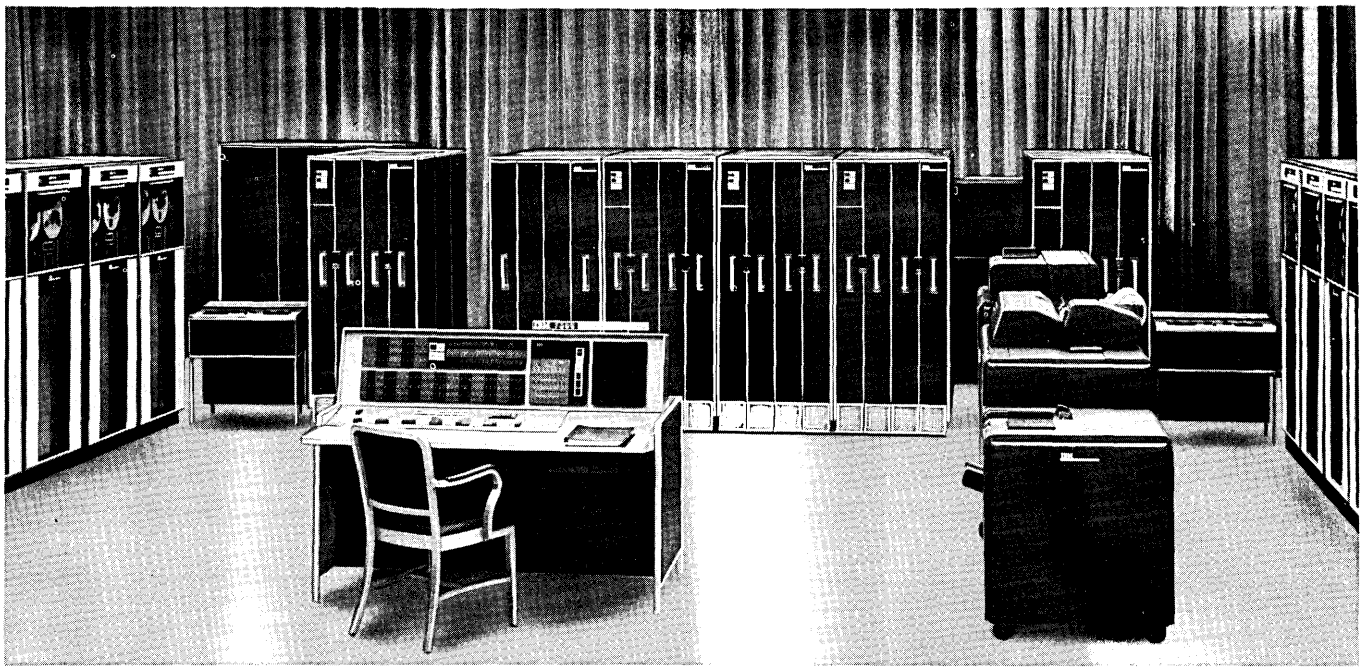
Printing: One or two 120-position wideline drum printers may be used. Printing rate: 650 lines per minute, double spaced; over 700 lines per minute, single spaced. Each accepts Burroughs Common Language, binary-coded alphanumeric information from any input/output channel into a 120-position buffer. Each has an immediate access print cycle. The print drum contains 64 characters per position. Spacing: 10 characters per inch horizontally; 6 or 8 lines per inch vertically.

Card Readers: A maximum of 2 may be used. 800 per minute or 200 per minute models available. Both are serial card readers with photo-electric sensing. Both models utilize an immediate access clutch and read data in either standard punched card or binary form. Read circuitry is automatically monitored and invalid character recognition is provided.

Card Punch: One parallel card punch may be used. Speed: 100 cards per minute.

Operator-System Communication: One keyboard and one message printer are provided. Keyboard permits entry of control and directive information to the system. Character-at-a-time printer prints instructions to the operator and replies to program status inquiries. Printing rate: 600 characters per minute. All 64 characters of Burroughs Common Language code can be printed.

CIRCLE 106 ON READER CARD



If you're going to buy COMPUTER *time, it will pay you to use the best...*

Here's how to put the efficient new IBM 7090 computer to work for you . . . at less cost than you may have thought possible.

You can rent a new IBM 7090 computer with 10 on-line tape drives, and two data channels in a new Data Processing Center* in Cambridge, Massachusetts . . . at a $450 hourly rate. Prime shift rate is $550 hourly. (Special rates for university level non-sponsored research.)

Note that the rental rate is comparable to that being asked for the "old" IBM 709 and 704. Yet the new 7090 is five and six times faster. Processing can be accomplished in a fraction of the time.

You will find the savings considerable.

In addition to the 7090, the following services are provided without charge:

1. Equipment operation by experienced personnel.
2. Up to date utility systems and consultation services.
3. Cards, paper, magnetic tape supplied free.
4. Programming assistance for converting programs to the 7090.
5. Use of extensive program library.
6. Mail service — work requests accompanied by programs received by mail will be carried out and returned as specified.

Here's all you do: for full details on the new IBM 7090 Data Processing Center, (the only one of its kind in New England) just write:

*The Data Processing Center is operated jointly with the Smithsonian Institute.

COMPUTIME Sales company

60 GARDEN STREET, CAMBRIDGE, MASSACHUSETTS — PHONE: UNiversity 4-7090

How to get the most from the IBM 7090

CSI's staff of programming and operational personnel, with extensive experience on the IBM 704 and 709 computers, will insure your efficient use of this Data Processing Center.

Complete programming assistance is available through Computer Services, Inc., parent company of Computime . . . whether the problem is modifying an existing program for use with the 7090; re-programming; or formulating and programming of new applications.

CSI specializes in the design, analysis, evaluation, and programming of digital data processing and control systems.

Whatever your data processing problem, chances are excellent that CSI's complete range of services can ease your burden — and save you time and money:

DATA PROCESSING SERVICES

Systems Analysis, Programming, Operation: CSI's Data Processing Division provides complete analysis from formulation and programming to data preparation and computation. In addition to the new Cambridge Computer Center, CSI operates a fully staffed and equipped data processing center at its Englewood, N. J. facility.

SYSTEMS ENGINEERING

Special Purpose Equipment and Prototype Development: CSI can meet your needs for development and production of special purpose equipment with any or all of these services: systems analysis and design, logic and circuit design, prototype development and manufacturing.

FOR COMPLETE INFORMATION on CSI's complete range of data processing services, write:

COMPUTER SERVICES INC.

25 HONECK STREET, ENGLEWOOD, NEW JERSEY — Phone: LOwell 8-0662

programming notes

SAMS—CONTROL DATA'S SATELLITE AUTOMONITOR SYSTEM. SAMS is a master program designed to be a communication and control network between computers and peripheral devices, the computer operator, the programmer, and the machine time accountant.

SAMS normally can run multi-job groups without operator help or intervention. However, when an operator assist is required, SAMS will request aid via the console typewriter. SAMS is designed to be independent of other systems programs such as assemblers, compilers, and debugging aids; it provides, instead, "hooks" which make integration of many of these subroutines into a sophisticated system relatively simple.

SAMS is a buffered three-phase automonitor system for maximum machine efficiency with minimum operator attention. No tape changes are necessary when a Control Data 160 Computer is connected as a satellite to the Model 1604 Computer, including even off-line card to tape and tape to print operations.

SAMS provides the computer user with:

- A means of exchanging information efficiently between the main computer and satellite computers;
- A versatile method of communicating between and monitoring the use of the main computer and its peripheral equipments with a minimum of programmer responsibility.
- A coordination program for batching debugging and/or production jobs, assemblies with the CODAP assembler, and compilations with ALGOL, FORTRAN and other advanced compilers;
- A means of interrogating and interpreting all interrupts; incidental to this is the ability to interrupt one job for another of higher priority with subsequent satisfactory completion of all tasks;
- Routines that load an extensive variety of data card formats, including FORTRAN input data;
- Complete machine accounting with features insuring job runs within stipulated time limits and jobs producing reasonable amounts of data.

Using SAMS, a typical job goes from punched cards onto magnetic tape via the Control Data 160 Computer. The information is written on magnetic tape mounted on one of the handlers shared by both computers. Control is taken automatically by the 1604 Computer when this information is needed, and the operation goes through three phases: input translation, execution, and output translation. The Satellite Computer controls the print out or punches cards from the magnetic tape, or both. In special instances the 1604 may take the data directly from the card reader, or drive the printer. Work loads between the computers are shared so that both are processing concurrently and idle time is minimized.

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

Important application

COMPUTER CONTROLLED RECORDER PRODUCES MECHANICAL DRAWINGS

IN WHAT HAS TO BE REGARDED as one of the most important application combinations to be announced in months, General Dynamics/Electronics, Information Technology Division (formerly Stromberg-Carlson), recently took the wraps off a concept which may have the affect of making draftsmen look nervously over their shoulders.

The 4020 microfilm recorder, manufactured by the San Diego firm is using a mathematical code supplied by a computer to draw with electron beams, lines, curves, symbols and dimensions necessary to make detailed, multiview drawings.

The ability to produce a mechanical drawing directly from a computer code is only part of the story, however. The same code can be used to produce tapes which will operate production equipment.

The specific application which was demonstrated involved the design and production of industrial parts. Key to the operaton is a program language called APT (Automatically Programmed Tool), a numerical code developed to control machine tools.

The sequence of events in a typical situation would begin when the design engineer decides the kinds of part needed and the specifications for it. A parts programmer, using APT, then enters contour and specification data into the computer.

The computer stores in its memory all of the engineering specifications of the part. The 4020 Post Processor calls upon the computer logic to produce a magnetic tape which is an electronic recording of all the specifications of the part. This tape is placed on the tape input unit of the 4020 Microfilm Recorder. As the tape is run, the 4020 makes multi-view mechanical drawings of the part in a fraction of a second. Once the engineering specifications are placed in the computer, the 4020 can produce drawings of any view or cross-section of the part in three dimensions.

After the drawing has been completed by the 4020, it is taken to the design engineer and the parts programmer. These men ascertain whether the part meets all of the requirements they have set forth for it. Once the drawing is approved, the same computer code that produced it is used, by means of a Numerical Tool Post Processor, to produce a magnetic tape that will operate an automatically programmed tool. This tape then goes to the tool where it is used to produce the part. Finally the finished part can be compared to the S-C 4020 drawing for inspection purposes.

One of the firm's top engineers, E. F. Myers, would not elaborate on the possible effect this development might have on the overall drafting picture. He admitted that the surface had only been scratched in respect to the possible number of applications which might be spawned. But he said that such fields as structural architecture might never be vulnerable to this datamated approach.

The 4020 can now produce wiring diagrams, layout work and other processes requiring calculations. And it is now capable of producing complex logic circuit diagrams.

The 4020 records information on 35-mm microfilm. Printing is accomplised by photographing displays on the face of a Charactron Shaped Beam Tube, the heart of the microfilm printer. In other words, impulses from the magnetic tape pass through the printer's electronic circuitry, appearing as TV-like displays on the tube.

CIRCLE 107 ON READER CARD

USERS O.K. AFFILIATION WITH ACM

ON DECEMBER 16, in New York City, the Joint Users Group held its third meeting at which the following resolution on affiliation with the Association for Computing Machinery was unanimously adopted:

Whereas the objectives of the Joint Users Group can be effectively achieved through a working relationship of the Joint Users Group within the ACM, and

Whereas such an affiliation is in the interest of unity in the computing profession, and

Whereas the individual users groups include a great many ACM members among their membership, still these constituent groups cannot impose ACM membership on their individual members,

Be it resolved that the Joint Users Group wishes to accept the ACM invitation to organize with the structure of the ACM, providing

That ACM membership of the individual members of the constituent users groups is not required, and

That suitable acess to ACM publications, working committees, and meeting programs is provided.

At the meeting, the committee on by-laws presented a set of by-laws which was provisionally approved, subject to study in view of the affiliation quesiton. An affiliation Committee was re-appointed to resolve this question possibly before the next meeting of JUG which will take place at the Ambassador Hotel, Los Angeles, on May 8.

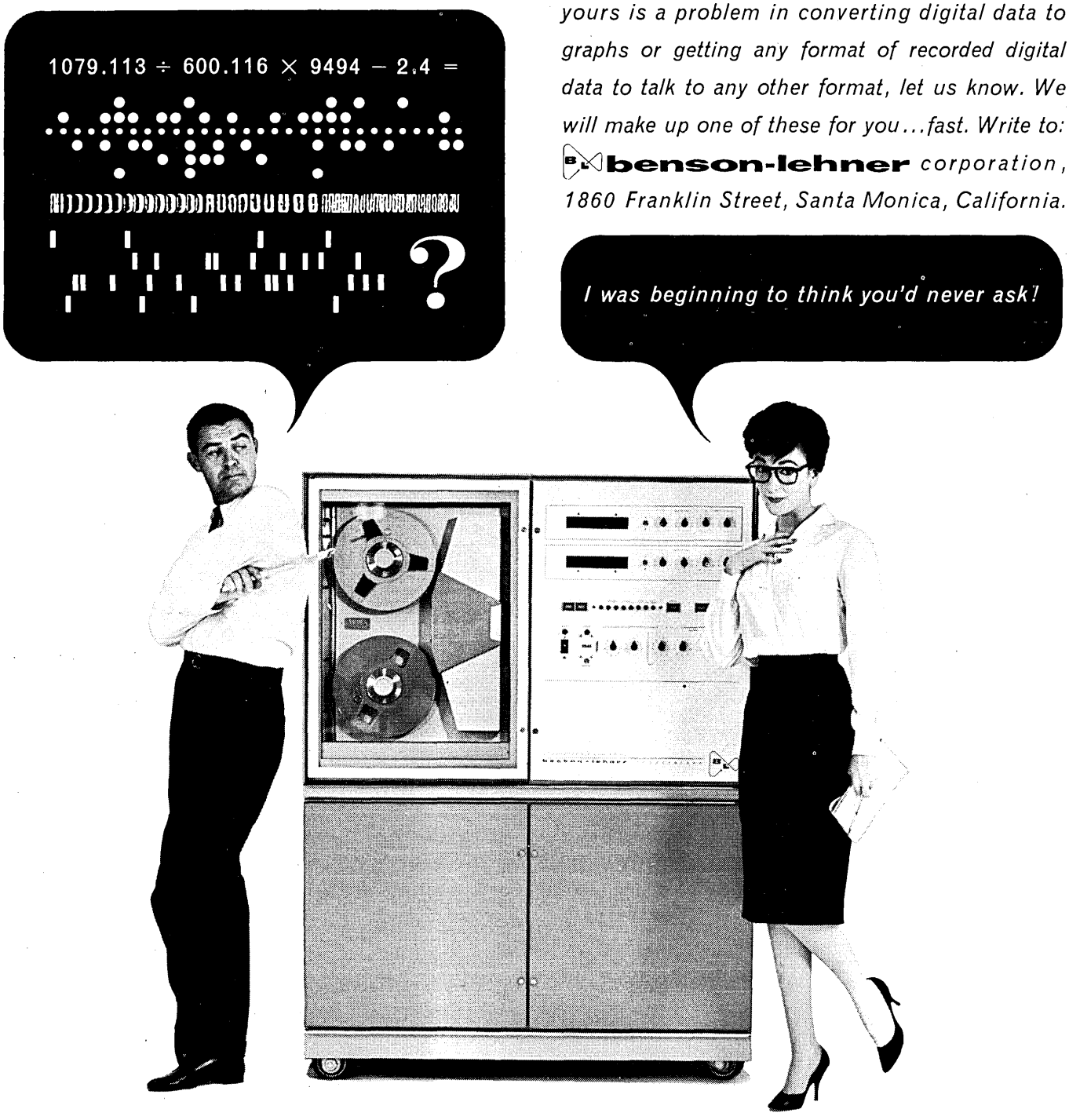
At the New York meeting, Jerry Koory, of SHARE and SDC, the provisional chairman and prime organizer of the JUG, stepped back in favor of the election of the following executive board: W. A. Smith, Jr. (POOL, Lehigh University), chairman; Harry Cantrell (SHARE, G.E.), vice-chairman; D. B. Houghton (UNIVAC Users Assoc., Westinghouse), Secretary; Zyg Jelinski (RUG, Autonetics), member; M. H. Perstein (SHARE, SDC), member.

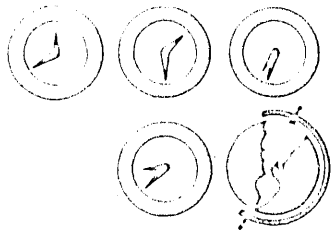
The JUG Communications Committee presented a report on Cobol, and Herb Bright, Chairman of the X-3 Committee on Data Processing of the American Standards Association, clarified the nature of ASA computing standards activity.

Present at the meeting were representatives of member groups who had previously met in August at Milwaukee, where they had decided that the JUG organization be formed, and where they had received an invitation from the ACM to have the JUG organize within the ACM. A first meeting had been held in San Francisco in May, last year.

Nothing is lost in the translation with Benson-Lehner's new Machine Language Translator. What is gained, however, with this new solid-state instrument is the ability to translate machine languages. The Translator will automatically convert data in one digital code or form to, 1) output in another digital code or form, or 2) to a signal suitable for input into any Benson-Lehner Electroplotter or similar device. Translation speeds are dictated by the input and/or output modes, i.e., operating speed in conversion of digital magnetic tape to graphs is limited by the speed of the graphing instrument. If yours is a problem in converting digital data to graphs or getting any format of recorded digital data to talk to any other format, let us know. We will make up one of these for you...fast. Write to:

benson-lehner *corporation, 1860 Franklin Street, Santa Monica, California.*





DATAMATION *news briefs*

BURROUGHS INSTALLS 100 SAGE DP SYSTEMS

One hundred data processors in the U. S. Air Force's SAGE program of North American air defense have been installed by Burroughs Corp. It represents about a million dollars in electronic equipment, spare parts, manuals and logistic support.

The equipment, called the AN/FST-2, is the chief building block for SAGE, a continent-wide reader and data processing network.

M-H EXPANDS SERVICE; TO HIRE 400 ENGINEERS

Minneapolis-Honeywell's Electronic Data Processing Division plans to employ 375 to 400 electronics service engineers in a major expansion of its field service and systems test operations. The engineers will receive more than six months training in the divison's field service school in the check-out, programming, operation and maintenance of the 800 and 400 EDP system.

CIRCLE 83 ON READER CARD

SYSTEMS SESSION SLATED FOR RESEARCH CONFERENCE

Included in the schedule of the forthcoming Business Research Conference March 29-30 at Roosevelt University is a special session devoted to systems research in the sixties. Slated for March 29th from 1:45 to 3:15, the session topics and speakers will be: "The Future of Magnetic Ink Characters in E.D.P. Systems" by Donald E. Wagner, Burroughs Corp.; "Thermo-plastic Recording Affecting Future Computers" by P. J. McGoldbrick, General Electric Co.; "Optical Character Recognition, Devices and Techniques" by John Glenn, Farrington Electronics, Inc.; and "Electronic Data Processing by Transistors and Tunnel-Diodes" by R. J. Neil, RCA.

SET OF POLYNIMIALS AVAILABLE FROM SBC

These polynomials are convenient for digit computers and can be easily modified for newly published or proprietary heat of formation data. They are available in printed form or on IBM cards. The original entropy, enthalpy and specific heat data from the JANAF tables are also available on IBM cards.

CIRCLE 108 ON READER CARD

SMALL COMPUTER FEATURED AT FIRST ACM EXHIBIT

Early reports on the International Data Processing Exhibit to be held in conjunction with the 6th National Meeting of the Association for Computing Machinery, September 6-8, 1961, at the Statler Hilton Hotel in Los Angeles, indicate that highlight of the show will be the number and respective advanced characteristics of the smaller high performance computers. The conference this year will launch the first industry exhibit sponsored by ACM.

Floyd Sherman, chairman of the exhibits, stated that of the 8,000 representatives of industry, government and academic institutions on the organization's to be in attendance.

MINIATURE MEMORY DRUM EMPLOYS 'FLOATING HEADS'

A miniature memory drum that can spin indefinitely and store information for its parent computer within its baseball-size, cylindrical frame has been developed by Sperry Gyroscope Co.

The drum, which can store information at 600 bits to the inch, achieves this capacity by using "floating heads" to pick up and record data. Another feature of the drum is its so-called "one-word loop," which enables a computer to use information virtually as fast as it receives it and deposits it on the drum.

CIRCLE 110 ON READER CARD

ELECTRO RADIATION TO HIRE VACUUM TECH

The acquisition of Vacuum Technology Laboratories of Van Nuys and the change of its name to Vacuum Technology, Inc. was disclosed by Donald B. Prell, president of Electro Radiation, Inc. of Santa Monica, Calif. Fred P. Ernest former owner of the company will remain as president and director of engineering and will be joined by Peter K. Worsley as vice president and genreal manager. Worsley was formerly manager of applications engineering with Elector Radiation, Inc. and prior to that he was in charge of the research department of the Benson-Lehner Corp.

POLYNOMIALS AVAILABLE

The San Jose Datacenter of the Service Bureau Corp. has available a complete set of polynomials based on the JANAF Interim Thermo-chemical Tables, The Dow Chemical Co., December 31, 1960.

✓ The B. F. Goodrich Company has announced the installation of a 7070 and a 1401 in their Akron headquarters. The firm is planning full utilization of the system in all major applications related to sales activity.

CIRCLE 111 ON READER CARD

✓ Use of a computer system with a magnetic tape memory in the processing of college entrance examinations and other nationwide testing programs was announced by RCA. A 501 is

PERMUTATION INDEXING PROGRAM DELIVERED TO BELL

Computer Usage Company, of New York City has delivered to Bell Telephone Laboratories, Murray Hill, N.J., a program to perform permutation indexing of technical reports on an IBM 7090. The program was written in symbolic assembly language and uses the Bell Laboratories BE-SYS-3 Monitor System.

This program, written to the specifications of the Bell Laboratories Technical Information Libraries, provides for a printout with a maximum of 120 characters in each index line. It also inserts in any vacated line space the title portions shifted out of line limits as a result of index word position. Treatment of multiple line titles, which are fairly frequent in Bell Laboratories, reports, received special attention. The complete program output also includes a full bibliographic listing of the reports, and author index, and a project number index. The program provides for a list of approximately 500 non-significant index entry words. Provision is also made for the periodic perparation of cumulative indices.

CIRCLE 109 ON READER CARD

now being employed at the Princeton headquarters of the Educational Testing Service.

CIRCLE 112 ON READER CARD

✓ Universal Data Processing Equipment, Inc., producer of control panels for programming data processing machines in South River, N.J., has become an autonomous subsidiary of Dashew Business Machines, Inc., Los Angeles. Raymond S. Richter and Joseph R. Infante will continue to operate the South River facility.

✓ Navy contracts totaling $3,592,460 have been received by the Remington Rand Univac Military department. These contracts include production of peripheral equipment for the Naval Tachtical Data System continuing work on the "software" phase of the program, including programming and system planning.

✓ Metropolitan Life Insurance Co. has contracted with Minneapolis-Honeywell Regulator Co. for the purchase and installation in it home office in New York of two H-800 computer systems. The first system is scheduled for delivery in May 1961.

CIRCLE 113 ON READER CARD

✓ Delivery of the first random access, mass memory device by an independent equipment supplier to the electronic computer industry has been announced by the Bryant Computer Products Division of Ex-Cell-O Corp. The device is a magnetic disc file.

CIRCLE 114 ON READER CARD

✓ For the 1,000th consecutive business day, Pacific Mutual Life Insurance Co has updated each of its 350,000 insurance policies on a Univac II. The firm's daily processing cycle, an average of 15,000 transactions are handled during each 7½ hour run.

✓ The Research Center of the American Can Company is using a G-15 computer to correlate data gathered in 90-day animal feed tests. Purpose of the tests is to determine possible toxicity in food additives and package components.

✓ A group of ACM members have formed the Atlantic County Computer Association. This association has petitioned the executive council of the ACM to become an active chapter. Yale Grayson was elected chairman and Stephen Pardee, vice president.

✓ Laboratory For Electronics, Inc. and Eastern Industries, Inc. have entered into a merger agreement. Un-

A Step Ahead of the State of the Art in ***Data Transmission***

Direct computer input from anywhere

at 2400 bits per second... over regular phone lines

A single computer can serve all points in a widespread organization – *directly* – with General Dynamics/Electronics High-Speed Data Transmission Systems. Data from a network of offices, plants, stations, warehouses or other points can be fed into the central computer over regular telephone lines . . . at 100 fully punched cards per minute, or at 350 seven-bit characters per second for magnetic tape. And results can be sent back . . . as they're processed . . . since either terminal can send or receive.

Accuracy? Highest yet, due to a special error detecting code and a unique method of *dual transmission.*

Here are some of the possible combinations. Direct computer entry from tape or cards. Card to card. Tape to tape. Card to tape. Tape to card.

Other permutations utilize paper tape, buffer systems, or the General Dynamics/Electronics High-Speed Communications Printer . . . which can print direct readout "hard" copy at 3500 words per minute from magnetic tape when used with this system.

Modularized, solid-state construction is used exclusively in all systems for utmost reliability, accuracy, low upkeep costs and minimal down time.

For more information about the business, scientific and military applications of General Dynamics/Electronics Data Transmission Systems write for the illuminating facts.

Engineers and scientists interested in challenging opportunities are invited to send résumés to Manager, Engineering Employment.

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MILITARY PRODUCTS DIVISION ROCHESTER 3, N. Y.

CIRCLE 18 ON READER CARD

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der the terms of the agreement, Eastern would be merged into LFE and one share of LFE would be issued for every three shares of Eastern outstanding stock. Eastern would operate as a division of LFE.

✓Minneapolis-Honeywell's EDP division disclosed plans for a new plant employing 350 to 400 people at Lowell, Mass., to manufacture components for the Honeywell 800 and 400 systems. The new facility will make available 54,000 sq. ft. of floor space in a nine story building.

✓A newly established consulting engineering firm, S. Himmelstein and Co., specializing in magnetic recording systems and computer peripheral equipment, has opened offices at 3300 W. Peterson Ave., Chicago. According to Himmelstein, the firm is prepared to "assist equipment manufacturers with engineering and design problems, provide advise to equipment users and serve as a contributor to large scale technical proposals."

✓Laboratory For Electronics has been awarded a new contract by G.E.'s Ordnance Dept. for design, documentation and prototype production of analog computer modules for use in Polaris missile submarines. Delivery of the transistorized modules will begin early next year.

✓A $90,000 thermal analog computer is under construction by Computer Engineering Assoc. for Douglas Aircraft to aid in solving missile thermal problems on Saturn, Skybolt and Nike Zeus programs. In addition to other components, 20 thermal radiation units are being designed for this computer.

✓Digitronics Corp. has opened a west coast regional office at 1058 E. 1st St., Santa Ana, Calif. Gordon Stillson was appointed manager.

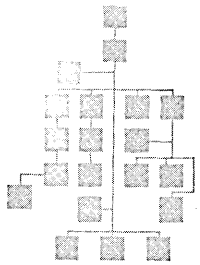
✓Installation of an IBM 1620 has been announced by Caywood-Schiller, Assoc., Chicago. The 1620 will perform its assignments in military, engineering and industrial fields.

✓A Honeywell 800 will be delivered early in '63 to the Northern Illinois Gas Co. First applications include billing and accounting for the company's 800,000 customers. Payroll, file maintenance for approximately 110,000 stockholders, and accounting for plant investments are other applications to be scheduled.

✓Teleprinter exchange service between the U.S. and India has been opened by RCA, bringing to 58 the total of overseas countries available to the 50,000 TWX subscribers. Initial service will be limited to Bombay and Ahmedabad.

✓C-E-I-R now has the first 1,000 1pm printer operating on a service basis, that company declared in a recent release. An Anelex printer has been installed in the Arlington Research Center. (In a burst of inspiration all too rare these days, someone at C-E-I-R put the two page release announcing the installation on cards, through a converter on to tape . . . and the printer printed 200 releases in 400 seconds.

✓General Electric intends to spend $4 million in an expansion program which will add approximately 190,000 sq. ft. to its Computer Department manufacturing and headquarters facility located just outside Phoenix. Construction is to begin in April; occupancy is expected in December.



people moving up in DATAMATION

★ Dr. Gilbert W. King has been named IBM director of research. He will be responsible for research activities across the nation under his direction. He joined the firm in 1958 as a consultant to the director of research.

★ S. R. Wyzenbeek has been named manager of marketing operations for the data processing divisions of Consolidated Electrodynamics Corp., Pasadena. He will be responsible for in-plant marketing support activities of the Datalab, Data Recorders, and Transducer divisions.

★ Edward W. Warnshuis has been appointed manager of advanced planning at the Data Systems Laboratory, Litton Systems, Inc., Canoga Park, Calif. Prior to joining the laboratory, he was a director of applications engineering at Nortronics.

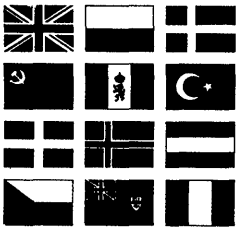
★ Computer Systems, Inc., Monmouth Junction, N. J., have announced three additions to its applications engineering staff. Joe M. Nelson was named chemical engineer in the research and development section. Willard S. Reaves has been assigned to applications, along with David J. Berkery, formerly with Curtiss Wright Corp.

★ R. K. Lockhart has been designated manager, development engineering, for a U.S. Navy ultra high-speed computer project. Lockhart is with the RCA engineering group assigned to the project.

★ Kenneth L. Snover has been named general plants manager of Ilion-Utica plants for the Remington Rand Univac Division of Sperry Rand Corp. He previously was with the International Business Machines Corp. as director of manufacturing control of the General Products Division. He will be responsible for all manufacturing operations at the plant.

★ Richard F. Barnes has been appointed manager of product planning and marketing research for General Electric Company's Computer Department, Phoenix. He will be responsible for planning current and future GE computer products, marketing research studies to forecast trends of market needs, and analysis of business and economic conditions.

★ Thomas H. Tatham has been named product engineering chief, Omer F. Hamann has been appointed chief of applied research, and Robert M. Peterson chief of design requirements of Ryan Transdata, Inc., San Diego. The firm specializes in the development of data and image systems.



DATAMATION *abroad*

U.S.S.R.

A general purpose electronic computer, the Kiev, has been manufactured by specialists of the computing center of the Ukrainian Academy of Sciences. The machine can be employed to solve systems of differential equations involved in the study of the nucleus to calculate statistical control tables, and also to solve various problems connected with the selection of the best variation from a large number of admissible ones. It can also be used for translation from one language into another, for automatic programming, and other purposes. A feature of the machine is that all its sections work independently, making it possible to modernize the entire unit all the time... A Ural-2 computer is planned for installation at the Arctic and Antarctic Institute in Leningrad to forecast weather 8-9 months ahead, Soviet radio reported.

LATVIA

A large computer center is reported to have been established under the Latvian University. A BESM-2 electronic computer has been installed. The computer's memory system has 2,048 cells each holding a figure of 40 numerals. The center will serve research institutions and industry in the Soviet Baltic Republics, and is the basis of a Mathematical Research Institute being set up at the University.

ENGLAND

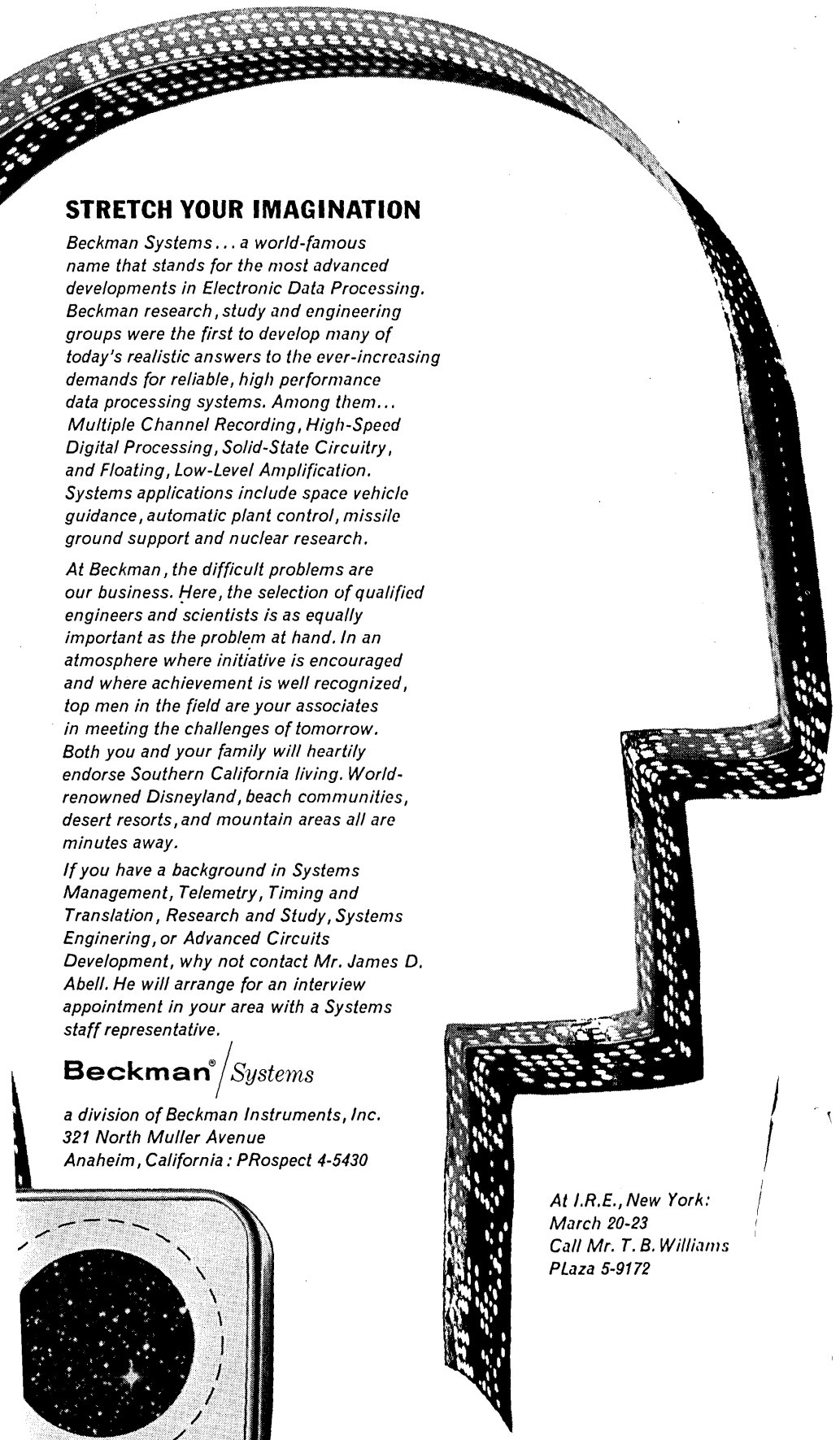
Over one hundred National-Elliott digital computers have been ordered from Elliott-Automation, England. Thirty of them were delivered during 1960 and the company starts 1961 with orders on hand for 25 more. Nearly half of all the orders received have been for the 803 medium-sized digital computer. Orders were received from six nations outside the United Kingdom.

SWEDEN

The Royal Swedish Air Force has placed an order with Facit Electronics AB for a special purpose data processing machine, to work as a simulator for the test and final development of an electronic air defense system. The solid state system will be able to work in real time and should be guided by analog-digital converters. A feature of the system is its buildup of two independent processors which are intimately connected together in their central units. Both machines may be tied to the input-output units and to large external data files with short access time.

WEST GERMANY

Thompson Ramo Wooldridge, Inc., which together with the French Radio Co. founded the European Company for Electronic Automation, has received a contract to fully automate the Analin and Soda Plant in Bade Province for chemical products at Ludwigshafen. Outside of the U.S.A., French reports state that it will be the first automatization of a whole plant from a computer. CAE builds the RW-300 in France for the European Common Market countries.



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Beckman Systems... a world-famous name that stands for the most advanced developments in Electronic Data Processing. Beckman research, study and engineering groups were the first to develop many of today's realistic answers to the ever-increasing demands for reliable, high performance data processing systems. Among them... Multiple Channel Recording, High-Speed Digital Processing, Solid-State Circuitry, and Floating, Low-Level Amplification. Systems applications include space vehicle guidance, automatic plant control, missile ground support and nuclear research.

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WJCC IN 1961 MAY ATTRACT

THE 9th ANNUAL Western J scheduled May 9-11 at the A Angeles is expected to be the la Walter F. Bauer, General Chairn

Over fifty-five firms will occu ment and displays illustrating th tending Man's Intellect." The e dicates the great interest in a within the industry, R. H. Hill, out.

Attendance at the 1960 Cor topped 2,000 and registrations ence and exhibit this year in proach 3,000 because of increas registration Dr. Bauer predicted has been spurred by industry's and nuclear energy offer the gr panding economy of the future.

Ten sessions will be held on tern recognition, automata theor lem solving and learning mach ming, modeling human mental control, simulation, computers large computer systems. Analo also scheduled.

More than 60 papers will Leondes, program chairman, sa hotel.

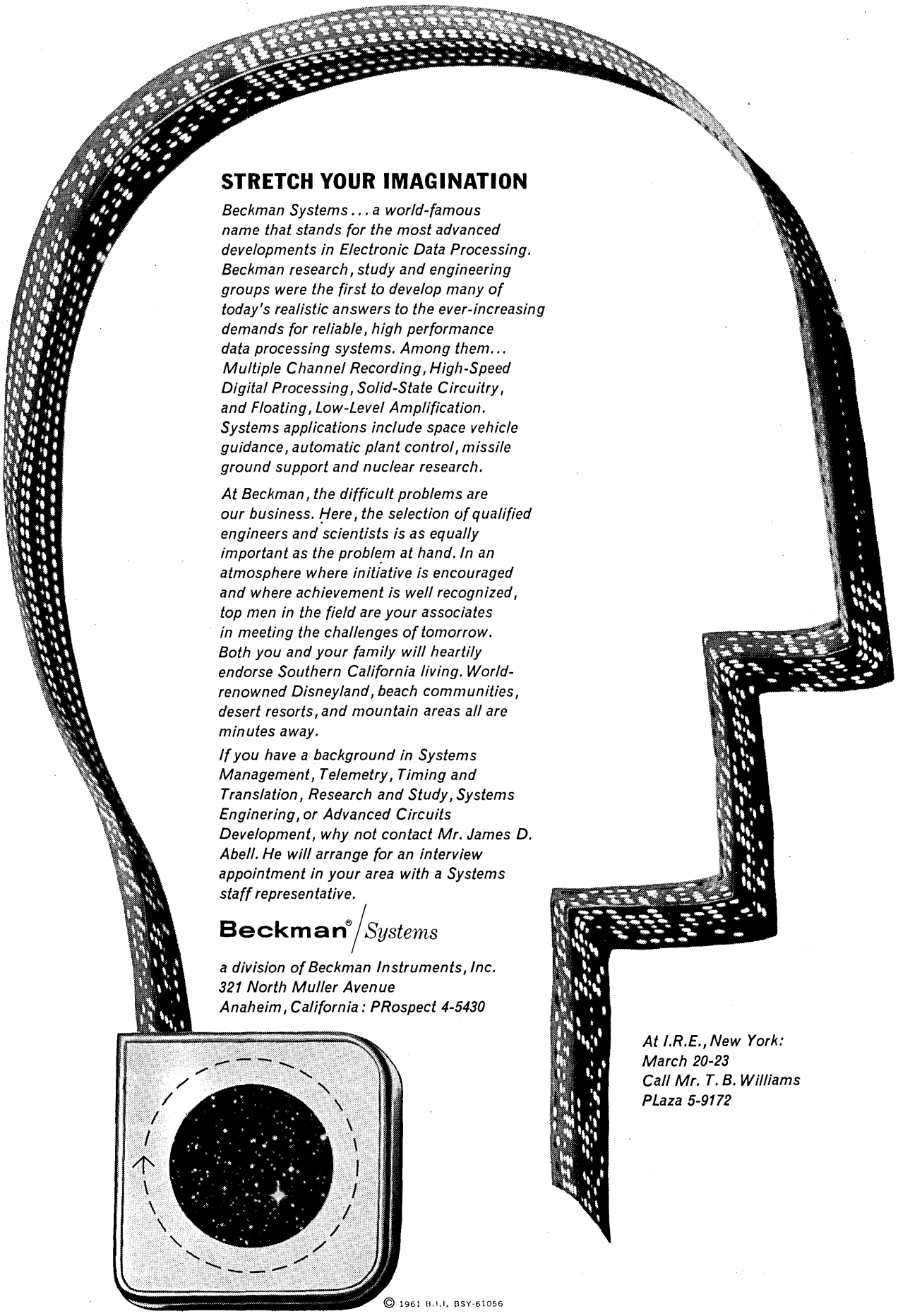
DATAMATION's April issu WJCC section to provide com erage. Details concerning the p cial events plus messages from and program chairman written zine will be presented.

Thomas J. Watson

Thomas J. Watson, Jr., preside Machines, and Dr. Simon Ra of Thompson Ramo Wooldrid speakers at the 9th Annual W ference, Dr. Walter F. Baue 1961 meeting, announced.

Watson will provide the l session of the three-day confe discuss "Future Application c luncheon speaker May 10 at th

The WJCC is sponsored puter Committee representin gineers, the American Institut the Association for Computin



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WJCC IN 1961 MAY ATTRACT 3,000

THE 9th ANNUAL Western Joint Computer Conference scheduled May 9-11 at the Ambassador Hotel in Los Angeles is expected to be the largest yet held, reports Dr. Walter F. Bauer, General Chairman.

Over fifty-five firms will occupy 105 booths with equipment and displays illustrating the conference theme, "Extending Man's Intellect." The early sale of all booths indicates the great interest in and need for information within the industry, R. H. Hill, exhibits chairman, pointed out.

Attendance at the 1960 Conference in San Francisco topped 2,000 and registrations for the technical conference and exhibit this year in Los Angeles should approach 3,000 because of increasing interest in computers, registration Dr. Bauer predicted. This interest, he added, has been spurred by industry's realization that computers and nuclear energy offer the greatest potential for the expanding economy of the future.

Ten sessions will be held on information retrieval, pattern recognition, automata theory and neural models, problem solving and learning machines, automatic programming, modeling human mental processes, computers in control, simulation, computers in communications and large computer systems. Analog computer sessions are also scheduled.

More than 60 papers will be presented, Dr. C. T. Leondes, program chairman, said, in sessions held at the hotel.

DATAMATION's April issue will contain a special WJCC section to provide complete pre-conference coverage. Details concerning the program, exhibits and special events plus messages from the conference chairman and program chairman written expressly for this magazine will be presented.

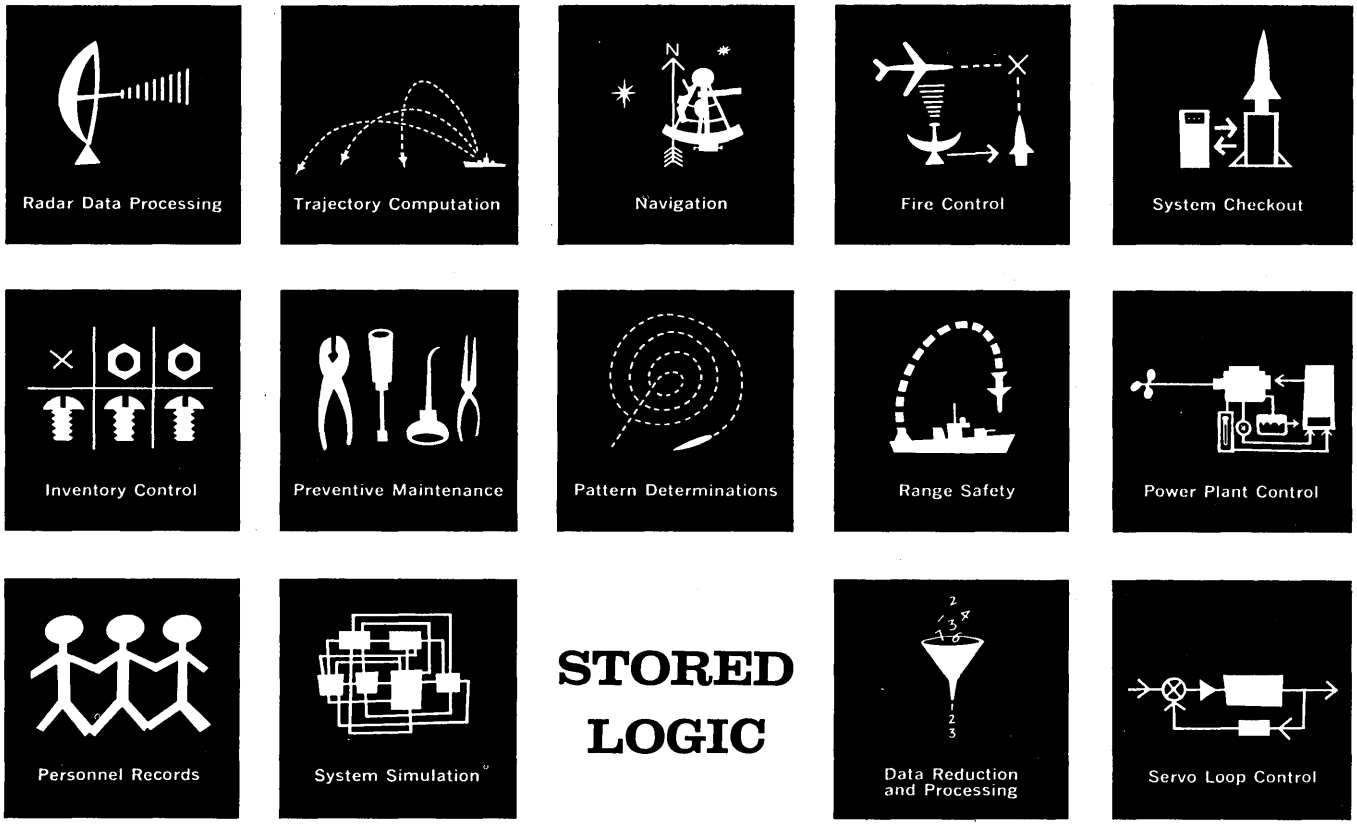
Thomas J. Watson

Dr. Simon Ramo

Thomas J. Watson, Jr., president of International Business Machines, and Dr. Simon Ramo, executive vice-president of Thompson Ramo Wooldridge, Inc. will be the featured speakers at the 9th Annual Western Joint Computer Conference, Dr. Walter F. Bauer, general chairman of the 1961 meeting, announced.

Watson will provide the keynote address at the first session of the three-day conference, May 9. Dr. Ramo will discuss "Future Application of Electronic Intelligence" as luncheon speaker May 10 at the Ambassador Hotel.

The WJCC is sponsored by the National Joint Computer Committee representing the Institute of Radio Engineers, the American Institute of Electrical Engineers and the Association for Computing Machinery.



How to get a computer to think it's a one-man gang

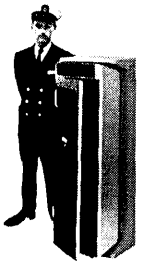
Most computers are pretty fussy about the kind of problems they are willing to handle. While it's true that a "business" computer can be made to do "scientific" problems, and vice versa, every experienced computer user knows it's no simple matter to get a machine to accept such a change of character gracefully. Besides the fancy reprogramming involved, the computer is likely to be inefficient and uneconomical at solving problems it wasn't designed for.

From the user's point of view, the "ideal" computer is a *multiple-purpose* machine that can be used *efficiently* in many different types of applications, and at no higher cost than a computer intended primarily for any one of these applications.

From the programmer's point of view, the "ideal" machine is one with a flexible set of instructions that can be easily manipulated to fit just about any kind of problem that comes along. Both programmer and designer are likely to agree that the most practical way to realize this "ideal" computer is by using the *stored logic* principle.

Stored logic concepts developed by Ramo-Wooldridge are being used in the AN/UYK-1, a low-price, multiple-purpose Navy computer intended for shipboard use. In the Ramo-Wooldridge approach, stored logic permits the user to select a word length, order structure and instruction repertoire especially suited to the problem at hand. These normally "wired in" characteristics are specified by data stored in the computer's memory and may be changed during the normal loading procedure without hardware modification.

The AN/UYK-1 "Stored Logic" Multiple-Purpose Computer takes its place alongside the RW-400 "Polymorphic" data processing system as an outstanding example of the kind of advanced work in computer design which has characterized Ramo-Wooldridge over the past six years. Senior programmers are urgently needed to help develop a large "software" package for commercial and military applications of R-W *stored logic* computers, to prepare programs for the polymorphic data processing system, and to work on challenging applications engineering problems. If you are qualified and interested in a career position in this field, contact Mr. Frank Nagel at



AN/UYK-1 "Stored Logic" Multiple-Purpose Computer

RAMO-WOOLDRIDGE

A DIVISION OF

THOMPSON RAMO WOOLDRIDGE INC.

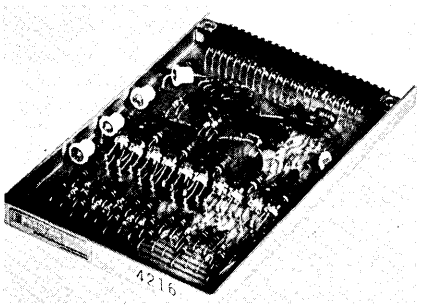
8433 FALLBROOK AVENUE · CANOGA PARK, CALIFORNIA

CIRCLE 20 ON READER CARD

new products in DATAMATION

flip-flop circuits

A new series of quadruple flip-flops and capacitor-diode gating circuits have been added to the line of 500 kc static-logic system building blocks. The circuits permit such applications as



parallel-serial conversion, up counting, down counting, up-down counting, binary-coded-decimal counting storage, and set-reset applications. DIGITAL EQUIPMENT CORP., Maynard, Mass. For information:

CIRCLE 200 ON READER CARD

paper tape reader

The model 350 high speed punched paper tape reader was designed for use with the 1604 and 160 computers. It is a photoelectric reader which reads 5, 7 or 8 level punched paper tape at the rate of 350 characters per second. The reader uses solid state components throughout and is available either with or without reading circuitry. A feature of the reader is the reading head which employs special windows which channel the light to the photocells. The use of the windows results in a smooth reading surface. The unit can be programmed to operate start/stop a character at a time, or to read continuously stopping after receipt of a stop code prior to the next character, operating at 350 characters per second in either mode. CONTROL DATA CORP., 5806 W. 36th St., Minneapolis 16, Minn. For information:

CIRCLE 201 ON READER CARD

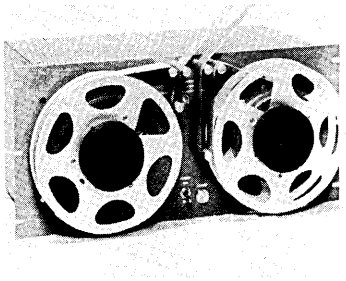
random-access memory

A new high-speed, electrically alterable random-access memory employs multiaperture ferrite cores and fully transistorized circuitry. It is capable of non-destructive readout and non-volatile storage and so does not lose stored information either during readout or as a consequence of power shutdown or failure. A 1024-word prototype model has been operated at an 0.6 microsecond cycle time with access time of 0.20 microsecond. The model and its memory core stack, drivers, switches, timing circuitry, and sense amplifiers has been operated over wide temperature excursions. As an extension of the development, the firm is presently engaged in developing a 4096-word, 50-bit, electrically alterable, non-destructive and non-volatile instruction memory with tape loading equipment. WESTINGHOUSE ELECTRIC CORP., Box 2278, Pittsburgh 30, Penna. For information:

CIRCLE 202 ON READER CARD

automatic tape spooler

The TS-400 automatic tape spooler is the first of the series of accessory equipment for use with the 400-series unidirectional and bidirectional



tape readers. The TS-400 is a bidirectional winding automatic tape spooler that may be used with any tape reader. The unit uses standard NAB reels up to 8 in. in diameter for the handling of paper or mylar tape. The tape is spooled automatically in either forward or reverse direction. Winding in a particular direction is controlled by a tension arm which senses slack in the tape. ELECTRONIC ENGINEERING COMPANY OF CALIFORNIA, 1601 E. Chestnut Ave., Santa Ana, Calif. For information:

CIRCLE 203 ON READER CARD

tape conversion equipment

A family of magnetic tape translation devices has been developed to provide computers with lower-cost on-line input conversion of foreign tape formats and signals. Using a new approach, the manufacturer has developed custom equipment, highly tailored to the needs of individual computers and tape transports. The approach is to translate tapes by making use of the reading computer's ability to edit the information, converting pulse shapes, format, and timing into a form exactly equal to that normally supplied by the computer's own magnetic tape readers. AUERBACH ELECTRONICS CORP. 1634 Arch St., Philadelphia 3, Penna. For information:

CIRCLE 204 ON READER CARD

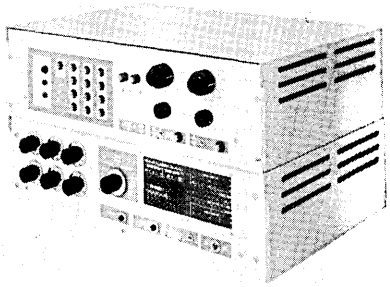
magnetic tape tensiometer

The model K-44 magnetic tape tensiometer was designed to allow measurement and recording of both the steady-state and transient tensions experienced by magnetic tape during it use in tape recorder transports. Both ½ and ¼ in. tapes can be accommodatbe inserted at any point in a tape path having a minimum clear area of ¾ in. x 3/16 in., and a minimum clearance between the recorder deck and inner tape edge of ¼ in. The instrument has a useful range from 0 to 8 lbs. When the tensiometer is properly installed and balanced its useful dynamic range exceeds 60 decibels. The instrument will respond to tension transients having rise time of 1 milliseconds or less. GENERAL KINETICS INC., 2611 Shirlington Rd., Arlington 6, Vir. For information:

CIRCLE 205 ON READER CARD

decimal converter

A new analog-to-digital converter, the decimal converter model F, converts potentiometer input resistances to decimal output and is compatible for



operation with any equipment that has a maximum output resistance of 5,000 ohms. It is used with oscillogram record readers, film readers, analog computers, production testing and process control systems. The basic circuit of the new converter is a resistance bridge, designed to sense the position of an input potentiometer and convert it to decimal form. The input resistance potentiometers form one arm of the bridge and the balancing arm is composed of coded decimal resistances. BENSON-LEHNER CORP., 11930 Olympic Blvd., Los Angeles 64, Calif. For information:

CIRCLE 206 ON READER CARD

Purdue—April 12, 13

Information, Decision Symposium Planned

THE IRE PROFESSIONAL GROUP on Information Theory will join with Purdue University in co-operating the Third Symposium on Information and Decision Processes to be held April 12 and 13, 1961 at Purdue University, Lafayette, Indiana.

The following is a list of speakers and the subjects to be presented:

Richard Bellman, Mathematician, The Rand Corporation –
"Theory of Dynamic Programming"

Tjalling C. Koopmans, Cowles Foundation for Research in Economics at Yale University, currently visiting at Harvard University –
"Axioms for Persistent Preference"

Bradford Dunham, International Business Machines Company –
"Exploratory Mathematics by Machine"

Norbert Wiener, Institute Professor and Professor of Mathematics, Emeritus, Massachusetts Institute of Technology –
"Mathematics of Self-Organizing Systems"

Kai Lai Chung, Professor of Mathematics, Syracuse University –
"The Ergodic Theorem of Information Theory"

Sigeiti Moriguti, Professor, Faculty of Engineering, University of Tokyo, currenty visiting at Columbia University –
"Further Results in the Theory of Numerical Convergence"

L. J. Savage, Professor of Mathematics, University of Michigan –
"Bayesian Statistics"

Howard Raiffa, Professor of Business Administration, Harvard University –
"Some Techniques for the Application of Bayes Decision Theory"

Paul F. Chenea, Head of the School of Mechanical Engineering, Purdue University, will address a banquet meeting.

The two previous symposia have been well attended by representatives of electronic industries, defense industries, the armed services and the universities. Out of these events came the recent book, "Information and Decision Processes" edited by Robert E. Machol, chairman of the forthcoming symposium, and published by McGraw-Hill. The program on April 12-13 will bring together a new group of eight speakers presenting a sampling of the approaches being taken by some of the most brilliant men in the field to the use of mathematics in the making of optimal decisions in exceedingly complex situations in various branches of engineering and the sciences.

The program will be of particular interest to those concerned with information theory, decision theory and mathematical statistics as well as those interested in operations research, systems engineering and related fields.

Complete information on the symposium may be had by addressing Dr. Robert E. Machol, School of Electrical Engineering, Purdue University, Lafayette, Indiana.

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Richard Bellman, Mathematician, The Rand Corporation –
"Theory of Dynamic Programming"

Tjalling C. Koopmans, Cowles Foundation for Research in Economics at Yale University, currently visiting at Harvard University –
"Axioms for Persistent Preference"

Bradford Dunham, International Business Machines Company –
"Exploratory Mathematics by Machine"

Norbert Wiener, Institute Professor and Professor of Mathematics, Emeritus, Massachusetts Institute of Technology –
"Mathematics of Self-Organizing Systems"

Kai-Lai Chung, Professor of Mathematics, Syracuse University –
"The Ergodic Theorem of Information Theory"

Sigeiti Moriguti, Professor, Faculty of Engineering, University of Tokyo, currenty visiting at Columbia University –
"Further Results in the Theory of Numerical Convergence"

L. J. Savage, Professor of Mathematics, University of Michigan –
"Bayesian Statistics"

Howard Raiffa, Professor of Business Administration, Harvard University –
"Some Techniques for the Application of Bayes Decision Theory"

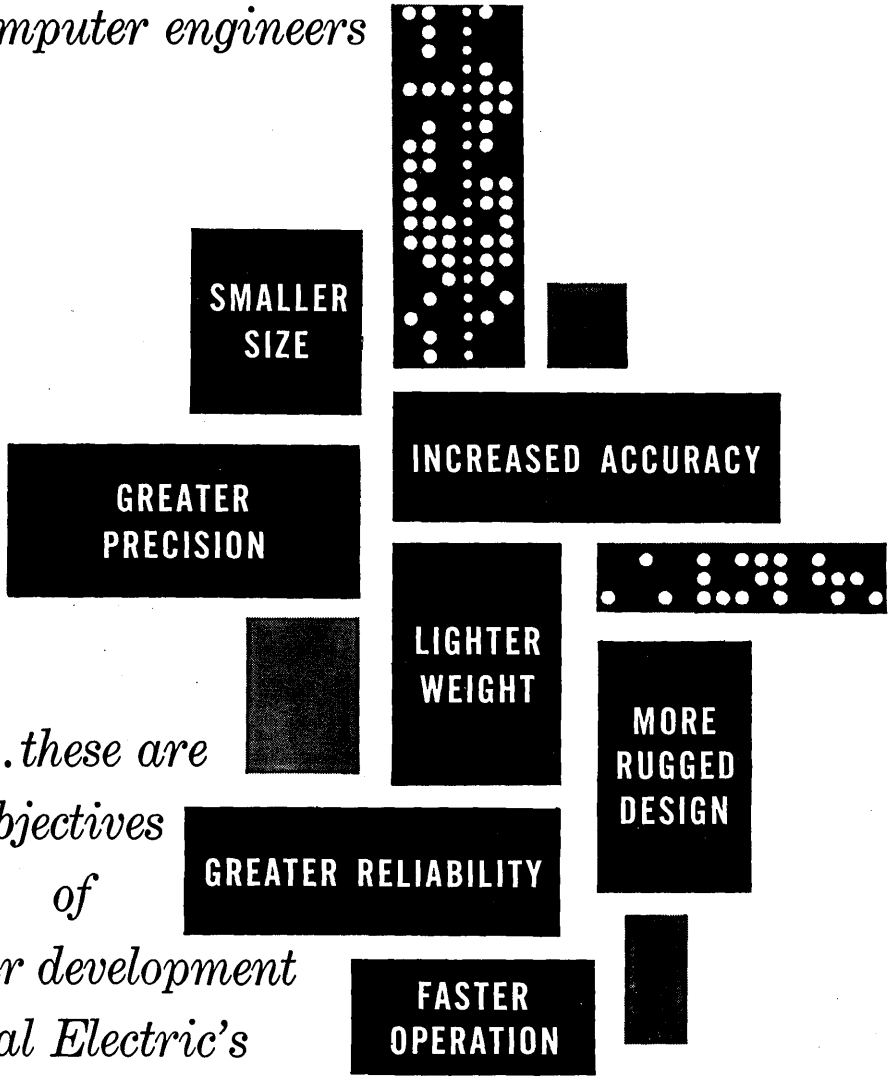
Paul F. Chenea, Head of the School of Mechanical Engineering, Purdue University, will address a banquet meeting.

The two previous symposia have been well attended by representatives of electronic industries, defense industries, the armed services and the universities. Out of these events came the recent book, "Information and Decision Processes" edited by Robert E. Machol, chairman of the forthcoming symposium, and published by McGraw-Hill. The program on April 12-13 will bring together a new group of eight speakers presenting a sampling of the approaches being taken by some of the most brilliant men in the field to the use of mathematics in the making of optimal decisions in exceedingly complex situations in various branches of engineering and the sciences.

The program will be of particular interest to those concerned with information theory, decision theory and mathematical statistics as well as those interested in operations research, systems engineering and related fields.

Complete information on the symposium may be had by addressing Dr. Robert E. Machol, School of Electrical Engineering, Purdue University, Lafayette, Indiana.

computer engineers



...these are objectives of computer development at General Electric's

Ordnance Department

Pittsfield, Massachusetts

The Ordnance Department of General Electric is undertaking a growing number of computer design and development projects. Utilizing advanced techniques in such fields as microminiaturization, cryogenics and thin film elements the continuing goal of this growing work program is major advances in the extension of computer capability. Areas of application include space, terrestrial and underwater navigation systems; missile inertial guidance and fire control systems.

At the present time there are a number of outstanding professional openings available to experienced computer engineers with the ability to:

- **CONVERT SYSTEM CONCEPTS AND EQUATIONS TO DIGITAL LOGIC AND ANALOG MECHANIZATION**
- **DESIGN MORE ACCURATE ELECTRO-MECHANICAL ANALOG ELEMENTS**
- **CONVERT LOGIC DESIGN AND MECHANICAL DIAGRAMS INTO DETAILED COMPUTER DESIGN AND EQUIPMENT**

Please forward your resume, including salary requirements, in complete confidence to W. B. Walker, Manager—Professional Relations, Dept. 56-MC.

ORDNANCE DEPARTMENT

OF THE DEFENSE ELECTRONICS DIVISION

GENERAL ELECTRIC

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Pittsfield, Massachusetts

CIRCLE 80 ON READER CARD

DATAMATION's FEATURE INDEX — 1960

JANUARY/FEBRUARY

MARCH/APRIL

MAY/JUNE

preparation of data in a form acceptable by digital computers is the topic of this article. A diagram of an automatic data handling system is included.

A Comparison of Computer Industries in the U.S. & the U.K. **pg. 51**

by Brian Pollard, Burroughs Corporation

Similarities and differences between the computer industries in the United States and England are highlighted in this one and one-half page evaluation.

JULY/AUGUST

Computing Power at Huntsville **pg. 18**

by S. A. Lanzarotta, Editor

A report on the test firing of a Saturn missile is included with a description of the computer facilities at the Huntsville base.

A re-evaluation of Generalization **pg. 25**

by R. C. McGee and H. Tellier, Hanford Atomic Products Operation

This five-page article deals with the background and progress that has been made in the field of generalization.

General Electric Announces 225 **pg. 44**

by Charles Katz, Manager of Programming research and Development, General Electric Computer Department, Applications Section

General Electric's entrance into the general purpose computer field with the GE-225 is reported. Specifications and applications are listed.

DP Standards Project Progressing **pg. 47**

This article covers the wide industry representation attracted by the x-3 program.

COMEX—For Information Transmission **pg. 51**

A new communications device which stores dc pulse generated by business machines such as typewriters is described in this report.

LFE Has New Storage Display System **pg. 67**

The article reports on the RASTAD data storage and display system offered by Laboratory For Electronics.

AFIPS Constitution Draft Now Under Consideration **pg. 69**

This is a letter of explanation by Harry H. Goode on a new constitution under consideration by the American Federation of Information Processing Societies.

CODASYL Emphasis Shifting to Development Committee **pg. 70**

by C. A. Phillips

This letter by Phillips is a progress report on the activities and development of COBOL.

SEPTEMBER/OCTOBER

A Progress Report on Machine Intelligence **pg. 10**

by Daniel D. McCracken, Consultant

An evaluation of the progress made in the field of machine intelligence is reported in this four-page feature.

C-E-I-R Brings STRETCH To Los Angeles **pg. 18**

The bringing of a STRETCH to Los Angeles, its intended application and a report on the number of systems in existence is the topic of discussion in this article.

A News Report on German Computing **pg. 27**

by Prof. Dr. Alwin Walther, Darmstadt Technical College

This report includes a brief history of German computing plus a survey of a number of machines on the market.

Planning the RCA 601 System **pg. 30**

by Arthur S. Kranzley, Manager, Product Planning & EDP Methods, RCA Electronic Data Processing Division

A four-page article on the RCA 601 contains a system description, system features, input-output transfer channels and addressing flexibility sections. Charts and photographs are included.

Postal System Input Buffer Device **pg. 42**

by Robertson Osborne, Joe & Gil, Burroughs Corporation

A satire on the type of involved article that is emerging from the growth of the electronic industry.

An Explanation of ALGOL 60 **pg. 46**

by Dr. Ivan Flores, Consultant, Dunlap & Associates

This article discusses the concepts which must be provided for in a problem language, and specifically in ALGOL 60.

A Customized Computer **pg. 70**

by Francis J. Alterman, Manager, Digital Computer Laboratory, Mechanical Division of General Mills

Specifications, features and applications are stated in this two-page report on a new machine from General Mills.

NOVEMBER/DECEMBER

A Chart for EDP Experts **pg. 13**

by Charles W. Adams

A four-page computer characteristic chart has complete listings of general characteristics, internal speed, magnetic tape, peripheral equipment and special features. Included in the chart are 43 computer types.

NCR To Produce Large, Small 315's **pg. 36**

This article gives a breakdown of the types of 315's that National Cash Register Co. now has available.

Gerber Develops Digital Plotter **pg. 38**

by H. Joseph Gerber, President, Gerber Scientific Instrument Co.

This report presents the specifications and concept of a new digital plotter.

Eastern Joint Computer Conference **pg. 41**

Ten pages are devoted to the EJCC; its exhibitor list, technical program, and featured speakers and events.

An Explanation of ALGOL 60 **pg. 65**

by Dr. Ivan Flores, Consultant, Dunlap & Associates, Inc.

This is the second in a two-part series by Dr. Flores dealing with an explanation of ALGOL 60.

Northwest Joint Computer Conference **pg. 72**

by W. J. Stadler, Boeing Airplane Co.

A summary report on the activities and happenings at the Northwest Joint Computer Conference.

Small Computer in a Large Computer Environment **pg. 87**

by Frank Cole, Missiles & Space Systems, Engineering Department, Douglas Aircraft Co.

This two-page article gives a picture of the atmosphere and applications computers are involved in at Douglas Aircraft Co.

Reducing Human Error in ADP Systems **pg. 91**

by John B. Teeple, Member Technical Staff, Ramo-Wooldridge Div., Thompson Ramo Wooldridge, Inc.

This paper outlines some human engineering "rules-of-thumb" which, when applied, will result in a more effective system through reduction of the probability of error.

new DATAMATION literature

TRANSISTOR TESTER: A new four-page, bulletin describes semi-automatic component tester for testing and classification of transistors at speeds of 30 to 60 tests per second. Typical test specifications, flow diagram, and test circuits are shown. MONITOR SYSTEMS, INC., Fort Washington Industrial Park, Fort Washington, Penn. For copy:
CIRCLE 260 ON READER CARD

MAGNETIC TAPE INSTRUMENTATION: Bulletin 3400 describes a new concept in magnetic tape instrumentation. Reel to reel and loop operation with the same machine is described in the publication which also includes specifications and photos. SANGAMO ELECTRIC CO., Springfield, Ill. For copy:
CIRCLE 261 ON READER CARD

AUTOMATIC PROGRAMMING: Several of the important programming systems for the G-15 digital computer are described in a new eight-page brochure. The publication describes the general characteristics of these systems and includes partially coded illustrations of typical problems. BENDIX COMPUTER DIVISION, 5630 Arbor Vitae, Los Angeles 45, Calif. For copy:
CIRCLE 262 ON READER CARD

MAGNETIC MATRIX CHARACTERS: A description, list of features and applications is included in this one-page bulletin on magnetic matrix characters for data display. FERRANTI-PACKARD ELECTRIC LTD., Electronics Division, Industry St., Toronto 15, Ont., Canada. For copy:
CIRCLE 263 ON READER CARD

AUTOMATIC TEST SYSTEM: An automatic coincident current and word address memory plane and stack tester is the subject of this four-page bulletin. A brief description of the time generator, program generator, drive current, calibrated sense amplification, size selection, mechanical construction and display decoding is offered. DIGITAL EQUIPMENT CORP., Maynard, Mass. For copy:
CIRCLE 264 ON READER CARD

DATA DISPLAY: The SM-2 display equipment, capable of converting digital information into a visual presentation of alpha-numeric characters, arbitrary or abstract symbols, schematics, logic diagrams, graphs, charts, or maps, is the subject of this four-page brochure. LABORATORY FOR ELECTRONICS, INC., 1079 Commonwealth Ave., Boston 15, Mass. For copy:
CIRCLE 265 ON READER CARD

ROTARY STEPPING SWITCHES: An 18-page booklet presents the specifications, special features, characteristics and technical summaries of three types of switches. Photos, charts, diagrams and drawings supplement the text. AUTOMATIC ELECTRIC, Northlake, Ill. For copy:

DATABILITY IN DEPTH: A listing of components & parts, assemblies, data handling sub-systems and data processing systems is offered. Under each section a list of products is included plus a tearout information request card. SYLVANIA ELECTRONIC SYSTEMS, 63 Second Ave., Waltham 54, Mass. For copy:
CIRCLE 266 ON READER CARD

ANALOG TAPE RECORDER: A new precision analog tape recorder is the subject of a four-page brochure now available. Pulse frequency modulation is the operating of this transistorized multi-channel unit which records and reproduces data down to DC. MNEMOTRON CORP., 1 N. Main St., Spring Valley, N.Y. For copy:
CIRCLE 267 ON READER CARD

MOLECULAR ENGINEERING: A facilities brochure covers the full range of activities and fields of interest of the firm. Molecular engineering is the keynote of the publication with emphasis being in this particular field. ELECTRO-RADIATION, INC., 2200 Colorado Ave., Santa Monica, Calif. For copy:
CIRCLE 268 ON READER CARD

INFORMATION RETRIEVAL SYSTEM: The objective, facilities, types of research and general information on a new center for documentation and communication research at Western Reserve University is described in this publication. WESTERN RESERVE UNIVERSITY, School of Library Science, Cleveland 6, Ohio. For copy:
CIRCLE 269 ON READER CARD

OPPORTUNITIES AT THE OUTER EDGE OF COMPUTER SCIENCE...

PERCEPTION*

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Studies in pattern and character recognition by computers, from theoretical conception through successful operation, are an intrinsic part of a long-term program recently initiated by the General Motors Research Laboratories. This major research and development effort is aimed at extending the sensor, problem-solving, and motor capabilities of computers.

MATHEMATICIANS, ENGINEERS, PHYSICISTS interested in contributing to this advanced work at the outer edges of computer science are invited to explore the many opportunities in our growing computer staff.

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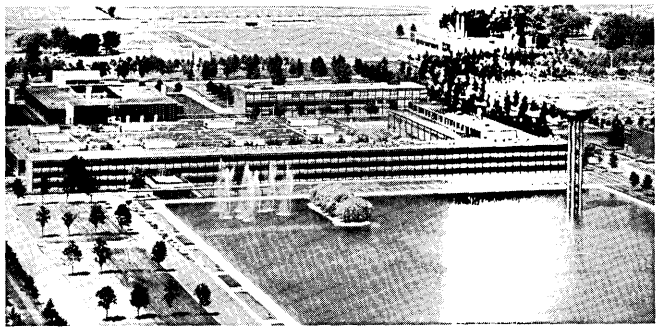
As a member of our Laboratories' staff, you enjoy stimulating association with professional personnel in diverse scientific and engineering fields, new and ample computer facilities (soon to include the IBM 7090), a comfortable campus-like working atmosphere, outstanding fringe benefits, and competitive salaries commensurate with background and experience.

***PERCEPTION.** *Illustrated is a computer interpretation on a 25 x 25 matrix of a hand-printed 9 enlarged from quarter-inch size. It is part of an experimental alphanumeric recognition technique . . . a straight-forward bit matching procedure using statistically generated master patterns as masks. Up to 85% of the data generated by optical scanning has been recognized at a rate of two characters per second using an IBM 704. Questions being explored: How can this technique—or others being devised—be refined for the 7090 to recognize all significant data? How can recognition rates be increased to several hundred characters per second using a relatively small memory?*



Home of the General Motors Research Laboratories consists of these eight buildings making up part of the 330-acre GM Technical Center. This modern campus of technology is located in suburban Warren, 13 miles north of downtown Detroit and within easy driving distance of top Michigan and Canadian recreational areas.

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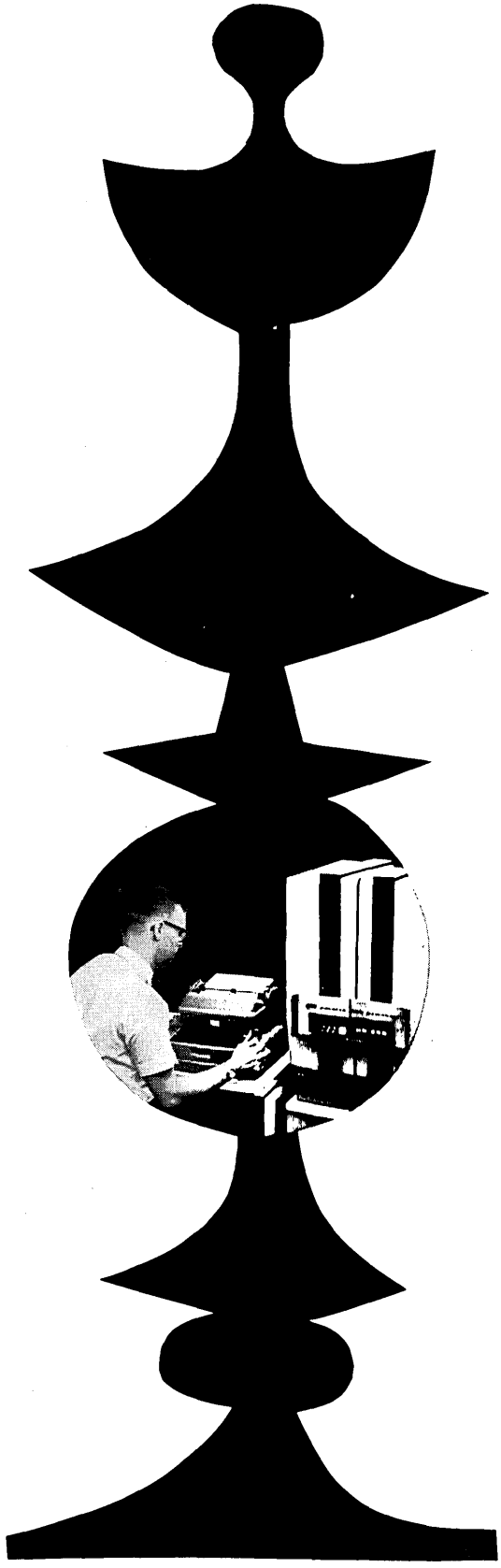
Mr. J. B. Sparhawk, Personnel Staff

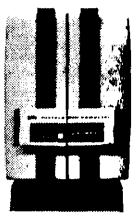
General Motors Research Laboratories

WARREN, MICHIGAN

ADVERTISERS' INDEX



...like its counterpart the chess queen, the [redacted] digital computer offers unmatched power...complemented by...many programming aids...microsecond speed ...an expandable plug-in memory...a full range of peripheral equipment...all in the most compact package at the lowest cost in the computer field.



[pb] **Packard Bell Computer**

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CIRCLE 2 ON READER CARD

Announcing a new ultra high-speed computer in the PHILCO 2000 series

MODEL 212

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...even four times faster than any previous Philco 2000 systems

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Advanced four-way processing, which permits simultaneous processing of four instructions; faster circuits, with diode-transistor logic; improved internal organization; all contribute to the tremendous speed of the 212 . . . four times faster than any previous model. For example, it can perform 639,000 additions in one second.

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The 212 central processor is fully compatible with all Philco 2000 systems. You can install a Philco 2000 system now, utilizing either the model 210 or 211 central processor, and as your work load increases, replace the central processor with the model 212, without reprogramming! Write today for complete information.

Features

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- Fully compatible with other Philco computers
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- Diode-transistor logic
- Improved internal organization
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- Advanced four-way processing. Permits four instructions to be processed simultaneously
- Access time of 1 microsecond for a pair of instructions
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