DATAMATION 59

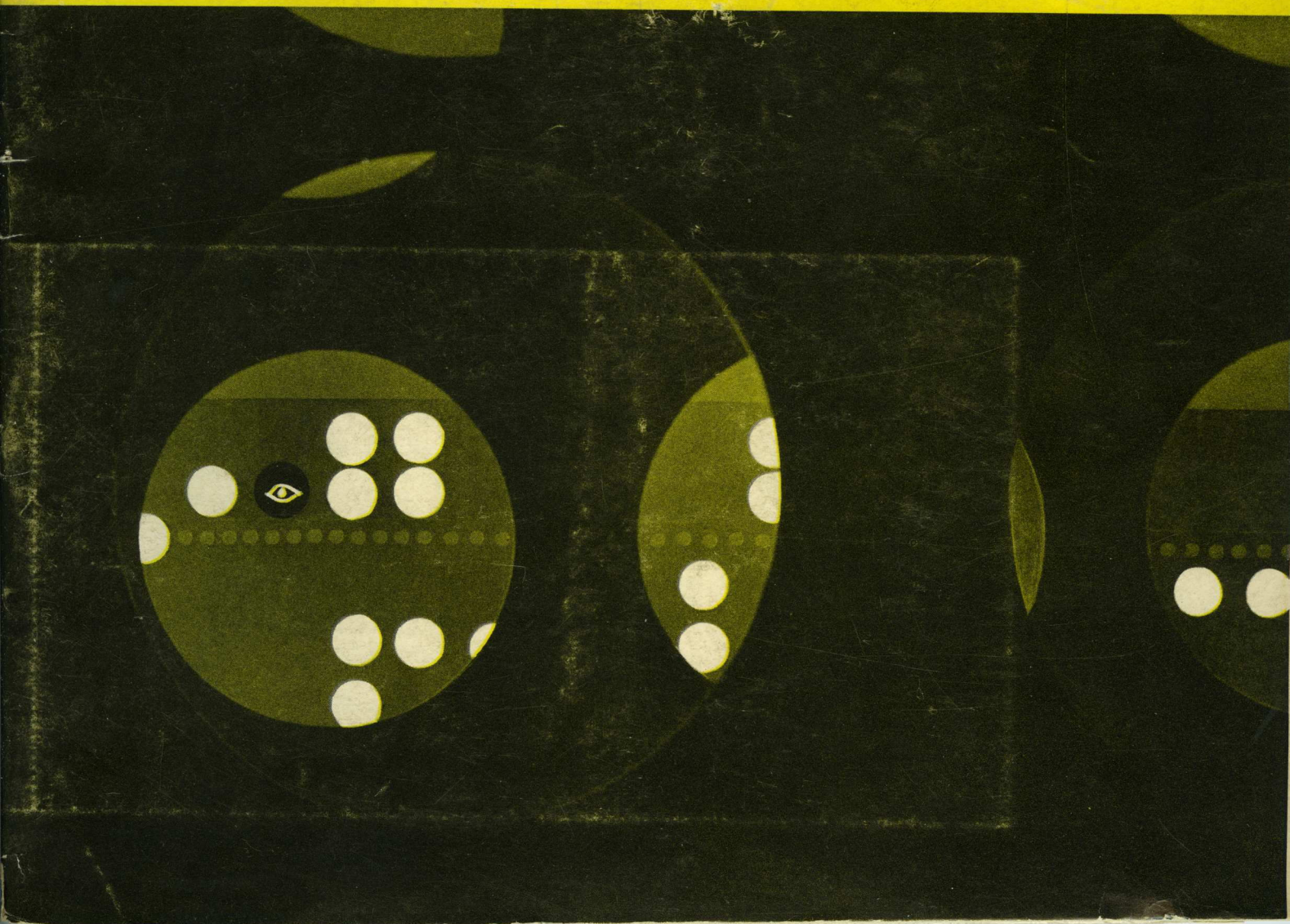
May/June

13-41

page 8 ALL ABOUT PAPER TAPE

page 15 ONE COMPILER, COMING UP!

page 25 INTRODUCING FLIDEN AND FAMILY



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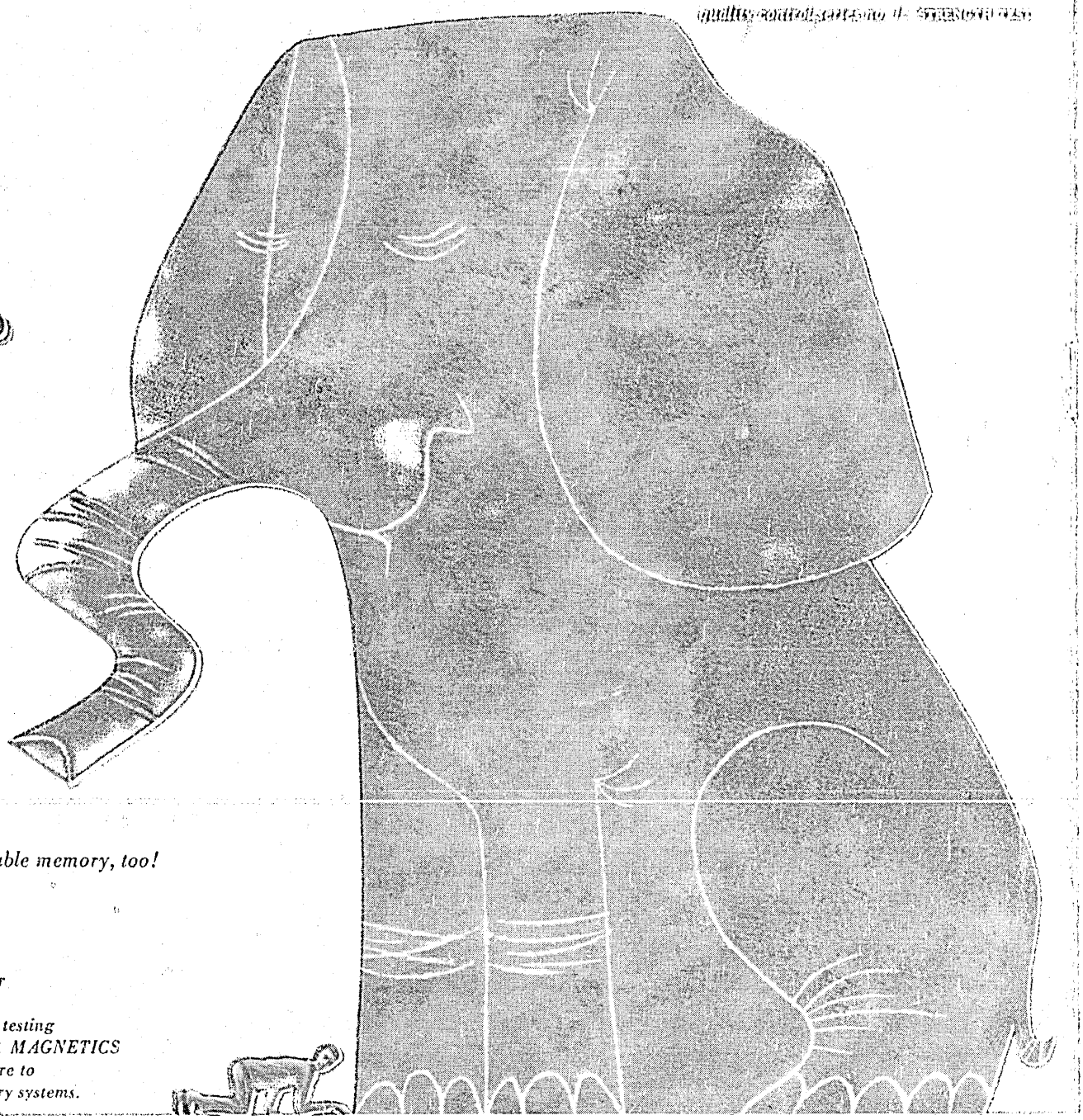

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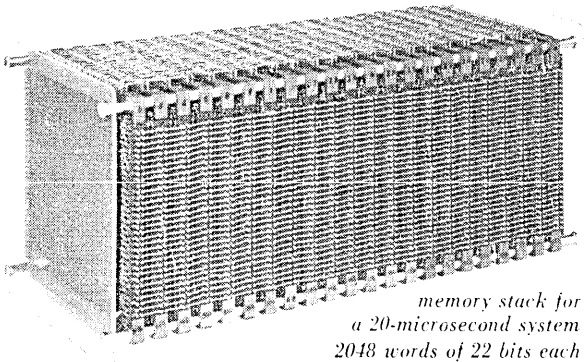

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Memory Size — 4,096 to 16,384 words

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Three-address operations — 30,000 per second
Information transfer rate — 140,000 words per second
Accumulations — 125,000 per second

Input-Output — MAGNETIC TAPE (¾" wide)
Speed — 96,000 decimal digits per second per unit
TAPE CAPACITY: up to 20,000,000 decimal digits (Maximum of 8 units reading and 8 units writing in simultaneous operation)
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HIGH SPEED CARD READERS: 650-900 cards per minute
STANDARD PRINTER: 150 lines per minute
HIGH-SPEED PRINTER: 600/900 lines per minute
STANDARD CARD PUNCH: 100 cards per minute
HIGH-SPEED CARD PUNCH: 250 cards per minute

Standard Features

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2. Parallel operation of up to 8 input and 8 output devices simultaneously
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4. Indexing
5. Word masking
6. Tape reading in either direction
7. Fast tape rewind
8. On-line inquiry processing
9. Multi-function instructions
10. Orthotronic Control
11. Automatic programming routines
12. Library routines
13. Bi-sequence operation mode
14. Handles variable-length records

Optional Features

Floating-point arithmetic
Random-access storage
Paper-tape input-output equipment

How To Get More Facts

If you would like detailed information explaining how Honeywell 800 can speed through your application, write Minneapolis-Honeywell, DATAmatic Division, Dept. C2, Newton Highlands 61, Massachusetts.

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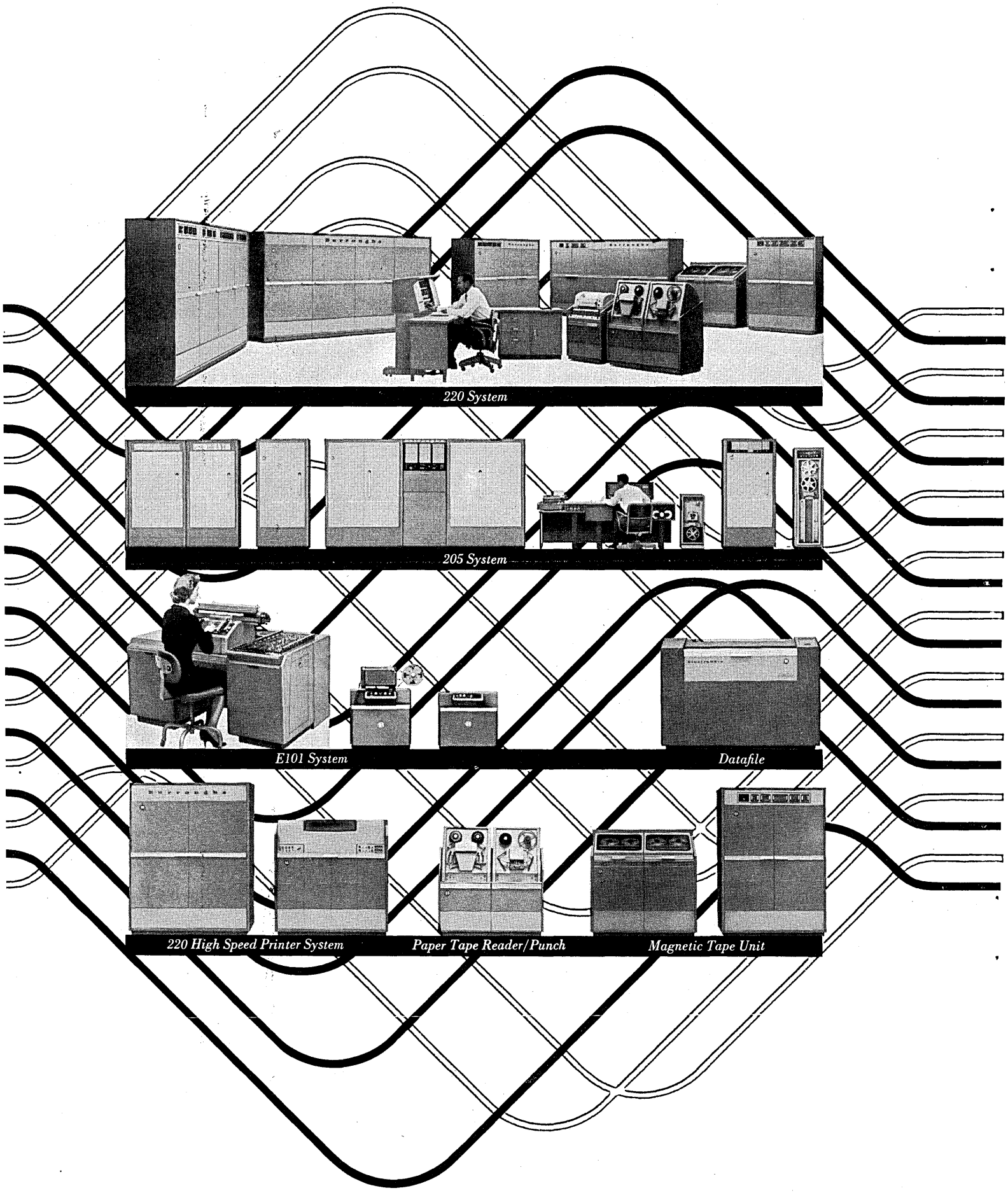
220 System
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Circle 4 on Reader Service Card.

to the editor...

With this issue, we establish a readers' sounding board. It is our hope that those who have comments concerning material covered on DATAMATION's pages will give us the opportunity to present these comments in this section. General opinions on any aspect of the broad field of automatic information handling will also receive every consideration. Letters should be addressed to: Editor, DATAMATION, Dept. L, 10373 W. Pico Blvd., Los Angeles 64, Calif. and should not exceed 300 words.—Ed.

Sir:

As Chairman of the National Joint Computer Committee for several years, I have probably been as concerned as anybody with the problems of organizing the conferences and making them meaningful. Therefore, I would like to thank you for the suggestions in your March/April 1959 issue.

The desirability of carrying over certain experienced members from one committee to the next is undeniable. However, we have had a policy in both the EJCC and WJCC of moving the conference location each year for two reasons; first, in order to maximize the opportunity for local people to attend and second, in order to minimize the terrific strain on volunteer committees. Such a carry over of committee members did, of course, take place from 1957 to the 1958 Western conferences in Los Angeles, and has also taken place from the 1959 to the 1960 committee in San Francisco. However, the WJCC will alternate between San Francisco and Los Angeles after 1960 in order to minimize the interference with Wescon.

Two other steps have been taken to try to solve this problem. First, we have adopted the policy of appointing the committee chairman for a given conference sufficiently in advance of the previous conference in his half of the country so that he and some of his key committee members can attend that conference and work with that com-

(Continued on page 42)

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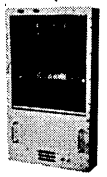

Character-rates to 200 KC!
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Capacity to 4,032 characters!
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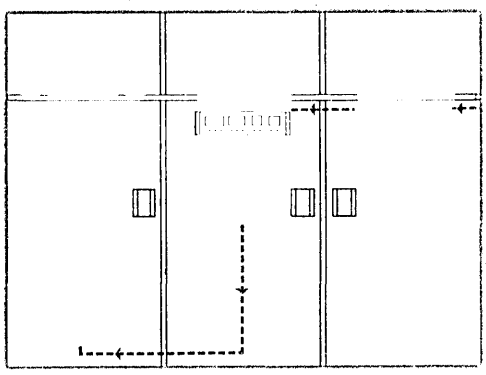
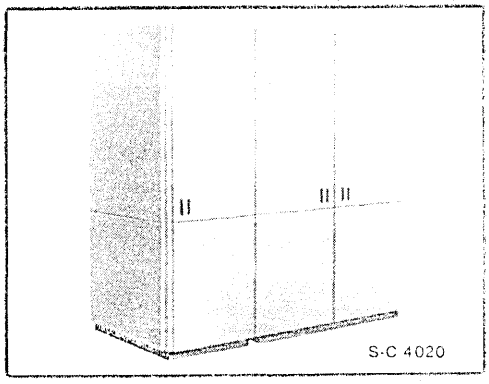
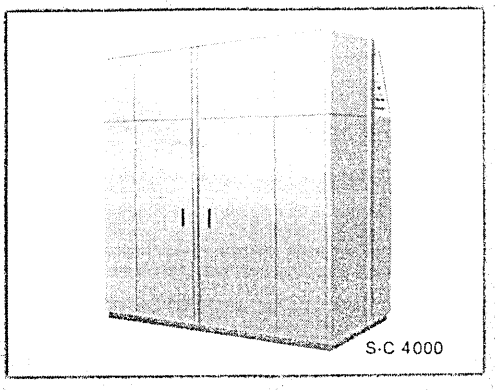
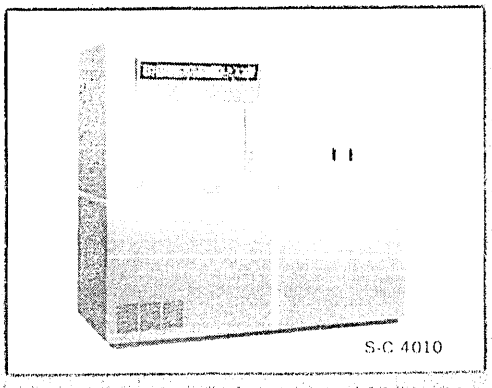


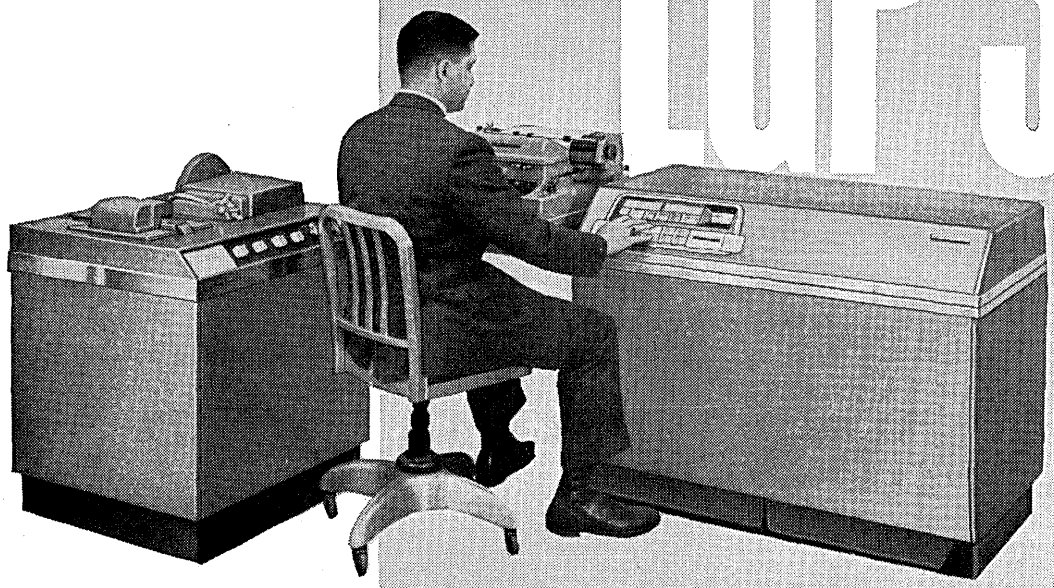






LGP-30

ROYAL PRECISION



Here is the low-cost electronic digital computer in greatest demand

Gives you large-capacity electronic computation at desk-side

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ROYAL McBEE · *data processing division*

Circle 7 on Reader Service Card.

DATAMATION 59

the automatic handling of information

volume 5, number **3**

ARTICLES

8 *All About Paper Tape*
Nine manufacturers of paper tape equipment display their wares in this issue. Next month, nine more will be featured.

15 *One Compiler, Coming Up!*
Messrs. Jones, Nutt and Patrick form Computer Sciences Corporation. Project No. 1—a compiler for the Honeywell 800.

25 *Introducing Fliden and Family*
It seems probable that Aeronutronic's remote entry advances are harbingers of bigger things to come from the firm's Computer Division.

37 *News of Communist Computer Technology*

38 *'SPEED' and the LGP-30*

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NEXT ISSUE—Featured article in the July/August issue of DATAMATION will be entitled "The Part Computers Play in Photographic Instrumentation." Another article, "Automatic Programming in the Soviet Union," was written by one of Russia's top authorities in this field, A. P. Ershov. These and the second half of our survey of paper tape equipment are but three of the many articles planned.

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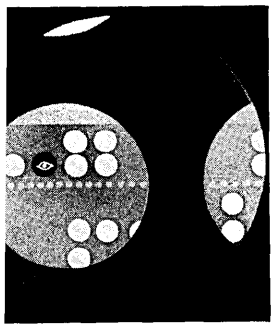


all about paper tape

Another survey article in a series featured by DATAMATION begins in this issue. We asked appropriate manufacturers to furnish us with pictures and information covering their complete line of paper tape readers, perforators and associated equipment. To use the accepted word, the response we received was "gratifying." So much so that we have decided to present the facts and figures in two installments.

Nine manufacturers are represented on these pages. In our July/August issue, the following firms will receive equal coverage: Burroughs ElectroData, Consolidated Electrodynamics Corp., Precision Specialties, International Business Machines, Fairchild, Digital Service Labs, Tally Register, Smith-Corona, and Olivetti. The basis for selecting companies was strictly first come, first served.

FRIDEN

1 Motorized tape punch, Model 2, is mechanically operated by a cam shaft which makes a single revolution for each punching cycle. This cam shaft is under control of an electro-magnetically controlled, single-revolution clutch for connecting the cam shaft to a constantly running drive pulley. A feedhole is always punched in the tape during each revolution of the cam shaft and individual electro-magnets control the punching of the code holes during each revolution. Some specifications – hole sizes are .046 in. diameter feed hole and .072 diameter code hole; hole spacing is .100 in.; feed hole location is .394 in. from the inner edge of the tape and operating speed is either 1,000 rpm or 1,228 rpm.

Circle 101 on Reader Service Card.

2 Punch assembly for the Model 2 is intended for applications at punching speeds up to 20 codes/second with a clutch operation each cycle. However, in special applications it can be operated up to speeds of 30 codes/second. It is available in five, six, seven and eight bit binary code.

Circle 102 on Reader Service Card.

3 This tape reader is mounted on the left side of a Flexowriter directly in front of the tape punch. The reader is mechanically operated from Flexowriter motor. In reading a binary code punched into the paper tape, normally open contacts for each bit of the binary code are closed whenever a hole is sensed in the tape for that unit of the code. In addition, a common contact is ordinarily provided on the tape reader which closes for each code sensed by the reader.

Circle 103 on Reader Service Card.

NCR

4 Model 360 paper tape reader provides photoelectric reading either on-line into the processor memory or off-line onto magnetic tape. Five, six, seven or eight-unit code tape may be read. Any punched hole code may be translated with an upper limit of 64 data characters plus any number of control characters. The reader operates at 1,800 characters/second. It will stop between characters.

Circle 104 on Reader Service Card.

5 Model 370 paper tape punch provides punched paper tape output directly from a central processor or from a converter. The output is either five-channel teletype code or seven-channel 304 code. The two different codes may be selected console switch. The punch rate is 60 characters/second.

Circle 105 on Reader Service Card.

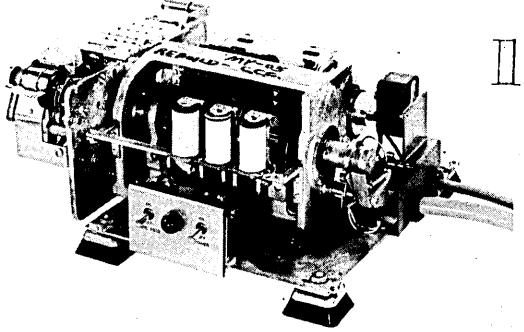
6 National's punched paper tape recorder is a recording device for use with the firm's accounting machines, sales registers and adding machines. The recorder produces a coded record on a strip of paper as a by-product of machine operation by punching holes in it. It can be adjusted for use with any known paper tape code and it can be used with any existing tabulating or dp system, NCR states. Two special features – "answer back," a self-checking electrical circuit that notes amounts recorded and "parity check," another self-checking circuit that detects faulty punching.

Circle 106 on Reader Service Card.

BENDIX

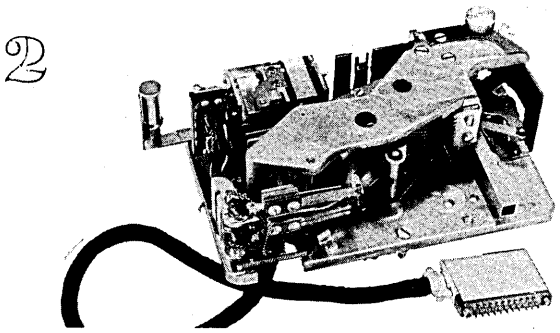
7 Using a PR-2 multi-code paper tape reader any device equipped with a punch can be read directly into a G-15 computer. The PR-2 accepts tapes bearing any numeric code on five, six, seven or eight-level tape, translates the codes into G-15 codes and enters them into the computer. Computation can proceed during the input cycle. Office equipment, A to D converters, etc., can all be used as computer input if they are equipped with a tape punch. PR-2 reads unit directionally at 400 characters/second and stops on one character.

Circle 107 on Reader Service Card.



8 The G-15 is supplied with paper tape reading and punching devices as standard equipment. The punch is a 17 character/second Commercial Controls unit intended for computer output. The photo-electric reader uses magazines which can be searched, just like magnetic tape, under control of the computer and computation can proceed during input or searching operations. Speed for either operation is 250 character/second.

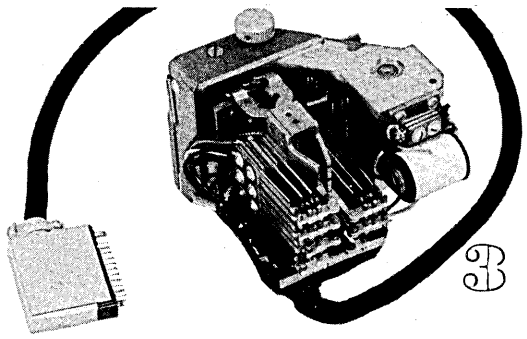
Circle 108 on Reader Service Card.



FERRANTI

9 Photoelectric tape reader TR5 is fully transistorized, operates at any speed up to 330 character/second and stops on the stop character. It accepts five, seven or eight-hole tape widths, provision being made for reading all tracks. Simple adjustment of a slide instantly adapts the reader for the required width of tape.

Circle 109 on Reader Service Card.



10 Where spooling is required, the type A 11 spooler can be used for either feed or take-up or both at any rate on demand by the reader. Amplifiers, brake control circuits and power supplies are all contained within the case and the only inputs required are 115V, 60 cps and 2V control signals from the unit to which data is fed.

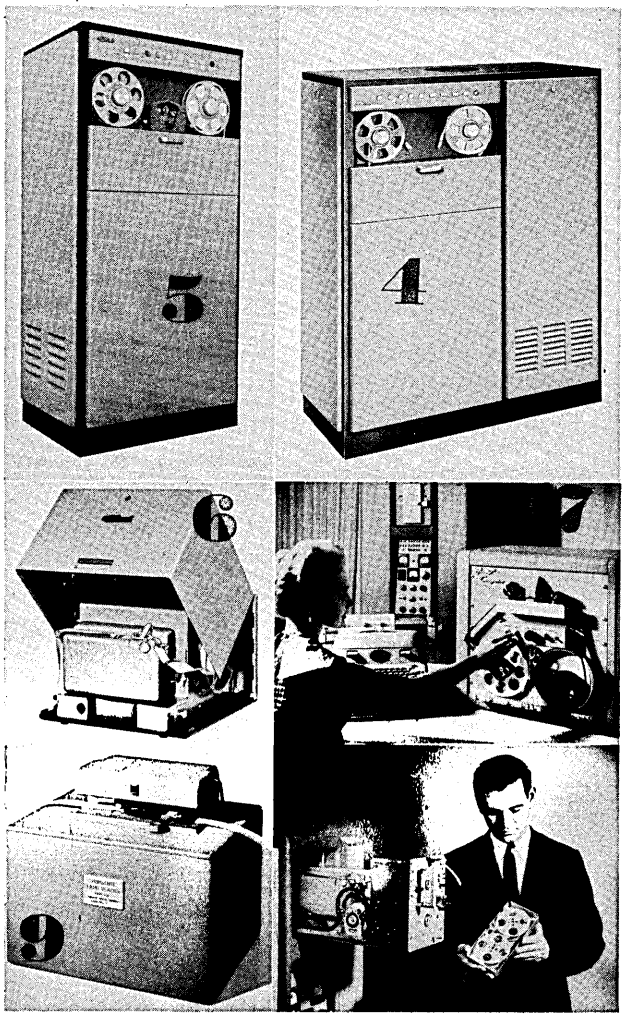
Circle 110 on Reader Service Card.

11 The TR2 and TR3 tape readers are almost identical in all respects. The TR2 uses vacuum photocells and a differential friction drive with externally controlled brakes. Five, seven or eight-level tape may be handled but provision is made for reading only up to seven signal levels. The TR3 does not stop on the stop character but on or before the subsequent character. It has a reading rate of 440 character/seconds (TR2, 2220 rate).

Circle 111 on Reader Service Card.

12 Tape reader 196 is transistorized, includes amplifiers, control circuits and power supplies and uses silicon solar battery photo-sensing elements. The unit has a reversible tape drive and is provided with ten ½ in. spools. Reading speed is normally 270 characters/second.

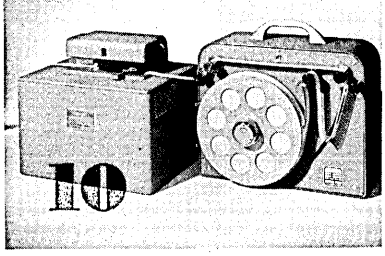
Circle 112 on Reader Service Card.

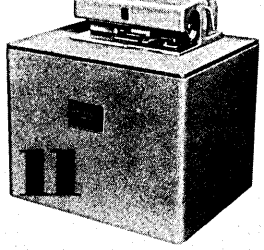


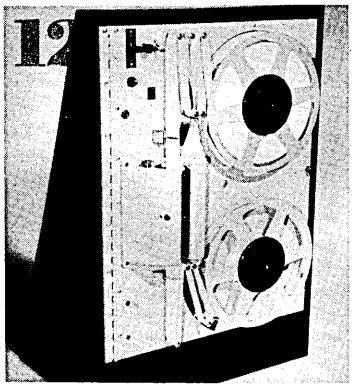
EPSCO

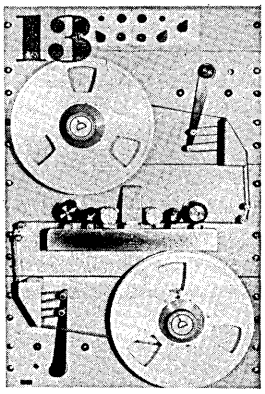
13 Epsco's Dykor photoelectric paper tape reel and strip reader (Model PTR-826), manufactured by Digitronics Corp., Albertson, N.Y. is an eight-channel plus sprocket channel reader. It reads paper strips or reels in either direction at speeds as high as 600 characters/second. An intermittent drive starts or stops the paper tape in 2 milliseconds or less and can stop the tape on or before the character following the stop character. Utilizing solid state reading heads and amplifiers, the reader is available as a single-speed or dual-speed unit.

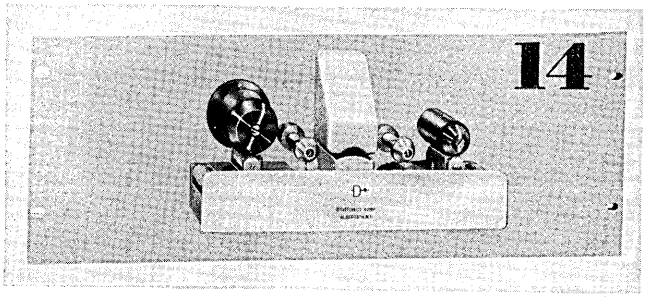
Circle 113 on Reader Service Card.

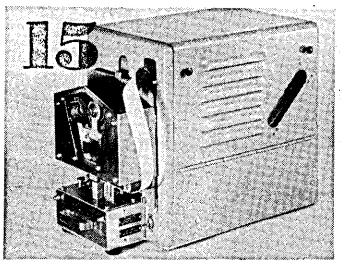


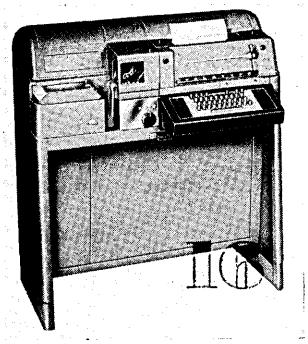


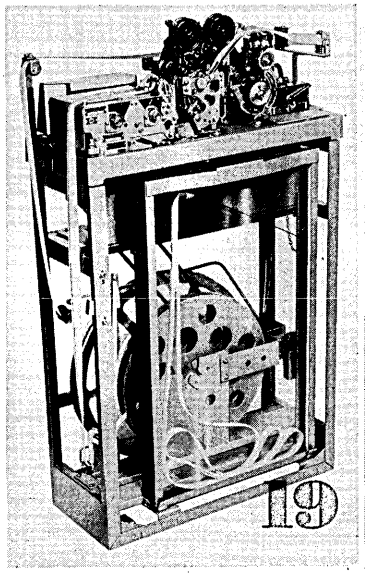


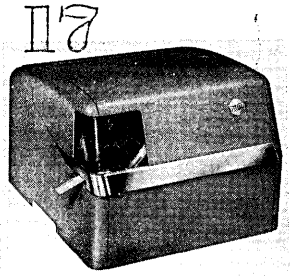


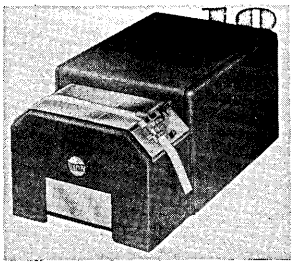












14 A photoelectric paper tape strip reader (Model PTS-825) marketed by Epsco and also manufactured by Digitronics is an eight-channel plus sprocket channel unit operating in one direction from right to left, the reader has a starting and stopping time of less than 2 milliseconds. The reader is available in single or dual-speed configurations and can read up to 600 characters/second. Tape is set in motion by triggering a thyratron which operates a fast acting solenoid. This solenoid moves a roller which presses the tape against a continuously rotating capstan.

Circle 114 on Reader Service Card.

TELETYPE

15 Teletype's high speed tape punch is designed to record data from high speed systems. It punches tape at speeds up to 60 characters/second. The punch can be supplied for five, six or seven-hole codes. It will perforate a single tape or two tapes simultaneously. Each code hole has an associated code punch controlled by its own magnet. An additional magnet is used to govern the tape-feed out mechanism. Thus, six magnets are used for five-hole operation; seven for six-hole operation, and eight for seven-hole. Single or double-tape reels can be supplied.

Circle 115 on Reader Service Card.

16 An automatic send-receive set by teletype operates at 100 wpm, provides facilities for typing, tape punching, tape transmission, tape reception, sending and receiving page copy on message paper or multi-part business forms, tape as a by-product of both transmission and reception, plus providing a built-in control system for remote apparatus. Will function off-line locally or on-line over communication channels.

Two units, the Teletype Model 28 tape punch and tape reader are now being introduced for communications, data processing and other applications.

Circle 116 on Reader Service Card.

17 The tape punch receives incoming sequential signals and translates them into perforated code combinations on tape, types corresponding characters on the tape and provides facility for parallel-wire output signals for control of external equipment.

Circle 117 on Reader Service Card.

18 The tape reader translates code of perforated tape into electrical impulses for sequential transmission or parallel wire transmission and receives electrical impulses from external parallel-wire source and converts these impulses for sequential transmission.

Circle 118 on Reader Service Card.

19 The Model 28 RT reperforator transmitter-distributor is a high capacity, self contained punched tape message relaying facility for receiving wire signals at speeds ranging from 60 to 200 wpm, converting them into perforations in paper tape and transmitting them at the same or another speed to local or remote receiving

stations. Applications include use as an input-output speed converter, intermediate message storage, business machine-communications linkage and automatic data accumulator.

Circle 119 on Reader Service Card.

CREED

20 Model 3000 tape punch is a multi-wire machine designed to record the output of computers in five, six, seven or eight-track fully punched tape at speeds up to 300 characters/second.

Circle 120 on Reader Service Card.

21 The Unipunch is a pocket-size accessory enabling incorrect combinations in an 11/16 in. wide five-track tape to be corrected by hand punching individual code holes.

Circle 121 on Reader Service Card.

22 Model 25 reperforator will record the output of electronic computers and other equipment in five, six or seven track fully punched tape at speeds up to 33 characters/second. A slow-speed solenoid-operated version is also available.

Circle 122 on Reader Service Card.

23 Model 92 tape reader is a single head, multi-wire reader for data processing applications, operating at a speed of 20 characters/second. It handles 11/16 in. wide five-track tape.

Circle 123 on Reader Service Card.

24 Model 85 printing reperforator is a single-wire machine which records incoming telegraph signals on 11/16 in. wide five-track tape at 60 or 66 wpm.

Circle 124 on Reader Service Card.

25 Model 86 printing reperforator is similar to the Model 85 except that tape punched is ⅞ in. wide-track fully punched and printed.

Circle 125 on Reader Service Card.

26 Model 6S/6 auto transmitter is a single head machine for telegraphic communications. It is available for operation at speeds of 60, 66 or 100 wpm. It handles 11/16 in. and ⅞ in. tape.

Circle 126 on Reader Service Card.

27 Model 71 three-gang multiplier transmitter is available for operation at speeds of 60 or 66 wpm. Used for telegraphic communication, it also comes in multi-wire form for parallel operation at a speed of 800 combinations/minute.

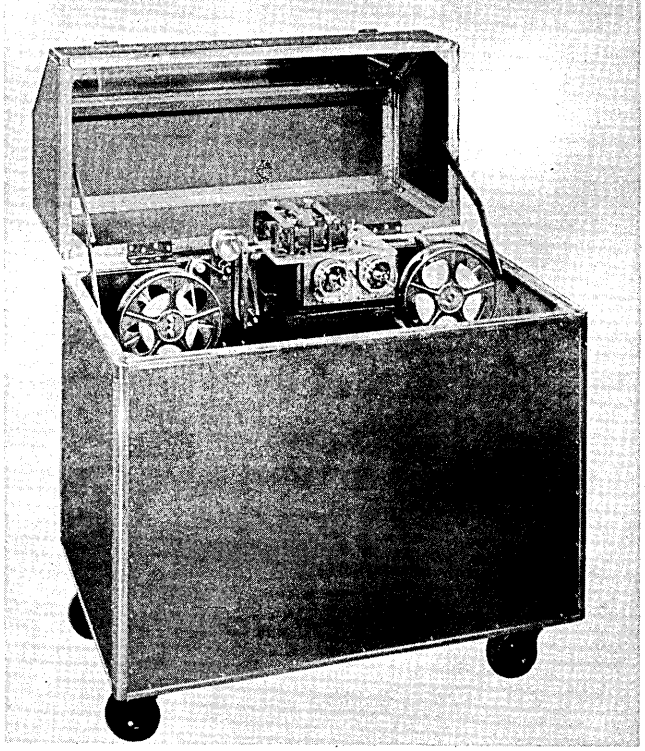
Circle 127 on Reader Service Card.

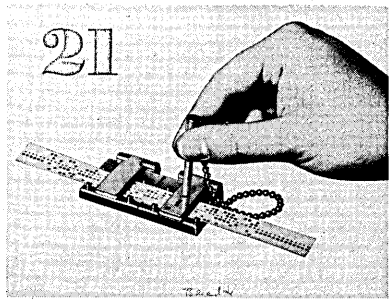
28 Model 7P/N keyboard perforator is a keyboard operated punch for the manual preparation of 11/16 in. tape at speeds up to 14 characters per second.

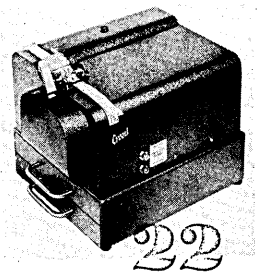
Circle 128 on Reader Service Card.

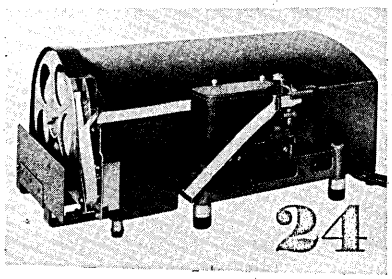
29 Model 90 tape verifier is a combination keyboard, tape reader and tape punch for verifying the accuracy of 11/16 in. wide tape at speeds up to 16 characters/second.

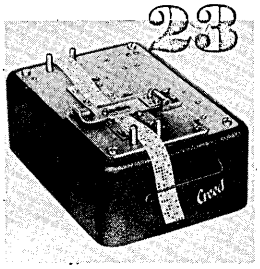
Circle 129 on Reader Service Card.

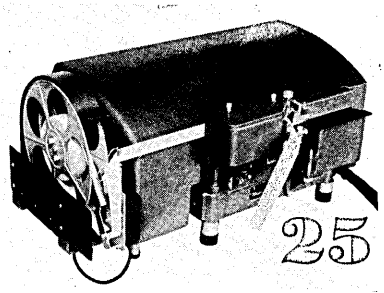


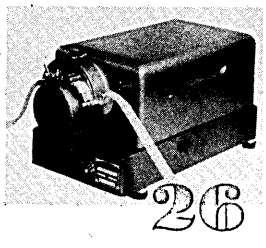


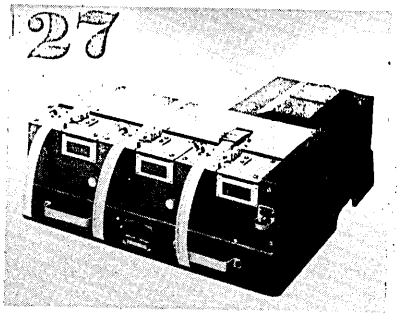


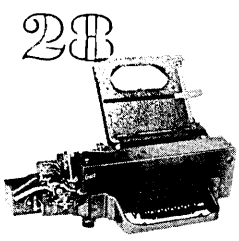


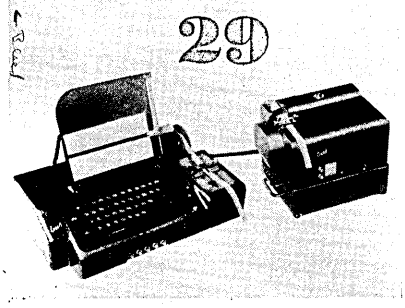


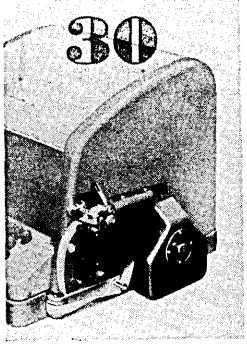


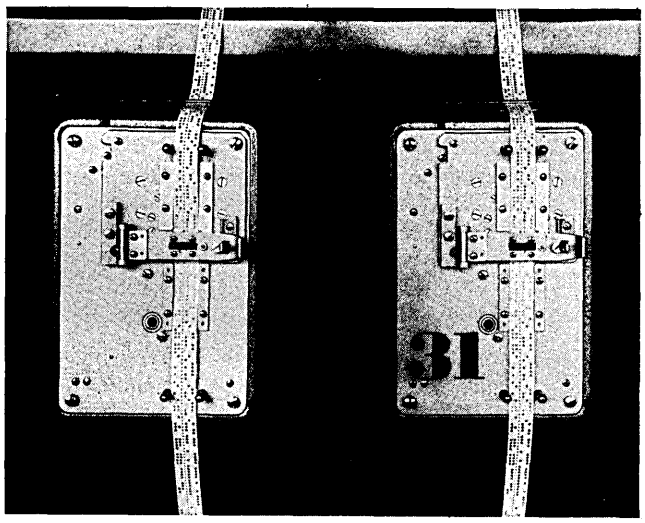


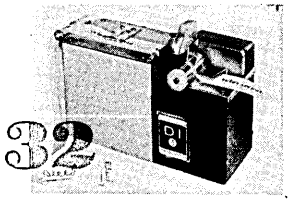


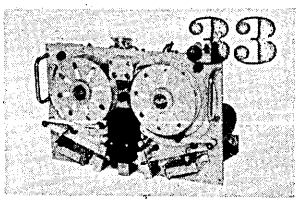


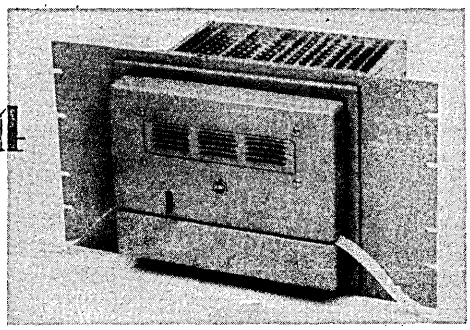


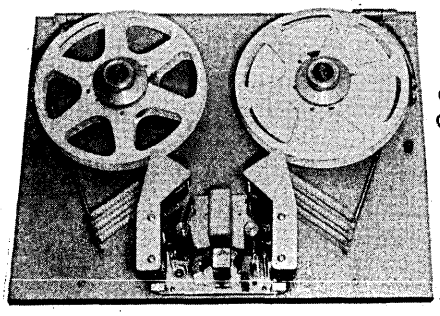


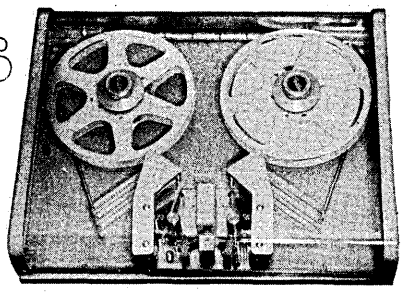












ALL ABOUT PAPER TAPE

30 Reperforating attachment is a tape punch attachment for the Model 75 teleprinter which enables 11/16 in. tape to be produced either from the keyboard or from incoming signals.

Circle 130 on Reader Service Card.

31 Tape comparator reads two supposedly identical 11/16 in. punched tapes for discrepancies at a speed of 26 characters/second.

Circle 131 on Reader Service Card.

TELECOMPUTING

32 This tape perforator has a punching speed of 40 columns per second and a simplified drive mechanism which requires only one eccentric and one cam-generated motion. Sealed ball bearings are used in the perforator and carbide inserts are placed at critical wear points. The perforator features four-way staggered positioning of the punching electro-magnets. Response to punching signals is obtained by an overlap. As the drive shaft completes 180° of the complete revolution required to punch each column, the perforator will accept the signal from the next column to be punched. Safety features are offered.

Circle 132 on Reader Service Card.

POTTER

33 Model 3277 is a 150 character/second photoelectric reader with six-in. tape reels and self-contained amplifiers designed to meet the requirements of MIL-E-16,400. A tape speed of 150 characters/second is provided with bi-directional drive. The six in. diameter tape reels will accommodate 550 feet of mylar tape.

Circle 133 on Reader Service Card.

34 Model 911 is a medium speed perforated tape transport designed for reading rates up to 750 characters/second. Mechanically and electrically similar to the Model 910, the 911 and 910 may be interchanged for field conversion of storage media. The 911 stops on the stop character.

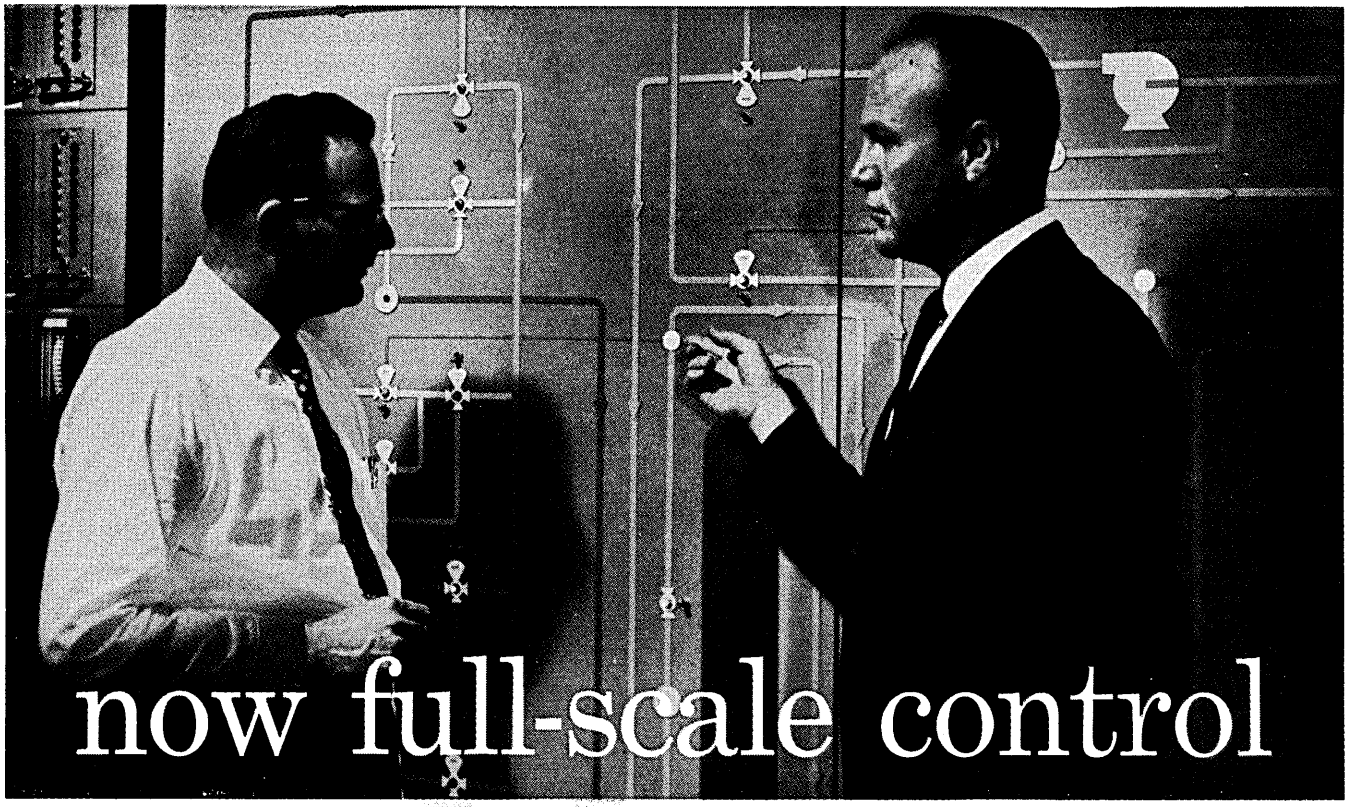
Circle 134 on Reader Service Card.

35 Model 909 reads perforated tape strips optically at rates up to 1,000/characters/second and has self-contained start-stop circuits, read amplifiers, and power supplies on plug-in etched circuit cards. Read amplifier flip-flops provide maintained level outputs, with internal provision for AND gating from the sprocket channel amplifier if pulse output is desired.

Circle 135 on Reader Service Card.

36 Model 907 paper tape transport is designed for data transfer rates up to 1,200 characters/second. It accommodates 10 ½ in. or 8 in reels and may also be used to read tape strips and tape loops. A high speed brake stops the tape on the stop character at any reading rate. The capstan drive panel may be interchanged with that of the 906 magnetic tape transport, permitting either machine to be used for both magnetic and perforated tapes.

Circle 136 on Reader Service Card.



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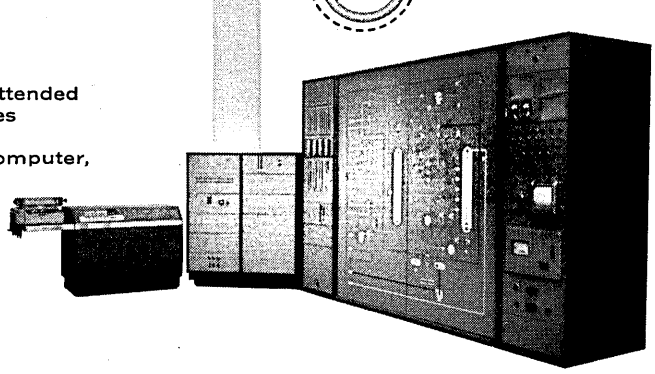

Circle 8 on Reader Service Card.

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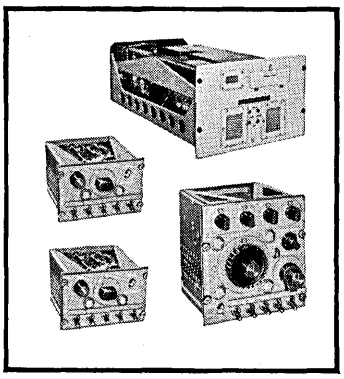

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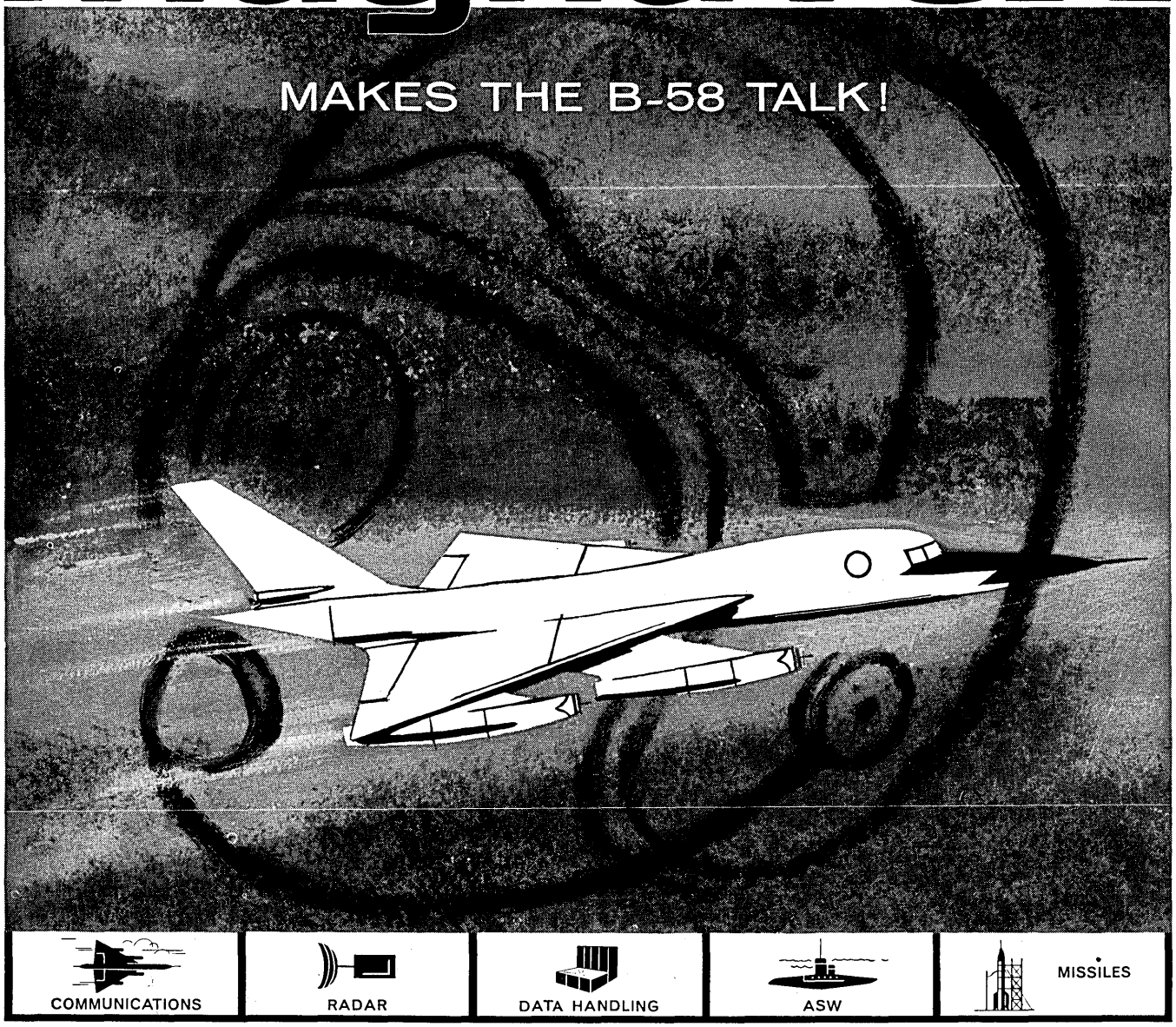

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Circle 9 on Reader Service Card.

ONE COMPILER, COMING UP!

jones, nutt, patrick form computer sciences corporation

A team of leading authorities in the highly specialized field of automatic programming of electronic data processing systems have formed Computer Sciences Corporation, to serve both computer users and manufacturers. The firm will open offices in Los Angeles June 15, and in September will occupy permanent headquarters in a building to be erected there this summer.

The corporation will serve the industry in feasibility studies, applications programming and problem analysis for both scientific and data processing work, a principal specialty being the development of compiler systems. Compilers are the most refined form of automatic programming, used in preparing instructions for computers. They provide a shorthand link between handy, rememberable codes used by programmers and complex sets of instructions in machine language needed by the computer to command itself in performing daily chores.

Fletcher Jones, formerly general supervisor of integrated data processing at North American Aviation's Columbus Division is president. Roy Nutt, who headed automatic programming at United Aircraft Corporation is design and development director and Robert L. Patrick is director of applications programming. Patrick formerly was deputy director of the computer services division of the Corporation for Economic and Industrial Research in Washington.

Computer Sciences is engaged in its initial assignment, the development of a new business data processing compiler for Minneapolis-Honeywell, in cooperation with experts of that company's DATAmatic Division under Dr. Richard Clippinger, director of systems and methods, and Dr. William Carter, systems analysis manager. Specifications for this compiler stipulate the development of a business-oriented compiler twenty times more powerful (and economical) than ordinary programming methods. It will be available to users of the new Honeywell 800 system by September of this year, Jones announced.

Roy Nutt is noted in the computer industry as the man who single-handedly created SAP (Share Assembly Program), the programming language most widely used by operators of large-scale computers in scientific-engineering work. He was active in the SHARE organization and headed a committee guiding the design of an advanced programming scheme now being readied for use on 704 computers.

Fletcher Jones, who headed a multi-company (SHARE) committee of big computer users led in the creation of SURGE, the most recently developed business compiler. He then supervised the application of that language to 50 crucial programs at North American, involving up to 20,000 instructions each. This work resulted in ten-fold savings of time and money in preparing those programs.

"In the past, preparation costs of computer programs averaged eight dollars per instruction," Jones recently told the electronic seminar of the American Management Association. New techniques have cut this cost to about 80 cents per instruction, he explained.

"Our objectives in the development of a business compiler for Honeywell are to reduce these costs to the computer user even further, and to make the capabilities of the Honeywell 800 easier to use in processing everyday office paperwork" he said. Jones pointed out that advances in hardware design and logic give new urgency to the development of better automatic programs. He cited as an example the parallel processing feature of the Honeywell 800, "which permits running up to eight jobs on the system simultaneously, and allows the machine to do both data processing and scientific computation at the same time." ●

Circle 137 on Reader Service Card.

DEADLINE SET FOR EJCC ABSTRACTS, SUMMARIES

Boston's Statler Hilton Hotel has been chosen as the site for this year's Eastern Joint Computer Conference. Dates are—December 1, 2 and 3, 1959. Sponsors of the conference will be the Association for Computing Machinery, the Institute of Radio Engineers and the American Institute of Electrical Engineers.

The call for papers has been made and persons wishing to present papers should submit, by August 15, 1959, four copies of a 100-word abstract and a 1000-word summary. Subjects dealing with any phase of computing will be accepted.

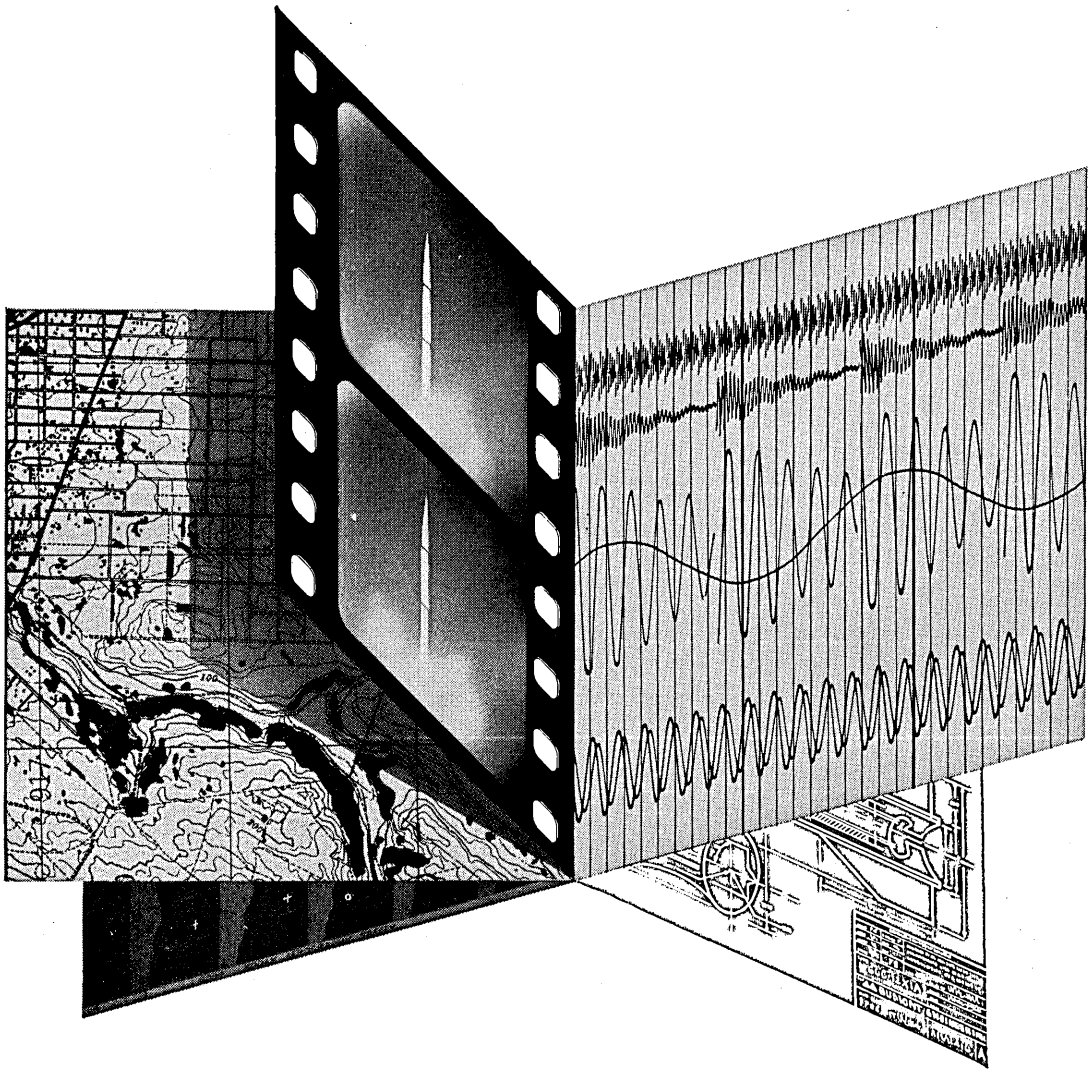
Plans made to date are for a single session conference and papers will be limited to a presentation time of 20 minutes, followed by a brief discussion period. At the discretion of the program committee, papers of exceptional interest may be allowed a longer period of time for presentation—provided written request by the author is made at the time the abstract and summary are submitted. Abstracts should be in a suitable form for inclusion in the program of the conference. The conference planners have requested that summaries be submitted which accurately describe the author's work; this will assist the program committee in selecting papers of greatest merit.

Abstracts and summaries of papers (deadline, August 15, 1959) should be sent to:

J. H. Felker, Chairman
EJCC Program Committee
Bell Telephone Laboratories
Room 5C-101
Mountain Avenue
Murray Hill, New Jersey

Chairman of the 1959 Eastern Joint Computer Conference will be Mr. F. E. Heart, Lincoln Laboratory, Lexington, Mass., and direction of the local arrangements will be managed by Mr. H. W. Fuller of Laboratory of Electronics, Inc., Boston, Mass. John Leslie Whitlock Associate, Arlington, Virginia, will be handling the exhibit management. ●

for making measurements on every kind of record...



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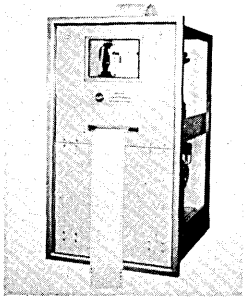
Model 3260 is an integrally housed drum type printer and electronic storage and control system suited for rack

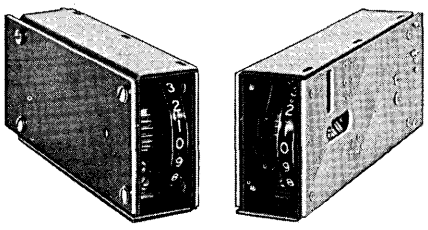


or desk mounting. It can be connected to many data producing devices and data can be accepted from any source of digital information such as digitizers, magnetic or perforated tapes, electronic counters or computers. A printout rate of 48,000 digits per minute is possible. As a logger of digitized data from a series of analog to digital converters, a scan and printout rate of 200 three-digit per second numbers is realizable. For information write POTTER INSTRUMENT CO., Sunnyside Blvd., Plainview, L.I., N.Y., or use card.

Circle 200 on Reader Service Card.

stepping relay

Series 500 has three printed circuit boards (switchboard, circuit board and code board) together with a high speed



stepping relay actuating a molded digital readout wheel. These may be assembled to auto-home to 0, read-out 0 to 9 on switchboard, carry at 9, direct read-out, additional switching as off-normal, and extra SPST-NC contacts opened by relay action. For information write HILLBURN ELECTRONIC PRODUCTS, CO., 55 Nassau Ave., Brooklyn 22, N. Y., or use reader card.

Circle 201 on Reader Service Card.

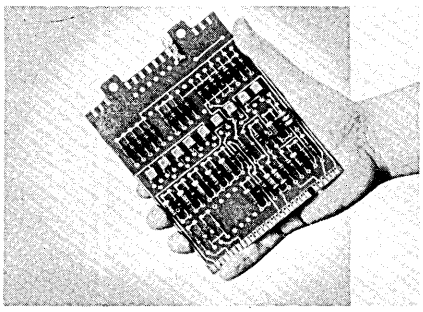
delay line

An ultrasonic, tapped delay line to provide various delays from one input signal may be used for data processing and analysis of digital and analog information. Typically, taps range from 5 usec to 50 usec per tap with additional range also available. Counting rates can be achieved up to 2,000,000 pulses per second. Drivers and post delay amplifiers may be supplied with pulse reshaping if desired. For information write ANDERSEN LABORATORIES, INC., 501 New Park Ave., West Hartford 10, Conn., or use card.

Circle 202 on Reader Sevice Card.

fireproof plastic

The risk of fire in computer printed circuits is minimized, says this manufacturer, through use of a new copper-



clad paper epoxy base laminated plastic. The plastic, EP-37, will not support combustion. A new adhesive secures the copper to the base laminate, so that EP-37 offers greater resistance to plating solutions. The new laminate will also withstand longer exposure to dip soldering at higher temperatures than XXXP-36. For information write FORMICA CORP., 4614 Spring Grove Ave., Cincinnati 32, Ohio., or use card.

Circle 203 on Reader Service Card.

memory core tester

Model 2040 REACT is a fully automatic magnetic core tester that accurately measures peak or instantaneous values of core response directly, in the production testing and laboratory analysis of bobbin type or ferrite memory cores. Accuracy of the core voltage measuring circuits is better than 0.5 millivolts absolute. For reliability, solid state circuits are used entirely for logic operations, with all transistor circuits mounted on etched, plug-in cards of glass-epoxy base material. For information write RESE ENGINEERING, INC., 731 Arch Street, Philadelphia 6, Pa., or use card.

Circle 204 on Reader Service Card.

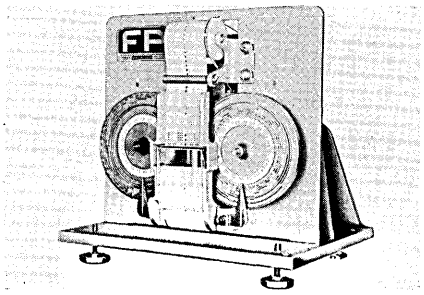
data converter

This converter translates data automatically at a rate of more than 50,000 computer words per minute. Paper tape to punched card conversion occurs at a rate of less than 800 words per minute with limited usefulness of the data. Information can be translated into magnetic tape or paper tape forms for such computers as the Univac 1103A and 1105, IBM 650 and 704 and the Burroughs Datatron 205. The converter was developed and built for Patrick Air Force Base by the manufacturer. For information write TELEMETER MAGNETICS, INC., 2245 Pontius Ave., Los Angeles 64, Calif.

Circle 205 on Reader Service Card.

analog/digital recorder

Now available is a shaft-input analog-to-digital recorder which records analog values in binary-decimal punched



tape form. Tape can be read directly, or translated automatically into standard punched cards or tape for computer processing. In addition to supplying a digital tape record, the unit supplies the digital information in the form of electrical contacts that may

GERBER PRESENTS –

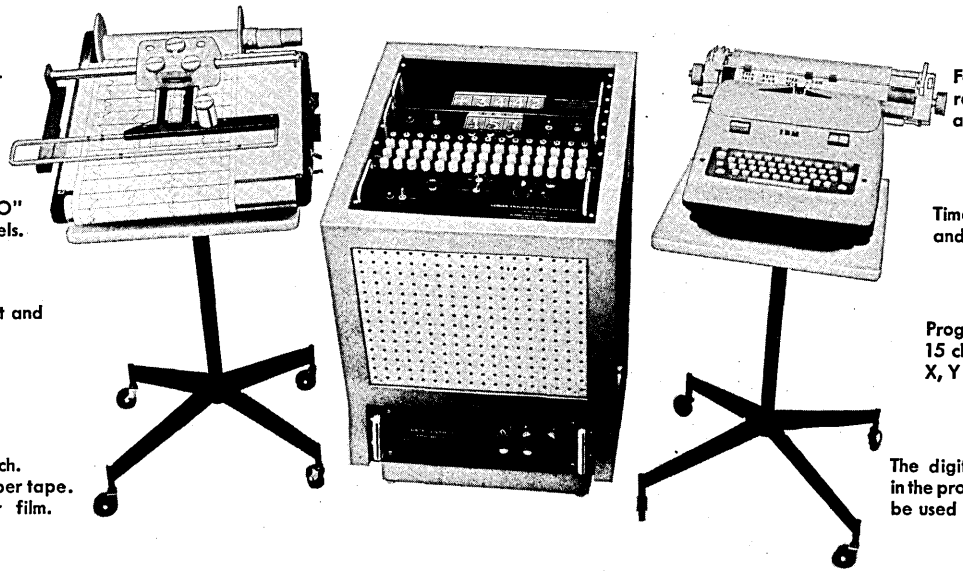
ANALOG-DIGITAL DATA REDUCTION SYSTEM COMPLETE–FOR LESS THAN $9000

★ Variable speed paper transport with instant braking, reversible.

★ Scale factors and "O" offsets for 15 channels.

★ Reads transparent and opaque records.

★ Optional features—
Peak-to-peak reader.
Output to IBM keypunch.
Output to punched paper tape.
Projection system for film.



★ Four-digit readout, reads Y and frequency and X continuously.

★ Time index counter and display.

★ Program selector for 15 channels, for either X, Y or frequency.

★ The digital voltmeter included in the program console may also be used for other applications.

We do not have to tell you what a moderate price this is! Demonstrations are now being arranged. Complete specification sheets are available. Write for full details.

G S I GERBER SCIENTIFIC INSTRUMENT CO., 89 SPRUCE ST., HARTFORD, CONNECTICUT

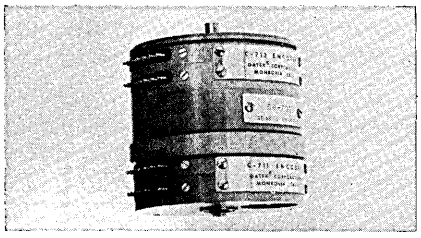
Circle 11 on Reader Service Card.

be used for telemetering. For information write FISCHER & PORTER Co., 116 Jacksonville Rd., Hatboro, Pa.

Circle 206 on Reader Service Card.

encoder assembly

Resolving shaft positions to one part in ten thousand can be done with the CG-701 geared encoder assembly. The



assembly uses two shaft position encoders and a gearbox. The encoder used on the input shaft provides 1,000 positions of the least significant digit per 360° rotation. Because the disk of this encoder is coupled directly to the input shaft, accuracy is that of the encoder used. This input unit is then geared 10:1 to a ten-position encoder. For information write DATEX CORP., 1307 S. Myrtle Ave., Monrovia, Calif.

Circle 207 on Reader Service Card.

analog computer

This 120-amplifier computer features "Tilted L" packaging in which the problem boards, controls, potentiometers, multipliers and all adjustments are within reach and direct vision of the operator. Forty-eight of the computers' 120 amplifiers are interchangeably summers or integrators. Sixteen are servo-multipliers, each with five 10-turn potentiometers and a slip-clutch which disengages the motor from the pots when the input reaches ±100 volts. Two-hundred and forty linear scale-factor potentiometers on sliding racks facilitate storage of problems for multi-shift operation. For information write DIAN LABORATORIES, INC., 611 Broadway, New York 12, N. Y., or use reader card.

Circle 208 on Reader Service Card.

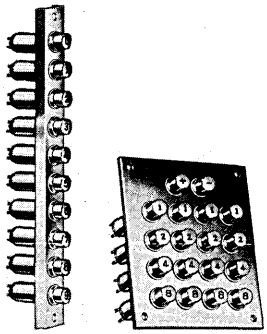
telemetry oscillator

Model AOV-5G is available for all IRIG channels. Volume is approximately 9 cubic inches; power supply is + 18 volts dc ±10% at 10 ma. The unit adapts modularly to this company's other airborne-telemetry equipment including a transistorized commutator and other miniaturized oscillators and amplifiers. For information write DATA-CONTROL SYSTEMS, INC., 39 Rose St., Danbury, Conn.

Circle 209 on Reader Service Card.

data strip, data matrix

The basic indicator light in a data strip consists of a lampholder with a plug-in lamp cartridge. The lamps used are



the T-1¾ incandescent lamp in a voltage range from 1.35 to 28 volts; or the NE-2E neon lamp for 105 to 125 volt circuits. Data strip No. DSV-7538-10 holds 10 lampholders but data strips can be made with any number of lamp-

holders on the aluminum channel for vertical or horizontal reading. The data matrix is similar to the data strip but rectangular in shape, No. DM-7538-18, a typical binary computing application, holds 18 lampholders. For information write DIALIGHT CORP., 60 Stuart Ave., Brooklyn 37, N. Y.

Circle 210 on Reader Service Card.

card sorter

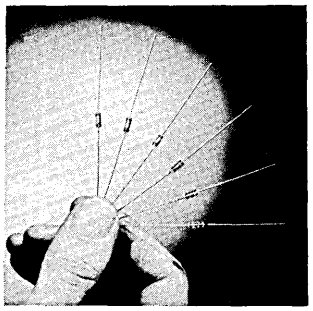
A punched card sorting machine which operates at 2,000 cards/minute can sort cards into alphabetic or numerical sequence at "twice the speed of its fastest predecessors," according to the manufacturer. Transistorized circuits, vacuum-assist card feeding, photosensing, radial stacking and continuous loading are features of the Model 84. For information write INTERNATIONAL BUSINESS MACHINES, Corp., Data Processsing Div., 112 East Post Rd., White Plains, N.Y., or use reader service card.

Circle 211 on Reader Service Card.

germanium diodes

Two major classifications of germanium diodes feature high forward conductance, high back resistance and fast reverse recovery time, according to the manufacturer. They are specially aged for stability. One is an extensive line for general purpose and computer use, in which from one to four operating characteristics are specified. The other line covers special computer diodes in which 10 operating characteristics are specified. For information write OHMITE MANUFACTURING CO., 3682 Howard St., Skokie, Illinois.

Circle 212 on Reader Service Card.

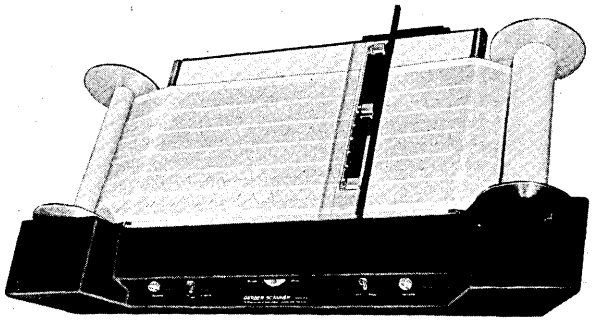


computer memory tester

This memory tester has been designed and built to test coincident current core memory stacks under simulated computer conditions. Type 1510 is a complete system including current sources, logic, error detecting circuits, power supplies, etc. X and Y drive currents

GERBER PRESENTS –

AN OSCILLOGRAM SCANNER
THAT TRACKS YOUR RECORD!



This Free Trial Offer Proves It!

From extensive testing, we know that you must be satisfied with this scanner. We are so confident it will work for you that we ask you to specify 7 day free trial on your purchase order.

Order now—or write for full details.

$595.00
FOR 12" MODEL.

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FOR 16" MODEL.

$95.00 extra for Variable Scale with mounting attachment.
F.O.B. Hartford, Conn.
Terms: Net 30 days.

GENERAL SPECIFICATIONS

- RECORD WIDTH—0 to 12", 0 to 16".
- RECORD SPEED—0 to 100 ft. per minute.
- TOP—Fully illuminated 24" long surface.
- CONTROLS—On or off, forward and reverse, variable record speed.
- RESPONSE—Instant positive braking.
- RECORD CORE INSIDE DIAMETER—5/8". Any longer core diameter can be built up with a false core enlarger.
- MAXIMUM ROLL DIAMETER—6".
- LOADING—Cantilever bars—no paper threading required.
- CURSOR—12" or 16" long.

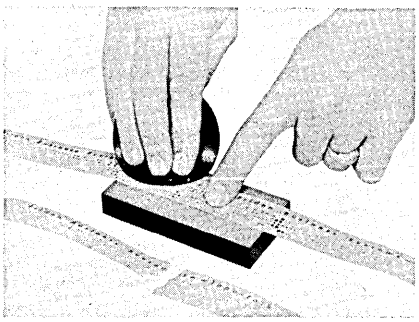
G S I GERBER SCIENTIFIC INSTRUMENT CO., 89 SPRUCE ST., HARTFORD, CONNECTICUT

Circle 12 on Reader Service Card.

can be varied from 40 to 600 milliamperes. A fully assembled stack of memory planes (up to 64 x 64 cores per plane) can be driven at one time for testing. Planes are checked one at a time for errors. For information write DIGITAL EQUIPMENT CORP., Maynard, Mass., or use reader card.
Circle 213 on Reader Service Card.

tape splicing kit

Paper tape splicing kit Model A-4809 includes a splicing block to align the tape for accurate hole location, a supply of pre-punched pressure-sensitive tape for splicing up to 8-hole programming tape, and a tube of cement for fusing splices. Basically, the splicer consists of a small metal block with a row of small pins which fit into the feed holes of either the standard 5 or 8 hole tapes. The tape's two broken ends are aligned on the metal block by the feed-hole pins, pushed down and smoothed out, and a short piece of adhesive material with punched holes is placed over the joined ends. For information write UNICORN ENGINEERING CORP., 1040 North McCadden Place, Hollywood 38, Calif., or use reader card.



Circle 214 on Reader Service Card.

power supply

Six different DC output voltages, electrically isolated from each other, and two AC outputs, one regulated and one unregulated, are provided, by a computer power supply system in which line transients are eliminated and transients caused by step load changes are minimal. A total of 4.75 KW DC is provided by the power supply system which is available from six individual rectifier power supplies rated at −30 volts at 2.6 amperes, +90 volts at 2 amperes, +150 volts at 3.75 amperes, −150 volts at 5 amperes, +250 volts at 2 ampeers and −300 volts at 2.2 amperes. Overall voltage regulation is better than ±3% from 40 to 100% of rated load. For information write BOGUE ELECTRIC MANUFACTURING CO., 52 Iowa Ave., Patterson 3, N. J., or use card.
Circle 215 on Reader Service Card.

buffer storages

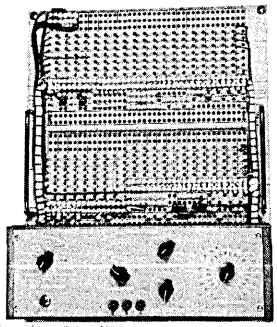
These buffers are designed to implement digital data transfer between systems or equipments that are asynchronous, or have different data rates, for collection of regular or aperiodic data from tapes, analog-to-digital converters, and other digital sources. Modular control-system design permits selection of from one-16 independent control and programming features as well as any capacity and bit-rate within standard ranges, for rapid delivery from stock modules. A number of optional features are included. For information write DI/AN CONTROLS, INC., 40 Leon St., Boston 15, Mass., or use reader service card.
Circle 216 on Reader Service Card.

magnetic recording system

This system records 108 channels of multiplexed FM/FM data plus the entire output of a 16-bit digitizer on a single one-inch wide magnetic tape. It was designed for instrumentation of advanced power plants for North American Aviation's F-108 and B-70 weapons systems. New magnetic head configurations combining many tracks of digital recording with multiple analog recording on a single tape are used to set new standards for pulse-code and wide-band analog recording. The system increases one-inch tape capacity to 16 digital tracks plus 7 standard analog tracks; or 32 tracks of digital information only may be recorded. For information write AMPEX CORP., Instrumentation Division, 934 Charter Street, Redwood City, Cal., or use card.
Circle 217 on Reader Service Card.

check panels

PNC panels provide a method of verifying the accuracy of the fully expanded 16-31R and 16-131 R PACE



systems as well as smaller systems and non-standard systems. They are permanently wired prepatched panels with control and selector switches allowing sequential testing of major computing elements. Two panels are required for a complete system. The first panel checks out linear equipment, while the second panel uses the previously checked equipment to check the non-linear equipment. Test results may be recorded manually by reading the VTVM, DVM, or multi-channel recorder. For information write ELECTRONIC ASSOCIATES, INC., Longbranch, N. J., or use reader card.
Circle 218 on Reader Service Card.

telemetry data system

Now available is a basic automatic PDM-to-digital computer format telemetry data system. MARK I is the result of an engineering development program for a major aircraft corporation. The system will receive PDM flight test data either directly or from an analog tape, convert the data into digital form, and record the data on a magnetic tape, in a format compatible

Space Technology Laboratories is responsible for the over-all systems engineering, technical direction and related research for the Air Force Intercontinental and Intermediate Range Ballistic Missile Programs and for the highly successful Thor-Able series of ram range re-entry launches. ☐ In addition, STL carries out special experimental projects for such agencies as the National Aeronautics and Space Administration and the Advanced Research Projects Agency. On behalf of these agencies and in conjunction with the Air Force Ballistic Missile Division, STL designed and produced the Pioneer I payload, one of the most sophisticated fact-finding devices ever launched into space. In addition, STL provided systems engineering and technical direction for the Air Force satellite, the Atlas score. ☐ In support of these and future requirements, STL's activities provide a medium through which scientists and engineers are able to direct their interests and abilities towards the solution of complex space age problems. STL invites inquiries regarding staff openings in any of the five major areas of the company's activities.

Electronics Laboratory
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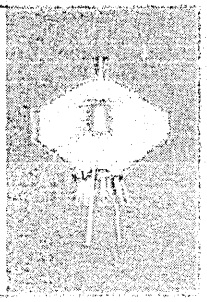

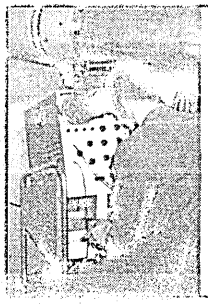

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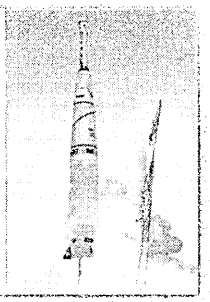
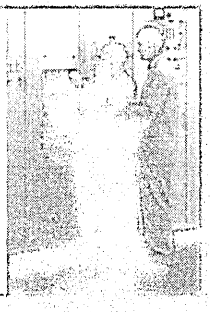
. . . conceives, evaluates, designs, develops, and tests space vehicle systems; provides technical direction of propulsion, nose cone, and airframe subsystems; explores new propulsion, airframe, re-entry, and ground handling techniques.



Computation & Data Reduction Center
. . . provides a centralized mathematical and computing facility and engages in advanced research in data systems, information theory, computation systems and automatic programming, systems and hardware simulation, and applied mathematics.



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. . . has the over-all responsibility for the system integration of the Atlas, Titan, Thor, and Minuteman weapons systems, in addition to responsibility for technical direction of the airframe, sub-system, assembly and test, and ground support activities; evaluates proposed future weapons and space systems.

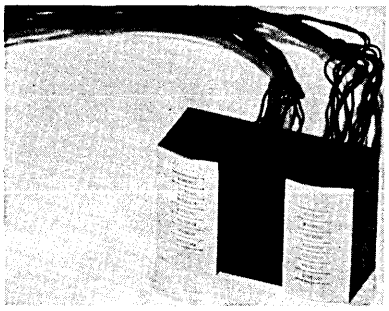
Space Technology Laboratories, Inc., P.O. Box 95004, Los Angeles 45, California

with the digital computer. The system operates without calibrations or adjustments, and performs with accuracies of better than ± 0.1 percent. Manual zero and 100% data correction is a feature of the system. For information write EPSCO, INC., 588 Commonwealth Ave., Boston 15, Mass.

Circle 219 on Reader Service Card.

record/reproduce head

The all-metal construction of this head and the elimination of potting compounds permit it to withstand severe

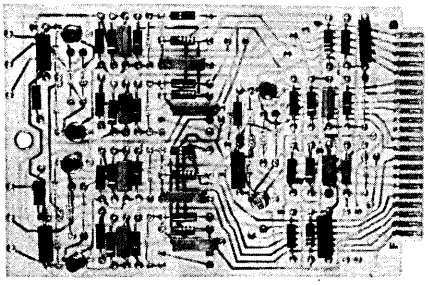


shock and temperature changes. Interchannel crosstalk is significantly reduced by the interlacing of individual channels between the two head stacks. Precision machining and optical lapping of the face surface further assures uniformity and stability of all dimensions, says the manufacturer. Specs may be modified. For information write J. B. REA CO., INC., 2202 Broadway, Santa Monica, California.

Circle 220 on Reader Service Card.

flip-flop package

Plug-in flip-flop package model FF3 is one of a line of over thirty types of transistorized modular logic cards now

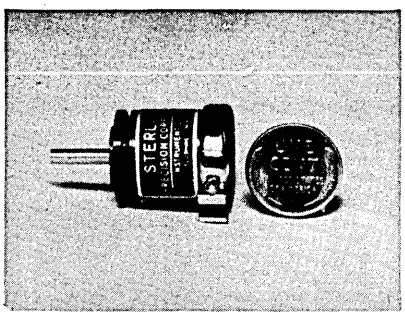


available from this manufacturer. FF3 contains 3 Eccles Jordan flip-flops. Non-linear feedback diodes are used to insure interchangeable operation without undue sacrifice of speed. Threshold bias provides noise discrimination. Clamping diodes are provided on both outputs to give a stable voltage level with low output impedence to minimize the effects of capacity loading. For information write DIGITRONICS CORP., Albertson Ave., Albertson, L. I., N. Y., or use reader card.

Circle 221 on Reader Service Card.

gearhead

Model T612 modular gearhead is designed for use in high accuracy computers, servo systems and similar pre-

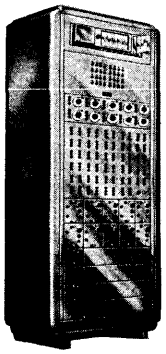


cision devices. It is available in any desired ratio up to 178:1. For information write STERLING PRECISION CORP., Instrument Division, 17 Matinecock Ave., Port Washington, N. Y.

Circle 222 on Reader Service Card.

analog computer

The "COLLEGIATE" Model 500 is offered for use both in the college classroom and in the industrial lab. All

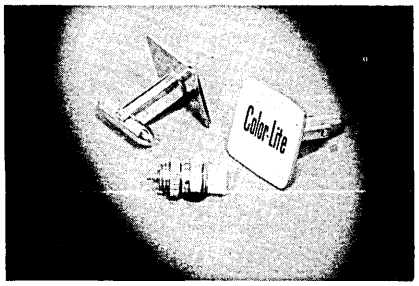


components have their own front panels and are not permanently associated with each other. The low drift and noise of the chopper-stabilized operational amplifiers allows real time simulation. The unit is portable. For information write ELECTRO PRECISION CORP., Arkadelphia, Arkansas.

Circle 223 on Reader Service Card.

panel light

Model 102S operates for 100,000 hours at 5 volts; 60,000 hours at 6.3 volts. Designed for front access, this is the



smallest (¼ inch in diameter) panel indicator light available, states the manufacturer. The light cap, available in red, white, green, blue and amber is ⅛ inch in diameter. Both single and two terminal models with either fixed or removable bulbs are available. For information write THE SLOAN CO., 4029 Burbank Blvd., Burbank, Calif.

Circle 224 on Reader Service Card.

operations monitor

Model RE 3303-00 records thirty channels of on-off, open-shut, pulse, or event type information, providing a

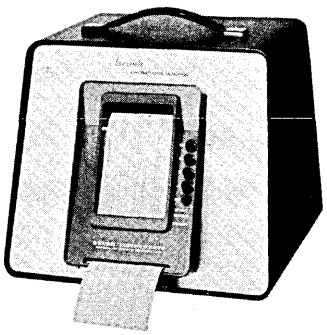
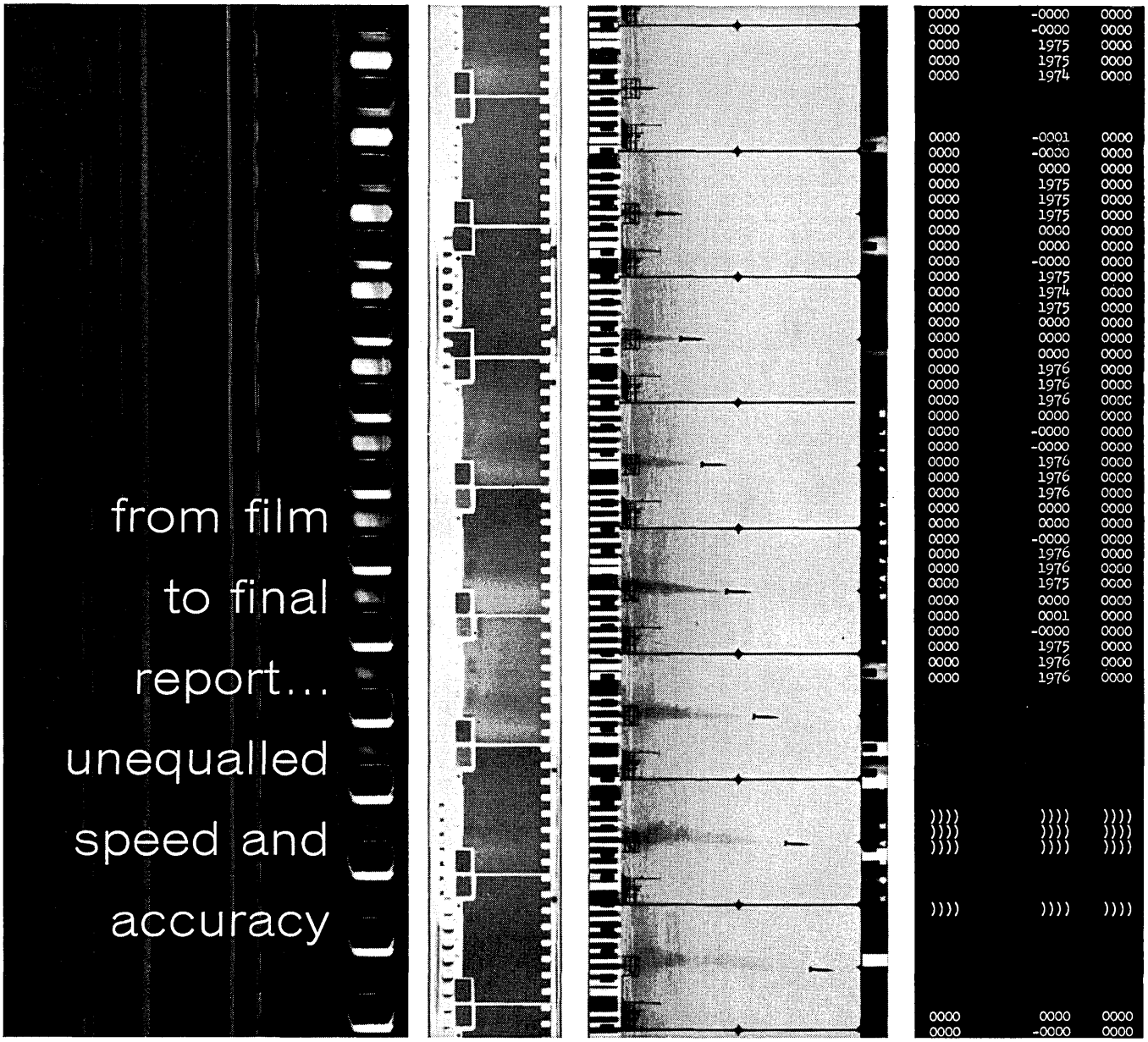


chart record of all operations and their duration. Thus, an immediate picture



THE DILOG 316 FILM RECORD READING SYSTEM

Now you can throw away your pencils and charts! The Data Instruments DILOG 316 is the fastest and most accurate method of film analysis. The DILOG 316 Film Reading System handles all films from 16mm through 9½ inches... and the required information is rapidly and accurately translated into digital form. The data may be automatically typed on an electric typewriter — punched into cards or paper — plotted — or any desired combination. For the fastest, most accurate film reading of radar checks, guided missiles tests... for any data recorded on film... the DILOG 316 gives you unmatched efficiency. Ask for the complete story of film reading equipment. Write, wire, or phone:

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INSTRUMENTS

DATA INSTRUMENTS
DIVISION OF TELECOMPUTING CORPORATION
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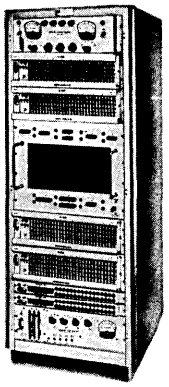
Circle 13 on Reader Service Card.

of an entire situation with each event shown in a time relationship to all other events is readily obtainable. Because the instrument features electric writing, an instantaneous dry and permanent record is obtained. Among applications – production testing and monitoring operation of computers. For information write BRUSH INSTRUMENTS, Division of Clevite Corp., 37th and Perkins, Cleveland 14, Ohio.

Circle 225 on Reader Service Card.

magnetic core memory

Model TCM is an all-transistor, coincident current, ferrite core, high speed random access magnetic core memory



with an eight microsecond cycle time. Design is based on proven coincident current ferrite core storage techniques. Word capacities up to 4,096 and word lengths up to 40 bits/word are assembled. Access time to any address is 4.0 microseconds. Read-write cycle time between random address locations may be as short as 8.0 microseconds. Manual control and marginal test facilities are contained within each memory system. For information write COMPUTER CONTROL CO., INC., 92 Broad St., Wellesley, Masachusetts.

Circle 226 on Reader Service Card.

silicon diodes

These diodes are glass encapsulated, hermetically sealed, sub miniature devices. They feature a resilient connection to one element of the junction. This fused spring contact minimizes the strain in the silicon junction area, provides a greater margin of durability under normal conditions, and insures normal operation under conditions of shock and vibration, according to the manufacturer. The family includes both low current and high current computer diodes. For information write SPERRY SEMICONDUCTOR DIVISION, Sperry Rand Corp., S. Norwalk, Conn., or use reader service card.

Circle 227 on Reader Serviec Card.

telemetering equipment

Modular, transistorized airborne or ground based telemetering equipment for data acquisition, known as K series, is designed principally for multiplexing and coding data in pulse width form. The module concept will be used also in telemetering systems employing PCM, PAM and FM/FM techniques. Electronic multicoding units with all solid-state components and no moving parts are one of the major system configurations of the K series line. Data acquisition modules can be custom designed to meet special needs of users. For information write ASCOP, P. O. Box 44, Princeton, N. J., or use card.

Circle 228 on Reader Service Card.

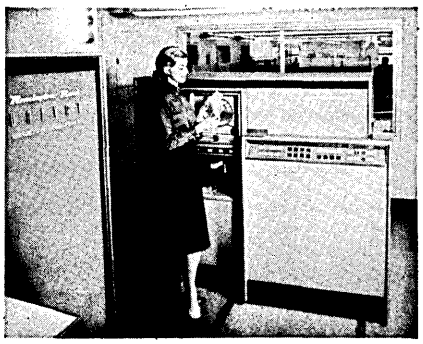
recorder/reproducer

A new magnetic tape continuous-loop recorder/reproducer designed for the repetitive study of highly transient data, random occurrences, and time-delay application is a completely self-contained system with amplifiers, precision frequency power supplies and blower. Type 5-781 provides selective or simultaneous erase for its 14 analog, FM, or PDM record/reproduce channels. It is designed to record or reproduce data on continuous magnetic tape loops of variable lengths, ranging from two to 75 feet and tape speeds from 1⅞ through 60 ins. per second. For information write CONSOLIDATED ELECTRODYNAMICS CORP., 300 North Sierra Madre Villa, Pasadena, Calif., or use reader card.

Circle 229 on Reader Service Card.

document printer

This unit is billed by the manufacturer as the first electronic printing unit to



compute, edit, punch, print on both sides and segregate any standard tabulating-sized documents in a single operation. Cards can be fully processed, in a single pass through the printer at speeds up to 1,456 lines per minute. For information write REMINGTON RAND, Division of Sperry Rand Corp., 315 Fourth Ave., New York 10, N.Y., or use reader card.

Circle 230 on Reader Service Card.

resistors, ratio sets

A complete line of laboratory-standard resistors and ratio sets to 0.0015% absolute accuracy and 0.0005% relative (ratio) accuracy, with comparable stability are available. Among applications – analog computer networks. For information write JULIE RESEARCH LABORATORIES, INC., 556 West 168th St., New York 32, N.Y.

Circle 231 on Reader Service Card.

400 channel analyzer

Model 34-9 uses a ferrite core memory system for spectrum analyses. Linearity is better than 0.5%. Average dead time – 120 microseconds; normal capacity per channel – 65,545 counts. For information write RADIATION INSTRUMENT DEVELOPMENT LABORATORY, INC., 5737 S. Halsted St., Chicago 21, Illinois, or use card.

Circle 232 on Reader Service Card.

INTRODUCING FLIDEN AND FAMILY

aeronutronic's remote entry advances impressive

by JOSEPH K. SLAP

Assistant, Director of Marketing
Aeronutronic Computer Division

Devices for the remote entry of messages to computers have been developed by Aeronutronic Systems, Inc., the West Coast subsidiary of Ford Motor Company. These devices feature keyboard input, visual display of the entire message as it is prepared, buffer drum storage of the message, provisions for rapid correction of the message before transmission, and built-in error-checking circuits.

Representative of Aeronutronic's message entry equipment is FLIDEN, for FLight Data ENtry. FLIDEN is part of a semi-automatic air traffic control system under development by several contractors for the Federal Aviation Agency. This system will involve teletype and/or high-speed pulse-coded information, a computer, and a variety of display and buffering equipment.

The FLIDEN equipment provides a means for an operator to enter data such as flight plans, position reports, and requests for information into the computer via a communication link.

In system operation, a message is composed by the operator on the manual keyboard, figure 1. As the message is composed, it is stored on FLIDEN's magnetic drum, and is displayed on the cathode ray tube screen in front of the operator to permit verification of content. If errors are made, they can be corrected rapidly without disturbing the satisfactory portions of the message. When the message is completed, the operator presses a key (marked XMT on the keyboard) which places FLIDEN in a ready position to send the composed message. The air traffic control computer then selects one of the FLIDEN units in this ready state for transmission of its stored message. A representative system block diagram is shown in figure 2.

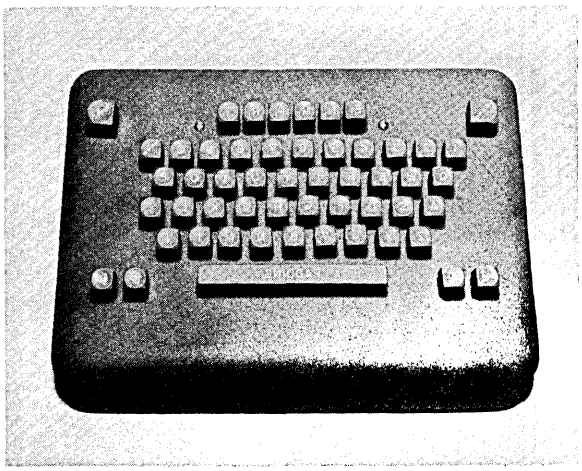


Figure 1. FLIDEN's keyboard.

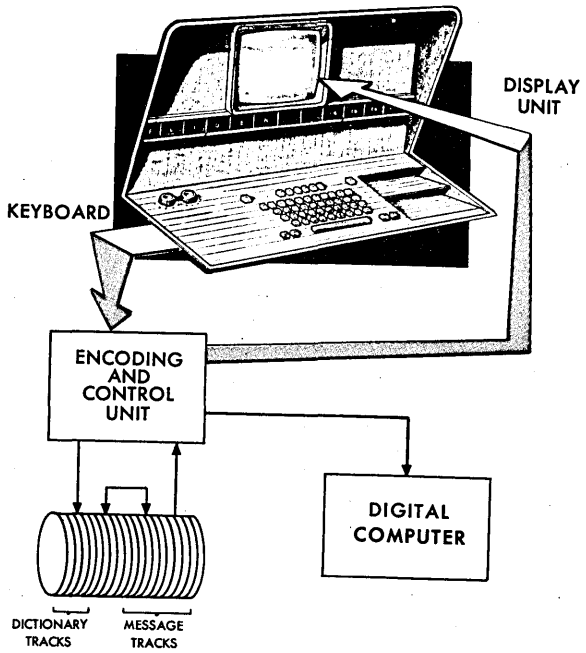


Figure 2. FLIDEN system block diagram.

The format for the kind of message to be sent is selected by depression of one of six format keys. The format display which then appears on the cathode ray tube screen serves the same purpose as the column headings on a printed form; it guides the operator in composing the message.

As the message is typed, a vertical line, or point-of-type indicator, moves so as to immediately precede the next character insertion space. In case an error is observed, the point-of-type indicator can be back-spaced, as far as necessary, the correction made by typing the correct character over the incorrect one, and the point-of-type indicator forward-spaced to the original position, all without disturbing correct portions of the message. A FLIDEN unit, with a typical display in the background, is shown in figure 3 (following page).

Each character on the display is formed from a five-by-seven dot matrix. Since the display raster is generated thirty times per second, a medium persistence cathode ray tube screen is sufficient to avoid flickering of the display.

After the operator has verified the message visually, he presses the transmit key. When transmission is complete, as indicated by a light on FLIDEN's control panel, the message can be erased (by means of the ERASE key)and a new message composed.

The transmission of information may be executed in either of two forms: character serial (teletype transmission)

for remote transmission, or character parallel for local transmission directly into the automatic data processor. The first mode permits switch selection of 75, 100, and 120 words per minute. The second mode accommodates any speed up to 600 words per minute.

A number of error-checking features are incorporated in FLIDEN. These include, for example, an alarm light indicating an unallowable input condition (such as the typing of a letter where a number is required) or an error in transmission.

With the exception of the high voltage power supply and the deflection amplifiers and cathode ray tube in the display, FLIDEN has entirely solid state circuitry, with plug-in circuit cards. The clock rate is 302.4 kc. The power required is some 600 watts. The drum recording uses a moderate packing density of 134 bits per inch.

A sister machine to FLIDEN in Aeronutronic's message entry family is the mil spec unit called TACDEN, for TACtical Data ENtry. TACDEN, like FLIDEN, is used as a remotely located input-output device, but is specifically designed to communicate with the Army's FIELDATA digital computing equipment. TACDEN differs from FLIDEN primarily in certain circuit details (the method of gating is different), in packaging (for military environments), in the addition of several field-required testing aids, and in some of the keyboard controls.

A third, and unique, type of message entry equipment is known as GRAPHDEN, for GRAPHical Data ENtry. This unit provides the capability for transmission of graphs, including any desirable scaling or identifying symbols. These symbols can be placed at arbitrary points on or adjacent to the curves. The graphical and symbolic data, inserted directly from the plots, are internally coded by GRAPHDEN in a form suitable for transmission to a remote digital computer or display device. Storage and transmission circuitry are similar to those of FLIDEN and TACDEN.

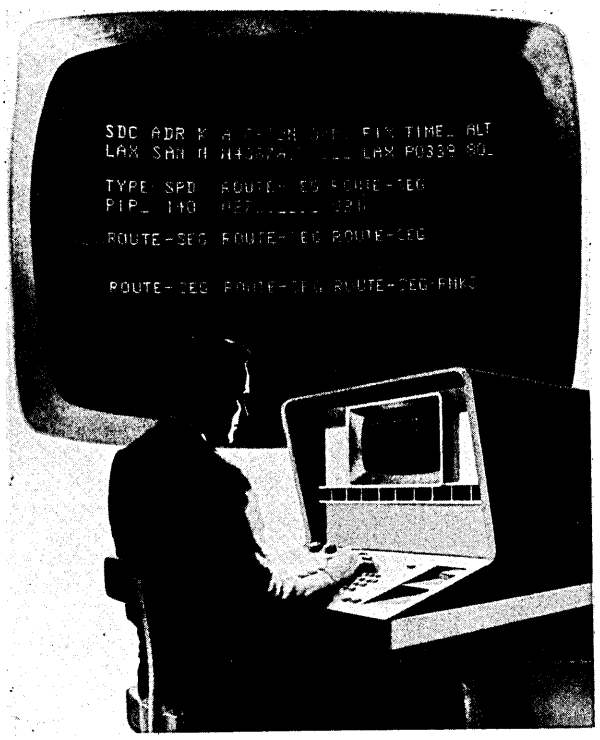


Figure 3. FLIDEN unit with typical display.

Variations on the above designs are under investigation at Aeronutronic to establish applicability in such other fields as file interrogation, inventory control, production control, and inter-plant industrial data communication. All the message entry equipment is being designed in the Data Processing Engineering Laboratory, which is headed by Dr. Gene Amdahl, who has been project engineer on both IBM's 704 and the University of Wisconsin's WISC computer.

In addition to the message entry equipment projects, Aeronutronic's Computer Division engineers are active in a variety of digital storage programs. These cover broad spectra in both size and speed of access. Examples are a large random access file of multi-megabit capacity with average access times in hundreds of milliseconds (also under Dr. Amdahl), and a miniature storage element operating in fractions of a microsecond. Work on this element, and on equipment springing from it, is under the direction of C. L. Wanlass.

At present, the largest project in the Computer Division

Joseph K. Slap has been special assistant to the director of marketing in Aeronutronic's Computer Division since November, 1958. He is active in a supervisory and design capacity in many areas including the preliminary design of new digital data handling systems. Graduating Magna Cum Laude from Queens College, N. Y., in 1948, he has done post graduate work at U. C. L. A., Case Institute of Technology and El Camino College. Slap was group engineer at Northrop Aircraft from July '48 to January '57. At Alwac, he was technical assistant to the director of engineering and later, assistant general manager. He joined Aeronutronic last year.

is the Operations Central. This project, headed by C. A. Brown, formerly in charge of Fort Monmouth's Evans Signal Laboratory, is responsible for the design and implementation of a mobile field army electronic command post. The command post, or central, will provide the army commander with an immediate visual display of his tactical situation, plus communication and analysis equipment for readily influencing that situation.

The programs described above, plus a number of classified computer projects, have been under development in the Computer Division's temporary quarters in Santa Ana, California. Early in July, the Division will be settled in its new 120,000 square foot building in Newport Beach, California. This building will be the third to be occupied in Aeronutronic's 200-acre complex.

The first two, with associated test facilities and "tank farm," form the Aerothermochemical Laboratory of the Space Technology Division. On the way are a large Space Technology building, a General Services building, a General Offices building, and an Environmental Test building. Aeronutronic also operates plants in Glendale and Maywood, California – the latter being occupied by its Tactical Weapon Systems Division. The Range Systems Division and Office of Advanced Research are presently located in Glendale.

Aeronutronic was established in 1956 and has shown a remarkable growth rate. Ernest R. Breech, chairman of the Ford board, is also chairman of the Aeronutronic board of directors. Other directors include Gerald J. Lynch, president of Aeronutronic, and Dr. Ernst H. Krause, vice-president and general manager of the Computer Division.

It is interesting to speculate on the projected expansion of the computer industry in the United States. However, such speculation is of more than passing interest to a dynamic computer organization – it is the company's future life-blood. Dr. S. Dean Wanlass, director of marketing and product planning for Aeronutronic's Computer Division, indicates that the Division's planning committee is continuously studying its "product mix" in relation to the projected future market. This study serves as the basis for initiating or modifying the extensive research and development programs necessary for Aeronutronic's continued growth and success. ●

Circle 138 on Reader Service Card.

Systems & programming Opportunities

AT THE REMINGTON RAND UNIVAC MILITARY DIVISION

Opportunities at Univac cover a wide range of interesting and challenging programs. They involve work associated with the Univac® systems which have demonstrated such an exceptional degree of reliability in ICBM guidance, and other control systems for the military.

There are immediate openings at various levels for:

COMPUTER PROGRAMMERS: College degree with at least one year of experience in programming digital machines.

MILITARY SYSTEMS ANALYSTS: Engineering, Mathematics or Physics degree with experience in weapons and missile guidance systems involving digital control, digital conversion, radar and communications information processing and display and output equipment.

BUSINESS SYSTEMS ANALYSTS: College degree with experience in business applications and programmings of digital data processing equipment as applied to production control, and maintenance logistics.

LOGICAL DESIGNERS: Engineering or Science degree with experience in logical design of data processing systems, utilizing transistorized circuits and solid state logical elements.

ENGINEERING WRITERS: Science degree with experience in the preparation of operation and maintenance manuals for electronic equipment.

These openings are primarily for our St. Paul laboratories, with some positions for programmers and analysts available in San Diego, California.

For immediate consideration, send inquiry and resume to:

Mr. R. K. Patterson, Dept. MA-4, REMINGTON RAND UNIVAC, 2750 West 7th Street, St. Paul 16, Minnesota

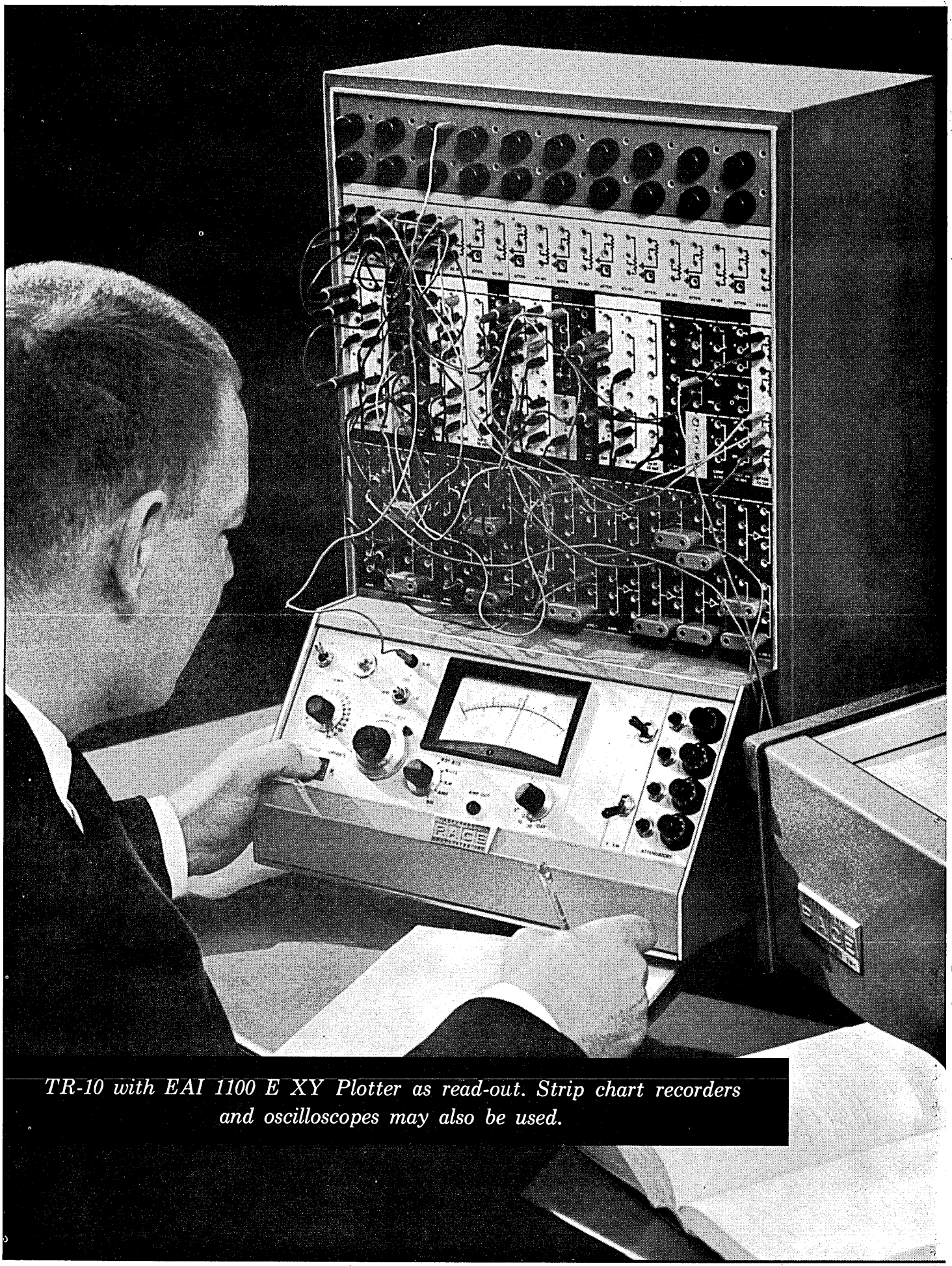
A limited number of openings are also available at our laboratories in Philadelphia, Pennsylvania, and South Norwalk, Connecticut. Inquiries may be addressed to:

Mr. James Drumm, Dept. MA-4, REMINGTON RAND UNIVAC, 1900 West Allegheny Avenue, Philadelphia, Pennsylvania

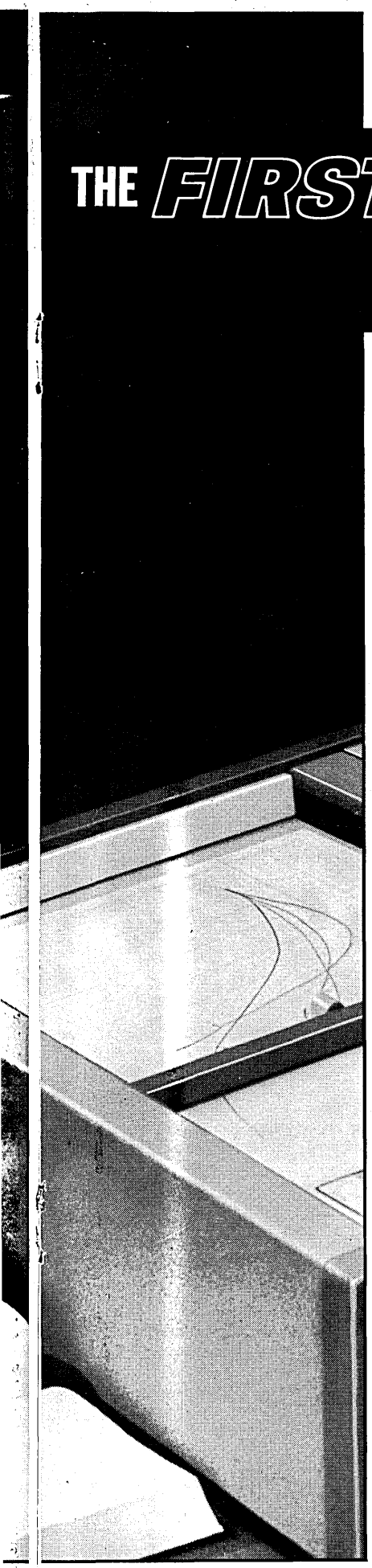
Mr. Robert Martin, Dept. MA-4, REMINGTON RAND UNIVAC, Wilson Avenue, South Norwalk, Connecticut

Remington Rand Univac DIVISION OF SPERRY RAND CORPORATION

Circle 70 on Reader Service Card.



TR-10 with EAI 1100 E XY Plotter as read-out. Strip chart recorders and oscilloscopes may also be used.



THE *FIRST* ALL TRANSISTORIZED ANALOG COMPUTER

—basic model less than $4000

PACE TR-10 Eliminates Drudgery
Gives New Insight Into Engineering Problems

New transistorized computer puts the advantages of analog computation within reach of every engineer. This compact unit, 15″ x 16″ by 24″ high, is powered by 115 volts AC and can provide day-in day-out instant solution of your most vexing engineering problems. Even if you have never seen a computer before, you can learn to operate the TR-10 as easily as you learned to use a slide rule.

Gain New Insight to Complex Problems

Once the problem is set up on your computer, you simply turn a dial to feed in design parameters. The computer provides an instant by instant, dynamic picture of the effect of each change. You can study the inter-related effects of heat, pressure, flow, vibration, torque or any variable. And you can visually compare one with the other. You see problems in a new light – engineering data comes alive – insight into how new designs will work is obtained easier, faster. There's no need for recalculating every time you change a factor – simply turn the dial and see what effect it has on the solution.

Your "Personal Computer" for Higher Creativity

Because of its minimum size and extremely low price, the TR-10 can become your own personal analog computer. It helps to free you from routine drudgery. Permits you to gain first-hand experience with the power of analog techniques, and convert more of your time to *creative engineering.*

Test New Ideas or Designs

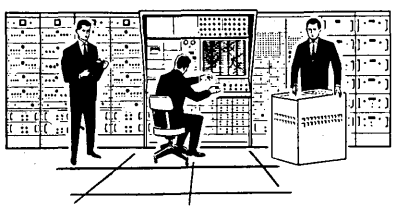
New ideas that were too costly to try before are now practical. Any possible combination of factors can be tried. You can design virtually to perfection and have a permanent, visual record of performance. All this can be done before building pilots or prototypes. As a result, "cut and try" expense is drastically reduced.

The same quality workmanship and design that has made Electronic Associates the world's leading producer of precision general purpose analog computers will be found in this new unit. Accuracy to ±.1 per cent. Modular construction allows you to select varying quantities of the following computing functions:

- Summation
- Integration
- Multiplication or Division
- Function generation
- Parameter adjustment
- Logical comparison

For complete engineering data, write for Bulletin TR-10-G.

EAI systems are serving engineers throughout the world. EAI maintains Computation Centers where PACE analog equipment is available on a rental basis. Write for details.



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

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Bendix G-15

PUNCHED CARD AND TABULATOR COUPLER

...a new accessory for the Bendix G-15 Digital Computer for low cost, high performance punched card computing

Now, at a cost significantly below that of any similar equipment, Bendix provides a complete computing system with 100 card per minute punched card input and output, and 100 line per minute tabulation.

Heart of the system is the Bendix G-15 general purpose digital computer, which has proven its performance in well over 150 successful installations.

The CA-2 coupler, a newly developed G-15 accessory, enables the computer to operate in conjunction with conventional punched card and tabulating equipment.

A full 80 columns of numeric, alphabetic, or special character information can be accommodated using only the CA-2 as a connecting link between the card equipment and the G-15. Any column of the card can contain any one of the three types of information.

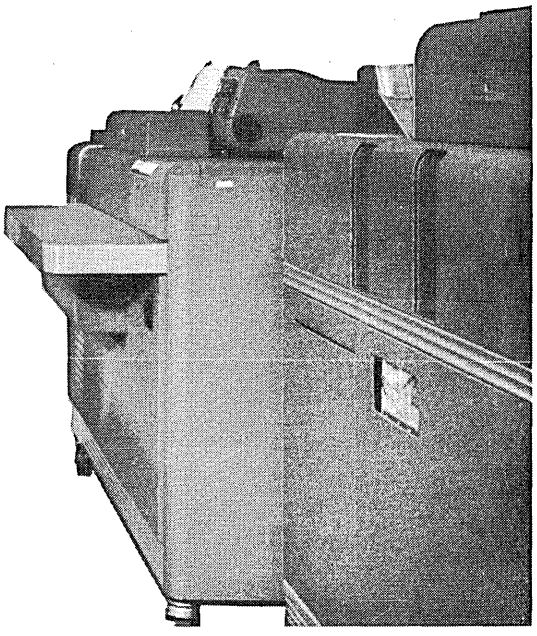
Three input-output units may be connected simultaneously . . . one for input, one for output, and a third for input or output. Data may be read or punched by standard card units, or printed by standard tabulators. All input and output is under complete control of the computer. Computation can proceed during the input or output cycle, thus assuring maximum over-all computing speed.

In addition to the CA-2, the computer's typewriter and paper tape equipment, and auxiliary magnetic tape storage units may be used for completely versatile input, output, and storage. Both power and space requirements of the complete punched card computer system are approximately half that of other systems of this type.

A system that includes the G-15 computer, the CA-2 coupler, two summary punches and a tabulator, leases for approximately half the price of a typical medium-priced system with similar capabilities.

Whether you are now using punched card or computing equipment, or if you are delaying such plans due to high costs, you will want to learn more about this inexpensive, efficient equipment. Detailed technical information on the G-15 and the CA-2 will be sent on request. Write to the Bendix Computer Division of Bendix Aviation Corporation, Los Angeles 45, California, Department E-11.

Bendix® Computer



Circle 15 on Reader Service Card.

REMRAND TURNS EMPHASIS ON 'NEW UNIVAC'

Remington Rand's entry in the solid state computer field, the Univac Magnetic Amplifier Solid State Computer (UMASSC) will soon be the object of an intense marketing and promotional campaign, according to company sources. Nine of these "New Univacs" are installed or about to be installed abroad and nine installations are planned initially for this country.

As more and more production effort is devoted to this computer Remington Rand expects to turn out the last of 25 Univac II's on order in October this year, DATAMATION learned exclusively. Commitments for the manufacture of Univac File-Computers will also be fulfilled at about the same time. Two Univac 1105's have been delivered to the U.S. Bureau of Census and another has been installed at McClellan Air Force Base. There was no company comment concerning production plans for the 1105.

European UMASSC installations include two operational systems at the Dresdner Bank, Hamburg, Germany (first user) and another installation at G.E.G., a manufacturing and warehousing center for a group of cooperatives in the same city. Other Univac Solid State Computers will handle payroll for Kronprinz in Solingen, Germany; premium billing for the Bundeslaender Insurance Company, Vienna; government accounting for a government agency in Vienna; and public utility billing for the Edison Company of Milan, Italy. Two computers have arrived at the Geneva and Zurich branches of the Bank of Switzerland. One of the first U.S. firms to order a UMASSC was the New Jersey Natural Gas Co., in Asbury Park, New Jersey. Nortronics, a division of Northrop Aircraft, Inc., will receive a computer this year and Zenith Plastics of Los Angeles is slated for a unit this fall.

The new computer consists of a central processor, a high speed card reader, a read-punch unit, and a high-speed printer. The equipment will rent for $6,950 a month with a purchase price of $347,500. A Flow-Matic programming package, using English words and phrases, has been developed for this computer.

BACK-UP BEEF-UP EVIDENCED BY DATAMATIC

Minneapolis-Honeywell's DATAmatic Division is being expanded to fully-staffed branch offices in five American cities. The action seems to be part of a plan, which could be labelled "Let's Not Spare The Horses, Boys," in establishing the Honeywell 800 as a real comer in the solid state computer field. (See story elsewhere in this issue concerning Computer Sciences Corporation.) Branch offices, manned by a full complement of systems and methods analysts, sales personnel and customer training instructors, have been opened in New York, Los Angeles, Boston, Chicago and Washington. Main office specialists (Newton Highlands, Mass.) will be available for special assignments.

With the announcement of these plans Honeywell also disclosed that Associated Hospital Service of New

York has ordered an 800 to serve its more than 7,100,-000 subscribers. The company also admitted to "at least ten" orders for this newest DATAmatic machine.

TMI AWARDED CONTRACT FOR MEMORIES

Two new memories are being developed by Telemeter Magnetics under a $400,000 contract awarded by the U.S. Army Ordnance Corp, and a TMI official has stated that these memories are three times faster than the fastest memories now known to be under construction. The new magnetic core memories will be used with a scientific computer at the Ballistic Research Laboratories, Aberdeen Proving Ground, Maryland.

The smaller memory has a cycle time of less than one micro-second for a complete read/write operation. The large memory has a storage capacity of approximately 300,000 bits and a cycle time of less than two microseconds.

NEW IBM DEVELOPMENT DIV. FORMED

IBM has formed an Advanced Systems Development division located in New York City. The new division reflects a major company program to increase further the development of wholly new systems in the general field of information processing, according to J. A. Haddad, General Manager. Byron L. Havens is in charge of engineering and technical activities.

AERONUTRONIC'S PLANT SITE IMPRESSES

Aeronutronic's Computer Division will move into its new facilities at Newport Beach, Calif., sooner than expected. Due to an unusually dry winter in Southern California construction of the 120,000 sq. ft. computer electronics facility will be all but completed in June. ASI's Computer Division should be installed by the end of July. DATAMATION is not usually impressed by plant sites but Aeronutronic's location overlooking Balboa and Newport Bay must be seen to be appreciated.

LIBRASCOPE PRODUCING AT FULL BLAST

Also impressive was a news release from Librascope which states that 23 LGP-30's valued at $1,150,000 were shipped in March to customers both here and abroad. This brings the total number of LGP-30's delivered to 253.

RANDOM INDUSTRY INFORMATION

Laboratory for Electronics, Inc., of Boston and the directors of Servomechanisms, Inc., of Los Angeles have approved a plan for combining the two companies this summer on the basis of 2¾ shares of Servomechanisms for 1 share of L/E. If the LA firm's stockholders approve, an exchange offer will be made in July to L/E stockholders, effective if accepted by at least 80%.

Electronic Communications, Inc., has received a $2,000,000 increase in contract authorizations from Hughes Aircraft Co., covering, in part, additional orders for communications and data-link systems. This increase is in addition to other recent orders from Hughes for systems and parts in the amount of $6,500,-000, calling for volume delivery of equipment in 1959.

Reorganization of the Ramo-Wooldridge engineering group into two major operating divisions has been announced. The divisions have been designated the Data Processing Division, Milton E. Mohr, director, and the Space Technology Division, to be directed by T. B. Bissett.

How to make your move without making a move...

• Tired? We've made it easy for you. Western Union, open-handed and large-hearted as ever was, has agreed to bring us your message at *no cost* to *you*. All *you* do is hand Western Union the blank below (tear out the whole page, if you feel strong enough) with check marks in the right places. We do the rest.

For example, we'll send you information about the broadly varied opportunities at *tech/ops*, and an illustrated brochure about this medium-sized and growing research and development firm with the usual benefits and an *unusual* profit-sharing plan. But do it today.

DOMESTIC SERVICE
Check the class of service desired; otherwise this message will be sent as a fast telegram

TELEGRAM	
DAY LETTER	
NIGHT LETTER	

$ S E

WESTERN UNION
TELEGRAM
1206 (4-55)
W. P. MARSHALL, PRESIDENT

INTERNATIONAL SERVICE
Check the class of service desired; otherwise the message will be sent at the full rate

FULL RATE	
LETTER TELEGRAM	
SHORE-SHIP	

NO. WDS.-CL. OF SVC.	PD. OR COLL.	CASH NO.	CHARGE TO THE ACCOUNT OF	TIME FILED

Send the following message, subject to the terms on back hereof, which are hereby agreed to

I am now a

✓ ☐ senior mathematician with a Ph.D. in mathematics or physics and experience with digital computers and modern programming techniques 1

☐ analysis division director with a Ph.D. and eight years of experience since my B.S. or B.A. degree 2

☐ senior OR analyst with a graduate degree in mathematics or the physical sciences and experience in OR and/or systems analysis 3

☐ associate OR analyst with a graduate degree in mathematics or the physical sciences 4

☐ research aide 5

I am interested in hearing more about positions available at tech/ops.

NAME_____

ADDRESS_____ TELEPHONE_____

Technical Operations, Incorporated

Central Research Laboratories / Burlington, Massachusetts

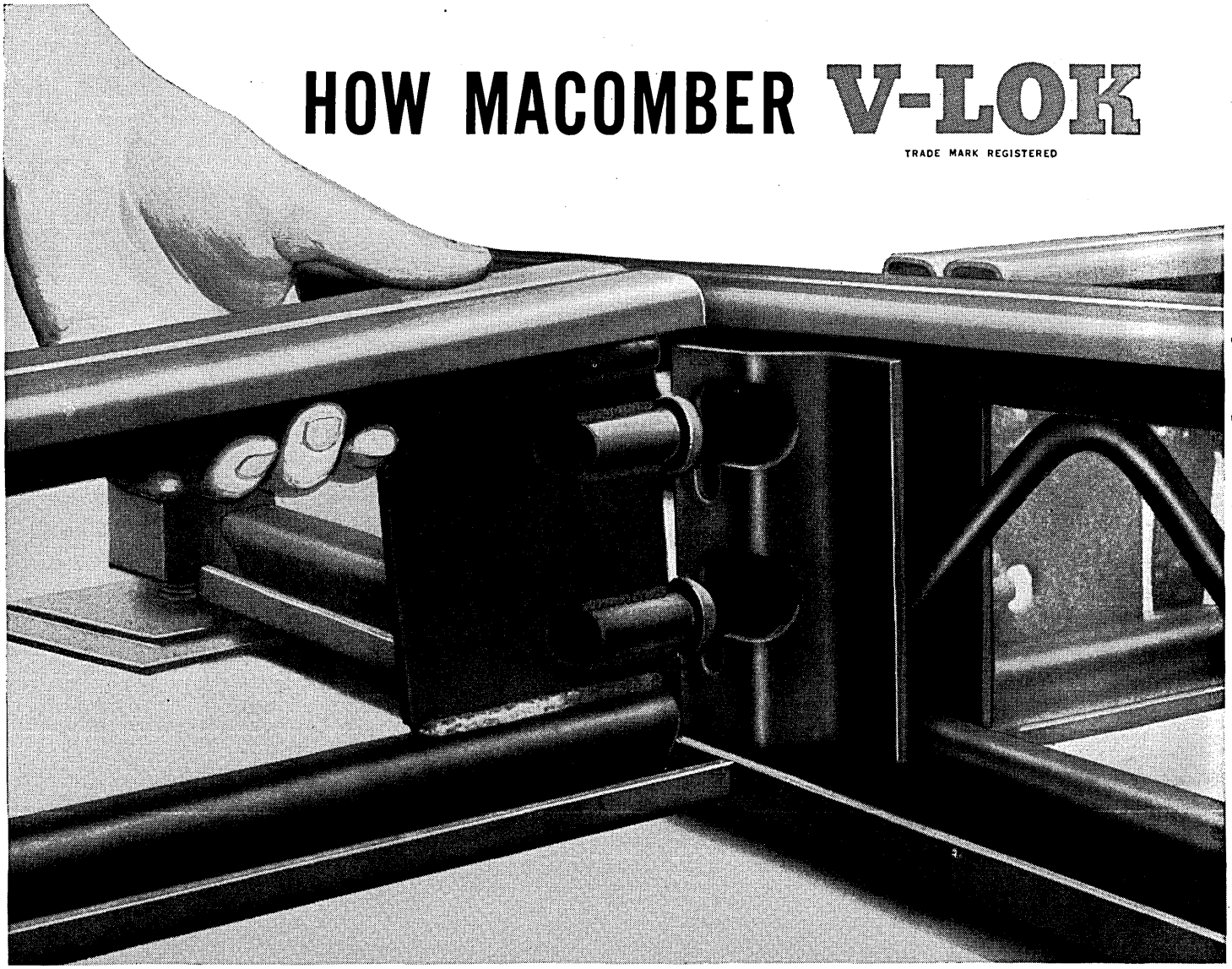
• WASHINGTON, D.C. • MONTEREY, CALIFORNIA • FORT MONROE, VIRGINIA

tech ops

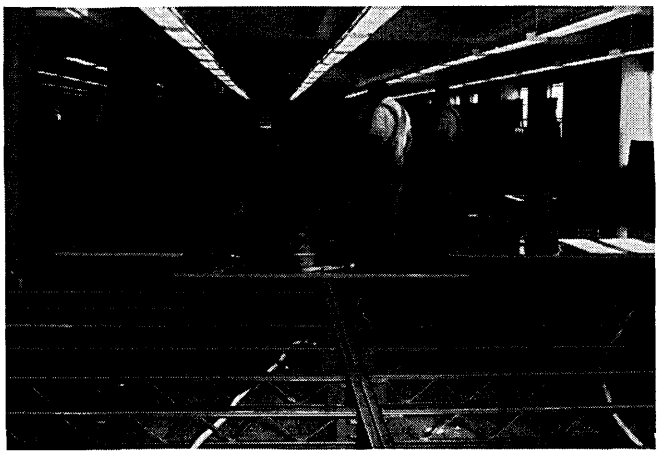
Circle 71 on Reader Service Card.

HOW MACOMBER V-LOK

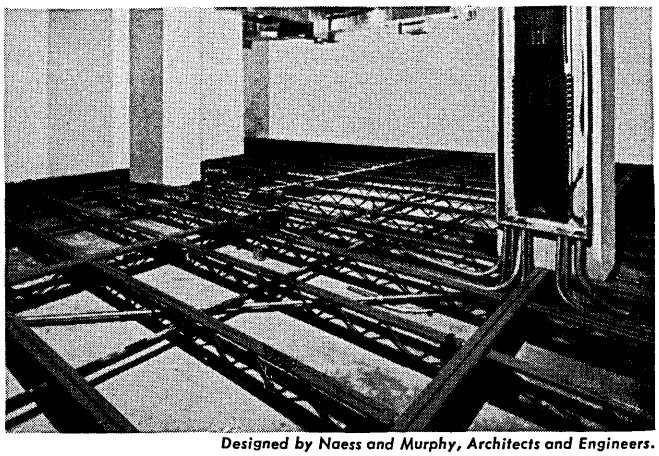
TRADE MARK REGISTERED



Engineered **V-LOK** *Principle* solidly locks the structural members of the computer platform installation into one rigid, quickly-assembled unit.



N. Y. Telephone Co., New York City employs approximately 18,000 square feet of Macomber Computer Platforms to support IBM billing machines in its New York Coliseum Building Accounting Department. Problem was to distribute and transmit uneven weight load to building steel. Although load averaged 25 lbs. per square foot, concentration of machines in some areas, boosted load to 200 lbs. per square foot. Macomber Computer Platforms solved this floor load problem.



Designed by Naess and Murphy, Architects and Engineers.

Federal Reserve Bank, Chicago is installing 1600 square feet of Macomber Computer Platforms to support the weight of thirteen units of IBM equipment in its Computer Room. Problem solved in this instance was distributing weight over old tile arch floors unable to support a concentrated load. Column supports of platforms had to bear directly on existing structural steel of the building – a problem easily solved by the flexibility of custom-fitted Macomber framing.

COMPUTER PLATFORMS

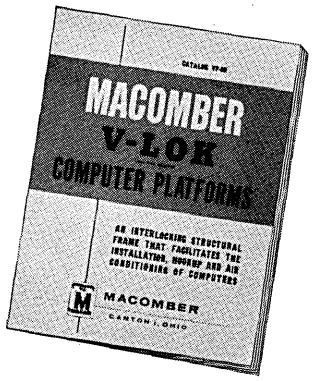
build strength, economy and speed into your installation

Macomber Computer Platforms, engineered to safeguard your computer investment, provide a structurally sound installation to safely carry and distribute concentrated floor loadings. And, where this extra weight must be carried on floors designed for ordinary office loads, Macomber V-LOK framing permits column spacing to bear upon the existing structural frame of the building.

Frame erection time is cut to a minimum by the speed of V-LOK connections. Adjustable V-LOK columns quickly compensate for uneven floors. As the frame is enclosed, a plenum chamber vented by floor panels is formed for air conditioning and electrical hookup. Marbleized, gray rubber-tiled, plywood floor panels with the positive Timlyn locking device attractively finish the installation.

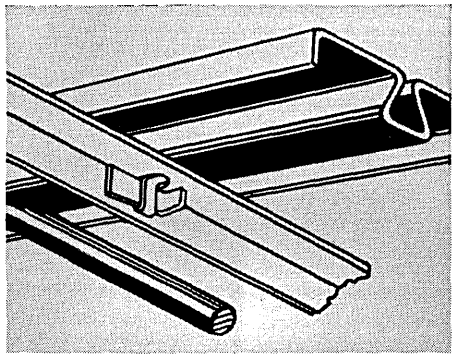
When you plan your computer room, the experience of Macomber engineers in designing computer floors for outstanding commercial and industrial organizations warrants your first consideration.

FOR COMPLETE INFORMATION, SEND FOR MACOMBER COMPUTER PLATFORM BOOKLET

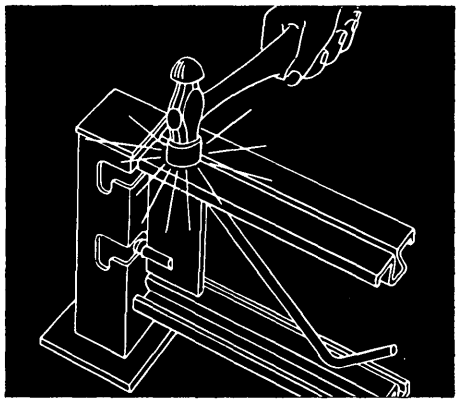


MACOMBER

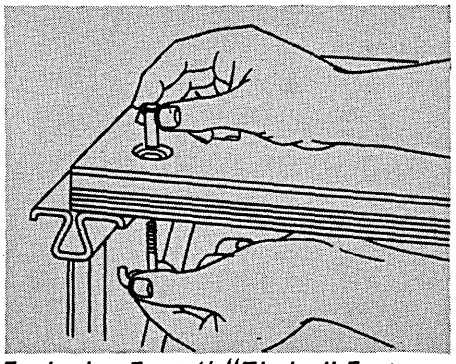
CANTON 1, OHIO



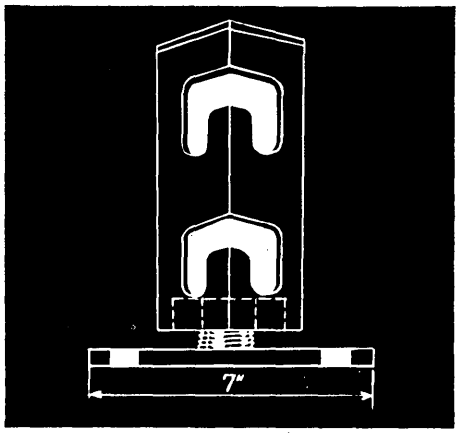
Instantaneous Wedge—Lock Bridging Fastener quickly secures purlins to girders without bolts or welds.



No Bolts, Rivets, or Welding—the driven V-LOK joint forms a rigid interlocked frame—easily expandable for future needs.



Exclusive Forsyth "Timlyn" Fastener produces a positive anchor of the floor panel to the V-LOK steel frame, yet permits removal of any section in minutes.



Quick Platform Leveling — the V-LOK column with adjustable base overcomes uneven floor conditions. Made in two heights — the 11½" and 7½" series.

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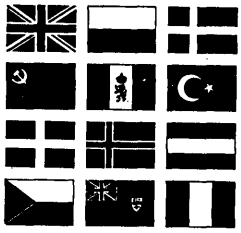


DATAMATION *abroad*

AMERICANS IN MOSCOW (AND PARIS)

Eight of America's top computer experts arrived in the Soviet Union on May 17th for a two week tour of computer and data processing facilities in Moscow, Leningrad, Kiev and Penza. The visit was arranged by the National Joint Computer Committee as part of a cultural exchange program under the auspices of the State Department. Making the tour are S. N. Alexander, Bureau of Standards; Paul Armer and Willis H. Ware, The RAND Corp.; Morton M. Astrahan, IBM; Lipman Bers, NYU; Harry H. Goode, Bendix Aviation; Harry D. Huskey, University of California and Morris Rubinoff, Philco.

The group, all of whom are remaining in Europe for the International Conference on Information Processing (Paris, June 13-22), were to tour many of the same facilities seen by an American group last year. It was hoped that much more information would be obtained during this trip, however, since a Russian party touring U. S. computer facilities this April had been given up-to-the-minute information. One new site visited by our group in May -- the computing machine factories in Penza.

RED CHINA, USSR COOPERATE TECHNOLOGICALLY

A joint agreement has been signed dealing with scientific and technological cooperation between Red China and the Soviet Union. Joint research on 122 major scientific and technological items has been provided between 1959 and 1962. Kuo Mo-Jo, President of the Chinese Academy of Sciences signed for China and Y. E. Maksarev, Chairman of the State Scientific and Technical Committee of the Soviet Council of Ministers signed for the USSR.

This agreement will have direct effect on China's entry into computer development. China is experimenting in production of her first universal electronic computer. Chinese scientists Fan Hsin-Pi and Wu Chi-Kang have been working together with a Soviet electronic computer expert, O. K. Shcherbakov, toward this end. From another source it was learned that a large scale computer has been constructed by two young technicians of the joint state-private owned Leichih Instrument Plant in Shanghai. One of the technicians is Chen Kuo-Yao. (See pictures, next page.)

OPEN SOON-- BIG SIBERIAN SCIENCE TOWN

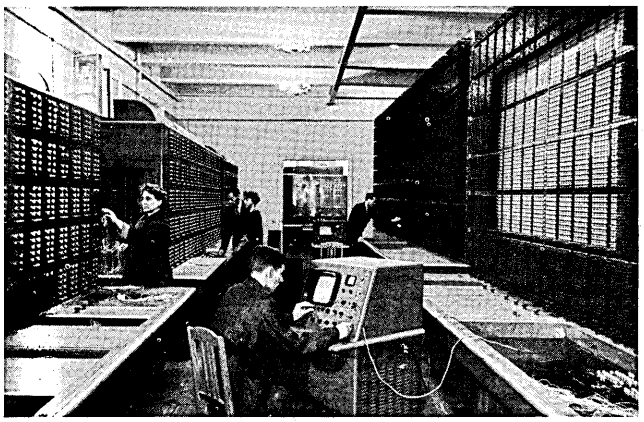
Construction started a few months ago on a new science town, fifteen miles from Nobosibirsk, the largest industrial and cultural center in Siberia. The move follows a decision (May, 1957) by the Soviet government to establish a Siberian branch of the Russian Academy of Sciences. The new town, soon to become a vast research center for the eastern part of the USSR, will cover an area of about 3,500 acres and will consist of 14 research institutes, a university, hotels and blocks of apartments. Planners have decided that the institutes will receive the services of a large scale computer center.

NEWS OF COMMUNIST COMPUTER TECHNOLOGY

by Etienne Guerin

A matrix-type electrointegrator with a matrix of resistors and capacitors at 20,000 points has been installed at the USSR Oil and Gas Research Institute in Moscow. Otherwise called an Oil Pool Analyzer, this machine is an important milestone in the refinement of recovery techniques, as it acts amazingly like an oil field. Representing a major breakthrough in production research, this analyzer predicts the future behaviour of real oil fields.

The underlying principle of the new machine is that the mathematic expression of the laws governing the movement of oil in subterranean deposits coincides with the



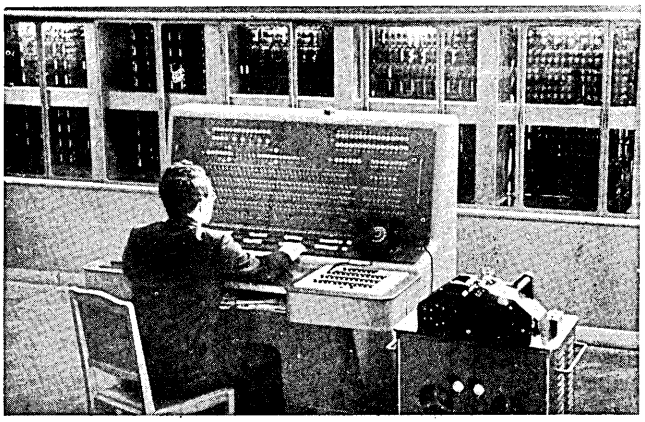
mathematic expression of the laws governing the passage of electric current through conducting plates. Thirty thousand different values representing the natural factors operating in the deposit can be introduced into the machine.

The electrointegrator has special devices which make it possible to reproduce in fractions of a second processes which in natural conditions take decades, and to follow simultaneously the work of 750 oil wells on a deposit under diverse modes of operation and choose the best for the practical exploitation of the deposit.

Photograph shows the new electrointegrator which has just been installed at the USSR Oil and Gas Research Institute in Moscow.

Pictured below are the console and arithmetic unit of the BESM computer in use at the Academy of Sciences Computing Center in Moscow.

BESM is currently the largest digital computer in the USSR. It is three-address, floating binary point. BESM I (in operation since 1952) has 1,000 words of core storage



supplemented by 5,120 words on a drum. BESM II has more modern hardware and 2,000 words of core storage; the two machines are otherwise fully compatible. The core storage uses two cores per bit.

BESM has four tape drives on-line, using 6.5 mm tape, 200 metres long. At a tape speed of 2 metres per second, and bit density of 8 bits per millimetre, the bit transfer rate is 16,000 per second.

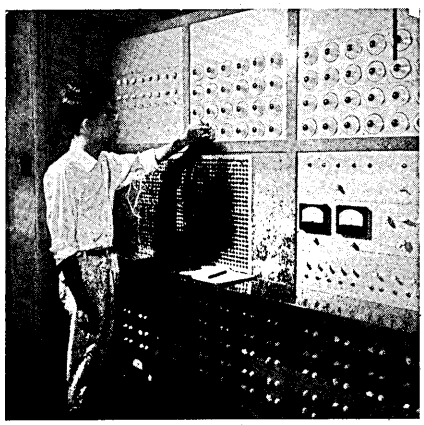
Add time ranges from 77 to 182 microseconds; multiply time is 270 microseconds; divide time is 288 microseconds.

Primary input to BESM is via punched paper tape using essential one-channel tape, 800 bits per second, read photoelectronically. The paper tapes are prepared off-line.

Output may be on film (200 numbers per second) with subsequent developing and printing or to an on-line printer which can handle 1½ numbers per second. (Photo and edited copy by Mr. A. P. Ershov, Chief, Theoretical Programming Department, Computing Center, Academy of Sciences of the U.S.S.R.)

Chinese sources reveal that Communist China is experimenting with the production of her first large-scale computer and other sources have provided information regarding the Leichih Plant machine. Pictured left, O. K. Sehcherbekov (center), a Soviet electronic expert, discusses logical design with Chinese Scientists Fan Hsin-pi (left) and Wu Chi-kang. Science in China is currently being actively promoted, according to Kuo Mo-jo, president of the Chinese Academy of Sciences in Peking.

A large analog computer has been successfully assembled by two young technicians of the joint state-private owned Leichih Instrument Plant in Shanghai. Photo (right) shows one of the technicians, Chen Kuo-yao, solving differential equations with the machine.



'SPEED' AND THE LGP-30

automatic coding system now in use

Much progress has been made in allowing full exploitation of electronic computers by personnel not specially trained in computer techniques. Many of the smaller computers that have become available in the past two years have been designed to be operated by the man with the problem – rather than specially-trained computer personnel. To varying degrees they have succeeded.

This trend has resulted in greatly simplified command structures and easier programming techniques – and compiling systems. This article deals with one such system that has been developed by the Royal McBee Corporation for use with their LGP-30 digital computer. Only an elementary knowledge of algebra is required and it is not necessary to juggle the compiling routine, the computing routine, or the compiled program and data, to fit in the 4096-word memory of the LGP-30.

The coding for the Speed system is very straightforward as demonstrated in example 1. In this example three expressions are used to define the problem to be presented to the computer. They represent the complete coding required from the programmer. The first expression "input" is used to enter values for all symbols used that require values, in this case, a, b, c, d, and t. The second expression is used to calculate the value for the symbol y. The third expression prints y and its corresponding value and then stops the calculation.

example 1

```
input
[ [ a + b + c ] x d + sin [ a x t ] ] : y
print y stop
```

example 2

```
(expressions)
[ sqrt [ exp [ a x t ] x sin [ b x t ] + c x t ] ] : y
print t print y cr
[ t + △ t ] : t
when t less tmax trn 01
stop
```

(input data)

a	*22222*	*0*	*b*	*17453*	*0*
c	*10000*	*1*	*t*	*00000*	*0*
△ *t*	*10000*	*1*	*tmax*	*10000*	*2*

(results)

t	*.0000000*	*00*	*y*	*.0000000*	*00*
t	*.1000000*	*01*	*y*	*.1103112*	*01*
t	*.2000000*	*01*	*y*	*.1591669*	*01*
t	*.3000000*	*01*	*y*	*.1993450*	*01*
t	*.4000000*	*01*	*y*	*.2558706*	*01*
t	*.5000000*	*01*	*y*	*.2706840*	*01*
t	*.6000000*	*01*	*y*	*.3047184*	*01*
t	*.7000000*	*01*	*y*	*.3384063*	*01*
t	*.8000000*	*01*	*y*	*.3718424*	*01*
t	*.9000000*	*01*	*y*	*.4048321*	*01*

The techniques of preparing a problem are reduced to the elementary rules of algebra. Techniques of scaling do not need to be considered as all work is done in floating point. All storage allocation is accomplished automatically by the system, thereby eliminating the need for the learning of special operations or addressing methods. When entering the description of a problem together with the data, a standard typewriter keyboard is used. If the operator knows how to use a typewriter and knows the basic rules of algebra, he can therefore easily program the LGP-30 using the Speed compiling system.

The first information entered into the computer must always be a statement of the problem. In the Speed system this is done as a series of algebraic expressions, as in example 1: **brackets** ( ) ; **operations** +, x, sin; and **symbols** a, b, c, d, t and y.

The **brackets** are used in exactly the same manner as brackets in high school algebra, that is, to enclose a portion of the expression.

A **symbol** is any combination of five or less typewriter characters with the exception of those characters reserved for other functions. In example 1, "x" has been used to represent the operation multiply and not a symbol. This is also true for the operation "sin."

To make the Speed system more powerful, transferring from one expression to another is desirable, so expressions when read into the computer are assigned an **expression number,** sequentially 00 through 63. Normally, these expressions are executed in a sequential manner, that is, after expression 00 is completed, 01 is executed, then 02, and so on. Through the use of control operations, "trn" and "use," the normal sequence of expression execution may be altered. For example, if an expression contained, "use 18," expression 18 would be executed next regardless of the sequence.

No reference to actual data is made in an expression, though an expression may contain brackets, symbols, operations and expression numbers.

The only information required by the computer other than the statement of the problem is the numerical values for the symbols. All numbers for the Speed system are handled in floating point.

Consider the following problem:

Given values for a, b, c, t, △t, tmax
Solve for each value of y
Where: $y = \vee e^{at} . \sin(bt) + ct$

It is desired to calculate y for t = 0.0, 1.0, 2.0 . . . 9.0. The print-out (results) is to be listed in tabular form indicating the values of y, with the corresponding value of t. In solving for y using the 10 values of t given, a looping technique is used. It may be noted that the respective values of t differ by 1.0 (△t = 1.0). In example 2 the loop consists of expressions 01 through 04, y is calculated with the initial value of t; t and y are printed; t is then incremented by 1.0; and then the computer loops back to expression 01 and next set of calculations are completed.

OPERATIONS FOR WRITING EXPRESSIONS

operation	*use*	*explanation*
+	*a + b*	*Addition*
−	*a − b*	*Subtraction*
×	*a × b*	*Multiplication*
/	*a/b*	*Division*
pwr	*a pwr b*	a^b, *The quantity a raised to the power b.*
sqrt	*sqrt a*	$\sqrt{a}$
abs	*abs a*	*The absolute value of a*
sin	*sin a*	*sin a, a is in radians*
cos	*cos a*	*cos a, a is in radians*
atan	*atan a*	*Arctan a, the angle is in radians*
exp	*exp a*	e^a
log	*log a*	*The natural logarithm of a*
input	*input*	*to read data*
print	*print a*	*Print data in Symbol a*
cr	*cr*	*carriage return*
:	*[a-b] : c*	*a substitution operation. Compute the quantity to the left side of operation and substitute it in symbol on the right side of operation.*
use	*use 18*	*Expression 18 will be executed next regardless of sequence. Then sequentially after 18.*
when	*when a grt b trn 24*	*When value for a is greater than the value for b, compute expression number 24 next, otherwise, compute the following consecutive expression.*
grt		
less	*when a less b trn 24*	*When the value for a is less than the value for b, compute expression number 24 next, otherwise compute the following consecutive expression.*
trn		
stop	*stop*	*Stop the computer.*

The looping continues until t = 10.0. At this point the computer will stop.

The expressions to solve this problem are shown in example 2 as they were actually run on the LGP-30.

The automatic coding system goes through two basic phases in computing answers for a problem: Phase one; reading all expressions into the computer and writing a program that it can interpret. During this phase the instructions are generated and stored in memory and symbols are assigned a memory location; Phase two; reading values for each of the symbols used into the computer except for those symbols that refer to results or intermediate results and starting the calculations. When the "input" expression is executed all values corresponding to their symbols may be read into the computer. After all the values are read in, a special symbol is read into the computer which enables the program to go on to the next expression number and continue the calculations. ●

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Expanding the Frontiers of Space Technology

Lockheed's computer center is one of the largest and most modern in the world. It is concerned with formula and data applications in more than forty areas of scientific and technical development. The center includes two Univac 1103A digital computers with floating-point arithmetic; twenty magnetic-tape units; card-to-tape converter; tape-to-card converter; two high-speed tape printers; model 1100 variplotter; three 100-amplifier, three 60-amplifier and two 20-amplifier analog computers; twelve 11" x 17" X-Y plotters; double-arm 30" x 30" X-Y plotter; and 114 channels of time-history recorders. In the solution of complex mathematical problems, the center serves both government and outside commercial organizations.

Programs have included: strategic and logistic problems; Monte Carlo systems; sales forecasting; personnel assignments; cost accounting; analysis of control-systems; stress and flutter; static, wind-tunnel and flight test; missile performance; aerodynamics; and trajectories. Digital computers are used in the solution of problems of missile motion, numerical integration of ordinary differential equations, dynamical simulation, wave fitting, and analytical approximation. Analog computers are most useful for the solution of problems concerning flight control, stability, structural analysis, dynamic analysis, and simulation.

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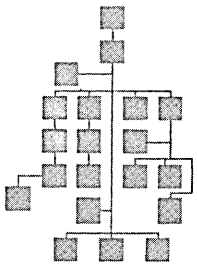

people moving up in DATAMATION

Philip S. Vincent has been named manager of equipment services for RemRand Univac. Vincent was assistant general manager of the firm's Philadelphia operations in 1951 – coordinated engineering, manufacturing and services in the production of commercial computer systems. Announced manager of RemRand's commercial sales is **Myron A. Angier** – formerly assistant branch manager for Univac sales in New York. **Andrew T. Fischer** is now director of product planning for the Univac engineering div. Fischer has been with IBM, RCA and recently – assistant to president of El-Tronics. Elected Fellow in the Institute of Radio Engineers, **Dr. Howard T. Engstrom** was feted at Institute's annual banquet recently. Dr. Engstrom is vice president and director of Univac Scientific Marketing – was one of the creators of the Univac Scientific electronic computer . . . . Autonetics, div. of North American Aviation, announces appointment of **Cedric F. O'Donnell** as chief of the digital computers section; **Dr. W. L. Mitchell** succeeds him as chief of systems engineering.

Graham Tyson has new position of western regional manager for Telemeter Magnetics; will direct sales and applications engineering for firm's electronic data equipment in western states. Tyson joined TMI in '57, was senior applications engineer until his recent appointment . . . . **Raymond C. Quick,** director of operations and **J. A. Bernier,** director of engineering for Feedback Controls, Waltham Mass., have been elected vp's. They will continue in same functions as before . . . . Electronic Associates, has announced formation of a development engineering sales group – appointed **Jerome D. Kennedy** manager. Group will explore and obtain contracts in new areas with data processing systems, special purpose and process computers are of particular interest . . . . Electro-Data Div. of Burroughs has appointed **Dr. E. L. Eichhorn** manager of applied mathematics. Before joining company in 1957, Eichhorn was research assistant to Dr. Linus Pauling at Cal Tech. **Robert S. Barton** is named manager of applied programming; **Kermith H. Speierman** appointed assistant to manager of technical services.

Appointment of **Dr. William F. Miller** as director of the applied mathematics division, announced by Argonne National Laboratory. Dr. Miller will direct consultation on mathematical problems for other company divisions, research in mathematical methods and the finding of answers to complex mathematical problems for scientists at the Laboratory . . . . Taller & Cooper has named as its vp and general manager, **John C. Beach** – one of the pioneers in the mass production of electronic computers . . . . **Robert W. Landee** is now director of research and development for airborne data communication at the western division of Collins Radio.

John K. Wetherbee, newly appointed chief of systems engineering div. at Battelle Memorial Institute, will be responsible for directing the division's program of research on automatic processing and control systems . . . . Appointment of **Gene K. Beare** to newly-created post of president of Sylvania International, div. of Sylvania Electric Products, has been announced. Beare continues as pres. of Automatic Electric International (subsidiary of General Telephone & Electronics). Sylvania Electric became a wholly-owned subsidiary of G.T.&E. by merger in March . . . . Malt and Ness Data Processing div., has named **R. Allan Hunt** technical director, and **Francis J. Keryk chief** systems analyst . . . . Eiseler Associates, data processing systems consulting firm, appointed **Edmond R. Pelta** vp . . . . Electronic Engineering Co. of Calif., has opened a Washington D.C. office – named **L. M. (Bud) Baxter** Washington district manager.

IBM has named **Dr. Herbert R. J. Grosch** manager of space program for the military products div., Washington, D.C. Dr. Grosch will be in charge of the Vanguard Center and maintain liaison with company's space laboratory and the Watson Scientific Computing Laboratory at Columbia Univ. **Dr. William A. Gross** is appointed research engineer to head applied mechanics research for IBM Laboratory, San Jose.

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Experienced in programming for large scale computers, such as IBM 704, 709, or 650, Univac or Datatron. Experienced with compilers and automatic coding techniques. Ability to analyze complex, non-routine, non-numerical problems for programming. Ability to draw detailed flow charts. Also ability to code and direct coders.

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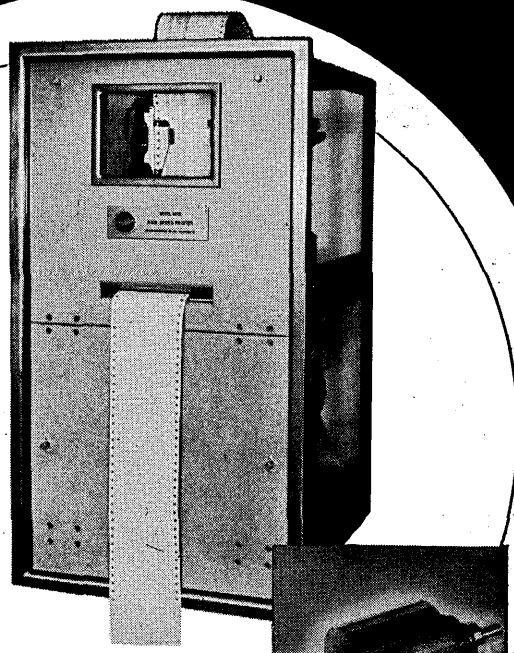

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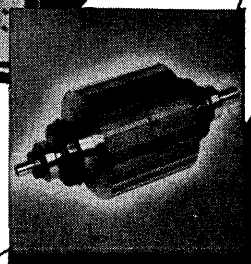

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to the editor . . .

(Continued from page 4)

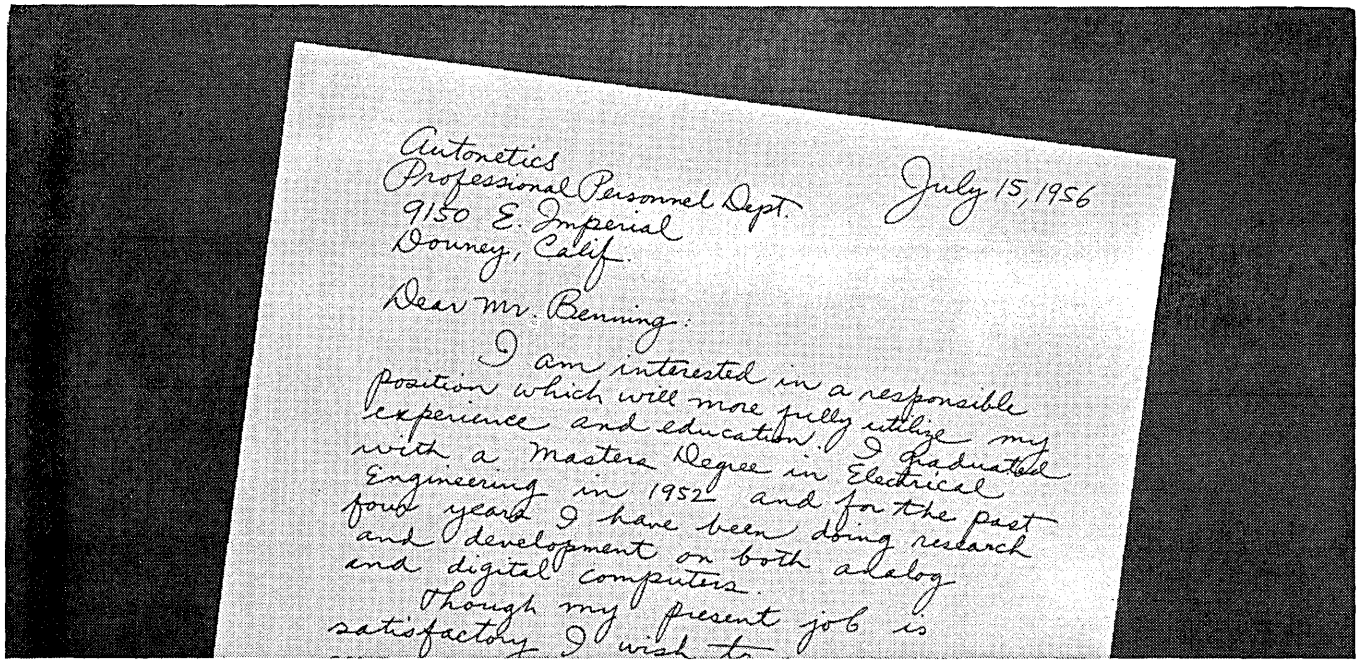
mittee to some extent. This was of considerable help in getting the 1959 WJCC organized. Second, a committee of three, including myself, has been appointed to write a procedure manual for joint computer conferences.

In the past, the conference committee has relied for its knowledge of previous experience on copies of the minutes and final reports of previous committees as well as on advice and policy decisions from the NJCC. The manual which we will prepare this year will attempt to distill this experience and to establish a more uniform NJCC policy on certain questions that have come up repeatedly.

There has been a continuing discussion for years in the NJCC on the question of how to get better papers at the conferences. There have always been as many differing opinions as there were participants in the discussions. In the 1959 WJCC an attempt was made to review complete papers instead of abstracts. The 1960 WJCC committee is carrying this further and is planning to have the conference proceedings available at registration. They also have a policy of "fewer, better papers" and they expect to allow more time for discussion without attempting to impede the discussion by recording it. This will all be quite a change and if it is successful, will undoubtedly set the pattern for future meetings. The disadvantage of such a policy is, of course, that papers must be in final form at an earlier date than otherwise and so the very latest information does not appear in these papers. The committee feels that this is of minor importance since information presented at such conferences is seldom "hot off the press" anyway and such hot items can always be included in the verbal presentation even if there was not time for them to be in the written. I am sure that Dr. H. H. Goode, present NJCC Chairman, joins me in welcoming any further constructive criticism that anyone has.

M. M. Astrahan
(Past Chairman, NJCC)
IBM, San Jose

(It seems that progressive steps are being taken by past-chairman Astrahan, chairman Goode and all conference planners. Imagine, 1960 WJCC Proceedings at 1960 WJCC registration!—Ed.)



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RECORDING SYSTEMS: Applications of recording systems in monitoring military, space technology and scientific data gathering systems are detailed in a 16-page booklet entitled "New Concepts In Recording." For copy write BRUSH INSTRUMENTS, 37th and Perkins, Cleveland 14, Ohio.
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AC/DC VOLTMETER: Data sheet No. 19-41 describes Model 502 AC/DC digital voltmeter, featuring a fifth digit for DC over-ranging. The fifth digit, either a "0" or a "1," doubles each range by extending it from 9999 to 19999 – prevents loss of resolution at range changeover points. For copy write KIN TEL, Cohu Electronics, Box 623, San Diego, Calif., or use card.
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AUTOMATIC DATA-GATHERING: An eight-page leaflet, DS-2, describes the TRANSACTER system (Transaction Transmitter). Serving as a rapid communication link between source of original entry at multiple, scattered transaction points and a central data-processing office, it eliminates intervening manual operations by completing the communications loop. For copy write STROMBERG TIME CORP., Thomaston, Conn., or use reader card.
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SAMPLING DEVICES: A sixteen-page illustrated booklet titled "Electronic and Electromechanical Sampling Devices for Multichannel Instrumentation" by John F. Brinster, supplies basic information toward the understanding of latest sampling devices and their application to multichannel systems. For copy write GENERAL DEVICES, INC., Princeton, N.J., or use reader service card.
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DIGITAL RECORDING: An illustrated, four-page bulletin No. 311, describes a few basic digital recording systems, with schematic drawings, and details on company's equipment. For copy write DATEX CORPORATION, 1307 S. Myrtle Ave., Monrovia, Calif.
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MEMORY CORES: This company's 3C Random Access Magnetic Core Memories, with the seven basic types of T-PAC systems, are fully detailed with specifications in a six-page leaflet. For copy write COMPUTER CONTROL CO., INC., 92 Broad St., Wellesley 57, Mass., or use reader card.
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MAG TAPE RECORDERS: Five instrumentation bulletins describe a series (called the Northam Line) of ruggedized, miniaturized magnetic tape recorders: Models MR-53, MR-1B, MR-11B, MR-2B, MR-100. For copy write BJ ELECTRONICS, Borg-Warner Corp., 3300 Newport Blvd., Santa Ana, Calif., or use reader card.
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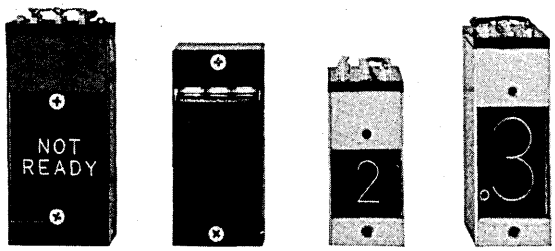

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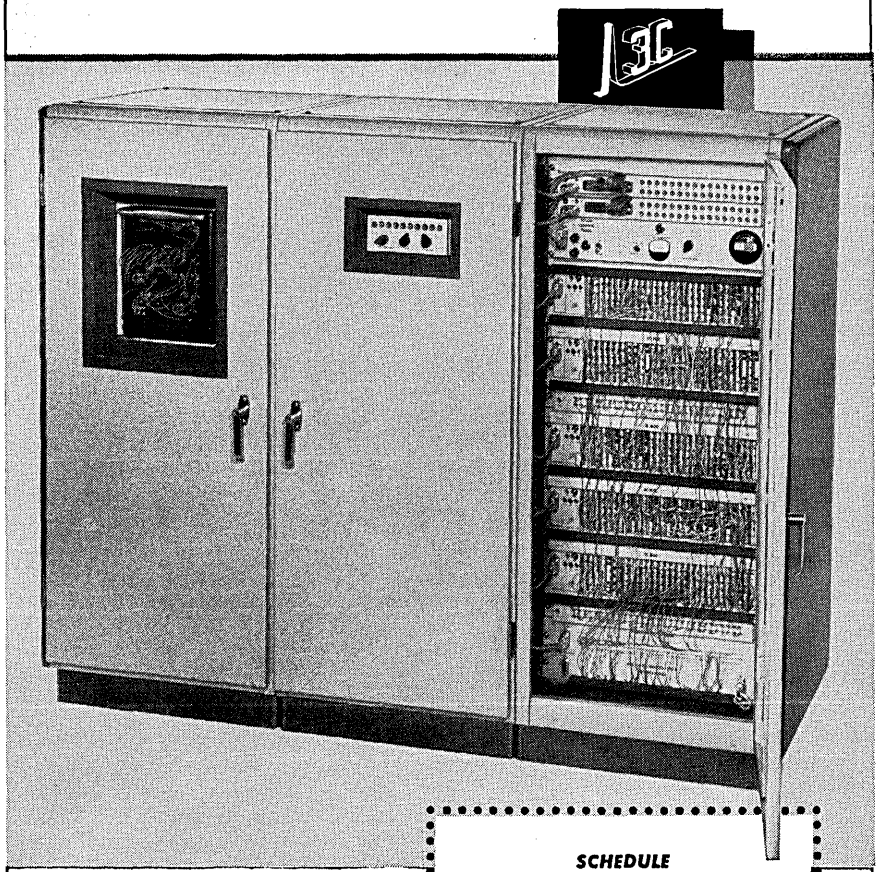

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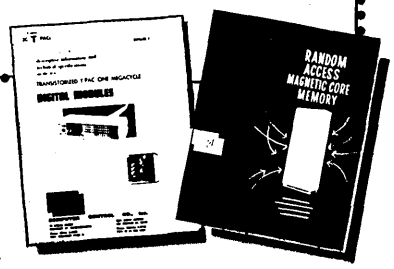

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NEW LITERATURE

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TRANSISTOR FAILURE: Five types of voltage breakdown, the major cause of transistor failures, and three leakage currents are discussed in a four-page article, Transistor Kinks, Vol. I, No. 1. For copy write VALOR INSTRUMENTS, INC., 13214 Crenshaw Blvd., Gardena, Calif., or use reader card.
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SWITCHES: Revised Catalog 90b describes, illustrates, gives technical drawings of company's standard line of mercury switches. For copy write MICRO SWITCH, Div. of Minneapolis-Honeywell Regulator Co., Freeport, Ill. or use reader service card.
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TAPE EQUIPMENT: Bulletin TPG39, a six-page brochure, describes Dykor Auxiliary Tape Processing Equipment, which offers computer users a solution to off-line testing, editing, interrogation and translating of magnetic tape files, etc. For copy write DIGITRONICS CORP., Albertson Ave., Albertson, L.I., N.Y., or use reader service card.
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TELEMETERING CATALOG: Illustrations, descriptions and specifications of Multichannel Telemetering Equipment, is contained in a comprehensive 36-page catalog No. 900. For copy write (on company letterhead) to GENERAL DEVICES, INC., P.O. Box 253, Princeton, N.J., or use reader card.
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INSTRUMENTATION: A 12-page digital instrumentation catalog describes 32 instruments and accessories

of this company. Included are a transistorized 150kc frequency-period meter, a digital voltmeter and a versatile digital printer, among others. For copy write COMPUTER MEASUREMENTS CO., 5528 Vineland Ave., North Hollywood, Calif., or use card.
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DIGITAL INSTRUMENTS: A feature of this company's instruments is use of fifth-digit over-ranging in all DC operations – described in a four-page, illustrated Catalog 19-36, giving complete company line. For copy write KIN TEL Division, Cohu Electronics, Inc., Box 623, San Diego 12, Calif.
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TRANSLATION PROBLEMS: A six-page, illustrated, brochure entitled "Computer Language Translator for Data Processing Systems," describes off-line processing of data, to permit full utilization of computers and systems; how the ZA-100 can solve 200 translation problems. For copy write ELECTRONIC ENGINEERING CO., 1601 E. Chestnut St., Santa Ana, Calif.
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BUILDING BLOCKS: A line of eight transistorized "DEC System Building Blocks" is described in detail with unit characteristics, in an eight-page brochure, DAP-9100. For copy write DIGITAL EQUIPMENT CORP., Maynard, Mass., or use reader card.
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EDP FOR INDUSTRY: Describing the GE 302 Data Accumulator and the GE 309 Gage Logging System, two eight-page leaflets outline this company's computing and data processing systems and services for the metals industry. For copy write GENERAL ELECTRIC CO., Computer Dept., Deer Valley Park, Phoenix, Ariz.
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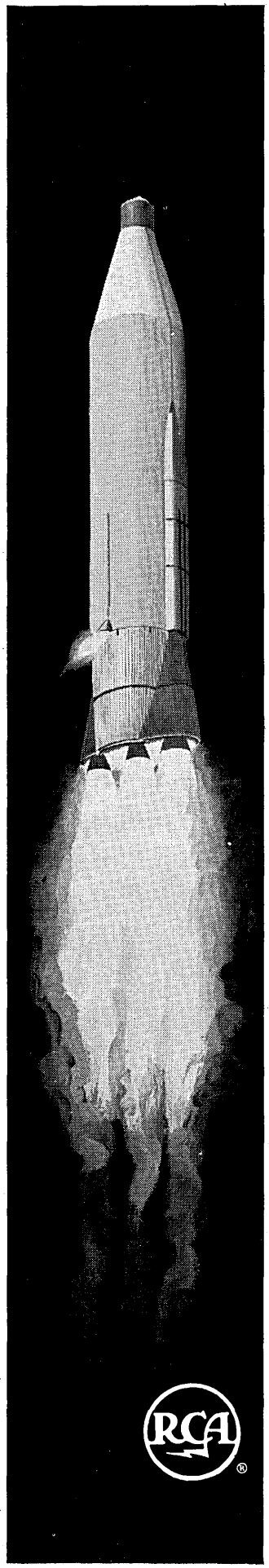

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trol" is an eight-page brochure pointing out, among other things, that decentralization must be balanced by appropriate centralization – demands capable managers. Of interest to all management personnel. For copy write REMINGTON RAND, Div. of Sperry Rand Corp., 315 Fourth Ave., New York 10, N.Y., or use reader card.
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MAGNETIC TAPE: A twelve-page release gives data on a specially designed magnetic tape unit which extends the capabilities of the RW-300 Digital Control Computer. Combination of the computer and matched tape unit creates an on-line data reduction system suited for many applications in test facilities. For copy write THE THOMPSON-RAMO-WOOLDRIDGE PRODUCTS CO., P.O. Box 90067 Airport Station, Los Angeles 45, California, or use reader service card.
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EDP FOR ADMEN: Brochure U1524 describes how this company's data processing methods can streamline operations, facilitate expansion and make possible automatic processing of voluminous paperwork for advertising agencies. For copy write REMINGTON RAND, Div. of Sperry Rand Corp., 315 Fourth Ave., New York 10, N.Y., or use reader service card.
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TAPE RECORDER: Type 5-701 Magnetic Tape Recorder for data acquisition systems is detailed in an illustrated four-page Bulletin 1578A. For copy write CONSOLIDATED ELECTRODYNAMICS CORP., 300 N. Sierra Madre Villa, Pasadena, California.
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SELLING DIRECTORY: Of use by vendors interested in serving this company is a new Purchasing Directory listing products used by company with addresses of purchasing locations. Statement of policy and descriptions of organizations is included. For copy write Director of Purchasing, IBM Corp., 590 Madison Ave., New York 22, N.Y., or use reader service card.
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A VIEW OF A COMPANY: The progress, products, personnel and purpose of the computer division of one company is clearly defined in a twelve-page, illustrated booklet. For copy write AERONUTRONIC SYSTEMS, INC., a subsidiary of Ford Motor Co., Computer Division, Newport Beach, California, or use reader service card.
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EDP SYSTEM: Information on the Automatic Keysort System, is given in non-technical terms in a 10-page brochure S-500. How an original unit record can be coded for automatic processing with flexible low-cost machines, is illustrated. For copy write ROYAL McBEE CORP., Data Processing Division, Port Chester, N.Y.
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MAGNETIC CORE STORAGE: Specifications for standard ferrite core and core product lines are included in an illustrated four-page brochure and catalog No. SL-106. Described are the company's ferrite storage and switch cores, core arrays, sequential and conversion types of core storage buffers, transistorized computer memory modules, and translators providing compatibility between systems utilizing different codes and formats. For copy write TELEMETER MAGNETICS, INC., 2245 Pontius Ave., Los Angeles 64, Calif., or use reader service card.
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eai demonstrates transistorized pace tr-10

An analog computer which, according to its designers, is "capable of performing 95% of the routine mathematical operations encountered by an engineer in normal design calculations" has been demonstrated by Electronic Associates, Inc., of Long Branch, N. J.

Known as the PACE TR-10, this completely transistorized computer is 15 in. wide, 17 in. deep and 24 in. high and weighs 80 pounds without accessories.

Company spokesmen state that the compact size of the TR-10, plus its "reliability and accuracy" (0.1%) were made possible by the design and development of a new transistorized DC amplifier. Two of the amplifiers, packaged in a single shielded unit, occupy a space measuring 1½ in. x 5 in. x 6½ in.

The basic computer sells for under $4,000. This may be expanded by adding various linear and non-linear components as requirements may dictate.

In problems where a constant value is the solution desired, the nullmeter on the control panel provides an acceptable answer. A precision potentiometer is provided with a nulling system whereby solutions can be read to three place accuracy (.1%).

In those problems where dynamics are involved, other read-out equipment is recommended for satisfactory solutions. When continuously varying results must be plotted against time, a two-channel, strip-chart recorder is indicated. Several commercially available recorders provide a permanent record of any two simultaneously recorded outputs against time at a cost of approximately $1,350. When it is desired to plot one variable in relation to another variable, an X-Y plotter is recommended.

PACE TR-10 has a wide area of application, especially as an educational tool. EA boasts that in this machine, they have a precision analog computer available to colleges and universities within the budget of individual departments. The TR-10 may be used as a device for demonstrating the basic chemical and physical concepts to undergraduates. Through the use of this computer, EA states, the mathematical expressions which govern the performance of physical phenomena can be solved in a manner which will afford the student an insight into the fundamentals of science instead of becoming lost in a maze of calculations.

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Organizations who already possess large analog computer installations may use this computer as a device for training engineers to use the larger, more expensive, analog computers. It is also expected to satisfy a need in those organizations for a device to solve small problems which would otherwise tie up a larger computer. ●

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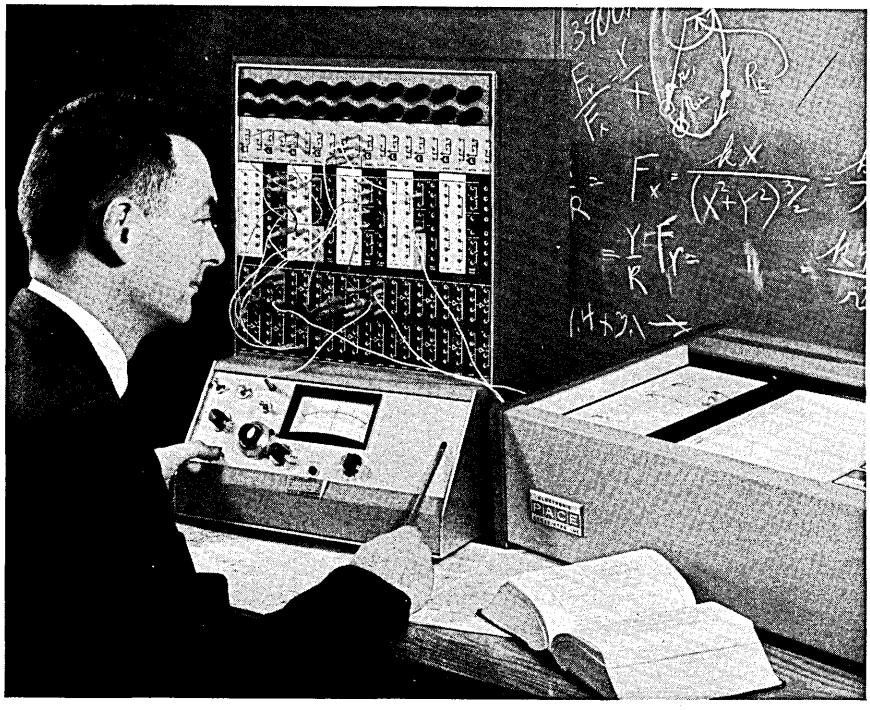

Electronic Associates' new transistorized analog computer (left) being used with a plotter provides an engineer with graphic presentation of the solution of a problem in dynamics. (Model 1100E Variplotter is at right.) The TR-10 enables an engineer to perform addition, subtraction, multiplication and division, integration, and non-analytical function generation with which he can solve a multitude of routine design calculations in a fraction of the time required by conventional methods, the company states.

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This unique concept opens entirely new fields for radar . . . including a great many as yet unexploited. Hughes Fullerton needs creative engineers who can step in and help develop these new military and civilian applications.

While Hughes Fullerton places emphasis on advanced development, it is a completely integrated engineering and manufacturing organization . . . whose activities cover a wide range of electronic and electromechanical applications.

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DATAMATION NEWS BRIEFS

NBS CONDUCTS TAPE STUDY

An investigation of the performance of magnetic tape, used in recording the data transmitted by guided missiles and satellites, is being conducted by the National Bureau of Standards for the Air Force. The quality of such tape directly influences the usefulness of the recorded information. For this reason, specification limits and quality control are needed in production. Standard methods of measuring the magnetic properties of the tape which will help make such control possible are the goal of the present study.

Although magnetic tape is widely used in recording sound, data recording by this method has not been entirely satisfactory. Failure of the tape to record important data has at times been very costly, wasting time and money, and even destroying irreplaceable data. Because existing test procedures do not adequately measure all properties that affect performance, the danger of tape failure is ever present. To make possible at least a predetermination of quality that will in some measure guarantee tape performance, I. Levine and E. Daniel of the Bureau's sound laboratories undertook the present investigation of magnetic properties.

ICIP 'FUTURE' SESSION SET

A special session on "Computer Techniques of the Future" has been added to the International Conference on Information Processing, which is scheduled to begin at UNESCO House, Paris, on June 15th. The new session, set for Saturday, June 20th, at 2:30 PM, will consist of previously unpublished reports on such developments as thin magnetic films, cryogenic components operating at a few degrees above absolute zero, microminiature printed systems making possible extremely small machines with tremendous computing capacity, and microwave solid-state techniques for high-speed computers.

The formal program of the session will include representatives of Switzerland, The German Federal Republic, Israel, and the United States. The discussion period is expected to include active participation by computer engineers and scientists from nearly 40 other countries to be represented at the International Conference.

NABAC SEEKS UNIFORMITY

Delegates attending the 1959 annual convention of the IRE were told that cooperative efforts of the computer manufacturers and banking could very well lead to strategically-placed computers for the direct application of

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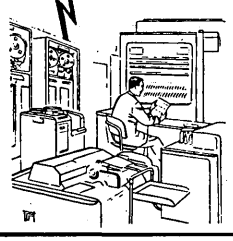

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data processing for many small and medium banks.

Speaker was Dr. F. Byers Miller, executive director of the National Association of Bank Auditors and Comptrollers which is headquartered in Chicago. The NABAC is the only banking organization making industry-wide research studies into performance standards that are a necessary prelude to automation.

Speaking at a session on industrial electronics, Miller stressed the need of centers for small and medium-sized banks because "it has become fairly obvious that if the capital investment for data processing systems runs into the multimillion dollar category, the needs of the medium and small banks can never be supplied independently."

"One approach to the utilization of large-scale equipment," Dr. Miller continued, "would be a central data processing system consisting of electronic computers for the direct application of data processing located in key areas for many small and medium banks. Before this can be attempted, the basic requirements for a uniform operation system among banks must be established."

ST. LOUIS SITE OF NMAA SHOW

National Conference and Business Show of the National Machine Accountants Association is set for St. Louis, June 24, 25 and 26. Program will cover 22 seminars on punched cards and eight electronics seminars (many dealing with data processing).

A conference innovation – a closed-circuit television presentation which will take registrants on an arm-chair tour of computer centers, including a look at IBM 702 and 705, Datatron 220 and Datamatic 1000 installations.

Among those exhibiting are Burroughs, ElectroData, IBM, NCR, RCA and Remington Rand.

EPSCO DELIVERS DATA SYSTEMS

Two medium high-speed automatic digital data logging systems have been delivered by Epsco Systems Division to the National Bureau of Standards

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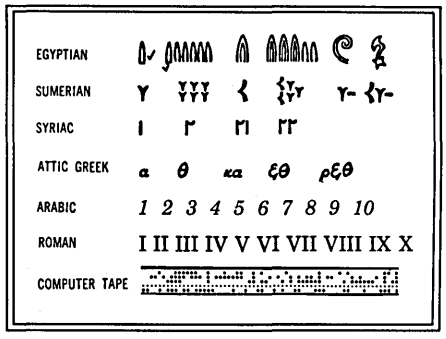

At Sylvania's Data Systems Operations, advanced research and development programs are under way to expand the use of this common language of science and extend man's capabilities over broad technological areas. An indication of the advanced work you will find at Sylvania's Data Systems Operations is the data processing phase of BMEWS, the USAF's Ballistic Missile Early Warning System. This work involves mathematical and statistical analysis as well as the construction of a real-time program to be run on large scale digital computers. The spectrum of the technological areas covered also includes utility programming, mathematical model building and systems analysis.

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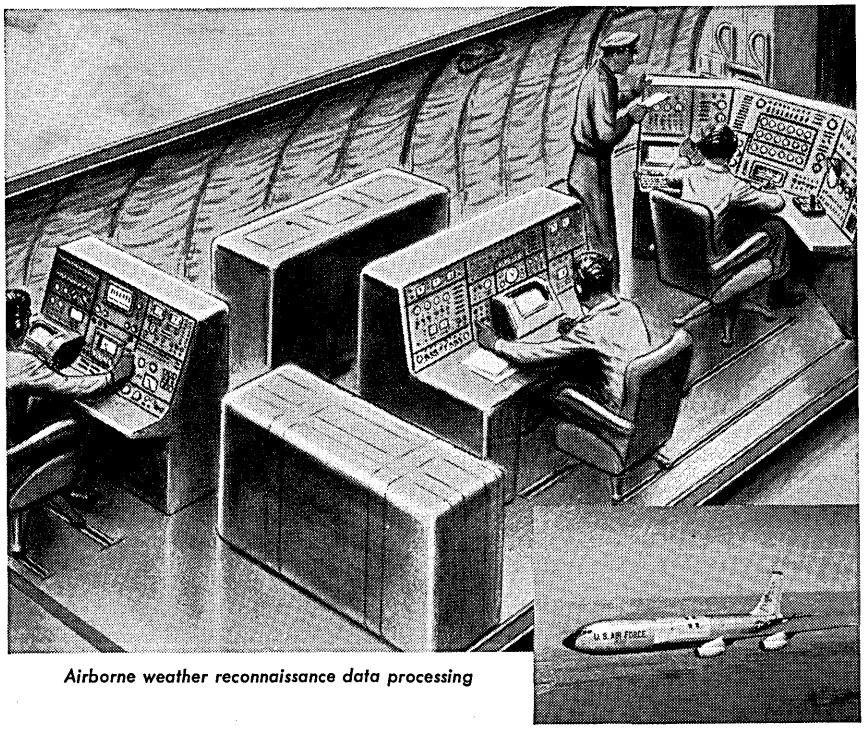

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NEWS BRIEFS

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Each system accepts a single-channel of analog voltage signals which is converted to digital in an Epsco custom designed DVM transistorized digital volt meter. The DVM converts the voltage data into six or seven bits of straight binary digital information. The conversion occurs at a rate of 60 conversions per second.

This digital data is amplified through a standard paper-tape punch driver unit fed into a paper-tape punch. For these systems the punch used is a Teletype Corporation model BRPE high-speed paper-tape punch. Punching occurs at the rate of 60 characters per second and the conversion process is synchronous with this punching rate. This punch data is used for subsequent analysis. The source and nature of the analog voltage inputs cannot be revealed at this time, the company states.

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RCA NUVISTOR INTERESTING

"Revolutionary," was just one word of several used by RCA to describe development of a miniature electronic tube called a "Nuvistor."

Design of the tube greatly reduces size and power drain and increases performance and reliability, states a recent release. And Nuvistor tubes are expected to offer many data processing advantages, according to one company spokesman.

"The small, high-efficiency triodes and tetrodes will find wide use in the logic and computing circuits of electronic computers. The power tetrode, capable of high peak current at low plate voltage, offers advantages for memory-core-driver applications."

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TRANSISTORS EXCEED SPECS

GE states that accelerated life tests on its new line of 45-volt silicon high-frequency transistors indicate the transistors far exceed military reliability specifications for both mechanical and electrical characteristics.

The company related that its fixed-bed mounting technique using a ceramic disk had been adapted to the

new line of mass-produced silicon transistors and is responsible for the "high reliability results."

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MAG INK PRINTING, NOW

Magnetic ink character printing, of the type approved as standard for automatic check processing by the American Bankers Association, has been made available on a production run basis by The Standard Register Company, Dayton, Ohio. The new code characters (digits and symbols) can be printed on continuous form and Zipset checks, paper and tab card types, in accordance with ABA design and tolerance specifications.

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704 CUTS BRAILLE LAG

Translation of printed text into braille has been demonstrated by IBM on a 704

The procedure creates in minutes a raised braille printing plate suitable for production of books for the nation's 350,000 sightless persons. It was developed by IBM mathematicians working in conjunction with the American Printing House for the Blind, leading braille book publisher.

The English text-to-braille computer translation program is expected to be put to work immediately.

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SUPERVISOR OF COMPUTER SERVICES

Position entails supervision of digital and analog facilities for a large progressive aircraft company. Work areas include computer solution of engineering research and development problems, business problems, machine tool control problems, and data processing.

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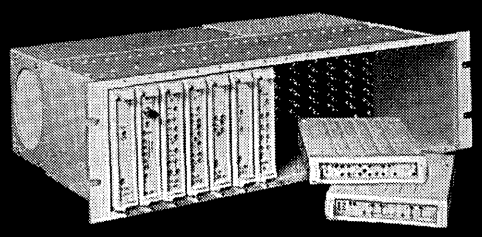

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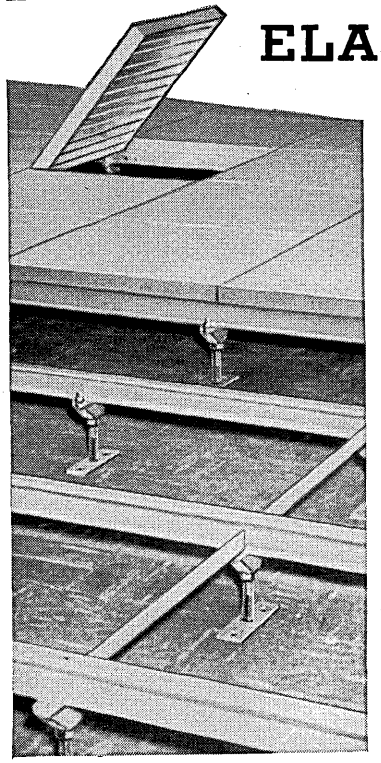

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Military Projects – Openings on: The TDM Data Link System – PPM voice systems that provide multiple voice links over a single frequency – PCM voice and teletype systems – cryptographic devices used in conjunction with PCM systems and digital automatically programmed missile checkout systems.

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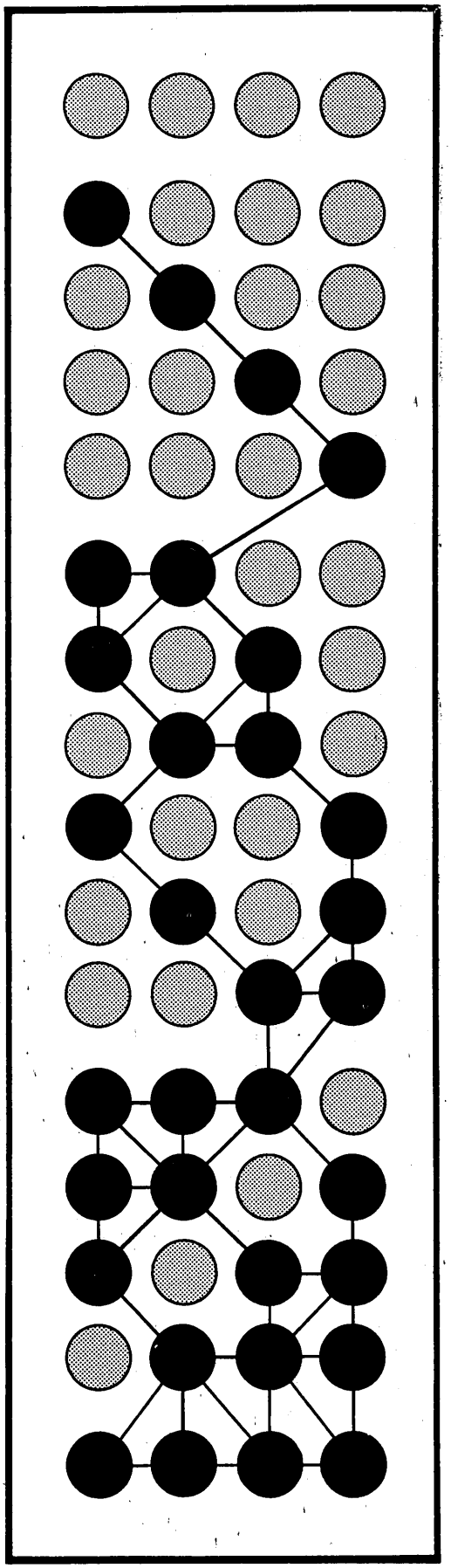

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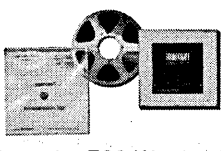

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