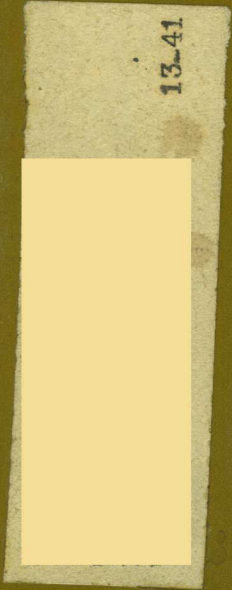


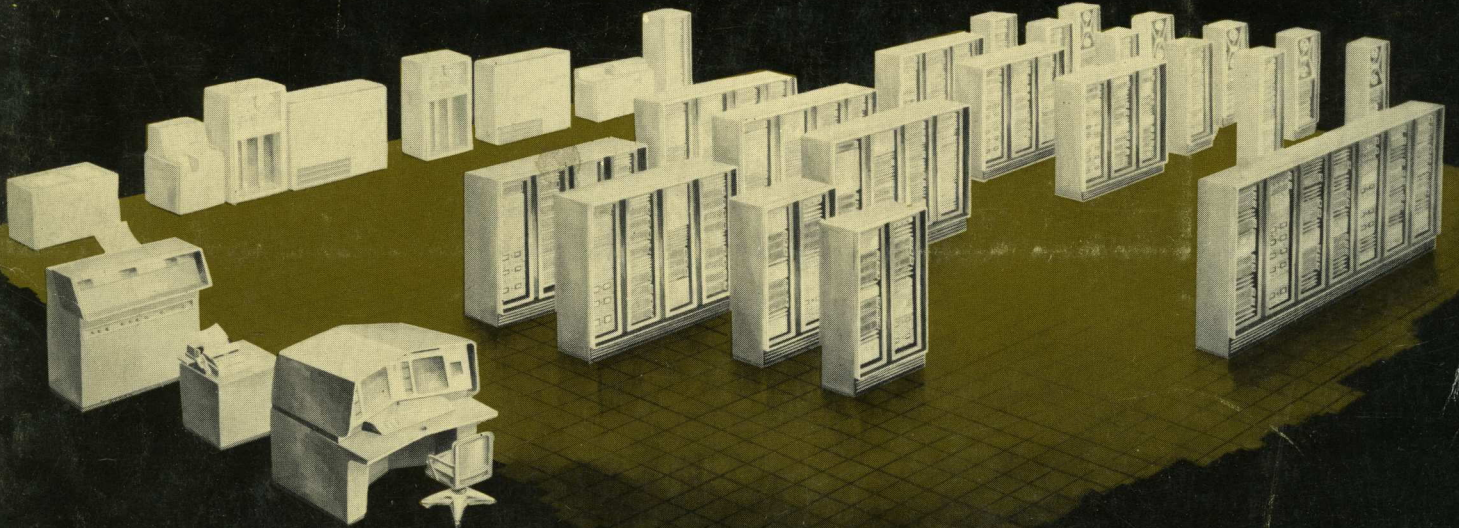
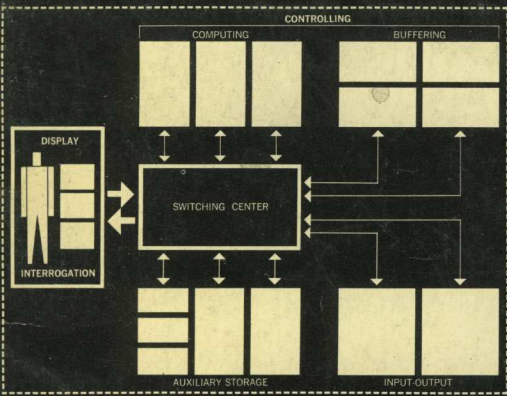
DATA MATION 60 N

January/February



IN THIS ISSUE—
FOUR NEW COMPUTERS

RW-400 RW-400
RW-400 RW-400
RW-400 RW-400



VERSATILITY

MARKS TMI TYPE RB
GENERAL PURPOSE MEMORIES

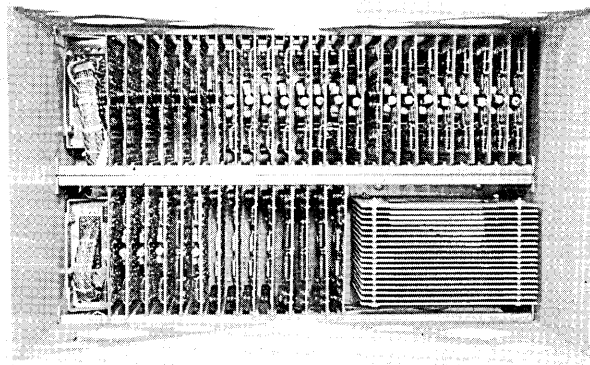
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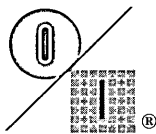


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Capacity — 128 to 1024 words — 4 to 24 bits per word — larger capacities with multiple units. 5-microsecond load or unload — 8-microsecond complete memory cycle.

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Input and Output Signals — input may be either polarity and may be levels or pulses; output signals are levels.



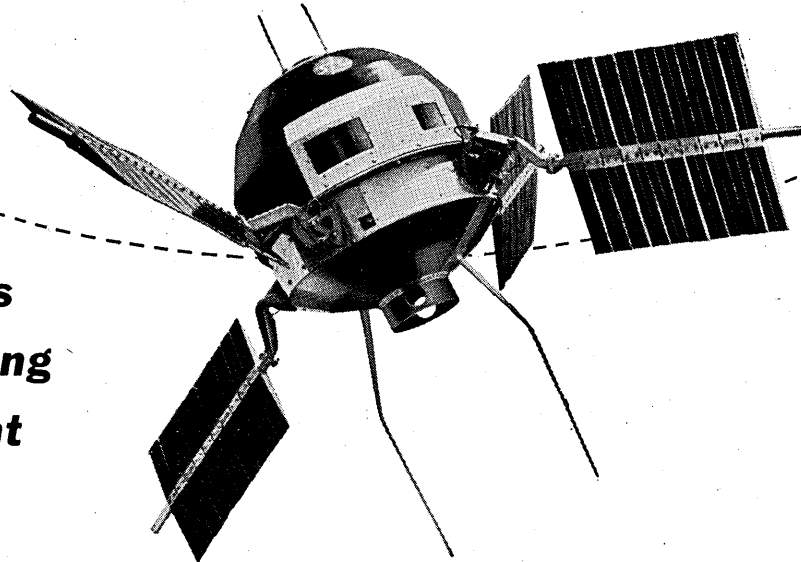
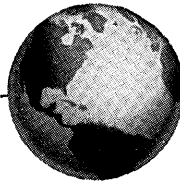
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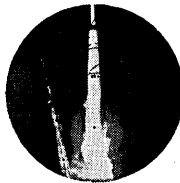
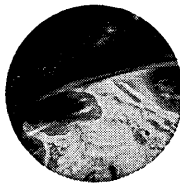
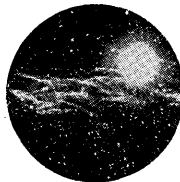
PIONEERS IN DEVELOPMENT AND MANUFACTURE OF CORE MEMORY PRODUCTS

Explorer VI

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space laboratory
orbiting
around
the
earth
with
paddles
capturing
sunlight
for
power**



The scientific data that will some day enable us to probe successfully to the very fringes of the universe is being recorded and transmitted at this moment by the space laboratory Explorer VI, a satellite now in orbit around the earth ● This project, carried out by Space Technology Laboratories for the National Aeronautics and Space Administration under the direction of the Air Force Ballistic Missile Division, will advance man's knowledge of: *The earth and the solar system . . . The magnetic field strengths in space . . . The cosmic ray intensities away from earth . . . and, The micrometeorite density encountered in inter-planetary travel* ● Explorer VI is the most sensitive and unique achievement ever launched into space. The 29" payload, STL designed and instrumented by STL in cooperation with the universities, will remain "vocal" for its anticipated one year life.



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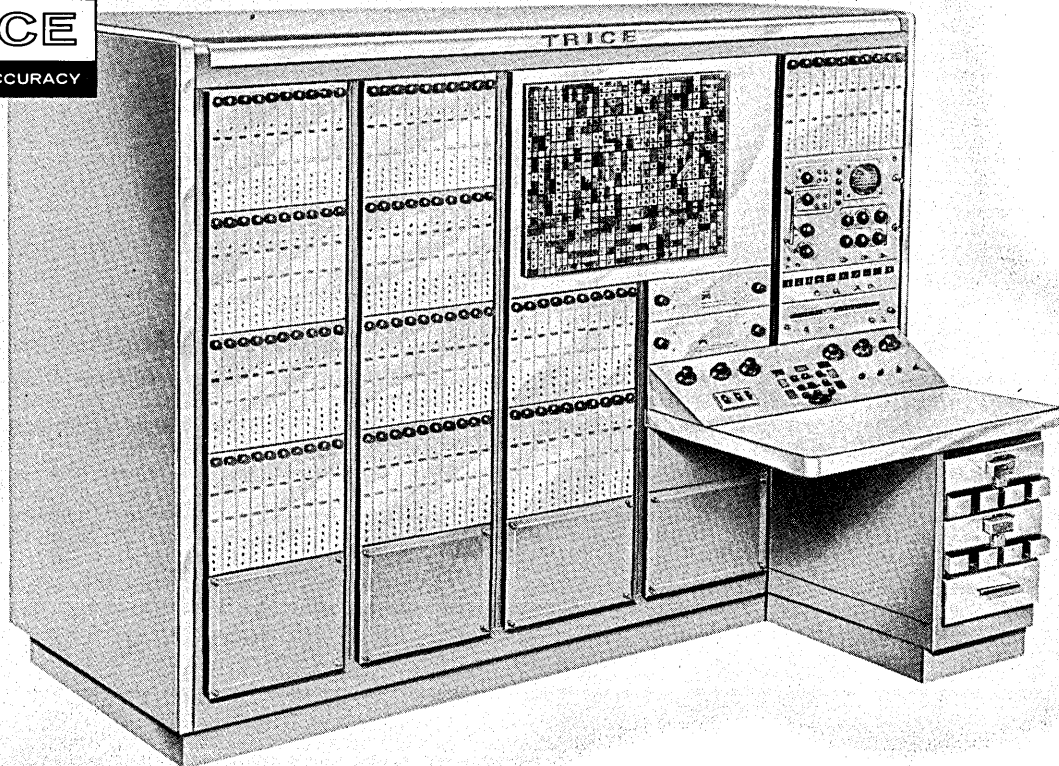
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Circle 2 on Reader Service Card.

*the automatic handling of
information*

volume 6, number

1

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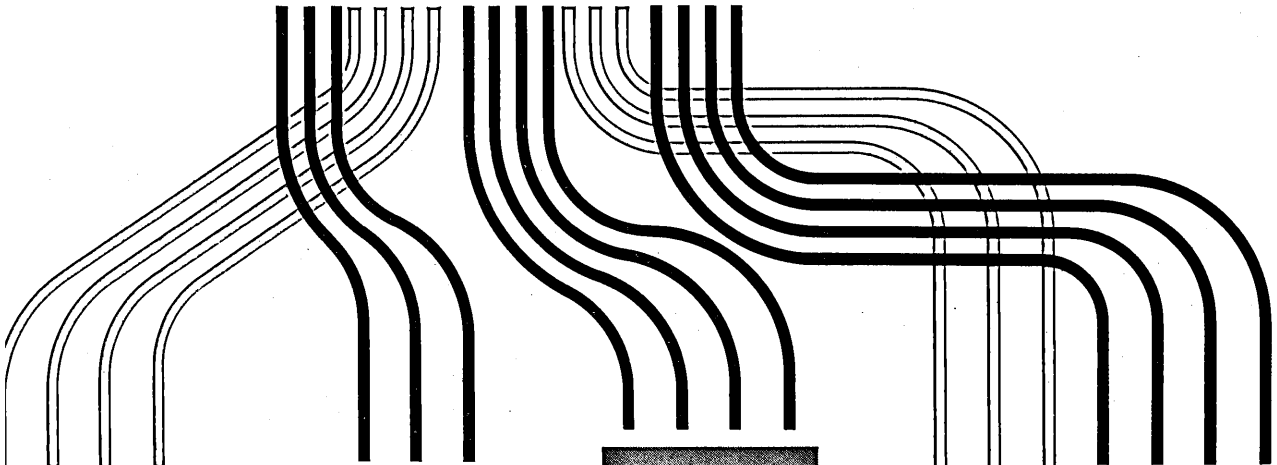
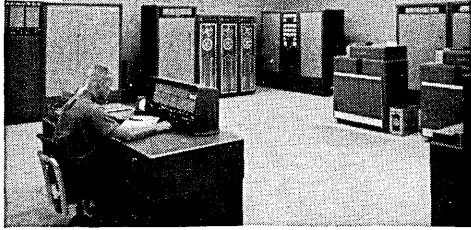
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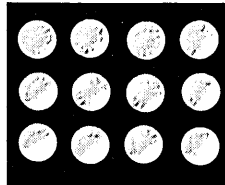
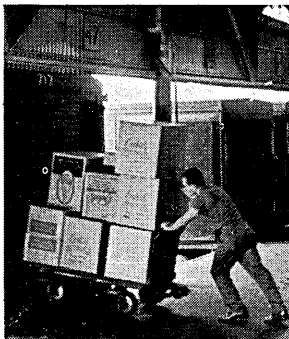
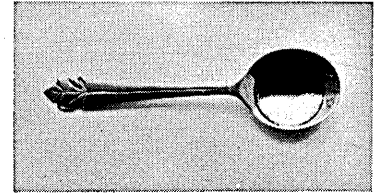
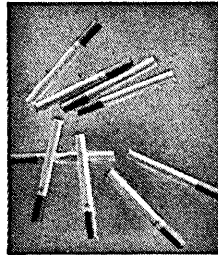
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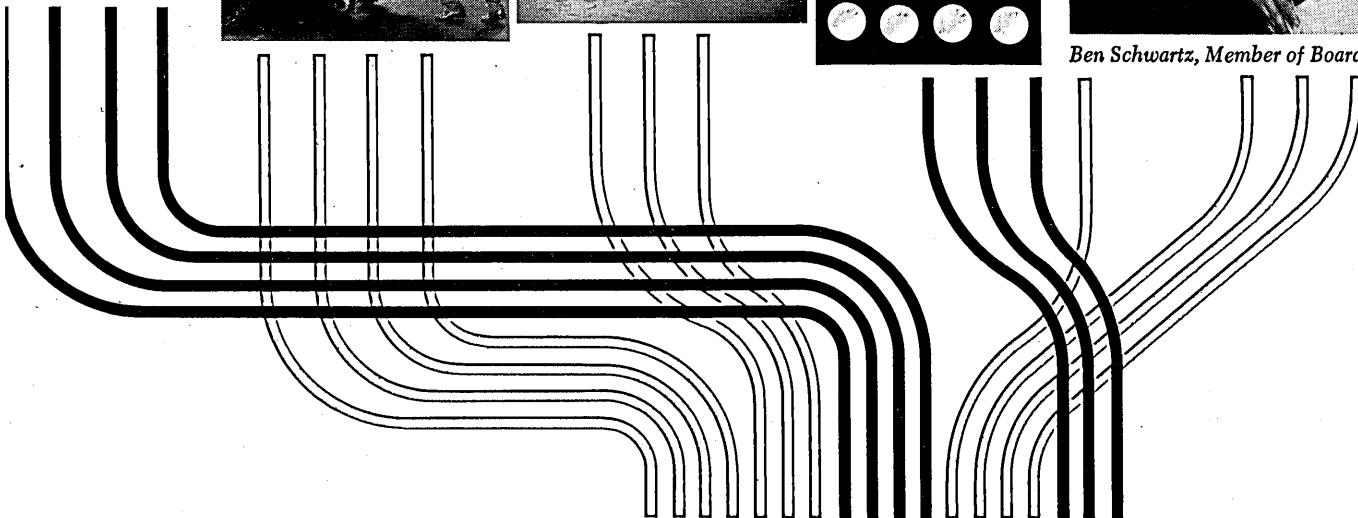
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Ben Schwartz, Member of Board of Directors



*"We are thousands of
dollars ahead with our
Burroughs 205 computers..."*

"...and keep a tight inventory control for our 1450 member-stores right down to the last pack of cigarettes shipped."

RANDOLPH PRICE, *Controller, Certified Grocers of California, Ltd.*

During a recent 13-week period, Certified Grocers provided more than 700-million smokes, cured (or tried to) about 5-million headaches, dished up some 6-million cans of baby food and kept a welter of household pets happy with around 12-million cans of dog and cat food. Little wonder, because Certified is the world's largest retailer-owned wholesale grocery distributor, and its member-store sales rank fourth among all of the nation's retail food distribution systems.



Randolph Price, Controller and Nick Walsh, Data Processing Manager

Certified Grocers was founded in 1922 by 15 visionary men who met in a quiet Pasadena hotel room to develop a group buying plan. They decided to pool their buying power in order to compete with the big chains. Their first purchase was a carload of soap, which they unloaded themselves at the rail-head. Their plan was successful, and by 1929 they purchased their own warehouse. Today, Certified's members own and operate more than 1450 stores in the West, and approximately 35 percent of the foodstuffs purchased in the greater Los Angeles area comes off the shelves of Certified member-stores.

Keeping an accurate tab on all that merchandise is a chore Certified has assigned to its two Burroughs 205 electronic data processing systems, purchased in 1956. One system controls the billing and inventory of a Los Angeles warehouse; the other handles the orders for goods shipped out of the San Fernando Valley warehouse and all non-food

orders. Between the two computing systems, they average some 200,000 items ordered daily. When frozen foods and delicatessen items are added to the computer program this month, the billing and stock control of over 18,000 different items will be automated.

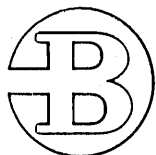
"Reliable daily use is an extremely important factor in our application," reports Nick Walsh, Certified's Data Processing Manager, "because ours is a 7-day per week, 20-hour per day, up-to-the-minute operation. Orders come in as checked off in a catalog. The orders, converted to punched cards, are merged with our stock status file on magnetic tape and entered into the computer. Our 205's process the orders, update the magnetic tape file, and produce the punched cards from which invoices are prepared. The printed invoices are then used to select merchandise from the warehouse and for the preparation of accounts receivable." Walsh continues, "We have found our 205's give us fast and accurate inventory control and save us money in the billing of daily invoices...savings that are passed on to our members." "More than just smooth operating equipment is important in a data processing installation," adds Controller Randolph Price. "A manufacturer must provide the training, service and over-all support such as Burroughs has given us...this is essential to any successful EDP program."

Certified is also using its 205's as an extremely valuable tool for another purpose: the preparation of purchase analysis reports. The reports, subscribed to by about 600 markets, give each member a current, accurate picture of all his purchases. They help him to decide which items are selling well, which to discontinue, shelf space to reserve, and of course, guide him in purchasing. The value of the reports is expressed by one member, Mr. Ben Schwartz, Member of the Board of Directors and owner of Foods Co., who reports, "This is one of the finest services Certified offers. I receive as many as 8 or 9 different kinds of analysis reports over a period of time, at a cost which is negligible in comparison to their usefulness. These reports save me thousands of dollars!"

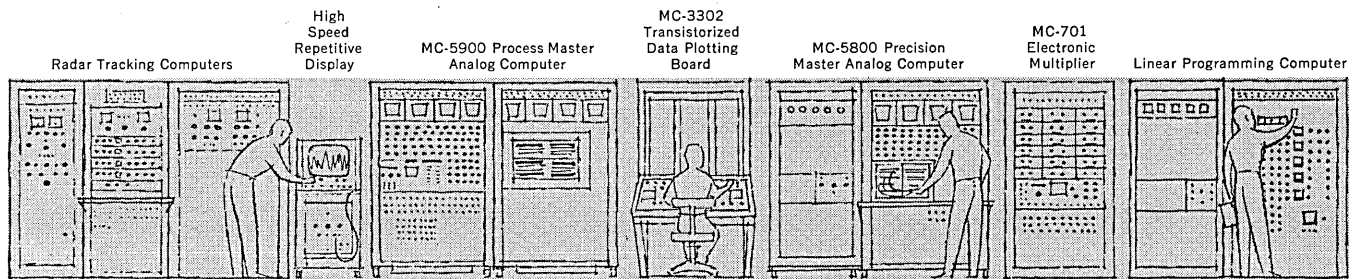
Controller Price points out, "These special reports, made possible by our 205 computers, would have been impracticable to prepare under our previous tub file and punched card system. Work that would have taken months now takes a few hours. The cost under our old system would have been three to five times as much and the reports wouldn't have been available soon enough to do our members any good."

The 205 systems are also being used for Certified's own complex purchasing operations. A periodic analysis keeps headquarters informed of the exact sales and distribution of thousands of items. Buyers are able to check out-of-stock situations quickly, determine the average inventory during the quarter, and accurately estimate average quarterly sales.

Just as Burroughs 205's are helping Certified's management take costly guesswork out of many daily business decisions, so are hundreds of Burroughs electronic data processing installations aiding other commercial and industrial users. Burroughs' complete line of computing systems is backed by a nationwide team of computer specialists. For additional information on how the 205 or other Burroughs electronic data processing equipment can help in your business, write ElectroData Division, Pasadena, California.



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



Some people can prove man and mouse are identical

It's all according to the points of similarity you choose. Differences are what really prove the superiority of man over mouse. Computers have differences, too. In fact, it's in these differences that the CSI-designed MC-5800 obsoletes every other Analog Computer. The best proof lies in

cold
hard
Specifications

- Exclusive dynamic memory makes automatic iterative solution of statistical or optimization problems a reality.
- Stable amplifier operation over the entire feed-back range from zero to infinity.
- Lowest amplifier grid-current 10^{-9} ampere.
- Amplifiers provide lowest noise level output—less than one millivolt at unity gain.
- Amplifier frequency response—flat to 10,000 cps and only 3 db down at 28 kc.
- Real-time precision @ speeds to 60 solutions/sec.
- Exclusive electronic generators of the function of two-or-more variables may be programmed at patch-board in same time required for setup of single-variable generators.
- Will program 134 amplifiers, 30 electronic multipliers, 18 diode function generators, 2 time-delay generators, 8 relay amplifiers, and 6 servos from one 2128-hole patchboard.
- Highest performance electronic multiplier—flat to 10,000 cps and only 3 db down at 20 kc.
- Dynamic memory + high-speed quick-reset rep-op provide practical approach to solution of simultaneous partial differential equations.
- Dynamic memory with time-base accuracy of $\pm 10 \mu\text{sec}$ provides automatic parameter searching by iteration—an exclusive capability.
- Solution of problems with up to 15 amplifiers in closed loops.
- Plug-in dynamic components ease maintenance.
- Lowest computer cross-talk—rejection greater than 2,000 to 1.
- Selection of real-time, expanded-time or high-speed compressed-time without reprogramming.
- Passive networks stabilized at $< 1^\circ\text{C}$ above room ambient—no oven required.
- EVERY SPECIFICATION IS GUARANTEED TO BE TRUE PERFORMANCE STANDARD—IN SUSTAINED OPERATION.
- Only diode function generators utilizing resistors, potentiometers, and diodes of equal quality to those in computing networks.
- Only diode function generators with individual hi-lo gain positions for each segment.
- Lowest function generator drift $< 5 \text{ mv}/8 \text{ hrs}$.
- Lowest servo step-function overshoot—less than 1%.
- DC tachometer feedback on all servos.
- Complete control of all amplifiers, multipliers, dividers, and non-linear equipment at patchboard.
- Exclusive equipment-door packaging for free access and quick maintenance without shutdown.
- Insulated patchboard prevents costly shorting accidents.
- Power supplies eliminated from console—lowest, most stable operating temperatures—rise $< 3^\circ\text{C}$.
- Field expandable without mechanical rework or rewiring.

There are many more differences (over a hundred, in fact). Before you buy or lease your next analog computer, compare them all... and we think you'll agree with us when we say: The MC-5800 obsoletes every other analog computer made.

Computer Systems, Inc.—designers and manufacturers of the highest precision analog computers and computer accessories.

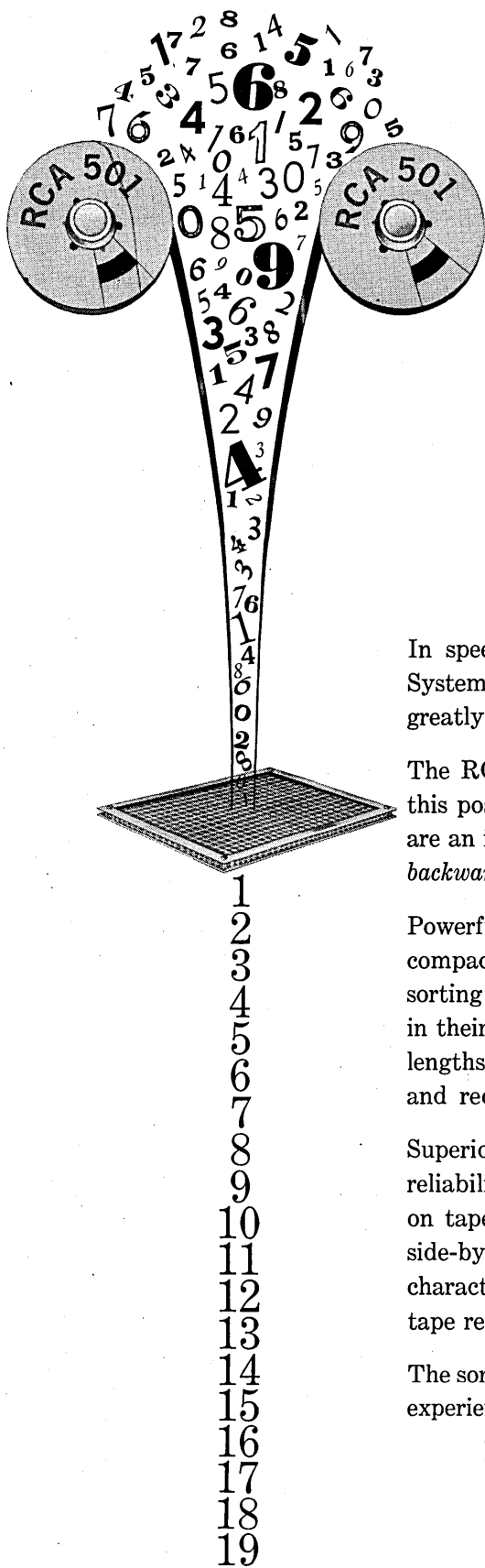
MAN IS A MOUSE



COMPUTER SYSTEMS, INC., 611 BROADWAY, NEW YORK 12, N. Y. • SP 7-4016
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Up to 40% of your data processing dollar can be consumed in sorting. Now, RCA offers a major breakthrough in sorting economy!

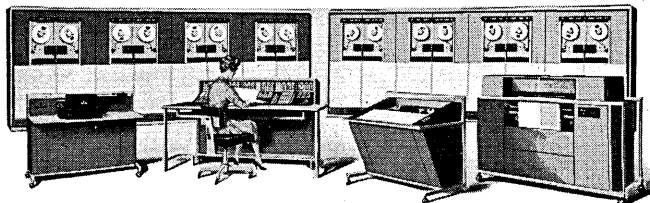
In speed, efficiency and low cost per item sorted, the RCA 501 System is indeed impressive! Tape limited sorting operations are greatly accelerated by the unique combination of 501 features.

The RCA 501 can *read and write simultaneously* on tape. To make this possible, *dual buffers*—a pair for input and a pair for output—are an integral feature of the system. Furthermore, the 501 can *read backward* avoiding time lost in rewinding.

Powerful features built into the tape system result in extremely compact information recording (saving miles of tape and hours of sorting time). *True Variable Length Recording* reads and writes items in their natural length rather than in artificial fixed word and block lengths. 501 Tape Units use an exceptionally short gap between items and require only 3.5 milliseconds to achieve full operating speed.

Superior sorting capabilities in the 501 are backed up by important reliability features. Positive accuracy is afforded by *Dual Recording* on tapes. All information is recorded in duplicate and both of the side-by-side recordings have individual parity checks. If either character is faulty, the correct one is automatically used without tape reread.

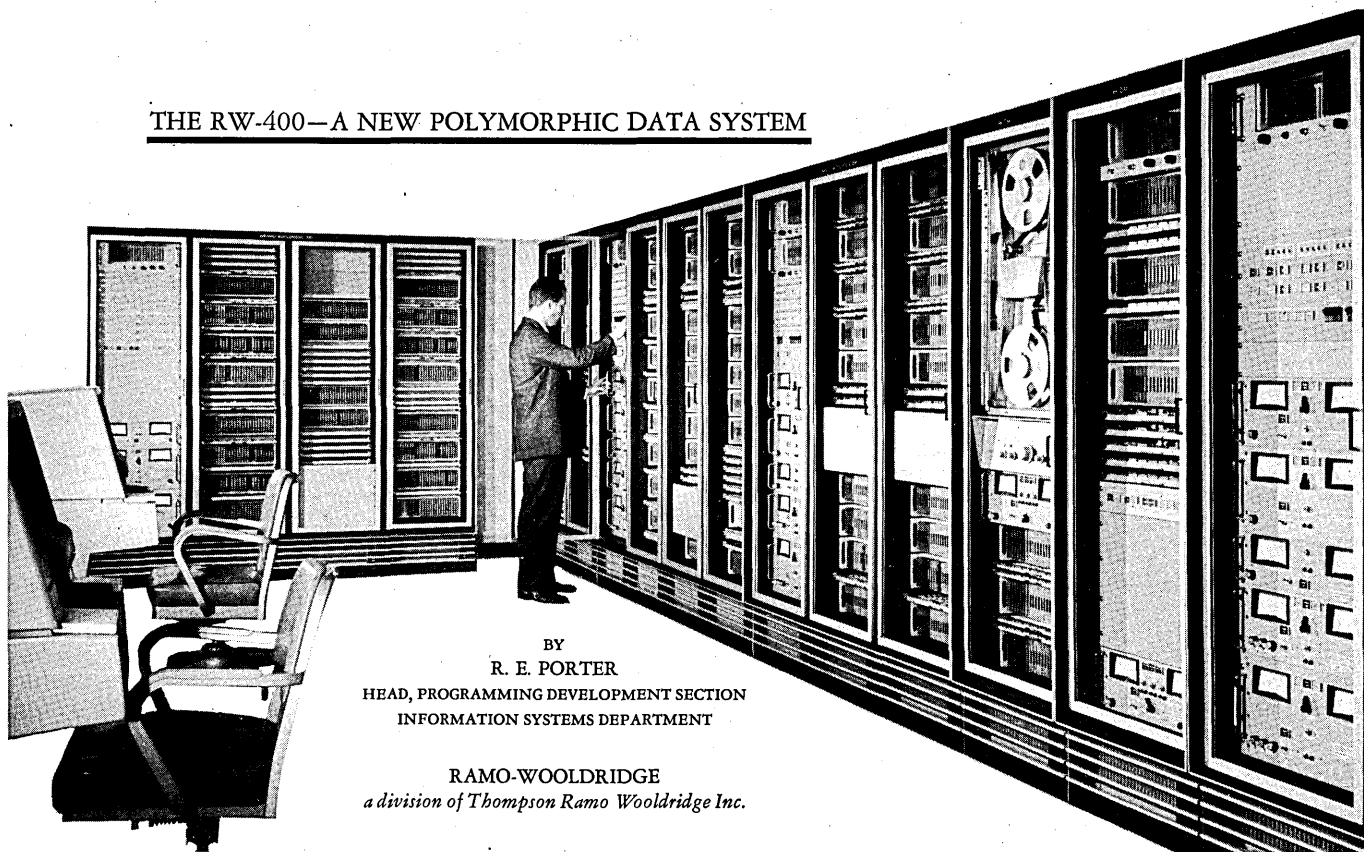
The sorting performance of the RCA 501 System is a fact of operating experience—not theory or conjecture. For full information write to—



RADIO CORPORATION of AMERICA
Electronic Data Processing Division

CAMDEN 2, NEW JERSEY

THE RW-400—A NEW POLYMORPHIC DATA SYSTEM



BY
R. E. PORTER
HEAD, PROGRAMMING DEVELOPMENT SECTION
INFORMATION SYSTEMS DEPARTMENT

RAMO-WOOLDRIDGE
a division of Thompson Ramo Wooldridge Inc.

The RW-400 Data System is a new design concept. It was developed to meet the increasing demand for information processing equipment with adaptability, real-time reliability and power to cope with continuously-changing information handling requirements. It is a polymorphic system including a variety of functionally-independent modules. These are interconnectable through a program-controlled electronic switching center. Many pairs of modules may be independently connected, disconnected, and reconnected, in microseconds if need be, to meet continuously-varying processing requirements. The system can assume whatever configuration is needed to handle problems of the moment. Hence it is best characterized by the term "polymorphic" — having many shapes.

Rapid, program-controlled switching of many pairs of functionally-independent modules permits nondisruptive system expandability, operating reliability, simultaneous multi-problem processing capability, and man-machine intercommunication feasibility. These are only partially found in computers of conventional design.

Computer users have been forced heretofore to match problems to computer limitations. Problem changes posed serious reorientation and reprogramming difficulties. Changes from one computer to another model, due to growth in applications, often resulted in large expenditures of time and money. During maintenance or malfunction of a conventional computer its entire processing capacity is shut down. Real time processing reliability cannot be maintained on an around-the-clock basis. The conventional machine must process its problems serially. This serious limitation is only partially alleviated by time-sharing or computing-element-doubling designs. The high cost-per-hour of conventional computer operation rules out direct man-machine intercommunication during other than emergency situations.

The radically-new polymorphic design concept of the RW-400 Data System was evolved by Ramo-Wooldridge engineers to provide a practical solution to those information processing problems now inadequately handled by conventional computer designs. The RW-400 is a powerful new tool in the field of intellectronics — the extension of man's intellect by electronics.

system description

The RW-400 Data System contains an optional number and variety of functionally-independent modules. These communicate via a central electronic switching exchange. Each module is designed, within practical economic and functional limits, to maximize system adaptability over a wide range of problem types and sizes. This new design embodies the latest proven electronic design techniques, assuring high processing speeds and high equipment reliability. The RW-400's modularity assures reliable, round-the-clock processing of information with controllable computing capacity degradation during module maintenance or malfunction. Practical man-machine intercommunication is achieved in the RW-400 system by use of program-controlled information display and interrogation consoles.

Figure 1 shows the over-all system design. Modules of various types communicate through a central exchange switching center. Computing and buffering modules provide control for the system. These modules are self-controlled and make possible completely independent processing of two or more problems. One of the computer modules may be designated the master computer and in this role initiates and monitors actions of the entire system. An alert-interrupt network is provided to allow coordinated system action. Therefore, the system as applied to given information processing problems may change on a short range

(microsecond) basis, thus providing, through programming, a self-organizing aspect to the system. In addition, the system may change through the years as the applications change. The most efficient and economical complement of equipment is applied to the problem at all times.

An RW-400 system is built around an expandable Central Exchange (CX) to which a number of primary modules may be attached. These are: Computer Modules (CM); self-instructed Buffer Modules (BM); Magnetic Tape Modules (TM); Magnetic Drum Modules (DM); Peripheral Buffer Modules (PB); and console communication Display Buffer Modules (DB). How many modules are put together in a system is entirely a function of system application. In addition to primary system modules, punched card, punched tape, high speed printing and control console devices are available. These handle nominal system input/output requirements. Additional man-machine communication devices such as interrogation, display and control consoles, may be included in the system as problem requirements dictate. A Tape Adapter (TA) module is available to provide compatibility with magnetic tape of other computers. Information generated at Flexowriter inquiry and recording stations may be directly received by the system via the Peripheral Buffer Module. This latter module also buffers the receipt of TWX and punched tape information.

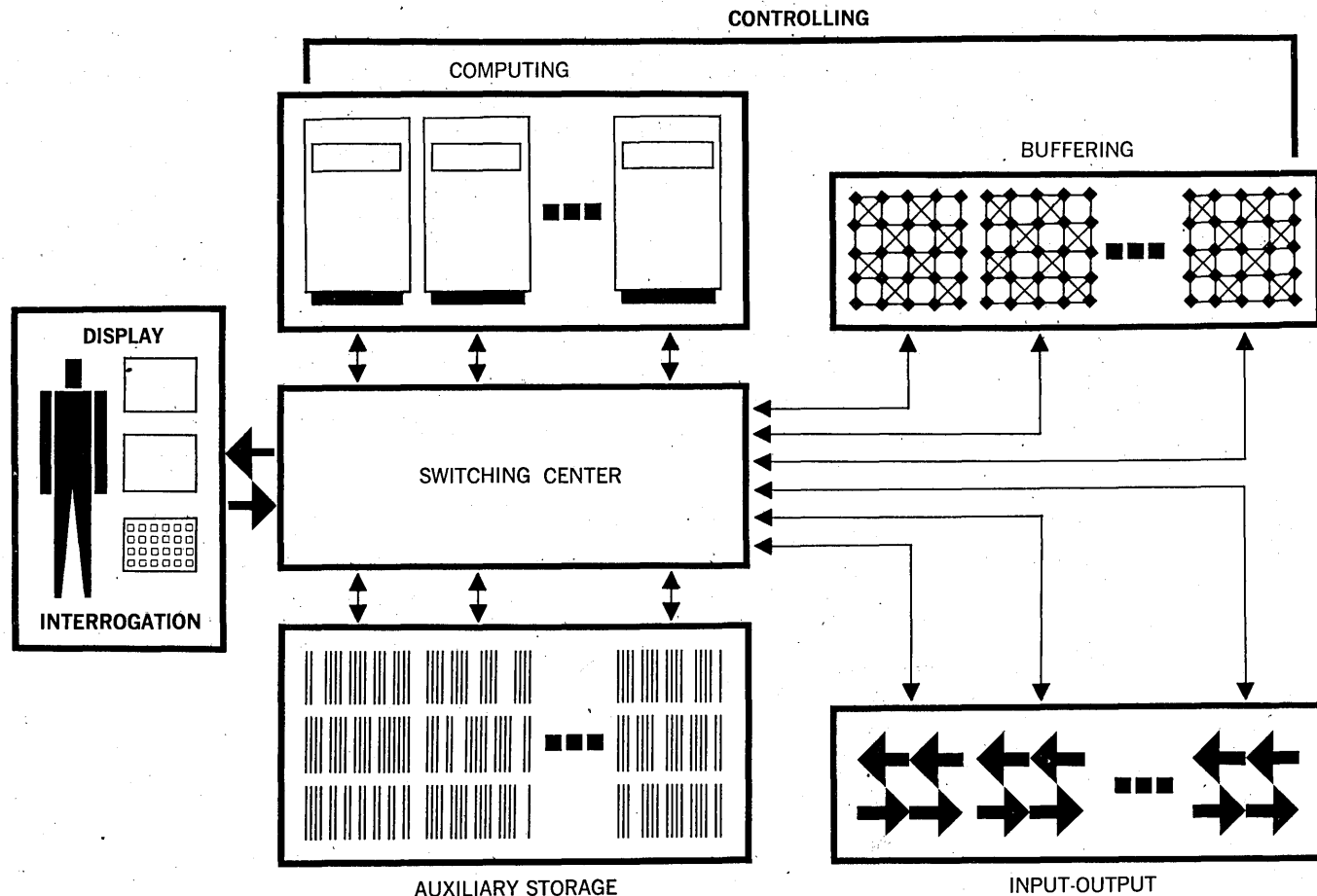
The way in which a particular RW-400 Data System functions depends on the number and type of each module included. It may initially be composed of the minimum number and variety of modules needed to do a small problem or the initial part of some large but yet-to-be-defined

problem. Such a system would work much like a conventional computer. It would probably include a buffer module and thus have a parallel data handling capability not found in the conventional design at a comparable price. The initial system installation may then be augmented by the timely addition of modules.

A buffer module (BM) has the capability to control its acquisition and dissemination of information independently. The buffer provides a computer module with parallel data handling capability without complicating the problem processing program with the conventional intermixture of arithmetic and housekeeping instructions. Information previously generated by the processing program may be appropriately disposed of within the system while processing continues. Data needed at a subsequent time in the processing may be retrieved from system storage in advance of need while processing progresses. The simultaneity of these operations not only materially increases over-all processing speed but also increases the practical utility of the less costly types of internal system storage such as a magnetic tape.

The computer (CM) or buffer (BM) modules, when acting in a controlling capacity, may initiate connection to an information storage or handling module during that part of the processing program when the two can work profitably in unison. The pair of modules thus interconnected neither affect nor are affected by other modules. Logical interlocks prevent unwanted cross talk among modules. An intermodule communication system lets controlling modules signal status or alert other such modules of their need to communicate. The decision by a module receiving an alert

Figure 1—The RW-400 Data System



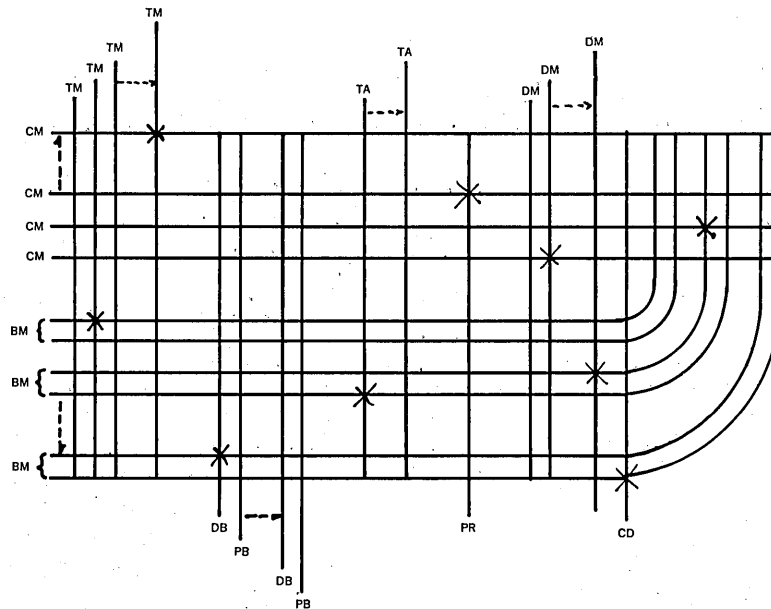


Figure 2—The Central Exchange Connection Matrix

signal to permit interruption or to proceed is optional with that module. The optional interrupt feature is that needed to make the often-discussed but seldom-used program interrupt capability both useful and practical. Programs may thus permit interruptions only at convenient points in the processing sequence.

Modules may be assigned, under program control, to work together on a problem in proportion to its needs. As soon as a module's function is complete for a given problem, that module may be released for reassignment to some other task. The system is thus self-controlled to match processing capacity to each problem for the time necessary to do the job. Full system capacity may be brought to bear upon a very large problem when needed. This capacity may be apportioned among a number of smaller problems for simultaneous processing, program compilation, program checkout, module maintenance etc., when it is not needed for maximum system effort.

From the preceding system description, it is apparent that such equipment can be expanded from a modest initial installation into a very powerful and comprehensive information processing center as requirements warrant. More specific descriptions of principal system modules follow to give the reader a better feel for how this system might perform his information processing work.

the functional modules

The key to appreciative understanding of the power of the RW-400 lies in knowledge of intermodule connection. It is appropriate to describe the Central Exchange (CX) unit first, then follow with descriptions of the various modules.

the central exchange

The Central Exchange performs the vital function of interconnecting a pair of modules whenever requested to do so by either a computer or a buffer module. Since internal programmed control is only possible within a computer or a buffer module, one of the interconnected pair of

modules must be either a computer or a buffer. The time in which any connection may be made or broken is about 65 microseconds. An exchange has basic capacity to connect any of 16 computer or buffer modules to any of 64 auxiliary function modules. There is nothing sacred about the number 16 since it is possible to extend the CX module's interconnection matrix through design modification when need arises. The CX is an expandable, program-controlled, electronic switching center capable of connecting or disconnecting any available pair of modules in roughly the time of one computer instruction execution. Figure 2 illustrates the permissible module interconnections within the Central Exchange.

Every intersection on the illustration represents a possible connection between modules. The "x-ed" intersections indicate typical connections in force at any point in time. The control logic of the CX module's connection table prevents more than one interconnection on any horizontal (controlling) or vertical (controlled) data path representation on the diagram. When connection is requested of the Central Exchange while one of the required modules is already carrying out a previous assignment, the requesting module can be programmed to sense this condition and wait until connection can be made without interference. Should waiting be undesirable, the requesting module can go on about its business and check back later to see when the desired connection can be made. There is an implication here, of course, that knowing the kind of a system he is dealing with, a programmer requests connections in advance of need whenever possible.

Provision for master-slave control is included via an Assignment Matrix established within the CX module by a computer module previously assigned to master status. Such a provision is necessary to preclude inadvertent connection requests from unchecked programs or malfunctioning control modules from affecting sets of modules simultaneously processing another problem. Connection requests are therefore essentially filtered through both an as-

segment and an interconnection validity matrix prior to being acted upon by the Central Exchange. The computer module manually assigned to master status is the only one permitted to cause the interconnection of a pair of modules which does not include itself.

the computer module (See Figure 3, page 12)

The Computer Module (CM) is a self-sufficient, general purpose, two-address, parallel word, fixed point, random access computer. Its internal magnetic core memory has a capacity of 1024 words. A computer word consists of 26 information bits and 2 parity bits. Each parity bit is associated with the 13-bit half word transferred in parallel via the Central Exchange to other system modules. The instruction repertoire of the CM consists of 38 primary instructions whose various modes effectively result in over 300 different operations. Of the 39 available CM-400 instructions, 24 may be classified as "arithmetic" and 10 as "program control" or "sequence determining" instructions. Five additional instructions may be classified as "external" or "input/output" instructions. All but three of the 24 arithmetic instructions fit into a symmetric scheme of classification wherein there are seven basic operations, each having three distinct modes. The seven basic operations are - add, subtract, absolute subtract, multiply, divide, square root and insert. The three modes are - Replace, Hold and Store. If we let the capital letter "G" identify the first operand, "H" identify the second operand, an "a" signify an arbitrary operation, the symbol " \longrightarrow " indicate replace, and "A" the word in the accumulator, then the three modes may be characterized as:

Replace:	H * G \longrightarrow H, A
Hold:	H * G \longrightarrow A
Store:	A * G \longrightarrow H, A

The three remaining arithmetic operations are Add Accumulate wherein the contents of H and G are added to the Accumulator; Multiply Accumulate wherein the contents of H are multiplied by G and added to A; and Transmit where the contents of G are stored in H.

The ten program control instructions are Store, Store Double Length Accumulator, Load Accumulator, Insert Mask in the S Register, Stop, Link Jump, Compare Jump, Tally Jump, Test Jump and a Multi-purpose Shift.

The five external instructions are those which cause data to be transmitted to or received from a device external to the computer. Each command is multi-purpose in nature and hence equivalent to several conventional external instructions. The commands are - Command Output, Data Input, Conditional Data Input, Data Output and Character Transfer. A comprehensive discussion of the variation of each of these commands is not pertinent to this article. Suffice it to say that commands are available for carrying out a wide variety of intermodule data communication.

The interrupt capability of a Computer Module is a logical generalization of the "trapping" feature found on several conventional computers. It permits the automatic interruption of a program, at the option of the program, when the computer module receives an "alert" that a condition requiring attention has arisen. It can be used to warn the program when an error of some type has occurred, minimize unproductive computer waiting time while another module completes its task, eliminate many programmed status test instructions and provide a con-



RW-400 Analysis Console

venient means of subjecting one computer module to the control of another. Program control of interruptions within a CM-400 is accomplished through the sense register S. This register may be filled with an interrupt mask by means of the Insert S instruction. A bit by bit correspondence exists between the S register and the interrupt register and the interrupt register I to which the alert lines are connected. A Test Jump instruction can be used to examine the coincidence between these registers of an alert signal in a bit position corresponding to a one in the S register mask. If an alert is received by the computer during the execution of an instruction, control will be transferred to memory location "O" at the end of the instruction if, and only if, (a) the sense bit corresponding to the alert is a "one," (b) the master sense bit is a "one," and (c) the instruction was not an "Insert S." The master sense bit in the S register may be programmed to permit the interrupt to take place according to the interrupt mask or to inhibit interrupt until the program can conveniently cope with it. All instructions being executed at the time an interrupt condition occurs are completed before the interruption is allowed to take place.

Figure 3 schematically illustrates the Computer Module's primary registers and the interconnecting information paths.

Typical two-address addition and subtraction times are approximately 35 microseconds including memory access time. Multiplication takes about 80 microseconds, and division and square root about 130 and 170 microseconds respectively.

Before attempting to draw a comparison between a CM and a deluxe conventional computer the reader should bear in mind the trade offs in features versus cost; parallel processing versus sequential processing; independent information handling versus program complicating "house-keeping"; and real time system reliability versus periodic inoperability. The only valid comparison is that between the RW-400 Data System and a conventional computer applied to the same task. The contribution to the RW-400 system made by the Buffer Modules can be better assessed by the reader after the following description has been considered.

THE RW-400

the buffer module

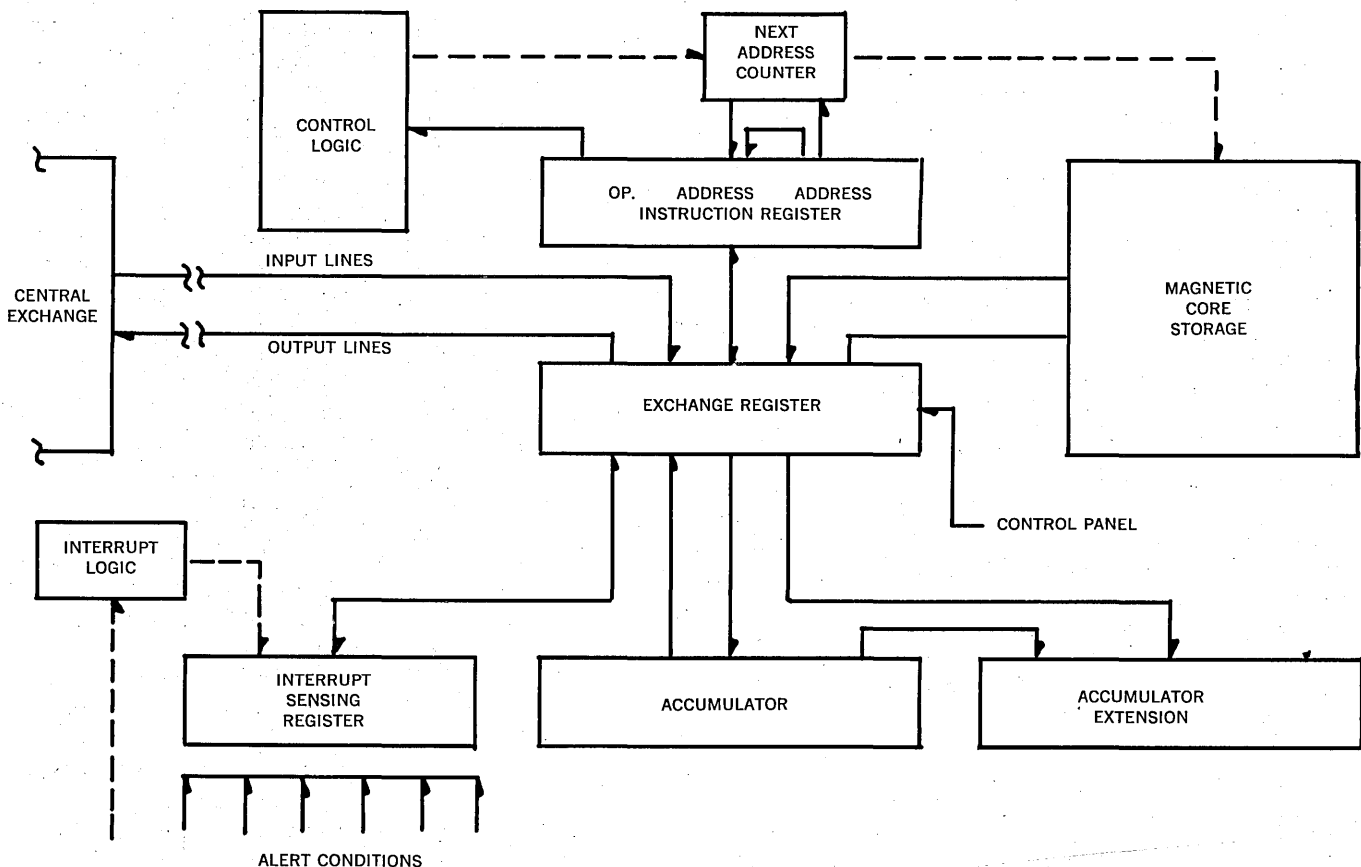
A Buffer Module consists of two independent logical buffer units, each having 1024 words of random access magnetic core storage and a number of internal registers used in performing its functions when in the self-controlling mode. A Buffer Module may be connected to a Computer Module so that the Buffer's core storage is accessible to the computer as an extension of the computer's own storage. A Buffer may also serve as an intermediary device between a computer and another module, such as a tape or drum, to minimize time conventionally lost in data transfers. The Buffer is capable of recognizing and executing certain instructions stored in its own memory. It can therefore be left to perform data handling functions on its own while computer modules are otherwise occupied.

A Buffer Module may be connected to a Computer Module and the buffer 1024 word storage used as an indirectly addressed extension of the computer's own working storage. When the address 1023 (all ones) appears in the operand field of a computer instruction to be executed, the computer is signalled that the operand refers to some cell in buffer storage. The computer then uses the number in the buffer read register R (or in the case of a few instructions, the buffer write register W) as the effective address designated by the operand field of the instruction. Extended addressing may be used in either the first or second operand field of the instruction or in both operand

fields. If extended addressing is used in only one operand field, the effective address designated by that field is the number in register R. A "1" is automatically added to the contents of the R register after the instruction is executed. If extended addressing is used in both operand fields of an instruction, the effective address of the first operand is the number in register R and the effective address of the second operand is one more than the number in register R. A "2" is automatically added to the contents of register R after the execution of this type of instruction. The R (or W) register may be preset to any desired initial condition by means of the computer's Command Output instruction. All the commands being executed by the computer must be stored within the computer module's storage and may not be in buffer cells addressed by the computer at execution time. The extended addressing and buffer register indexing may be used to materially simplify repetitive data acquisition operations.

The primary function of a Buffer Module is not, however, that of an auxiliary computer storage unit. The drum and tape modules more aptly serve this function in the RW-400 system. A Buffer Module is capable of operating autonomously and of controlling other modules such as Tape Modules, Drum Modules, Peripheral Buffers, Display Buffers, Printers or Plotters. This capability enables the Buffer Modules in a system to perform routine tape searching and data transferral tasks thereby freeing the Computer Modules to do more computing. In its "self-instruction" mode, the buffer executes its own internally stored program in much the same fashion as a computer. The memory of a Buffer Module will therefore be occupied by its own control programs as well as blocks of data which it is holding for transmission to other units.

Figure 3—The CM-400 Computer Module



The buffer is used to acquire information from the relatively slower auxiliary storage and communication modules while the computer proceeds at high speed. Blocks of information retrieved in advance of computer need by the buffer may then be rapidly transferred to the computer's own storage or operated upon as they stand in the buffer via the indirect addressing capability of the computer. Another feature of the buffer is its switching capability. Each Buffer Module is composed of two buffer units tied together. A unit function switching feature permits the employment of the two units together in an alternating mode of operation. Continuous information transfer from tape to computer, for example, may be accomplished without stopping the tape unit. A switching instruction executed simultaneously by both units of a buffer module causes whatever devices were connected to the first unit to be connected to the second and vice versa.

Now that the functional controlling modules and the module interconnection concept have been discussed, the more conventional auxiliary storage modules available with the system may be described to round out the processing capability of the system.

the tape modules

A Tape Module consists of an altered Ampex FR-300 tape transport plus the necessary power supplies and control circuitry to effect information reading, writing and control. One inch mylar tape is used. Information is written on 16 channels—two of which are clock channels. The remaining 14 channels consist of 13 information bits plus parity. The information reading or recording rate is 15,000 computer words per second. Data may be recorded on tape in variable blocks up to a maximum of 1024 words per block (the size of the storage available to hold the data in a sending or receiving module). Each block is preceded by a block identification which permits selective tape information searching by a Buffer Module. Single blocks imbedded in a tape file of other blocks can be overwritten. A two-stack head permits automatic verification of each block as it is written. Readback parity errors are automatically detected during the writing process. Thus dropout areas may be determined while the data is still available in a computer or buffer for recording elsewhere.

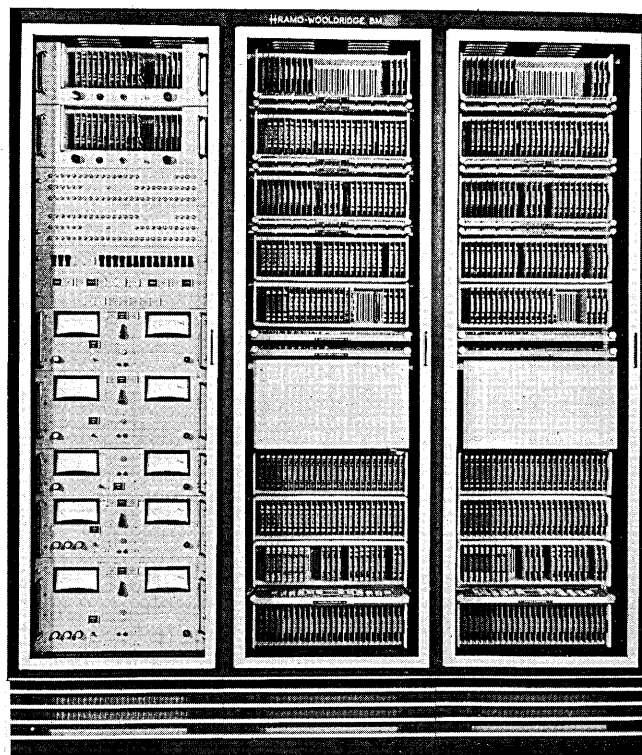
A description of the RW-400's tape handling capability would not be complete without mentioning the Tape Adapter (TA) module. This is a self-contained unit capable of performing the reading and writing of magnetic tapes in a format acceptable to the IBM 704 and 709 systems. The TA consists of an Ampex FR-300 half-inch digital tape transport, including dual gap head and servo control system; reading, writing and control circuits; and a module housing with its own blower and power supply.

the drum module

The Drum Module (DM) contains a magnetic drum with storage capacity of 8192 words. It may be connected to either a Computer or a Buffer Module through the Central Exchange. Average access time to the first word position on the drum is 8½ milliseconds. Successive words are transmitted at the rate of 60,000 computer words per second. The Drum Module is conventionally used as an intermediate item storage device to minimize tape handling time.

special system communication modules

The external data and man-machine communication of



RW-400 Buffer Module

the RW-400 Data System are handled via drum buffer modules. A wide variety of asynchronously operated equipment is speed matched and program controlled through the features designed into these special system communication modules.

The Peripheral Buffer (PB) provides input/output buffers for communication between Computer or Buffer Modules and relatively slow speed external devices such as Flexowriters, Plotters, Punched Tape Handlers, Teletype Lines and Keyboard Operated Equipment. The Peripheral Buffer stores its information in four pairs of bands which operate alternately as circulating registers. Each band contains eight input and eight output buffers for a total of 32 input buffers and 32 output buffers in each Peripheral Buffer Module. Each buffer is a drum band sector 64 computer words long. Conventionally one input and one output buffer sector are connected to each external device (such as a Flexowriter) to permit two-way communication between the external device and the RW-400 system.

the display buffer

A Display Buffer (DB) acts as a recirculating storage for the cathode ray tube display units in a Display Console. Information to be displayed is sent to the DB band associated with a particular display tube via the Central Exchange. The Display Buffer sends only status information back to other system modules upon request. The information displayed on any tube is controlled by the bit pattern sent to the Display Buffer. The display pattern is regenerated 30 times per second to minimize image fading and flicker. The preceding explanation of the Display Buffer has little meaning to a reader unfamiliar with the features of the Display Console itself. This console is therefore described in more detail in the following paragraphs.

display consoles

Display Consoles can give a problem "analyst" or "monitor" a visual picture of the status or results of any

THE RW-400

information being handled by the RW-400 system. In addition to the actual Cathode Ray Tube, numerical indicator, signal lamp and typewriter information outputs, several types of keyboard activated system control and parameter entry facilities are provided on the console. The total man-machine communication facility represented by each console is designed to be primarily a function of the computer control programs initiated by the analyst via his console.

A set of Display Control Keys generate messages which are recorded on a Peripheral Buffer sector for later interpretation and display generation by a computer program. A set of Process Step Keys are provided the analyst so that he can initiate preprogrammed system processing variations. Associated with the Process Step Keys is an overlay or "program card" which permits the assignment of a variety of meanings to the set of Process Step Keys. Insertion of the overlay by the analyst gives him a unique label for each Process Step Key and automatically cues the controlling computer to assign the corresponding set of programs to each key message. A Data Entry Keyboard is provided on the console so that the analyst can enter control parameters when asked to do so via the display devices.

A Joystick Lever affords the console operator a means of controlling the position of cross hair markers on the cathode ray display tubes. Associated with the joystick are control keys which may be used to send a message to the controlling computer specifying the coordinates of the cross hairs. Control programs may be written, for example, to act upon this information to reorient the display with respect to the area selected by the cross hair position.

A Light Gun is also provided as a means of selecting any point on the cathode ray tube displays. The gun emits a small beam of light. With the beam centered on a given point on the cathode ray display tube, pressing the trigger results in the automatic generation of a message to the Peripheral Buffer specifying the address in the Display Buffer containing the coordinates of the selected point.

A set of Status and Error lights are contained on the Display Console to provide the console operator with over-all knowledge of the system and thus minimize conflicting control requests and intermodule interference. For example, a Peripheral Buffer may not be ready to accept a console key message until after certain previously requested control actions have been completed. The Status Lights indicate this condition to the console operator so that he may act accordingly.

the printer module

The Printer Module (PR) is basically a 160 column, 900 line per minute Anelex type printer. It receives information from either a Computer or a Buffer module via the Central Exchange. Individual characters to be printed are represented by a 6-bit code and are transmitted four to a computer word. Zero suppression, line completion and information block end codes are included for format control. A plugboard is provided for flexibility in columnar data arrangement. Paper feed is controlled by means of a

loop of 7-channel punched paper tape. Control of the printing operation has been arranged so that the connected control module may send line headings from one set of memory locations, stop sending information while going to a different part of the memory, and then proceed to send data from this new set of memory locations to complete a line of print.

the punched card modules

The RW-400 Data System may be equipped with a high speed punched card reading module (CR) and an IBM card punch. The CR communicates with Computer or Buffer modules via the Central Exchange. It is capable of reading 80 column punched cards at the rate of 2500 cards per minute. The card punch is connected to the system through the Peripheral Buffer Module (PB) since it is a relatively low speed device. Emphasis has not been placed on directly connected punched card equipment since the sources of large volumes of punched cards usually convert this data into magnetic tape form which may be more rapidly handled using the Tape Adapter Module (TA).

summary

The RW-400 Data System, based upon modularly constructed, independently operating and flexibly connected components, is the logically evolved successor to conventional computer designs. It provides the means by which information processing requirements can be met with equipment capable of producing timely results at a cost commensurate with problem economic value. System obsolescence is minimized by the expandability in numbers and types of processing modules. Real time reliability is assured by component duplication at minimum cost and by the advanced design techniques employed in the system's manufacture. Man-machine communication facilities are program controlled for maximum flexibility. Parallel processing and parallel information handling modules increase the system's speed and adaptability when handling complex computing workloads. This polymorphic design truly represents an extension of man's intellect through electronics.



Randall Porter supervises the Programming Development Section of the Information Systems Department within Ramo-Wooldridge. This section develops advanced computer programming techniques in support of RW-400 computing systems. Porter was formerly Applied Mathematics Staff

Engineer for the Boeing Airplane Company in Seattle, Washington. He managed the computer processing work of the Telecomputing Corporation during its formative years. He was employed by the Lockheed Aircraft Corporation during the war years and participated in the structural engineering design and analysis of the Constellation and Constitution airplanes. He is an honor graduate and former instructor at the Curtiss-Wright Technical Institute of Aeronautics. His mechanized computation experience spans the period from 1942 to the present.

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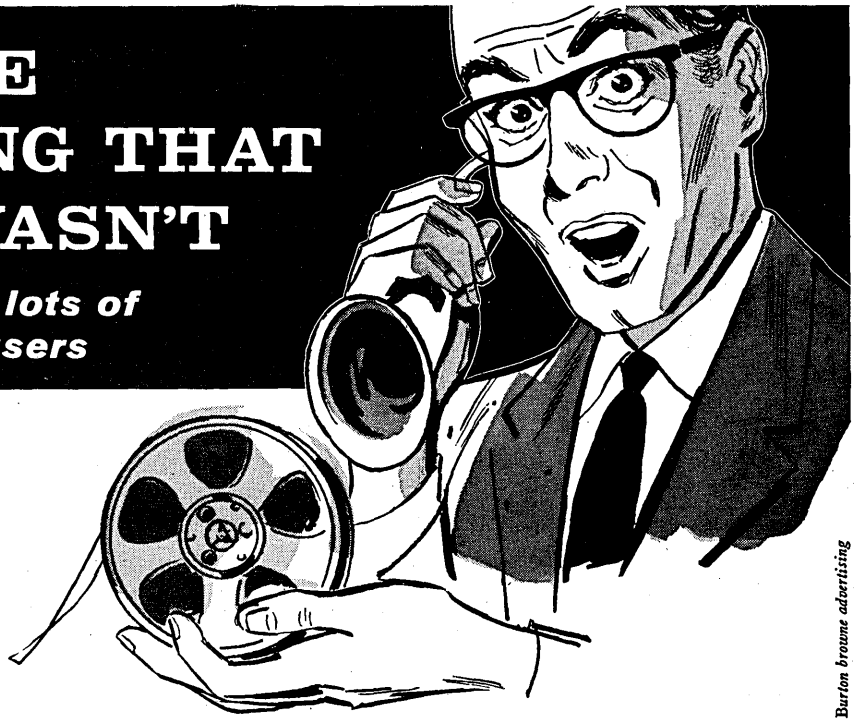
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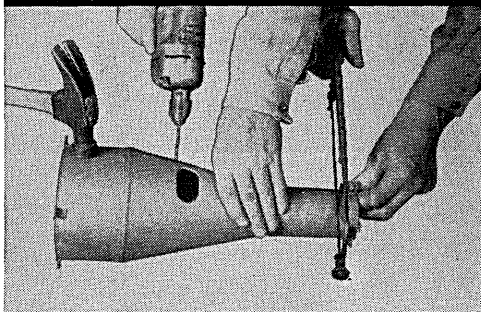
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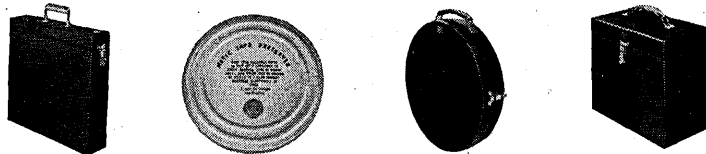
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MC BEE HAS ANOTHER SMALL MACHINE

rpc-4000 joins company's lgp-30

An article comparing desk-size computers ("Speaking of Small Computers," DATAMATION, November/December, 1959) was barely in the hands of our readers when it became slightly outdated. This was brought about by the announcement of two new small machines (see below and page 48) and the knowledge that perhaps one more is being made ready for marketing quite soon.

Royal McBee's LGP-30 was one of the entrants in the above-mentioned survey and but for that firm's ability to keep the machine described below a secret and a matter of a few days in terms of an official machine announcement, McB would have had two computers in the lineup.

Royal McBee's RPC-4000 is by any standards an impressive small machine. While DATAMATION does not intend to expose it to a comparison at this time (we will wait a few months in hopes that we will be able to place eight machines in review) a summation of its outstanding features is offered first.

The first thing one notes when reviewing the 4000's specs is that its drum memory has an 8,008-word capacity, approximately twice that offered by any competitor. A lock-in feature (see text below) must be called novel, new and unique.

The 4000 has good speed, probably not the fastest of the desk-size machines, but still good. It will boast 42 commands. Optional high-speed input-output units will be available and seventeen I/O devices can be used on-line.

The machine has one index register, a repeat command, an eight-word accumulator and a ten-amp drain (can be plugged into any standard outlet). The 4000 is transistorized and will be available in July of this year. Monthly

is idle, the drum rests away from the heads. Air pressure automatically raises the drum to correct operating position when power is turned on. Physical size has been kept down by the use of miniaturized heads. The memory has a storage capacity of 8,008 words (word length is 32 usable bits, accommodating a nine-decimal digit number).

A variety of programs can be stored permanently for access when needed. Average access time to the main storage is 8.5 milliseconds. Memory may be searched for full or partial words (through a masking feature) at a rate of nearly 200,000 words per minute. Three thousand words of memory can be scanned in less than one second for full or partial equality to a key word or full or partial equality or superiority to a key word. Part of memory (136 words) is available through the high-speed line or dual access tracks in from 1 to 6 milliseconds.

The main memory is non-volatile. Switches allow information to be locked in the main memory in increments of 1024 words — so that it cannot be altered by program or operator error. The arithmetic and control section of memory includes three one-word registers, and one "one-or-eight" word register. When used in conjunction with the repeat execution feature, the "one-or-eight" word register provides for block arithmetic and block transfers without special commands. Up to seventeen input-output devices (60 minor modifications) may be connected to the 4000 on-line.

Standard input-output equipment for the machine is a tape typewriter system complete with typewriter, desk, tape punch-read console and chair, all specially designed as a unit. Basic reader speed is 60 characters per second, basic punch speed is 30 characters per second. A reversible photo-electric reader (\$15,300 or \$300 per month (which reads punched paper tape at 500 characters per second, and a high-speed punch (\$20,400 or \$400 per month) which operates at 300 characters per second, are available as optional accessories for system expansion. All of the paper tape equipment includes full tape handling reel facilities.

Peripheral equipment to be made available in 1961 includes a magnetic tape drum and a line printer. The tape drum will have a maximum storage capacity of about 200,000 computer words per replaceable tape cartridge. Lower capacity tapes — with resultant faster access times — may be used if desired. Peripheral input-output equipment may be turned on and off automatically by the computer, however, a comprehensive manual control system permits full operator control. Six branch point switches are provided. Other switches permit manual selection of peripheral equipment and a variety of input modes. Standard equipment provides compatibility with existing paper tape systems. A Universal Translator, to be available later, will further extend compatibility.

Circle 101 on Reader Service Card.



rental will be \$1,750; total sales price — \$87,500.

Some details: R McB states that the magnetic drum memory unit is encased in a metal shroud to protect it from dust particles or accidental damage. The drum is tapered and floats on a cushion of air. When the machine

U N C O L

universal computer oriented language revisited

by **T. B. Steel**

System Development Corporation

In the early days of digital data processing by electronics the major problems facing the computing fraternity were concomitants of the hardware; equipment design, fabrication and maintenance. It was then a great deal more difficult to insure that a machine was behaving than to determine if it had been properly programmed. At the present time, however, this coin is reversed. Construction and upkeep of computing machinery has become well understood, if not routine, and users may act with confidence that random, unanticipated errors due to machine malfunction are few and far apart. On the contrary, the problem of program design, now in the beginning stages of being transformed from an art to a science, is currently fraught with perils unimagined in the beginning.

The power of the modern complex of digital computing devices is fast outrunning the capacity of available programming talent to tame it. This is due in part to the rapid increase in sheer number of machines with an associated growth in their variety and complexity, and in part to the widening horizon of application. An additional complication is the fact that machine development is usually discontinuous so that a new machine is incompatible with older equipment. This leads to an attendant discomfort in the requirement for re-programming old problems.

In time, perhaps, the law that people reproduce faster than machines will take effect between programmers and computers but, for the moment, this inequality is inverted. Locating potentially capable programmers, interesting them in programming as a profession and providing them with the requisite training and experience is a slow process. With large computers making their appearance at an increasing rate — nearly one per day at the present time — it is clear that developing improved methods of feeding these monsters is imperative.

A glance at the rationale for the machines themselves suggests a possible direction of search for a solution. Large data processing systems have been built primarily to automate computational and other clerical operations in anticipation of a reduction in the time, cost and manpower of performing these activities. Success in this effort has gone far beyond the initial hopes. The message here is obvious — automate programming.

Even the briefest acquaintance with programming will show that this is not an entirely futile aim. Loosely speaking, the problem of programming may be divided into three stages: (1) formulation of the problem at hand in rigorous terms; (2) translation of this formulation into a code suitable for the machine; (3) determination that the formulation and translation have been correctly made.

Obviously the formulation stage cannot be automated, although it may be possible in time to dispense with some of the rigor. The machine must be told what problem it is to solve. A great deal can be done, however, to ease

the burden of formulation by designing languages for the statement of problems that are natural for human beings. Conventional mathematical notation is an extreme example of this. All efforts in this direction must recognize the general principle that the more suitable a language is for people, the more difficult the translation process becomes.

This last remark holds the key to the entire problem of automating programming for it is theoretically possible to automate the whole translation process. However, the easier we make the formulation job, the harder we make the job of programming the automatic translation. But even if this task is extremely difficult — and it is — there is a big payoff, for the job need only be done once for each formulation language and for each machine. This is in contrast to the necessity for a separate translation for each problem in the absence of automatic techniques.

The automatic programming procedures envisioned here are not imaginary. Such programs, called "compilers," actually exist and enjoy widespread use. Indeed, the names of some of them; e.g., FORTRAN, FLOWMATIC, IT, are bywords in the data processing business. Considerable experience with their use has unequivocally demonstrated that the net gain from these techniques is positive. They save more time, money and people than they cost.

As usual, however, there is a catch. The design and implementation of a good compiler is costly. The ones in existence today have taken on the order of fifteen to twenty-five man years of experienced programming talent, spread over about three calendar years. It is, of course, the last condition that causes the trouble. The benefits obtained are well worth twenty-five man years in the long run, presuming there is a long run. Not infrequently a machine is obsolete soon after a compiler designed for it has come into use. In this event there may well be insufficient time for the investment in compiler construction to be amortized.

An obvious way out of this dilemma is to maintain a given machine for a longer period of time. Experience indicates, however, that there are few machine users who do not feel compelled to obtain new and different machines every three to five years. This change is normally prompted by technical obsolescence rather than by decaying ability of the machine. Despite the high cost of establishing a new machine, this course of action is generally an expression of sound economics. The curve of growth of computer work load invariably has a long term trend that is sharply positive. Periodic increases in total computing power are imperative. Additionally, the development of hardware for data processing results in a significant decrease in the **cost per unit of computing** with each new machine generation. It follows that maintaining a static computing facility is unsound practice in the present situation.

In this dynamic environment that, for good or ill, appears to be a fact of life, a concomitant of advance in

machine design is increased complexity in the structure of its language, making programming in machine-like language progressively more costly in both dollars and elapsed time. As noted above, the development of compilers alleviates this problem somewhat, but just as added complexity in machine language makes programming of specific problems more difficult, so too is the difficulty of compiler construction compounded. This last is aided somewhat by the growing spread of knowledge of how to write compilers, but not enough. The vicious circle remains. The time required to code a compiler is of the same order of magnitude as the machine replacement cycle, resulting in the ever present danger of having a good compiler available for the old machine just after it has been replaced.

The above remarks have implicit in them a division of the programming problem into two levels: (1) the problem language level; (2) the machine language level, with a special type of program, a compiler, to join the two. Were this the best of all possible worlds, a single, universally accepted problem language would be available (or at least possible) and the problem would reduce to that of designing a suitable compiler for the problem language as each new machine appears. This would be a great deal simpler than having to design compilers for a variety of problem languages for a variety of machines.

The historical and predictable situation, however, clearly demonstrates the inability of the human beings engaged in data processing to agree on a problem language. Even where the problem area considered is considerably restricted, such as to those problems describable in terms of algebra, full agreement is not to be had. A singular attempt in this direction has recently been made by a group of American and European computer specialists. The result has been the development of a language, the International Algebraic Language, now known as ALGOL, which is decidedly superior to any similar language now in existence. These results have been widely publicized, indeed propagandized, and have gained a large measure of acceptance. Despite this, at least one large machine manufacturer has felt a pressing need to develop another, very similar language, which it proposes to implement for its particular family of machines. Whether this is a good thing remains to be seen, but it is a clear signal that universality in problem languages is not in the offing.

It has been lucidly argued in some quarters that such universality is not even desirable. Universality implies agreement and agreement implies compromise. The result is liable to be a system that is adequate for most but satisfactory for none. This view envisions specially tailored programmer languages for aerodynamicists, petroleum en-

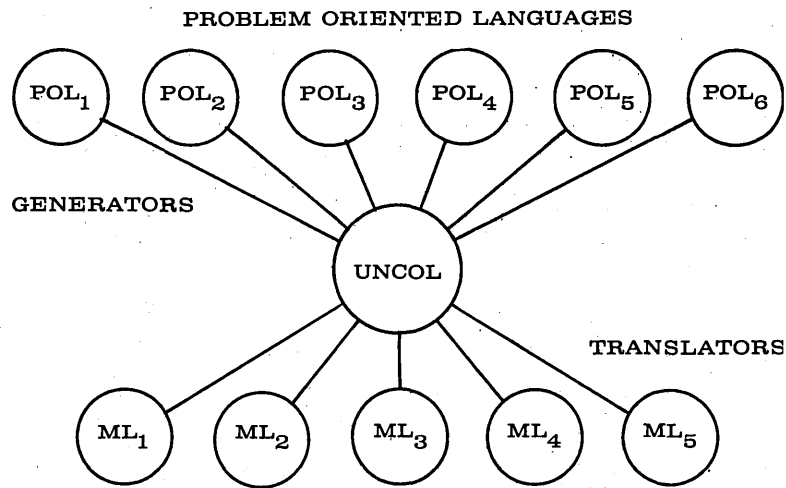


FIGURE II

gineers, nuclear physicists, medical diagnosticians, librarians, clothing manufacturers, etc. The success of this approach is contingent on the development of compiling techniques superior to those currently in use.

The point of all the above remarks has been to state the problem. We may call the traditional method of solution the "two level concept." In its bare essentials it implies the following: if there are M problem languages and N machine languages then there must be M times N programs — compilers — written by people. Thus, for each new problem language N programs are required, one for each machine. For each new machine M programs are required, one for each problem language. This situation is illustrated in Figure I.

The concept of UNCOL — Universal Computer Oriented Language — has grown out of a possible second approach to this problem. We may best refer to this alternate solution as the "three level concept." The basic idea involved is the interposition of a third kind of language between the level of problem oriented languages, POLs, and the level of machine languages, MLs. This third level is assumed to consist of a single language, UNCOL, which has the character of a generalized machine-like language.

The operating procedure is now the following: Each problem language is transformable into UNCOL and UNCOL is transformable into each machine language. Given a problem described in a POL, processing through a program, called a "generator," specific to the given POL, results in a transformation of the problem statement from its POL form to an UNCOL form, which is **independent of the machine which will actually solve the problem.** Now, selecting a specific machine, **independent of the original POL,** processing the problem in its UNCOL form through a program, called a "translator," specific to the given ML, results in a transformation of the problem from its UNCOL form to a ML form. The situation here is shown graphically in Figure II.

The following conclusions may be derived from the remarks above. First, as each new machine is produced, all that will be necessary in the way of preparatory programming is the construction of a single translator to convert UNCOL to the new machine language. One would anticipate that the machine's manufacturer would probably write several successive versions of this translator in an attempt to exploit to the fullest the outstanding features of the machine. While one cannot expect the machine manufacturer to provide compilers for each problem language, the chance of getting a single program, the trans-

PROBLEM ORIENTED LANGUAGES

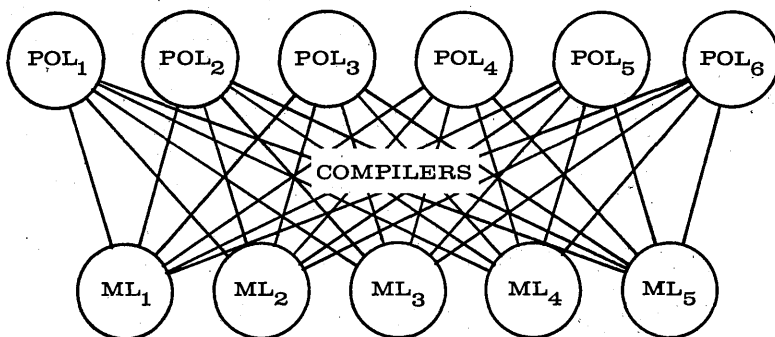


FIGURE I

lator, is good. This significantly aids the lapsed time problem as the manufacturer is aware of the essential details of his machines well in advance of anyone else. He can start programming sooner and, perhaps, finish on time.

Secondly, as each problem oriented language is invented, all that is required to make the language generally available is a single generator to convert the problem language to UNCOL. Thereafter, the POL will never become obsolete. Programs stated in it can be run on any machine at any time in the future. A corollary of this situation is the probable increase in the number and kind of problem oriented languages. Additionally, the liberation of the problem language from reference to a specific machine will make the task of their formulation easier and improve the product. Most of the glaring failures of current POLs revolve around residual elements of machine orientation.

Finally, and to some the most significant, the UNCOL system will enable any computing installations to use its current programs on any machine without additional delay — decidedly not a feature of the present environment. This feature alone is adequate justification for UNCOL.

This entire concept is neither particularly new nor original. It has been considered in a variety of forms by many independent people at least as long ago as 1954. Indeed, it might not be difficult to advance a claim that "this was well-known to Babbage." Accordingly, no attempt will be made to credit the originator.

While it is clear from the above considerations that the UNCOL concept has theoretical advantages unequalled by the traditional approaches, there remain three questions of considerable practical importance. First, is there a reasonable hope of implementing UNCOL in the near future? Second, granting a positive answer to the first question, how much will this effort cost in manpower and money? Finally, is this really the best answer?

Although an absolute answer cannot be given to the first question, a considerable segment of the computing fraternity is convinced that UNCOL is practical. All public objection to the feasibility of UNCOL has been based on the postulate, "it's impossible!" The inability of critics to give substance to their objections suggests that it is a mat-

ter of faith rather than logic. In fact, much of the criticism has come from quarters that have a vested interest in other approaches.

There is now underway one serious investigation of the idea, undertaken by a group intimately concerned with the problem of changing machines and languages — the SHARE UNCOL Committee. An initial report of this group, expanding on the concepts described here, may be found by the interested reader in the *Communications of the ACM*, Volume I, numbers 8 and 9, August-September 1958. The results of this investigation so far have suggested a general means of attacking the problem and a proposal for evaluating the results. It is felt that a useful first iteration can be accomplished in about two years by a half-dozen or so qualified programmers.

Very early in this committee's deliberations it became apparent that certain limits had to be placed on a first effort in order to provide a reasonable hope for success. The evolution of computer design is still in the wild horse stage, continually bucking, now this way and now that. In any attempt to tame this beast it seems desirable to restrict explicit consideration of machine characteristics to those that might reasonably be expected to occur in equipment available for general use prior to 1970. All efforts to outguess the designer beyond a decade are most probably futile at this point in time.

To further reduce the problem to manageable proportions, only a certain priority class of machines will be critically considered. While no precise definition of this class need be given, it can be roughly characterized as comprising those computers that are commercially available, general purpose in design and possessed of a capacity at least equivalent to that of an IBM 701.

It is possible, indeed probable, that many machines outside the priority class will prove amenable to inclusion in the UNCOL scheme of things. The point is that no peculiar feature of any such machine will be allowed to introduce a compromise that restricts the efficacy of the system for priority class machines.

In answer to the final questions posed above it need only be said that, to date, no concrete proposal even touching the general problem has been made, other than UNCOL and some notions that turn out to be UNCOL in a disguised form. It has been suggested that effort on UNCOL is a waste of time in that UNCOL is a stopgap measure. The proponents of this position claim that the real problem lies elsewhere. If substantial gains have been made by automating the programming of problems, can not further gains be had by automating the automation — in other words, by constructing a compiler of compilers?

This idea is quite simple in principle. A single program is written, exactly once, which takes as input descriptions of a problem oriented language and a machine language and then proceeds to produce as output a compiler that translates the given problem language statements into the given machine language. The trouble with this approach is that nobody has even the vaguest idea about how to do it despite occasional statements to the contrary. It is hoped that UNCOL will provide an opening wedge in this ultimate problem.

In summary, UNCOL may be described as a practical programming technique for removing the bottleneck now surrounding the continuing problem of changing problem languages and machines. ●



Since 1956, T. B. Steel, Jr., has been a research programmer at the System Development Corporation, Santa Monica, California, where he initiated research into the Universal Computer-Oriented Language (UNCOL). At SDC he has also served as the corporation's representative to SHARE and participated in the design and development of the 709 Operating System (SOS). Steel was a mathematician with The RAND Corporation in its System Development Division for a year, until it became the separate corporation in 1957. Prior to that time, from 1952 to 1955, he served in the U. S. Navy with the National Security Agency, Washington, D. C., as programming supervisor directing the programming and operations of the 701 installation.



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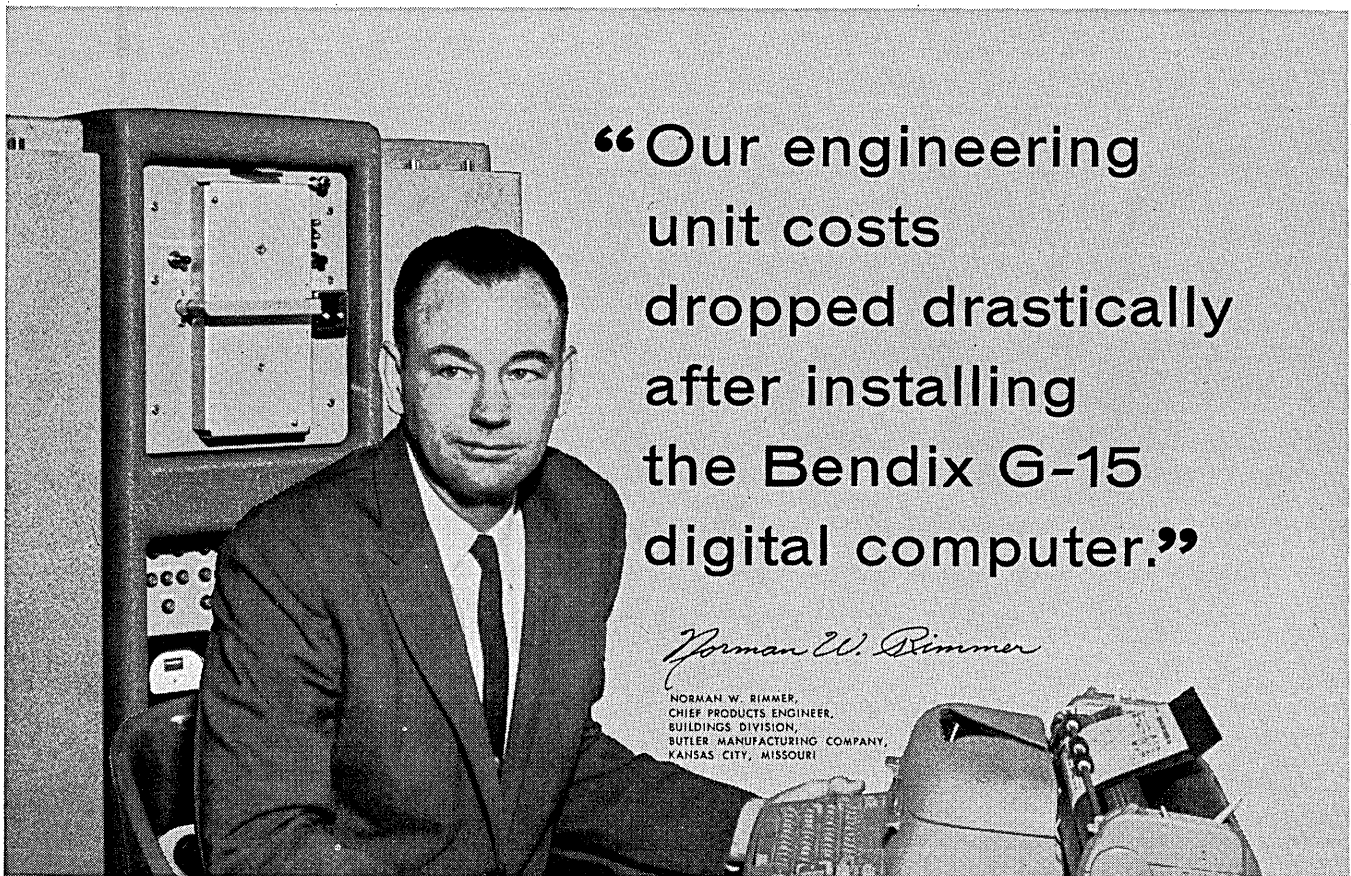
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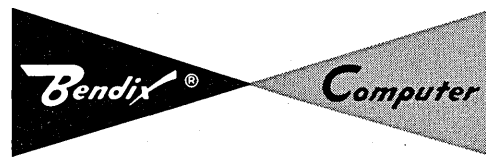
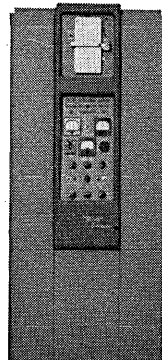
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EJCC IMPRESSIONS

STATLER HILTON HOTEL, BOSTON

by **MANDALAY GREMS**

Computing experts who attended the recent Eastern Joint Computer Conference in Boston stretched the facilities and burst the seams of the Statler Hilton Hotel. These specialists involved in computing overflowed in all directions both day and night. The National Joint Computer Committee (NJCC) may be forced to heed Frank Heart's warning for next year; i.e., needed — a bigger Eastern Joint.

There was a formal session devoted to character recognition on Thursday afternoon, but the informal recognition of characters started on Monday. Everyone (or so it seemed) arrived by airplane at the same time, and the waiting line for reservations at the hotel desk grew longer and longer. Eventually, it spilled over into the street and into the bar — without reservations.

Enthusiastic early arrivals swelled the ranks of this waiting line to take advantage of an opportunity to greet friends and foes, renew acquaintances, and even carry on a little side business — selling and recruiting.

The continued growth of computing interests and applications coupled with the resulting problems of stability and instability were reflected in repeated greetings such as: "Where are you working now? What projects are you working on? Are you settled in your new location?"

The informal recognition of characters continued at the cocktail party on Tuesday evening. A carefully guarded secret of the Arrangements Committee was how they filled the ballroom with people for two hours, and also kept the food, drinks and conversation coming and going during the entire affair. The cocktail party was terrific and anyone who missed it, missed a good one.

According to the morning-after reports, the informal panel discussions on Wednesday evening was worth the extra committee effort. Topics have already been suggested for special panels like these at future meetings. Originally, an attendance of about 50 for each session was anticipated and material was planned for an hour and a half sessions. The estimates were wrong. Sessions were attended by anywhere from 50 to 200 people and lasted an average of three hours in hot, stuffy, overcrowded rooms. Some participants even stood the whole three hours. Discussions were cut off by the panel at about 11:00 p.m., but in some instances were continued by small groups into the early hours of the morning.

The Award Dinner on Thursday evening was another First for the EJCC. The idea of a dinner on the evening of the last day of the conference met with hearty disapproval. However, a truly rewarding evening was spent by all who attended. Incidentally, it was well attended. Dr. Jean Felker presented the 1959 Speaker's Award to H. K. Skramstad for his excellent presentation of 'A Combined Analog-Digital Differential Analyzer.'

After dinner, Dr. Willis Ware held an interested audi-

ence for over an hour. He gave a first-hand description, along with about 50 colored slides, of the computer components, computing installations, consulting mathematicians, and computing life in general in Russia.

The papers delivered at the technical sessions provided the real meat of the conference. Remarkably little criticizing was detected in the corridors between sessions — for three good reasons. First, the papers submitted at this conference were screened more thoroughly than usual because of a single rather than double or triple session conference. Only 27 papers were selected to be presented from the 140 papers which were submitted and reviewed. Second, the audience was forced to submit all questions in writing, and these were collected as quickly as possible by monitors who circulated throughout the ballroom. The speaker was then allowed sufficient time to answer most of the questions immediately after his paper. Third, all sessions started on time, and time between sessions was limited. There wasn't time enough to gripe.

The Publicity and Printing Committee hope to have the Proceedings out shortly and certainly deserve praise for this unusual feat. This will be the combined result of various committees setting realistic deadlines and firmly sticking to those deadlines. It proves that it can be done. Could this be another first?

On Tuesday morning the conference started with a bang and was a tremendous success. Was it the challenge of competition for an award or the lure of lucre which stimulated the engineers to polish up their talks and color up their slides? Speaking of slides, they were literally conspicuous. A few had too much color and a few had too many lines of information — but they were all informative and without exception legible in the back of the room.

In the welcome address, Frank Heart issues a number of subtle warnings to jar us out of our complacency and keep us looking to the future. He mildly remonstrated us for neglecting future machine needs associated with the library problems. He convinced us that the pathway to computing fame is wide open to anyone with imagination and initiative, but it is still a rough, rocky road. Let's hope that he prodded at least one listener out of his well-grooved rut to produce startling results in the year 1960.

The first sessions at the conference seemed to be above and beyond the direct control of most of us — A Look in the Future, STRETCH, LARC, MOBIDIC, etc. They made for good listening, nodding agreement, marvelling at accomplishments, accepting certain facts, and mentally filing references. Then, suddenly, the speakers turned to bread and butter applications — heat transfer problems, machine shorthand, medical diagnosis, Boolean matrices, flow diagrams, simulated compilers, etc. These papers illustrated the versatility of computers and the wide range of current applications in industry.

The transition from research papers to application papers was so gradual that it was a shock to numbers of at-

EJCC IMPRESSIONS

tendees who had been paying attention, but not listening. From that time on, events followed each other swiftly. There was always some unanswered question or particularly revealing comment to be made about a previous paper, but not time enough for it. The question and answer periods helped some, but more time was always needed.

It all boiled down to the startling fact that there just wasn't enough time to attend all the sessions and also to recognize all the characters. There was barely time to visit the exhibits, try the better restaurants in town, and keep up to date on all the latest gossip. If pursued thoroughly and extensively, each of these latter activities consumes vast amounts of free time which is accounted for as the recognition and association of characters. ●



Following Miss Grem's "broad picture" of the Eastern JCC, DATAMATION presents some additional highlights (staff-written) of the Boston meeting.

exhibitors (some unhappy)

The handling of exhibits in the Statler Hilton left some exhibitors with a dissatisfied feeling, stating it politely. Those exhibitors lucky enough to obtain space on the hotel's mezzanine floor had no complaints (although representatives of firms placed in the coat room off the main corridor said they felt somehow cut off from the main stream of interest).

Those individuals charged with setting up their exhibits in the fourth floor catacombs were quite vocal in their displeasure, however. The situation was this: all conference sessions were held on the mezzanine floor and the comings and goings of delegates to the general sessions obviously benefited exhibitors stationed on that floor. The only attractions on the fourth floor, besides some twenty-five exhibits, were individual meetings of the NJCC, ACM, etc., and people attending these were not prone to wander down hallways in search of diversion.

Repercussions from this unhappy situation may be felt in terms of fewer exhibitors at future Eastern Joints, DATAMATION learned. Many of those in charge of booths on the fourth floor stated that they would never agree to exhibit under similar conditions again.

exhibits

Minneapolis-Honeywell's magnetic tape transport, Ramo-Wooldridge's Analysis Console mock-up and Digitronics' paper tape reader were three stand-outs among equipment exhibited. Electronic Associates and GPS Instrument Co., installed representative displays of their analog equipment. Also attracting attention was the Laboratory for Electronics magnetic disk memory and the Anelex Print Station - viewed by those able to attend the Anelex open house in another part of Boston.

The tape transport was the first unit of Honeywell's 800 dp system to be publicly demonstrated. The unit uses an all-vacuum drive, as well as vacuum to hold the tape reel on its hub and the tape on the reel. The firm's term "gentle tape handling" is a legitimate way to describe the operation. Nothing but the reading head touches the tape. Tape is driven at 120 inches per second

in either direction and is capable of reading or recording 96,000 decimal digits or 64,000 alphanumeric characters per second. Rewind speed is 360 inches per second. The system starts in slightly less than 1 millisecond and in 2.7 milliseconds is travelling at full speed.

Digitronics Corporation's 4500 Series perforated tape reader operates at 1,000 characters per second and stops before the next character. A stop time of less than 0.5 milliseconds is possible. The reader handles 5, 6, 7 or 8 level tape and uses either strips or reels of tape on the same machine.

The R-W Analysis Console was developed for use with the RW-400 but can be connected to any data processing system. Through the use of a keyboard arrangement, operators may control the computer to which the console is attached, and obtain a display of data either in graphic or printed form on the console's video screens.

njcc—chapter one

The National Joint Computer Committee held two significant meetings during the EJCC. The first, an open meeting, was held December 1 and was attended by 50 or 60 hardy individuals (this meeting followed the conference cocktail party). It was generally conceded that the motivating force behind this meeting was prevailing dissatisfaction with the powers, or lack of same, vested in the present NJCC. Reference was made at this gathering to the two-part article presented in DATAMATION last summer dealing with the need for a truly effective professional computing society. Attendees, many of them official representatives to the NJCC, were obviously in a mood to take action.

Chairman Harry Goode called the meeting to order, summarized the Dissatisfaction Theme, and began introducing a successive line of speakers.

- Dr. Willis Ware, RAND Corporation, was the official spokesman for PGEC/IRE. In brief, his group proposed dissolving NJCC and forming a new society of societies.
- Dr. Morris Rubinoff, AIEE representative, addressed the group with remarks which he labelled his own. He suggested that the NJCC be given broader powers as a society of societies and its own budget.
- Paul Armer, of RAND, also presented personal views which he clearly labeled as such. He was introduced as the ACM representative. Armer proposed a super society of members.

Many other speakers aired their views at this meeting but nearly all of their comments revolved around the propositions of the above three speakers. Most significant of the unofficial orators was Mr. D. B. Paquin, President of the NMAA, who proposed the merger of NMAA and ACM. This gentleman's remarks were covered in an EJCC report published by COMPUTING NEWS, 163, Volume 7, No. 24.

njcc—chapter two

On Wednesday night the NJCC met officially. The following was accomplished:

- Concerning the question "Whither NJCC?," the three societies represented in effect recognized some action would have to be taken; recognized, too, the feeling expressed at the meeting on the previous night and agreed that they would explore the feasi-

bility of reestablishing NJCC which might eventually be constituted as a larger and stronger society of societies.

- Concerning ratification of International Federation of Information Processing Societies statutes, it was learned that the AIEE had ratified as had ACM (but not officially at that date) and PGECC was still waiting for an IRE OK. (NJCC has since ratified and is now an official member of IFIPS. See page 29.)

- A report was delivered by a policy committee on how to conduct conferences more effectively.

- Exchanges of delegates with the USSR and other nations was considered.

- The assembled group heard a report on progress being made in organizing the Western Joint Computer Conference. (See page 28.)

postscript . . . The NJCC congratulated EJCC Chairman Frank Heart on the organization of the then current meeting but registered a mild complaint that the meeting seemed too hardware oriented with not enough emphasis on applications . . . Paul Armer of the RAND Corporation announced his resignation as NJCC vice-chairman and indicated that he would be unable to serve the committee in an official capacity during the coming year. Armer stated that he felt that 1960 would be a crucial year for NJCC and that the press of RAND business would not allow him to devote sufficient time to Joint Computer Committee activities . . . One result of Armer's announcement, Harry Goode will continue to chair the NJCC during 1960 and will be assisted by Morris Rubinoff as vice-chairman.

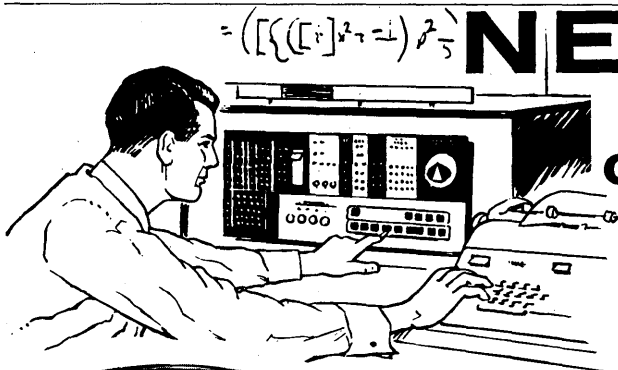
acm council meeting

Association for Computing Machinery councilmen met on the morning of December 3 to attack an agenda which was dominated by consideration, item by item, of the proposed new constitution. The meeting was punctuated by often friendly but always spirited exchanges between two rather hazily defined groups known as the big "E" (for Establishment) and the big "R" (for Reform). These two groups exchanged barbs across the table while every "i" was dotted and every "t" was crossed in the constitution. Chief Architect Bruce Gilchrist, like many another constitution drafter, was all for getting on with the thing, but he wasn't to have his way. There seemed to be a legitimate point worthy of discussion every few minutes.

Notable among changes in the constitution OKed by the group were the fact that the office of secretary would be elective and that the bylaws will be made amendable by the council. Ballots have been issued to all ACM members asking them to accept or reject the constitution and the new constitution would either be in effect or voted down before the ACM elections this Spring.

The council heard a report stating that agreement with the New York Academy of Sciences for the handling of ACM business would soon be terminated. The result is that an ACM office will be set up with a paid staff probably in the New York Academy of Sciences building.

postscript . . . a nominating committee for the coming ACM elections was appointed by council president Richard Hamming. Chairman is Gene Jacobs of SDC. His committee — John W. Carr, III, James Douglas, Robert Bemer, and Franz Alt.

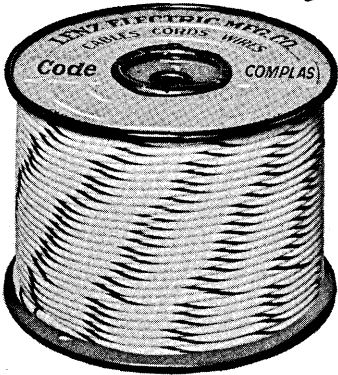


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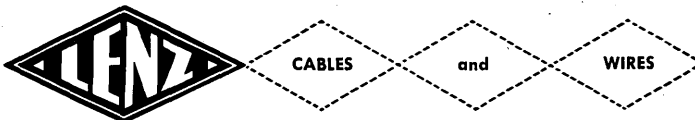
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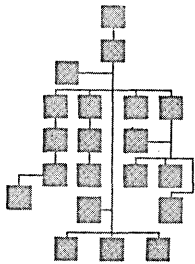
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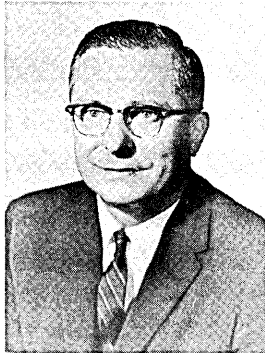
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people moving up in **DATAMATION**

William J. Suchors has been named executive assistant to Dause L. Bibby, RemRand Division of Sperry Rand. Robert L. Blakely was made chief engineer of product planning at the Univac Div. and James D. Redding is now director of military applications in St. Paul . . . RCA announced these appointments: Donald H. Kunsman, general manager of the Electronic Data Processing Div.; A. S. Kranzley, manager of product planning; Leonard S. Holstad, vp of Data Processing Service; George H. Ritter, plant manager of the new transistor plant in Mountaintop, Pa. . . . Fritz W. Wanzenberg joined C-E-I-R as director of the management engineering div. Winston Riley, III, joined the operations research branch and Glenn T. Martin has been assigned to C-E-I-R's New York research center . . . Control Data Corp., announced the appointment of James D. Harris as director of administration. Other new computer division personnel: Robert E. Anderson, Grant H. Robinson, Norbert R. Berg . . . Frank F. Cleminshaw is now vp and gen. mgr. of John Diebold & Assoc.

CEC has appointed Robert H. Garretson group vp of data processing divisions. John J. McDonald and Linden G. Criddle were elected vp's of Consolidated Systems Corp., a CEC subsidiary. S. R. Wyzenbeek, Jr., has been named manager of the newly opened San Francisco sales office for CEC data processing divs. . . . Aeronutronic made the following appointments recently: Edward L. Montgomery — executive assistant to the vp and general manager; Rear Admiral Thomas G. Warfield, U.S. Navy, (Ret.) — the administrative staff; Dr. Lloyd P. Smith — director of research operations; John C. Christian — manager of marketing for space technology operations . . . Electronic Associates, Inc., has named William K. Kindle to the newly created post of chief engineer . . . Appointment of Charles T. Haist, as western regional manager for GE's computer department, has been announced . . . Wolfgang G. Pfeiffer has joined NCR's Hawthorne electronics div., as a senior research engineer. Other NCR appointments: Irving Ross and Robert I. Reiss — senior design development engineers . . . Autonetics established a new division, Computers and Data Systems, with N. F. Parker as operations manager . . . Jack Belzer joined Bobbie Brooks, Inc., as director of electronic data processing . . . Farrington Manufacturing Co., engaged Alfred C. Haemer as a manager.



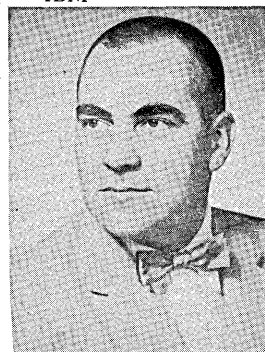
W. J. SUCHORS
Exec. Asst.,
RemRand



R. H. GARRETSON
Group VP,
CEC



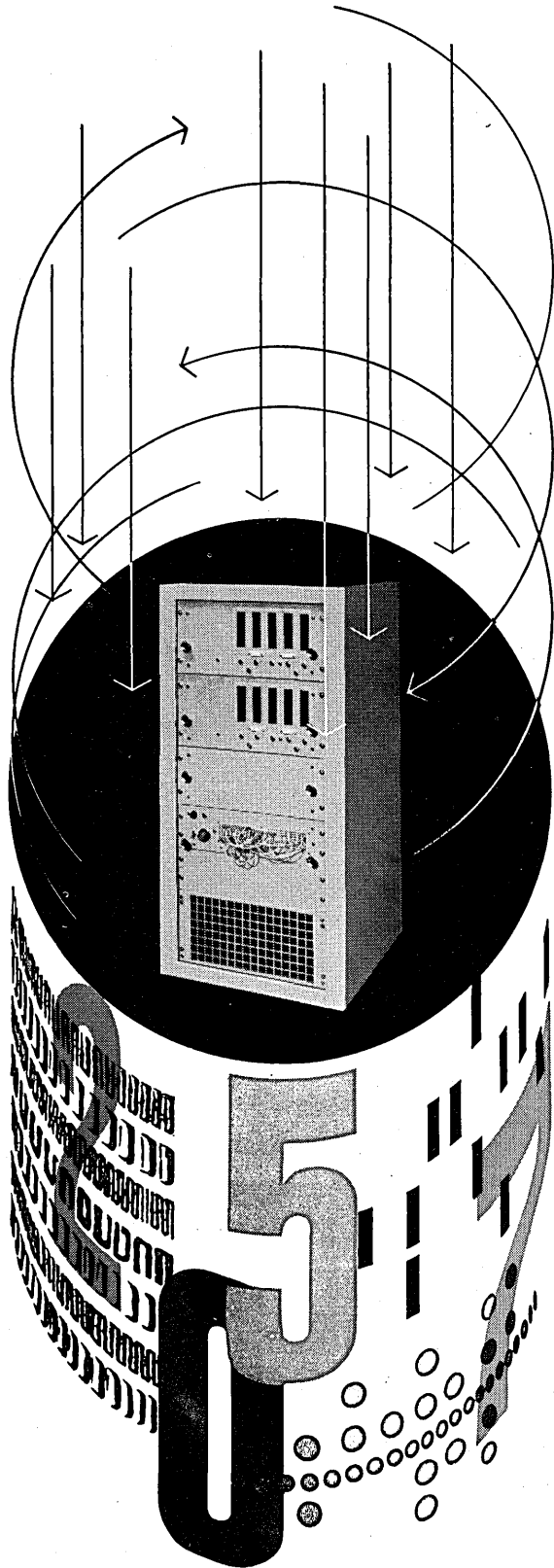
G. E. JONES
President dp,
IBM



M. C. GILLILAND
Berkeley Div.,
Beckman

IBM announced the promotion of four of the company's divisional general managers to the position of divisional president. Gilbert E. Jones is appointed president of the data processing division. Other presidents: Charles Benton, Jr. — federal systems div.; William B. McWhirter, data systems div.; Orland M. Scott, general products div. New manager of the IBM San Jose Product Development Lab is Victor R. Witt. Dr. Richard S. Hirsch was appointed senior psychologist . . . J. C. Pitchford of Benson-Lehner has been promoted to vp in charge of engineering and elected an officer of the company. Other B-L appointments: Robert C. Saunders, Jr., — manager, applications engineering; Donald F. White — project manager of electronics engineering . . . Three executive appointments have been made at Computer Systems, Inc.: Raymond W. Carney — vp of manufacturing; Charles B. Husick — engineering and systems vp; Henry Zaron — vp of operations and facilities. Potter Instrument elected Fred Heine to head up the product engineering department.

Dr. Maxwell C. Gilliland has assumed direction of a program of advanced study in analog computing techniques at the Berkeley Div., of Beckman Instruments . . . Bendix Aviation Corp., elected R. C. Fuller to general manager of the Pacific Div., and the supervision of the Bendix Computer Div. Ted A. Blanke was appointed administrative assistant to the applications manager at Bendix . . . J. R. Weiner has moved up to associate director of information processing and computers at Lockheed Missiles & Space Div. . . . Charles W. Adams has joined forces with John T. Gilmore, Jr., to establish the edp consulting firm, Charles W. Adams Associates, Inc., in Bedford, Mass. . . . Epsco, Inc., announced the following appointments: Wallace E. Rianda and David Bakalar — board of directors; Bernard L. Friedman — assistant to the executive vp on special organizational assignments; Harold S. Goldberg — section head of systems engineering . . . TMI named William P. Wilson, midwestern regional manager . . . Ramo-Wooldrige announced the following technical staff additions at the Intellectronics Laboratories: Paul Rosenbaum, Harold S. Cosel, Werner L. Frank, James F. Everett, Morton Boisen, Robert H. Stotz, and Frank A. Metz . . . Digital Equipment Corp., engaged Benjamin M. Gurley as a member of the r & d engineering dept.



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angular or linear position
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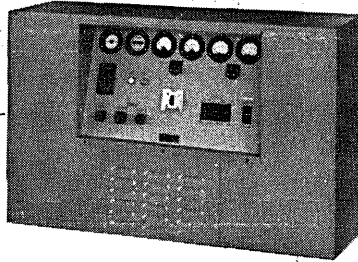
A PRECISE-POWER SET is a rotary electro-mechanical system, statically regulated, which performs **one or more** of the following functions:

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Raises the power-line frequency, reducing the cost, size, and complexity of the system power supplies.

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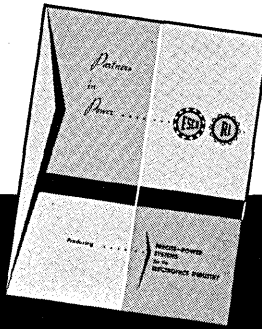
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WJCC PLANS FINALIZED

Final planning sessions are under way for the 1960 Western Joint Computer Conference, to be held this year in San Francisco on May 3, 4 and 5.

Site of this year's conference will be the new Jack Tar Hotel located at Van Ness and Geary Streets. As far as exhibit space is concerned, it is a "sold out" affair. Harry K. Farrar of P. T. & T. Co., who is exhibit chairman, reports that all 78 booth locations have been fully subscribed. However requests for exhibit space will continue to be received until April 1, in the event of last minute cancellations of booths. The exhibits will be on the same level and close by the California and International Rooms where the technical sessions will be conducted.

Theme for the conference will be "Computers—Challenge of the Next Decade" and the program is being developed along lines reporting on new computer technology. Howard Zeidler of Stanford Research Institute, Menlo Park, who is technical program chairman, stated that 125 "well written" papers are currently being evaluated. Forty of the best papers will be chosen and scheduled into 15 sessions.

General chairman of the conference is Robert M. Bennett, Jr., of IBM Research Laboratories, San Jose; George A. Barnard III of Ampex Corporation, Redwood City, is vice-chairman.

Inquiries relative to the conference are being received at Box 214, Station A, Palo Alto, California.

DATAMATION will present all available WJCC details in a March/April issue special section.

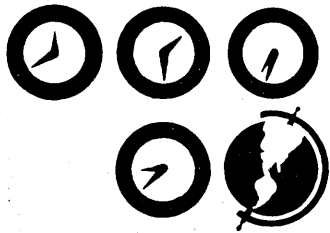


*R. M. Bennett
WJCC Chairman
(top left)*



*Howard Zeidler
Program Chairman
(above)*

*G. A. Barnard, III
Vice-Chairman*



DATAMATION *news briefs*

IFIPS NOW OFFICIAL; UNITED STATES RATIFIES

With ratification of statutes by 12 countries, the International Federation of Information Processing Societies is now in existence. The movement to form the new federation resulted from action taken at the first International Conference on Information Processing, sponsored by UNESCO and held in Paris last June.

The countries whose national computer technical societies have ratified the statutes include Canada, Denmark, Finland, France, Germany, the Netherlands, Spain, Sweden, Switzerland, the United Kingdom, the U.S., and the USSR. In addition, Belgium, Israel, and Japan are forming national computer societies to qualify for membership.

It is expected that the first meeting of the IFIPS council later this year will result in plans for a second International Conference on Information Processing with an associated technical exhibit to be held in 1963.

THIRD TUG MEETING HELD; BRIGHT NAMED PRESIDENT

Third meeting of the TRANSAC Users' Group (TUG) took place in Philadelphia in October, 1959. Eight installations were represented, including one of the new members, the Government of Israel. At this meeting the group decided to formalize its hitherto informal organization, and permanent officers were elected. H. S. Bright, Westinghouse-Bettis was elected president; D. B. MacMillan, GE-KAPL, vice president; R. H. Richards, U.S. Naval Supply Center, Oakland, secretary; D. Dowling, White Sands Missile Proving Ground and H. Stahl, of United Aircraft, were elected representatives-at-large.

These officers will also serve on a government committee to propose a set of by-laws for the group. A committee chaired by H. Stahl was appointed to clarify program and hardware implementation of the standard TUG alphabet.

MORE PROGRAM MANUALS PLANNED BY AICHE IN '60

The American Institute of Chemical Engineers announced during their recent annual meeting that they have

published one computer program manual and are planning four to six others this year. The manuals are an effort to provide adequate interchange of computer programs in the chemical and petroleum industry. This action followed an industry survey by Du Pont disclosing secrecy, confusion and duplication of effort among companies in this field utilizing computers.

U OF R SERIES TO COVER NON-COMPUTATIONAL USES

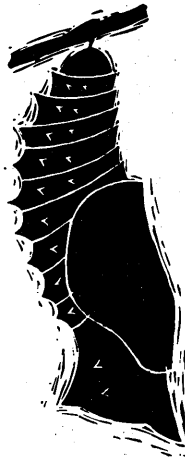
A series of lectures will be held at the University of Rochester during the year under the general title, "Non-Computational Uses of Computers." The lectures will be given by outstanding persons, not only in computer simulation but also in other non-computational uses of the computer. As far as is known this is the first series of this kind in the country.

Speakers and their topics, are: Dr. H. A. Simon, "Heuristic Programs;" Dr. A. J. Perlis, "Algebraic Languages;" Dr. Saul Gorn, "Formal Lan-

guages;" Dr. R. S. Ledley, "Computers in Medicine;" Dr. V. E. Giuliano, "Automatic Language Translation;" Dr. Philip Morse, "Operations Research;" Dr. N. Rochester, "Machine Learning;" and Dr. L. A. Hiller, Jr., "Computer Music."

UNDERWOOD PRODUCING TAPE DATA FLO SYSTEMS

Underwood Corporation is currently producing a complete line of tape producing equipment known as Data-Flo Systems. The purpose of these multiple systems is to meet all needs in producing hard copy as well as punch paper tape or tab cards. One Data-Flo feature is the building block principle of combining components. From a simple Data-Flo System consisting of a typewriter and a tape punch, a system can be expanded to as many as three typewriters, two duplex 10-key adding machines, two tape readers and two tape punches; tab card punch and reader can be substituted. Very shortly a transistorized

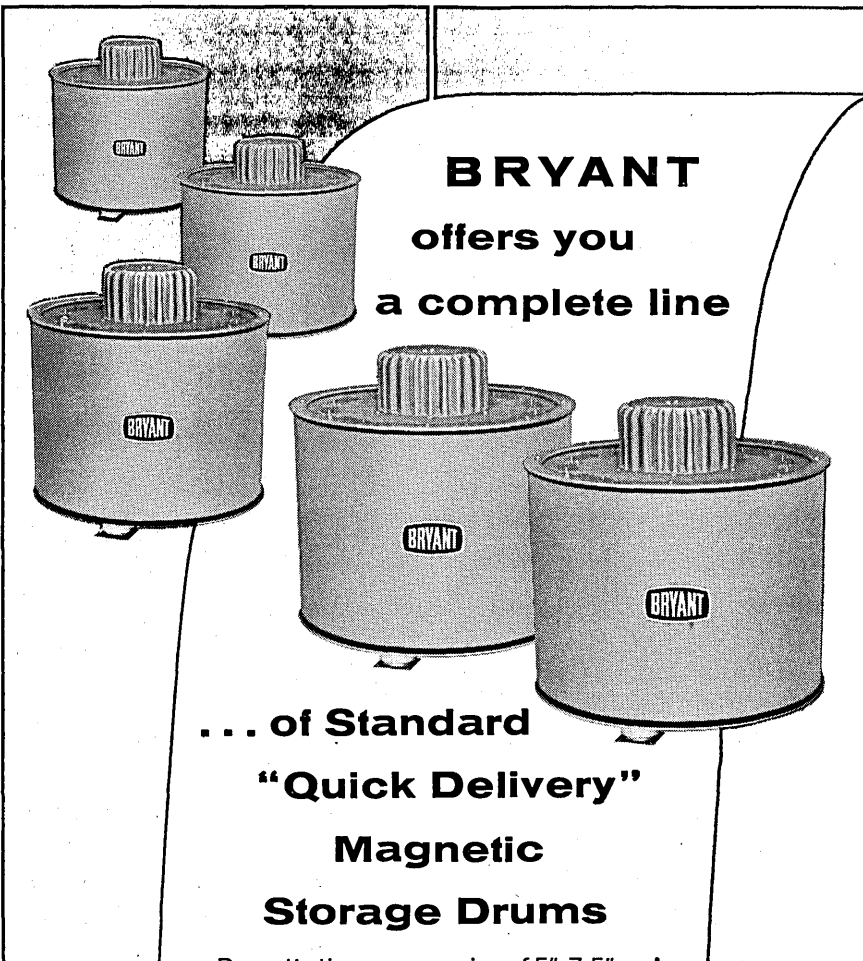


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SERIES	TRACKS	BIT CAPACITY	R.P.M.
5000B	85 to 280	174,080 to 569,344	3,600 to 24,000
7500B	85 to 280	261,220 to 860,160	1,800 to 12,000
10000B	85 to 420	348,160 to 1,720,320	1,800 to 6,000

All Bryant standard magnetic drums are made to the same precision standards as are Bryant custom-designed drums. A few of their many features: 1. Drums are precision ground and dynamically balanced. Guaranteed less than .0001" dynamic runout. 2. Powered by exclusive Bryant-designed-and-manufactured integral drive induction motors. 3. Super-precision ball bearings. 4. Exclusive Bryant tapered drum head-setting method, guaranteeing exact head-to-drum spacing. 5. Standard heads providing .200" minimum register arc length. 6. Compatible with MIL-E-4158A and MIL-E-16400-B specifications. Bryant Computer Products Division, P.O. Box 620, Springfield, Vermont, U.S.A.

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NEWS BRIEFS

multiplier unit will be available. Another feature is the variety of automatic controls that enable different degrees of automation.

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BURROUGHS OPERATING OWN INPUT/OUTPUT UNITS

No official announcement has been made but three Burroughs input/output units are known to be operating with that firm's Cardatron equipment. The Burroughs card input unit, Model 293, operates at 300 cards per minute. The card output unit, Model 292, has a 100 card a minute punching or reading rate and the Burroughs line printer, Model 289, prints at 150 lines a minute. Unique feature of all three units is an immediate-access clutch.

TIMS-ORSA MEET IN APRIL

TIMS-ORSA annual Joint West Coast Regional Meeting will be held at the U.S. Naval Postgraduate School, Monterey, on April 7 and 8th. Joint sponsors are the Northern and Southern California Chapters of the Institute of Management Sciences and the Western Section of the Operations Research Society of America.

✓Largest single shipment of GE computers — more than \$4,000,000 worth — was made in December to Bank of America sites and a Government installation in Southern California. This marked the GE Computer Department's move-up to full production of data processing and industrial computers in its new 87,000 square foot manufacturing addition in Phoenix, Arizona.

✓Minneapolis - Honeywell Regulator Co., announced that its facility at Beltsville, Md., has been renamed the Industrial Systems Division. The Maryland plant, which produces analog and digital magnetic tape systems and components, has been known as the Davies Laboratories Division since its acquisition in 1956.

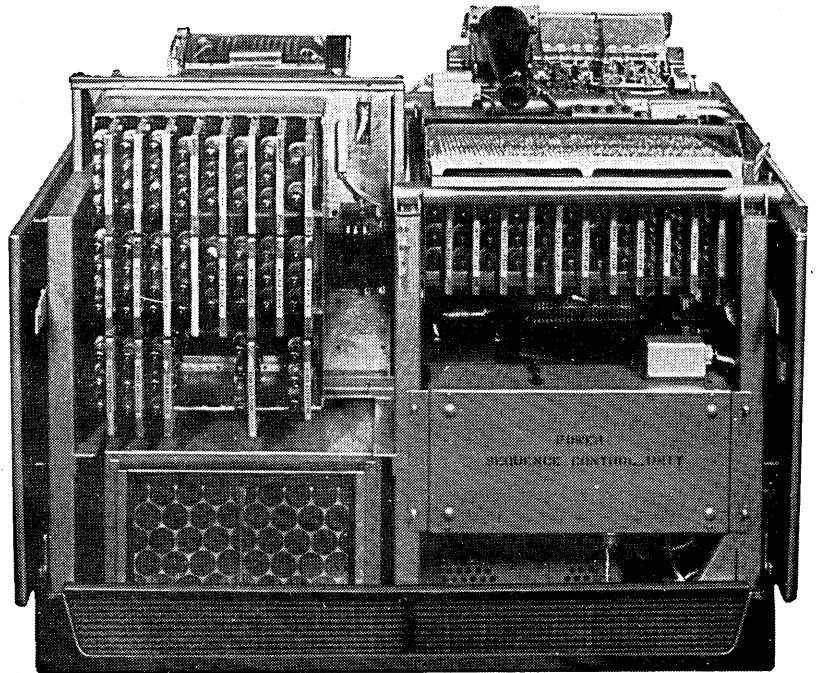
✓Telemeter Magnetics, Inc., received a contract from the University of Illinois to manufacture core planes for a magnetic core memory unit, to be included in a computer under development in the University's Digital Computer Laboratory. The unit will provide high speed storage for nearly 250,000 bits of information.

✓The Atlantic Refining Company announced today that it will install a 7070 - 1401 combination in its Philadelphia refinery headquarters early in 1961.

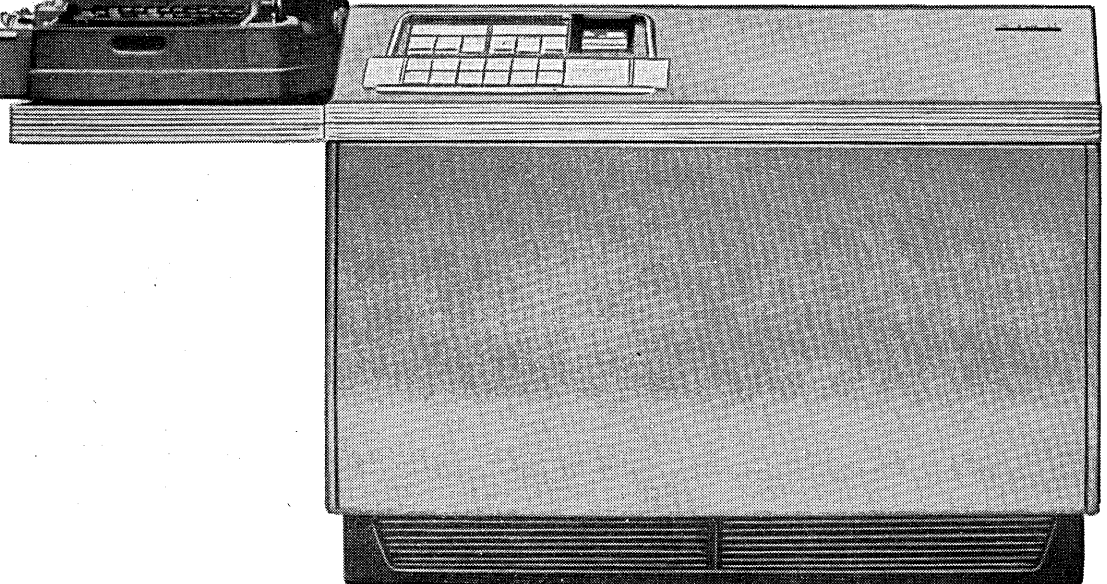
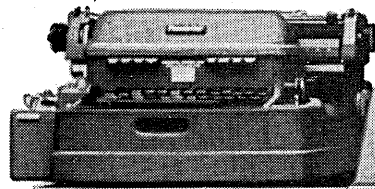
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computer
value
on
the
market...**



inside . . . The world's largest-selling engineering and scientific computer, the compact, mobile LGP-30 is also the lowest-priced complete computing system you can buy or lease. It gives you the largest memory (4096 words) and capacity in its class. Internal components have been greatly reduced to insure highest operating reliability. The logic circuit and few etched circuit cards are easily removed for checkout and maintenance. **and** . . . The LGP-30 operates from any wall outlet, requires no site preparation. With its simplified command structure, the LGP-30 is the easiest computer to program and operate. It is delivered complete with tape typewriter for alpha-numeric input-output. An extensive library of programs and sub-routines is available. Sold and serviced coast-to-coast, in Canada and abroad by Royal McBee, it's your greatest computer value inside and **out.**



Royal Precision Corporation



Royal Precision is jointly owned by the Royal McBee and General Precision Equipment Corporations. LGP-30 sales and service are available coast-to-coast, in Canada and abroad through Royal McBee Data Processing offices. For complete information write **ROYAL MCBEE CORPORATION**, data processing division, Port Chester, New York
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Why are computers exciting? Because they can solve problems — a greater variety of problems than any special purpose intellectual tool. Speed, memory capacity, reliability are the characteristics that make these solutions economical. But it is the fundamental generality and flexibility of the digital computing system that makes us sure we have a new kind of tool for science, for business, and for interactions in our society.

To solve new classes of problems, or to improve the solutions of old ones, occupies the efforts of many thousands of programmers. A novel learning technique in pattern recognition is as exciting to them as the advent of the cryotron is to the hardware boys, and rightly so. A mathematical device for narrowing the Monte Carlo exploration of combinatorial problems opens as many new vistas as a few-cores-per-bit associative memory.

Our friends with the soldering irons — or perhaps I should say, with the helium dewars — are going great guns. On the applications side, though, progress is slower. We have no vast reservoir of natural phenomena to explore; we cannot browse in handbooks of physical and chemical measurements. If on the one hand we attempt to master a problem area, we have to wade through the arti-

facts of a whole discipline like chemical reactor control or airline reservations practice, or even find ourselves forced to codify and regularize where no set discipline exists. And if on the other hand we search for general concepts of problem solution, for systems techniques, we are in completely virgin territory; worse than that, we have to turn inward, and by sheer introspection create a territory to be explored.

If the programmers and the analysts face a harder task, it is all the more important that we muster our best efforts. And there is a cloud considerably bigger than a man's hand well above the horizon. Too great a proportion of our intelligence, our effort, our finances are given to discussing, specifying, and writing automatic coding systems.

The OK activity for many of our best people today is a SHARE committee: it's non-U to be useful! I could be cruel, and claim that like the pure mathematicians they are escaping harsh reality by clambering into private universes. And I could point out how much safer it is, as well as more pleasant, to be judged by one's programming peers, rather than by the harsh exigencies of that overdue, underfinanced "commercial" project! But in most cases that would be unfair. There are fashions, good and bad fashions, in technology as well as in everyday living. What I want to do here is to bring up the present and prospective situation for conscious examination, and ask the fine people who are working or planning to work in this special field whether they could not make a more valuable, more unique, more stimulating contribution elsewhere.

Look, I'm not trying to go back to the days of programming in absolute! No one would order a STRETCH, let alone an 800 or a GAMMA 60, without considering the assemblers, the generators, the subroutines, the monitor programs that will be needed. But the provision of these tools should occupy only a few of our professionals, not dominate the working thoughts of a majority. Remember, the power of the computer and the value of its users in our culture comes from the problems solved, not from the elegance of the tools.

Many outstanding polishers of programming systems feel they are helping others do better work by providing more perfect coding techniques. Certainly this is so, but the question is one of proper balance. To pioneer a new application expands our horizon far more than to redefine the use of the semicolon in UGHTRAN, and should stimulate a far larger percentage of our best people.

One of the most rewarding aspects of a new technical field like ours is that it attracts the bright and the brave. The youngsters who yesterday would have gone into supersonic aerodynamics, or before that into quantum mechanics, today knock at our door. We compete with radio astronomy; we salvage from polymer chemistry; we even seduce a few fine spirits away from the B-School! If they observe their elders wasting time in penny semantics, or striving to increase the number of angels that can dance on a binary point, we shall lose them. ●

ELECTRONIC DATA PROCESSING

A challenging opening exists for an experienced Electronic Data Processing engineer who is capable of initiating and directing research programs in this area. His background should cover all electronic aspects of data processing including specific research experience in logical design, memory development, circuit design, input/output development and reliability. This position offers an exceptional opportunity to develop creative research programs for industry and government, coupled with excellent facilities (a Univac 1105 computer installation), and stimulating staff associations.

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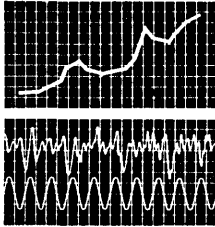
Qualified personnel are invited to send a resume of their qualifications to:

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DATAMATION *in business and science*

FORTY-SIX 501 ORDERS RECEIVED BY RCA

RCA has revealed that orders were accepted for forty-six 501 systems during 1959. The firm installed nine machines last year. Four are located at RCA's Wall Street data processing center, the Fidelity Philadelphia Trust & Savings Bank, The Navy's Bureau of Ordnance, Washington, D.C., and the Air Reserve Records Center in Denver. Another bank installation is set for Jan. 1, 1961, at the Chase Manhattan Bank where the complete 501 system, including magnetic ink character recording to handle deposit accounting has been completed. This system incorporates Burroughs card sorters.

SYLVANIA ON AIR; GNL. TEL OFF?

The two IBM 7090 systems installed at Sylvania's Needham, Mass., plant were on the air on December 10th, some ten days after they had been delivered. Quite casually, IBM announced that two more 7090's were delivered to the Sylvania installation during the last days of December and were operational Jan. 8. Another piece of news involving these two firms is less likely to cause joy at IBM. A reliable source at the General Telephone Company in Santa Monica, Calif., has stated that the company is "seriously considering" replacing its 705 with an expanded MOBIDIC system. This item is in line with the generally known fact that Sylvania is about to announce that MOBIDIC, or, more accurately, a fixed installation variation of this computer will soon be commercially available.

UNION CARBIDE, C-E-I-R TO SHARE 7090

Union Carbide Corporation and C-E-I-R, Inc., have signed a two-year agreement to share equally in the use of an IBM 7090 computer, scheduled to be installed on the 36th floor of the new Union Carbide skyscraper currently being completed at 270 Park Avenue, New York City. It is expected that the machine will be installed in the late summer, 1960. C-E-I-R will make its share of machine time available to its business, industrial, and government clients on an hourly or job basis. In addition, C-E-I-R will provide analytical and programming backup. The company has leased 1½ floors in the Union Carbide building, containing 20,000 square feet of office space, for its staff. C-E-I-R plans to build up its New York Research Center to a strength of some 200 staff members after it takes occupancy in May, 1960. In addition to this ½ machine, C-E-I-R still has three additional 7090's on order. Eventually, the firm will put another 7090 in New York (November).

BURROUGHS REPORTS MACHINE ORDERS

Burroughs Corporation reports that U.S. banks have placed orders for 40 of its new B251 Visible Record Computer systems in the first two months following its announcement. The VRC is a solid-state system which automatically reads magnetically encoded MICR-language documents and processes them for posting to conventional ledgers. The system consists of a high-

speed sorter (up to 1,560 documents/minute), computer, record processor and console. VRC system cost is \$217,400; it will lease for \$3,975 per month. In the way of unofficial news, DATAMATION has learned that the number used to designate a new Burroughs solid-state computer is the next lowest prime number under 2113.

ElectroData (officially) reports that it had installed 31 of its Burroughs 220 intermediate-scale systems by the end of 1959. The list of 220 users includes: Naval Electronics Lab, San Diego, Cal.; Hoffman Labs, Menlo Park, Cal.; Georgia Tech Research Institute, Atlanta, Ga.; Aeronautical Chart & Information Center, St. Louis, Mo.; GE Company, Utica, N.Y.; Ordnance Supply Depot, Mechanicsburg, Pa.; U.S. Army R & D Lab, Fort Monmouth, N.J.; Air Training Command, Randolph AFB, Tex.; Allstate Insurance Co., (2) Skokie, Ill.; Tactical Air Command, Langley AFB, Va.; Dow Chemical Co., Midland, Mich.; Cornell University, Ithaca, N.Y.; Norton AFB, San Bernardino, Cal.; Naval Supply Center, Norfolk, Va.; John Deere Waterloo Tractor Works, Waterloo, Iowa; The Upjohn Co., Kalamazoo, Mich.; Allstate Insurance Co., Pasadena, Cal.; U.S. Dept. of the Interior, Washington, D.C.; Abbott Labs, North Chicago, Ill.; Babcock & Wilcox Co.; Barberton, Ohio; Smith, Kline, & French Labs, Philadelphia, Pa.; Crane Co., Chicago, Ill.; Stanford Research Institute, Menlo Park, Cal.; Atlantic Research Corp., Alexandria, Va.; New Mexico State University, Las Cruces, N.M.; First Pennsylvania Banking & Trust Co., Philadelphia, Pa.

SHARE WANTS
MEETING OF USERS GROUP

Gerry L. Koory of System Development Corporation, representing the executive board of SHARE, has written a letter to the presidents and secretaries of computer user groups suggesting a meeting of the respective executive boards to consider "several items of common interest." Possible agenda items listed by Koory include information exchange problems, areas for cooperation, common language problems and representation of the profession. Letters went out to thirteen organizations and to date, four have responded. The respondents are the officers of TUG, MCUG, CUE, and RECOMP Users Group. In responding to the invitation, the CUE representative proposed that the first meeting of the group be held the day following the Western Joint Computer Conference in San Francisco. Koory said he expected an almost unanimous favorable response from the various users.

ACM ACCEPTS
FIRST INSTITUTIONAL MEMBER

System Development Corporation has become the first institutional member of the ACM. Provision for institutional members has been in the constitution for at least a year but no organization has taken advantage of it until now. Institutional members pay \$250 in annual dues and agree to support the national organization whenever possible.

GRASS-ROOT
NOMINATIONS PROMISED ACM

The Chairman of this years ACM nominating committee, Gene Jacobs of SDC, has committed his group to a "grass-root level" operation. Jacobs stated that he has written to all ACM chapters requesting they send him their ideas for likely candidates for the offices which will be filled in April.

NEW *system...*
NEW *capabilities...*

FOR COMPLETE ON-LINE DATA REDUCTION

Combining the RW-300 Digital Control Computer with its matched magnetic tape unit creates a powerful new system for on-line data reduction. For the first time, a single compact system can fulfill all data reduction requirements at the test site. The system will automatically scan measuring instruments, convert their readings to digital form, and store this data on magnetic tape at a maximum rate of 2,560 words per second. Generally, the RW-300 will also compute quick-look data and feedback control signals. Within minutes after a test is finished the system will automatically produce complete test data and results in meaningful form. For further information, call or write Mr. Raymond E. Jacobson, Director of Marketing, The Thompson-Ramo-Wooldridge Products Company, 202 North Canon Drive, Beverly Hills, California, BRadshaw 2-8892.



The **RW-300 DIGITAL CONTROL COMPUTER**

with the

**NEW
MAGNETIC
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**EXPEDITES TESTING
REDUCES COSTS**

THE THOMPSON-RAMO-WOOLDRIDGE PRODUCTS COMPANY
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TRANSISTORIZED DIGITAL COMPUTER MODULES . . .

added to COMPUTER CONTROL COMPANY'S line of 100 kc M-PAC digital logical building blocks:

BINARY DECADE COUNTER (BD-101).... NIXIE DRIVER (NX-101) SOLENOID DRIVER (SD-102) INDICATOR AMPLIFIER (LA-101) SCHMITT TRIGGER (ST-102) FREE RUNNING MULTIVIBRATOR (OM-102) DC INVERTER AMPLIFIER (DI-101)

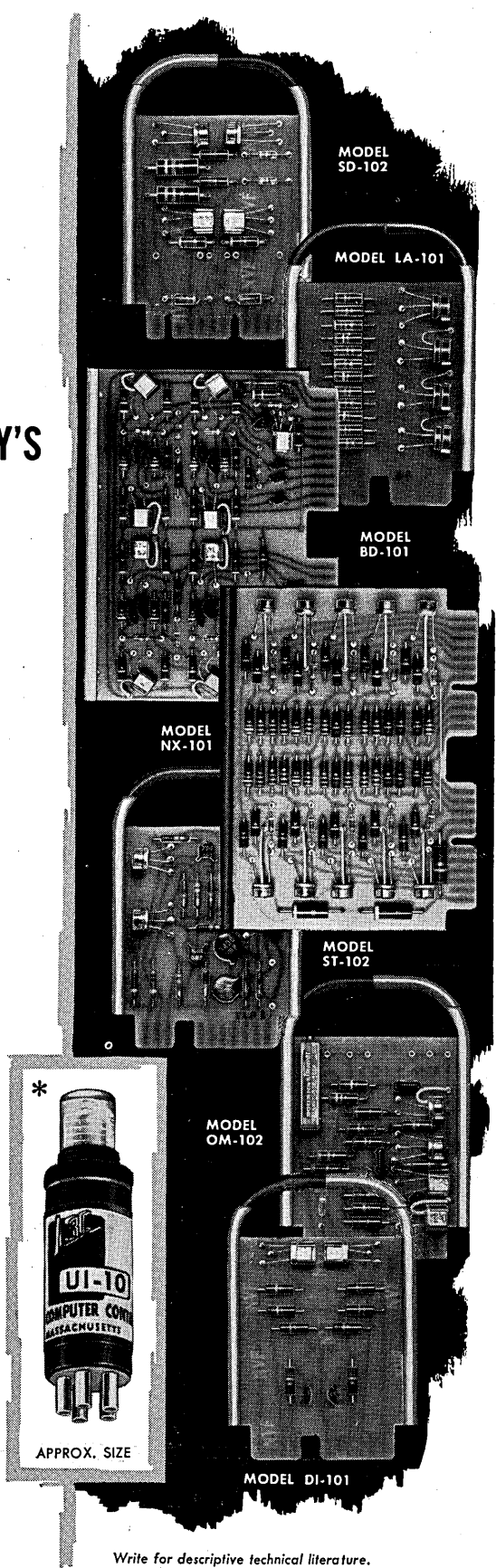
Module NX-101 is a BCD-to-decimal converter. It accepts the 8-4-2-1 binary decimal code from BD-101 (or equivalent decimal counter) and applies appropriate signals to the cathode of a NIXIE tube for numerical display.

These new modules complement and extend the present line of M-PACs providing valuable additional tools for the Control System and Test Equipment Engineer, Computer Designer and others interested in digital computer applications.

All 100 kc M-PAC plug-in modules feature: solid state components . . . compact, etched circuit boards . . . color coded handles . . . mating connectors . . . complete intercircuit compatibility . . . no external-to-the-package coupling circuits necessary . . . guaranteed for one full year.

*** NEW FOR 1 mc T-PACs:**

Unit Indicator (UI-10) for displaying the output of a Logical Element Model LE-10, Static Flip-flop FS-10 or other bistable devices . . . contains provisions for driving an external indicator. **UNIT PRICE \$8.90.**



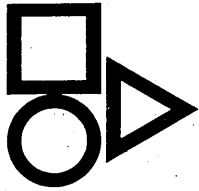
Write for descriptive technical literature.



COMPUTER CONTROL COMPANY, INC.

EASTERN DIVISION: 983 CONCORD STREET • FRAMINGHAM, MASSACHUSETTS
WESTERN DIVISION: 2251 BARRY AVE. • WEST LOS ANGELES 64, CALIFORNIA

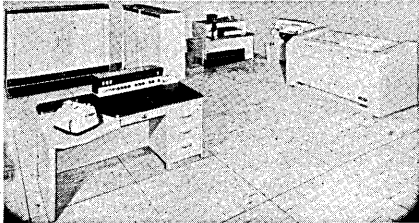
Circle 16 on Reader Service Card.



new products in **DATAMATION**

process computer system

The ISI 609 solid state process computer system can provide data for (a) on-line operation and analysis, (b) off-



line analysis, and (c) off-line analysis using on-line data and permits analysis of any process without interference with daily operation. A direct, plain English and decimal system Operator Control panel permits operator to change or read out instantly any process data constants or variables with no time-wasting decoding. Big machine-type programming includes complete machine order code, 4000 index registers and fast arithmetic, such as 2.1 milliseconds for obtaining square root or multiplying. Random access magnetic core memory contains 8000 words. Stored data constants and operating programs can be modified or corrected while the machine is running without disturbing the remaining program or stored information. Internally stored program can be automatically modified by external commands from feedback signals, or from operator, or from decisions within the machine itself. For information write, INFORMATION SYSTEMS, INC., 7350 No. Ridgeway Ave., Skokie, Ill., or use reader card.

Circle 200 on Reader Service Card.

translator-editor system

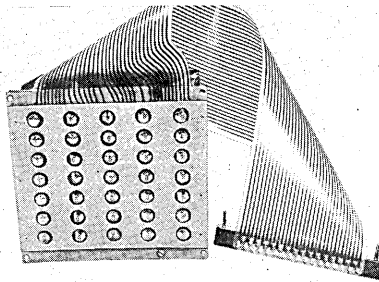
A new translator and editor system compresses an input of analog voltage data into a computer-compatible digital magnetic tape recording of only significant data. Input can be direct from any number of channels, or from analog magnetic tape recording. To save time and tape if a recording input is chosen, playback speed is a maximum of 100 times recording speed. Signal frequency is a maximum of 600 cycles per second. The system recognizes and digitizes only during defined voltage peaks, bands, or zones

which are established by mathematical criteria. For information write CONSOLIDATED ELECTRODYNAMICS CORP., 360 Sierra Madre Villa, Pasadena, Calif., or use reader card.

Circle 201 on Reader Service Card.

printed circuits

A new type of printed circuit now available is made by sandwiching thin copper conductors between insulating



layers of flexible plastic sheeting. The resulting flexible circuit, called FLEX-PRINT wiring, greatly simplifies the

design of electronic and electrical systems, since it can be easily routed through crowded layouts. Thus, according to the manufacturer, the printed circuit, free from rigidity, is no longer the determining design factor in the assembly. For information write SANDERS ASSOCIATES, INC., Nashua, N.H., or use reader card.

Circle 202 on Reader Service Card.

paper tape reader

The model 3500 photoelectric reader is a completely solid-state unit which stops before the next character at



reading speeds of 1000 characters per second. The stop is made possible by

IN-LINE DIGITAL DISPLAY WITH **ONE PLANE PRESENTATION**



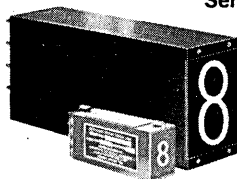
SERIES 10,000

OUTSTANDING FEATURES

- Reliable, dependable, no moving parts.
- All digits displayed on front surface viewing screen...quickly seen from any angle of viewing.
- All digits uniform in size and intensity...easier and faster to read.
- High-contrast viewing screen insures utmost visual sharpness.
- Digit style of your choice to complement manufacturer's original equipment.
- Colored digits of your choice for special environmental lighting.
- Individual units may be assembled in groups for convenient panel mounting.
- Dimensions: 1-9/16" wide, 2 5/8" high, 5 7/8" long.

NEW! LARGE IN-LINE DISPLAY

Series 80,000



\$3300
each

Quantity
prices
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Offers same outstanding features as Series 10,000 In-Line Display, but approx. four times larger. Easily viewed over 100 feet away.

PRICE PER UNIT

\$18⁰⁰

QUANTITY PRICES
ON REQUEST

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COMPLETE DETAILED
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Engineers and Manufacturers of
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ENGINEERS

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Aeronutronic, a new division of Ford Motor Company, has immediate need for computer engineers to staff its new \$22 million Research Center in Newport Beach, Southern California. Here, you have all the advantages of a stimulating environment, working with advanced equipment, located where you can enjoy California living at its finest.

Look into these ground floor opportunities in research and development work that is challenging and exceptionally rewarding to qualified men.

Positions now open:

- Systems Engineer
- Magnetic Memory Engineers
- Communications Engineers
- Digital Computer Programmers
- Transistorized Circuit Engineers
- Logical Designers
- Circuit Engineers
- Mechanical Engineers
- Optical Engineers

Qualified applicants are invited to send resumes or inquiries to Mr. R. E. Durant, Aeronutronic, Box NH-486, Newport Beach, California.

Computer Operations

AERONUTRONIC

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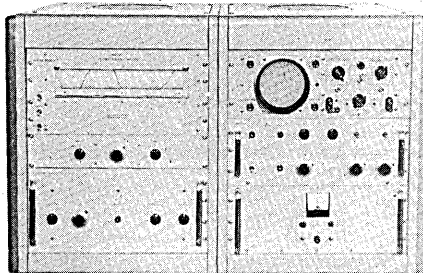
NEW PRODUCTS

a design feature which has essentially eliminated mechanical motion involved in stopping the tape. Both dual and single speed units operating at 100 to 1500 characters per second are available. Only silicon photodiodes are used, providing stability over wide temperature ranges. The light source is considerably derated. The reader mounts on a standard 19 in. rack and takes up seven in. of space. Power requirements are 115 volts, 60 cps, 180 watts. For information write DIGITRONICS CORP., Albertson Ave., Albertson, L.I., N.Y.

Circle 203 on Reader Service Card.

analog computer

An analog computer, Model CF-1, especially designed to solve Fourier integrals, can be used to determine the



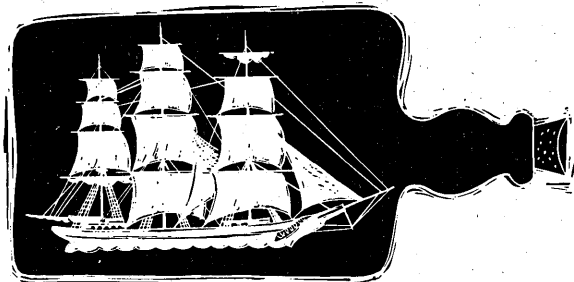
far fields of aperture antennas from the distribution of the field in the

aperture, the far fields of arrays from the magnitude and phase of the currents in the elements, the frequency spectra of voltage pulses, and other physical problems involving Fourier transforms and their inverse transforms over finite limits. In operation, amplitude and phase input functions are plotted on graph paper for presentation to the computer. These functions are taken off the graph with a photoelectric reader, passed through a pulse position to voltage converter and then to appropriate computing circuitry. For information write SCIENTIFIC-ATLANTA, INC., 2162 Piedmont Rd., N.E., Atlanta 9, Georgia, or use reader service card.

Circle 204 on Reader Service Card.

oscillogram, chart reader

A new oscillogram and strip chart record reader, the OSCAR Model K, is priced for the smaller laboratory and test facility. The reader measures trace amplitudes, applies a linear or non-linear calibration, converts the data to engineering units and automatically operates a typewriter and card punch. This complete system has motorized chart drive, patchboard programming, channel and time counters, in-line decimal displays and a serial keyboard for manual data input. For information write BENSON-



PARAMETERS

Yesterday's limitations on logic design are broken through today. Our capabilities in this field contribute to the advanced design of the airborne computers used in our Inertial Guidance systems. If the new parameters in logic design challenge you, perhaps you'd like to work with us. Write to Mr. C. T. Petrie.

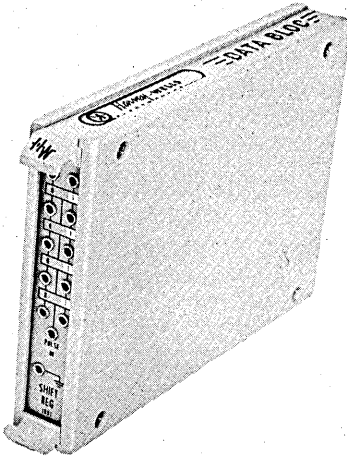


LITTON INDUSTRIES Electronic Equipments Division
Beverly Hills, California

LEHNER CORP., 1860 Franklin St.,
Santa Monica, Calif., or use card.
Circle 205 on Reader Service Card.

shift register

A four-stage shift register featuring three inputs and eight outputs, may be cascaded to form a multistage

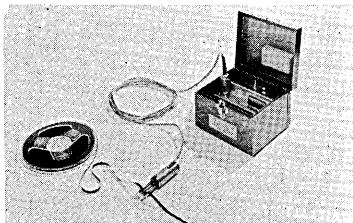


shift register. It has the same electrical characteristics as other units in the manufacturer's lines. The new unit replaces four standard Flip Flop B units for shift register applications. For information write HARVEY-WELLS ELECTRONICS, INC., Research & Development Div., E. Natick Industrial Park, Natick, Mass.

Circle 206 on Reader Service Card.

mag tape tensiometer

The Model K-44 Magnetic Tape Tensiometer was designed to allow measurement and recording of both the



steady-state and transient tensions experienced by magnetic tape during its use in tape recorder transports. Both 1/2-inch and 3/4-inch tapes may be accommodated. The tensiometer may be inserted at any point in a tape path having a minimum clear area of 3/4" x 3/16", and a minimum clearance between the recorder deck and inner tape edge of 1/4". The instrument has a range from 0 to 8 lbs. For information write GENERAL KINETICS, INC., 555 23rd St., S., Arlington 2, Va., or use reader service card.

Circle 207 on Reader Service Card.

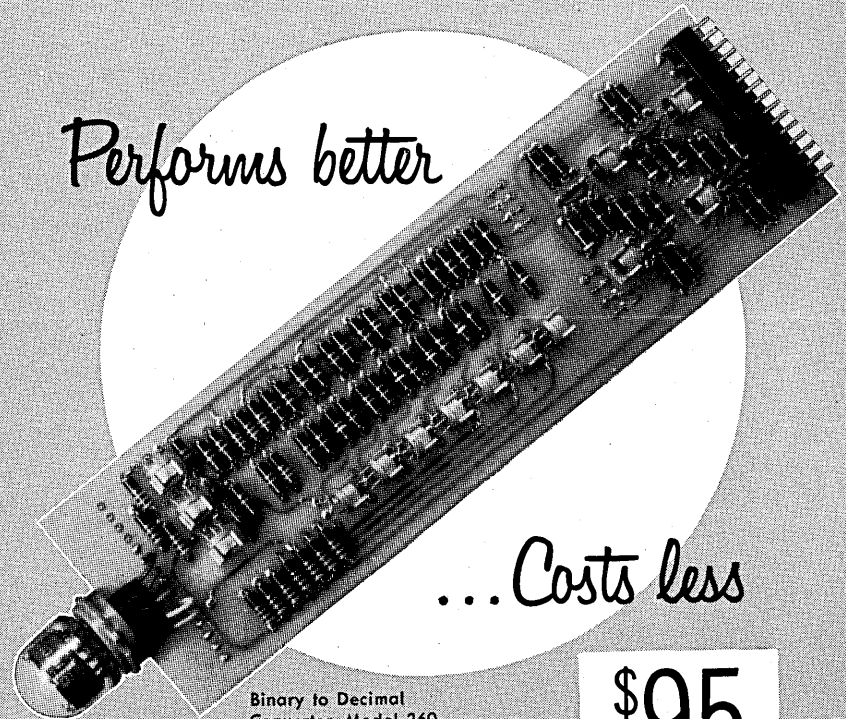
magnetic tape shields

A new line of magnetically shielded containers, designed to accommodate recording tapes that are normally

Hermes Solid State BINARY TO DECIMAL CONVERTER

for converting any 4 bit code
to decimal illuminated display

Performs better



... Costs less

Binary to Decimal Converter, Model 260, shown approx. 1/2 size

\$95

(Nixie Bulb not included)

Discounts for quantity purchases

NO FALSE READOUTS

Relays and tubes eliminated

MAXIMUM RELIABILITY

100% solid state circuitry

LONG USEFUL LIFE

No preventive maintenance required

OPERATIONAL FLEXIBILITY

Variety of four bit codes can be converted

LATCHING CIRCUITS

Provide memory for binary information

Write for Technical Bulletin 260

Hermes



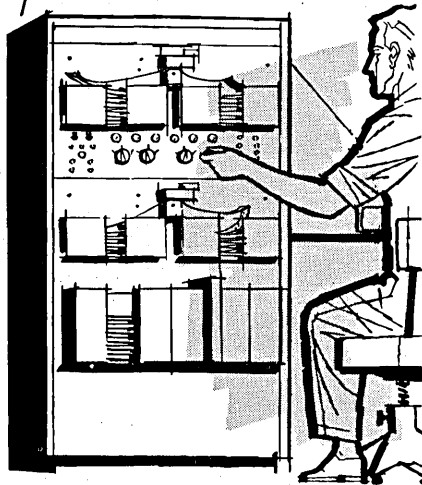
ELECTRONICS CO.

75 CAMBRIDGE PARKWAY, CAMBRIDGE 42, MASSACHUSETTS

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This is the New

TALLY



Tape Preparation & Editing Console

It makes error-free paper tape

By automatically verifying and/or duplicating paper tapes. The console consists of a numerical keyboard, two punch tape readers and one tape perforator. The buffer storage system uses unique Tally Logic Switches.

It features...

- Tape to tape duplication and verification at 60 characters per second
- Keyboard visual display and shift register to eliminate copying errors and operator fatigue in both punching and verifying modes
- Tape corrections without over punching or splicing.

It's ready for delivery now

For complete technical information, prices, delivery, and the name of your nearest Tally engineering representative who will be happy to arrange for a demonstration, please address Dept. 80

TALLY
REGISTER CORPORATION
5300 14th Avenue N.W., Seattle 7, Wash.

See this Console and other tape handling equipment at WESCON, Booth 119.

Circle 19 on Reader Service Card.

NEW PRODUCTS



supplied in square or round plastic reel cases, is now available. Tapes are protected against erasure or distortion caused by extraneous magnetic fields. The containers are available in round and square shapes, in single or multiple reel capacities. The Netic Co-Netic alloys are non-shock sensitive, non-retentive and do not require periodic annealing to maintain shielding effectiveness. For information write MAGNETIC SHIELD DIVISION, Perfection Mica Co., 1322 N. Elston Ave., Chicago 22, Ill.

Circle 208 on Reader Service Card.

paper tape reader

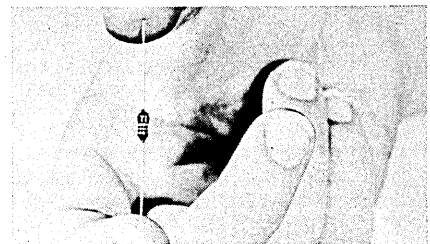
A punched tape reader (Model 909) with a companion spooler mechanism

(Model 3299) is now in production. A completely transistorized electronic readout system is included with output signals compatible with most data processing systems. Reading speeds up to 200 characters per second are possible with the spooler, which accommodates paper or mylar tape up to one inch in width on eight inch diameter reels. Without the spooler, the Model 909 is capable of reading at rates up to 1000 characters per second and stop on a "STOP" character. For information write POTTER INSTRUMENT CO., INC., Plainview, L.I., N.Y., or use reader service card.

Circle 209 on Reader Service Card.

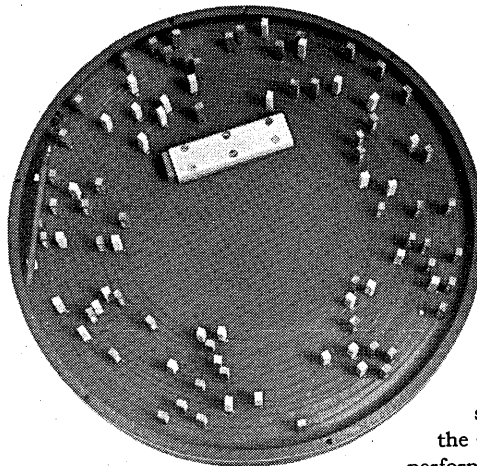
silicon mesa diodes

These diffused devices switch from 10 ma forward current to six volts reverse in four millimicroseconds max-



imum. The switching capability of TI 1N914 and 1N916 is coupled with a capacitance of two micromicro-

G-E WIRE SONIC DELAY LINES PROVIDE LOWER INSERTION LOSS HIGHER STORAGE RATE



Information storage up to 1.2 mc/s
Delay up to Ten Milliseconds
Adjustable Delay
Small Volume for Length of Delay
Shock and Vibration Resistant
Stable over Wide Temperature Range

Wire Sonic Delay Lines employ a special alloy wire as the delay medium. G.E. uses both piezoelectric and magnetostrictive transducers to provide the greatest possible range of system performance: Piezoelectric transducers assure *minimum insertion loss* for fixed inputs and/or outputs while the magnetostrictive transducers provide intermediate taps, both fixed and adjustable.

For complete development information write to Defense Industries Sales, Sect. 227-28E

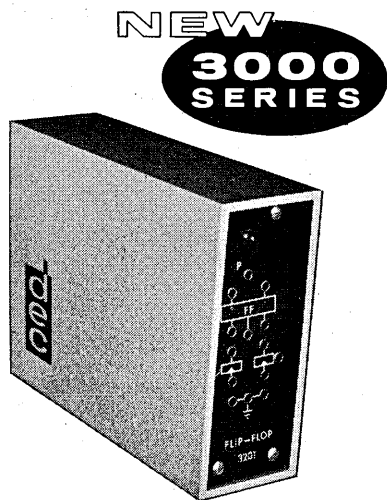
GENERAL ELECTRIC

DEFENSE ELECTRONICS DIVISION
HEAVY MILITARY ELECTRONICS DEPARTMENT, SYRACUSE, NEW YORK

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an economical
new line of
**DIGITAL
TEST
EQUIPMENT**

New low-speed, low-cost version of Digital's unique patchcord-interconnecting building block test units.



Coordinated logic packages
Operate at any speed up to 500 kc.
Directly compatible with 5 mc. line
Priced as low as \$43.00 per unit

Graphic front panels — a Digital first — make the 3000 Series ideal for educational uses. Also a great time- and work-saver in test and development projects. Write for complete information on this new line of high quality, high reliability DEC Digital Test Equipment.

digital

**EQUIPMENT
CORPORATION**

MAYNARD, MASSACHUSETTS

WEST COAST OFFICE: 690 N. Sepulveda Blvd
El Segundo, California (EAsgate 2-5707)
Circle 21 on Reader Service Card.

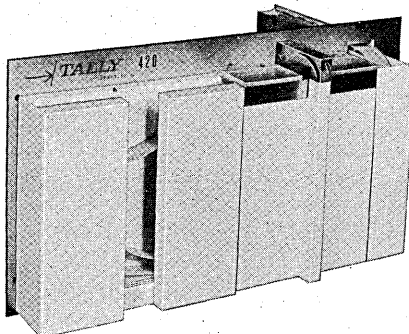
farads (max). For frequencies up to 100 megacycles, both diodes provide a minimum rectification efficiency of 45% and have a guaranteed maximum leakage of 25 millimicroamperes at 20 volts. The mesa diodes feature a high peak inverse voltage of 75 volts. Both devices will dissipate 250 mw of power at 25°C and have a guaranteed minimum forward voltage of 1 volt at 10 milliamps. For information write TEXAS INSTRUMENTS, INC., P. O. Box 312, Dallas, Texas.
Circle 210 on Reader Service Card.

data converter

Data conversion from four binary inputs to a tape recording in the IBM 704 format is possible with an all-transistor data converter which will convert a 27-bit time code, one 20-bit data signal, and two 17-bit data signals into an IBM 704 magnetic tape. The unit will also supply signal outputs to seven central locations also in the 704 coding but without gaps between the blocks. The sampling rate of the input data may be selected at 10, 20, 40, 80, or 100 pps. The data converter was designed for the multiplexing and the recording of range, azimuth, and elevation data from digital radar outputs together with a timing signal. For information write ELECTRONIC ENGINEERING COMPANY OF CALIFORNIA, 1601 East Chestnut Ave., Santa Ana, Calif.
Circle 211 on Reader Service Card.

paper tape perforator

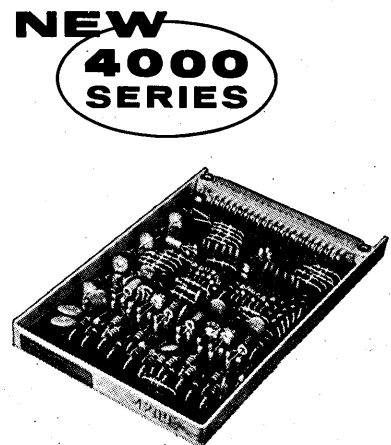
Designed to accept tape of varying widths up to eight channels. This 60 char/sec. perforator prepares tape



from keyboards, tape reproducers, digital counters and digital data handling systems. The unit is available in two models: Model 420PF, a panel mounted unit for fan fold tape handling, and Model 420PR, using reels. The fan fold model offers easy tape handling and space-saving storage without rewinding. Tally perforators use wire clutch drives for each punch. This provides a non-synchronous

an economical
new line of
**SYSTEM
BUILDING
BLOCKS**

New low-speed, low-cost version of Digital's popular interchangeable plug-in building block design units



Coordinated logic packages
Operate at any speed up to 500 kc.
Directly compatible with 5 mc. line
Priced as low as \$43.00 per unit

Ruggedly built for long, trouble-free service, the 4000 Series is especially suitable for process control systems and other applications where very high speeds are not required. Write for details on this new money-saving line of proven-performance DEC System Building Blocks.

digital

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MAYNARD, MASSACHUSETTS

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El Segundo, California (EAsgate 2-5707)
Circle 22 on Reader Service Card.

A Message to

Computer Engineers

Capable of Advanced Research
and Development in

TRANSISTORIZED AIRBORNE DIGITAL COMPUTING SYSTEMS

Wide latitude is accorded the qualified individual team member at our Advanced Electronics Research and Development Laboratory. Under the direction of Dr. Arthur S. Robinson, a broad program of exploration is in progress in the development of new concepts in solid state airborne digital computers and digital control systems. This program is the logical extension of the Bendix developments which, in 1955, resulted in the first successful fully transistorized automatic flight control system.

If you find satisfaction in defining and solving advanced problems in computer technology, the work of this Laboratory has a great deal to offer. If you are currently qualified in one of the following areas...

- | | |
|---------------------------|-------------------------|
| Digital Systems Synthesis | Pulse Techniques |
| High Speed Switching | Input-Output Devices |
| Logical Implementations | Transistorized Circuits |
| Magnetic Memory | Micro-Miniaturization |
| Logical Design | |

...we suggest that you send a brief resume of your experience and educational background to Dr. Robinson, or telephone Engineering Personnel at ATLAS 8-2000 in New Jersey, or BRyant 9-8541 in New York.

ECLIPSE-PIONEER DIVISION



AVIATION CORPORATION

Route 46 at 17, Teterboro, New Jersey

(Located in suburban New Jersey, 10 minutes from New York City)

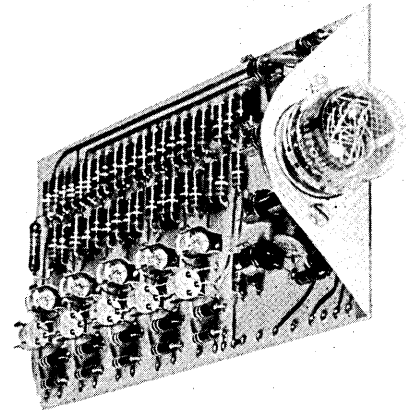
Circle 72 on Reader Service Card.

NEW PRODUCTS

drive that can be operated at any speed if the minimum time interval between cycles is not less than 16 $\frac{2}{3}$ milliseconds. For information write TALLY REGISTER CORP., 5300 14th Ave., N.W., Seattle 7, Wash.
Circle 212 on Reader Service Card.

binary-decimal converter

A solid state binary to decimal converter, Model 260, has been designed as companion equipment for com-

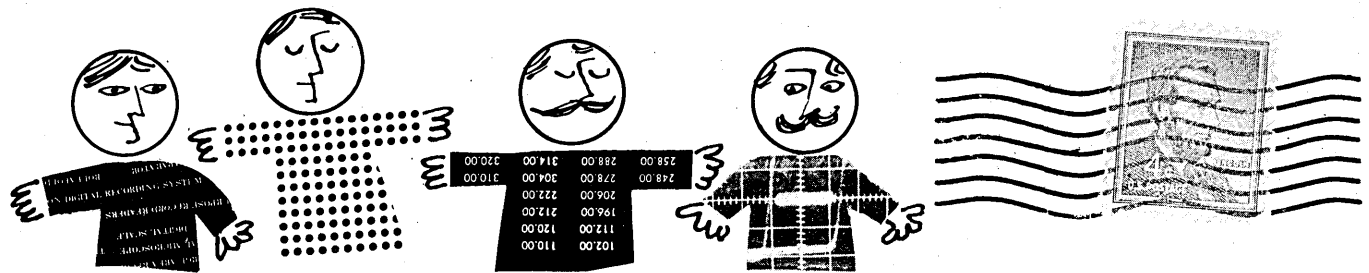


puters which require decimal display readout for any number of four bit code inputs. The converter activates a cold-cathode decimal display. Filamentary projected readout equivalent to IEE Alpha-Numeric Unit is available on special order. A variety of four bit codes can be converted. Model 260 is available as a single plug-in module complete with illuminated display or as an assembly of a number of modules which are packaged for mounting in a standard RETMA rack. For information write HERMES ELECTRONICS CO., 75 Cambridge Parkway, Cambridge 42, Mass., or use reader service card.
Circle 213 on Reader Service Card.

analog computer

The AR-2 analog computer measures 35 $\frac{1}{2}$ x 21 x 23 inches. It is furnished complete with twelve amplifiers, sixteen potentiometers, a pulse generator, and a stepping function generator. Six of the amplifiers can be used as integrators (with three different ratios of integration). An x-y plotter can be used to plot one variable against another. Developed by Guttinger Industries in Switzerland, the AR-2 sales and manufacturing rights are held by Boonschaft and Fuchs in this country. For information write BOONSHAFT AND FUCHS, INC., Hatboro Industrial Park, Hatboro, Pa., or use card.
Circle 214 on Reader Service Card.

Circle 214 on Reader Service Card.



AND STILL MORE ON COMPUTER CONFERENCES

letters to and from WJCC's chairman

(During 1959, *DATAMATION* offered several commentaries on computer conferences. We presented various opinions of what made these gatherings effective or ineffective and what could be done to improve them.

On these pages are two letters which should dispose of this question for at least the duration of 1960.

DATAMATION feels that both letters deserve careful attention since they demonstrate that ideas for conference improvements are being generated and, more important, conference planners are aware that problems exist and are trying to alleviate them.—Ed.)

15 July 1959

Mr. Robert M. Bennett, Jr.
International Business Machines Corp.
San Jose, California

Dear Mr. Bennett:

A group of us at RAND got together one afternoon to discuss how our computing conventions could be improved (a popular subject, indeed). Since you are the general chairman of the next convention which could possibly be affected, we thought you would probably not be offended at hearing our conclusions . . .

Let's begin by listing the main reasons for having a convention in the first place. This list could be arrived at another way: what are some of the reasons why a company should be willing to pay out several hundred dollars per man to send people to computing conventions? The following list may not be exhaustive, and is not necessarily in priority order.

I. Opportunity to gather information from individuals (other than the speakers). This includes contacts with professional colleagues as well as the chance to hear things off-the-record which might never appear in print. Many persons rate this topic as the number one reason for the existence of a convention, but this may be only their reaction to the quality level of past conventions. It is certainly the chief thing which cannot be provided by any amount of reading.

II. Exhibits. Apart from being a splendid source of revenue, exhibits are probably good, since attendance at exhibit halls seems to indicate a certain amount of interest. Again, one must be wary of jumping to conclusions: it is conceivable that the exhibit hall is the only convenient place to go to escape from dull, prolix, or poorly prepared talks without leaving the convention. Then, too, there have been conventions where the exhibit hall had the only drinking water at the convention and/or the only friendly girls. Still, people have testified that they gather useful information at the exhibits and, as in (I), make interesting contacts there.

III. Stimulation . . . Presumably, one should be stim-

ulated at hearing news of what is going on elsewhere and of things to come in both hardware and systems.

IV. Controversy. This is generally stimulating, but is a separate topic. In a field as dynamic as ours, few absolutes exist and it would take a bold soul to certify that any single thing we do is really done right. Nearly all installations tend to believe that something is correct because that's the way we do it; it could be refreshing to hear the cry "you're doing it all wrong."

V. Scheduled talks. Look how far we got before we thought of the official program! At that, very few papers (using the past as a criterion) belong on this list. State-of-the-art papers do; e.g., papers which announce a new machine, or a new operating coding system. On the other hand, nearly everyone who has ever attended a convention can list rapidly many categories of papers which made him regret his trip.

VI. Broadening. We have to face the fact that people won't, don't, or can't read, and properly prepared talks can substitute in part for the reading we should have done . . .

VII. Morale. If some or all of the above items apply to an individual, he receives a boost to his morale. Since improved morale is good, convention-going is a sort of fringe benefit of his job. Any improvement in his knowledge of the field is a free bonus which his company receives . . .

VIII. Miscellaneous. Men are sent to conventions for advertising and public relations. Similarly, it is not unknown for companies to send whole teams to a convention for purposes of recruiting; conversely, individuals sometimes go to a convention with an eye to job-hopping.

There is a small group who attend conventions out of duty; included are committee members, etc., who might, at the moment, be bored stiff with conventions but must attend.

All right; these, we think, are the main reasons for having a convention. Perhaps from them we can suggest some ways to improve future conventions.

A. For the first four items above there is not a great deal that a convention chairman can do. However, since many attendees do value the opportunity to meet and talk with others, some pains should be taken to assist this function. Perhaps we could use more planned luncheons and after-hours social activities geared to the idea of mixing and talking. Lunches and dinners tend to group people in a rather random way; our thought is that perhaps small groups could be organized more efficiently. Maybe the exhibits should be spread out more, which would reduce the noise level and provide a space for three people to sit. Designation of "meeting" places might help.

B. The program itself. Here is where the real work should be done. We feel that it is fatuous to have the most capable men available working on mundane things

General Electric's Missile & Space Vehicle Dept. Building New \$14,000,000 Space Research Center

17 miles from Philadelphia, Near Valley Forge Park

Back in 1956 this General Electric organization outgrew its quarters in Schenectady, N. Y. and moved to Philadelphia. Since then its research and development staff has increased 5-fold. A new move is fast becoming imperative and will be met by the \$14,000,000 Space Research Center now under construction on a 132 acres site near Valley Forge Park. This construction will feature unique facilities, to be utilized in a long-term program, to expand the activities in the realm of space research and the development of space vehicles and systems—areas in which MSVD has already contributed so many notable advances:

- the FIRST re-entry at ICBM range with both heatsink and ablation methods
- the FIRST recovery of payload from space
- the FIRST movies of earth from space
- the FIRST flight demonstration of effective space vehicle stabilization control and navigation (control systems of interplanetary capacity)
- the FIRST measurements in space of earth's magnetic field and infrared radiation
- the FIRST meteorological information from space
- the FIRST organic plastic ablation material for nose cone re-entry protection capable of withstanding temperatures from 5,000 to 13,000°F

Currently a broad diversity of programs are under way at MSVD, offering assignments of exceptional interest to engineers and scientists qualified to work with a research-oriented organization. Your inquiries are invited regarding the following areas: SYSTEMS ENGINEERING • AERODYNAMICS • THERMODYNAMICS • GUIDANCE & CONTROL • INSTRUMENTATION & COMMUNICATION • PLASMA PHYSICS • GAS DYNAMICS • AEROMEDICAL DESIGN ENGINEERING • ANTENNA & MICROWAVE DESIGN • SPACE MECHANICS • STRUCTURAL DESIGN • ENERGY CONVERSION • HUMAN FACTORS • ADVANCED POWER SYSTEMS • RELIABILITY ENGINEERING • PRODUCIBILITY ENGINEERING • ARMING AND FUZING SYSTEMS • APPLIED MATHEMATICS & COMPUTER PROGRAMMING

Write in confidence to: Mr. Thomas H. Sebring, Div. 56-BMA

Missile & Space Vehicle Department

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3198 Chestnut St., Philadelphia 4, Pa.

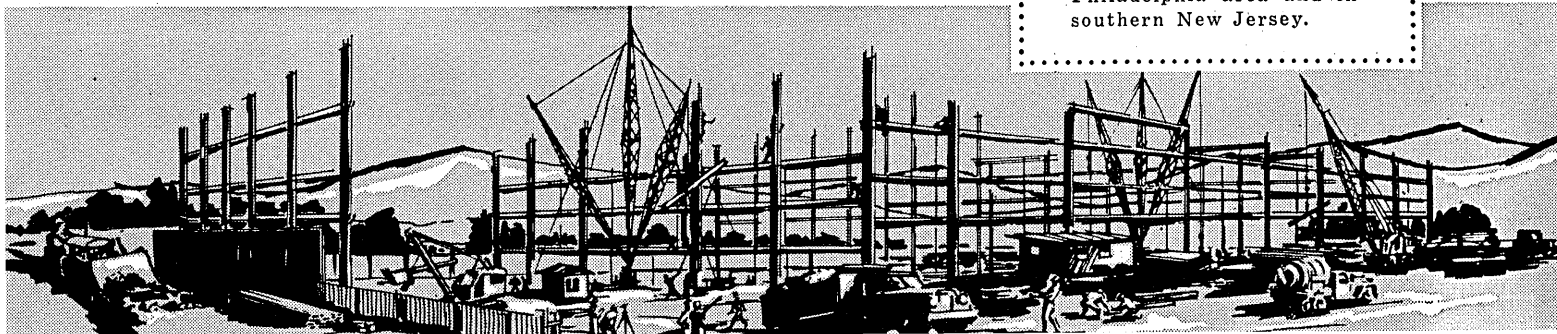
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A campus-like setting is planned for the new Space Research Center which General Electric's Missile and Space Vehicle Department is building close to historic Valley Forge Park. Situated at the junction of the Schuylkill Expressway and Pennsylvania Turnpike, the Center will be easily reached by engineers and scientists living in the Philadelphia area and in southern New Jersey.



COMPUTER CONFERENCES

like registration and arrangements; these men are urgently needed to guide the program. This is not to say that the more mechanical chores can be neglected (see C below), but they should be left to mechanically minded people. Our suggestions regarding the program are pointed primarily at the program chairman, but must be of concern to the general chairman as well.

1. Parallel sessions. This one is good for an hour's hot debate anytime. A joint computer conference by its very origin, must cater to two groups (the designers and the users). It is natural, then, to plan two parallel sessions . . . Our conclusions are as follows: there should be no more than two sessions in parallel at any one time, and then not all the time; and the total number of papers should be drastically reduced.

2. There is a vast difference between papers which should be given orally and papers which should never be given orally. Examples of the latter are quite obvious; (a) Our New Complicated Flip Flop Circuit, (b) The Equations for a New Method of Solving Partial Differential Equations (c) The Flow Charts for the XYZ Company's Production Control System.

The program committee needs to take a stand on this topic. Papers which fall into the "never to be given orally" category should be refused, no matter how important the discovery they recount. They can be accepted in the form of distributed preprints to be discussed.

3. Which leads to a stronger point: no one should ever be allowed to read (literally) his paper . . . If the paper can be put into finished form, suitable for reading, it can almost as easily be duplicated and handed out. And in that case, we could all make much better use of our time (assuming we're interested in it after having read it) by discussing it.

4. Whatever happened to real panel discussions? We do not refer here to the situation where four men who never met before each give a ten minute speech — we mean a discussion, led by someone who has the ability and the nerve to shut them off at the appropriate time. This good device seems to have vanished.

5. Similarly, except for dinner speeches, there seem to be fewer invited papers these days: An invited talk, assuming the one who invites knows what he's doing, has an intrinsic high probability of being successful.

6. Great stress should be put on state-of-the-art papers which are likely to disseminate useful information in a way which shortcuts the normal nine months' delay. For example: a paper which gives the facts concerning the announcement of a new computer (but keep in mind item 2!).

7. We do not believe that there can be any justification for prestige papers, either for individuals or companies. No manufacturer has a right to a place on the program simply because other manufacturers are represented who do have something to say. Similarly, one should be wary of papers whose sole purpose could in any way be construed to be that of getting a man's name on the program. Unfortunately, the fact that that was his purpose usually becomes evident only after the paper is delivered.

8. We think it is morally wrong to pad a program. To be sure, you have three days and three auditoriums (and

a fat program fills out an envelope better than a thin one), but if the material runs out along the line, we suggest that the program be terminated right there. It would be a refreshing change.

9. A nice approach to selecting the program might be this: look at the convention as a graduate school for those who already have their degrees in programming or design.

C. Mechanics

1. Arrange to have session chairmen watch the timing of the session and of each talk. Especially with parallel sessions, it is disconcerting to change channels and find that the other network is 20 minutes out of phase.

Session chairmen, we have found, like to be good Joes and let a speaker wander a few minutes over his time period. This is really gracious to the one o'clock speaker who is mighty rude to the subsequent five o'clock speaker who is now going to go on at ten minutes to six. It also ruins the timing of the parallel session, and is somewhat discourteous to the audience, who paid their nickel in the belief that this was to be a half hour talk.

2. Have someone make himself personally responsible for the smooth functioning of PA systems and projectors. If questions are to be received from the floor, and they are to be heard on the PA system, have extra mikes and attendants for them, so that the crowd is not held up while each questioner trips up to the stage.

It would help a great deal if there were lots of signs posted, saying "this way to the XYZ room." And somewhere around the main desk there should be posted notices of the time and place of all committee meetings . . .

3. For one recent convention, the program material went out six weeks before the conference opened. This is just too short a time for many persons to come to a decision and then push through the paper work to go. We realize that there are any number of excellent reasons why the printed program is held up, but the effort should be made to increase the lead time to eight weeks.

4. Registration at some recent conventions has been pretty miserable. It is ridiculous to have to sweat out a long line, then get your card to fill out, then find that the little girl has never before met the problem of making change, and then go to another line to have an identification tag typed. The point need not be labored further. A very small amount of advance planning would pay off handsomely here.

We look forward to hearing your reaction.

Cordially,
E. A. Feigenbaum
I. D. Greenwald
F. J. Gruenberger
E. H. Jacobs

Mr. E. A. Feigenbaum
The Rand Corporation
1700 Main Street
Santa Monica, California

Dear Mr. Feigenbaum:

This letter is being addressed to you with copies to the rest of the individuals who signed the letter of July 15, with suggestions regarding the management of a computer conference. It is easier to write to one individual rather than to four.

First let me say that the delay in answering your letter is primarily due to vacation and work schedules. Copies



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COMPUTER CONFERENCES

of your letter were made and circulated to various members of the 1960 WJCC steering committee for their perusal and comments.

I must say that this letter was extremely well thought out and presented. I wish indeed that more people would take an active interest in indicating their feelings and desires regarding Joint Computer Conferences. I am sure that the active committees each year would welcome such comments. In general it is rather like working in the dark in which you try to obtain comments, ideas, and suggestions from as many people as you can talk to and then going ahead with plans probably based on your own prejudices. Outside comments tend to alleviate this.

It is of interest to note that most of the points which you discussed in your letter were also discussed in some very spirited sessions by our own committee members and with quite good general agreement with your conclusions. One point of particular interest was your suggestion for some meeting arrangements where people can sit down and chat without blocking or filling up exhibit space. This is being seriously considered for the 1960 conference.

I might indicate some of the basic philosophies which have been adopted by this year's committee. These specifically apply to the program which we feel has been somewhat lacking in quality in recent years.

(1) We are being extremely critical in reviewing papers and being very hardhearted regarding invitational papers if they do not meet our standards.

(2) The number of sessions will be limited and scheduling is going to be attempted to allow every paper to be heard by an individual. In general this will mean a maximum of two sessions going on simultaneously.

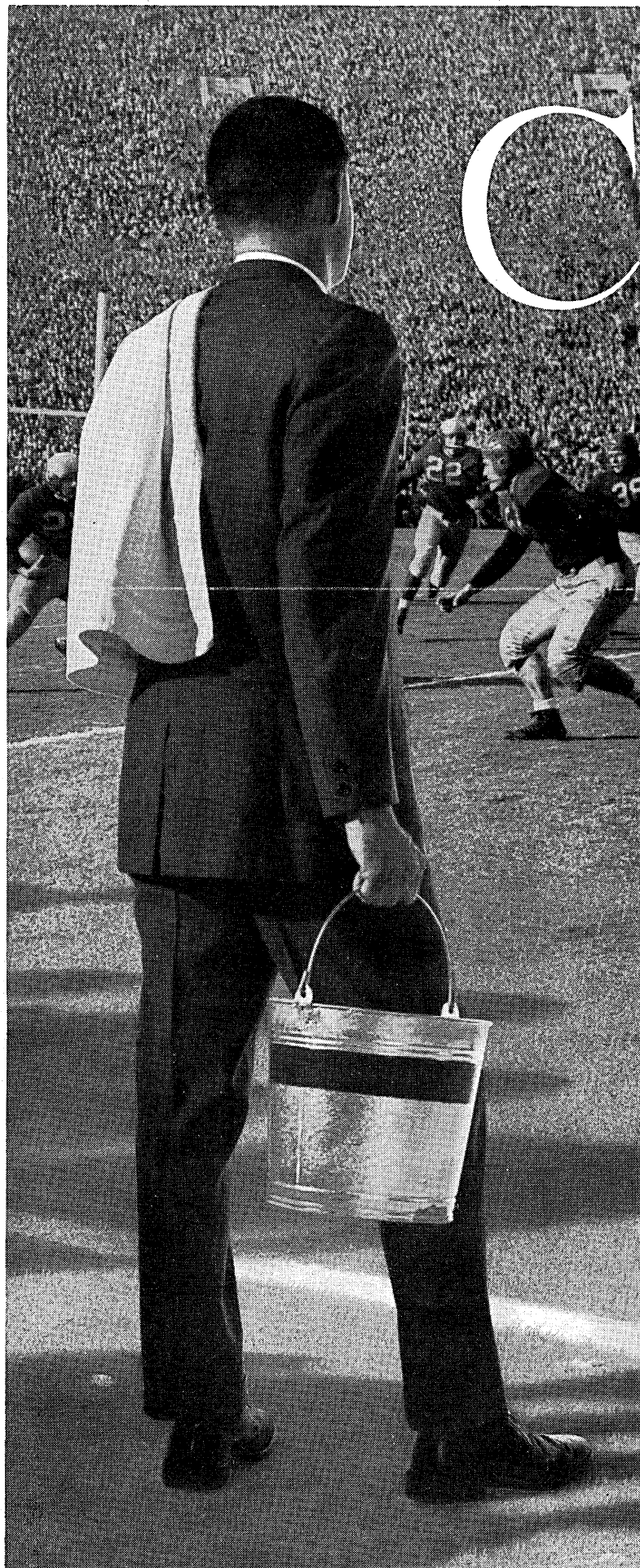
(3) We are attempting to print the proceedings in time for passing out at the conference. This will result in two things. One, the papers can be read by interested individuals prior to attending the session; secondly, this will tend to improve the presentations by the speaker because there will be no reason for reading the paper. We are attempting to encourage the authors to take one of two tacks, one being to take a particular section of his paper and expand upon it, and two, to bring the information up to date.

(4) Sessions will be strictly held on time and speakers will be limited in time both for purposes of scheduling and to allow what we hope will be very aggressive question and answer or discussion sessions.

(5) We anticipate scheduling some panel discussions which will not involve papers at all but will be controlled presentations by recognized experts in their fields.

Again let me thank you gentlemen for your comments and your presentation and, rest assured that your letter was quite thoroughly gone over and discussed at our committee meetings. I might mention that your presentation leads me to one quite obvious conclusion, namely that you gentlemen might well form the nucleus of an excellent working committee for the 1961 WJCC in Los Angeles.

Sincerely yours,
R. M. Bennett
General Chairman
1960 WJCC



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.....
"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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MODEL 160 MAKES DEBUT

cdc announces compact machine

Control Data Corporation, Minneapolis, through no malice aforethought, has rendered a DATAMATION article ("Speaking of Small Computers," November/December, 1959) slightly less effective by announcing a new desk-size computer — the Model 160. Thus, two new machines (see below and page 17) were on the scene roughly a month after our article appeared. And at least one more small computer may soon be on the market.

Concerning this compact machine, CDC states that "the magnetic core memory of 1496 twelve-bit words is the fastest in its price class of \$60,000 computers. First delivery of a 160 is scheduled this spring.

The Model 160 is a parallel, twelve-bit, single-address computer with a basic add time of 12.8 microseconds. Random-access storage has a storage cycle time of 6.4 microseconds. Information read is available 2.2 microseconds after the start of the cycle. Average execution time for an entire program is approximately 15 microseconds per instruction.

Operation of this new desk-size computer is controlled by an internally stored program located in sequential storage locations. These instructions operate on two major registers, A and P, each handling 12 bits of information.



The single-address, twelve-bit instruction word is divided into a 6-bit function code (F) and a 6-bit execution address (E). The function code utilizes the most significant six bits of the instruction word and determines which of the 62 possible instructions will be performed; the least significant six bits are used to determine the execution address.

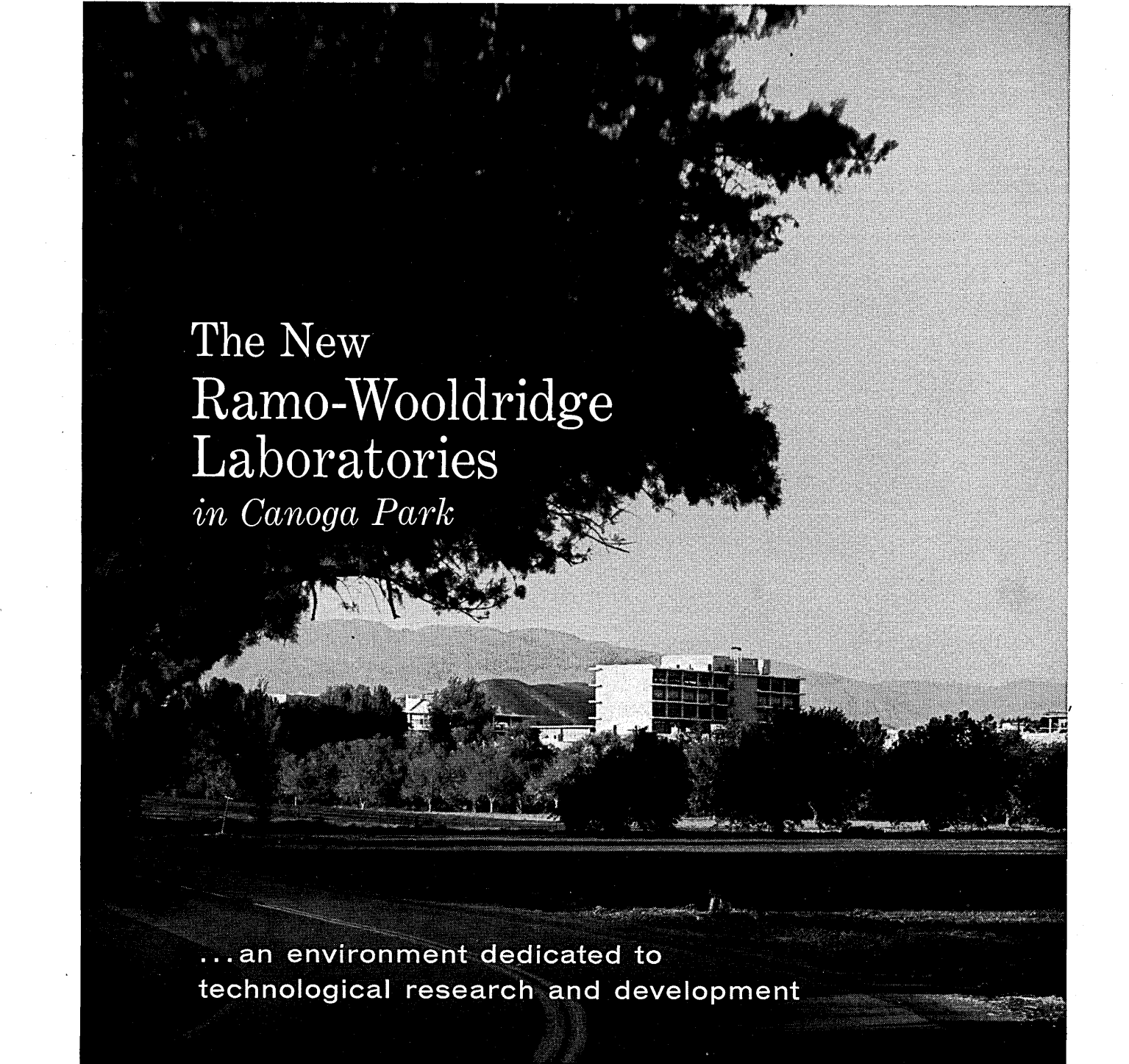
Internal organization of the Model 160 has been designed to obtain the maximum data processing capabilities with the least amount of hardware. A major factor in this attainment is the use of the adder pyramid — time shared to perform all addition operations required in the computer.

With a repertoire of 62 instructions, the computer is simple to program. Various addressing modes are offered, depending on the instruction code. These modes include no address, direct address, indirect address, and relative address. Through the various addressing modes, the 6-bit address is used to specify one of the first 64 storage locations, or one of the 63 locations preceding or following the instructions — and, indirectly, the 4096 words of memory.

A wide range of input-output devices can be used with the 160. Standard equipment consists of a 350-character per second paper type reader and a 60-character per second paper tape punch. Optional equipment includes an electric typewriter, magnetic tape units (15 KC or 30 KC), card reader and punch, and line printer.

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DATAMATION



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academic environment necessary for creative work. The new Laboratories will be the West Coast headquarters of Thompson Ramo Wooldridge Inc. as well as house the Ramo-Wooldridge division of TRW.

The Ramo-Wooldridge Laboratories are engaged in the broad fields of electronic systems technology, computers, and data processing. Outstanding opportunities exist for scientists and engineers.

For specific information on current openings write to Mr. D. L. Pyke.



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new **DATAMATION** literature

LARC: A forty-page booklet, U-1797, contains a general description of the Univac LARC system. With diagrams and charts the contents include sections on the computer, the processor, data storage systems, input-output units and control consoles. For copy write REMINGTON RAND UNIVAC, 315 Fourth Ave., New York 10, N.Y., or use reader service card.
Circle 260 on Reader Service Card.

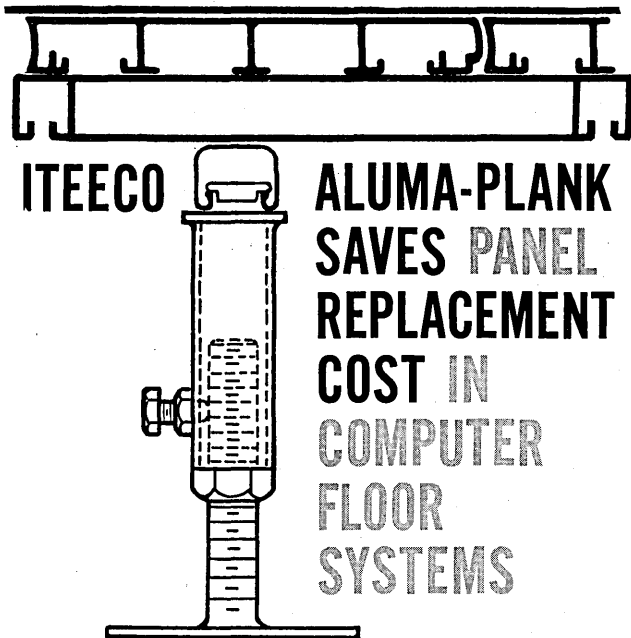
PRINT STATION: An eight-page folder is available on this firm's print station, a high speed printing system for off-line operation from computer prepared magnetic tapes. A record of performance at various installations is included and a description of the units which form the print station. For copy write ANELEX CORP., 150 Causeway St., Boston 14, Mass.
Circle 261 on Reader Service Card.

TRANSISTORS: Brochure G-200 describes manufacturer's complete line of PNP and NPN transistors. Specifications and an applications chart are included. Sections devoted to various transistor types include: audio, computer, high current computer; bilateral, drift, and silicon alloy junction transistors. For copy write GENERAL TRANSISTOR CORP., 91-27 138th Place, Jamaica 35, N.Y., or use card.
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RECORDER/REPRODUCER: Two new booklets present this company's magnetic tape recorder and recorder/reproducer systems: Bulletin 1607 details the Type 5-702 airborne and mobile recorder with specifications and operating description; Bulletin 1618 covers the 5-681 digital tape recorder/reproducer transport, and the 5-682 high-speed transport,

designed to meet a broad range of computer, military and industrial requirements. For copy write CONSOLIDATED ELECTRODYNAMICS CORP., 360 Sierra Madre Villa, Pasadena, Calif., or use reader card.
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ASSEMBLER: Assembly language of "ARGUS," the automatic routine generating and updating system for the Honeywell 800, is contained in a new manual. ARGUS reduces time and effort in coding and checking out programs for the 800 by allowing the computer to perform routine clerical operations, the manufacturer states. For copy write MINNEAPOLIS-HONEYWELL REGULATOR CO., DATAmatic Division, 151 Needham St., Newton Highlands 61, Mass.
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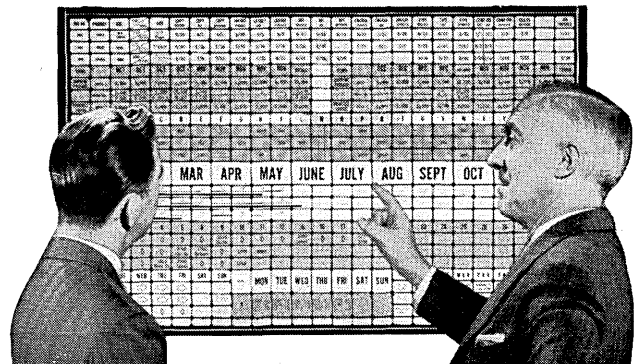
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ANALOG INSTRUMENTS: Typical analog instruments in the various lines produced by this manufacturer are contained in a six-page folder which includes operational amplifiers, operational manifolds, linear operators, etc. The folder is entitled "The Analog Way is the Model Way." For copy write GEORGE A. PHILBRICK RESEARCHES, INC., 285 Columbus Ave., Boston 16, Mass., or use card.
Circle 265 on Reader Service Card.

COMPUTER GAMES: Twelve games, for matching a machine against a human operator, are described in a twelve-page booklet. Explained is the adaptation of these games to various computers. For copy write WILLIS G. McCORMICK CO., 15733 Septo St. Sepulveda, Calif., or use card.
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EDP EQUIPMENT: Preliminary Technical Publication N-07(1) is a 48-page booklet describing this manufacturer's data processing equipment in use. Digital data processing and analog and digital computing systems are included. Types of inputs, input switching, output devices and modes of operation for various applications are explained and fully illustrated. For copy write LEEDS & NORTHROP, CO., 4934 Stenton Ave., Philadelphia 44, Pa., or use reader card.
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ALGEBRAIC COMPUTER: Applications of the ESAC algebraic computer are dealt with in Bulletin No. 16. Frequency response, root locus plots, transient response, factoring polynomials, etc., are but a few of the applications which are contained. For copy write ELECTRO-MEASUREMENTS, INC., 7524 S.W. Macadam, Portland 19, Ore., or use reader card.
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DIGITAL TAPE HANDLER: A new three-color, eight-page brochure on the FR-400 Digital Magnetic Tape Handler, is available. The booklet includes complete specifications on the machine which is available with 1/2-, 3/4- or 1-inch tape, providing up to 32 data channels. For information write AMPEX CORPORATION, Instrumentation Div., 934 Charter St., Redwood City, Calif., or use reader card.
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NEW LITERATURE

variables at frequencies in excess of that feasible by other methods, claims the manufacturer. Details are contained in a 16-page brochure. For copy write **COMPUTER SYSTEMS, INC.**, 611 Broadway, New York 12, N.Y., or use reader service card.

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ELECTRONIC COMPUTER: A 12-page booklet has, as its subject, the Model 1604 large-scale, general purpose digital computer. Sections of the system are dealt with in detail along with diagrams and charts. For copy write **CONTROL DATA CORP.**, 501 Park Ave., Minneapolis 15, Minn.

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BUILDING BLOCKS: Described in a four-page folder are the "3000 Series DEC Digital Test Equipment." Similar in design and appearance to the company's line of 5 megacycle test equipment, the new blocks operate at speeds up to 500 kilocycles. For copy write **DIGITAL EQUIPMENT CORP.**, Maynard, Mass., or use card.

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ANALOG COMPUTER: Application notes, Bulletin AN921-AN932, on the PACE TR-10 system includes the following problem descriptions: design of an automobile suspension system, analysis of the flow path of an old globule, time response of a two-winding transformer, and output response of a positional servo system. Diagrams are included. For copy write **ELECTRONIC ASSOCIATES, INC.**, Long Branch, N.J., or use reader card.

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FERRITE CORES: A folder entitled "Ferrite Switch Cores" includes test specifications and characteristic curves on three types produced by this manufacturer. Also available is Bulletin SL-106A presenting basic characteristics of the standard product lines. For copies write **TELEMETER MAGNETICS, INC.**, P. O. Box 329, Culver City, Calif., or use reader card.

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COMPILER: An 18-page brochure on ACT I, a new compiling routine and translator for the Royal Precision LGP-30 is now available. The compiler is fed into the LGP-30's 4096-word internal memory on punched tape, and translates problems to the machine language automatically. It need not remain in the machine at compute time, thus preserving the en-

tire memory for useful calculation. ACT I is capable of compiling fixed or floating point programs. For copy write ROYAL McBEE CORP., Data Processing Div., Port Chester, N.Y. Circle 275 on Reader Service Card.

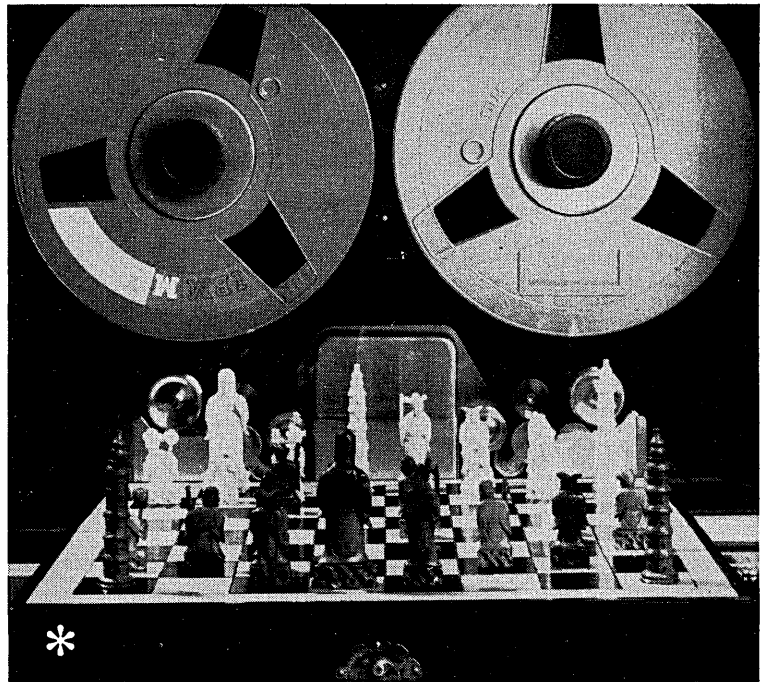
SHIFT REGISTERS: Circuit diagrams, electrical specifications and description of standard units available in encapsulated magnetic shift registers are contained in an eight-page folder. For copy write C & K COMPONENTS, INC., 101 Morse St., Newton 58, Mass., or use card. Circle 276 on Reader Service Card.

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COBOL IS THE LANGUAGE!

but it hasn't had an easy time of it

Last May 28 and 29 a concentrated well-organized movement was initiated to provide the digital computing industry with a common business language. At a meeting sponsored by the Department of Defense, users and manufacturers were brought together in the persons of many of the top names in the computing profession. Officers were elected, committees established and goals set.

At a meeting of the Executive Committee of the Committee on Data Systems Languages, held January 7 and 8 in Washington, COBOL (COmmon Business Oriented Language), the work of the Short Range Language Committee (or Task Group I) was accepted and plans for publishing it are under way.

What transpired between those last days in May and the early days in January is considerably more complicated than the above two paragraphs would indicate. What had all the appearances of a truly idealistic effort soon became punctured with differences of opinion—between individuals and committees. A real suspicion of pressure from some manufacturers seemed to be present. And finally, acceptance of and enthusiasm for COBOL as it is now constituted is, from all reports, far from unanimous.

DATAMATION will attempt to outline what steps led to the Executive Committee's acceptance of COBOL. Involved in the outline will be accounts of meetings of three committees—the aforementioned Executive and Short Range Committees and the Intermediate Range Committee. Listed are four meetings considered most significant.

May 28, 29—This was the initial organization gathering. In an official summary, the meeting's purposes were detailed as follows: "To bring together users and manufacturers to consider the development of specifications for a common business language for automatic programming of data processing systems. The suggestion that the Department of Defense call this conference was made by a group representing users, manufacturers and universities which had met at the University of Pennsylvania Computing Center on April 8, 1959 to discuss the problem of developing a common business language."

Also noted at this meeting—"The Short Range Committee is to do a fact-finding study of what's wrong and right with existing business compilers (such as FLOW-

MATIC, AIMACO, COMTRAN, etc.), and the experience of users thereof. This short range group is due to complete its work in three months, i.e., by September 1, 1959."

September 4—At this meeting of the Executive Committee, Joseph Wegstein reported on COBOL. The conclusions of his group as presented to the Executive Committee read in part: "The (Short Range) committee considers this to be a framework upon which an effective common business language can be built. It feels that the work is complete enough for presentation to the Executive Committee. However, the report to date contains rough spots and requires some additions. Therefore, it is recommended that the (Short Range) committee be authorized to complete and polish the system by December 1, 1959. At that time, the completed system can be presented to the Executive Committee with the recommendation that the system be turned over to the manufacturers and users for implementation and application."

The rough spots in the report must have been considerable because it was at this point that a wide representation of the individuals connected with the overall effort began looking over and around COBOL for an alternate solution. Some members of the Intermediate Range Committee in particular voiced the opinion that if COBOL, as it was then constituted, represented what would be proposed, the Short Range Committee needed help, probably from the Intermediate Committee.

At this point the Honeywell Business Compiler entered the picture as a possible solution to the problem.

October 8, 9—Minutes from this meeting in Dayton of the Intermediate Range Committee contain an endorsement of the Honeywell Business Compiler and incorporate reference after reference indicating displeasure with COBOL as it then existed. This meeting resulted in the calling of the extraordinary meeting outlined below.

October 14—Purpose of this Intermediate Range Meeting in New York, to quote the minutes, was to effect a "comprehensive consideration of the Honeywell Business Compiler by the Intermediate Range Task Force II, augmented by invited representatives of computer manufacturers and Short Range Task Force I."

COMMITTEE ON DATA SYSTEMS LANGUAGE

EXECUTIVE COMMITTEE

Charles A. Phillips, Office, Secretary of Defense—Chairman

Members—E. J. Albertson, U.S. Steel; Joseph F. Cunningham, HQ., Dept. of Air Force; Robert B. Curry, Southern Railway; Gregory Dillon, Du Pont Co.; A. Eugene Smith, Bur. of Ships, Navy Dept.; Joseph Wegstein, NBS; Mel Grosz, Esso Standard Oil Co.

Advisors—Robert W. Bemer, IBM; Dr. Grace M. Hopper, Sperry Rand.

INTERMEDIATE RANGE COMMITTEE (TASK GROUP #2)

A. Eugene Smith, Bureau of Ships—Chairman

Members—John Backus, IBM; Robert Bosac, SDC; Donald Bradley, Chesapeake & Ohio Railway; Carl Byham, Southern Railway Co.; Les Calkins, U.S. Steel; Ben F. Cheydleur, RCA;

Richard F. Clippinger, DATAMatic Div., Minneapolis-Honeywell; Gregory Dillon, Du Pont Corp.; Lt. William Fell, U.S. Army Signal Agency; Kenneth A. Foster, Sylvania Electric Products; Walter Frese, Harvard Business School; Roy Goldfinger, IBM; A. D. Hestenes, G.M.; Donald B. Houghton, Franklin Institute; Mrs. Renee Jasper, Navy Dept.; Jack Jones, Air Material Command; Charlie Katz, GE; William P. Keating, NCR; George M. Perry, Travelers Ins. Co.; Howard E. Robinson, AMC; Robert Rosshelm, Sperry Rand; Ja. Laurence Nelson, AF; Peter Sheridan, IBM; Albert E. Smith, Navy Dept.; John R. Smith, Aeronutronic; Jack A. Strong, North American; Dick Utman, Ramo-Wooldridge; Saul Pollock, RAND; Orren Evans, Hunt Foods; Lee H. Amaya, Lockheed.

SHORT-RANGE LANGUAGE COMMITTEE (TASK GROUP #1)

Joseph Wegstein, NBS—Chairman

Members—Col. Alfred Asch, and Duane Hedges, Air Material Command; William Carter, and Charles Gaudette, DATAMatic Div., M-H; Howard Bromberg, and Norman Discount, and Ben F. Cheydleur, RCA; Mrs. Mary K. Hawes, RCA; Mrs. Frances E. Holbertson, David Taylor Model Basin, Wash., D.C.; Miss Jean E. Sammett and Vernon Reeves, Sylvania; William Selden, IBM; E. F. Somers, and R. J. Rosshelm, Sperry Rand; Miss Gertrude Tierney, IBM; William Logan, Burroughs; Dan Goldstein, Sperry Rand.

(These names represent not only committee members but also some of the individuals who, at one time or another, assisted the three committees.)

Attending were representatives of IBM, Southern Railway Company, U.S. Steel, RCA, Minneapolis-Honeywell, DuPont Corporation, Sylvania, NCR, Franklin Institute, Navy Management Office, Air Material Command, Systems Development Corporation, Computer Sciences Corporation, Philco Corporation, Sperry-Rand, Bureau of Ships, North American and Ramo-Wooldridge. It should be noted that representatives of the Short Range and Executive Committees were indeed present.

The entire session, which was devoted to arguing the pro's and con's of COBOL and HBC, can be neatly summed up. A resolution was passed by a vote of 15 to 1 with 2 abstentions. The resolution:

"IRTF II recognizes that the Honeywell Business Compiler represents the most advanced compiler specification existent at this date, and recommends to the Executive Committee that the Honeywell Business Compiler specifications be the basis for the first stage common business language. It is further recommended that the SRTF I be expanded to include all interested manufacturers; that the SRTF I CBL Committee should proceed to resolve all exceptions and differences in COBOL that can be resolved readily; and that the unresolved differences subsequent to January 1, 1960 be referred to the Executive Committee for action."

This resolution was forwarded to the Executive Committee and, as of January 1, no acknowledgment was received by the Intermediate Range Committee. Evidently nothing has been done to revive the HBC movement.

In late October and early November, COBOL was turned over to a committee of six for intensive reworking. Their product was presented to the Short Range Committee for action in late November.

The Executive Committee was to consider COBOL on Dec. 21 and 22 but another delay moved consideration to January 7 and 8. As stated, the COBOL report was accepted at this time, was submitted for full committee review and comment and will soon be printed in quantity.

Those who endorse COBOL acceptance point to the fact that, after some delay, a common business language now actually exists. They state that their language is a distinct improvement over anything in existence and point to the fact that in COBOL, data descriptions and procedure descriptions are completely specified. They acknowledge the lack of input/output routines, sort, and other "bells and whistles," but state these fall under the category of environment description and will be taken care of by the manufacturers.

Those critical of COBOL feel that by presenting it without frills, the designers are leaving it wide open to alteration by users, thus rendering it "uncommon." In addition, these critics contend that acceptance of COBOL is being accomplished by a small group of individuals when actually it should be submitted for more thorough review by a wider industry representation — responsible representatives of recognized users groups, for instance. In suggesting this, they stipulate that for the sake of speed a time limit could be imposed on any such deliberations.

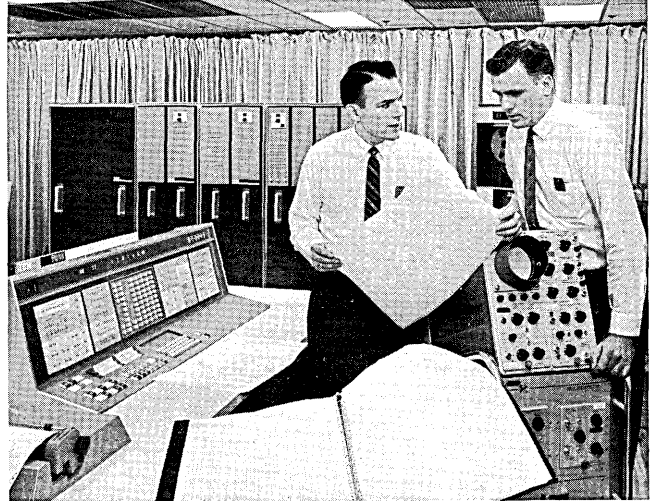
It goes without saying that DATAMATION does not offer this report as being a thorough analysis of the efforts of the three committees mentioned. We feel that a thorough airing of all that has transpired since the May meeting is long overdue, and we offer these excerpts and ideas as a first step towards presenting the facts. ●

7 0 8 0

ibm's new business system

IBM's solid state 7080 data processing system was announced January 20. This new machine, designed specifically for business, has processing speeds approximately ten times faster than the IBM 705 systems.

New design advances include a fast memory, called Communication Storage, which can transfer information between tape units and main storage at a 1.09 microsecond character rate (up to five tape units can be reading in or out simultaneously); a main memory from which any



of up to 160,000 characters of information can be called into the central processing unit in 2.18 microseconds; Priority Processing, a system which involves simultaneous reading, writing and processing operations and permits input/output devices to automatically control the flow of programs.

A typical 7080 system will sell for \$2,528,000 or rent for \$55,500 a month. This includes the central processing unit, magnetic core storage, console, two tape control units and 12 magnetic tape units. A basic system will sell for \$2,233,000 or rent for \$49,100 a month.

The new concepts in the 1.09 microsecond communication storage simplify the attachment of input/output devices and provide the basis for priority processing.

The 7080 has a console which includes a digital display of registers. This information is projected in black-lighted Arabic numbers which can be read by the operator.

Increased main memory speed of 2.18 microseconds in the 7080 compares to 17 microseconds on the IBM 705 I and II systems, and 9 microseconds on the 705 III. A magnetic core memory of either 40,000, 80,000 or 160,000 characters is available on the new system.

The new system has three modes of operation — 705 I and II, 705 III and 7080. The operator can establish either 705 mode by simply pushing a compatibility switch on the console.

Major 705 programs which will operate on the 7080 system include Autocoder III, Input/Output Package, Decision Making Language Fortran, Report Generator, 705 Processor, and sort and merge routines. The solid state 7080 needs 50% of the air conditioning and power of its predecessors, and occupies 30% less space. ●

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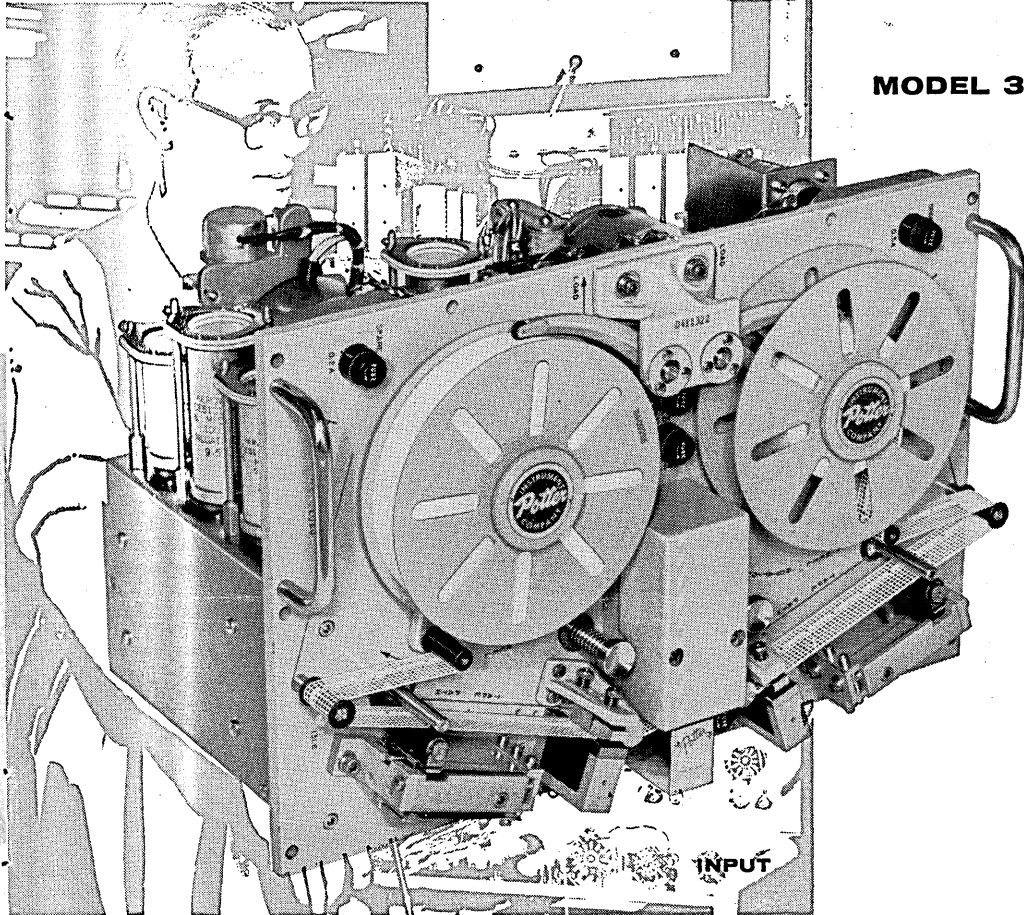
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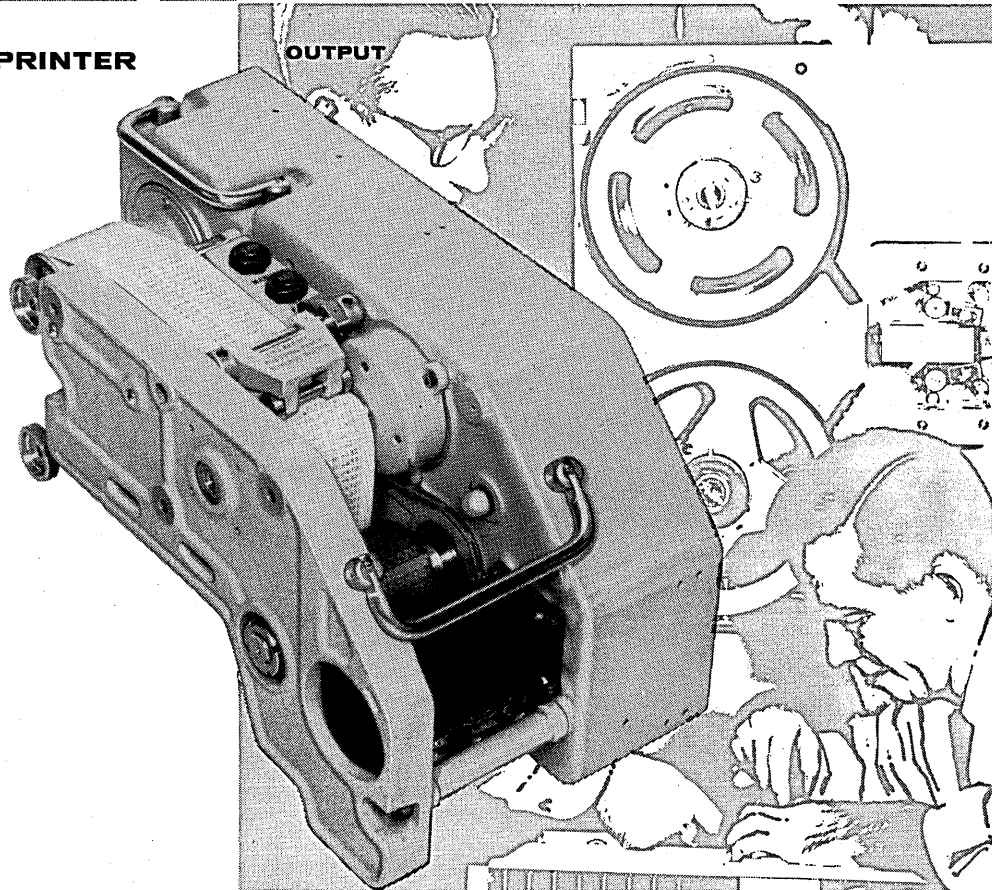
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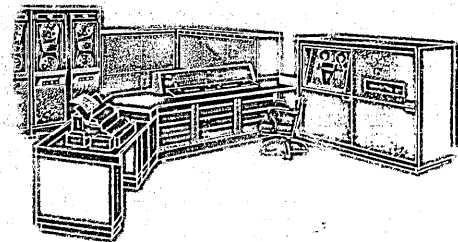
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