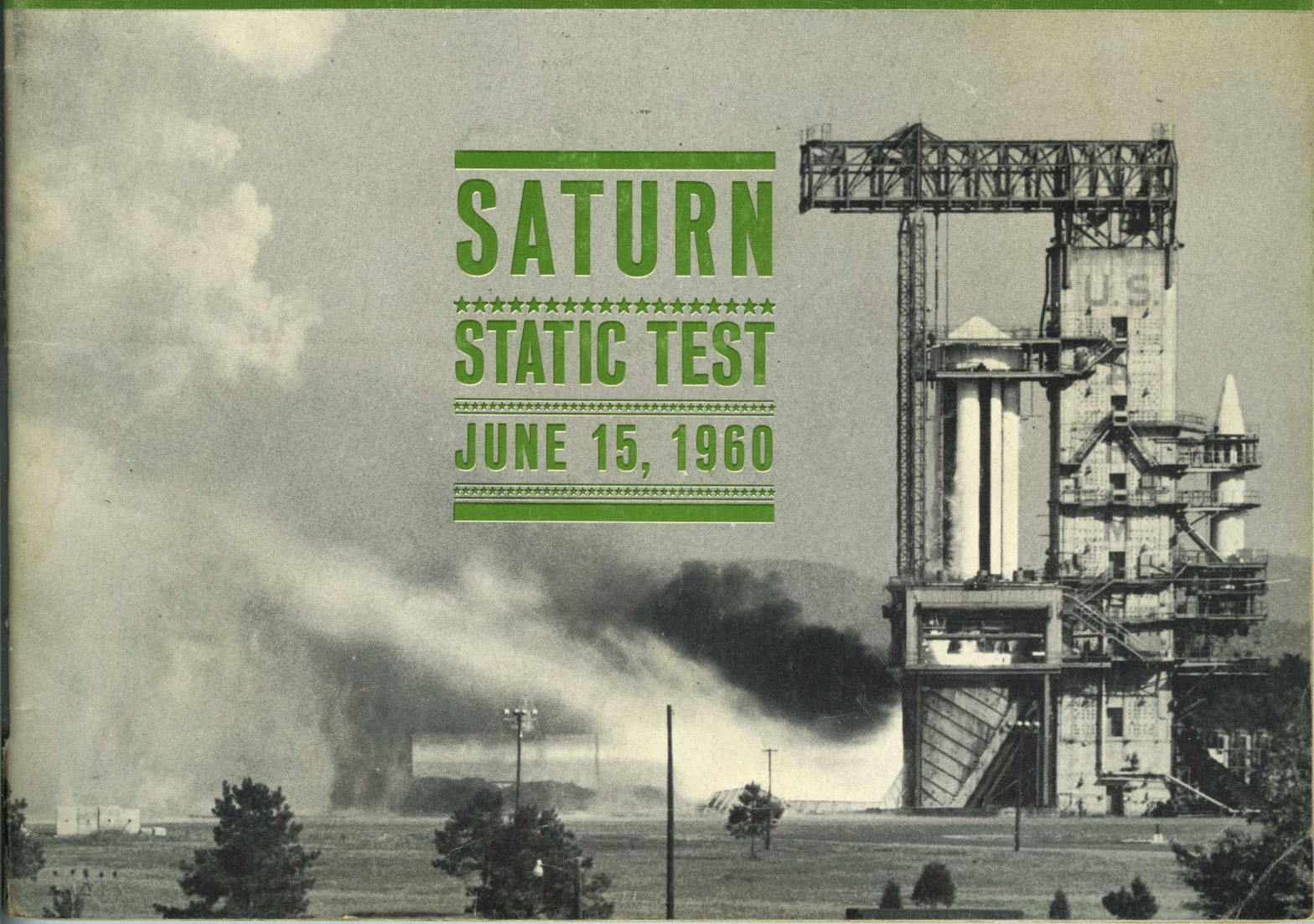
DATAMATION 60

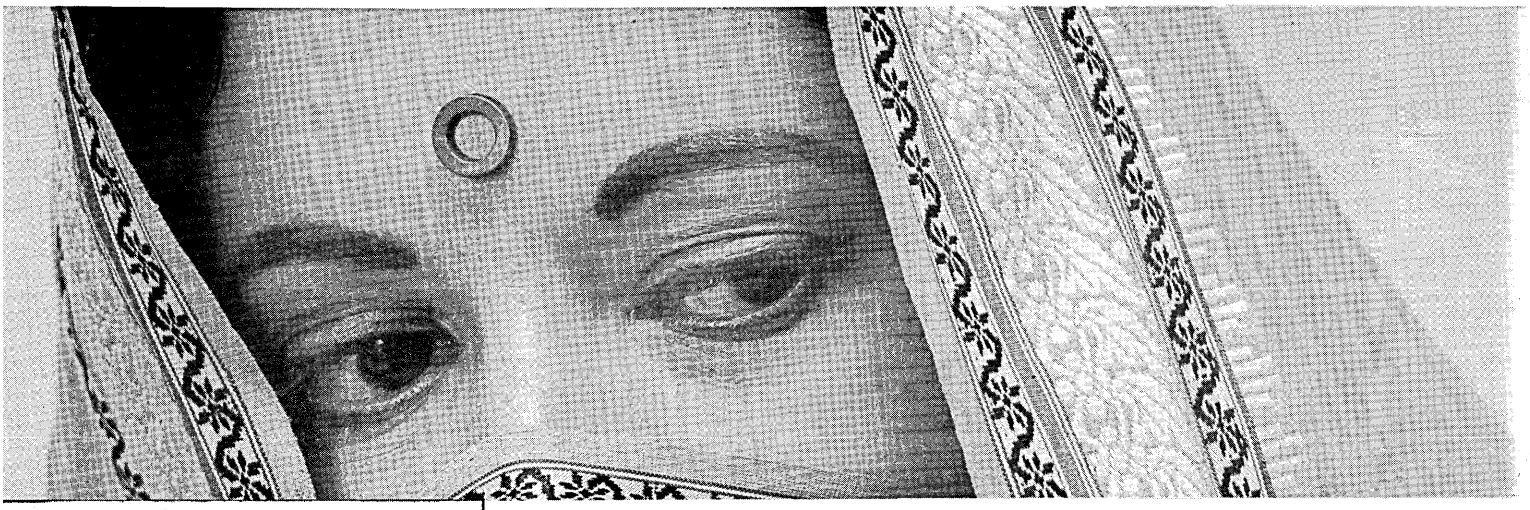
July/August



VERSATILITY

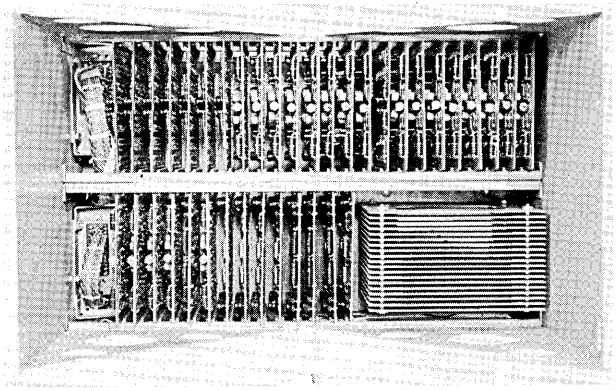
MARKS TMI TYPE RB GENERAL PURPOSE MEMORIES

with a wide range of applications for the computer design engineer who eyes costs, evaluates his time . . . and expects high speed operation with long term reliability.



APPLICATIONS

Systems for...
Automatic Control • Data editing and format revision • Multiplexing data from several sources • Analog to digital conversion • Small digital computers • Complex data processing • Automatic checkout programing • Process control • Machine tool control • Weapons fire control • Digital data communication • Meteor burst data transmission • Nuclear energy analysis and instrumentation • Pulse height analysis



Designed for use in data systems requiring small, fast memories compatible with logical control at rates to 200 kc.
Capacity — 128 to 1024 words — 4 to 24 bits per word — larger capacities with multiple units. 5-microsecond load or unload — 8-microsecond complete memory cycle.
Operating Modes — Sequential load and unload — random access load and unload — clear/write and read/restore memory cycles. Operations may be intermixed in any manner desired.
Input and Output Signals — input may be either polarity and may be levels or pulses; output signals are levels.

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TELEMETER MAGNETICS Inc
P.O. Box 329, Culver City, California
offices and plant: 9937 Jefferson Blvd., Culver City, California

PIONEERS IN DEVELOPMENT AND MANUFACTURE OF CORE MEMORY PRODUCTS

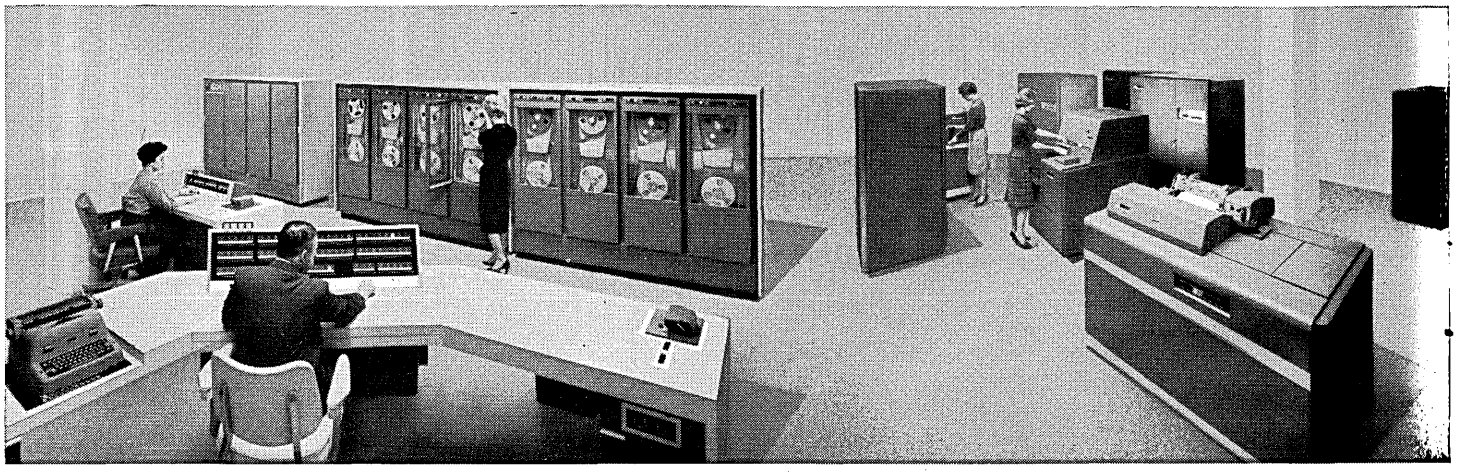
WHICH COMPUTER?

IT'S A DECISION WORTH MILLIONS...

several good computers to choose from

BUT 4 SIGNIFICANT FACTS STAND OUT

SEE CONTROL DATA'S Computing Center in action at the Minneapolis office.



FACT 1.

Control Data's advanced, large-scale 1604 Computers have been customer operated an average of 72.3 hours per week since acceptance. These computers have been operating with an uptime of 98.5%. Such outstanding performance records represent the total history of customer operation for all 1604 computers since their acceptance.

FACT 2.

Control Data builds and delivers the advanced, large-scale 1604 Computers in less than 10 months. All 1604 Computers have been installed at the sites and fully operating within only 5 days.

FACT 3.

Control Data's all-inclusive customer services are tailored to meet your needs. Programmer and Programming Assistance. Complete Programming Packages including Compilers, Automatic Routines, Service Library Routines, and Standard Input-Output Routines. Complete Computing Center for Customer Service and Program Debugging. System Planning Analysts. Application Analysts. Customer Training. Field Maintenance. Nationwide Sales Offices.

FACT 4.

Control Data's advanced large-scale 1604 Computers cost hundreds of thousands of dollars less than comparable computers.

FOR COMPLETE INFORMATION *about Control Data's full line of completely transistorized computers, Phone FEderal 9-0411 . . . wire or write:*
Mr. George S. Hanson, Director of Sales

CONTROL DATA CORPORATION
501 PARK AVENUE • MINNEAPOLIS 15, MINNESOTA

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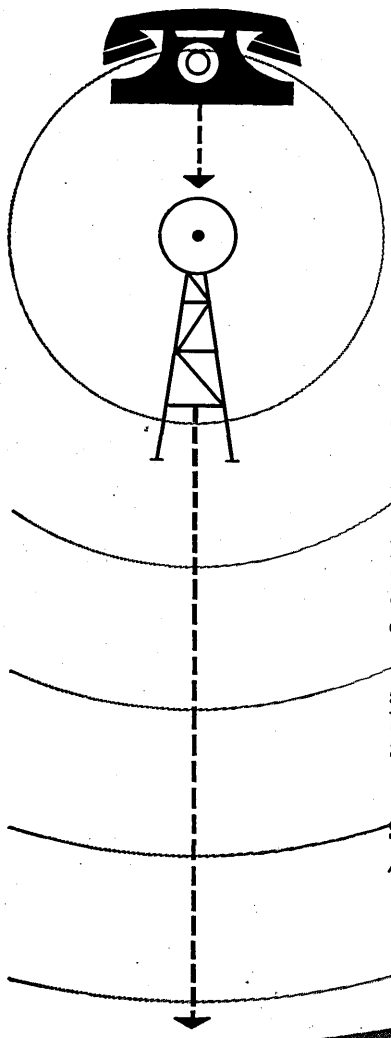
PRINTS 3,000 WORDS/MIN

FROM REMOTE POINTS



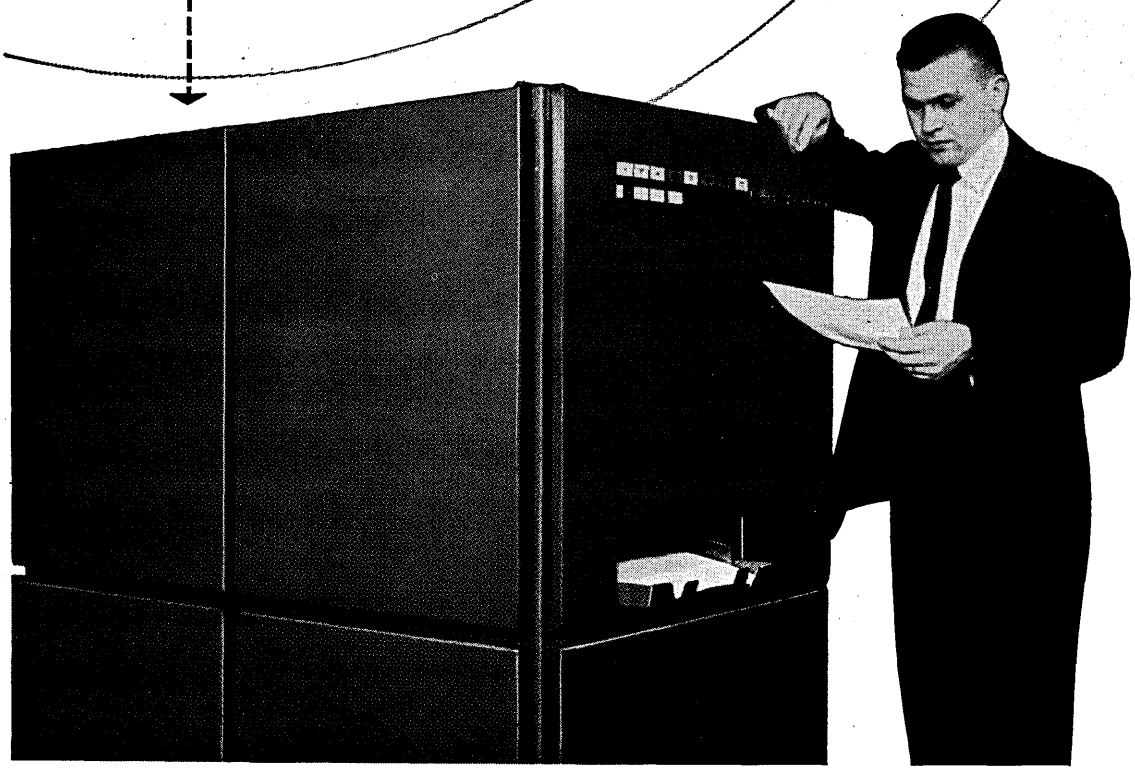
The U.S. Army Corps of Engineers is using Stromberg-Carlson—San Diego's new S-C 3000 High Speed Communications Printer to print 3000 words a minute from remote sources. The equipment can print out over great distances, using standard wire or radio links.

The S-C 3000 is compatible with most available data link systems, including the Collins Kineplex data transmission system and the Stromberg-Carlson Binary Data Link. Printing is accomplished through a unique combination of the Stromberg-Carlson CHARACTRON® shaped beam tube and Haloid Xerox, Inc's., electrostatic printing process. The S-C 3000 prints without impact on untreated paper or lithographic masters.

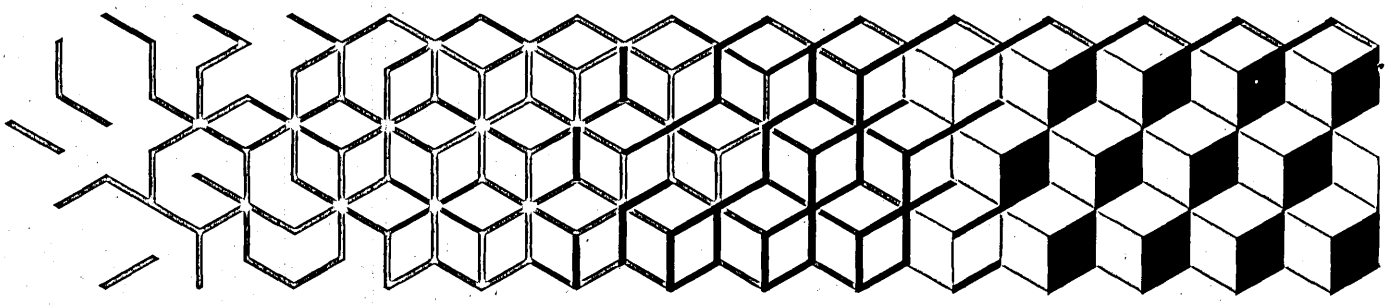
This new communications printer answers the need for equipment that can keep pace with today's high speed communications systems. It is designed for military, government, news service, business and public communications systems where speed and reliability are essential. The S-C 3000 accepts data via wire or radio link from computers located at a distant point and prints out copy of outstanding readability.

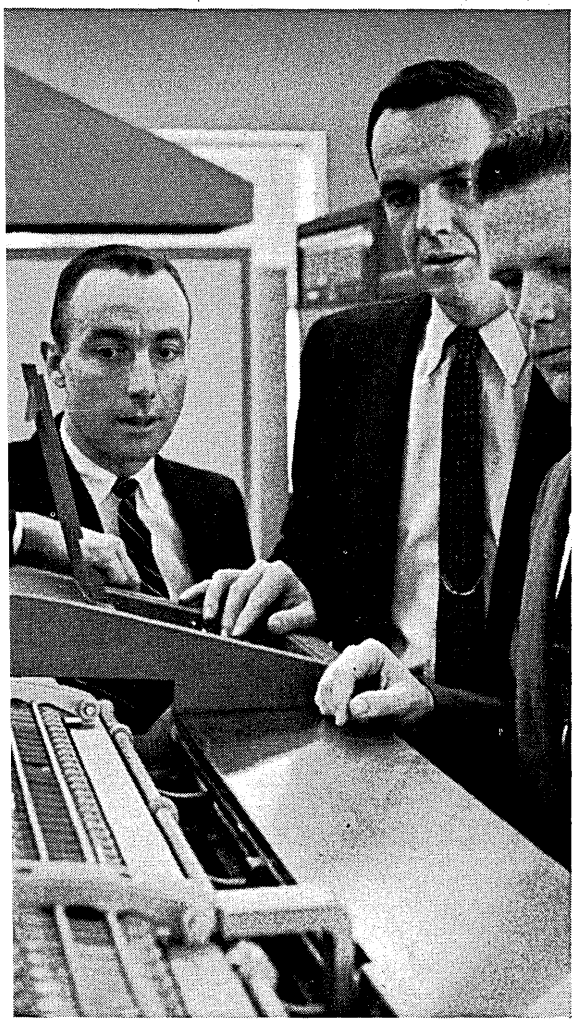
If you are interested in high-speed printing of data received from a distant point, don't fail to investigate the S-C 3000. Write for free booklet to Stromberg-Carlson-San Diego, Dept. A-60, P.O. Box 2449, San Diego 12, California. Telephone BRowning 6-3911

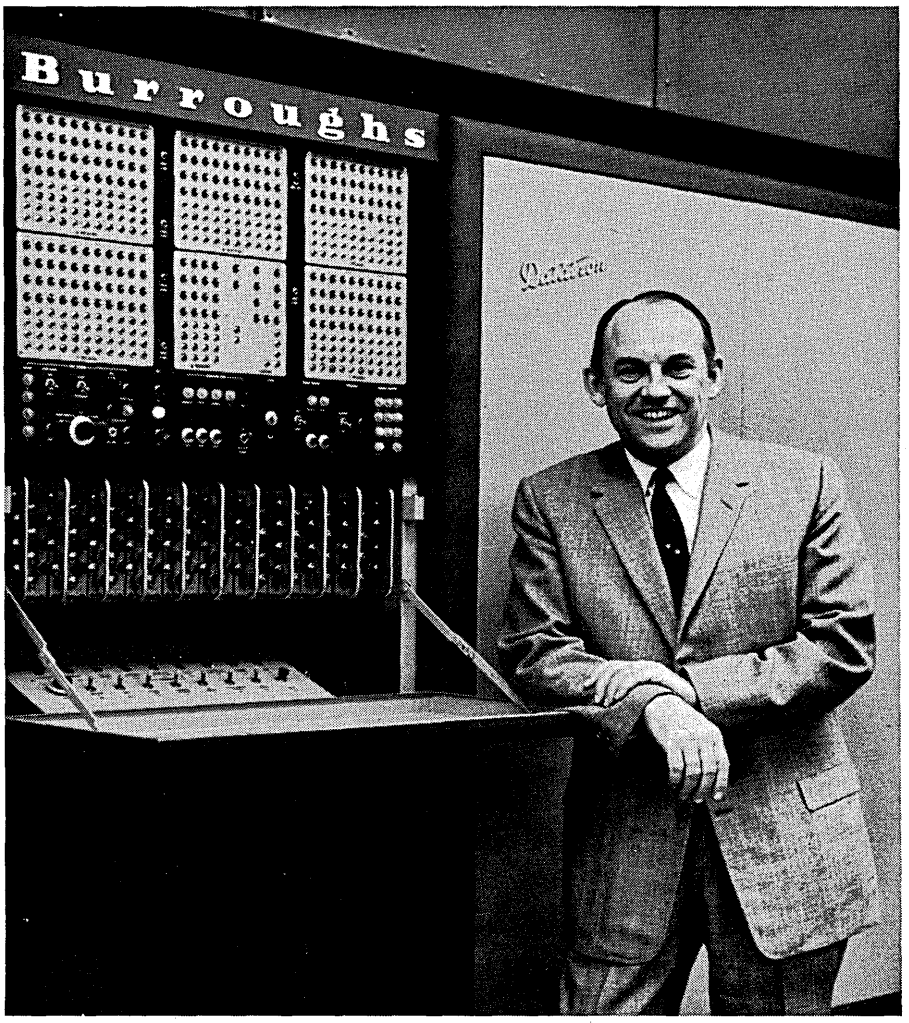
STROMBERG-CARLSON-SAN DIEGO
A DIVISION OF **GENERAL DYNAMICS CORPORATION**



A statement from Behr-Manning Co.: "*Our Burroughs computer processes our customer order data in 1/50 the time*"







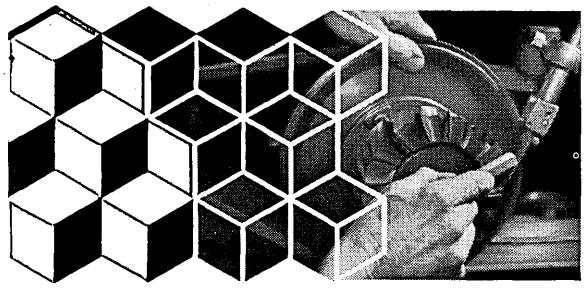
Behr-Manning's Philip Doherty (left) meets with members of his group at the Datafile.

Edwin C. Evans, Vice President and General Manager of Behr-Manning Co.

"Our Burroughs computer processes our customer order data in 1/50 the time... and provides our management with up-to-the-minute statistical reports for the control and planning of our business."

EDWIN C. EVANS

Vice President and General Manager
Behr-Manning Co.



Nearly 40,000 different products are manufactured by Behr-Manning Co., of Troy, New York, a division of Norton Company. These products have use in almost every manufacturing process... from the making of cars to the shelling of peanuts. The products are of three main types: coated abrasives, pressure sensitive tapes and floor maintenance products. Behr-Manning, with its parent company, the Norton Company, is the largest abrasives enterprise in the world, and Behr-Manning's cellophane and other pressure sensitive tapes, sold under the "Bear" Brand are quality leaders in their field.

Behr-Manning's vast selection of products are stocked and shipped from the factory warehouse and from 16 branch warehouses across the country. Their products are purchased by countless different types of customers through every major channel of distribution.

The company, which began as a sandpaper business in 1872, now has 3,000 employees. As Behr-Manning's line of products and list of customers grew, their record keeping and accounting procedures also became extremely complex. In November, 1958, they installed a Burroughs 205 electronic data processing system to solve their paperwork problems.

Behr-Manning's decision to purchase a Burroughs 205 was preceded by considerable investigation. Vice President and General Manager, Edwin C. Evans, states, "We first organized a 6-man study team. The group's job was to determine whether or not a data processing program would help us, and if so, to recommend which data processing system would help us most. When we decided to enter electronic data processing, the group prepared a detailed description of our particular requirements. We settled on Burroughs equipment because the 205 best satisfied our specific needs. Furthermore, the high capacity, low-cost random access Datafiles were especially suited to our application."

The computer soon took over a number of complex clerical functions... in actuality, 19 different computational assignments, from factory payroll to budget reporting. The computer's capacity enabled it to do all of this work in only 10 hours per week.

Despite the magnitude of these jobs, this was not the chief reason for acquiring the 205. Behr-Manning's most important need is a process called "order entry," which literally automates the entire sales-inventory-billing-report cycle.

The source of all Behr-Manning operations is the customer order, which is also a source of a mass of paper work. It must be edited, analyzed and reproduced prior to completion of processing.

"All order entry, from every branch, can be done by our 205," states Philip Doherty, Behr-Manning's Manager of Operations Analysis and Planning. "We process thousands of orders a day. An original order is picked up just once at a receiving location and all the work is done automatically in the system. An order coming in from a branch office is transmitted in minutes to headquarters by private wire, quantity and item data are automatically fed to the computer, and return wire messages make stock status and shipping information instantly available to the branch office."

In addition to processing the order, the 205's magnetic tape Datafiles, each having a capacity of 20,000,000 digits of information, hold many thousands of different customer and product records. When an order is entered in the 205, the computer locates the appropriate customer and product records, then issues either a production order or shipping instruction. It also automatically prices the order and issues the invoice. Upon completion of a customer order, the computer automatically issues factory orders to replenish the stock level of the factory or branch warehouse.

The statistics accumulated by the 205 are then prepared in numerous different reports which are distributed either daily, weekly, monthly or quarterly in a digested form for Behr-Manning management. The reports include information on sales, finance and production. Previous to the 205 these statistical analyses required as long as three weeks to prepare. Now, even the most involved report can be issued in 48 hours, and if information is needed more quickly, it can be obtained by inquiring through the computer console. In such cases, specific replies are typed automatically by the printer.

"These up-to-the-minute reports," says Behr-Manning's President, Elmer C. Schacht, "are invaluable to us in the planning and control of our business. The information obtained from one waste report alone should save us thousands of dollars a year. In addition to improving the speed and accuracy of our own operation, installation of the 205 benefits our customers with the fastest possible service."

Behr-Manning originally leased their 205 computer, but after about nine months of use, they decided to purchase it. Vice President Edwin C. Evans points out, "By June, 1959, it was obvious that our 205 would accommodate all of our 'order entry' procedures plus many of our other data processing needs. So at that time we purchased the 205 outright. The equipment had proved itself and it made economical good sense to own it rather than rent it."

Like the people of Behr-Manning, hundreds of other industrial and business users are confirming the same experience. Burroughs complete line of electronic data processing equipment is backed by a coast-to-coast team of computer specialists, all eager to tell you how Burroughs can help in your business. For additional information, write General Manager, Data Processing Systems Group, Detroit, Michigan.

Burroughs Corporation *"NEW DIMENSIONS/in electronics and data processing systems"*

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For engineering, for research, for business data processing in companies both large and small... **The new, fully-transistorized**

RPC-4000

ELECTRONIC COMPUTING SYSTEM

another outstanding computer value
... marketed by Royal McBee Corporation

Advanced design: fully transistorized—with important new computer design concepts that provide the largest memory, greatest problem-solving capacity and flexibility in the low- or medium-priced field. Entire system—computer, input-output typewriter and tape punch-read console—have been specially designed as a unit. **High-speed computing ability:** extra large capacity (8008 words) magnetic drum memory, with special fast access features. Computing speeds of up to 230,000 operations per minute. **Ultra high speed input-output:** 500 characters per second photoelectric punched paper tape reader, and 300 characters per second paper tape punch available as optional equipment. **Easy to use:** maximum results can be obtained by non-technical personnel. Users benefit from free training, continuing assistance, an extensive library of programs. Versatile command structure provides programming speed and flexibility. **Low in cost:** priced just above the small-scale computers, the RPC-4000 outperforms computers costing many times more. **Economical to install and operate:** no site preparation, air-conditioning or special maintenance required. Plugs into any standard wall outlet. **Multiple application ability:** designed to perform engineering, scientific and research calculations, as well as business data processing and management control functions.

The RPC-4000 is a product of the Royal Precision Corporation, and is marketed by the Data Processing Division of Royal McBee. It is the latest member of the growing family of electronic computers from the people whose LGP-30 has become the world's leading small-scale computer.

Royal Precision Corporation

Royal Precision is jointly owned by the Royal McBee and General Precision Equipment Corporations. RPC-4000 sales and service are available coast-to-coast, in Canada and abroad through Royal McBee Data Processing offices. For full specifications, write **ROYAL McBEE CORPORATION,** data processing division, Port Chester, N.Y.

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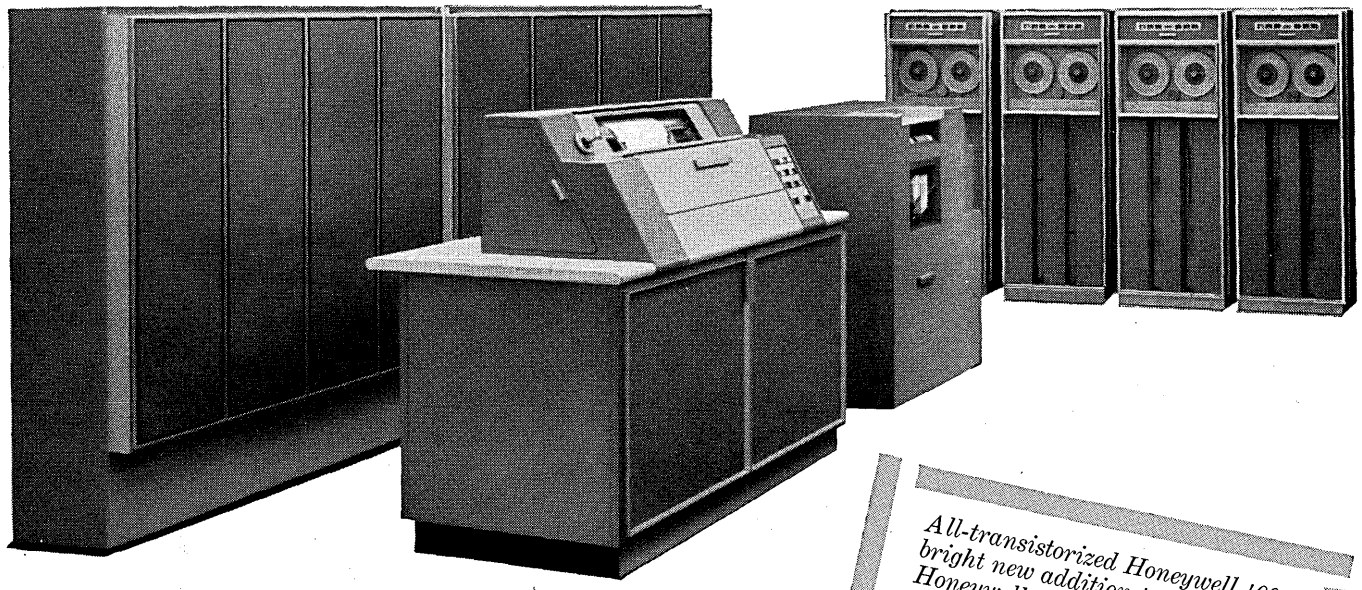

All-transistorized Honeywell 400, bright new addition to the Honeywell line of EDP Systems!

MONTHLY RENTAL

$_____

Honeywell Electronic Data Processing System

For full details call your nearest Honeywell office or write to Minneapolis-Honeywell, Datamatic Division, Wellesley Hills 81, Massachusetts

how much?

READ WHAT THIS BRAND-NEW HONEYWELL 400 DATA PROCESSING SYSTEM CAN DO— AND WE'LL BET YOU OVERESTIMATE ITS MONTHLY RENTAL COST BY THOUSANDS OF DOLLARS!

High-speed magnetic tapes, magnetic core memory, high-speed printing — Honeywell 400 gives you all the basics of big system EDP at far lower cost. You can process 650 punched cards a minute. You can read and write taped information simultaneously, and transfer this information at a speed of 96,000 decimal digits per second. You can print lines of 120 characters in length at a rate of 900 lines a minute. And you get good clean, readable carbons, too!

How much? Take a guess. $12,000? $15,000? $20,000? Write your own ticket, then look on page 72 and see how little Honeywell 400 costs. Then call your nearest Honeywell office for full details; or write to Minneapolis-Honeywell, Datamatic Division, Wellesley Hills 81, Massachusetts.

75th YEAR — PIONEERING THE FUTURE

Honeywell

H HONEYWELL *Electronic Data Processing*

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COBOL STORY CONTINUES IN THIS ISSUE

Various opinions regarding COBOL continue to make the rounds in computing circles. Three references to this first attempt to establish a common business oriented language for computers will be found in this issue. DOD's C. A. Phillips has written a follow-up letter concerning COBOL and other CODASYL matters which appears on page 70. RCA takes an official COBOL stand on page 35. And GE seems somewhat less than sold on the concept on page 44.

SS 80s, 90s ROLL OUT ONE EACH DAY

At Ilion, N.Y., Remington Rand is turning out solid state systems (SS 80s and 90s) at a rate of one a day. At present, approximately 150 systems have been shipped. Company sources state that 250 orders are in. Meanwhile, much behind-the-scenes RemRand activity suggests the imminent announcement of another new system, reportedly of the business variety.

WHITHER BURROUGHS' COMPUTERS?

There is much speculation currently regarding changes which have occurred within Burroughs Corporation. To quote Burroughs president Ray R. Eppert, addressing stockholders, " . . . I want to tell you about a very significant corporate re-organization . . . This re-alignment affects the philosophy, administration and operation of Burroughs -- including manufacturing, engineering, research, product planning and marketing." The ElectroData and Burroughs divisions are now the manufacturing and engineering divisions. Their products are marketed by an Equipment and Systems Marketing Division. What seems to be happening, as far as Burroughs' dp division, ElectroData, is concerned is that the emphasis on a strictly computer-oriented operation seems to be altered. Burroughs computers may soon be offered as part of an overall office equipment package. The OK phrase around Detroit hq these days, we are told, is "item processing," not "data processing." It will be interesting to see this new Burroughs look in operation.

GE MOVES IN ON GENERAL PURPOSE FIELD

Out on the Arizona desert, where Phoenix thrives under a thin veil of smog and GE makes computers, things began happening this summer. Lacy W. Goostree replaced George A. Hagerty as marketing manager of the computer department. Hagerty, a process control enthusiast, was named manager, process computers. In mid-June, GE announced its first general purpose digital computer, the 225 (see page 44). At the same time, it began referring to the NCR 304 (GE manufactured) as the 304 and even the GE 304 (even though it was DATAMATION's understanding that the original machine was of NCR design). Early in July, GE and Arizona State Univ. at Tempe announced they were jettisoning the school's 704 installation and replacing it with a 304 system. By setting an August installation date, the firm lays claim to "the first large scale, completely transistorized system to be

installed in a computer center on a university campus." The change at Tempe might also represent the first step in a company-wide move to cut down on the huge rental GE is paying for IBM equipment. The figure is said to be upwards of $12 million annually. With the 225, GE may be beginning its long-expected invasion of the general purpose field.

AMPEX, TMI MERGER ALL BUT SET

As Ampex and Telemeter Magnetics talk merger, DATAMATION established a few facts and heard a few rumors. More likely than not, TMI will become a working unit within Ampex, not a subsidiary of that firm. The L. A. firm's officials expect few, if any, personnel changes resulting from the merger and state that TMI will almost certainly remain in Southern California. Meanwhile, up in Redwood City, word is that an Ampex computer, presumably a gp machine, is at least in the thinking stage, maybe on paper. Final merger particulars were not available at press time.

C-E-I-R, GAC SIGN MERGER CONTRACT

We are informed by C-E-I-R that DATAMATION was premature in counting them out of the STRETCH picture (May/June issue). According to the Arlington, Va. firm, negotiations for a STRETCH on the West Coast are well under way with IBM. In another west-of-Rockies development, C-E-I-R announced the signing of a merger contract with General Analysis Corporation of California. C-E-I-R is the surviving company in the July 1 transaction. GAC has been in existence since 1955 and has divisions at Dugway, Utah and Fort Huachuca, Arizona, in addition to headquarters personnel in L. A. GAC's activities range from war gaming and operations analysis to economic surveys and data processing. The firm has a full-time staff of 30 headed by Dr. Alexander M. Mood and Dr. George W. Brown.

NEW PACT SETS TI-IBM COOPERATION

Texas Instruments has signed a new agreement with IBM providing for the continuing exchange of technical information pertaining to transistors and diodes for at least three more years. In addition, the exchange of technical information was broadened to include TI circuits. Under the agreement, each company retains the right to exchange its technical information with other organizations. A procurement commitment through 1961 sustaining, as a minimum, TI's current production level of transistors for IBM's dp machines was also completed. Under the agreement terms, IBM has the freedom to manufacture or buy its remaining transistor requirements and there are no limitations on TI's freedom to sell to other customers.

Late in June, TI accepted delivery of the first 7070 to be installed anywhere. The Texas firm is paying $31,000 per month for the system.

COMPUTER USAGE ASSIGNED M-H PROJECTS

Computer Usage Co., Inc., developer of the Honeywell Algebraic Compiler, has been awarded several additional contracts by Minneapolis-Honeywell. The New York City firm is engaged in simulation of the 650 of the H-800, development of a card version of the ARGUS Assembly System, and a comprehensive study of feasibility and techniques for code translation between large-scale systems.

DESIGN WITH ARNOLD 6T CORES . . .

SAME-DAY SHIPMENT OF STANDARD DELTAMAX CORE SIZES

Arnold 6T tape cores (aluminum-cased and hermetically-sealed) offer you three very important design advantages. *One:* Maximum compactness, comparable to or exceeding that previously offered only by plastic-cased cores. *Two:* Maximum built-in protection against environmental hazards. *Three:* Require no supplementary insulation prior to winding and can be vacuum impregnated after winding.

Now we've added a fourth vital advantage: Maximum availability. An initial stock of approximately 20,000 Deltamax 1, 2 and 4-mil tape cores in the proposed EIA standard sizes (See AIEE Publication No. 430) is ready on warehouse shelves for your convenience. From this revolving stock, you can get immediate shipment (*the same day order is received*) on cores in quantities from prototype lots to regular production requirements.

Use Arnold 6T cores in your designs for improved performance and reduced cost. They're guaranteed against 1000-volt breakdown . . . guaranteed to meet military test specifications for resistance to vibration and shock . . . guaranteed also to meet military specifications for operating temperatures. The 6T hermetic casing method is extra rigid to protect against strains.

Let us supply *your* requirements. Full data (Bulletin TC-101A and Supplements) on request. ● Write *The Arnold Engineering Company, Main Office and Plant, Marengo, Ill.*

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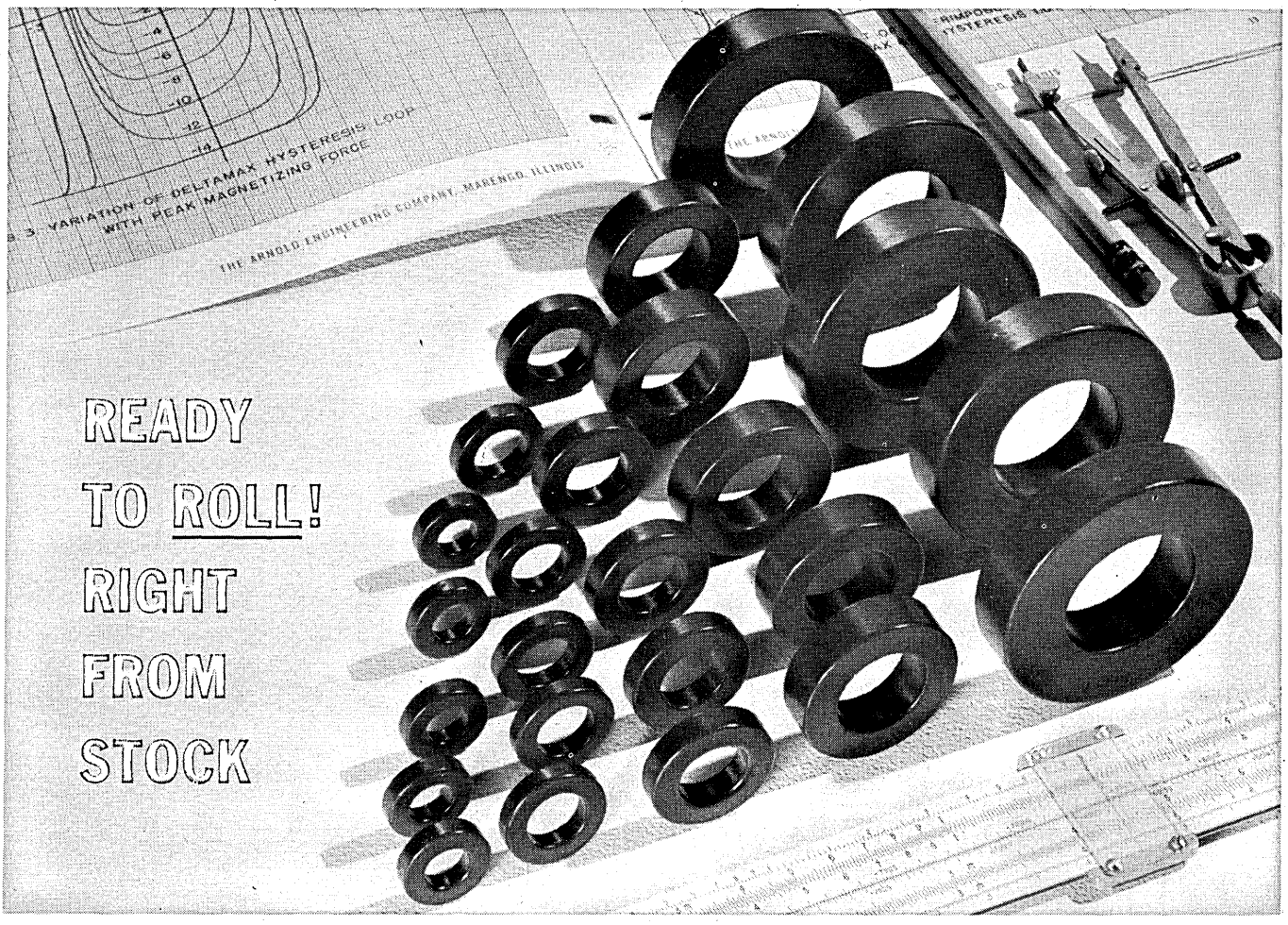

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Bendix G-20

with organization chart design means unequalled performance for your data processing dollar

Today's sophisticated buyer of scientific and business data processing equipment knows that expandability, efficiency, and simplicity of operation must be considered right along with speed specifications. *The Bendix G-20, with "organization chart" design offers an optimum combination of* ALL *these features that you'll find in no other system... at any price!* To see why, compare the G-20 to an efficient business organization. The "boss" of the system is the Central Processor... a very fast digital computer. Unlike other data processors which must direct every operation, this boss delegates many of its responsibilities to highly skilled "line supervisors," called control buffers. These units direct input-output operations, data transfers and code translations—independently, but under program control. The Central Processor remains free to do the work that only it is qualified to do... high speed computing, as well as scheduling and directing the work flow in the proper order of importance.

This "organization chart" efficiency is what makes the G-20 system so fast and economical. It makes multiple, simultaneous operations completely practical, and with a minimum of equipment. The G-20's own management skill eliminates most operator decisions.

Truly modular, a G-20 system can vary in size from medium-scale to very large. Note carefully the specifications below. Check them against any other data processing system you wish... then compare price. You will see why we can state so confidently that *the Bendix G-20 offers unequalled performance for your data processing dollar. Write or wire for detailed descriptive literature.*

SPECIFICATIONS: MEMORY: Core, to 32,768 words in 4096 word modules. EXECUTE +: 7μs. avg., fixed point, one-word precision. 13 μs. avg., floating point, one-word precision. EXECUTE ×: 49 μs avg., fixed point, one-word precision. 49 μs. avg., floating point, one-word precision. ARITHMETIC: Built-in floating point, 12 decimal digit precision. CIRCUITRY: Solid-state; parallel; 2.5 kva. PROGRAMMING: Algebraic compiler or symbolic assembler. INPUT/OUTPUT: 165,000 character/second max., asynchronous. MAGNETIC TAPE: 120,000 decimal digit/second read-write. LINE PRINTERS: 600 lines per minute. PUNCHED TAPE: 500 or more character/second readers. 100 or more character/second punches. PUNCHED CARDS: Standard high-speed 80 column units. CONTROL BUFFERS: 1024 character memory for data and commands. Controls transmission on-line or off-line.

Bendix Computer Division
DEPT. E-26 LOS ANGELES 45, CALIF.

THE Bendix CORPORATION

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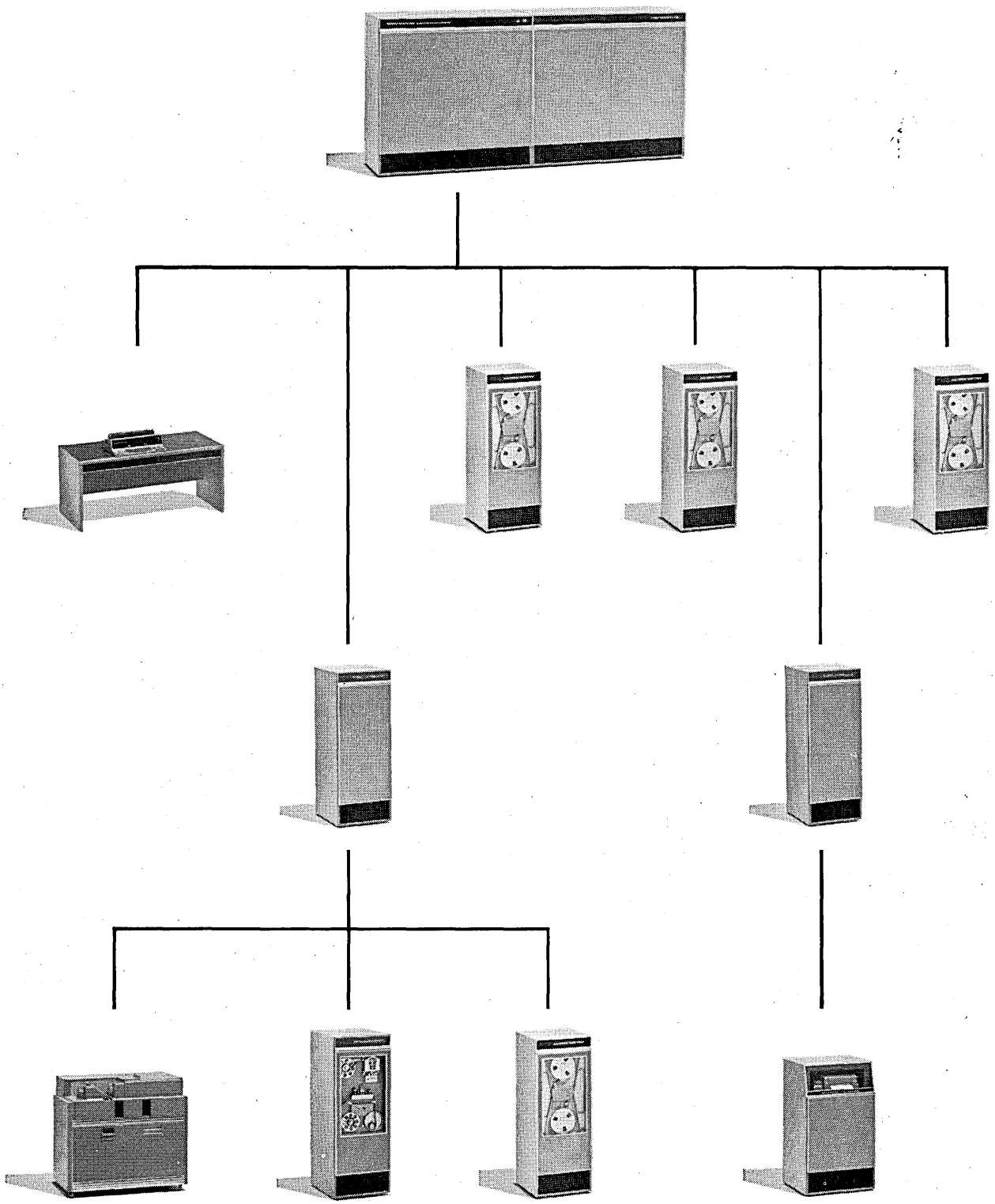

ORGANIZATION OF A TYPICAL MEDIUM SCALE G-20 SYSTEM

DATAMATION 60

the automatic handling of information

volume 6, number **4**

ARTICLES

DEPARTMENTS

EDITORIAL OFFICES — 10373 W. PICO BLVD., LOS ANGELES 64, CALIF.

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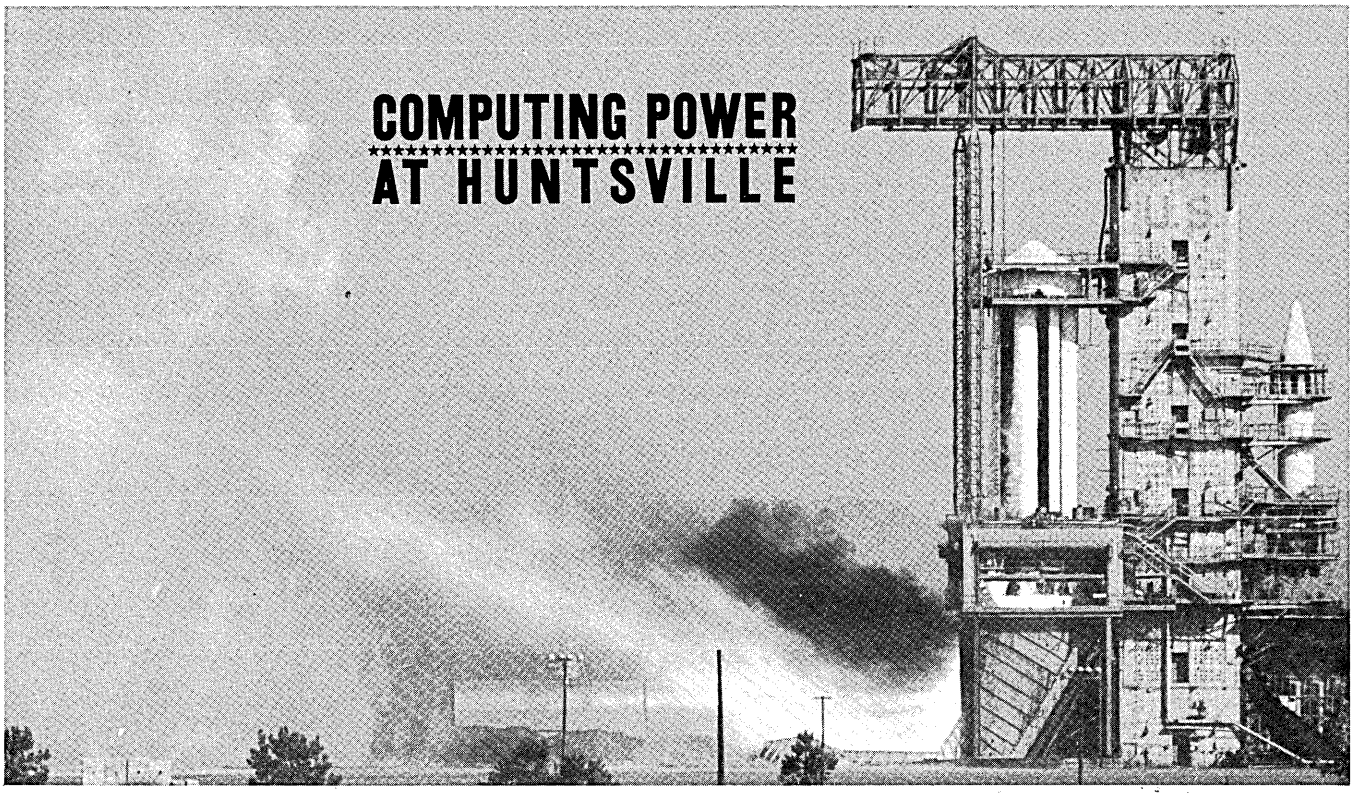
COMPUTING POWER AT HUNTSVILLE



by S.A. LANZAROTTA
Editor

At exactly 5:37 p.m. on June 15th, eight Rocketdyne engines powering the super-booster first stage of a Saturn space vehicle roared to life at a test site at NASA's George C. Marshall Space Flight Center in Huntsville, Alabama. For 122 seconds the giant missile, firmly locked to the test stand, hurled a huge shaft of flames and gasses representing 1,500,000 pounds of thrust (30,000,000 hp) into a metal chute. The shaft struck the ground and shot back into the air to form a 200-foot tapering tail.

This completely successful static firing shook some 200 press representatives, Army personnel and other spectators watching from a hill one-half mile from the test stand – shook them emotionally and physically. The miles of trembling earth surrounding the firing site provided convincing evidence that all of the world's advanced rocket work was not being performed somewhere in the wastelands of Russia.

These editors and reporters had, earlier that day, attended a press conference at the center (formerly the Army Ordnance Missile Command) and heard Dr. Wernher von Braun say that the test firing planned for weeks and executed that day and, indeed, any effective space vehicle program would have been impossible to develop without computers and computing techniques.

"The impact of large computers has been felt in the missile industry more than in any other area in our life," Dr. von Braun said. "In a decade," he added, "computers have developed from a curiosity and convenience in space vehicle design to an integral, indispensable element of our work."

The press gathering was occasioned by the dedication of an IBM 7090 at the Marshall Center's Computation Division. This installation represented the first "standard" 7090 to be put into operation. Modified versions of the system have been incorporated into the Ballistic Missile Early Warning System.

An impressive array of computing power is found at MSFC – power which establishes the center's computer facility as the largest, by far, in the southeast United States.

In mid-June, the 7090 was operating in one of two large adjoining rooms which also housed a 704, a 705 and a 709. Elsewhere in the Huntsville complex five Burroughs 205s, 10 Royal McBee LGP-30s, four IBM 610s, three Burroughs E-101s and a Bendix G-15 were helping to meet the center's computational demands. The center also maintains a 205 at Cape Canaveral.

The 704 and 709 were replaced by a second 7090 on July 21 and more equipment is on the way. Eight 1401s are on order and the division will get a second 705 in September. Four of the 1401s will support the 90s and four will back up the 5s.

the army's role

For more than a decade, advanced computational techniques have played a vital role in the Army's rocket and space vehicle efforts. As part of Dr. von Braun's space flight team, a Computation Laboratory under Dr. Helmut Hoelzer was established in 1950 for the Guided Missile Division of Redstone Arsenal. In 1956 the division became a part of the Army Ballistic Missile Agency. Two years later, ABMA was made one of the principal elements of the Army Ordnance Missile Command.

The mission of the Computation Laboratory had three aspects: Application of computing science and techniques in the field of guided or ballistic missiles and space vehicles; economic utilization of computation equipment, and further development of computing theories.

To carry out this mission as space vehicles have increased in complexity and power, there has been an increasing reliance on electronic computing equipment for scientific investigations and analysis. The direct parallel between the growth in missiles and space vehicles at Huntsville and the use of IBM equipment as the principal source of computing power may be seen in the following table.

PROGRAM		COMPUTER
Development of the Army Redstone, 200-mile range, which was the nation's first ballistic missile and established excellent record of reliability.	1951	Card Programmed Calculator system which was first digital computer used in space program. Added figures at rate of 2,174 a minute. Two CPC's were added later.
Jupiter C (Composite Reentry Test Vehicle), consisting of modified Redstone and upper stages, under development to study reentry problem.	1955	Two 650 data processing systems capable of performing 78,000 additions a minute. 650 tape system added later.
Priority development of Jupiter IRBM under way. Vehicle provides pinpoint accuracy over 1,500-mile range. First IRBM launched by this nation.	1956	704 data processing system. First large-scale electronic computer at Huntsville. Magnetic tape system able to add figures at rate of 1,496,000 a minute.
Launching of Explorer I, free world's first earth satellite. Three others orbited during the year. General increase in space activity.	1958	705 data processing system capable of 1,364,000 logical decisions a minute. Second 704 computer added during the year.
Acceleration of satellite launching program. Included first U.S. satellite of the sun and flight of monkeys into outer space.	1959	709 data processing system used for more difficult research problems encountered. Able to perform 2,496,000 logical decisions a minute.
Project Saturn, Development of super-booster with thrust of 1.5-million pounds. Becomes NASA project July 1, with goal of flights around moon and into deep space.	1960	7090 data processing system. First solid-state computer at Huntsville. Data available from storage in 2.18 millionths of a second. Adds 13,740,000 figures a minute.

project saturn

Because of the size of the Saturn booster and the clustering of eight engines to power it, the computations required in Project Saturn far exceed any other undertaken in the nation's space program. This complex work, begun under the Army Ballistic Missile Agency and continuing under the National Aeronautics and Space Administration (since July 1) will be handled by the 7090s.

Typical of the problems encountered are new areas of research being investigated. These include the effects of vibration and heat transfer caused by interaction of the multiple engines; thrust alignment which determines where the actual thrust vector of the engines is located, and multiplexing of fuel and oxidizing engines to provide continued power in the event of one or more engine failures.

To obtain this information for computer reduction and analysis, more than eight to ten times as much data is taken from each static firing of the Saturn booster than from any previous space vehicle. In early eight-engine tests, information was collected from 970 instrument channels attached to the booster. Static testing of the Redstone missile required only 100 instrument channels. Later in the Saturn program, far greater amounts of information will be collected from actual test flights through telemetering and optical and electronic tracking.

In handling this data, the Computing Division acts as a central switching point in the constant interchange

```
INITIAL CONDITIONS     SATELLITE OR SPACE PROBE PREDICTION          LAUNCH DATE 18 AUGUST 1964
 DAY          0.   HOUR  16.40000010    MIN 24.000000000    SEC  0.000343323   LAT   12.0793661   LONG   44.0002508
   R  6677.999456  EVEL 37364.396189      X -6448.156189      Y   1043.651825     Z   1388.434143  XDOT-10845.649292
YDOT-36836.724609  ZDOT -7017.016357
 DDX  111985.99628  DDY  -18123.66384  DDZ  -24184.72196  DDXM       0.00000  DDYM       0.00000  DDZM       0.00000
 DDXS       0.00000  DDYS       0.00000  DDZS       0.00000  XM          0.0000  YM          0.0000  ZM          0.0000
 XS            0.00  YS            0.00  ZS            0.00  SCAL          14.
 AREA  0.291200000  MASS  15.70000000  CD   2.0000000000  THTH  328.1329994  DAY           18.  MON           8.
 YEAR        1964.


NODAL CROSS
 DAY          0.   HOUR  16.56812254    MIN 34.000000000    SEC  5.241129398   LAT  -0.0000164   LONG   1.3429966
   R  8477.352849  EVEL 32701.976887      X -6858.996731      Y  -4981.934883     Z  -0.002406  XDOT  4304.029819
YDOT-33154.338388  ZDOT -2796.877436
 DDX   58215.61161  DDY   42284.08287  DDZ       0.02045  DDXM       0.00000  DDYM       0.00000  DDZM       0.00000
 DDXS       0.00000  DDYS       0.00000  DDZS       0.00000  XM          0.0000  YM          0.0000  ZM          0.0000
 XS            0.00  YS            0.00  ZS            0.00  SCAL          14.
 INCT  16.68231736  MXLT -16.78962819
```

Part of the readout from an MSFC 7090 showing computations involved in plotting the translunar flight of a space vehicle.

of information and ideas among the various groups that make up the Marshall Space Flight Center.

For example, Guidance and Control might indicate an equipment change. A 7090 would simulate the flight of the revised vehicle and the new trajectory would be passed to Aeroballistics for study. A new trajectory might be devised and the vehicle computer-flown again. The results of this simulation might be given to Structures and Mechanics for an evaluation of the results to learn if other physical changes are needed.

the SPOOK system

(DATAMATION will present a detailed account of the SPOOK system in an early issue.)

The conventional procedure in computer operations is to process the three basic types of programs separately. This means that test problems, assembly of new programs and production runs often must be handled singly.

With the increased operating speed of the 7090, however, it was desirable that jobs of all types should be stacked on a single reel of magnetic tape to be processed continuously regardless of sequence. This would minimize interruption of computing time for tape changes and other manual operations.

To achieve this objective, computation personnel at Huntsville developed SPOOK – Supervisory Program Over Other Kinds. It is believed to be the first complete automatic operations monitor to be put into use.

SPOOK is an expansion of the SHARE Operating System (SOS) developed for users of IBM's large-scale, scientifically-oriented computers. It is tailored specifically for the 7090 and the Huntsville computing mission.

Consisting of 50,000 instructions on a single reel of tape, SPOOK enables the 7090 to recognize whether incoming data should be used to diagnose its own performance, assemble a program or run one of its data handling jobs.

As the monitor switches computer activity from one type of job to another, an on-line printer indicates what action is being taken. It also notifies the operator when to change input or output tape reels. If, during a test run, trouble is encountered, SPOOK prepares a "snapshot" of the situation in which the 7090's stored information is printed out for analysis. An interrupt feature enables operators to enter emergency computations by flicking a sense switch which halts current operations and returns to them when urgent work is completed.

Because of the 7090's power, a computing job which might take two hours on a large non-transistorized computer, could be completed by the solid-state system in 15 or 20 minutes. The SPOOK monitor makes possible maximum use of this speed by eliminating

COMPUTING FROM V-2 TO SATURN

Dr. Helmut Hoelzer, director of the Marshall Space Flight Center's Computation Division, is a conversational spell-binder of the von Braun school. One of some 120 Peenemuende colleagues of the famed scientist who surrendered to the Western Allied Powers at the end of World War II, Hoelzer combines the limitless, concentrated enthusiasm of the computer specialist with the dedicated zeal typical of all the missile scientists at the Huntsville center.

Hoelzer's dual interest in computing and missiles began when he joined von Braun at the Peenemuende Rocket Center in 1937. Hoelzer's staff of 12 Ph.D.'s and 40 secretaries with desk calculators was perhaps making the world's first organized attempts to predict and plot rocket trajectories.

"Compared with the equipment we have available today and the work we are able to accomplish, ours were very primitive efforts," Hoelzer stated. "But even though it took us months instead of hours, we came up with the basic information."

Hoelzer's group eventually gathered a sizable mass of computing equipment which was the equivalent of a basic analog system, he relates.

Hoelzer tells this story about his first contact with actual rocket firing. He had been involved in a series of particularly difficult computational problems and was discussing them fairly heatedly with von Braun. At one point in the conversation, the computerman relates, von Braun seized him by the arm and, in a spirit of this-thing-is-bigger-than-all-of-us, took him to a V-2 test site. A V-2 was about to be launched; the countdown was in progress.

Hoelzer relates that he was peering through a hole in a fence near a test stand as the countdown progressed. The count reached zero, the rocket roared off the pad and the blast rammed the fence into Hoelzer's face, bloodying his nose.

"It was a very impressive occasion," Hoelzer says with a laugh. "From then on, rocketry was in my blood."

Hoelzer echos von Braun's contention that missile development could not now progress without the assistance of computer technology.

"The V-2 rocket was developed at Peenemuende basically without automatic digital computers. As a result, there were approximately 1,000 test firings. Yet for the vastly more intricate Saturn, we have scheduled only 10 research and development firings."

DATAMATION asked how long the two 7090's would be able to meet the center's computational needs.

"We expect our present equipment to take us through the entire Saturn project," Hoelzer stated. "But," he continued, "we know from experience that our computer effectiveness goes down as missile development becomes more complex. We will probably need a 'next generation' machine in three to five years."

The Marshall Space Flight Center at Huntsville, Ala., is the newest and largest of the NASA's field installations. Directed by Dr. Wernher von Braun, the Marshall Center is in charge of developing NASA space vehicles and conducting research.

Employing some 5,500 persons, the Marshall Center is the only single organization in the U.S. capable of conducting a launch vehicle program from conception of the idea, through design, development, fabrication and flight testing.

The center occupies 1,200 acres adjoining the city of Huntsville. Its facilities are valued at $100-million.

Among the MSFC programs are the Saturn heavy space vehicle, Agenda B, Centaur, and the F-1 single chamber 1,500,000-pound thrust engine. The center is also launching a series of satellites and space probes with the Juno II booster, and providing modified Redstone rockets for the Mercury manned satellite program of NASA.

The technical functions of the center are divided among nine divisions. These are: The Aeroballistics Division, the Computation Division, the Fabrication and Assembly Engineering Division, the Guidance and Control Division, the Launch Operations Directorate, the Research Projects Division, the Structures and Mechanics Division, the Systems Analysis Division, and the Test Division.

The Computation Division is responsible for establishing and conducting high-speed digital computation, simulation, and data reduction in the fields of space vehicle research, development, test, and flight firing; and devising improved methods and systems in this field.

much machine preparation through continuous productive runs. It also provides invaluable aid to machine operators and programmers.

the people

Dr. Helmut Hoelzer, director of MSFC's Computation Division, heads a computer effort involving 275 employees, many of whom are scattered throughout the center's nine divisions. He is assisted by Charles L. Bradshaw, the division's deputy director.

Bradshaw, a man who knows his computing equipment and knows how to best apply it in space work, has the distinction of being the only American deputy director at the center. All other directors and deputies are members of von Braun's original German contingent.

The deputy director explains that the division is made up of three groups. Scientific and commercial digital computing is performed at the comp lab by 155 General Electric employees and 25 civil service employees. The analog and simulation facility (a Bendix three-axis flight table and other equipment) has a staff of 25 and the data reduction center employs 45. The remaining personnel operate digital equipment in other divisions and at the 205 site at Canaveral.

Eighty percent of the digital computing is tied in with NASA work. The remaining 20 percent is commercial work performed for the Army.

"We have a joint effort here involving GE, civil service and IBM applied science representatives," Bradshaw stated. "We feel we have a good working arrangement in operation and we can point to achievements such as development of the SPOOK system to prove it." ●

MSFC director Dr. Wernher von Braun (right) reviews solar-system flight calculations with Dr. Helmut Hoelzer (left), director of the computation division, and Dr. Eberhard Rees, deputy director for research and development.

Project Saturn, directed by the National Aeronautics and Space Administration, has the objective of developing by the 1963-64 time period an efficient and reliable system for lifting multi-ton loads into orbit around the Earth and into deep space.

The Saturn vehicle will have a super-booster first stage with 1,500,000 pounds of thrust. The booster is under development at Huntsville, Ala. Upper stages designed to meet NASA requirements will be procured from industrial contractors.

The long-range Saturn program calls for several configurations, each one a logical follow-on to the previous version. The first Saturn configuration will consist of:

1. The booster unit made up of a cluster of eight conventional liquid fueled rocket engines, each developing 188,000 pounds of thrust, or an over-all thrust of about 1,500,000 pounds. This was the unit tested on June 15. See cover.)

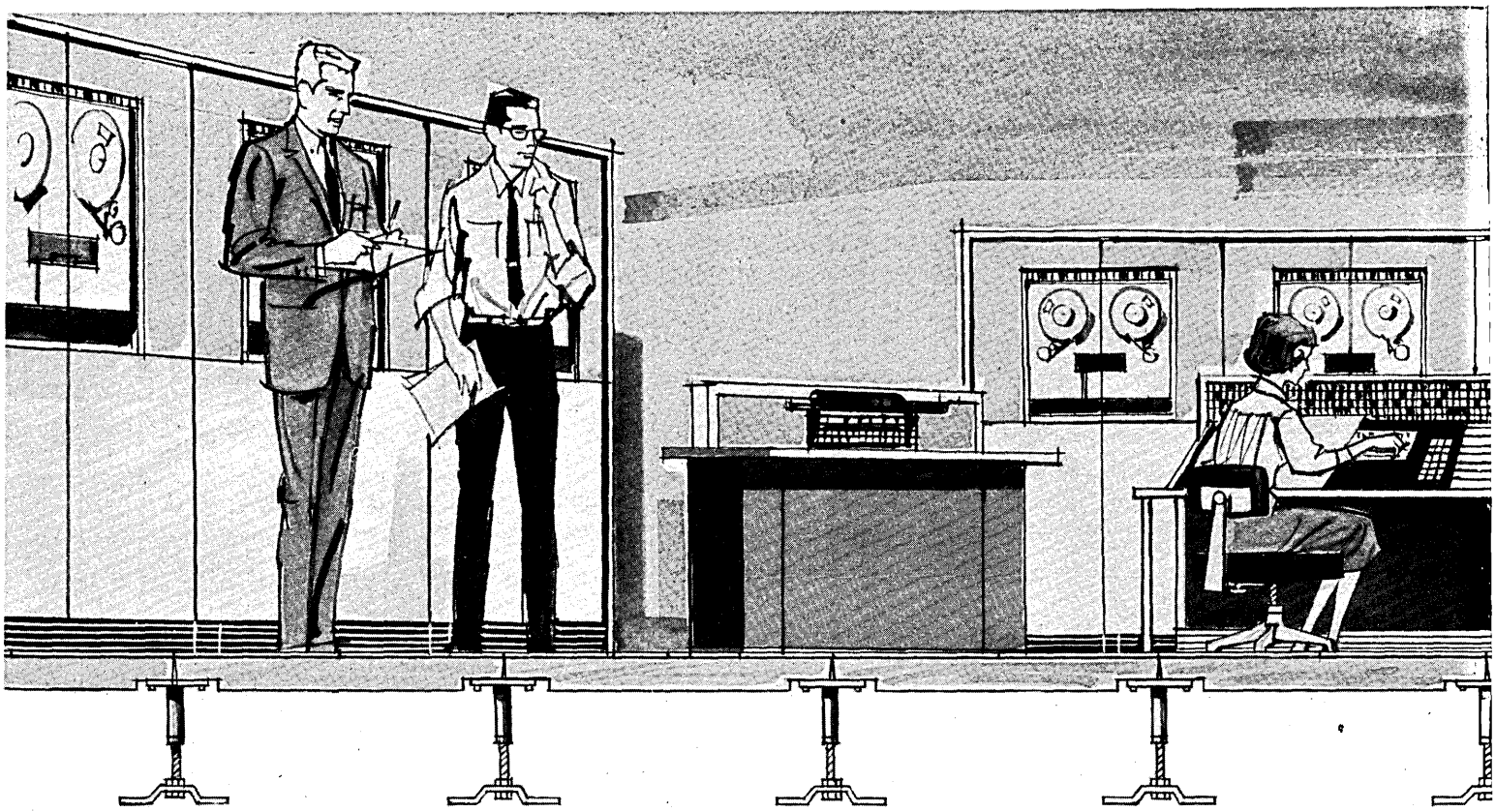
2. The second stage will be powered by four liquid hydrogen fueled engines of 20,000 pounds thrust each. Douglas Aircraft will develop the second stage.

3. The third stage will be powered by two liquid hydrogen fueled engines identical with those of the second stage.

For satellite missions, this configuration, standing about 180 feet tall, will orbit payloads of from 23,000 to 25,000 pounds, depending upon the altitude desired.

Later configurations, employing the same booster, will utilize a new second stage of four engines of 200,000 pounds thrust each, this cluster also being powered by liquid hydrogen. Two additional stages, the same as in the first configuration, would be used. This would make possible orbiting payloads of 45,000 pounds. It would also be possible to transport two men around the Moon and back to Earth, or to place instruments on Mars and Venus.

The Saturn project, thus far costing about 100-million dollars, was begun in August, 1958. There have been a number of static test firings to date, including several of all eight engines. All firings have been completely successful.



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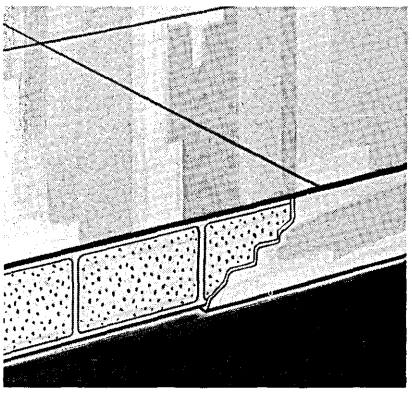

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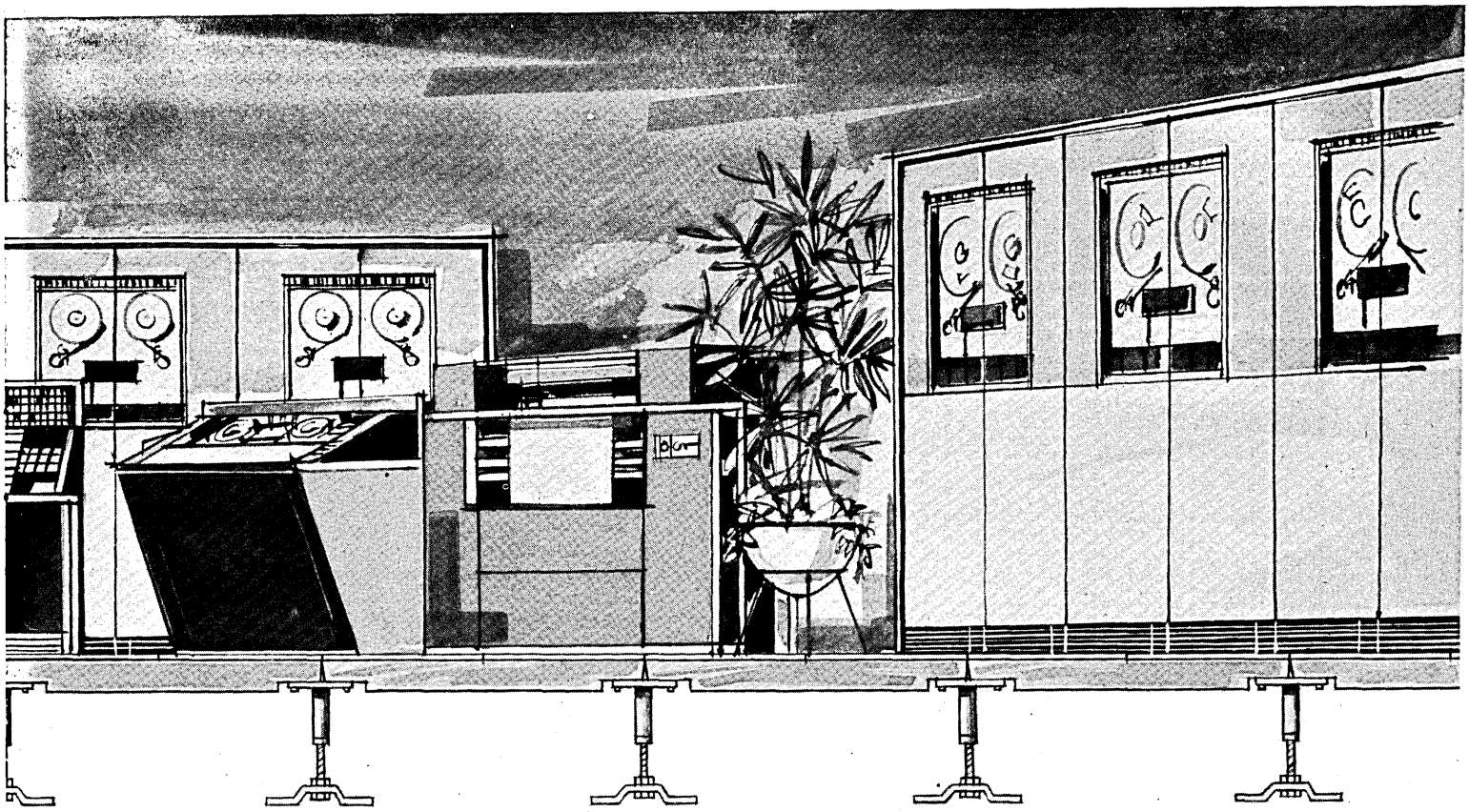

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A RE-EVALUATION OF GENERALIZATION

by R. C. McGEE and H. TELLIER
Hanford Atomic Products Operation
Richland, Washington

In August of 1957, the General Electric operation at the Atomic Energy Commission plant in the State of Washington published a report entitled, "Generalization: Key to Successful Electronic Data Processing."[1] As will be pointed out, these concepts of generalized routines have been accepted by certain EDP installations. However, to many persons who have a limited knowledge of this approach to data processing, there seems to be confusion as to the intent of the generators. In this article we hope to clarify some of this confusion.

history

The first generalized report generator and file maintenance routines were in operation at the General Electric, Hanford Atomic Products Operation in May, 1957. These generators were written for the IBM 702 Electronic Data Processor. A second, more powerful report generator was written and placed in operation in September of 1957. By November of 1957, an interest in this approach to data processing had been expressed by certain members of the SHARE organization. This interest led to the development of the 9PAC programming system based upon the concepts embodied in the earlier generalized routines developed at the General Electric Hanford Plant. By the time the 9PAC system was completed for the 709, the following companies had made significant contributions to its development:

Chrysler Corporation
Dow Chemical
General Electric
International Business Machines
Lockheed Missiles and Space Division
North American Aviation
Northern States Power
Phillips Petroleum
Space Technology Laboratories
Thompson Ramo-Wooldridge
Union Carbide
University of California at Los Angeles

The 9PAC system is now in productive use in many 709 installations throughout the country. The maintenance of the system is being performed by IBM Applied Programming.

In the 9PAC system the standard nomenclature for the report preparation program is Reports Generator, whereas the term, "Report Generator" had been used in earlier literature. Similarly, in keeping with its expanded capabilities, the term, "File Processor" is used in the 9PAC literature for the counterpart of generalized file maintenance in the earlier system. The over-all 9PAC system corresponds to the system referred to simply as "Generalized Routines" on the 702. Since this article is concerned with the concepts embodied in this approach to programming, the earlier nomenclature of report generator, file maintenance and generalized routines are used for generality.

[1]This material was reprinted in the January, 1959 issue of the ACM Journal.

why generalized routines were developed

Early in the game of using an electronic data processor, the following points became evident when conventional programming techniques were used:

1. The elapsed time required to install an automatic data processing system and the investment of man-hours were too great.
2. The time and cost required to maintain data processing systems after installation were too great.
3. The systems were not as flexible as they should be.

A study of what kind of effort was being expended on an electronic data processor while performing data processing showed that less than 20% of running time was spent in performing the arithmetic operations of add, subtract, multiply and divide. The rest of the time was spent in the manipulation of data to maintain files, sort records and prepare reports.

A careful, thorough study of the problem lead to the conclusion that any data processing system could be organized by use of the four functions of sorting, file maintenance, report preparation and calculation. A generalized sort routine had been developed in 1955 and the conclusion was reached that if similar generators were developed for file maintenance and report preparation, a high degree of flexibility would be available at a low cost of manpower.

This building block approach to data processing assumes the existence of subject source files. Each so-called source file is a collection of data on a broad subject category such as all the information on personnel or the information on stores inventory items. If the source files are correctly defined and the right kinds of information included in them, the number of such files for a business turns out to be relatively small.

A very important factor in the building block approach is that during installation of the system, the blocks can be distributed among a number of workers with a minimum of coordination required. After the source file is in operation, as explained later, a number of persons can request reports from the file with no coordination of effort required. Based upon the collection of independent report requests, the Report Generator will generate a machine program which will prepare at the same time all the required reports. This is a very important element of flexibility.

what are generalized routines?

Before attempting to describe the properties of the generalized routines, let us define the term and consider how generalized routines differ from a compiler. A compiler translates instructions written in a pseudo-language to the language of a particular machine. Generally, the organization of the instructions is entirely under the con-

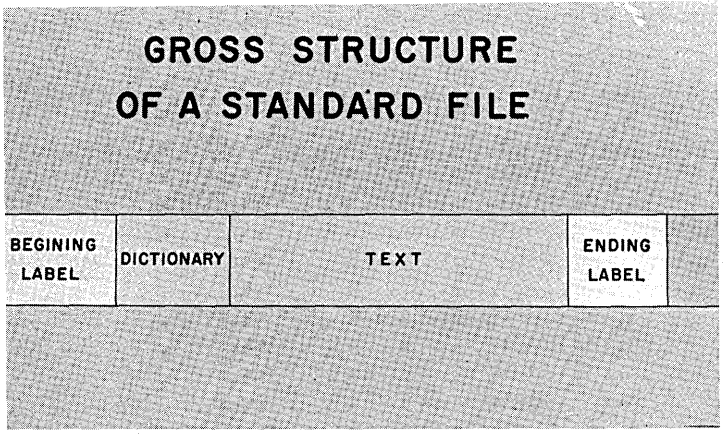


Figure 1

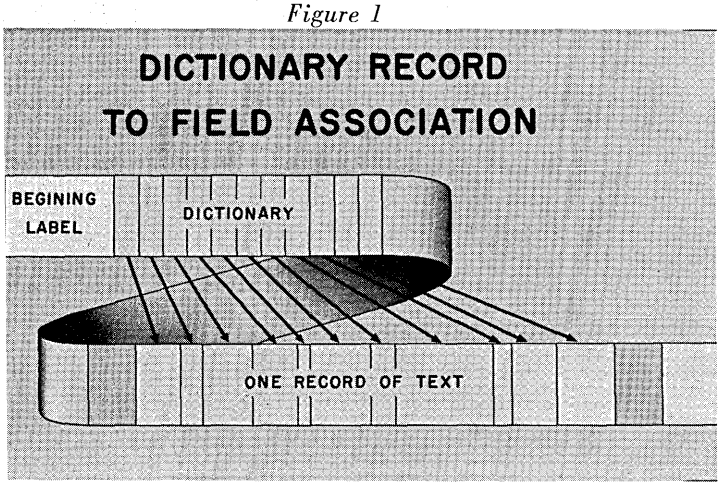


Figure 2

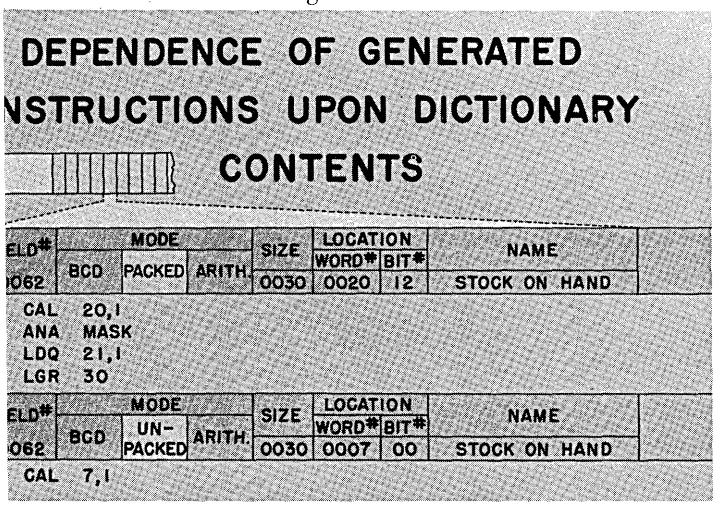


Figure 3

trol of the programmer. By contrast, a generalized routine is a program which is capable of obtaining a solution to a particular problem or class of problems. The over-all structure of a generalized routine is fixed. Variability is acquired by varying parameters which are supplied to the generalized routine.

A representative example is that of a generalized sorting program in which the record length, location and length of sort keys, and input and output record blocking are provided as parameters. The structure of the object program is relatively fixed, but certain portions of the program will be varied on the basis of parameters. This variability may be achieved in two ways: (1) by modifying the structure of a basic program, through the use of some preliminary processing, sometimes referred to as an

assignment phase, or (2) through the use of a generator in which the entire program is reconstructed from short sequences of precoded instructions prior to each processing of the object program. The generalized routines developed at Hanford are of the latter type.

It is clear, then, that the basic properties of a compiler lead to flexibility of structure, but generalized routines demand that a fixed over-all structure be adhered to. At first glance, this does not appear to be an advantage; however, the fixed structure of the generalized routines leads to economy in programming because it is not necessary to write instructions or do logical planning to determine what the structure of the object program is to be. This is pre-defined and determined in the generalized program.

To pursue this matter a little further, it should be noted that there are variations on both of these approaches. In particular, there are hybrids which exist such as compilers which contain generators and generators which contain compilers. For example, the FORTRAN compiler contains generators which produce object program from parameters specified in the form of equations. Similarly, the generalized routines contain compilers which enable one to augment the basic properties of the generalized routines by writing instructions in a language very similar to SCAT on the 709 or SCRIPT on the 702. In addition to augmenting the basic functions which are pre-defined in the generalized routines, this facility allows certain variations to be realized in the pre-determined structure of the object programs.

the language of the generalized routines

The source language of the generalized routines is unique. Although it is not highly refined in detail, it is advanced in concept. Insofar as possible, the source language inputs to the generalized routines consist of descriptions of desired end results. The descriptions are each recorded on one or more pre-printed forms. They are then keypunched, resulting in a set of cards, or a "packet," corresponding to each description.

In the case of file maintenance, the packet specifies which source file fields are to be affected by which change data fields and which fields of the two files are to be matched against one another to determine the appropriate timing for making changes. In the case of the report generator, the description consists of a pictorial representation of the report to be constructed and a set of correspondences which specify which source file fields are to become particular entries in that report.

This is a rather significant deviation from the classical approach to programming. In the classical approach, it is customary to describe a process which will lead to a certain end result. The approach used in the generalized routines is to describe only the end result. The process to be used in achieving the end result is determined by the generalized routines.

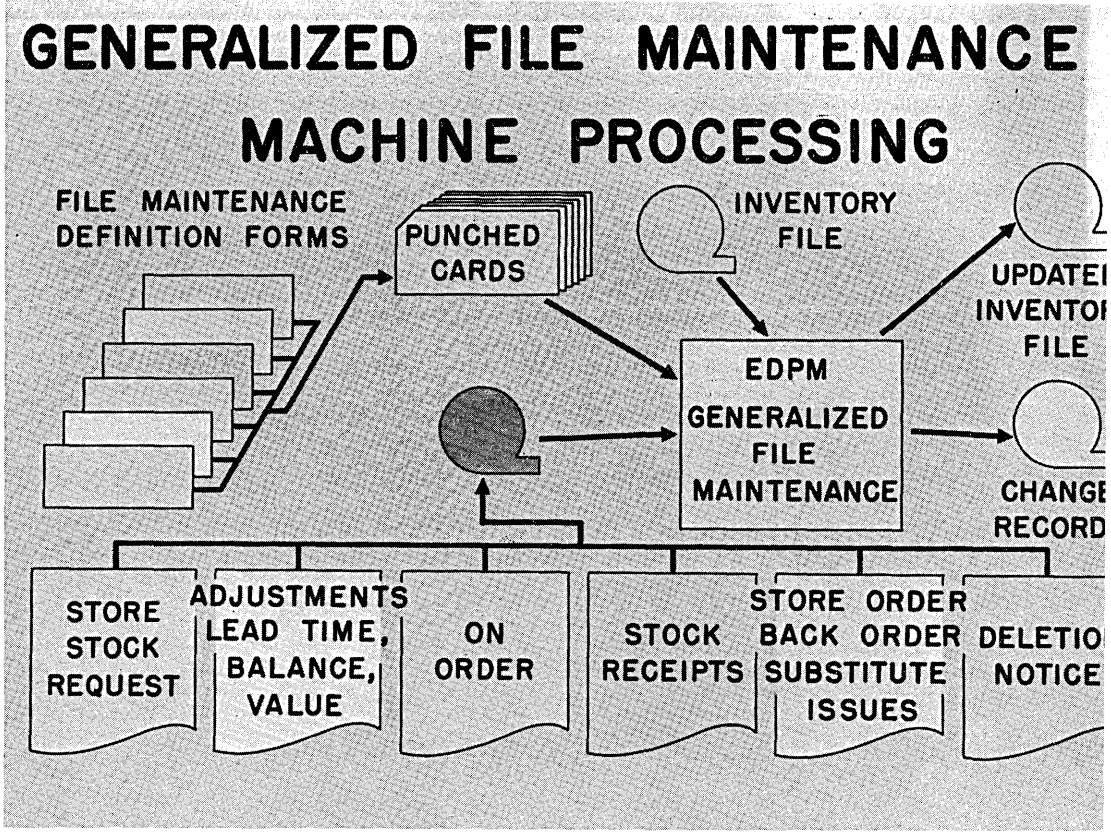


Figure 4

the standard file

Let us digress for a moment to look at the structure of the standard source file which the generalized routines are designed to handle. Although it is possible for the generalized routines to process files which do not conform to these standards, they have their greatest power and flexibility when dealing with such files.

Figure 1 is a diagram of a standard file. The file consists mostly of text, which is the subject matter of the file. If this is a personnel file, the text will consist of one record for each man; if it is an inventory file, the text will consist of one record for each line item in the inventory. The records or items are further broken down into fields – one for each piece of information recorded about each item. For instance, fields would exist for Stock Number, Balance on Hand, and Economic Order Quantity in an Inventory File.

In addition to text, the file will have beginning and ending labels. These are provided for accuracy control. During processing, the generated programs will interrogate the labels to make sure that the correct inputs are being used on every pass.

The file will also contain a dictionary. The dictionary gives a detailed description of each of the fields in the records of the standard file. (FIGURE 2) Hence, if the records which constitute the text contain 30 fields each, the dictionary will contain 30 records. Corresponding to each field of the records in the file, there exists a record in the file dictionary specifying such things as its field number, its mode (whether it is binary or binary coded decimal, packed or unpacked, arithmetic or logical), the field size, the location of the field in the record, the name of the field and certain other information which is used for checking the correctness of the field during file maintenance processing.

When reference is made to a field by its field number in a packet, the generator will search the file dictionary to determine where this field is to be found and what its

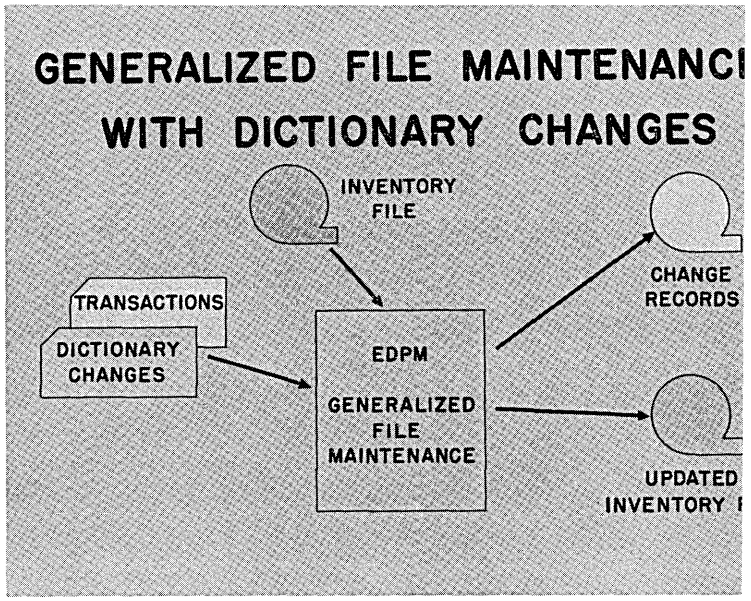


Figure 5

properties are so that appropriate instruction may be generated. In Figure 3, for instance, it is assumed that reference is being made to field number 0062. In the dictionary record illustrated at the top, it is seen that the mode of the field is BCD, packed, arithmetic; its length is 30 bits; and its leftmost bit is in position 0 of word 20 of each record. Consequently, the generator knows that it must generate the pattern of four instructions shown on the figure to get the field into the accumulator in a usable form. However, if the mode of the field were BCD, unpacked, arithmetic as shown in the lower portion of the figure, the generator would know that all it need provide would be a clear and add instruction.

use of generalized routines

Now, let us see how generalized file maintenance would be used in a typical application. (FIGURE 4) An inven-

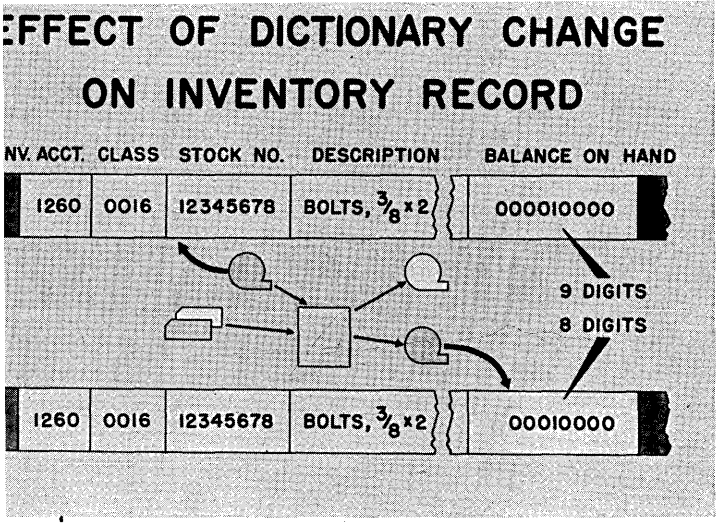


Figure 6

tory application has been chosen as an example. Following the concept of integrated record keeping all information concerning the inventory is stored on a single inventory source file. The object of the file maintenance processing is to update the inventory file reflecting the latest activity in the inventory and to extract from the file all current activity and other information needed for reports and to enter subsequent processing. In addition to the inventory file, a file of current transactions which constitutes the change data to be entered into the source file and a set of file maintenance packets are inputs to the system. The packets will inform the generator what is to be done with each type of input data. The outputs from the processing will be an updated inventory file and a change record output. The change record output will contain the beginning and ending value of each record affected by a change, plus any records which the file maintenance packets specify are to be extracted from the file.

Note that in this application the change record output will become the input to report generator for the remainder of the inventory processing. This is not a necessary procedure. In many cases, the source file will be the input to the next processing pass. The choice of outputs from file maintenance for subsequent processing is arbitrary and at the disposal of the programmer.

The sequence of events in the file maintenance program illustrated in figure 4 is as follows: The file maintenance generator is read into memory from a tape unit not shown in the diagram. The generator reads file maintenance packets and generates an object program on the basis of the packets and the file dictionary which is recorded on the front of the inventory file. At the completion of the generating process, all of the file maintenance packets have been read and processed and the object program is in memory ready for processing. Recent additions to 9PAC allow for punching of object programs if it is felt desirable to bypass generation during subsequent processing. At this point the program will be executed if the start button on the computer is depressed.

Now, let us suppose that the inventory control system has been so effective that the balance on hand in all items has been significantly reduced. As a consequence of this, the size of the balance-on-hand field is to be reduced from 9 to 8 decimal digits. (FIGURE 5) This change in the basic format of the file would be accomplished during normal file maintenance processing of the inventory. The only difference between this and the normal processing would be that the file maintenance packets which describe the incorporation into the file of current transactions would be preceded by a dictionary change packet which would describe the format change. (FIGURE 6) As a consequence of this processing, the original format of each record in the file will be changed from the form illustrated at the top of figure 6 to the form illustrated at the bottom of the figure. Remembering that the object program is regenerated on every processing cycle, it is clear that all generalized programs that worked prior to the change of input format will also work after the change because all references to source file fields are made indirectly via the source file dictionary.

Changing the length of a field has been chosen as an illustration of the use of dictionary changes. Virtually any other property of a field can be modified as well by performing a dictionary change.

Another step in the inventory application is completed through the use of report generator. Figure 7 shows the configuration of the report generator pass which will complete the inventory processing for a single cycle. The inputs to the machine will be the change records prepared during file maintenance processing, report generator packets (one for each output to be prepared), and the report generator system tape which is not shown on the diagram. The outputs from this processing will be various reports, three types of cards which are punched out in anticipation of future processing and tape records which will go into a budget and cost system for further processing of distribution of material costs. The sequence of events during this processing is entirely synonymous with that used by the file maintenance generator. That is, the report generator program is read into memeory from the system tape which in turn reads report generator packets into memory. Based upon the specifications of the reports found in the packets and upon the field definitions found on the input file dictionary, an object program will be generated in memory. The execution of this object program will produce the specified reports, cards and tape records on the output units.

One should take particular note of the report definition form labeled, "Special Reports" and the corresponding report on the output side of the diagram. One of the greatest powers of report generator is the potential it provides for rapidly filling request for special reports. To satisfy such requests, all one need do is to place the packet describing the special report into the card reader with the normally processed packets and the special report will be developed at virtually no cost, as a by-product of routine processing. Preparation of the packet for the special report is the only human effort required. An example of such a request in the inventory application is the preparation of tag cards preliminary to the taking of a physical inventory. The tag cards (one of which describes each of the items to be inventoried) will be prepared during some week's processing prior to the physical inventory. The cards will be punched out and

delivered to the customer who will in turn place them in the bins with the various inventory items. When the inventory is taken, the actual balance on hand is written on the tag cards. The true balance is punched in the cards and they are returned to Electronic Data Processing so that variance reports can be prepared by comparing the tag cards with the inventory file. Of course, in addition to the demands brought about by physical inventories, there are other demands for special reports by the organizations responsible for the inventory. These requests can be filled quickly and economically providing accurate, timely information to the responsible management.

other uses of generalized routines

An inventory application has been used as an example in describing the generalized routines; however, the same basic approach applies to many other data processing applications. The flexibility which can be achieved through the use of a standard file and its dictionary in conjunction with the generators has been demonstrated. Through this facility, rather drastic changes in the detail structure of the file can be performed without re-writing a single instruction. We have also seen the flexibility which is gained in applications through the ability to extract special reports with report generator. There is one additional form of flexibility which has not been mentioned and which is extremely important from a standpoint of achieving our goal of integrated record-keeping. As it is possible to change the properties of fields during file maintenance, it is also possible to add or delete fields and to add entire new record types, with associated dictionaries to the file. By this process, broad areas of data can be integrated into single files, so that many applications can be processed from a common source of records.

advantages of the generalized approach

Employment of this approach leads to the construction of a few very large files. The following are some of the advantages which this approach has to offer:

1. The ability to extract or cross-correlate any facts from the broad class of information in the file.
2. The ability to perform all processing on a given subject category in a few machine passes.
3. The ability to accurately control the data on a broad subject class in a single file thereby avoiding the difficulty of making several small files agree with one another.
4. The ability to provide accurate and up-to-date information as inputs to scientific investigations, evaluations and forecasts of a business.

In general, these advantages far outweigh the disadvantage of having to process a large file of information; however, there is nothing implicit in the generalized routines which requires the use and construction of large files. Only experience will indicate the extent to which it is desirable to integrate information into single files.

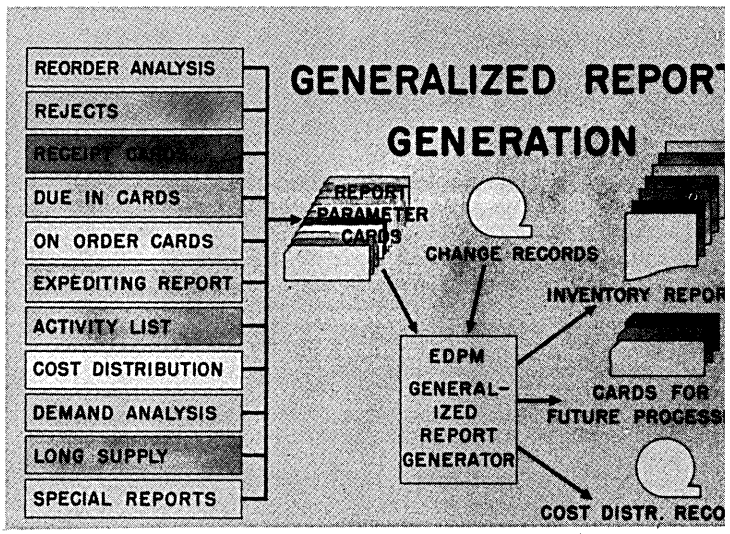
Experience with the generalized routines at the General Electric Hanford Atomic Products Operation indicates that the basic philosophies are correct. The programming advantage is illustrated in several ways. Perhaps most drastic is the fact that in 1957, the General Electric Hanford programming staff was able to accomplish as much work, in terms of the number of applications put on machines, as was accomplished in the previous four years. Whereas the original Hanford payroll for the 702 took approximately 6 man-years to write; the new payroll using generalized routines took approximately 6 man-months to write. The original payroll contained about 50,000 handwritten symbolic instructions; the generalized payroll contained about 5,000. As of the beginning of 1959, 75% of General Electric Hanford's business data processing on the 702 was expressed in the language of the generalized routines; 100% of the work in this area is expressed in the language of the generalized routines on the 709; the remaining work on the machine, with one exception, is written in the FORTRAN language.

machine efficiency

The question of machine efficiency is always raised in discussing the generalized routines. Our experiences on the 702 indicated that in all cases the generalized programs are more efficient than the corresponding handwritten programs. This is true for two reasons: First, the generalized programs are clean, by definition. They do not contain any corrections or redundant programming included to make the program work when errors arose in the original writing. Second, each generalized program performs more work than a corresponding handwritten program. This is not to imply that generalized programs are more efficient than handwritten programs **might be** if they were continuously recompiled to incorporate corrections and redesigned to include new demands within the framework of existing programs. This statement of efficiency relates generalized programs to be the patchwork programs which are resorted to in most installations to meet the time pressure and variability of a dynamic organization. It should be emphasized, however, that even if the generalized programs did not lead to highly efficient programs, they would still be very valuable tools because of the flexibility which they provide and because they lead to important savings inherent in integrated record-keeping.

The creation of the generalized routines has been an evolutionary process. The progress they have made possible in the past has been gratifying. Additional refinements of the source language should enable the generalized approach to become one of the important contributions to the future of electronic data processing. ●

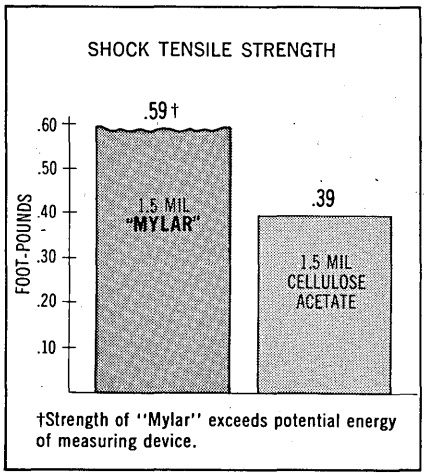
Figure 7



How magnetic tapes of "Mylar"® help insure maximum reliability

Stresses of high-speed transport . . . quick starts and stops can cause tape breakage or stretching that results in loss of data or chance for error. Magnetic tapes of "Mylar"* polyester film minimize these hazards because of their greater strength and durability. Their additional cost is more than offset by savings on tape replacement and reconstruction of broken or damaged tapes. Here's why·

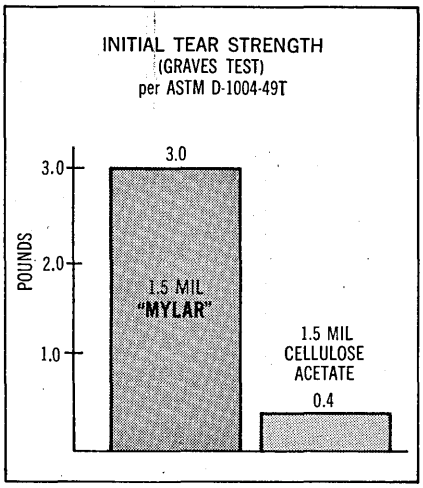
CHART NO. 1



†Strength of "Mylar" exceeds potential energy of measuring device.

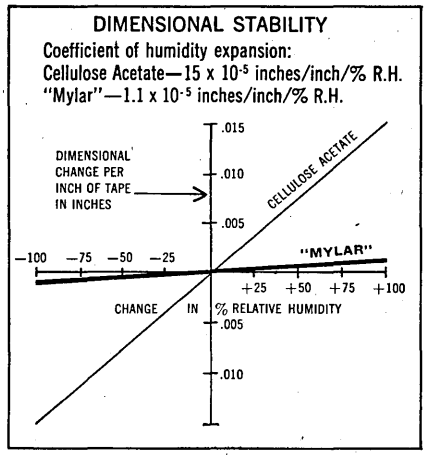
Less breakage from shock. Chart 1 compares shock tensile strength of "Mylar" with that of cellulose acetate. The strength of "Mylar" actually exceeds the range of the measuring device, while acetate failed at 0.39 foot-pounds. With "Mylar" you'll have less tape breakage from high-shock loading sometimes created by operating conditions. And, "Mylar" does not lose its strength with age, repeated playbacks or storage, because it has no plasticizer to dry out.

CHART NO. 2



Reduced breakage from edge nicks. Chart 2 shows the initial tear strength of "Mylar" is over seven times that of acetate. "Mylar" resists edge nicking and retards growth of tears if nicking occurs. Since most tape breaks start as edge nicks, you'll have less tape breakage and loss of valuable information with "Mylar".

CHART NO. 3



Fewer weak or garbled signals. Chart 3 shows dimensional change in "Mylar" with temperature or humidity change is negligible compared with that of cellulose acetate. This exceptional stability prevents tape shrinking, swelling or cupping that could result in shifting of tracks or loss of contact with the recording or playback head. Possibility of signal dropout or garbled or weak signals is minimized, and reliability of recorded data is improved.

Tapes of "Mylar" can make an important contribution to the reliability and economy of your data processing. Ask your magnetic-tape supplier to recommend the specific tape of "Mylar" for your needs.

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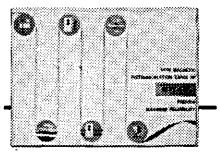
DU PONT **MYLAR**® POLYESTER FILM

*"*Mylar*" *is Du Pont's registered trademark for its polyester film.*



E. I. du Pont de Nemours & Co. (Inc.)
Film Department, Room #12, Wilmington 98, Delaware

Please send free, 12-page booklet of comparative test data to help me evaluate magnetic-tape reliability.

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Company_____
Address_____
City_____ Zone____ State_____

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GLOBE-GIRDLING GROSCH REPORTS STATE-OF-ART IN AUSTRALIA, JAPAN

Last January I was working part time with Dr. Robinson of C-E-I-R. We went over to London for a week or so, and I helped him set up a British subsidiary. The project went so smoothly that I began to think about future possibilities of the same sort. And just about that time, the new Australian Committee on Computation and Automation Control began talking about its first JCC-type meeting, to be held in Sydney in late May. There is a lot of excitement in financial circles here, and much more in London, about the boom Down Under, so I decided to go have a look, partly to get acquainted with

the computer people, partly to see if the time was ripe for a C-E-I-R operation there in the near future.

I sent an initial feeler to Clem Harper, the chairman of the Sydney meeting, and got an immediate reply from John Bennett, whom I had met several times here, and who is now head of ANCCAC. So I ended up chairing a couple of sessions on technical applications – but more on that later.

OK, that left a couple of weeks between the end of the WJCC in San Francisco and the Sydney do. My first idea was to double back to Washington and New York.

Then another little bat began to flap in the belfry. Everyone talks about the fantastic progress Japan is making in electronics – how about computers? I'd met Goto in Paris, and seen two or three intriguing Japanese exhibits at the Grand Palais show, including some parametron equipment, but I knew almost nothing about applications, or the depth of R & D support behind hardware and non-hardware development. For a few hundred bucks of my own money I could go to Tokyo between the two big meetings and take a look.

Now that money (or to be exact, **my** money) had entered the discussion, I started to explore tariffs and routings. Once I converted an essentially simple New York-Sydney fare into a round-the-Pacific circus, what fun and games could I add on? You know the tourist bait, "Fly to Reykjavik with Qantas and visit eighteen other cities, including Tananarive and Ulan Bator, free." Well I found one **almost** that good! There are transpolar flights from Tokyo to Europe now, and I could convert my Pacific swing into an exaggerated RTW (agent's lingo for round-the-world) with return to New York across the Atlantic, for only an additional twenty or thirty dollars. I'd wanted to call on Olivetti and Ferranti soon anyhow, so that looked like good business as well as a fantastic travel bargain.

But there was, as always, a slight catch. I had to go to Sydney first, then Tokyo, then Europe. Time was not too serious a problem, since only the WJCC and the ANCCAC dates were fixed, but how to fill the time between?

And the solution was, to repeat last month's joke, a PIP! Two weeks is plenty to start a computer society, as Ed Berkeley and Ike Auerbach can attest, and what better place to start one than Tahiti? That's how the Polynesian Information Processing Society was born, and that's how an inquiry about service bureau work in Australia grew into a 45,000 mile swing from Bankok to Milano, and from Milford Sound to the North Pole.

Let me skip blithely over the WJCC. I wrote from Tahiti about PIPS. When I review this trip I'll tell more about that; it went smoothly, the initial meeting did, except for a question about the proper definition of "Polynesia" (meetings, say the Constitution, must be held in Polynesia). The final decision was "Pacific islands between the parallels of 40°N and 40°S without IBM offices."

I managed to squeeze on to the inaugural flight of TAI (Transports Aeriens Intercontinentaux) from Los Angeles to Tahiti, in place of Ava Gardner. Really! And I was a guest of TAI until the VIP's – I almost said "the rest of the VIP's" – flew back to Los Angeles. Two days later, in despair at paying my own bar bill again, I adjourned the first PIP meeting in computing history and left for Figi and points south.

herb in australia

The Sydney sessions were a huge (I choose the word carefully) success. Originally, Bennett, Harper, and the other organizers expected one or two hundred people, and perhaps thirty or forty papers; they ended up with six hundred registrations, 140 papers in quadruplex (usually one business applications, two technical applications and one design session in parallel), and a major program of visits to sample installations. The meeting was opened at the University of Sydney and sessions were also held at the University of New South Wales across the city. It gave me an eerie feeling to hear J. P. Baxter, chairman of the Australian Atomic Energy Commission, bewail the low output of "mathematicians and of engineers with adequate mathematical training" and predict that the spread of computers in Australian industry would cause a shortage of mathematics teachers in schools and universities. Another hemisphere, same problems! That was the official opening speech, too; Baxter is also vice chancellor of the University of New South Wales.

Preprinted summaries of all talks were distributed at registration; these were bound in four units, one for each parallel session – a nice touch. There was a well-attended cocktail party instead of a banquet; the idea may well

Plus & Minus

by Herb Grosch

have been brought back by the many visitors to our JCC's from those climes, but the well-oiled recruiting pitch was conspicuous by its absence. The familiar rivalries of Los Angeles and San Francisco, still lingering like grit between the molars from two weeks before, transformed smoothly into Sydney and Melbourne after only a few sherries, especially as Gordon Pearson and some other bank types from the Melbourne cabal seemed to know Al and ERMA Zipf better than I did!

I heard, perforce, less than a quarter of the papers. Those reciting actual accomplishments were in tune with current installations: quite a few 650's, RAMAC's and 7070's later this year, a 7090 for the Weapons Research Establishment just ordered (that's IBM; about the same level of sophistication in English equipment, of course). The projections, though, were closer to our own current excitements: an Army DP concept like Fieldata, overly fancy automatic coding system plans, remote data input/output and transmission channels. Even the extreme upper end of the size spectrum is being considered, rather to my surprise – mostly ATLAS, but LARC and STRETCH are under surveillance.

And the universities, with apologies to my good friends there, are falling behind just like ours.

The largest newspaper put out a special section on the meeting, with five pages of ads from the major English manufacturers. I made the front page, via a photograph cribbed from an old DATAMATION masthead, and so did Thompson of LEO Computers, Ltd. Swann of Ferranti's also came down. Burroughs, Remington Rand, and Bendix (there's a G-15 in Sydney) were represented by their local affiliates, and there were substantial pushes from English Electric and EMI. There is no purely Australian effort – nothing, at any rate, corresponding to the Holden automobile, which while a GM product, is designed for and manufactured in Australia. My educated guess, based on only a week in the country, would be that IBM and Ferranti are tussling for the lead. Moyes of IBM Australia took me out to lunch, and was so pleased over his 7090 order from WRE he almost didn't order a lemon squash!

The number of major applications will probably be out of proportion to the Australian population (say ten million people). But the tasks are smaller; thus, the largest stock broker in Sydney or Melbourne needs a 7070, not a 7080. Balanced against this is the tremendous optimism and excitement of the Australian boom and the scarcity of clerical workers.

service bureaus down under?

Oh yes, I wanted to look at service bureau possibilities – well, they're outstanding. The Australians and New Zealanders are more used to cooperating with their "competitors" than we, and shared installations are already envisaged. The many industrial Boards, trade associations with government backing and assistance, are a possible medium to explore. And the Australians want the best available machines, even if they can't keep 'em busy. So it's fertile ground for service agencies.

And it's a tremendous continent – five hours by Comet, four just from Sydney to Darwin. I shared a seat to Singapore with Vic Severine of Smith-Corona Marchant, who had been in Sydney on other business, and he gave me some valuable tips on Tokyo. Family friends in Singapore, several rolls of Kodachrome in Thailand, and several rolls of travelers' checks in Hong Kong, and up loomed Tokyo.

herb in japan

You know, it really is different. Especially finding your way around on business calls. There are no street names, no house numbers; the phone books are – you guessed it – in Japanese; taxi drivers and subway changemakers don't understand your pronunciation of place names, and they don't know the Roman alphabet. So the procedure is as follows: your hotel clerk, who speaks pretty good English, produces a tattered copy of a Tokyo directory printed in English; you find the company or individual you want and show it to him (if too new, or too Japanese, to be in the directory, the outfit is reduced to a hypothesis, try the hypothesis on all your English-speaking friends); he reads the "address," something like "a very small alley, Williamsburg area, Brooklyn" and shakes his head; he calls the listed number (often obsolete) and asks the executive you want where his office is; he writes down the directions given in Japanese, useless to you, on a card which carries

on the front the plaintive message, printed in Japanese also, "Taxidriver, take me back to the Nikkatsu Hotel, two blocks up from the Nichegeki Music Hall" or some such; the taxidriver, if he can read the clerk's symbols, takes you to the approximate neighborhood and makes a local inquiry, at length, in a bar. With luck, you arrive.

The first thing MacArthur did when he occupied Tokyo was to put up street signs, otherwise he never would have gotten to Sperry Rand!

For a general view of electronics in Japan, with a great deal of factual and background dope on computers, you should read a special survey in the May 27, 1960 issue of "Electronics." I saw reprints at the McGraw-Hill offices in Tokyo and it's an admirable job. I want to supplement the hardware dope with news about peripheral equipment, applications, installations, and so on.

I called the new science attache' at the American Embassy, I visited Goto at Tokyo University, I met the head of Kurosawa (a line of six-hole teletype equipment, with interests in input/output computer attachment) and toured the Fuji computer center with him, I called on the International Division of Toshiba, the G-E of Japan, and was informed and entertained, and especially I visited the Computer Center of the Japan Electronic Industry Development Association. I also had a most pleasant visit at IBM Japan, starting with Kaoru Ando, who was just about to leave for the Pan Pacific NMAA Seminar in Honolulu, where he spoke June 28; then a leisurely luncheon with the rest of the top brass; finally, a pep talk next day to the young Applied Science men who were getting excited about the first 7090 going to Mitsubishi late this autumn.

japanese computer marketing

The marketing picture is very different indeed from Australia. The national systems are struggling very successfully to catch up with IBM and Remington Rand, both of which have made heavy inroads. There appears to be little English or Continental equipment by comparison. The Japanese machines are going directly from first-generation relays to transistors and parametrons, printed circuits, and fairly sophisticated systems thinking. No tubes! But the size is bounded by, say, the 1401 and the 7070. I found no trace of a Japanese STRETCH or TRANSAC. And, perhaps surprisingly in view of their tape recorders, they are behind Europe (and far behind us) in magnetic tape and tape drives. Very nice paper tape and perforated film equipment, though, and some curious static card readers to take the place of, say, a Burroughs E101 pinboard.

There did not seem to be anything like the industrial or government support of university work, hardware or applications that we have in America or that I have seen in England, the Continent, or even beginning in Australia. I could be sarcastic and say that, like tubes, they're skipping an obsolete technique. I won't; indeed, I hope sincerely that I'm mistaken, or that the situation will improve. There are no formal courses in programming at Tokyo University, incidentally, but that doesn't bother me too much; the old parametron machine is loaded with work programmed by students who picked it up on the firing line.

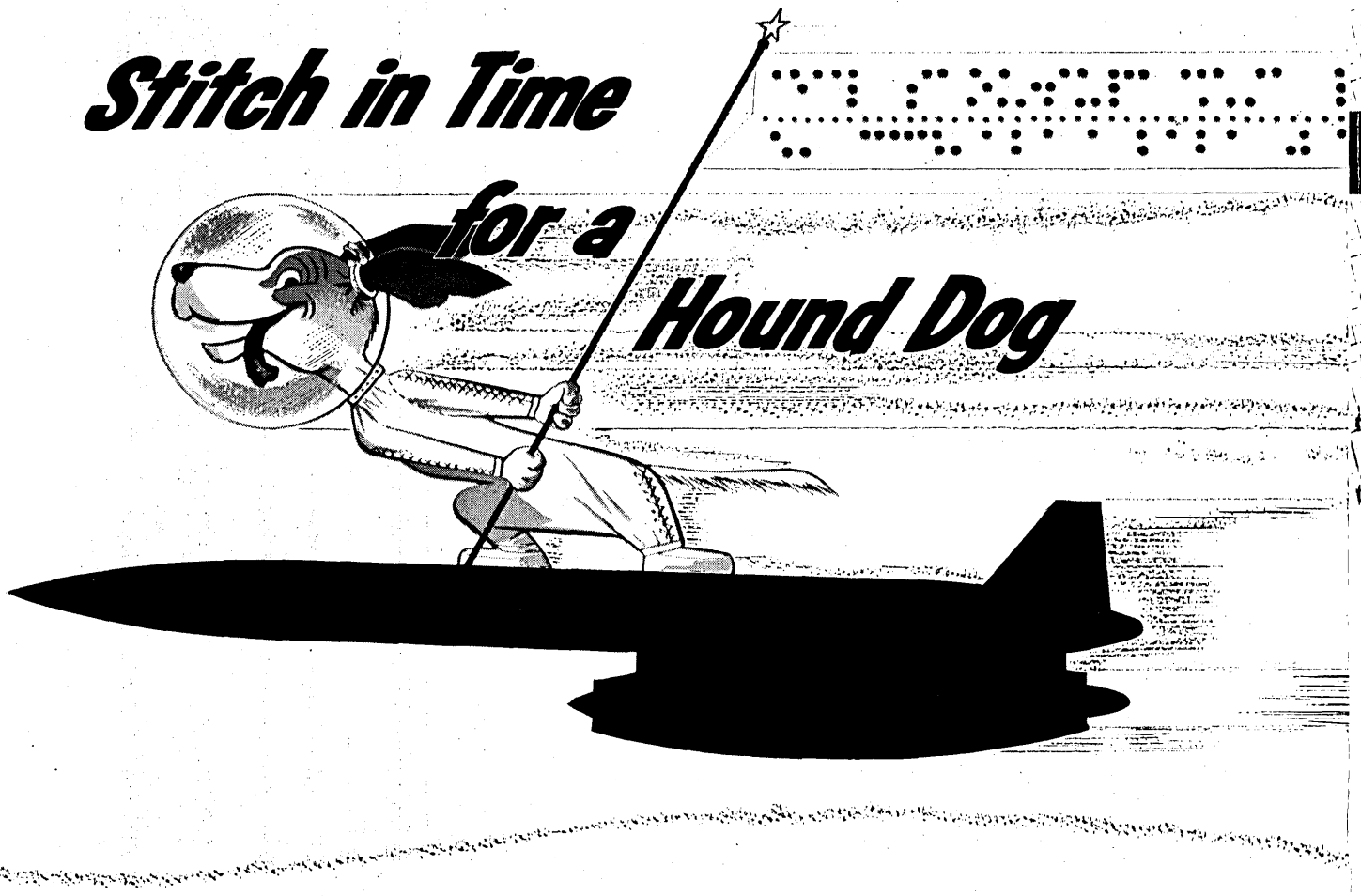
At the JEIDA, Takasaki, the head of the Computer Center, showed me a service operation built around four machines, one each from Fuji, Hitachi, Toshiba, and Nippon Electric. The Center undertakes much demonstration and instruction work in addition to service, and other groups at JEIDA are doing development work and testing new products, much of their efforts being related to non-computer hardware.

My general feeling was that no Japanese company had even begun to appreciate the importance of non-hardware support activities: customer problem analyses, support programming, programming research and coding systems development, and so on. As usual, IBM sees this pretty well and is moving to close the gap. Ando showed me a remarkably busy tape 650 installation with auxiliary core memory, something not often encountered in America, and his young men are teaching as well as selling service.

Perhaps because of this lack, Japan doesn't seem as enthused about using computers as Australia. Sure, design and manufacturing are going ahead at fantastic speed, but the applications are not as varied or as challenging as I'd like to see.

Well, I'll have to leave the Olivetti 9003, MUSE and ATLAS and ORION, and even my tour of Alaska in a French airplane from Japan, until the next issue. Be sure to tune in, kiddies! (Remember what Uncle Don said after that???) ●

Stitch in Time for a Hound Dog



New Tally Tape Console cuts punched tape preparation time by 600% on Hound Dog missile

Last fall, the first production model of the new Tally Tape Console was delivered to North American Aviation's Missile Division to speed the preparation of punched paper tapes. The tapes in turn program both production and preflight missile checkout systems on SAC's Hound Dog missile.

Before the Tally Tape Console was installed North American Missile Division engineers took 30 hours to make and absolutely verify a 400-foot programming tape. To make and absolutely verify a duplicate copy of the tape required an additional 75 minutes.

The Results

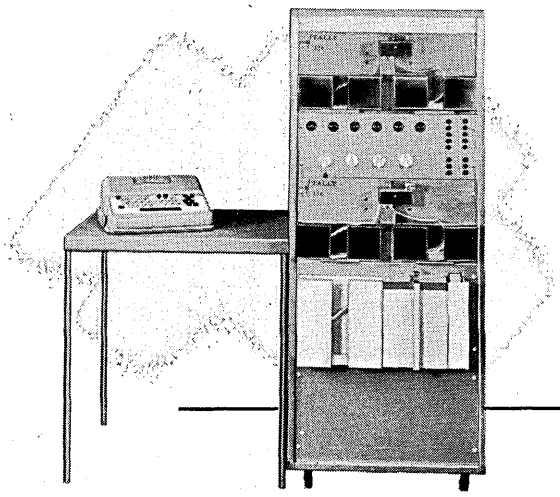
Now, North American Missile Division engineers using the new Tally Model 150 Tape Preparation and Editing Console make 400-foot tapes in three to four hours. Duplicate tapes are made in only 37 minutes. And Tally tapes are *guaranteed* error free.

Tally/Seattle is pleased to have played a significant role in North American's pace setting GAM-77 program which took only thirty months from design to flight of production models by SAC crews.

Tally's Tape Console simplifies and automates punched paper tape production

It features tape-to-tape duplication and verification at 60 characters per second. A keyboard visual display and shift register reduces error and operator fatigue in both punching and verifying modes. Tape corrections can be made without overpunching or splicing.

The Tally Tape Console is another new product from a creative engineering team specializing in punched paper tape technology. Your nearby Tally engineering representative can provide you with complete technical information on the Tally Tape Console or you may write directly to Dept.——



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TALLY

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Phone: MAin 4-0760

B. BERLANT ANSWERS GLASER LETTER TO EDITOR

Dear Sir:

I have received a copy of a letter from George Glaser, of Ampex, to you. (Published in May/June issue.)

His criticism would be valid, if the article were a full analysis of the application of magnetic recorders in digital data reduction systems.

But my problem was to illustrate to the maximum degree the capabilities of this type of equipment in a single illustration in a very short space. For this reason, the mode of operation described was selected to emphasize the scope of operation, not the most common mode. I hope I did not cause confusion.

Regards,
Bert Berlant

CONTROL DATA ORGANIZES PROGRAMMING RESEARCH

A Programming Research Group, under direction of Dr. Robert E. Smith, has been formed at Control Data Computer Division. In addition to other accomplishments, the group has developed complete libraries of subroutines for the company's 1604 and 160 computers. Translators are under development to automatically translate the language of other computers to the language of the 1604.

Circle 100 on Reader Service Card.

IBM'S 1401 FEATURES ENLARGED CORE STORAGE

Quadrupled magnetic core storage capacity for the 1401 has been introduced by IBM's Data Processing Division. By adding the new 1406 core storage unit, 16,000 positions are available for various card and tape configurations. Previous maximum core memory capacity of the 1401 was 4,000 positions. Twenty-eight hundred orders for the 1401 have been received since its introduction last October, IBM states.

Circle 101 on Reader Service Card.

ENGINEERS PURCHASE TWENTY-FIVE PRINTERS

The U.S. Army Corps of Engineers purchased 25 S-C 3000 high speed communications printers recently. Developed by Stromberg - Carlson - San Diego engineers last year, the printers are designed to read out data from computers, telegraph, and radio communication links.

As a computer printer, the 3000 operates either on-line or off-line in conjunction with various types of data processing systems.

Circle 102 on Reader Service Card.

ELECTRONIC ASSOCIATES GETS NASA CONTRACT

A $1,510,000 contract for what is described as the largest and most advanced general purpose analog computer in the world has been awarded to Electronic Associates, Inc., by the National Aeronautics and Space Administration. The computer, made up of five separate systems, will be 132 feet long and will occupy about 1,800 feet of floor space, according to Lloyd F. Christianson, EAI president.

BECKMAN WILL DEVELOP COMPUTER FOR LOCKHEED

Beckman Instruments, Inc. has received a $375,000 contract from the Lockheed Missiles and Space Division for a high-speed analog computer to be used in development and testing of the Polaris missile and its components. The computer will be the largest all-electronic computer in existence, according to a recent news release.

AUTO-CONTROL SYSTEM DESIGNED FOR 2000

A new "Auto-Control System" for the Philco-2000 has been announced by Philco. An automatic interrupt feature permits the programmer to determine the system conditions that shall be checked, when to check and the action to be taken. The system also increases the scope of the entire Philco 2000 system by the expansion of real-time capabilities.

Circle 103 on Reader Service Card.

ELECTRONIC EDITOR AIDS IN CHEMICAL PUBLICATION

An "electronic editor" has been trained to index thousands of articles appearing in the leading chemical journals of the world for the American Chemical Society. The end-product is a

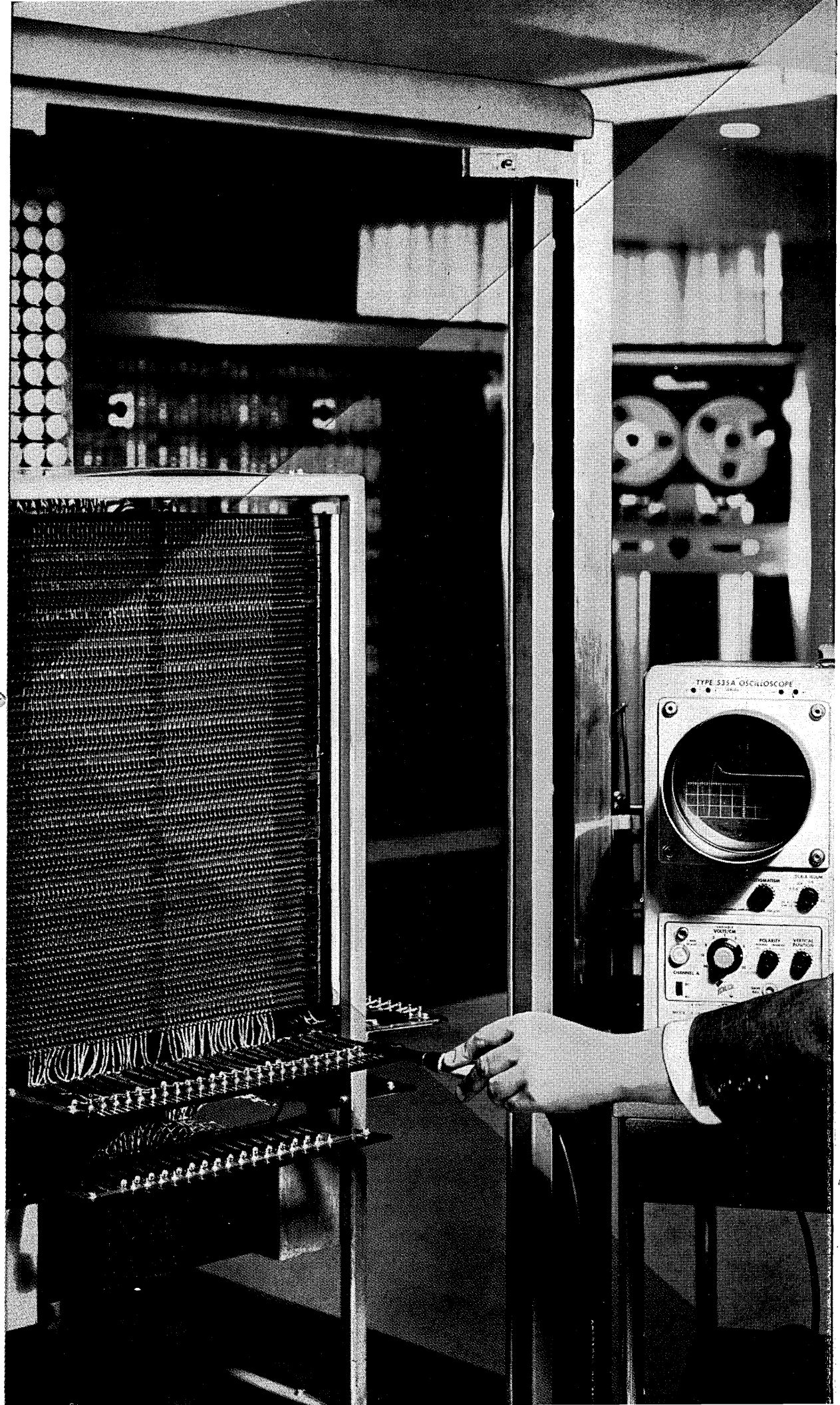
RCA SUPPORTS COMMON BUSINESS ORIENTED LANGUAGE

(In the March/April, 1960, issue of DATAMATION, an IBM statement representing that company's position with respect to COmmon Business Oriented Language (COBOL) was presented. Following is an RCA official statement regarding this important computer programming development.—Ed.)

RCA has been a contributing member of the Conference on Data Systems Language since its inception. Our sustaining belief in COBOL is not deterred by any speculative statements either connoting or coveting an inferior or unworthy system. We are firmly convinced of the desirability of the CODASYL effort and benefits to be gained by the industry. Consequently, RCA will continue to work in a positive effort to insure the success of COBOL by implementing the system for its computer product line.

We see two advantages from our allegiance to COBOL. First, we believe that we will offer our customers a practical and effective vehicle for the solution of business data processing problems. Second, we will be in a position to cooperate in any effort necessary to provide a compatible product. The growth potential of our systems is such that the inclusion of the improvements resulting from expected advancements and refinements may easily be applied. The immediate absence of this latter advantage is not sufficient cause for us to condemn the work that has been done thus far.

In addition, RCA's approach will further serve the industry in its present COBOL efforts through early implementation and usage. These early efforts will reveal those design deficiencies which make themselves known only through mechanization and usage. It is only by this means, in addition to committee participation, that a true measure of the system's worth can be achieved and the necessary steps taken to guarantee the mutual design and acceptance of a "Common Business Oriented Language."



✻

Professional **M**aintenance

Preventive **M**aintenance

Pridemanship

Protective **M**aintenance

Profitable **M**aintenance Management

. . . take your pick; they all embody IBM's traditional service philosophy . . . The manufacturer is responsible for performance of his product

THE SCOPE OF PM* AT IBM

...this, too, is *Balanced Data Processing:*

Until failure-free equipment is perfected (and our engineers are working toward this goal) management must ask: "How can I be protected from unscheduled maintenance?"..."How fast can I put my system back to work in the event of down time?"

Keeping operating time up and maintenance time down is a service management job the IBM Customer Engineer knows best.

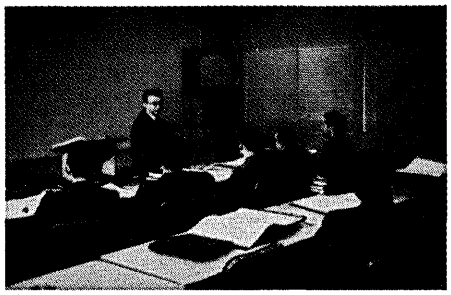
Who is this IBM Customer Engineer?

He is an intensely trained specialist with the dedication of a professional. His career starts with training at an IBM education center. Regularly he returns to school and attends periodic seminars to keep up with the latest advances. As a fully qualified Customer Engineer, he is assigned the responsibility for a customer territory.

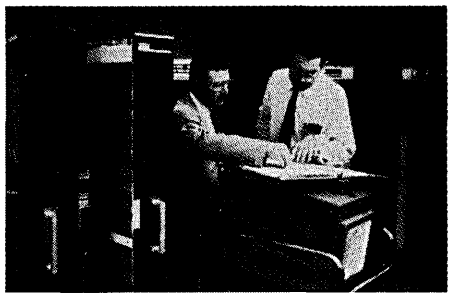
He is a trouble shooter and businessman combined. He is trained to spot trouble before it starts...to understand the special nature of your business and to see to it, through a program of Protective Maintenance, that you get more data processing per dollar.

Operating from over 300 locations he and his colleagues have developed an enviable reputation for promptness and efficiency. The performance of your equipment and the extra help they can give you through maintenance management are responsibilities they accept proudly.

When you *Think* of data processing... *Think* of IBM and dedicated PM as your guarantee of more data processing per dollar...*this is a vital part of Balanced Data Processing.*



At a modern IBM education center, a class of Customer Engineers watches a technical demonstration on closed-circuit TV.



These Customer Engineers go back to school for advanced training in solid state circuitry used in new IBM equipment.

Replacement parts are immediately available to IBM service locations from this central supply depot in Mechanicsburg, Pa.

On the job the IBM Customer Engineer's training and high sense of responsibility pay off in prompt, expert service.

IBM®

Balanced Data Processing

Circle 17 on Reader Service Card.

104-page semi-monthly publication named "Chemical Titles."

The computer program was originally written for a 704 but can be adapted to any of the family of general purpose machines.

BAIRD PRINT READER AID TO TRANSLATION

An automatic print reader has been developed by Baird Atomic to aid machine translation of foreign languages. The machine was designed for the electronic translator recently announced by the U.S. Air Force.

The print reader reads alphabet characters, punctuation marks, and numbers from a filmed copy of the original publication. Used with the translator it will operate at a rate of about 60 times faster than a typist who now copies Russian text on a typewriter. (The typewriter produces perforated tape which feeds the translating computer.)

Circle 104 on Reader Service Card.

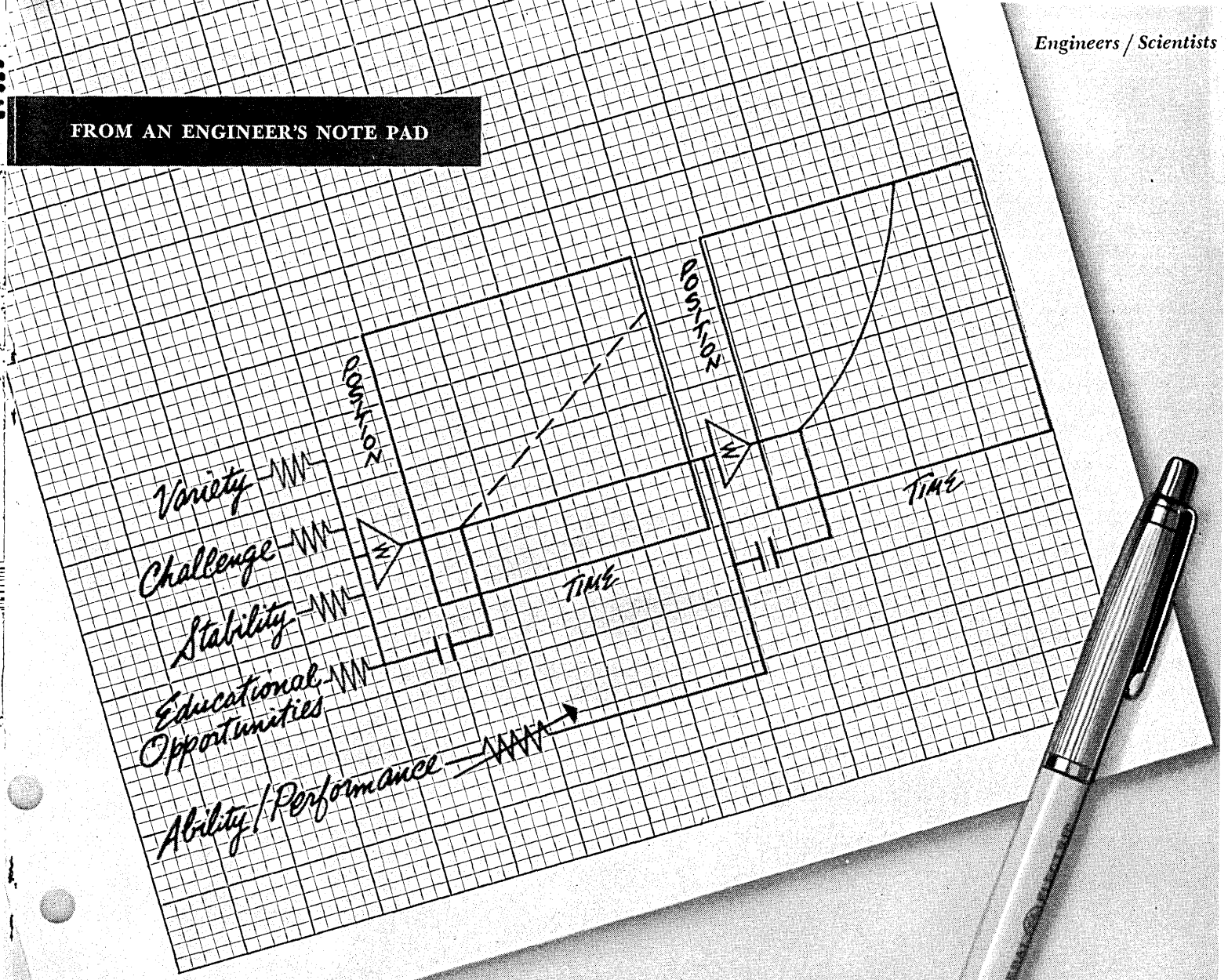
✓Lockheed Missiles and Space Div. has ordered two 1604 large scale solid-state computers from Control Data Corp. These computers are to be used as part of the ground-based data receiving stations in the Air Force's Discoverer, Midas and Samos satellite systems.

✓Ampex Data Products Co. has received an order from Sylvania Electronic Systems Division for a complete tape system to meet Sylvania's computer requirements.

✓General Electric's Atomic Power Equipment Department plans to lease a Philco 2000 which will enable engineers to explore many areas of nuclear reactor design in greater detail than is now possible with its present computers, according to general manager George White.

✓A large-scale 800 digital computer will be the heart of a $3.6-million nuclear submarine training center being developed by Minneapolis-Honeywell for the Navy to electronically simulate full-scale naval battles.

✓An RCA 501 is providing daily control of finished goods inventories at the General Tire & Rubber Co.'s three plants and thirty warehouses throughout the United States. It is



"You plot your own curve at HMED"

ENGINEERS ARE a curious lot; a breed apart. Their natural preferences for facts, their talents for logic have been trained and disciplined.

The result many times...an uncommon, refreshing way of expressing the well known...a direct, succinct method of stating the complex.

Here is an actual example. It is a composite of sketches made by one of our Engineering Supervisors during a discussion of General Electric's unique Salary Administration Program.

Circuit engineers will have little trouble in reading it. Others may have more difficulty. All may wish additional detail. For this, as well as other information regarding the unusual professional and outstanding personal opportunities awaiting you at General Electric's Heavy Military Electronics Department, write in confidence to George B. Callender.

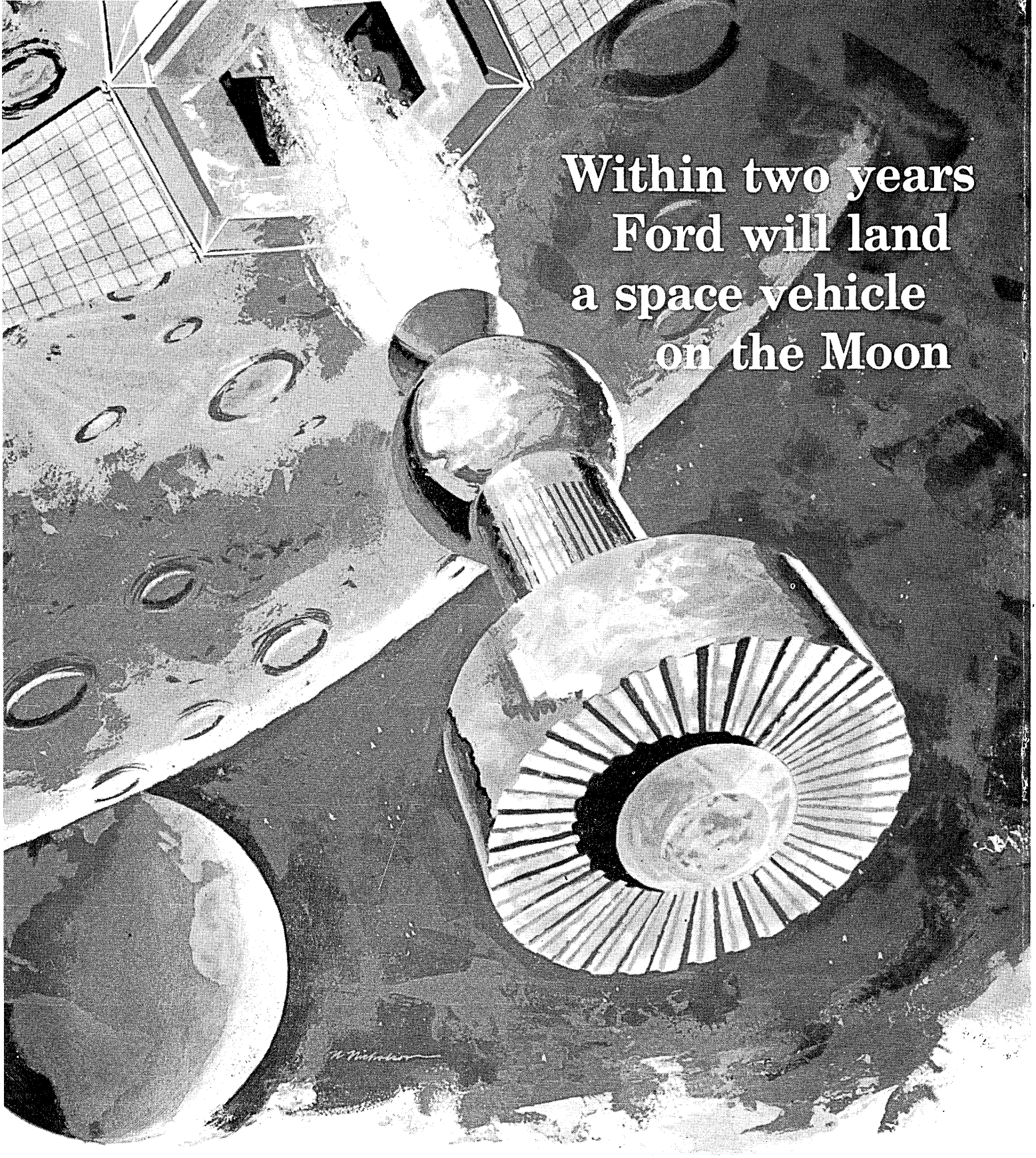
HEAVY MILITARY ELECTRONICS DEPARTMENT

GENERAL ELECTRIC

Div. 56-BMG Syracuse, New York

There are openings for graduate engineers at intermediate (3 or more years) and high levels of experience in the following areas: **Weapons Systems Analysis; Mathematical Analysis of Engineering Problems; Military Communications Systems; Radar Systems; Weapons Control Systems; Electronic Circuitry; Experimental Psychology—Human Factors; Instrumentation.**

Circle 71 on Reader Service Card.



A 300-pound Lunar Capsule containing scientific instruments will soon make a "rough" landing on the Moon. It will be carried by a larger spacecraft to a location about 25 miles from the Moon's surface, then released. A retro-rocket will cushion its impact. The Lunar Capsule will transmit vital scientific data back to Earth for a month or more. This unique space vehicle will be the product of Ford Motor Company's Aeronutronic Division.

NEWS BRIEFS . . .

reported to be the first all-transistorized system operating in the rubber industry.

✓Sylvania's Applied Research Laboratory received four study contracts from Air Force Cambridge Research Center. All awards call for basic research studies in applied electromagnetic analysis or physics leading toward possible applications in the information processing field.

✓Six electronic reading machines will make their debut in the Chicago area. Standard Oil Company and Time Inc. have ordered the installation of three Farrington Optical Scanners each to help overcome their vast paperwork problems.

Circle 105 on Reader Service Card.

✓Stromberg-Carlson has delivered an S-C 3060 to the U.S. Navy Postgraduate School at Monterey, California. The printer will be used in conjunction with the development of new naval meteorological techniques. The Navy school was the site of the first CDC 1604 installation earlier this year.

Circle 106 on Reader Service Card.

✓The Advanced Systems Development Division of IBM Corp. announced plans to establish an experimental microwave communication network in the N.Y.-N.J. area to study new data transmission techniques.

✓A new firm, Computer Applications, Inc., will bring computing services to the New York metropolitan area. Company offices are located in Elizabeth, N.J. and New York City. A $30,000 contract launches the company's operations.

Circle 107 on Reader Service Card.

✓Computronics, Inc., a new Denver electronics firm, plans to pursue a program of development, manufacture, and sales of components and systems for instrumentation, computers, controls and data handling.

Circle 108 on Reader Service Card.

✓The first production model of a 3,000 word-per-minute teleprinter has been shipped by Burroughs Corp. to Kellogg Switchboard and Supply Co., Chicago, a Div. of I.T.&T. Co. This machine will be incorporated into the Strategic Air Command 465L control system by Kellogg.

Circle 109 on Reader Service Card.

✓Telemeter Magnetics Inc. and the Hughes International Division of Hughes Aircraft Co. have entered in-

NEWS BRIEFS . . .

to an agreement for overseas distribution of TMI's core memory products. Hughes will represent Telemeter Magnetics throughout the world except for the U.S. Japan and Taiwan.

✓The Naval Air Material Center, Philadelphia, has ordered a large scale 1604 computer system from Control Data Corp. to be part of a combined Navy - Air Force - National Aeronautics and Space Administration facility for the evaluation and formulation of structural design criteria for aircraft.

✓The Electro Nuclear Systems Corp., a new Minneapolis firm, will engage in R&D and manufacture of advanced systems and equipment for industry and government programs—operating in such areas as automation, data processing, weapons and missile systems, medical electronics and nuclear electronics.

Circle 110 on Reader Service Card.

dates

MARQUETTE UNIV. SITE OF 15TH ACM CONFERENCE

The 15th national conference of the Association for Computing Machinery will be held at Marquette University August 23-26. The association, established in 1947, now numbers more than 6,000 members.

More than 100 papers will be presented at the conference and abstracts will appear in the conference program. Arthur C. Moeller, a Marquette engineering faculty member, heads the local conference executive committee.

NORTHWEST GATHERING PLANNED FOR PORTLAND

The first Northwest Joint Computer Conference will be held Sept. 30-Oct. 1 at the Multnomah Hotel in Portland, Oregon. Joint sponsors of the conference are the Northwest Computing Association, Oregon State College and the General Extension Division of the Oregon State System of Higher Education. General Chairman is Floyd Campbell, 1500 S.W. Taylor, Portland 5.

U. OF A. THEME FEATURES DP TECHNIQUES, SYSTEMS

The Numerical Analysis Laboratory at The University of Arizona invites contributions of papers and equipment displays for their Conference on

Data Processing Techniques and Systems, March 16 and 17, 1961.

Tentative area divisions of the conference are experiment design, system design, equipment, and demonstration. Interested contributors must mail abstracts by September 1, 1960 to Miss Betty Takvam, Conference Secretary, Numerical Analysis Laboratory, University of Arizona, Tucson, Ariz.

ACM CONFERENCE, '61, WILL INVITE EXHIBITS

For the first time in their history, the Association of Computing Machinery will invite exhibitors at their 16th national conference to be held in Los Angeles, September, 1961. Reservations and exhibit information may be obtained at this time from E. F. Sherman, Electronic Specialty Co., 5121 San Fernando Road, Los Angeles 39, Calif.

✓The 1960 Western Electronic Show and Convention will be held in Los Angeles, August 23-26. Several sessions will relate to computers and computer systems.

✓The Univac Users Association has scheduled its fall meeting for September 22 and 23 in Washington, D.C. Inquiries concerning this meeting should be addressed to D. B. Houghton, Association Secretary, Franklin Institute, 20th & Parkway, Philadelphia, Pa.

✓The next meeting of the Burroughs 220 computer user group – CUE – will be held October 4-6 in Philadelphia, Pennsylvania.

✓Current developments in automatic data processing systems will be the theme of the Seventh Institute on Electronics in Management to be held at the American University, Washington, D.C. from Oct. 31 through Nov. 4.

✓"Computers for Engineering and Power" is the theme of the second Power Industry Computer Application Conference to be held on November 9-11, at the Chase Hotel, St. Louis, Mo. Latest developments in computers for utility engineering and plant automation and control will be presented.

✓The 1960 Eastern Joint Computer Conference will be held December 13-15 at the Hotel New Yorker and the Manhattan Center in New York City. Conference chairman is Nathaniel Rochester, IBM Research Center.

GENERAL ELECTRIC ANNOUNCES 225

company goes own programming way with general compiler

by CHARLES KATZ
Manager of Programming Research and Development
G-E Computer Department, Applications Section

The General Electric Company has entered the general purpose computer field with its new GE-225 computer. The GE-225 marks General Electric's first bid for the general-purpose market. Until the announcement of this new machine, General Electric concentrated on a number of specialized fields. This experience and technical know-how has been used in the design and development of the GE-225.

With the decision to enter the general computer field, it became necessary for G-E to determine how to equip this machine with the most advanced automatic programming systems. Investigations of the various approaches taken by others showed that many vastly different techniques had been used. Some groups built algebraic compilers and/or business data processing compilers. Others devised sophisticated assembly programs with library capabilities. Still other groups centered their efforts around generators designed to do specific jobs – report generators, file maintenance generators, sort and merge generators, etc. One group designed its source language around positional or tabular notation, another around algebraic formulae, still another around a restricted form of the English language. Some, it appears still prefer hieroglyphics.

From our vantage position – that of an observer without a vested interest in any of the above approaches – we have detected an unmistakable trend which is quite profound in its implications. Each of the different groups is discovering some of the worthwhile techniques that have long been employed by others and is incorporating these into its individual systems. This means that a common end is gradually being approached by perhaps a dozen different paths.

The General Electric Computer Department, by exploiting this trend to the fullest and by anticipating the common goal toward which all are striving, has developed a General Compiler System for the GE-225.

With the General Compiler, each job – be it a formula evaluation, a sort, or even a payroll – is approached in exactly the same way. The language for describing any run is consistent. The operating procedure and programming conventions are standard, and every run is automatically documented in a readable and easily understandable fashion. This concept gives to the GE-225 installation a standard and efficient method of operation.

GE's new 225 is billed as a medium price computer capable of performing in both the scientific and business areas. A company news release speaks of "a quiet but successful sales campaign" netting "more than two dozen" 225 orders. Delivery time is 18 months.

DATAMATION notes that the 225 offers nothing revolutionary in its design but when one considers the price range of $125,000 to $400,000 – it becomes obvious that this is quite a computing bargain.

central processor
- *—magnetic core memory*
- *—2048, 4096, 8192 or 16384 binary words*
- *—double-precision word capability*
- *—single- and double-precision arithmetic*
- *—built-in floating point option*
- *—simultaneous read-write-compute of all pheripheral units*
- *—parity check of information transfers*
- *—59 commands, not including input-output*
- *—solid state throughout*
- *—accommodates alphabetic or numeric, binary or decimal information*
- *—arithmetic and control registers*
- *—3 registers for automatic instruction modification (direct and indirect addressing)*

execution times
(Fetch and Execute)
Add—40 microseconds
Multiply—250 microseconds (average)
Divide—500 microseconds
Logic—40 microseconds

control console
- *—register display lights*
- *—indicator lights*
- *—power switches*
- *—status lights*
- *—20 program control switches*

console typewriter
- *—types 10 characters per second maximum under control of Central Processor*

Document sorters
(2- and 12-pocket)
- *—1200 documents per minute*
- *—sorting pockets under control of Central Processor*
- *—recognizes 14 magnetic characters*
- *—data entered into Central Processor*

card punch
- *—100 cards per minute*
- *—punches binary or Hollerith cards*
- *—double punch and blank column checking*
- *—accepts numeric or alphabetic information*

card reader
- *—400 cards per minute*
- *—reads binary or Hollerith cards*
- *—photoelectric*
- *—synchronization check*
- *—accepts numeric or alphabetic information*

high speed printer
- *—500 lines per minute*
- *—120 printing positions*
- *—prints 10 numerics, 26 alphabetics and 11 special characters*
- *—flexible print format*
- *—parity check*

magnetic tape system
- *—15,000 characters per second transfer rate*
- *—up to 64 tape units*
- *—horizontal and vertical parity checking*
- *—200 characters per inch at 75 inches per second*
- *—tape language is compatible with most existing tape installations*

paper tape reader
- *—200 characters per second*
- *—reads 5, 6, 7 or 8 channel tape*
- *—parity check*

paper tape punch
- *—60 characters per second*
- *—punches 5, 6, 7 or 8 channel tape*

auxiliary magnetic drum storage
- *—8192 or 16384 20-bit binary words*
- *—average access time: 8.3 milliseconds*
- *—3600 rpm*
- *—word time: .128 milliseconds*
- *—high speed block transfer codes*
- *—"write control" switches for information protection*

transmission line scanner-controller
- *—horizontal and vertical parity checking of messages at both sending and receiving ends*
- *—translates data into machine-acceptable form*

data transmitter-receiver unit
- *—sends or receives data at speeds of up to 60 characters per second*

It is quite apparent that not every installation will need the full power of this generalized system. However, they pay no penalty for this flexibility, but are free to select any sub-set of the whole. Just as the use of general purpose computers uncovered and aided in the solution of many problem areas that were not anticipated, so a general purpose programming system offers convenient tools for handling many situations that could not be handled by a more restrictive special purpose approach.

requirements differ

Installations differ greatly in their requirements and in their selection of the tools to meet these requirements. An algebraic language that might be more efficient and useful at one installation, might be completely meaningless at another, where perhaps an English language or a tabular approach might better fit their needs. It should be observed that there is little or no difference between the compiler designed to aid in the solving of scientific problems and one which is designed for business problems. However, a vast difference exists between the people who will use the compilers to solve their individual problems. Most of these people are not concerned with the inner workings or the techniques of the compiler in solving their problems. They are concerned only with the convenience and comprehensiveness of the language that they use. Therefore, it is not necessary to have different automatic programming systems to handle different types of problems. It is only necessary to have appropriate means of communications between user and machine.

The source language of the General Compiler is general and comprehensive. It contains English language statements, algebraic formulae, and tabular structure. Each, or all portions, of the language will be taught and used as applicable. If a given installation has no need for algebraic expressions, or does not care to use Boolean expressions, then they need not even be aware that these abilities are available in the system. In fact, they may select for their use only that portion of the system which is applicable to their needs, and still have available the ability to expand and employ new techniques as their needs change. Each installation, at its option, can tailor the system even more closely to fit its needs, by completely revising the vocabulary. In fact, they may alter the language each time a program is compiled.

ALGOL, COBOL stand

The computer field today is very active in the standardization of source languages. ALGOL and COBOL have been proposed as common languages for scientific and business applications respectively. Three or four other common languages are being considered by various groups. ALGOL (and to a much greater extent COBOL) are not firmly and finally defined at this stage. They have been interpreted in at least as many different ways as there have been interpreters. They are subject to continued and considerable alteration. Those who implement a fixed version of COBOL today may find that their language is obsolete by the time the implementation is completed. The General Compiler, with its wide scope, comprehensiveness, and flexibility, is designed so that it can accept ALGOL, COBOL, a combination of these, or any other common language that may evolve, and be easily altered to keep pace with the changing demands. ●

Circle 111 on Reader Service Card.

DP STANDARDS PROJECT PROGRESSING

x-3 program attracts wide industry representation

Along with considerable progress toward the organization of the United States project to develop logical systems standards for data processing machines (including electronic computers), it can also be reported that this country has been granted the secretariat for the international program undertaken by the International Organization for Standards (ISO). The American standardization project is based upon proposals submitted before a recent American Standards Association conference by the Office Equipment Manufacturers Institute (OEMI). At that time, OEMI was designated as sponsors of two American standards projects – X-3 for data processing machines and X-4 for office machines – to be organized under the procedures of the ASA. The American Standards Association, which is composed of over 110 national technical societies and trade associations, serves as the United States member to the ISO.

The first step in this program was the appointment in April of Dr. J. W. Barker, former Dean of the Columbia University School of Engineering, former President of the American Society of Mechanical Engineers, and, until his recent retirement, Chairman of the Board of the Research Corporation, as consultant and acting director of the data processing standards project.

Dr. Barker's immediate task was the preparation of definitions of the manufacturing activities of companies having similar interests in the field of data processing. The twenty-two OEMI member companies involved in the manufacture of digital computing and data processing equipment fell into two logical divisions: a) Data Processing Systems; and b) Data Processing Devices.

The next step was to determine the composition of the working committee, designated by ASA as X-3, which would operate under the sectional committee procedures of the American Standards Association. It was decided that a representative and functional group could be created by selecting eighteen committee members to be a substantially equal division between manufacturers, users, and general interest groups.

At a meeting June 6 of the Engineering Committee for OEMI's Standards Program, the following members were selected to represent the entire industry on the standardization committee: Mr. B. W. Pollard; Mr. I. C. Liggett; Mr. R. G. Chollar; Dr. J. C. Chu; Mr. J. T. Davidson; Mr. A. C. Reynolds, Jr. These gentlemen represent both systems manufacturers and device manufacturers.

The following user groups have each been invited to designate an X-3 committee member:

Banking:	American Bankers Association
Insurance:	Insurance Accounting and Statistical Association
Retailing:	National Retail Merchants Association
Utilities:	American Gas Association & Edison Electric Institute (to be represented by one man jointly)
Government:	General Services Administration
Petroleum:	American Petroleum Institute

The general interest groups invited to participate in the standards project are:

Engineers Joint Council – representing all professional engineering societies
Department of Defense
Association for Computing Machinery
National Machine Accountants Association
American Management Association
Association of Consulting Management Engineers

Each of the above groups will name one representative. It is hoped that by the time this report is published, all designations for membership on the X-3 committee will have been made.

Another area in which considerable progress can be reported is delineation of the four principal objectives originally defined for the data processing standards project. Study of the original scope accepted by ASA has led to the following recommendations for functional responsibilities to be delegated to sub-committees:

1) Input and output media to data processing systems for interchange of information between data processing systems and associated equipment.
   (a) Humanly legible printed character sets, e.g. character recognition.
   (b) Machine sensible coded character sets, including bit representation, e.g. magnetic tape, punched card, punched tape.
   (c) Standard format for defining data fields, data records, program instructions and the like.
2) Data transmission – including coordination with the communications industry and an analysis of significant related standards between data processing and data transmission.
3) Common problem-oriented programming language governing the operation of data processing equipment with the objective of establishing a common language for data processing in which to describe processes to be carried out. This will involve close coordination with user groups and other agencies in this field.
4) Definition of data processing operations at the machine level to insure identical results from different equipment when executing a given program.
5) Terminology and glossary including information gathering and screening of existing material and the editing of subcommittee reports prior to submission to ASA.
6) Procedures for defining data processing application studies including preparation of standardized survey techniques and standardized flow charting symbols and procedures.

Through the organization of subcommittees to research standardization requirements, many additional experts in agencies or groups which do not have direct representation on the X-3 committee will be able to contribute to the project. Each subcommittee will be chaired by a

member of the X-3 committee through which it will report. Organizations doing work in related areas will be represented through an established liaison procedure.

The drafts of proposed American standards prepared by each subcommittee and approved by a substantial majority of its members will be presented to the X-3 sectional committee. The sectional committee will review each subcommittee's proposals and recommend any revisions needed in order to achieve uniform terminology. The sectional committee will eventually vote on these edited drafts. In the discussions before the sectional committee, the chairman of each subcommittee will be responsible for presenting the essence of the arguments within the subcommittee which led to the adoption of the drafts. The sectional committee may accept the drafts or may return them to the subcommittee for possible reconsideration and amendment. In such voting on the sectional committee the six manufacturers on the committee represent the entire industry and not their companies.

Before the draft proposals can be recommended by the sectional committee, there must be substantial agreement by all members of that committee. By substantial agreement, the ASA in general considers that an 83⅓ per cent majority meets this requirement. The final draft will be circulated to the committee for a letter ballot and the results attached to the proposed standard sent to the ASA. In all stages of the preparation of a draft standard, either a negative vote or an abstention by any member of the sectional committee or subcommittee must be accompanied by a written statement specifying the reasons for negation.

When substantial agreement has been achieved, the sectional committee will present its final draft of the proposed American standard to the Board of Office Equipment Manufacturers Institute who, as sponsors of the project, must approve its submission. At this point, the Board will attach any proposals of its own relating to these standards before forwarding the final draft to ASA.

The record of the development of the standard, the tabulation of the vote, the reasons for negative votes if any, the relation to standards previously approved, and any other information bearing on the establishment of a consensus are reviewed by the appropriate Standards Board of ASA. When the Standards Board has approved the material submitted by the sponsoring organization, it is recommended to the ASA Board of Review for final approval as American Standard. The standards thus approved may then be published by OEMI or, at their request, by ASA.

Since the U.S. has been requested by the International Organization for Standards to assume the secretariat for the international data processing standardization program, the X-3 sectional committee will be, in effect, the technical committee of the ISO. The approved American Standard will be recommended to ISO for consideration as the basis for international data processing standards.

It should be emphasized that the existence of an American Standard prepared under the auspices of the ASA does not preclude any person from manufacturing, selling, or using products, processes, or procedures not conforming to the standard. The American Standard established under these procedures is completely voluntary. Where legal standards are required, action by the proper legislative bodies is necessary.

ONLY HONEYWELL GUARANTEES ITS SYSTEMS WON'T DAMAGE YOUR TAPES!

NOW...HONEYWELL EDP SYSTEMS AIR-CUSHION MAGNETIC TAPE TO PROTECT VALUABLE RECORDS

Honeywell electronic data processing scientists have developed the world's most reliable tape drive mechanism. It virtually eliminates the common causes of tape damage which can shut down the equipment for costly minutes or hours. This new technique is so reliable that Honeywell is the only computer manufacturer that guarantees its Systems will not break or damage your tapes during processing. If they do, tapes will be replaced without charge.

NO PINCH ROLLERS — ANYWHERE. Only Honeywell 800 and 400 high-speed Systems transport magnetic tape *by air* throughout the processing cycle. Vacuum capstans take the place of old-fashioned pinch rollers, dramatically reducing wear and tear, flaking and scratching. The recording surface is touched only by the recording head and only when information is read or recorded. Since nearly every read-write error can be traced to tape surface damage, it is clear why Honeywell tape drives are intriguing managements in all parts of the business world.

ADD ORTHOTRONIC CONTROL — AND MAKE SURE. Added to this advanced technique of vacuum transport is Honeywell's exclusive Orthotronic Control, which insures uninterrupted accuracy during processing. Using Orthotronic Control, Honeywell Systems can re-create lost or damaged data instantaneously — without human aid, without reprocessing. Errors can be detected and corrected *automatically* in 1/20th of a second. Where other systems would stop and blink signals for human help, Honeywell 800 and Honeywell 400 will simply do what needs to be done and keep humming right along at top speed.

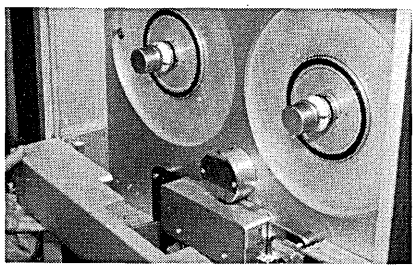
ELIMINATE UNPRODUCTIVE MACHINE TIME. This self-correcting ability plus the protection inherent in airborne tape combine to boost your profit potential on any data processing application. These Honeywell scientific advances help eliminate machine downtime, which methods men know can often cancel the economic gains of electronic data processing.

INVESTIGATE HONEYWELL 800 AND 400 SYSTEMS. Greater reliability in data recording is but one of the several major factors that multiply the cost advantages to users of Honeywell EDP Systems. If your company is now considering the move to electronics, we respectfully suggest you put Honeywell Systems at the top of your list for investigation. Our applications engineers will be glad to discuss your individual requirements.

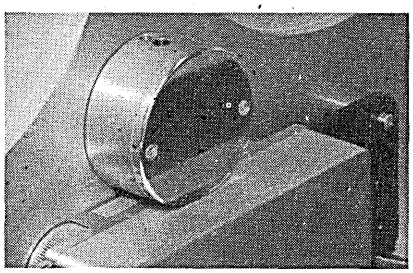
For more information, get in touch with your nearest Honeywell office. Or write Minneapolis-Honeywell, Datamatic Division, Wellesley Hills 81, Massachusetts; or Honeywell Controls Ltd., Toronto 17, Ontario.

75th YEAR — PIONEERING THE FUTURE

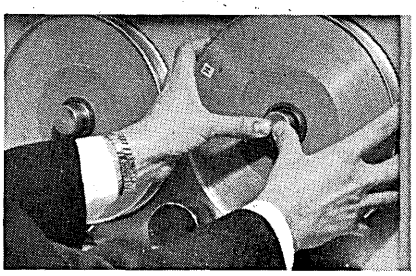
WHY HONEYWELL RECORDING TECHNIQUES ARE FASTER, MORE RELIABLE



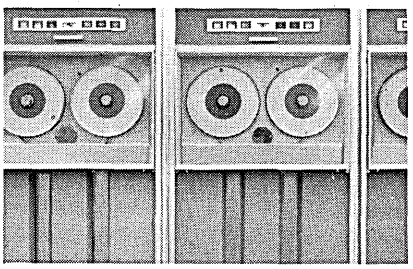
Vacuum capstans propel tape gently and precisely throughout processing cycle, removing danger of damage by pinch rollers.



Recording head alone touches recording surface of magnetic tape, reads information with tape moving forward or backwards.



Tape changes can be made in less than 25 seconds. Changes on other data processing systems often require several minutes.



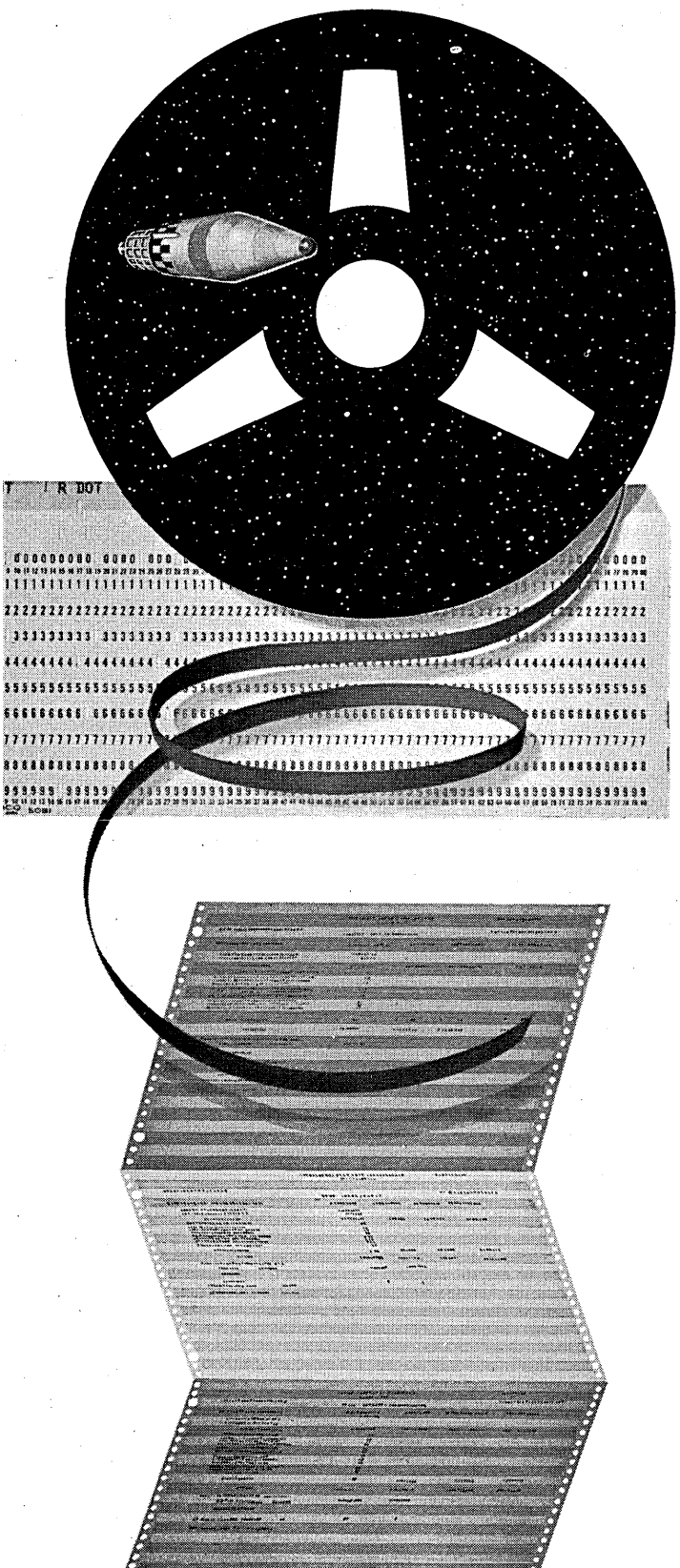
Information is read or recorded with tape moving 120 inches per second, a transfer rate of 96,000 decimal digits per second.

Honeywell

Electronic Data Processing

Circle 24 on Reader Service Card.

INFORMATION PROCESSING



Information Processing plays a vital role in the Lockheed Missiles and Space Division's activities—from aiding basic research and development to supporting current military and commercial projects. The Division's computing facilities are among the most advanced in the country and include: two—IBM 7090; two—Sperry-Rand 1103 AF; one—Control Data Corp. 1604, in addition to a variety of other advanced peripheral equipment. Future plans include several IBM 1401 Data Processors.

Functions of Information Processing encompass: Preparing programs and operating large, high-speed digital computers; responsibility for the Division's analog computing activities—including set-up and operation of analog computers, used both as simulators and in solving problems; the reduction of highly complex and critical telemetry data received from missiles and space vehicles.

Further activities involve performing data reduction for Quality Assurance and Manufacturing, and programming of Administrative Data Processing and Financial Forecasting Problems for the entire Division.

Expanding the scope and depth of present programs in Information Processing has created positions for engineers and scientists with experience in these important areas:

DIGITAL COMPUTER SYSTEMS DEVELOPMENT including monitors, compilers and information retrieval systems.

HIGH-SPEED DIGITAL COMPUTER PROGRAMMING for satellite control, scientific computation, numerical analysis, and administrative data processing.

TRAINING PROGRAMS conducted for computer programmers and operators.

ANALOG COMPUTER OPERATION in solving complicated engineering problems.

AUTOMATIC CONVERSION of flight data and scientific information utilizing analog and digital converters and advanced automatic control devices.

FLIGHT DATA AND SYSTEMS ANALYSIS including research in complex problems, theories and methods of preflight and flight data analysis; test performance research; analysis and performance reports on testing, flight test data and data reduction.

DATA PROCESSING EQUIPMENT DESIGN including research and engineering in development of highly advanced data conversion devices.

Engineers and Scientists: Work in the broad spectrum of Information Processing functions provides constant challenge at Lockheed's Missiles and Space Division. If you are experienced in the above areas, you are invited to write: Research and Development Staff, Dept. H-46
962 W. El Camino Real, Sunnyvale, California.
U.S. Citizenship or existing Department of Defense industrial security clearance required.

Lockheed

MISSILES AND SPACE DIVISION

Systems Manager for the Navy POLARIS FBM; the Air Force AGENA Satellite in the DISCOVERER, MIDAS and SAMOS Programs; Air Force X-7; and Army KINGFISHER

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

COMEX–FOR INFORMATION TRANSMISSION

COMEX is a new communications device which stores a serial D. C. pulse generated by business machines such as teletypewriters. It transmits the signal over the telephone lines at data rates compatible with existing telephone tariffs (600 and 750 bits/sec). Each unit is half duplex – it can send and receive, store and unload sequentially.

It can be used for transmitting data and administrative message traffic. Wherever there is an existing telephone, COMEX can be installed to provide efficient alternate voice or data use of the telephone toll or leased lines. It is connected to the phone lines by the Bell Dataphone unit.

The primary use of COMEX is the transmission of a volume of information over the phone lines. In addition, its storage features permit it to be used as a remote data collecting and distributing center. Transmitting speeds of 1000 words per minute (750 bits/sec) are available now. The storage capacity is 12 hours or approximately 3,200,000 bits. These two features result in a data handling system that is flexible and can be used for a variety of applications.

Teletypewriter equipment as provided by Teletype Corp., Olivetti, Kleinschmidt, Teleprinter, Friden, IBM, etc., generates and is operated by a D. C. pulse. These pulses are serialized for transmission. COMEX accepts this serial signal, modulates it and records it on ¼-inch wide 1.0 mil thick magnetic instrumentation recording tape. The recording speed is one inch per second. This results in a lineal bit density of 45 to 75 bits per inch.

When all of the information for a particular destination is recorded, or as frequently as desired, a telephone call is made to the telephone number of the receiving COMEX. The operator at the receiving station places her COMEX into the record mode. The transmitting operator places her COMEX in the send mode. The recorded information is then transmitted 10 times faster than originally recorded. This is done by speeding up the tape drive to 10 inches per second.

The receiving COMEX records the information at the high speed, after which it is stored until reproduction in the print out devices is desired.

Basically, COMEX, manufactured by Avco/Crosley, is a magnetic storage device of high accuracy. A modulation method allows a slow tape speed during recording and the mechanical drive system gives extremely close control on reproduction speed, a feature essential with unsynchronized data sources. An indexing system insures machine stoppage when the end of the message is reached, and this feature also puts the digital subset back into the talk condition, unless the handset has been previously replaced on the cradle in which case the telephone line will be broken and the call automatically terminated.

The absence of line carrier at the receiving station causes the Bell Dataphone unit to signal COMEX to stop, and the line will be disconnected if the receiver is on the cradle. Thus, there is no need to watch COMEX during transmission unless manual monitoring is desired. The presence of data during all operations is shown by the message indicator light on the control panel. A complete rewind cycle takes less than 3½ minutes. All control buttons are interlocked to insure that the machine returns to the standby mode before each function. Lighted push-buttons indicate the mode of operation.

COMEX is solid state throughout; off-line input and output signals may be varied from less than 10 to more than 80 milliamps.

Circle 112 on Reader Service Card.

new products in DATAMATION

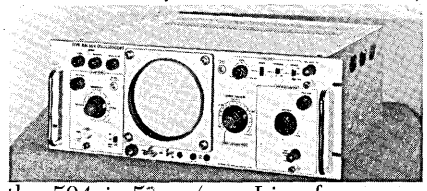
tunnel diode

A new series of hermetically sealed germanium tunnel diodes have been designed for low level switching and small signal applications and can be used in computer systems. Peak point current is closely controlled providing a peak to valley ratio of 8 to 1. The units exhibit low series inductance of one millimicrohenry and series resistance of one ohm with peak and valley ratios of 5 to 1 and 10 to 1. Measured frequency of oscillation is over 1,500 megacycles. For information write PHILCO CORP., Lansdale Div., Lansdale, Pa., or use card.

Circle 200 on Reader Service Card.

oscilloscopes

Two new dc-to-450 kc instruments, the 503 and the 504, are available. Basic sensitivity of the 503 is 1 mv/cm,

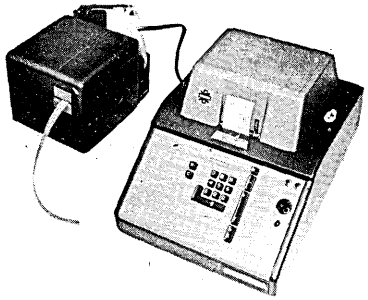


the 504 is 5 mv/cm. Line frequency is 50 to 800 cycles and instruments operate between 105 to 125 v or 210 to 250 v. Rack-mounting models have been designed which are electrically similar but mechanically rearranged. The RM503 and RM504 fit in a standard 19″ rack. Dimensions are 7″ high by 19″ wide by 16½″ deep. For information write TEKTRONIX, INC., P.O. Box 500, Beaverton, Oregon.

Circle 201 on Reader Service Card.

data punch

A new unit produces punched data processing tape as a by-product of routine adding machine computations.



The company's new 10-key adding machine associated with a tape punch produces 5, 6, 7 or 8 channel punched tape at a rate of 20 characters per second. A variable field control selector permits optional control over the columns to be punched. The function selector control allows the operator to punch items only, totals only, or both. For information write VICTOR ADDING MACHINE CO., 3900 N. Rockwell St., Chicago 18, Ill., or use card.

Circle 202 on Reader Service Card.

data processing system

The 7074 is a new computer which the manufacturer says is twice as fast processing business data and up to twenty times as fast in scientific computation as the 7070 system to which it is related. Typical 7074 systems will sell or rent for about twenty-two per cent more than 7070 system prices. Any 7070 can be converted to a 7074 system in the customer's office. The major change is the replacement of the three 7070 modules with two high-speed 7074 components. The "building block" design of the 7074 lends itself to growth to match user needs, the manufacturer states. Both systems offer five models of the processing unit; four models of core storage; and six models of core storage control units. For information write INTERNATIONAL BUSINESS MACHINES CORPORATION, Data Processing Division, 112 E. Post Road, White Plains, N.Y.

Circle 203 on Reader Service Card.

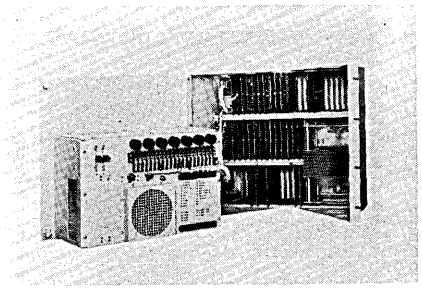
magnetic shift register

The model 5TDWW100/U 5-bit, 100KC magnetic shift register features the ability to read out a stored pulse-pattern repeatedly without destroying the information stored. It operates from a single, uncritical 12V DC supply, and is designed to handle peak signal amplitude of 5V. Input may be serial or parallel. On command at a separate input, non-destructive read-out (in parallel) occurs. The register may be cleared by reading out serially, in the normal way. All gate and control circuitry is provided on the printed-circuit board. Both MIL (100 C) and commercial (55 C) designs are available. For information write MAGNETICS RESEARCH CO., 255 Grove St., White Plains, N.Y., or use reader card.

Circle 204 on Reader Service Card.

random access memory

A new small general purpose memory provides asynchronous operation at rates to 200 kc and available in

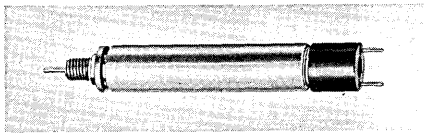


capacities from 128 to 1024 words with word lengths from 4 to 24 bits. Designated type RB, these core memories are said to offer a combination of features not previously considered feasible in any but custom units. Among its features are long term reliability, low cost, a wide range of capacities, and a variety of operating modes. The new memories may be operated in a random access mode, as sequential access buffers, or any combination of both without loss of speed. For information write TELEMETER MAGNETICS, INC., P.O. Box 329, Culver City, California.

Circle 205 on Reader Service Card.

solenoid

A long, small diameter solenoid lifts up to 8 oz. intermittent, or 6 oz. continuous duty, has been tested to



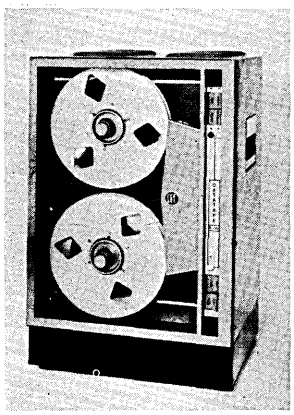
20,000,000. It carries a stroke up to 5/16 in. push or pull type as specified. Operates on 6 to 110 volts dc, with power requirements of 3 watts continuous or 6 watts intermittent

duty. Enclosure is steel shell; terminals are plug-in or lead types; mounting 4-28 threaded bushing. It is designed primarily for business machines, computers, data processing and instrumentation, and has a variety of additional applications. For information write GUARDIAN ELECTRIC MFG. CO., 1550 W. Carroll Ave., Chicago 7, Illinois.

Circle 206 on Reader Service Card.

recorder/reproducer

An all-solid-state magnetic tape recorder/reproducer features up to 14 channels of direct-record or wide

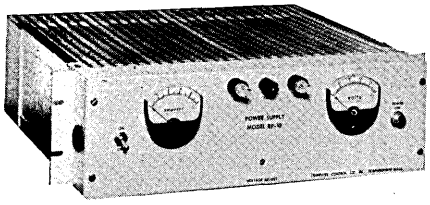


band FM analog data that can be recorded and played back bi-directionally. The type PR-2300 recorder/reproducer is modularized to extend the versatility made possible by its small size (22¾ in. high, 17¾ in. wide, 15 in. deep) and light weight (less than 150 lbs.). The tape transport system is mounted in an aluminum case. It records and reproduces at speeds of 60, 30, 15, 7½, 3¾, and 1⅞ in. per second. Speeds are changed in pairs by changing drive belts. Cumulative peak-to-peak flutter from dc to 300 cps is less than 0.4% at 30 or 60 ips. Input range for the direct record system is 0.25 to 25 volts rms for normal record level. For information write CONSOLIDATED ELECTRODYNAMICS CORP., 360 Sierra Madre Villa, Pasadena, California.

Circle 207 on Reader Service Card.

power supply

The model RP-10 is a completely transistorized, regulated, 8-ampere power supply designed and rated for



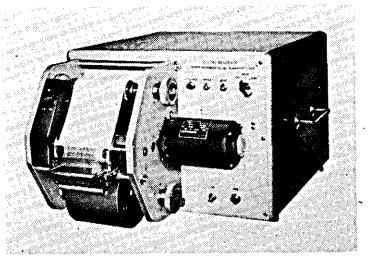
NEW PRODUCTS . . .

computer applications. It is designed for rack mounting in T-PAC systems where ultra-high density is desired. Notched for standard rack mounting, it measures 5¼ in. high, by 19 in. wide, by 11½ in. deep, and weighs 38 lbs. It will power 320 LE-10 logical element T-PACs operating continuously at one megacycle or 640 operating at 50% duty cycle. The front panel carries both a voltmeter and ammeter with full-scale ranges of 25 volts and 10 amperes respectively. For information write COMPUTER CONTROL CO., INC., 983 Concord St., Framingham, Mass.

Circle 208 on Reader Service Card.

binary digital recorder

Model 690 digital recorder features high speed transfer of digital information to a permanent record at rates



up to 150 lines (or words), of 32 bits each, per second with compatibility to digital data sources. Included are the necessary circuits to couple directly to D.C. levels derived for example, from flip-flop storage or counters. For information write ELECTRONIC COUNTERS, INC., 155 Eileen Way, Syosset, L.I., N.Y.

Circle 209 on Reader Service Card.

analog computer

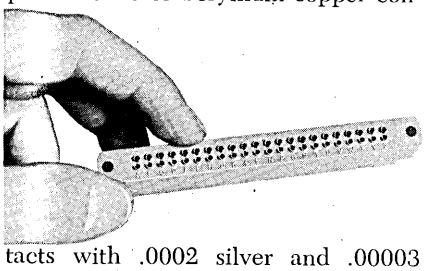
A "desktop" computer can be expanded by plugging in additional modules or even an additional cabinet. To convert this unit to a complex floor model the firm can add such components as a pre-programmed, removable patchboard system, up to 64 amplifiers, electronic multipliers and diode function generators – all requiring less power than an ordinary toaster. Called the "AD-1" Electronic Differential Analyzer, the computer is the brainchild of four University of Michigan engineering professors who incorporated themselves as Applied Dynamics, Inc. and are now under the control of the

company named below. For information write BOWMAR INSTRUMENT CORP., 8000 Bluffton Rd., Ft. Wayne, Ind., or use reader card.

Circle 210 on Reader Service Card.

tapered pin connector

A new tapered pin connector for printed circuit boards features phosphor bronze or beryllium copper con-

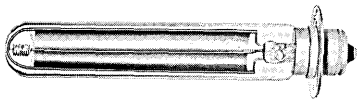


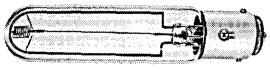
tacts with .0002 silver and .00003 gold that withstand one thousand or more insertions. The connections are stranded to mate with 3½ degree taper pins. The pins have a minimum capacity of 5 amsp. and 2150 volts AC at 60 cps. Polarization pins may be installed if requested with a minimum order. The body material of the connector is Alkyd-mag 422 approved MIL-M-14E. For information write ASTRAL ELECTRONICS, INC., 14620 Arminta St., Van Nuys, Calif., or use reader service card.

Circle 211 on Reader Service Card.

lamp

Designed especially to scan punch cards and tapes, this new lamp was engineered for use with an input for





instantaneous computation of aircraft position for an air traffic control system. The special spring tensioned straight wire filament offers the required single straight light source. Specifications called for the filament to be braced to withstand repeated 30 G shocks delivered to 90° angle to the filament. The lamp operates at 4 volts – 1.8 amperes and is rated at 2200 K. For information write CHICAGO MINIATURE LAMP WORKS, 1500 N. Ogden Ave., Chicago 10, Ill.

Circle 212 on Reader Service Card.

switching transistor

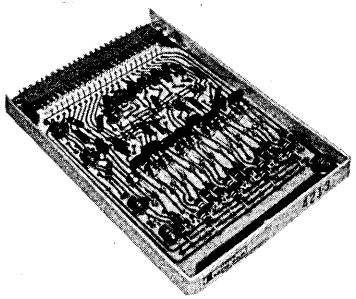
Type 2N404A PNP germanium alloy switching transistor is interchange-

NEW PRODUCTS . . .

able with its military prototype (2N404) but excels it in voltage, current and heat characteristics. This new device was designed for high speed computer applications. For information write SYLVANIA ELECTRIC PRODUCTS INC., General Telephone Bldg., 730 Third Ave., New York 17, N.Y. or use reader card.
Circle 213 on Reader Service Card.

quadruple flip-flop package

A new transistorized quadruple flip-flop package has built-in gates for use in shift registers or buffer applica-



tions. Gating is accomplished with capacitor-diode gates. The unit features a built-in pulse and amplifier for driving the four flip-flops. The One output and Zero output from each flip-flop provide standard levels each capable of simultaneously driving two units of base load and one capacitor-diode gate level input. The type 4213 is an economical and compact unit, permitting up to 100 flip-flops in 5¼ in. of panel in a standard 19 in. rack. For information write DIGITAL EQUIPMENT CORP., Maynard, Mass., or use reader card.
Circle 214 on Reader Service Card.

stroke-nor modules

The "HS" series modules provide transistorized stroke gates for use in mechanizing digital systems. Because of its logical properties, complete digital switching networks including flip-flops can be built from these gates alone. Available gates have from two to six inputs, with provisions for interconnecting gates to provide more than six inputs. When stroke gates are used with the manufacturer's flip-flops, two level logic can be operated with a single phase clock at 3 MC. For information write ABACUS, INC., 3040 Overland Ave., Los Angeles 43, Calif., or use card.
Circle 215 on Reader Service Card.

IN TOUCH WITH NEW WORLDS

Another project of IBM Applied Scientists: helping solve Einstein's Two-Body Problem

Helping to increase man's understanding and control of reality is a job of IBM Applied Science Representatives. Project by project, through unique and creative applications of data processing, they are changing the worlds of engineering, the sciences, and business.

IBM Applied Scientists are even helping illuminate the fundamental mysteries of space and matter. They are working with mathematicians in an attempt to solve Einstein's field equations for the Two-Body Problem, using an IBM computer.

Others are working on industrial process control, linear and non-linear programming, operations research, and design analysis. The variety of projects is limitless.

You may play an important part in this challenging profession. There are openings in many cities for men and women with advanced degrees in engineering, mathematics, or a physical science, or a degree in one of these areas plus a Master's in business administration or experience in programming.

For a confidential interview, please call any IBM Branch Office or one of these Regional Managers of Applied Science:

L. M. Fulton
IBM Corporation
425 Park Avenue
New York 22, N.Y.

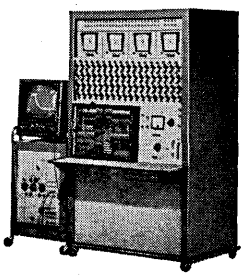
R. W. DeSio
IBM Corporation
618 S. Michigan Ave.
Chicago 5, Ill.

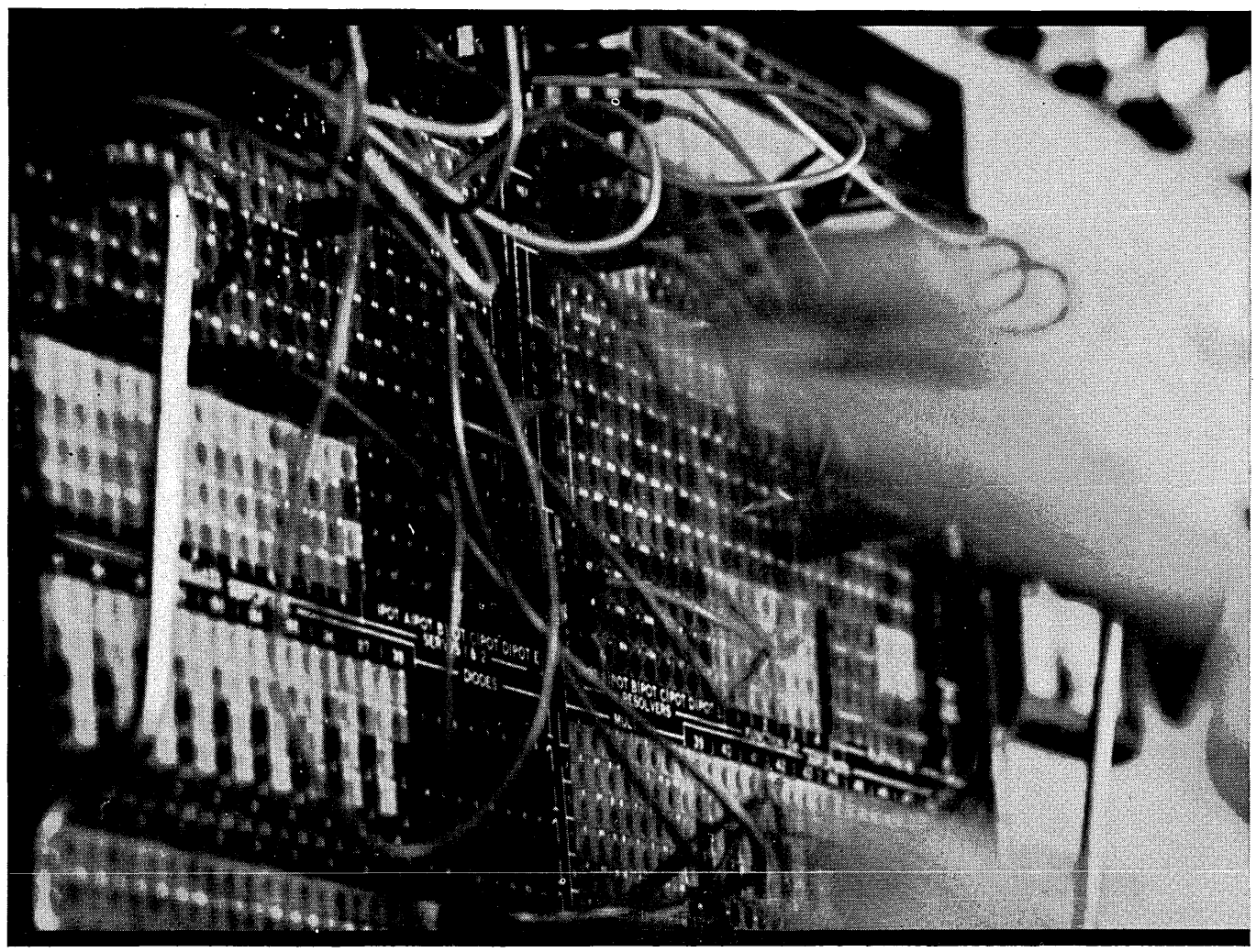
L. C. Hubbard
IBM Corporation
3424 Wilshire Blvd.
Los Angeles 5, Calif.

DATA PROCESSING DIVISION IBM®

when responding, a mention of DATAMATION would be appreciated

DYSTAC*





A MAJOR BREAKTHROUGH IN PROBLEM SOLVING

*DYSTAC: Dynamic Storage Analog Computer, developed by CSI, incorporates high-speed repetitive capabilities with dynamic storage of analog data to an accuracy of 0.01% and with a time-base accuracy of ±0.5 microsecond. This development has tremendously increased the versatility, economy, and speed of solution associated with analog computers.

DYSTAC provides unique time-sharing of computer components and high speed reiterations. These features make possible economic and rapid solution of complex problems that have required too many computer components or too long a solution time to be considered practical for either digital or analog techniques. Different combinations of this new development readily solve problems in four broad categories.

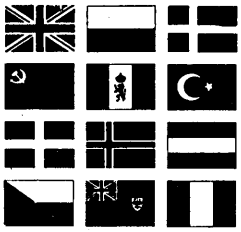
- Sequential calculation, as encountered in the distillation problem. Here, successive solutions to algebraic matrices are obtained from cycle to cycle at a repetitive speed of 60 cps until the problem is solved.
- Definite integral calculations. Varying definite integrals are evaluated from one cycle to another and held in memory for the successful solution of optimization problems.
- Rapid evaluation of multiple integrals. This technique can be employed for the solution of partial differential equations.
- Transient problems and difference-differential equations are solved with continuous memory.

For complete information or to arrange for a demonstration write, phone, or wire:

COMPUTER SYSTEMS, INC., Culver Road, Monmouth Junction, N. J. • DAvis 9-2351

A Schlumberger Subsidiary • formerly Mid-Century Instrumatic Corp.

Circle 28 on Reader Service Card.



DATAMATION *abroad*

IFIPS COUNCIL CONCLUDES 1ST MEETING

The Council of the International Federation of Information Processing Societies concluded its first meeting in June at the International Computation Centre in Rome. The Federation was organized at the UNESCO-sponsored First International Conference on Information Processing, held in Paris in June, 1959, which attracted more than 1800 delegates from all parts of the world.

The officers elected by the Council of the International Federation of Information Processing Societies during the June meeting were, as president, Mr. Isaac L. Auerbach, representing the National Joint Computer Committee of the United States; as vice president, Professor Dr. Alwin Walther, representing DARA (Deutsche Arbeitsgemeinschaft fur Rechen-Anlagen) of Germany; as secretary-treasurer, Dr. Ambrose P. Speiser, representing the Swiss Federation of Automatic Control.

The Second International Conference on Information Processing will be convened in September 1962 in Germany. Professor Alwin Walther as appointed General Chairman for the conference, and Mr. Niels Ivar Bech of the Danish Academy of Technical Sciences (Regnecentralen, Copenhagen) will be Chairman of the Program Committee.

FRENCH PLAN SEPT. COMPUTER CONGRESS

The First Congress of AFCAL, the French Computing Association (Association Francaise de Calcul) is scheduled to take place in Grenoble in the French Alps from September 14-16, 1960. It has been characterized by Professor Paul Namian of the Grenoble University Computing Laboratory as the first real gathering of practically all persons in France taking an active part in computing development.

Those interested should contact the Institute Polytechnique de l'Universite de Grenoble, 46 Avenue Felix-Viallet, Grenoble, Isere, France.

BELGIAN MEET COVERS CYBERNETICS AREA

The Third International Congress on Cybernetics will be organized by the International Association for Cybernetics from September 11 to September 15, 1961 in Namur, Belgium. The proceedings will cover the following five themes: Bases and methods of Cybernetics, Semantic machines, Automation: Technical Aspects, Automation: Economic and Social Aspects, and Cybernetics and biology.

SWEDEN ORDERS 7090; SIX 70s ALSO SOLD

IBM Sweden sold an IBM 7090, their first in Sweden, for delivery in July, 1961 to the Research Institute of National Defense to be used for research on defense problems. They had previously been using time on the 704 of the Paris IBM processing center. Ten tape transports, model 729, and a 1401 for off-line operation will also go to the same organization.

Six 7070s have been sold so far in Sweden.

new DATAMATION literature

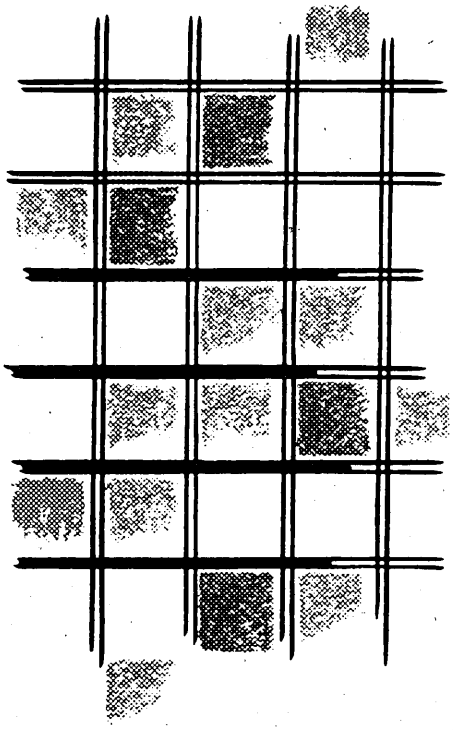
DATA PROCESSING SYSTEM: A 27-page booklet provides information on the 301, designed to provide full-scale data processing for small firms, according to the manufacturer. Text includes description of system, description of computer, input-output-media, typical systems and applications. For copy write RADIO CORPORATION OF AMERICA, Electronic Data Processing Div., Camden 2, N.J., or use reader service card.
Circle 260 on Reader Service Card.

DP SYSTEM: A four-section illustrated booklet details this company's 601 data processing system. A detailed introduction and sections covering system elements, typical systems description and programming features may be found. Three way expansibility, modularity, operating rates, on-line operations, communications and accuracy are topics covered in the introductory section. The section on programming features includes treatment of organization of data, program instructions, length of instructions, simultaneity, multiple programming, automatic programming and programming aids. For copy write RADIO CORPORATION OF AMERICA, Electronic Data Processing Div., Camden 2, N.J., or use card.
Circle 261 on Reader Service Card.

RECORDER/REPRODUCER: Features of the C-100 and detailed specifications for both analog and PDM recording are listed in a new six-page brochure. The product's all-transistorized modular construction, dynamic braking and instant speed change are covered. For copy write MINNESOTA MINING AND MANUFACTURING CO., Mincom Div., 2049 So. Barrington Ave., Los Angeles 25, Calif., or use reader card.
Circle 262 on Reader Service Card.

TAPE SYSTEM: Description of the M-3000 digital tape system is available from the manufacturer. In view of the widely varying application requirements, only general performance specifications are being released. For copy write MIDWESTERN INSTRUMENTS, P.O. Box 7186, Tulsa, Okla.
Circle 263 on Reader Service Card.

MANUFACTURER'S CATALOG: Included in the 12 pages is a complete listing and specifications of a comprehensive line of germanium PNP and NPN audio (small and large signal), computer and switching (high and low speed) transistors. Also listed are the company's complete lines of germanium and silicon refer-



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NEW LITERATURE . . .

ence and power rectifier types and photodiodes. For copy write AMPEREX ELECTRONIC CORP., Advertising Dept. 230 Duffy Avenue, Hicksville, L.I., N.Y., or use card.
Circle 264 on Reader Service Card.

TAPE TRANSPORT: Features, applications and specifications of the Model 81 tape transport are provided in a company brochure. When used as a tape reader, the transport is suitable for on-line service in computer, communication and control applications. Typical magnetic tape applications include both analog and digital modes. For copy write DATASTOR, Div. of Cook Electric Co., 8100 N. Monticello Ave., Skokie, Ill.
Circle 265 on Reader Service Card.

DIGITAL COMPUTER: Complete description of the Programmed Data Processor-1 is provided in a recent folder. Text covers speed, memory size and access time, programming features, input-output equipment, instruction format, instruction list and prices. For copy write DIGITAL EQUIPMENT CORP., Maynard, Mass., or use reader service card.
Circle 266 on Reader Service Card.

PROGRAMMER: Specifications and description of the TP-860 8-channel, time base punched tape programmer are provided in a manufacturer's data sheet. The unit uses standard one-inch teletype punched tape and provides 20 minutes of programming at a tape speed of 1 ips. For copy write ELECTRONIC ENGINEERING CO., Anaheim Electronics Div., 1601 East Chestnut Ave., Santa Ana, Calif.
Circle 267 on Reader Service Card.

DATA PLOTTING: A complete description of the company's digital data plotting instrument is presented in a new brochure. Called the "Dataplotter" this product automatically converts data from punched card or punched tape to graphic form. Specifications are included in the brochure. For copy write ELECTRONIC ASSOCIATES, INC., Long Branch, N.J., or use reader card.
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COMPUTER APPLICATIONS: Single copies of the recently published literature described below may be obtained by writing to the manufacturer.

"Demand Deposit Accounting at Worcester County National Bank with the IBM RAMAC 305." Application General Information Manual, Form No. E20-2048, 20 pages.
Circle 269 on Reader Service Card.

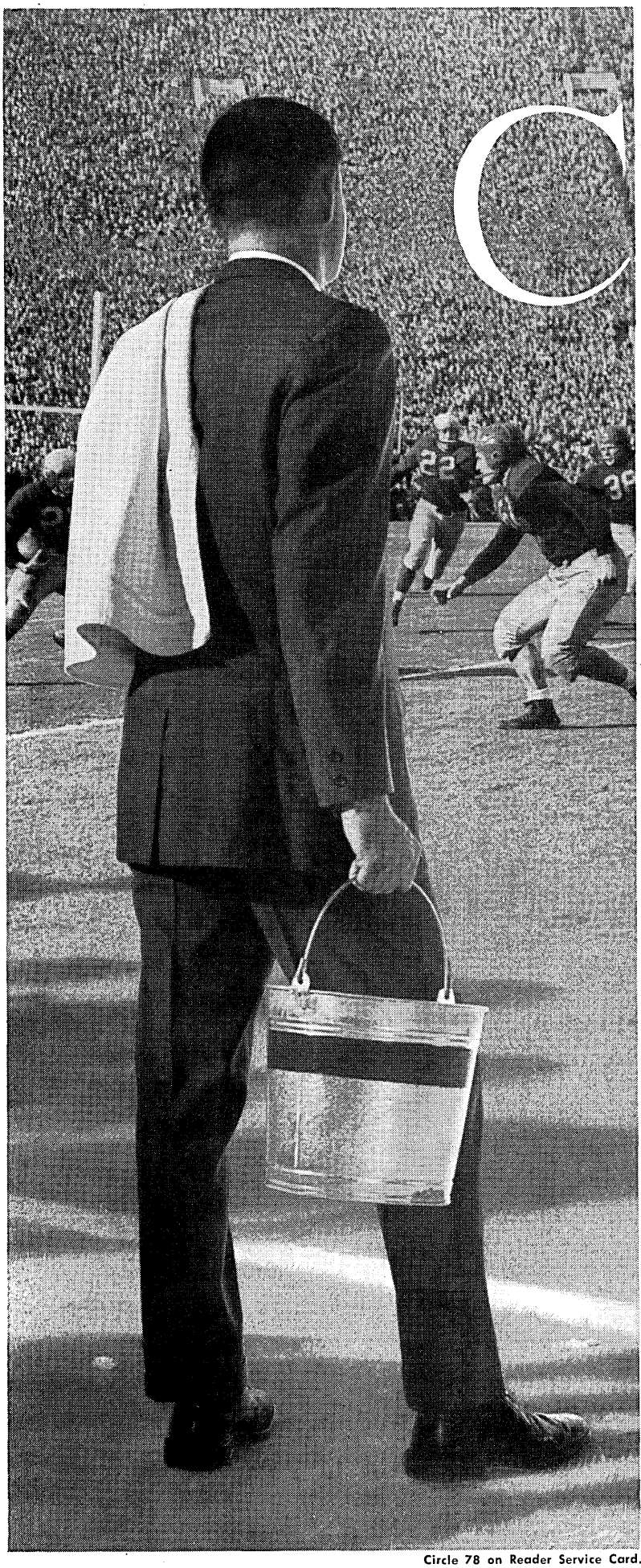
"Milbank Mutual Insurance Co., An Approach to Policy Rating and Writing on the IBM RAMAC 305." Application Brief, Form No. K20-1268, 12 pages.
Circle 270 on Reader Service Card.

"Piecework Payroll for the Garment Industry." Application Reference Manual, Form No. B20-0070, 36 pages.
Circle 271 on Reader Service Card.

"Clearinghouse of Ideas, Board of Education Memphis City Schools." Systems Folder, Form No. K20-1261, 4 pages.
Circle 272 on Reader Service Card.

"Oscar G. Carlstedt Co., Wholesale Florist Accounting." Application Brief, Form No. K20-1228, 12 pages.
Circle 273 on Reader Service Card.

"IBM 609 Calculator for Highway Construction Earthwork Computa-



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The extension of SDC's programming activities into new areas has created openings for Programmers at various levels of experience, including senior status. Please send your inquiry to Mr. E. A. Shaw, SDC, 2478 Colorado Avenue, Santa Monica, California.

"Project CLIP—The Design of a Compiler and Language for Information Processing," a paper by Harvey Bratman of SDC's Data Processing Research staff, is available upon request. Send request to Mr. Bratman at SDC.

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tions." Application General Information Manual, Form No. E26-1516, 32 pages.

Circle 274 on Reader Service Card.

"IBM 1401 Programs for Card Systems: Preliminary Specifications." Systems Bulletin, Form No. J28-0209, 36 pages.

Circle 275 on Reader Service Card.

"IBM 709 Utility Programs." Systems Bulletin, Form No. J28-6080, 20 pages.

Circle 276 on Reader Service Card.

"INFORMER Pulse Magnetic Information Retrieval and Data Processing System." Promotional Booklet, Form No. 550-0001, 8 pages.

Circle 277 on Reader Service Card.

"Concepts of Automatic Data Processing for Army Class I Installations." Application General Information Manual, Form No. E50-0001, 40 pages.

Circle 278 on Reader Service Card.

"The Balanced Approach to Electronic Data Processing Problems – IBM 650." Promotional Brochure, Form No. 520-1226, 24 pages.

Circle 279 on Reader Service Card.

"The Tape-Oriented Configuration (IBM 7070-1401)." Machine Bulletin, Form No. G22-7007-1, 8 pages.

Circle 280 on Reader Service Card.

"IBM 7090 Links Experience with Increased Speed and Capacity." Promotional Brochure, Form No. 520-1263, 8 pages.

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For copy write INTERNATIONAL BUSINESS MACHINES CORP., 590 Madison Ave., New York 22, N.Y.

COMPUTER ABSTRACTS: A leaflet provides information on a new technical abstracting service. Abstracts of papers on computer equipment, programs and mathematics are printed on 3″ x 5″ index cards to provide a cumulative, multiple-entry index to the computer literature. Approximately 2000 cards will be supplied during the first year of publication. For copy write CAMBRIDGE COMMUNICATIONS, 238 Main St., Cambridge 42, Mass., or use reader service card.

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TAPE PERFORATOR: Mechanical components, circuit design considerations, mechanical and electrical characteristics, and theory of operation of the GP-2 are included in a 24-page booklet. This perforator is capable of recording digital data at the rate of 300 codes per second. For copy write SOROBAN ENGINEERING, INC., Box 1717, Melbourne, Florida.

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DATA PROCESSING SYSTEM: A descriptive folder and a 23-page technical booklet provide details of this company's general purpose system, the G-20. Technical material includes information flow, accessories, programming, and specifications. For copies write, BENDIX COMPUTER, 5630 Arbor Vitae St., Los Angeles 45, Calif., or use reader service card.

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ANALOG COMPUTER: The CM-3 analog computer is detailed in a recent bulletin. Employing solid-state circuitry, the computer features continuous "real-time" control of variables in the chemical, refining and process industries. For copy write SOUTHWESTERN INDUSTRIAL ELECTRONICS CO., P.O. Box 22187, Houston 27, Tex., or use card.

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TAPE RECORDER: Bulletin 58 describes the company's recently introduced 16-channel digital magnetic

tape recorder, Model PS-216-D. Specifications and illustrations included. Also available is Bulletin 55 covering the entire PS-200 line of transistorized instrumentation tape recorders. For copies write PRECISION INSTRUMENT CO., 1011 Commercial St., San Carlos, Calif., or use card.
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COMPUTER APPLICATION: Report Number 16 is an 8-page description of refinery design work at J. F. Pritchard & Co. being accomplished with an LGP-30 electronic computer. Sample programs and computer outputs are illustrated. For copy write ROYAL McBEE CORP., Data Processing Div., Port Chester, N.Y., or use reader service card.
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BANK ACCOUNTING: A 16-page illustrated booklet describes electronic demand deposit accounting on a contractual basis. The booklet explains how daily transactions are recorded by an adding machine coupled to a card punch and then processed at night in a computing center. For copy write THE SERVICE BUREAU CORP., a subsidiary of IBM, 425 Park Ave., New York 22, New York.
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AIR TRAFFIC CONTROL: "Breaking the Air Traffic Jam" titles a 21-page booklet which discusses the problems of air traffic control and precision air navigation. A data processing system's role in air traffic control is covered in detail. For copy write GENERAL PRECISION EQUIPMENT CORP., 92 Gold St., New York 38, N.Y., or use card.
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MICROELECTRONICS: Information about this company's developments in microcircuitry and computer memories is provided in a 20-page booklet. Techniques of fabrication and packaging are described outlining a 250 word, 40 bits per word, bulk ferrite memory segment. For copy write CBS ELECTRONICS, 100 Endicott Street, Danvers, Mass.
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LANGUAGE TRANSLATOR: A large magnetic tape to magnetic tape language translator is completely described in a four-page leaflet titled "3C Pulse No. 8." Applications and input, output capabilities are included. For copy write COMPUTER CONTROL CO., INC., 983 Concord St., Framingham, Mass., or use card.
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DELAY LINES: An 18 page booklet lists the advantages, disadvantages and limitations of all types of delay lines available, including high density, lumped constant, distributed constant, magnetostrictive and ultrasonic delay lines. Exacting MIL specs which are presently met by delay lines and typical applications are enumerated. For copy write VALOR INSTRUMENTS, INC., 13214 Crenshaw Blvd., Gardena, Calif., or use card.
Circle 292 on Reader Service Card.

BUILDING BLOCKS: Two folders describe this manufacturer's line of building blocks. Folder C-1000 gives details of the 5 megacycle line which has been expanded to 35 different and compatible units. Folder C-4000 describes 17 of the company's 500-kilocycle plug-in system building blocks. Logic diagrams and price lists are included in both folders. For copies write DIGITAL EQUIPMENT CORP., Maynard, Mass., or use card.
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BREADBOARD EQUIPMENT: Details and illustrations of this manufacturer's products are included in a four-page brochure. Breadboards built in various degrees of complexity are shown. For copy write ENGINEERED ELECTRONICS CO., 1441 East Chestnut Ave., Santa Ana, Calif., or use reader service card.
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DIGITAL TRANSLATOR: "A Progress Report on Machines to Learn to Translate Languages and Retrieve Information" outlines theoretical steps in developing a digital computer for mechanical language translation. The author points out that such a computer would be able to learn and "pair off" only simple, synthetic languages and that the pairs which could be successfully translated are very limited. The report describes the technical and semantic difficulties in detail, and proposes a unified method for resolving problems in both mechanical translation and information retrieval. For copy send 75¢ to OFFICE OF TECHNICAL SERVICES, Business and Defense Services Administration, U.S. Dept. of Commerce, Washington 25, D.C.

PEOPLE MOVING UP IN DATAMATION

✓Irving L. Wieselman, manager, digital systems engineering Telemeter Magnetics, has been awarded the Louis Lipsky Fellowship at the Weizman Institute of Science in Tel Aviv, Israel, for a year beginning July 1, 1960. One of his responsibilities will be directing modification of the Weisac Computer.

✓Two additions to the technical staff of Computer Sciences Corp., a computer consulting firm in Inglewood, Calif., have been announced. New members of the staff are Reginald Martin and Jack Middlekauff.

✓George M. Sokol has been appointed manager of the MOBIDIC (Mobile Digital Computer) program at the Data Systems Operations of Sylvania Electronic Systems, a division of Sylvania Electric Products, Inc.

✓Lynn C. Holmes, director of engineering operations at the Stromberg-Carlson Division of General Dynamics Corp., has been named coordinator of all cooperative education programs at the division.

✓Promotions in the memory development department at Remington Rand Univac, St. Paul, have been announced. A. W. Allen is the new supervising engineer for thin film memory production. Dr. P. L. Morawetz was promoted to supervising engineer for advanced memory development.

✓Martin J. Crean has been appointed director of data processing for Sperry Gyroscope Company, Great Neck, N.Y. Crean will be responsible for planning and programming of business systems and the operation of central data facilities.

✓Dr. Hanan Rubin has been named manager of analytical services for The Service Bureau Corp. in New York City.

✓Dr. James T. Smith, now head of the electrical engineering department at San Jose State College, has returned to the IBM General Products Division Development Laboratory in San Jose as advanced technology manager.

✓Appointment of William Fitzwater, Jr. as senior design specialist has been announced by Epsco-West, Anaheim, Calif., manufacturer of high-speed data control systems.

✓David Fox has been named director of the computer division of the Systems Research Group, Inc. in Mineola, L.I. SRG is an independent research firm specializing in data processing, computer programming and operations analysis.

✓Anthony G. Oettinger, an expert on automatic translation from one language to another, became associate professor of linquistics and applied mathematics in Harvard University on July 1. For the past seven years, Dr. Oettinger has been working on computer translation of Russian into English.

✓John C. Croyle has been named director of customer services of the Remington Rand Univac Div. of Sperry Rand Corp. Mr. Croyle has spent the last 25 years with the IBM Crop in the field of customer services.

✓Jerry Svigals, nationally known as one of IBM's more proficient "computer instructors," has been appointed manager, Commercial Analysis, Data Processing Div. Headquarters, White Plains.

LFE HAS NEW STORAGE, DISPLAY SYSTEM

A new data storage and display system, called RASTAD, has been demonstrated by Laboratory for Electronics, Inc., Boston, Mass. The demonstration showed the system's ability to store, retrieve, and display information almost instantaneously. A RASTAD system will be delivered soon to the government where it will be installed in a highly classified location.

LFE's demonstration was conducted by an operator seated at a console. The operator pressed nine keys which gave RASTAD all the information commands it needed. By pressing the start key, RASTAD carried out the commands. Two seconds later the 21-inch screen displayed an index listing the reports available in storage and the drum, track, and sector numbers where each report was located. A report was selected and a touch of the erase key erased the index. Nine more keys were pressed and the operator again pressed the start key.

In just two seconds the complete report consisting of 100 lines with 128 characters (numbers and letters) on each line appeared on the TV-like tube. This report was erased and more reports were requested and displayed as rapidly as the operator could press the command keys. By merely changing the operating mode, this same set of keys was used to display a map. This display was retained on the tube while other information was called for and superimposed on specific areas of the map.

drum storage for reports, maps

Reports and maps viewed were all stored on high density magnetic file drums. Simply pressing the instruction keys and the start button makes it possible to retrieve any portion of stored information. RASTAD's chief value lies in its ability to operate with virtually any computer system in use today and enable that computer system to operate most economically.

Since a computer's principal function is to operate continuously on a pre-programmed basis to keep information up to date, any interruption of this function diverts the computer to an auxiliary operation. A request for stored information requires an auxiliary operation from the computer. A large number of such random requests ties up the computer for unnecessarily long periods of time processing these auxiliary requests. This could result in the loss of many thousands of dollars a month in valuable computation time.

Random requests are addressed to the RASTAD files. The information processed by the computer is automatically transmitted to RASTAD to keep the stored data up to date. Any external requests for data are now directed from the RASTAD viewing consoles to the RASTAD files, read from the files, and displayed on the RASTAD viewers. In this way the computer is permitted to continue its principal function uninterrupted; while its former auxiliary function is taken over by the RASTAD system.

A RASTAD system consists of from 1 to 33 high density magnetic file drums containing 300 tracks on each drum, a symbol generator which simultaneously generates each of the alphanumeric and abstract characters required in report, map, chart, and other abstract displays a master viewer and control console plus as many associated viewing consoles as required, and the necessary associated electronic controls and power supplies. Each file drum has a storage capacity of 1.7 million alphanumeric characters, giving a 33 drum system a total storage capacity of some 55 million alphanumeric characters.

Access to any stored information is achieved in two-tenths of a second. The system read/write rate is 20,000 characters per second – identical with the display rate of the display equipment. A complete display consists of a maximum of 12,800 characters. A complete operation from the pressing of the start key to a completed visual display is accomplished in less than two seconds. The display may be erased immediately or retained for up to 20 minutes if desired. Thus, if a requesting error is made it is discovered; the undesired information is erased; and the proper request is inserted.

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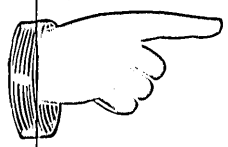
DATAMATION

THE MAGAZINE OF AUTOMATIC INFORMATION HANDLING

is going monthly beginning with the **JANUARY 1961** *issue*

		1 JAN.	2 FEB.	3 MAR.	4 APRIL	5 MAY
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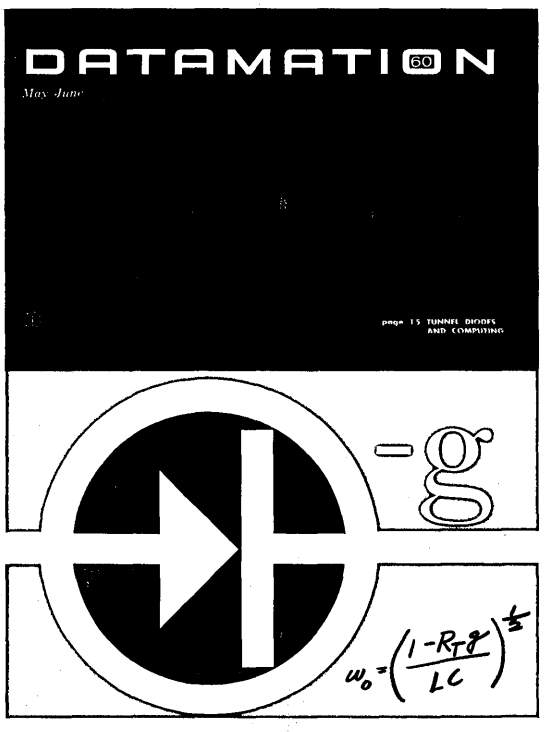

In Step with Progress

The field of automatic information handling is vigorously growing—and we are well aware of it! In order to keep up with the dynamic industry we serve, DATAMATION proudly announces monthly publication beginning January, 1961.

This decision re-emphasizes our goal of providing DATAMATION readers with up-to-date, significant information in many areas of interest: computing, data sensing, recording, conversion, acquisition, transmission, storage, retrieval, reduction and display, to name a few. Monthly publication enables us to more easily broaden our scope of interest as the industry itself expands—thus furthering DATAMATION'S desire to keep in step with progress.

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AFIPS CONSTITUTION DRAFT NOW UNDER CONSIDERATION

June 6, 1960

Dear Mr. Lanzarotta:

It is desirable that the members of the ACM, PGEC of IRE, and the Computer Committee of AIEE, all of which are sponsoring societies of the National Joint Computer Committee, should be made aware of developments relative to the National Joint Computer Committee as these have occurred over the past several months. A forerunner to these events appeared in the pages of your magazine when you published the deliberations, concerning the future of computing societies, which were carried on at the Rand Corporation just prior to the WJCC meeting of 1959. These deliberations developed the theme that something was lacking in the way of information processing and computer science representation. Several members of the Association for Computing Machinery had also considered this question at a national meeting in Boston.

Subsequently, I called a special meeting of the National Joint Computer Committee, which was open to the computing public, to consider the question of "Whither NJCC?" This meeting was held the night before the official National Joint Computer Committee meeting which took place at December 1959 EJCC.

A direct outcome of these two meetings, official and unofficial, was the conclusion by the members of NJCC that it would be desirable to form a "society of societies" whose major purpose would be to take actions relative to those matters which are either fragmented as a result of the multiplicity of societies existing in the information processing field, or omitted because of the deeper but narrower interest of each of the societies in the information processing field. Examples of items of such a nature are: The conduct of NJCC meetings, the representation of the United States in international information processing affairs, the encouragement of joint seminars and symposiums among the various information processing societies, and the conduct of public relations of the computing sciences with the other sciences and with society in general.

Toward these ends the executive committee of the NJCC has undertaken the consideration of a draft constitution for an "American Federation of Information Processing Societies." During the conduct of these considerations, the sponsoring societies of NJCC have been kept carefully informed of events as they occur. The major difference between the proposed AFIPS and the present NJCC is that the former can take action without repeated references to the parent societies to carry out those functions which are not directly competitive with component society members, whereas the latter could not.

The present state of affairs is that a constitution has been agreed upon by NJCC and has been submitted to the three presently sponsoring societies of NJCC for ratification. If this latter action takes place, then subsequently, under the constitution, other societies concerned with information processing may be invited to join the American Federation of Information Processing Societies.

In closing, it may be well to quote the purposes of the AFIPS as these are stated in the draft constitution:

"The purpose of this Federation shall be the advancement and diffusion of knowledge of the information processing sciences. These sciences include, but are by no means restricted to, the computer sciences and their applications to Society. To this end it is part of the purpose of this Federation, among other measures, to serve the public by making available to journals, newspapers, and other channels of public information reliable communications as to information processing and its progress; to cooperate with local, national, and international organizations or agencies on matters pertaining to information processing; to serve as representative of the United States of America on inter-

national organizations with like interests; to promote unity and effectiveness of effort among all those who are devoting themselves to information processing by research, by application of its principles, by teaching or by study; and to foster the relations of the sciences of information processing to other sciences and to the arts and industries. In pursuing these purposes, the Federation shall do nothing that is in direct competition with activities of its member societies."

Sincerely yours,
Harry H. Goode, Chairman
National Joint Computer Committee

MORE ON COBOL

CODASYL EMPHASIS SHIFTING TO DEVELOPMENT COMMITTEE

DATAMATION has received a second letter from Mr. Charles A. Phillips, Chairman of the Executive Committee, Conference on Data Systems Languages. Mr. Phillips' first letter, covering COBOL details and other CODASYL developments, appeared in the May/June issue.

June 30, 1960

Dear Sandy:

Thanks for publishing my letter in the May/June issue of DATAMATION. I am taking advantage of your offer to present this second letter covering material omitted from the May/June issue by reason of space limitations, together with some late developments on COBOL.

Your readers will be interested to learn that COBOL is now in printed form as a "Report to the Conference on Data Systems Languages, Including Initial Specifications for a Common Business Oriented Language (COBOL) for Programming Electronic Digital Computers." A copy is enclosed for your information. COBOL is being distributed to the CODASYL membership today and has been placed on sale by the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C. It should be ordered under the title "Common Business Oriented Language, April 1960," and the price is 75¢ per copy with a discount of 25% on orders of 100 or more copies.

Whatever its limitations may be, the publication of a common business oriented language – COBOL – developed as a spontaneous cooperative effort of manufacturers and users of data processing equipment through a voluntary committee effort, and within 13 months from original conception, must certainly be accepted as a general recognition by all concerned of the widespread and urgent need for such a programming language.

To be effective, a programming language must be dynamic and quickly responsive to questions involving ambiguity, error or needed improvement. At the last meeting of the CODASYL Executive Committee on June 1st, a change was made in the organizational structure designed to maintain the currency and effectiveness of COBOL. To reflect the joint responsibility and interest of both users and manufacturers in COBOL maintenance, the Technical Committee and the Maintenance Committee were combined as the COBOL Committee with a Manufacturers Group (the former Technical Committee) and a Users Group (the former Maintenance Committee). Ten manufacturers and twelve major users are now represented on these two groups which meet concurrently (with at least one joint session) as frequently as needed to consider problems arising in the development of compilers and the further implementation of COBOL.

As supplements to the COBOL report are agreed to by the COBOL Committee, they will be reproduced and a single copy sent to the CODASYL membership. Periodically, these will be combined and the CODASYL members advised when they have been printed and are available through the

Government Printing Office. We believe that this maintenance technique gives every manufacturer or user who has suggestions or criticism of COBOL a quick and responsive method of presenting them for action.

The standard Government rental contract now being negotiated by the General Services Administration contains a clause in which the manufacturer is asked to indicate whether he will or will not provide a compiler for the Common Business Oriented Language (COBOL). Most of the computer manufacturers have advised us of their intent to develop compilers for COBOL and some have made public announcements on this subject. At the June 1st meeting, the Executive Committee directed the Chairman to obtain as much detail as possible from the manufacturers on their plans in this regard including a time schedule. Some of these schedules indicate that the compiler development work is well along. At this point we are encouraged to believe that computer users looking for the advantages of a common language, basically in English, which is oriented toward business data processing problems, is open-ended and essentially independent of any make or model of data processing equipment, can begin to use COBOL very soon.

Emphasis under the CODASYL program will be turning more and more to the efforts of the Development Committee, and I would like to suggest that you carry an article on this effort in an early issue of DATAMATION.

In closing I wish to pay public tribute to the excellent support that computer manufacturers have given to the development of COBOL and the cooperative spirit that has been so much in evidence in writing the initial specifications. Those of us who have been working in the CODASYL program feel confident that this same support will continue in the implementation stage.

Sincerely,

C. A. Phillips

(DATAMATION will carry a report on work being accomplished by the Development Committee in the September/October issue. Key members of that committee state that "significant gains" are being made in the development of post-COBOL languages—Ed.)

ADVERTISERS' INDEX

See page 10 for more information

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POTTER SETS THE PACE

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A single speed, unidirectional, photo-electric, perforated strip reader, the Potter 909 is

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VERSATILE...output is a timed, shaped pulse for input to a computer, high speed printer, or control system.

...parallel NPN, PNP amplifier output circuit supplies up to 40 ma to loads returned to any bias voltage.

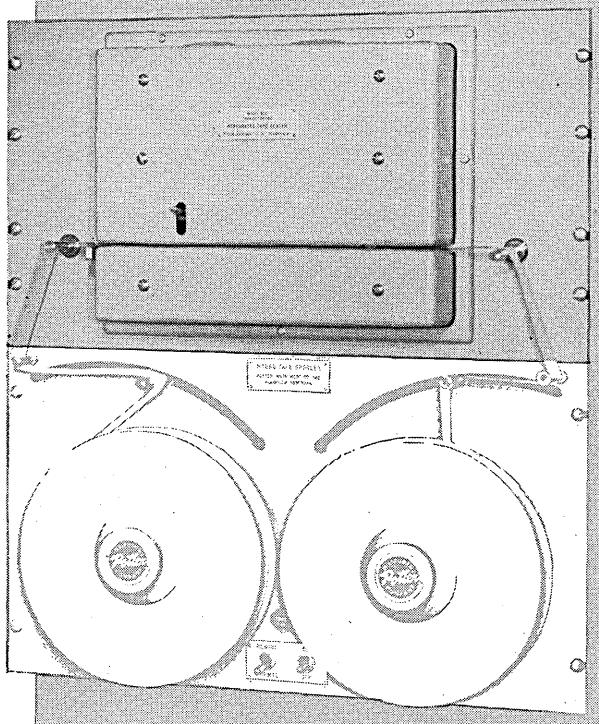
FAST...operates at speeds up to 1000 characters per second with complete dependability.

SENSITIVE...a broad image light source eliminates the effects of filament variations in the lamp.

COMPACT...fits into a 10½ in. case—with its own power supply and amplifiers.

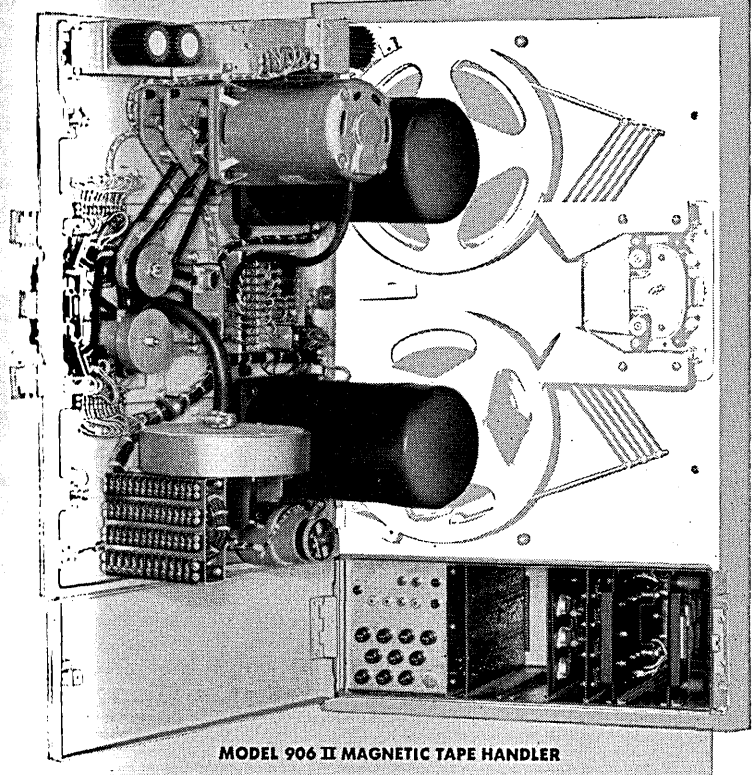
The Potter 909 perforated tape reader includes a tape transport system, tape reading system, power system, and control system. It is designed for panel, rack, or cabinet mounting. Accessories available include tape spoolers and tape bin, cooling fan, mounting adapters and extension frames.

WRITE FOR DETAILED SPECS AND LATEST PRICE AND DELIVERY INFORMATION



MODEL 909 PERFORATED STRIP READER WITH MODEL 3299 SPOOLER

WITH...THE MOST TAPE HANDLER FOR YOUR MONEY



MODEL 906 II MAGNETIC TAPE HANDLER

The Potter 906 II is the high speed digital magnetic tape handler that gives you higher performance, greater reliability, and lower cost than any other tape handler on the market—bar none.

Only with the 906 II do you get such advantages as:

...full forward reverse cycling at 120 ips with 1 inch tape.

...low skew tape guide that permits conventional recording at 400 bpi density.

...1500 bpi recording densities which are made possible by using the 906 II with the Potter Contiguous Double Transition System. 450,000 8-bit characters per second can be recorded on 1 inch tape.

...transistorized control of all functions that simplifies computer design.

...simplified packaging for easy maintenance.

...a price—far below other makes—that proves the economy of superior design.

Compare them any way you like—spec for spec, dollar for dollar, space for space—and you'll agree that the high performance, low cost Potter 906 II is the most tape transport at any price.

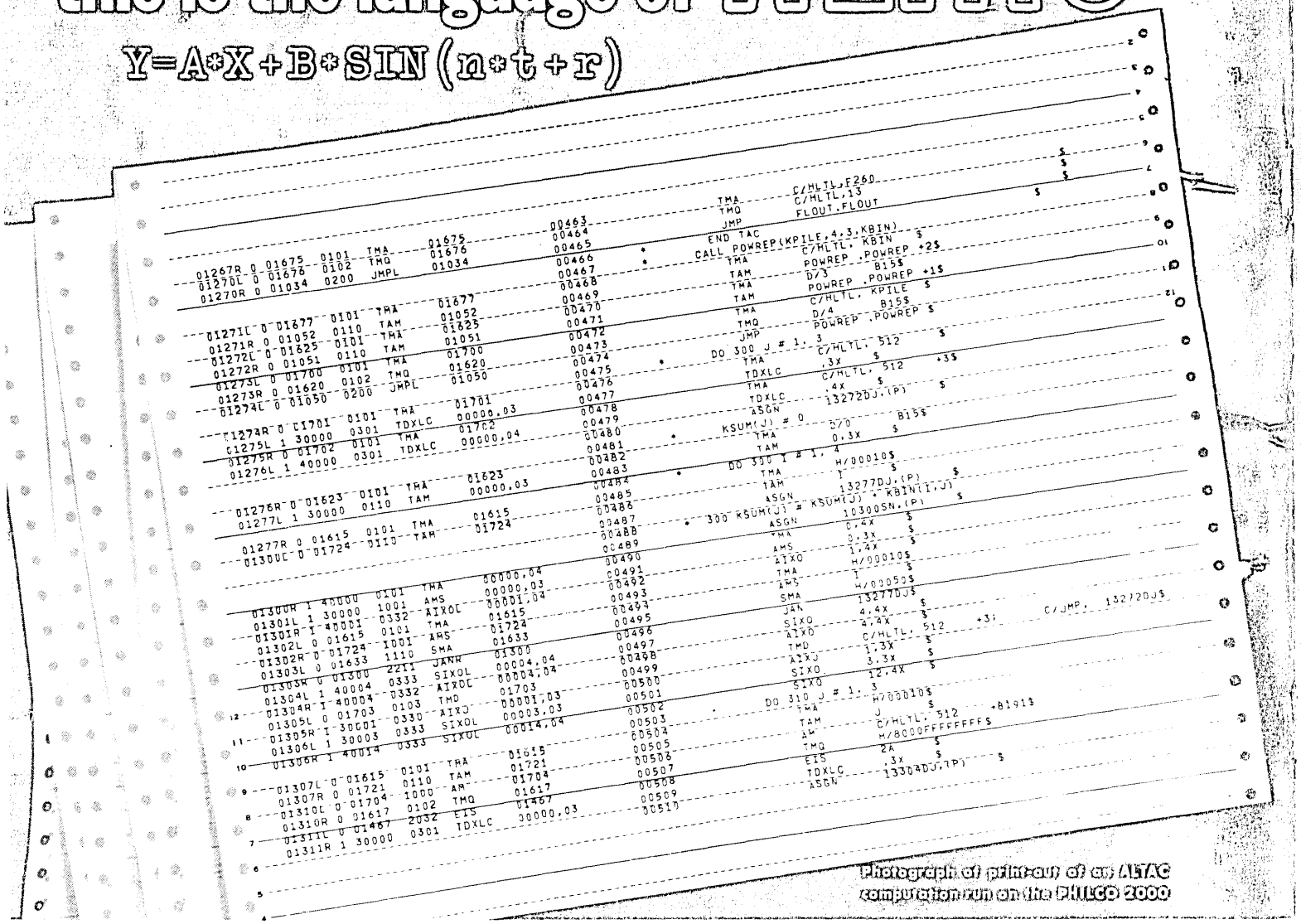
WRITE FOR DETAILED SPECS AND LATEST PRICE AND DELIVERY INFORMATION

POTTER INSTRUMENT CO., INC. Potter **Sunnyside Boulevard, Plainview, L. I., N.Y.**
OVerbrook 1-3200

Circle 34 on Reader Service Card.

this is the language of ALTAC*

$$Y=A*X+B*SIN(n*t+r)$$



Photograph of printout of an ALTAC computation run on the PHILCO 2000

* THE PHILCO ALGEBRAIC TRANSLATOR THAT ACCEPTS PROGRAMS WRITTEN IN MATHEMATICAL LANGUAGE

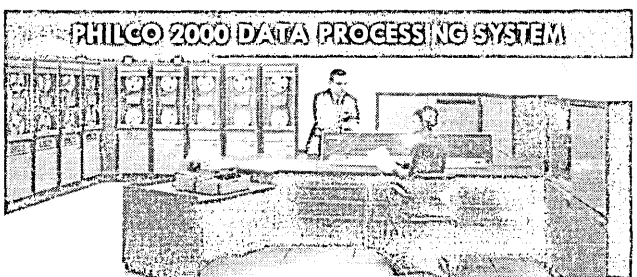
ALTAC is the Philco mathematical language compiler which operates in conjunction with TAC, the Philco Translator Assembler-Compiler . . . a powerful, computer-oriented language with extensive library features.

ALTAC is completely compatible with the most popular algebraic languages in use today . . . permitting thousands of existing programs to be run on the Philco 2000 Computer without change. It produces a fast, efficient running program. TAC language inserts may be included at will in ALTAC language programs.

ALTAC is now in full operation at customer installations.

Philco automatic programming techniques enable you to learn and use the Philco 2000 Computer faster. For more complete information, write:

PHILCO CORPORATION • GOVERNMENT & INDUSTRIAL GROUP
COMPUTER DIVISION, 3900 WELSH ROAD, WILLOW GROVE, PA.



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