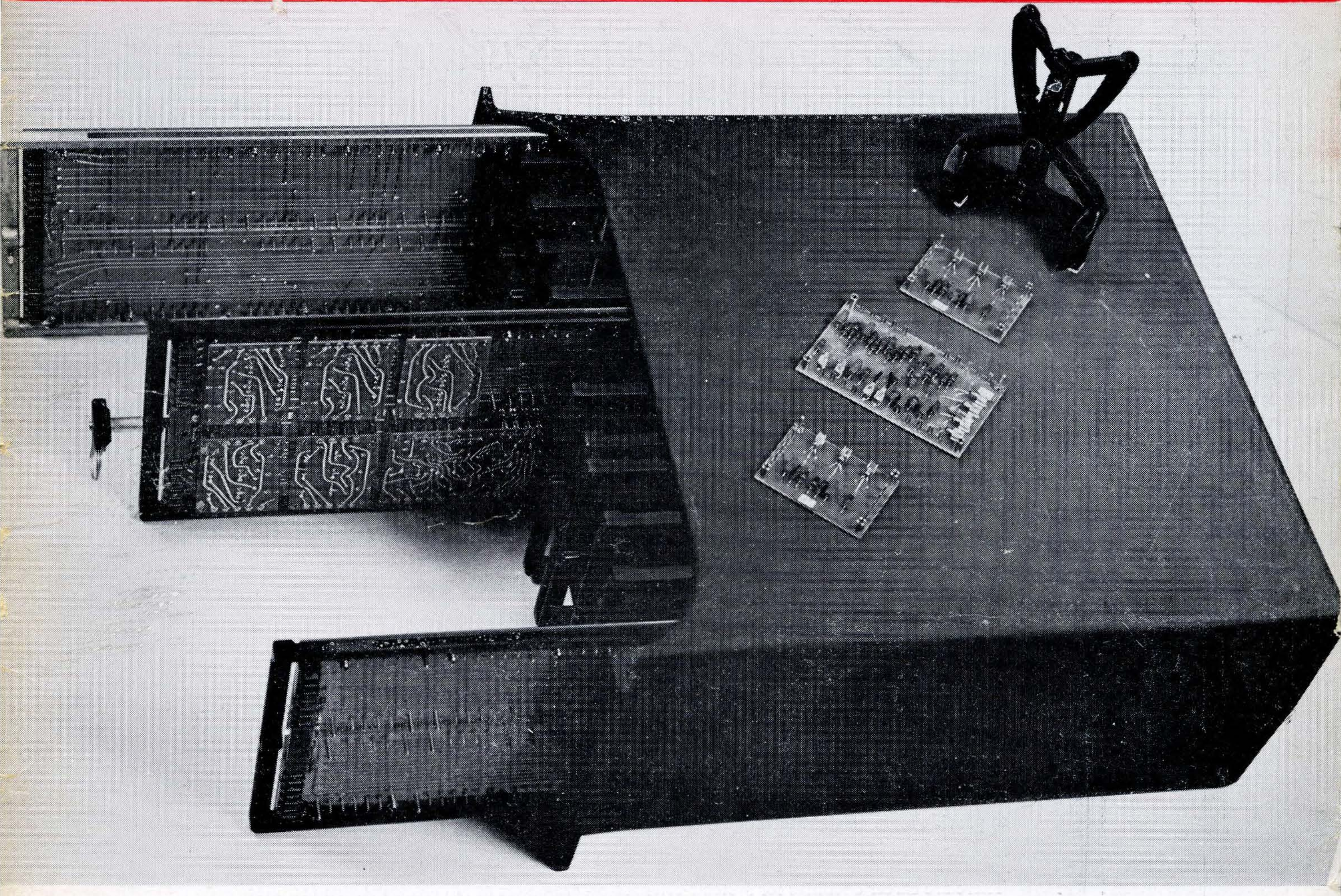
COMPUTERS
and AUTOMATION

DATA PROCESSING • CYBERNETICS • ROBOTS



1959 PICTORIAL REPORT ON THE COMPUTER FIELD

Maintenance Methods for Digital Computers

DECEMBER
1959
•
VOL. 8 - NO. 12

COMPUTER PROGRAMMERS

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- **Assist in the design and evaluation of new systems**
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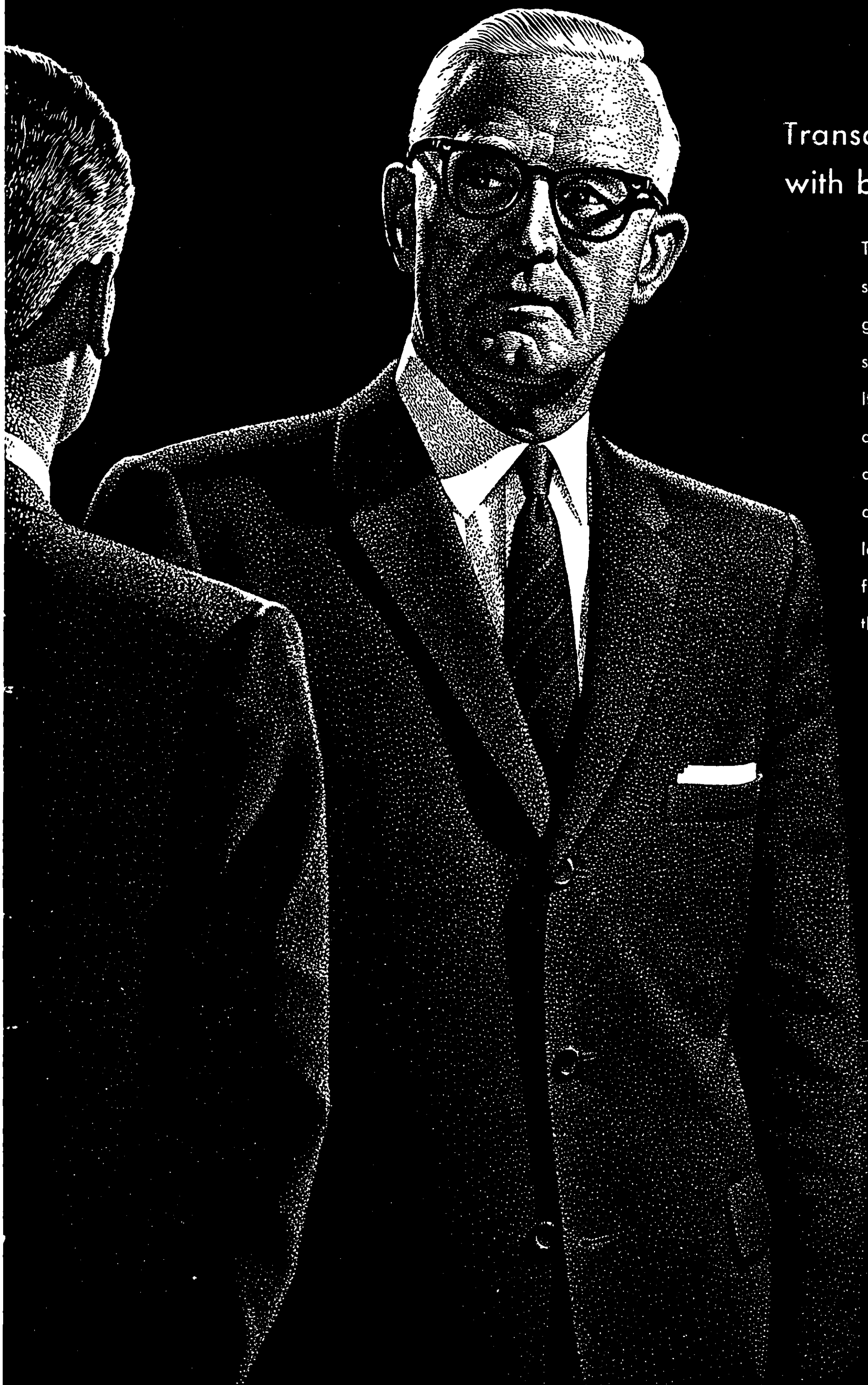

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COMPUTERS

and AUTOMATION

DATA PROCESSING • CYBERNETICS • ROBOTS

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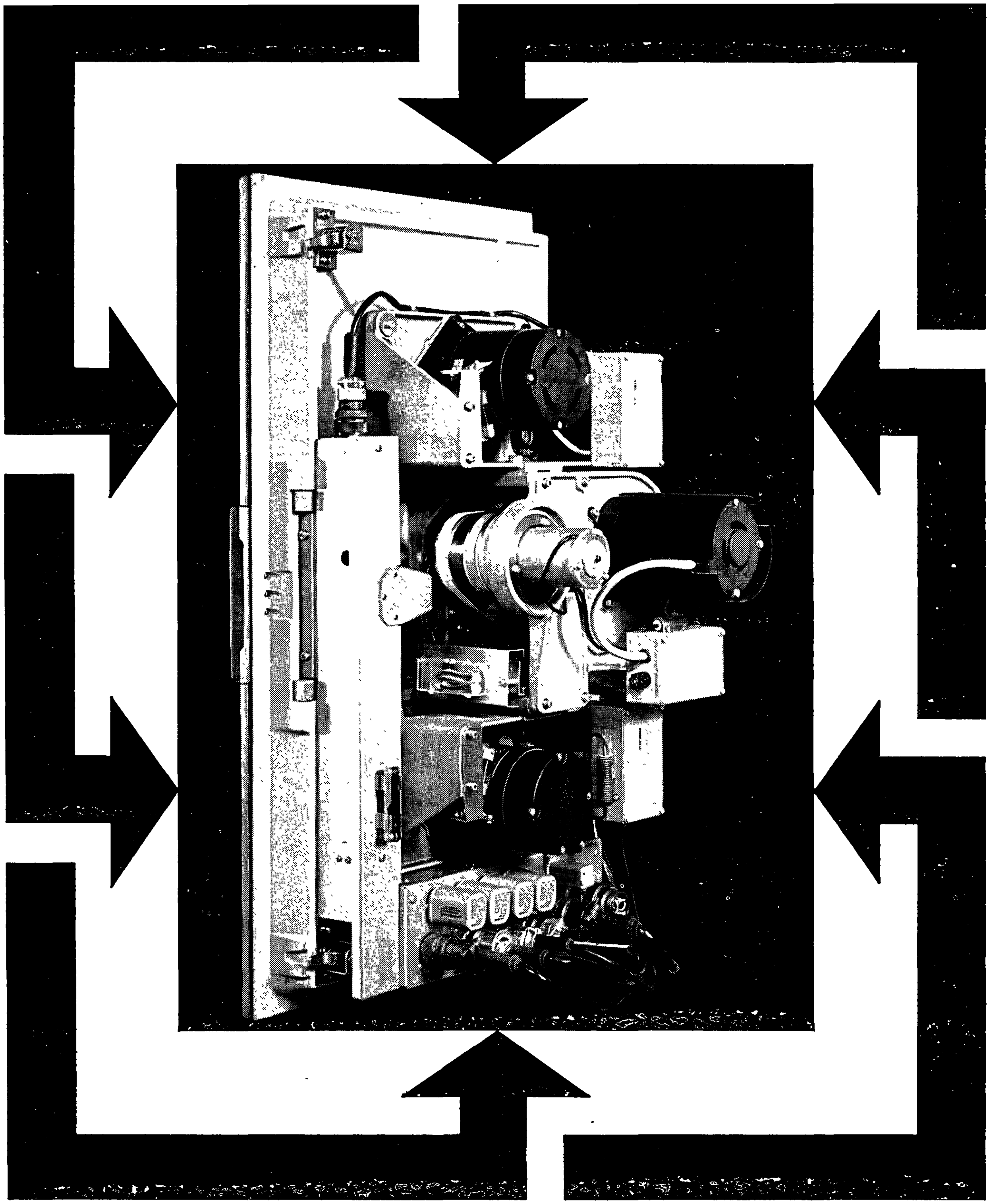

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Other advanced features: 1. A unique electrical hold-back system keeps tape tension constant within narrow limits, reducing flutter and eliminating mechanical feedback of speed variations. 2. Modular plug-in amplifiers and power supplies give quick versatility for direct, FM carrier, PDM, and NRZ digital recording. 3. Front-panel, four-speed switching over a six-speed range from 1⅞ to 60 ips allows flexibility in selecting upper frequency limit for maximum tape economy.

These and other features of the new Ampex FR-100B add up to unmatched performance and reliability. The full story is available in the new Ampex FR-100 brochure.

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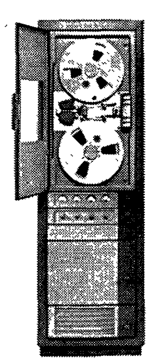


Readers' and Editor's Forum

GREETINGS TO COMPUTERS

FOR CHRISTMAS, WE wish our subscribers, our readers, and all computer people:

```
                M E R R Y
            ×       M A S   and a
            ---------------
              A T A W W Y
            E Y B S S T
          S N E S A S
          -----------------
      = N Y B M M B W Y ,
  + S A S N A R T E Y S B
  -----------------------
  = S A N E N E W Y E A R ,
```

24619 59956 65743 85219 60145 65743 2453000. (Solve for the digits; each letter stands for just one digit 0 to 9, although one digit may be represented by more than one letter.)

This is a Numble, a number puzzle for nimble minds. For hints for solution if needed, write us. The solution will appear in January.

We repeat our annual challenge to automatic computers — to solve this kind of problem by an automatic program. The challenge, offered now for the sixth December, remains unanswered so far as we know.

CONTROVERSY AND "COMPUTERS AND AUTOMATION"

I. From: E. J. Teagle

Maracaibo, Venezuela

This is my last subscription unless you cut out that c - - p about social responsibility and devote more space to applications.

II. From: George A. Hall, Jr.

Asst. Editor, ISA Journal
Pittsburgh, Pa.

We here are particularly interested in your continued support and promotion of the social responsibility of computer scientists — and by implication automatic control engineers — in the columns of your magazine. This is fine work: please keep it up.

III. From the Editor's Notes, Computers and Automation, April 1954 (Vol. 3, No. 4), p. 4 ff:

We believe in the value of controversy, in the field of computers and automation as well as in all other fields. A controversial subject is an interesting subject, an important one to argue about and seek the truth about, through discussion, investigation, and the clash of different views. It is not necessary to lose one's temper in discussion, but it is necessary that each party in the discussion have his fair chance to express his views, without being called names or having his integrity or loyalty to anybody or anything attacked. . . .

In the pages of this magazine we shall do our best to promote controversy, honorable controversy, which truthfully and honestly explores ideas, and which tries to make sure that each side of a question is expressed fairly — without calling names, attacking reputations, or hugging orthodoxy.

IV. From the Editor:

This is still exactly what we believe in — and the subject of the social responsibility of computer scientists is worth quantities of discussion and argument.

MATHEMATICS LABORATORIES

I. From: J. F. Clark

21054 Clark Ave., RR3
Langley, British Columbia
Canada

I am teaching mathematics in one of two Junior-Senior High Schools in this district. Our total enrolment in Grades 7 - 13 is approximately 1600. Our School Board is at present planning to spend about $30,000 on a music-band room in one school to satisfy the demands of a Music Specialist. Full band equipment, music scores, piano, record-player, etc., are already provided.

As a mathematics specialist I am green with envy. The total appropriation for mathematics equipment in the last 10 years would scarcely buy the piano. In order to rectify this sitaution I am contacting the major American suppliers of mathematics laboratory equipment. Your address has been obtained from a publication of the National Council of Teachers of Mathematics.

I therefore request your serious consideration in supplying me with catalogues, descriptive literature, and material which can be of use in approaching the School Board and selling them on the necessity of mathematics laboratories.

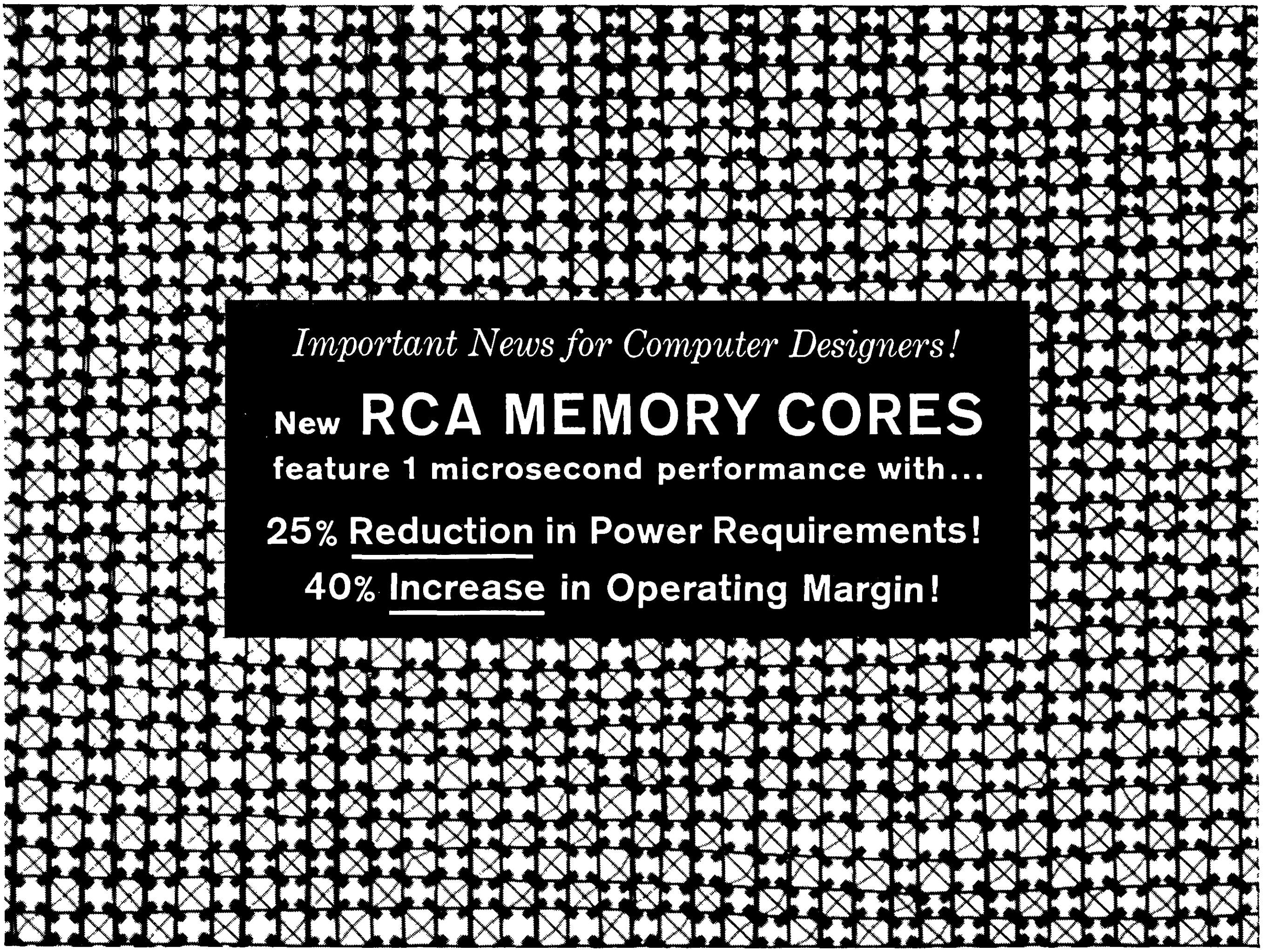
Our local Board is one of the best and I can assure you they will respond to reasonable demands.

II. From the Editor to Mr. Clark:

Thank you for your recent letter. We are happy to enclose our announcements of the things we publish and our Brainiac kit. Good luck to you in what you are trying to do, and if we can be of any further help to you, write us again.

III. From the Editor to the readers of Computers and Automation:

If you have any information or announcements which relate to school mathematics laboratories which might be of interest to Mr. Clark, will you please send them to him?



Dramatic improvement over present standard cores offers greater design flexibility, top performance in high-speed coincident current memory applications

New 1-μ sec memory cores 226M1 (XF-4028) and 228M1 (XF-4257) developed at RCA's Materials Lab in Needham Heights, Mass., represent an important step forward in ferrite core design for military and commercial computers. See chart for the significant improvements in power requirements and operating margin now possible in 1-μ sec operation.

Call your local RCA Field Representative and learn how the new 226M1 and 228M1 can fit into your new computer designs. He can also give you information on the entire line of RCA Ferrite Memory Cores, Planes and Stacks available to meet your specific design requirements. For technical data, write RCA Commercial Engineering, Section L-90-NN, Somerville, N. J.

NOMINAL OPERATING CHARACTERISTICS AT 25°C

Type	Size	Full Driving Current (Im) (ma)	Partial-Write Current (Ipw) (ma)	Pulse Rise Time (T_r) (μsec)	Switching Time (T_s) (μsec)	Response: "Undisturbed 1" (uV_1) (mv)	Response: "Disturbed 0" (dV_2) (mv)
228M1 (XF-4257)	080" x 050" x .025"	620	310	0.2	1	160	18
226M1 (XF-4028)	.050" x .030" x .015"	380	190	0.2	1	75	10

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1959 Pictorial Report on the Computer Field

This is a pictorial report for 1959 on the computer field, including computers, data processors, components, etc. To put together this report, we sent out a letter to many organizations in the computer field, asking for:

"interesting, striking, and dramatic pictures related to the computer field in 1959 — pictures that answer questions:

What does a . . . . . look like?
What goes into a . . . . . ?
How is a . . . . . made?
How does a . . . . . operate?

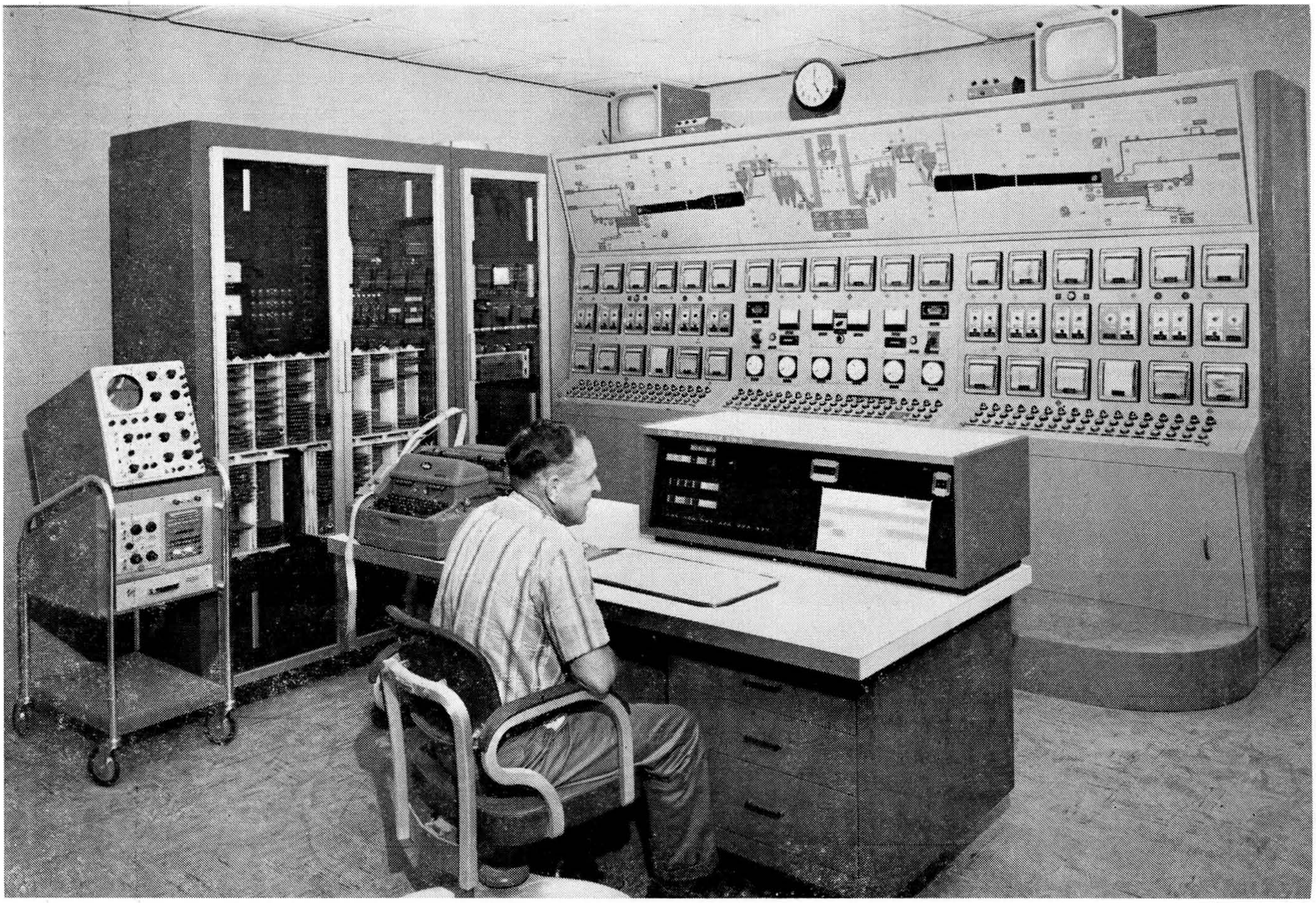
and similar questions."

We said we wanted to avoid pictures that showed only "smooth and featureless outside coverings."

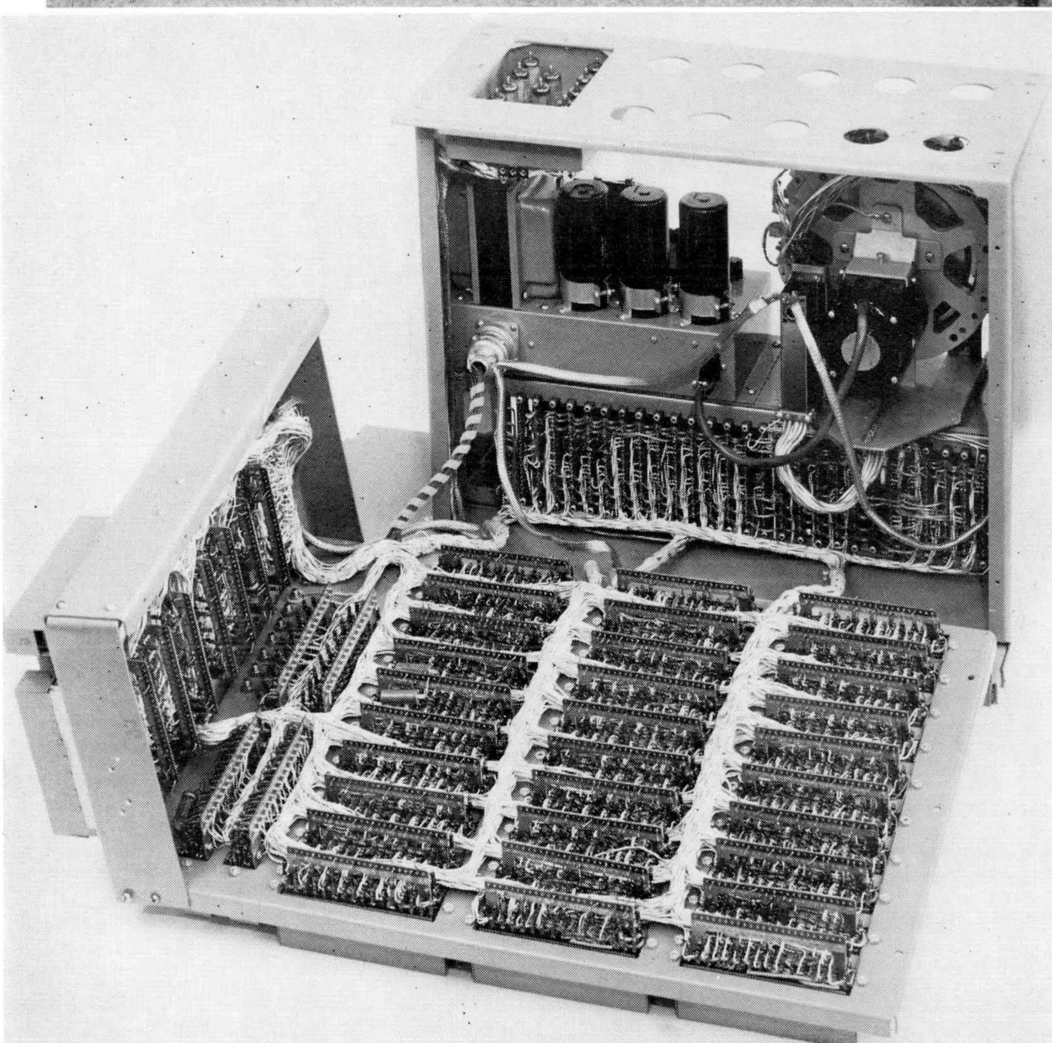
A number of good pictures have been sent to us, and we are grateful for them. Many of these have been printed as a part of this report, which includes the front cover also; but there is not room for all of them to be published in this issue, and so we shall plan to publish more of them in later issues.

The present report is a continuation of our previous pictorial reports: "A Pictorial Manual on Computers," first printed in two parts, one in December 1957, the other in January 1958, subsequently reprinted as a special issue of **Computers and Automation**, vol. 6, no. 12B; and "1958 Pictorial Report on the Computer Field," printed in the December 1958 issue of **Computers and Automation**, vol. 7, no. 12.

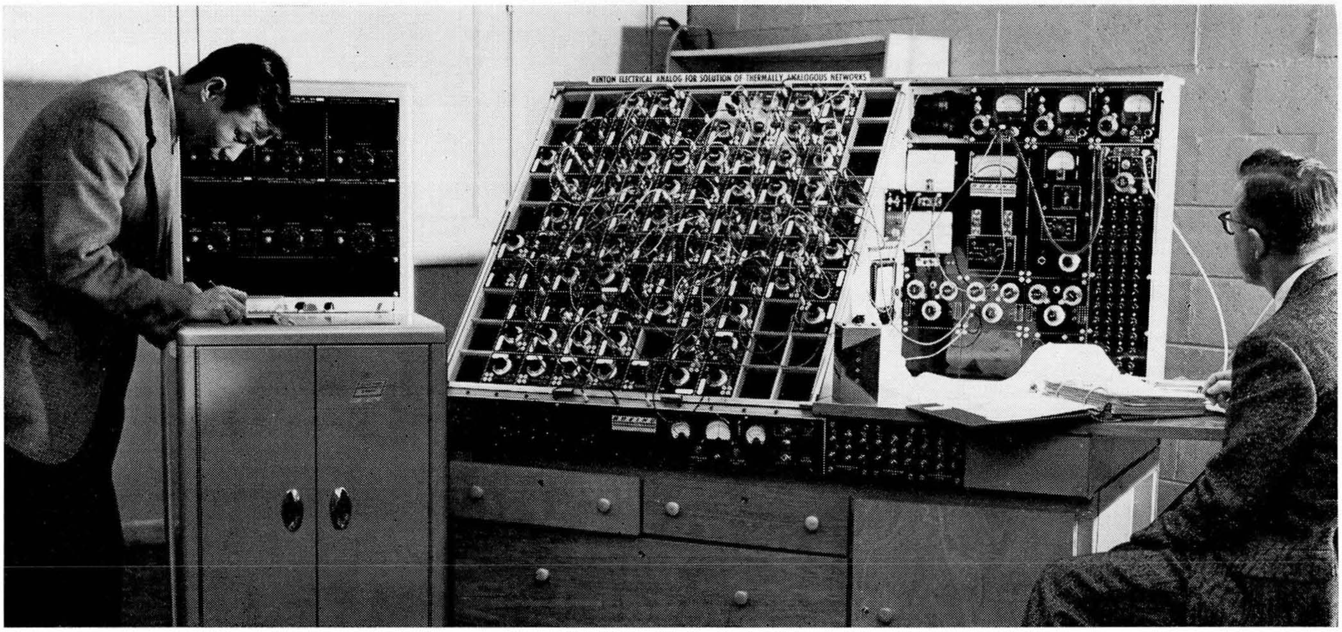
I. Computers



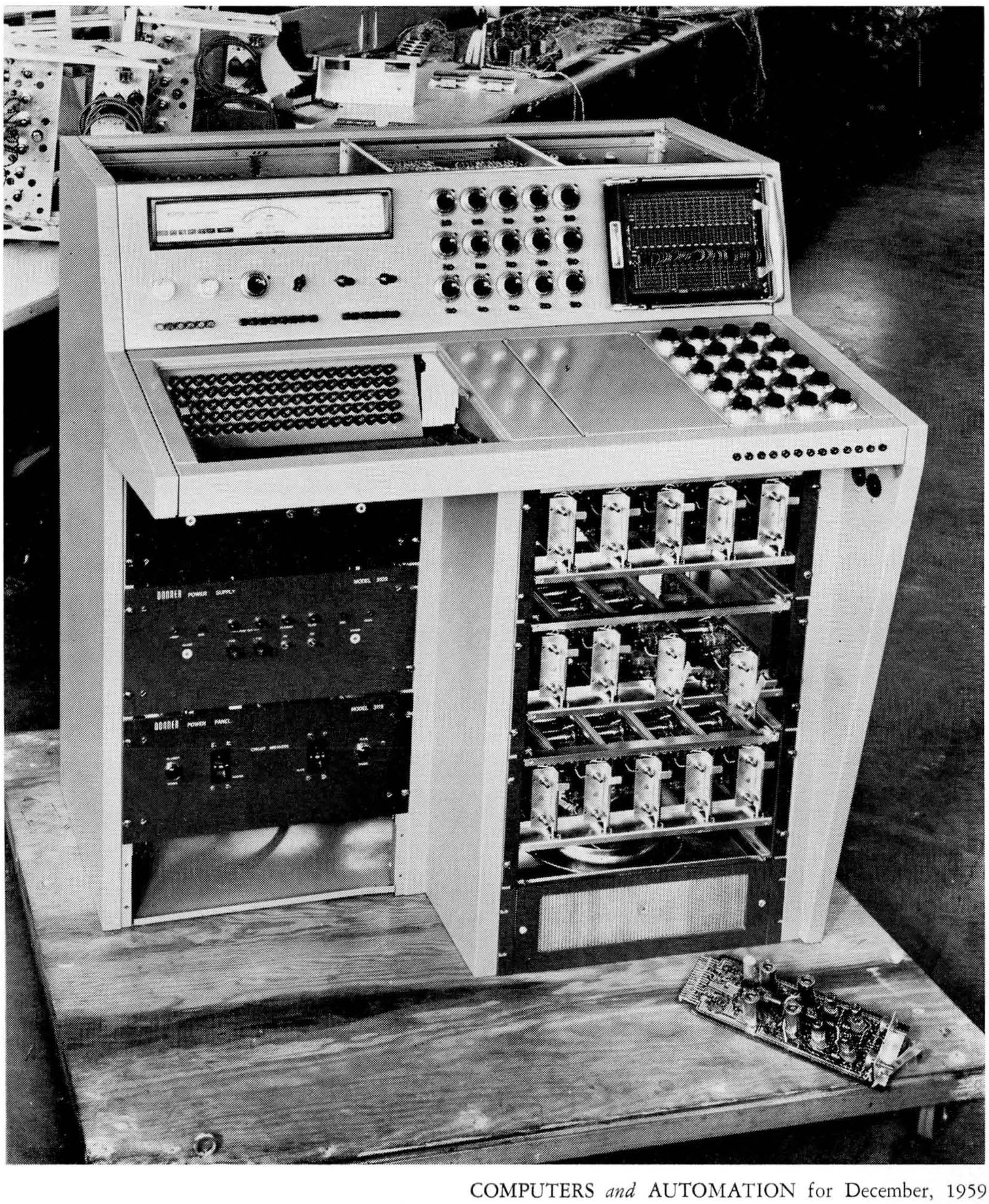
This is an automatic digital computer being used for control purposes in a cement-mixing company. It directs the blending and storage of raw materials, and will eventually exercise closed-loop control over the kilns. The machine is an RW 300 made by Thompson-Ramo-Wooldridge Products Co., Beverly Hills, Calif., and is in use at the Riverside Cement Co., Oro Grande, Calif. (Figure 1)



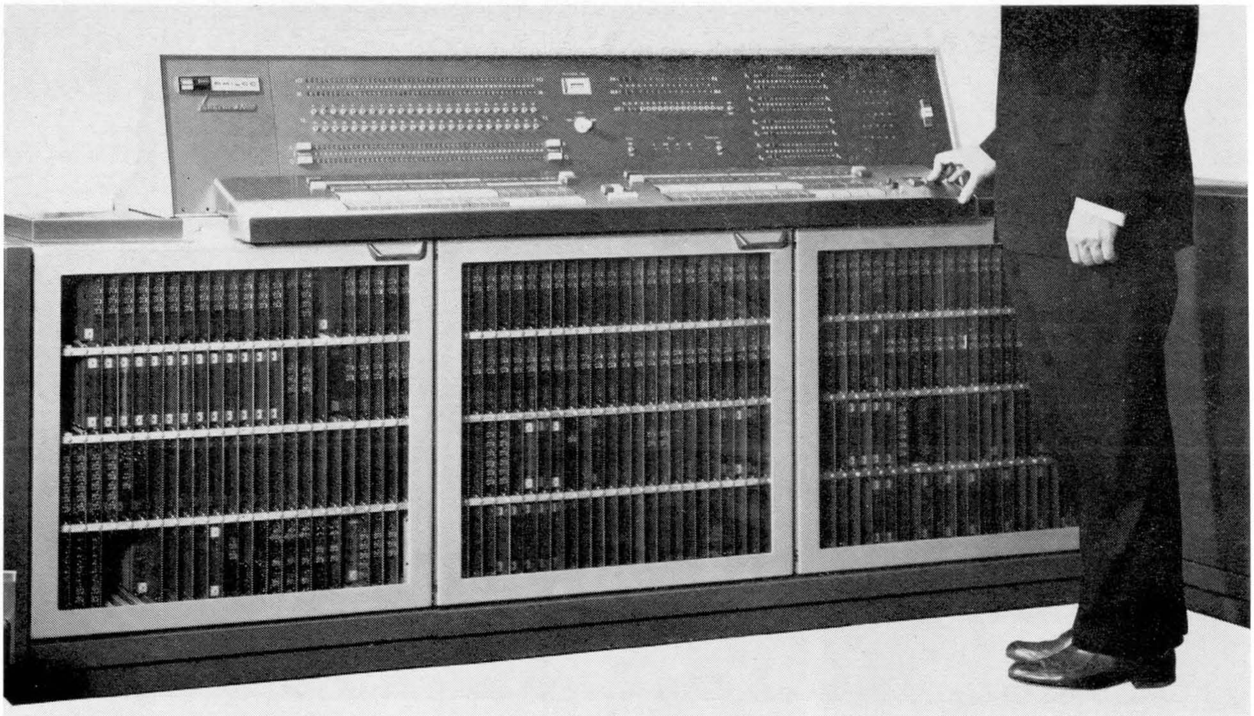
One of the lowest-priced (under $20,000) complete automatic digital computers is the DE 60 of Clary Corporation, San Gabriel, Calif. (Figure 2). Part of the programming is accomplished by a plugboard, and more by sequential instructions from the keyboard. The arithmetic unit (Figure 3) is contained in the box under the typewriter, and is shown opened in Figure 3. No tubes are used in the logical operations of the computer; the thyratrons are power tubes.



This is a general purpose analog computer constructed by and in use at Boeing Airplane Co., Seattle, Wash., for solving heat-transfer problems in the design of manned supersonic aircraft. It is about 1/8 the size and 1/10 the cost of comparable models. It is assembled from 11 kinds of standard boxed units, which are connected from in front. In a steady-state heat-transfer problem, where skin temperatures are assumed to be constant, interior temperatures can be found simultaneously at 400 different locations. The computer has been named Reastan. (Figure 4)

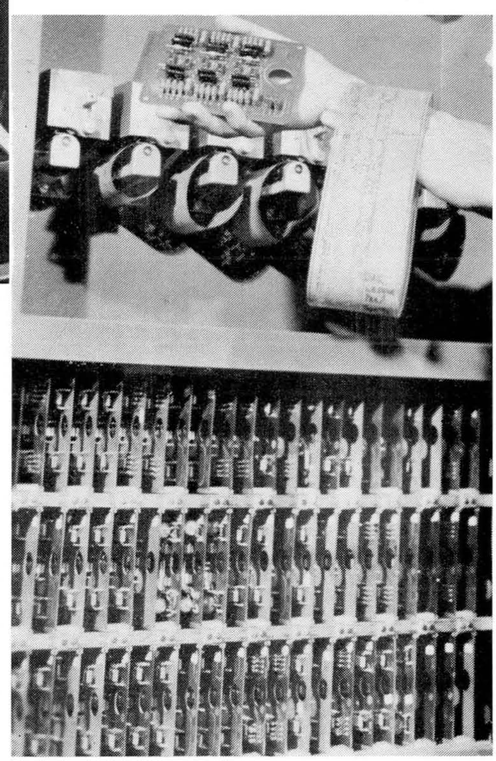


This is a new general-purpose analog computer with 30 amplifiers and 35 to 55 potentiometers, desk size, expandable, able to solve linear and nonlinear differential equations, etc. The machine is the Model 3100 analog computer made by Donner Scientific Co., Concord, Calif. (Figure 5)



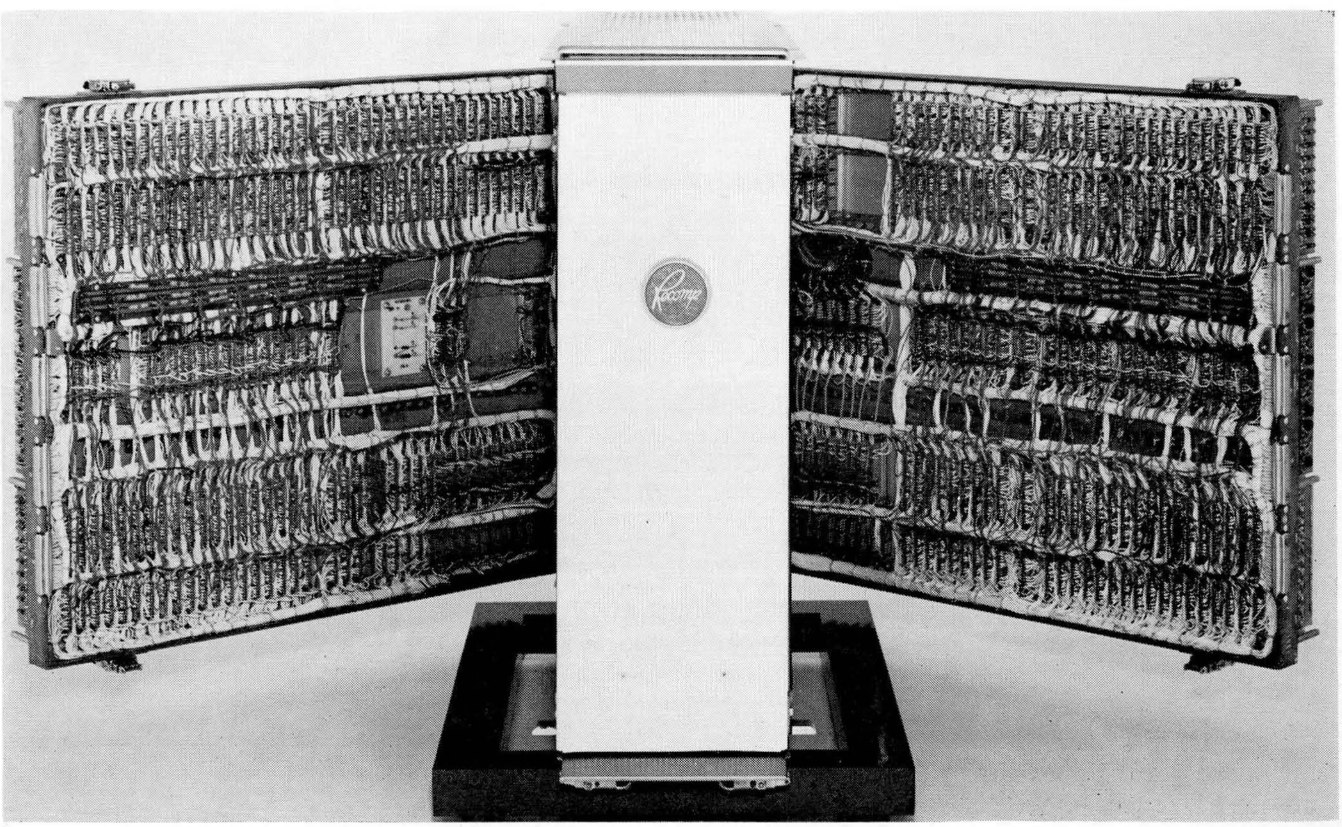
This shows the console of the central computing unit of the very large-scale and powerful computer, the Transac S 2000 made by Philco Corp., Philadelphia, Pa. The plug-in circuit boards appear through the glass windows of the front of the console. (Figure 6)

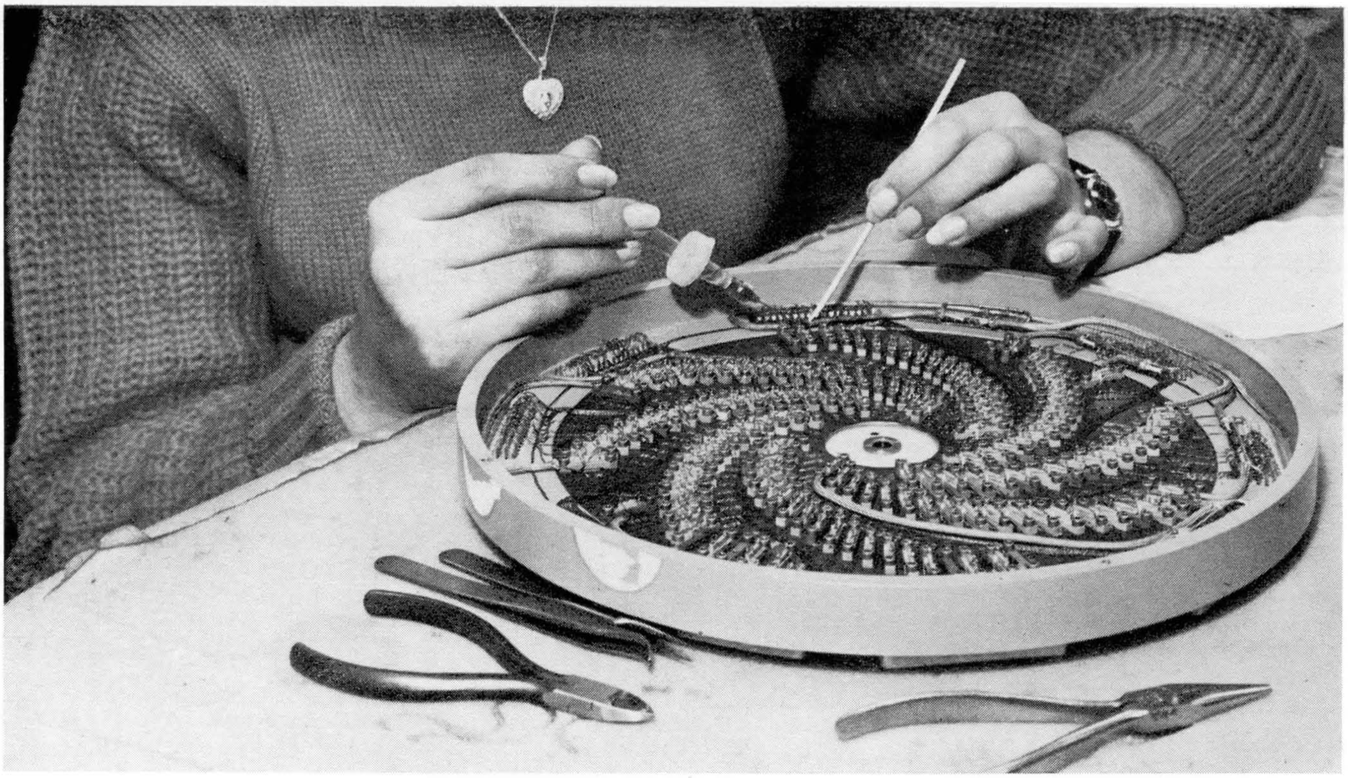
This machine is sorting checks at the rate of 25 a second, by means of magnetic ink characters printed or entered on each check. The characters record account number, amount, and other information. The sorter is an element of the Burroughs B 251 Visible Record Computer made by Burroughs Corp., Detroit, Mich. (Figure 7)



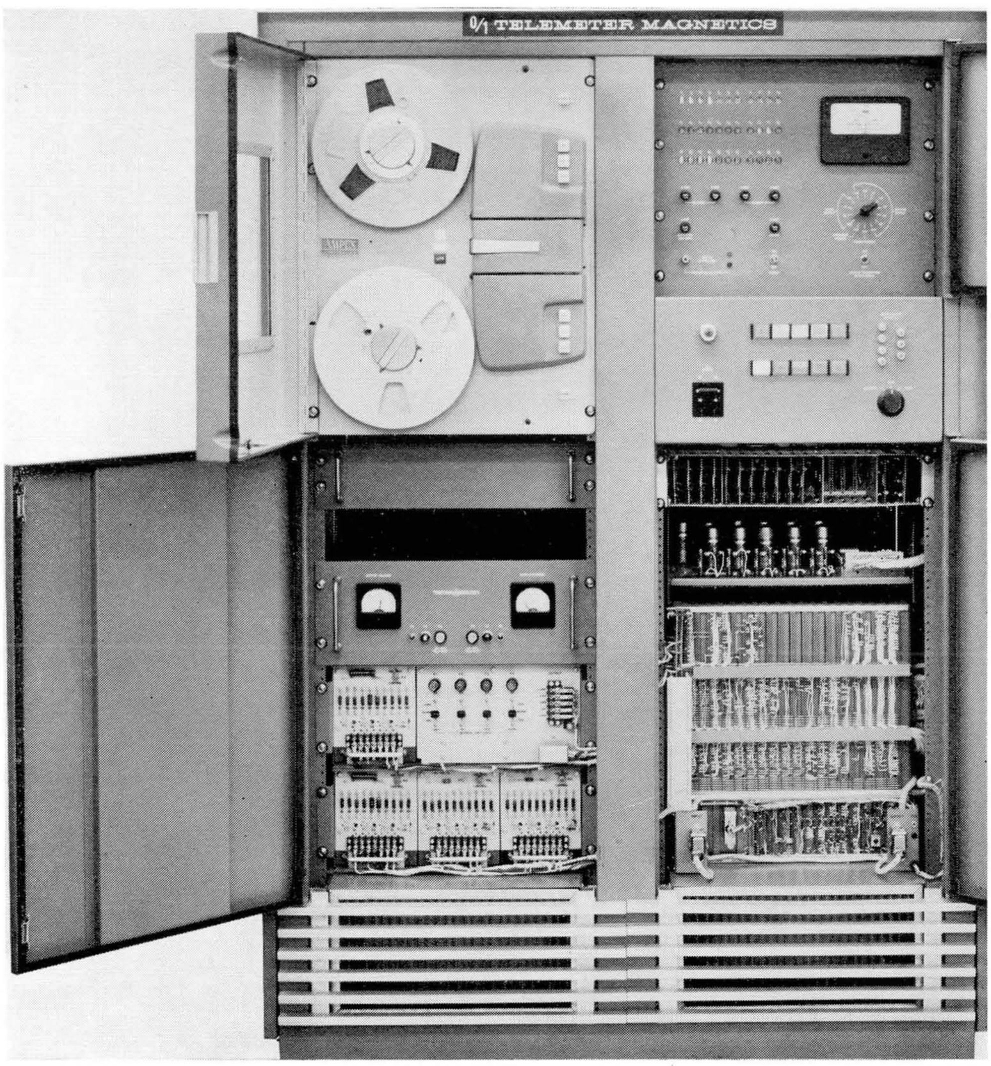
Here is shown a band of Mylar plastic tape containing about 200 instructions for the operation of the Burroughs B 251 Visible Record Computer. Up to 12 tape readers may be installed, so that the computer may refer to more than 2500 programming instructions. Also shown is one of the small transistorized printed circuit boards. (Figure 8)

Here is a small general-purpose digital computer, with: electric typewriter input and output; paper tape reader and punch; and at the right, the main computing unit (Figure 9). This is the Recomp II made by Autonetics division of North American Aviation, Downey, Calif. Below is the computer unit opened up. (Figure 10).



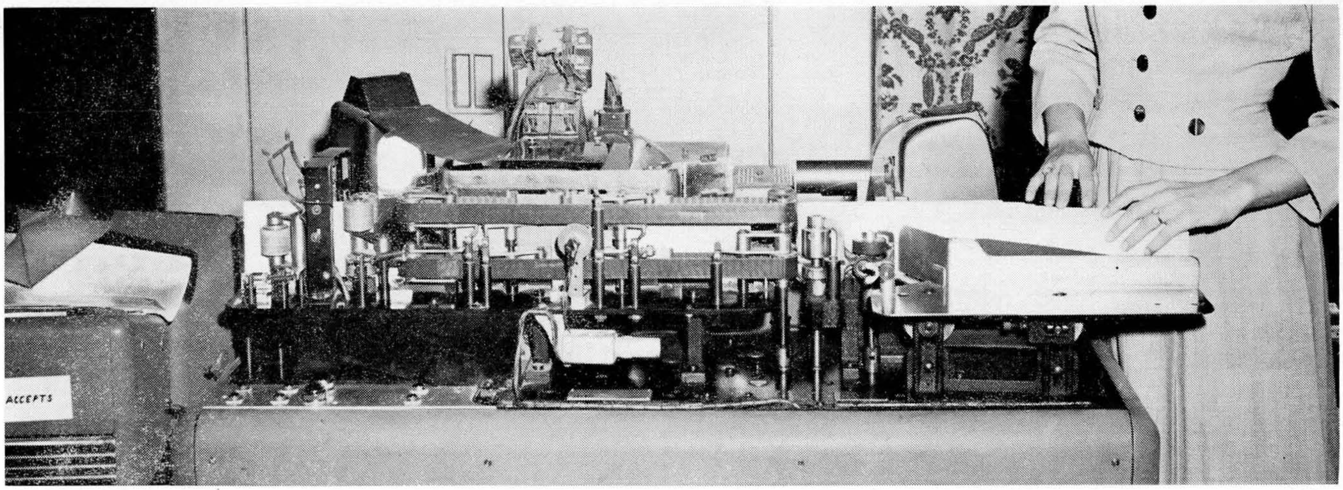


Here is part of the magnetic drum memory of the Recomp II being assembled and wired. The capacity of the memory is 4096 words of 40 binary digits each. (Figure 11)



The purpose of this machine is to convert information from magnetic tape to paper tape. It is made by Telemeter Magnetics, Los Angeles, Calif., and contains among other components a magnetic tape reader made by Ampex Instrumentation, Redwood, City, Calif. (Figure 12)

2. Input



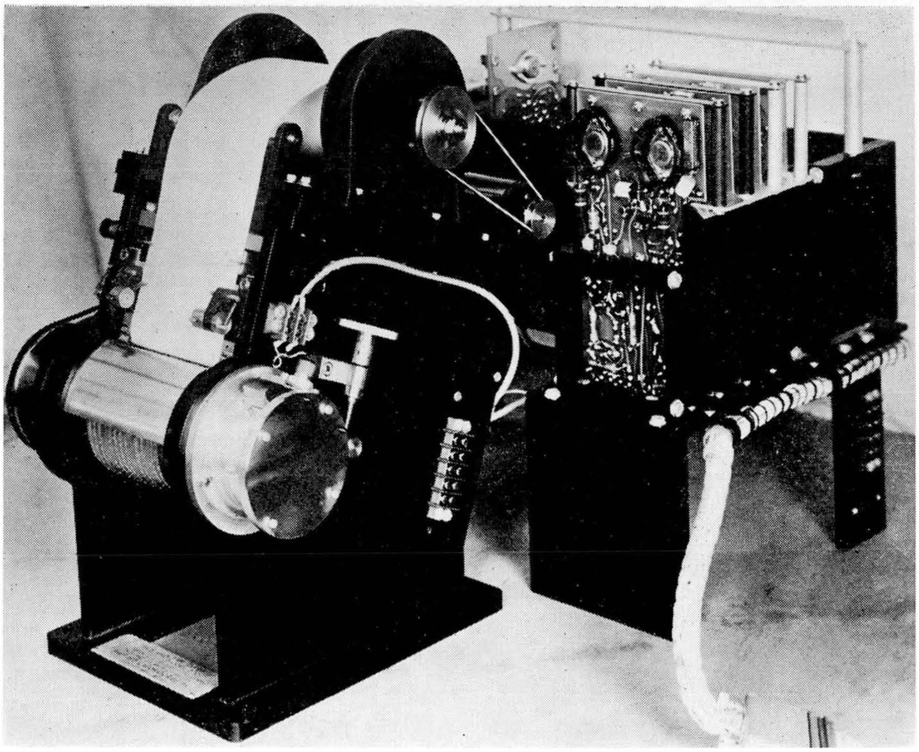
This is an automatic electronic reader of typewritten or printed characters in correspondents' addresses on ordinary mailed envelopes. The model is being developed further, under a contract with the U.S. Post Office Department, by Intelligent Machines Research Corp., a subsidiary of Farrington Manufacturing Co., Needham Heights, Mass. (Figure 13)

Pictorial information can be converted into digital data for computer input. The machine shown takes stereophotographs and with the aid of an operator converts highway cross-section measurements into digital form punched on punch cards or punch tape. The machine is the Terrain Data Translator made by the Benson Lehner Corp., Los Angeles 64, Calif. (Figure 14)

3. Output

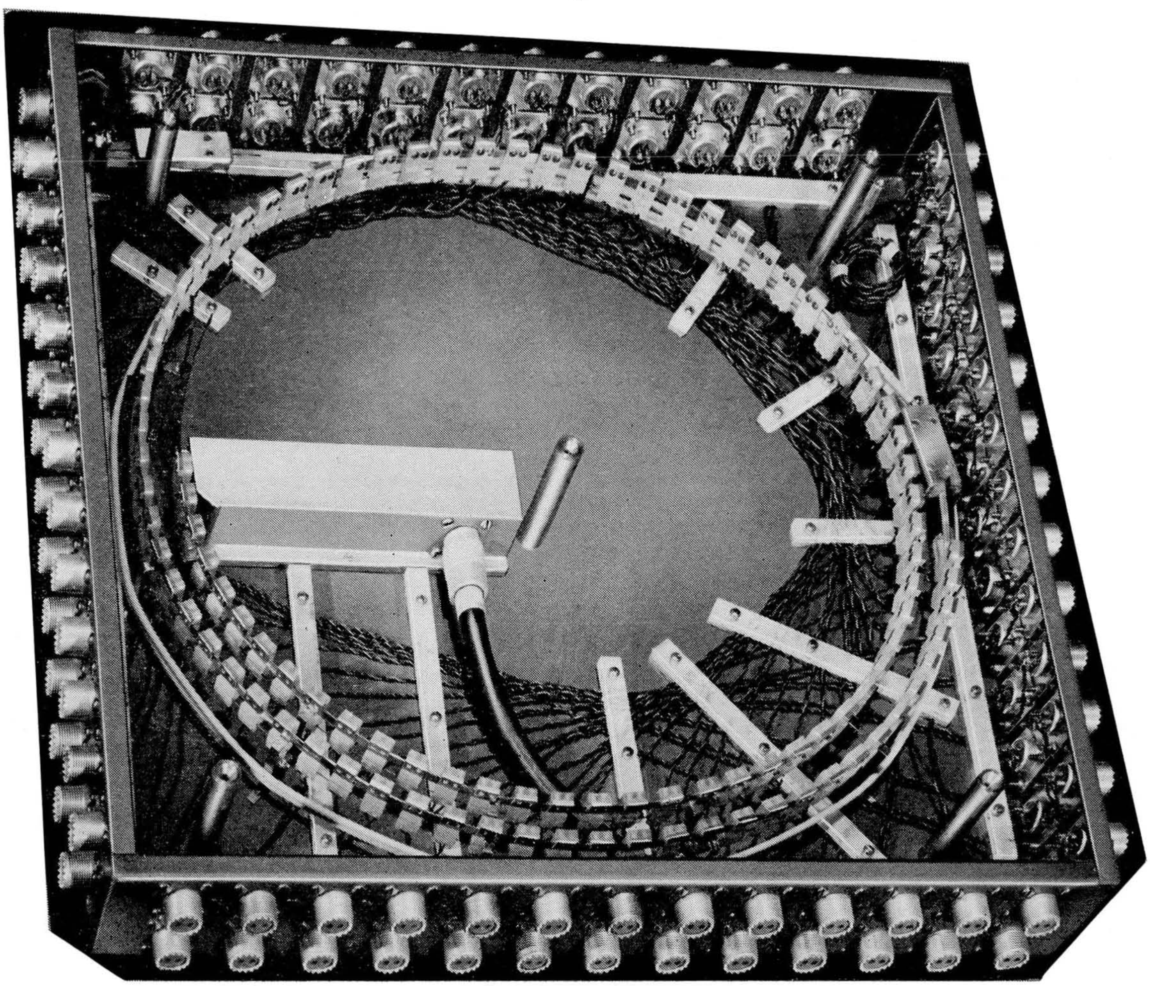
Here is a tape punch which punches 120 characters per second. It is part of FLAC, the Florida Automatic Computer. This machine was designed and is operated by the RCA Service Co., Missile Test Project, Patrick Air Force Base, Florida. (Figure 15)

The machine shown above puts out digital and other symbolic displays (eight numbers or symbols printed in parallel) at speeds of up to one display per second. The machine also draws lines. In fact, it can draw any picture consisting of a series of straight lines; for the mapmaker it draws maps; for the highway engineer it draws terrain cross sections and profiles; for the petroleum geophysicist it prints subsurface contours; and for the petroleum production man it presents oil well production information. This machine is the Electroplotter Model S made by Benson Lehner Corp., Los Angeles 64, Calif. (Figure 16)

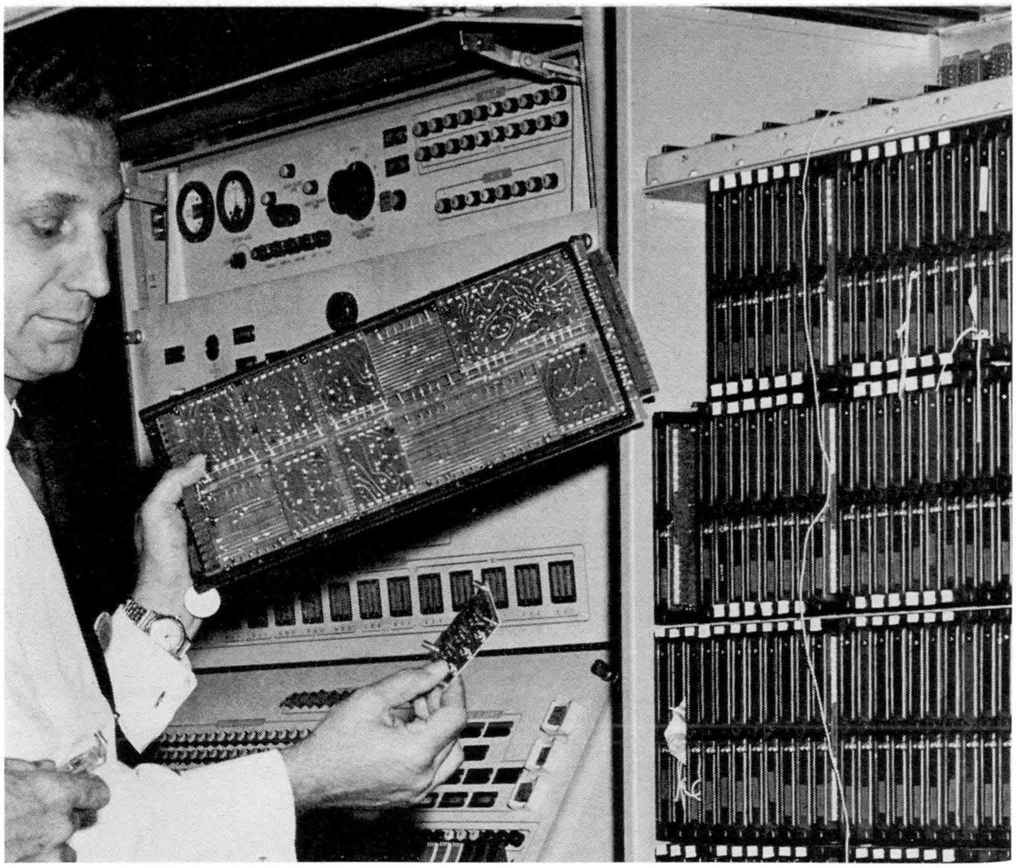


This is a high-speed paper-tape-imprinting output device. While the paper tape runs continuously, the typewheels make up to 30 revolutions a second, each wheel bearing 64 characters. Hammers actuated by precisely timed solenoids strike the pressure-sensitive paper, and character face in 50 millionths of a second, so there is no smearing of the impression. Another model can type up to 190 characters per line at rates up to 15 lines per second. The machine is made by Shepard Laboratories, Summit, N.J. (Figure 17)

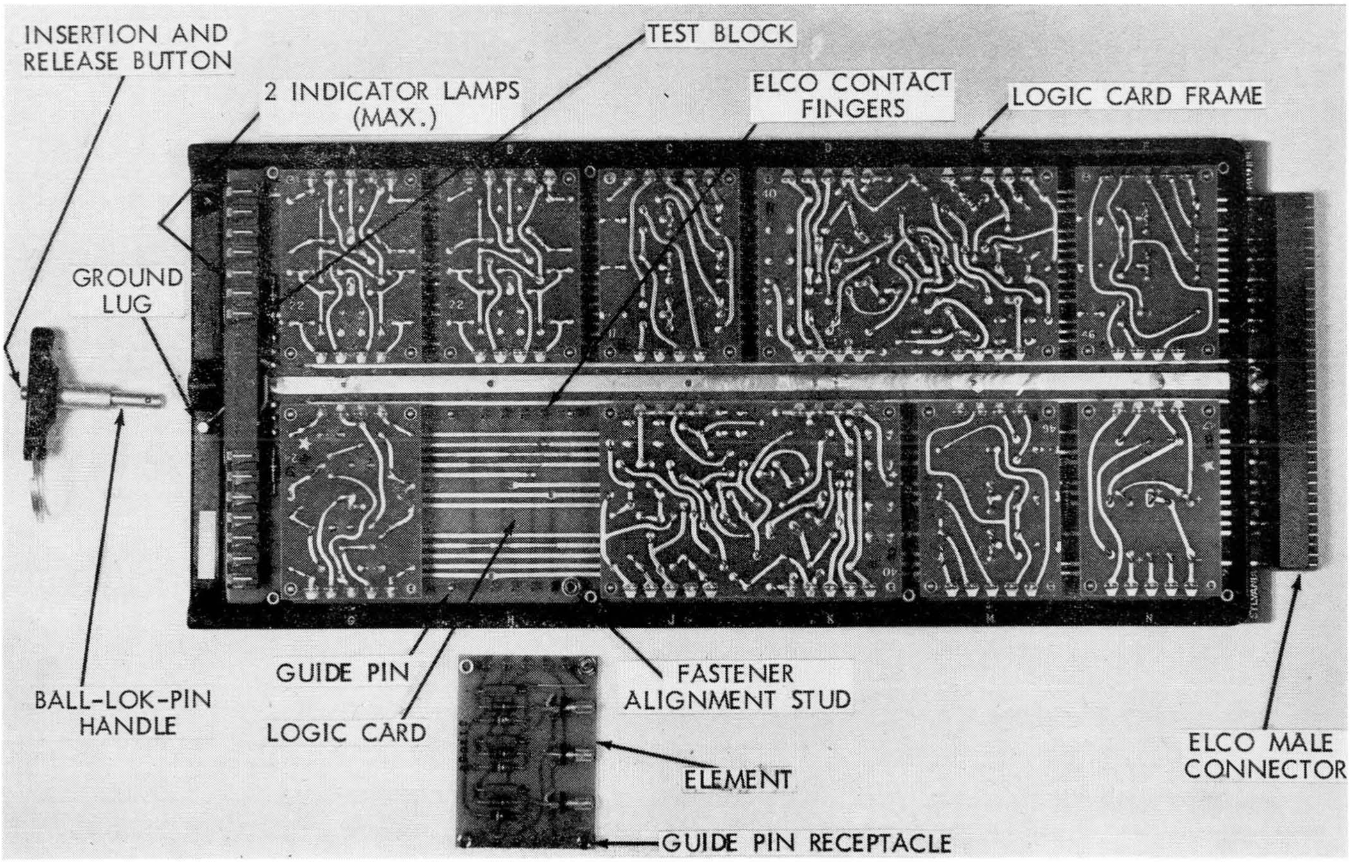
4. Components

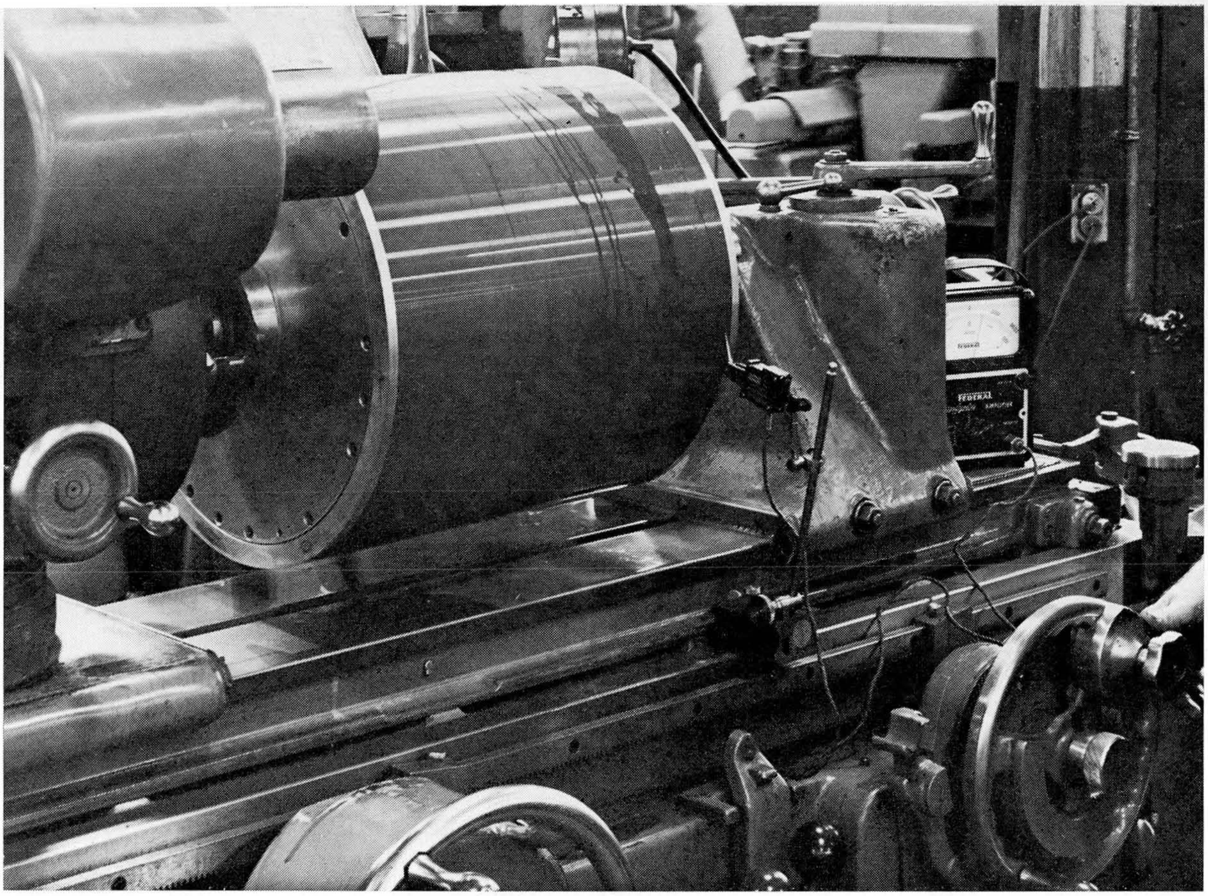


This is a magnetostriction delay line, a memory which stores information based on the change of physical dimensions of a material when it is magnetized as compared with when it is not magnetized. The manufacturer is Ferranti Electric Co., Hempstead, N.Y. (Figure 18)



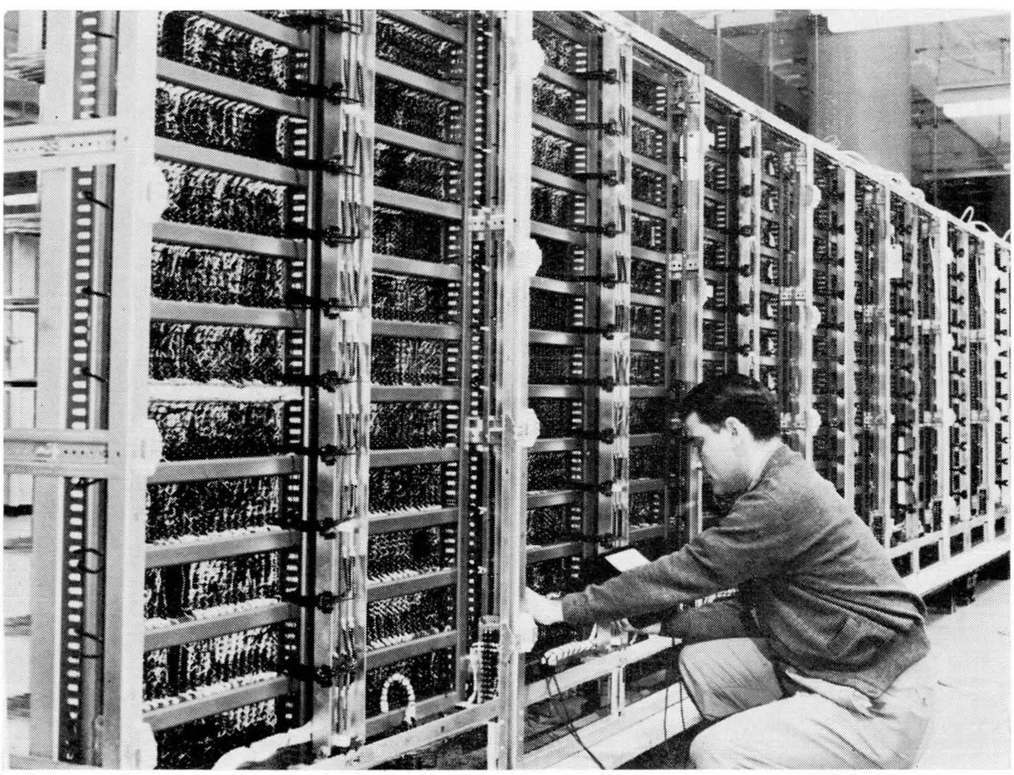
The utmost reliability under very rigorous conditions has been sought in the components of the mobile digital computer, Mobidic (Figures 19 and 20, and the Front Cover). It is being built by Sylvania Electronic Systems, Needham, Mass. for the U.S. Armed Forces. The components have been constructed in three levels of packaging: (1) small printed circuit plaques with components mounted and soldered; (2) larger printed circuit boards with the plaques mounted upon them; and (3) frames in which the larger boards may slide in and out. For other purposes than Mobidic, the frames also have been made removable and insertable. (See Front Cover)





Above the magnetic oxide coating for a magnetic drum is being inspected for concentricity with a micro-probe amplifier. The concentricity tolerance on this particular drum was 70 millionths of an inch. The manufacturer is Bryant Computer Products Division, Springfield, Vermont. (Figure 21). Below holes are being machined into the drum housing in order to fasten the magnetic read/record heads. (Figure 22)

This picture high-lights a current computer application to a U.S. Army war-game problem. The game (called SYNTAC) is used to evaluate the feasibility of operational and organizational concepts; it is played manually by two opposing teams maneuvering on a map. The teams are members of the Combat Research Operations Group (CORG) of Technical Operations Inc., Burlington, Mass., associated with Combat Development System, U.S. Continental Army Command, Fort Monroe, Va. The umpire is a Control Group assisted by an LGP-30 computer, made by Royal McBee Corp., Port Chester, N.Y.; the computer is essential for quickly and accurately judging the moves. (Figure 23)



Checking and maintaining the operation of computers is perhaps the most fundamental of all computer requirements. This picture shows a technician checking a logic chassis in the RCA-501 electronic data processing system, in the RCA plant, Camden, N.J. The most recently delivered RCA 501 was installed in Denver in October for supervision and control over records of air reservists. (Figure 24)

MAINTENANCE METHODS FOR DIGITAL COMPUTERS

Fred Liguori
Sperry Gyroscope Co., Marine Div.
Syosset, L.I., N.Y.

Supplying an adequate maintenance manual concurrently with or shortly after the delivery of an elaborate equipment is never a simple task. The problem of anticipating actual operating conditions and the reliability of the equipment has no simple solution. In the case of digital computers, however, two additional factors further complicate the problem:

(1) Almost unlimited flexibility of operation based on an easily changed, stored program makes the computer's ultimate use unpredictable.

(2) The dependence of computer operation on stored data requires tests other than the usual tests on physical hardware.

The usual solution to the checkout and maintenance problem is to utilize the computer itself to isolate or at least localize the trouble area. This requires a well developed test program that checks memory data as well as the system electronics. The use of test programs, however, present problems of their own.

The main purpose of this article is to consider various methods of attacking the maintenance problem and to discuss the merits and disadvantages of the methods considered.

Maintenance based on Permanently Stored Test Programs

The desirable features of a well designed test procedure based on programs permanently stored in the computer memory are:

(1) Thoroughness of checkout
(2) Minimum of time required
(3) Minimum possibility of human error
(4) Actual operating conditions can be simulated
(5) Minimum knowledge required by technician
(6) Minimum of test devices and maintenance literature required

Items (1) and (2) are closely interrelated since it is the rapid action of programmed tests that enables all circuitry and each memory cell to be checked out within a reasonable time. For the average computer the time required for such tests is about fifteen minutes if no faults are encountered. A similar test by manual procedures would require hours or even days for larger computers.

Human error is obviously minimized by semi-automatic testing that requires only the use of a selector switch and actuating button.

The inherent computational speed of the computer enables the system to be checked out while operating at normal speed. Thus the programmed test gives the truest indication of operability. Such a test would be impossible by means other than automatic.

Programmed tests can be performed by the operator since a minimum knowledge of computer theory is required. The results obtained are compared to predicted results to determine faulty areas. Such tests serve as an excellent checkout procedure before putting the computer "on line."

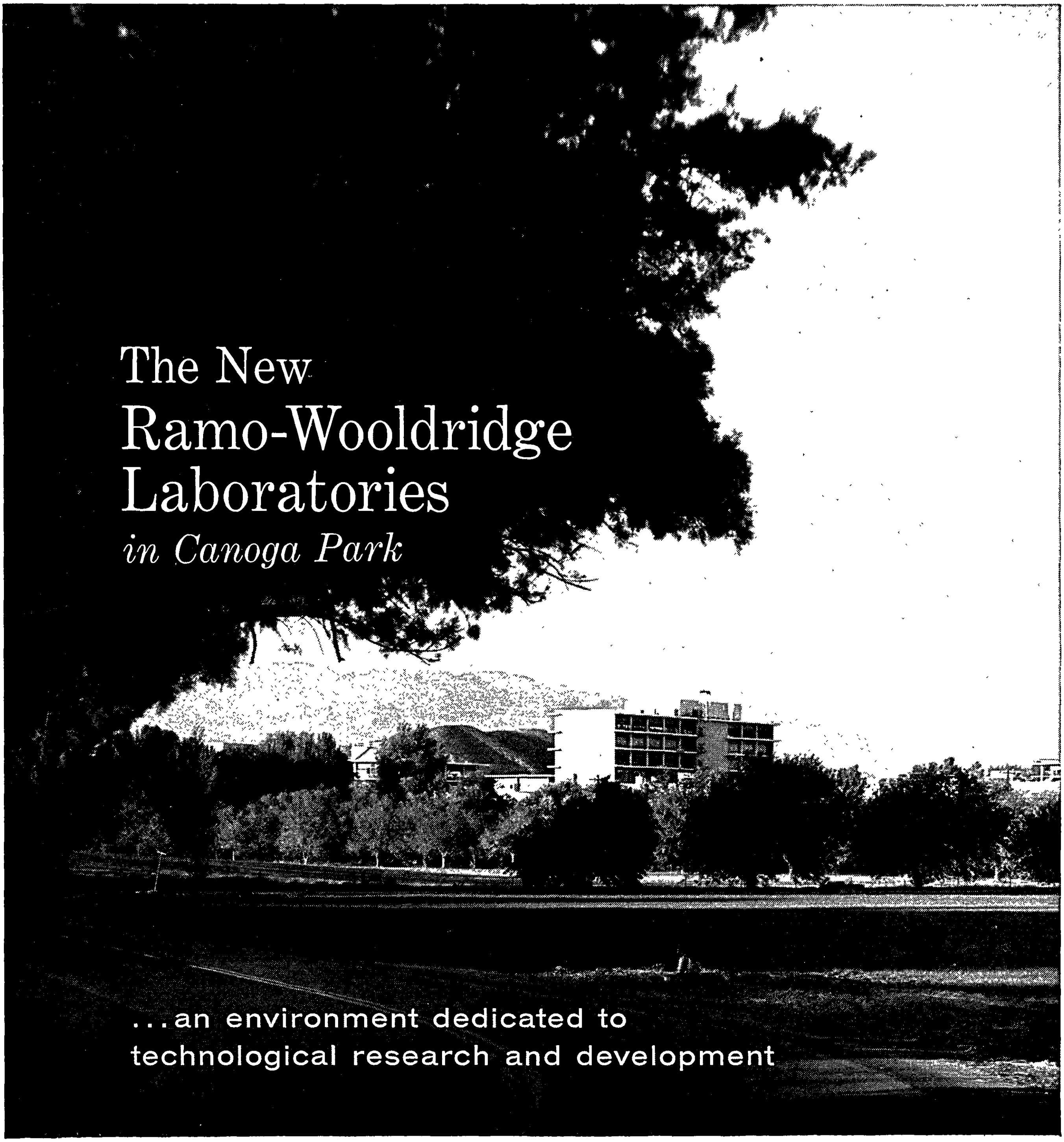
A minimum of technical literature is required to explain the operation of tests because of their simplicity. If the computer is well-designed, no auxiliary test devices are required for the first stage of checkout and troubleshooting. For detailed trouble isolation, a minimum of equipment is required. Usually a fast-sweep oscilloscope and a vacuum tube volt meter are sufficient.

With these powerful advantages, it is difficult to belittle the stored program troubleshooting approach. Yet there are a few items that must be considered since it may be impossible to depend on stored program troubleshooting.

(1) There may be failures in the test program.
(2) Space may not be available for storing the required test programs.
(3) Reliance on test programs hinders the development of the maintenance man.

There is always the possibility that the test program itself will fail. Such a failure can be due to a damaged portion of the memory or to an electronic failure in the computer hardware. A well-designed memory is almost indestructible in normal operation, or at least its life expectancy can be fairly well determined beforehand. False failures can be eliminated by accepted verification routines. An electronic failure hindering the test program will in all probability result in an operational failure as well. Thus such a failure is the very reason for which the test program exists. By analyzing the point of failure, a good insight to the difficulty is obtained. Here, however, the burden is placed on the test program designer to avoid false indications when displaying test program results.

The space problem in programmed testing is of no concern where an adequate storage facility is incorporated in the computer memory. But it is important enough to be prohibitive where storage space is not available. The solution to this problem is not nearly so simple as "providing an adequate storage" may sound. The problem of anticipating the storage space required for operational programs is one of the most difficult problems in computer design. The cost of the memory unit is too great to employ a large safety factor in estimating its storage require-



The new Ramo-Wooldridge Laboratories in Canoga Park, California, will provide an excellent environment for scientists and engineers engaged in technological research and development. Because of the high degree of scientific and engineering effort involved in Ramo-Wooldridge programs, technically trained people are assigned a more dominant role in the management of the organization than is customary.

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THE RAMO-WOOLDRIDGE LABORATORIES

8433 FALLBROOK AVENUE, CANOGA PARK, CALIFORNIA ments. Modular design of storage is possible so space could be added after the completed design. This, however, still requires some costly provisioning in the original design that may never be utilized. Also, most modular memory units with a reasonable capacity are not fast-access memories; therefore they would slow down the testing operation. Thus after painstaking design of a suitable test routine, it may not fit into the computer together with the operational program without a costly compromise of one or both programs.

Finally, the maintenance man must be considered. If, as is the case with armed forces installations, there is a rapid turnover of personnel, simple test procedures are a must. But undue reliance on simplified routines gives the maintenance man little occasion to become really familiar with computer theory. He is subsequently hampered in dealing with problems not isolated by the routines. This is a more severe problem in experimental or constantly changing computer applications where analytical ability is required of the maintenance man in addition to general experience and know-how.

Maintenance based on Programs in Temporary Storage

Besides the permanent storage space, computers also have temporary storage space in varying proportions to permanent storage. The storage is temporary in that this space is required for intermediate or "scratch-pad" computations during normal computer operation. Thus its contents are automatically destroyed, by re-writing in these cells under the direction of the program.

The advantages of utilizing temporary storage space for test programs are as follows:

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(1) The use of valuable permanent storage space required is minimized, or unnecessary.
(2) Substantially all advantages of permanent storage test routines can be realized.

Item (1) is an advantage only if the temporary storage is adequate for test programs or if sufficient additional space is available in permanent storage. For a thorough checkout procedure, however, temporary storage facilities are usually inadequate.

Utilizing temporary storage space reduces the speed of testing inherent in permanently stored test programs because the routine must be loaded into memory before each use.

Where temporary storage space is inadequate, it is possible to use permanent storage space in the same manner as temporary storage, but this is further complicated by the need to re-load the operational program when the test program operation is completed. Such an operation allows some human error into the picture, but this can be minimized as follows:

(a) Have the temporary program automatically stop itself when the test program is fully loaded.

(b) Have the same input device (tape, etc.) also contain that portion of the operational program to be restored.

(c) Make part of the procedure for the test a simple switch action that continues the loading operation through the operating data reload cycle upon completion of the test operation.

Verification of the re-loaded program is still a must, but there are well established techniques for that.

The disadvantages of relying on temporary test programs are:

(1) Items (1) and (3) of those discussed for permanently stored tests.
(2) Speed of operation is greatly reduced by the need for loading and possibly reloading and verification.
(3) There is at least a partial increase in potential human error.

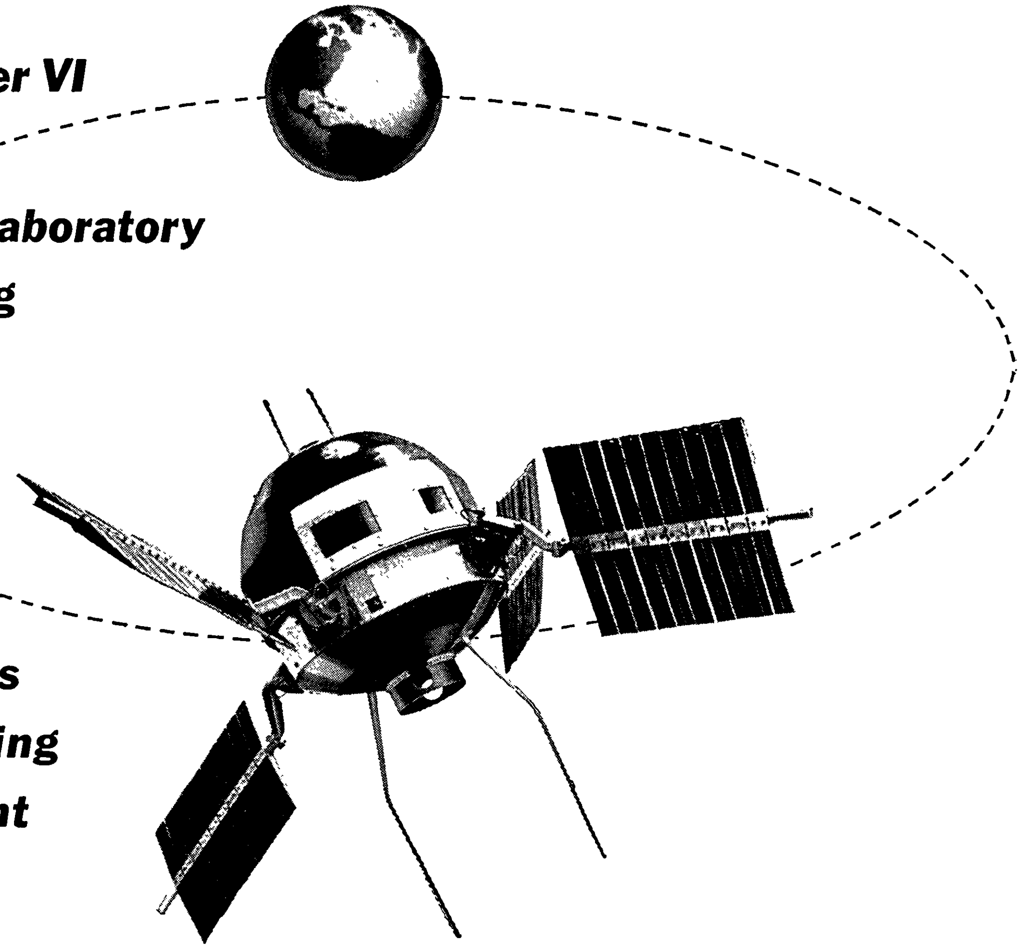
Maintenance based on Manual Testing Procedures

Even with the best programmed test procedures, there comes a time when the final analysis of the trouble depends on conventional troubleshooting techniques with auxiliary test devices. If the computer has a well-designed test program, however, this is only the last step in the repair procedure. The computer will normally have been put back into operation by replacing a modular unit before detailed testing of circuits begins. The modular unit itself is tested by the auxiliary devices without the pressure of having to get the computer back "on line."

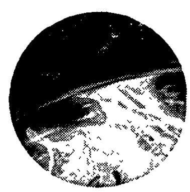
There are certain advantages to a complete manual troubleshooting technique despite its seemingly old-fashioned approach. Most of these advantages, however, diminish in relative importance as the computing system increases in size and complexity. Among the paramount advantages are:

(1) There is little or no need for storage space.
(2) There is no drain on programming time in setting up procedures.
(3) The testing approach is more independent of the computer itself.
(4) The technician must learn more of the system.
(5) With intelligent modular design this may be at least as fast as using temporary storage programs.

Explorer VI is a space laboratory orbiting around the earth with paddles capturing sunlight for power



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



How? Because Explorer VI's 132 pounds of electronic components are powered by storage batteries kept charged by the impingement of solar radiation on 8,000 cells in the four sails or paddles equivalent to 12.2 square feet in area ● Many more of the scientific and technological miracles of Explorer VI will be reported to the world as it continues its epic flight. The STL technical staff brings to this space research the same talents which have provided systems engineering and over-all direction since 1954 to the Air Force Missile Programs including Atlas, Thor, Titan, Minuteman, and the Pioneer I space probe.

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Since many computer routines require the use of storage a valid test must also utilize storage space. The temporary storage is adequate for such simple storage problems, however. All instructions in this approach are entered manually so the often lengthy loading operation is not required.

An important advantage in the early stages of computer development is the independence of this technique. The programming time is often preoccupied with evaluation and operational programs so that a period might exist where no test programs are available even if it is intended to develop them.

In programmed tests there is always some dependence on basic computer operations which may not be available due to the malfunction that exists. The failure indication when the test program cannot be completed cannot always be anticipated by the procedure. This complication is avoided in a manual testing procedure.

Advantage (4) might sound like a disadvantage but there is merit to making the technician work at troubleshooting. In difficult troubles where programmed tests fail, the technician's reservoir of experience and familiarity with theory are valuable assets. These assets are acquired only through working with the circuitry.

The speed with which the computer is returned to operation is of utmost importance in large scale computers where operating time is in hundreds of dollars per hour. There, this serious disadvantage to manual techniques exists. Indeed it is often prohibitive. Yet with modular design in vogue, large sections of the computer can be replaced by simply exchanging pluggable packages without even shutting off power. A good technician need not make too many calculated guesses to replace the faulty circuit. Then the testers do the rest when the computer has been returned to operation. A good maintenance manual is a valuable aid in this "mental" troubleshooting process. Troubleshooting charts of the "yes - no" variety that are well thought out can do a lot of the thinking and eliminate much of the pressure when first attempting the repair.

The major disadvantages of the completely manual approach to testing are:

(1) The enormity of the system may make it virtually impossible to use this method exclusively.

(2) Where useable, the method will almost always be slower.

(3) It requires a high-calibre technician and close familiarity with the system.

(4) It requires a better-than-average maintenance manual.

(5) The storage system must be almost infallible if it is very large, since manual checking of stored data is impractical.

CALENDAR OF COMING EVENTS

Dec. 1-2, 1959: 4th Midwest Symposium on Circuit Theory, Marquette Univ., Milwaukee, Wisc.

Dec. 1-3, 1959: Eastern Joint Computer Conference, Statler Hotel, Boston, Mass.

Dec. 7-9, 1959: Cooperating Users Exchange (CUE) Meeting, (users of Burroughs 220), Statler Hotel, St. Louis, Mo.

Feb. 25-26, 1960: Univac Users Association Semi-Annual Meeting, Greenbrier Hotel, White Sulphur Springs, W. Va.

March 21-24, 1960: IRE National Convention, Coliseum and Waldorf Astoria Hotel, New York, N.Y.

April 18-19, 1960: Third Annual Conference on Automatic Techniques, Cleveland-Sheraton Hotel, Cleveland, Ohio.

May 2-6, 1960: Western Joint Computer Conference, San Francisco, Calif.

August 23-25, 1960: Annual Meeting of the Association for Computing Machinery, Marquette Univ., Milwaukee, Wisc.

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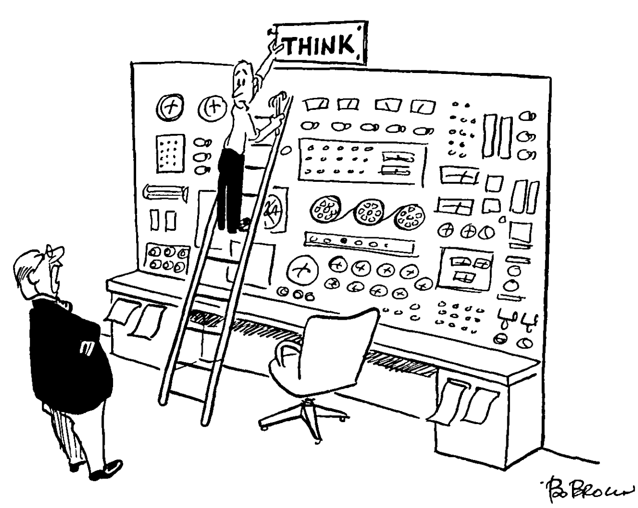

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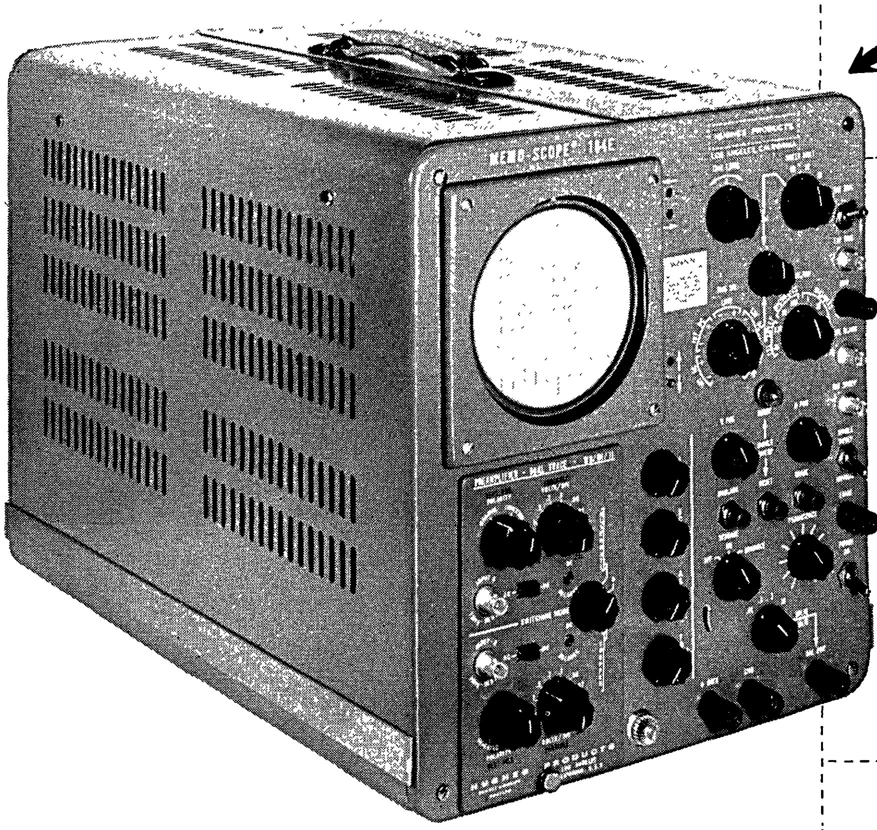

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Building-Block Circuits for Transistorized Digital Computers / C. J. Creveling and others, (Staff Group of the Electronics Div.), U.S. Naval Res. Lab., Washington, D.C. / Electronic Design, vol. 7, no. 18, Sept. 2, 1959, p 18 / Hayden Pub. Co., Inc., 830 Third Ave., New York 22, N.Y.

This article offers an aid to the computer design engineer, by presenting several key building-block circuits. The circuits were originally designed for a unit computing at a 500 kc rate with logic performed in one micro-second wide synchronized pulse positions; but it can serve as a guide for the design of other computer systems.

Data Storage and Display with Polarized Phosphors / H. P. Kallman and J. Rennert, Physics Dept., Institute of Mathematical Sciences, New York University, New York / Electronics, vol. 32, no. 35, Aug. 28, 1959, p 39 / McGraw-Hill Pub. Co., Inc., 330 West 42 St., New York 36, N.Y.

Used in computers as well as photography, a system known as "persistent internal polarization" stores data on a phosphor. The process produces a separation of charges with d-c fields and radiation, and provides longer storage life in the memory of the computer.

Automatic Programming in the Soviet Union / A. P. Ershov, Chief, Theoretical Programming Dept., Computing Center, Academy of Sciences of the USSR; as related to E. J. Guerin, European Editor, Datamation / Datamation, vol. 5, no. 4, July-August, 1959, p 14 / Datamation, 10373 W. Pico Blvd., Los Angeles 64, Calif.

This article describes early coding methods developed in Russia and applied to Soviet computers. Various schemes are given, and arithmetic, logical readdressing, restoring and double-counting operators are included.

Analog-Digital Converters, Part III / Electromechanical Design, vol. 3, no. 8, Aug., 1959, pp 27-33 / Benwill Publishing Corp., 1357 Washington St., West Newton 65, Mass.

The performance characteristics of the converters are described. Tables are given, which list the commercially available types; however, as is stated at the outset, the scope of the report is limited strictly to converters, excluding digital voltmeters which constitute a particular class of converter with visual read-out.

Progress in Computers and Office Automation / V. J. Ford, Regional Mgr., Electrodata Div., Burroughs Corp., Detroit / Journal of Machine Accounting, vol. 10, no. 8, Aug., 1959, p 14 / National Machine Accountants Assn., 720 Kensington Rd., Arlington Heights, Ill.

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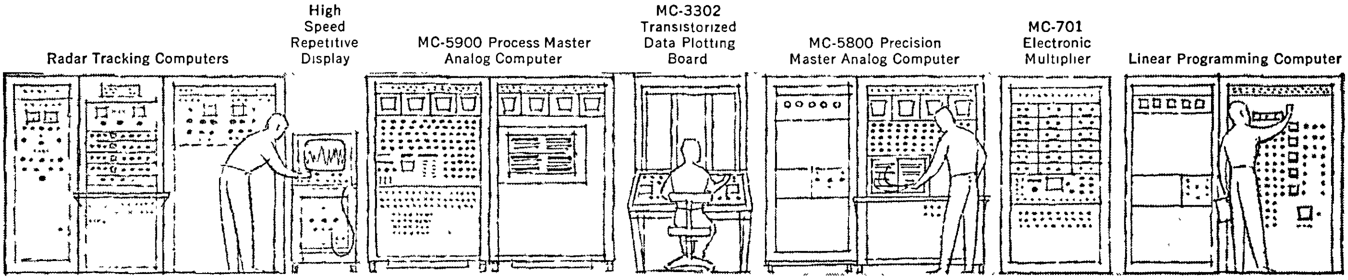

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progress in the industry and reveals some interesting applications of computers.

The Use of Univac in Processing and Analyzing Origin-Destination Data for the Washington, D.C., Metropolitan Area / Dr. E. E. Blanche, Chief Res. Scientist, E. E. Blanche & Associates, Inc. / Journal of Machine Accounting, vol. 10, no. 8, Aug., 1959, p 26 / NMAA, 720 Kensington Rd., Arlington Hts., Ill.

The use of high-speed computers have made possible the design of systems which save time and accurately process origin-destination data. The article describes the operation of the system, giving examples of actual data processed by computer.

Showcase Your Computer! / E. Whitmore / Management and Business Automation, vol. 2, no. 1, July, 1959, p 18 / The Office Appliance Co., 600 W. Jackson Blvd., Chicago 6, Ill.

This article questions the wisdom of executives who seem to "soft-pedal" their company's use of automation, and points to a large stock advising firm, which attempts to publicize their computer installation, and informs their customers and employees of the benefits to be derived from electronic data processing.

Machine Translation of Russian / C. H. Johnson, Editor, Journal of Machine Accounting / Journal of Machine Accounting, vol. 10, no. 8, Aug., 1959, p 100 / NMAA, 720 Kensington Rd., Arlington Hts., Ill.

The National Bureau of Standards has been studying the problem of translating languages by computer. This article describes a process which resulted from experiments in translation. The process goes beyond word-to-word translation, taking into account grammatical, syntactical and lexicological properties of the words.

English Abstracts of Russian Technical Journals / Publications, and Public Information Div., Office of Technical Services, U.S. Dept. of Commerce, Washington 25, D.C. / 1959, printed, (5" by 8" card form on card stock), cost: see below

A listing of the numerous abstracts available, has been issued by the OTS. Listed according to subject — aeronautics, astronomy and mathematics, chemistry and chemical engineering, civil engineering, electrical engineering, fuel and power, geography and geology, mechanical engineering, mining and metallurgy, physics, science and technology-general — single issue prices and subscription rates are given.

Governor's Island File Computer / L. Feidt / Computing News, vol. 7, no. 16, Aug. 15, 1959, pp 155-3 / Computing News, P.O. Box 90424, Airport Station, Los Angeles 45, Calif.

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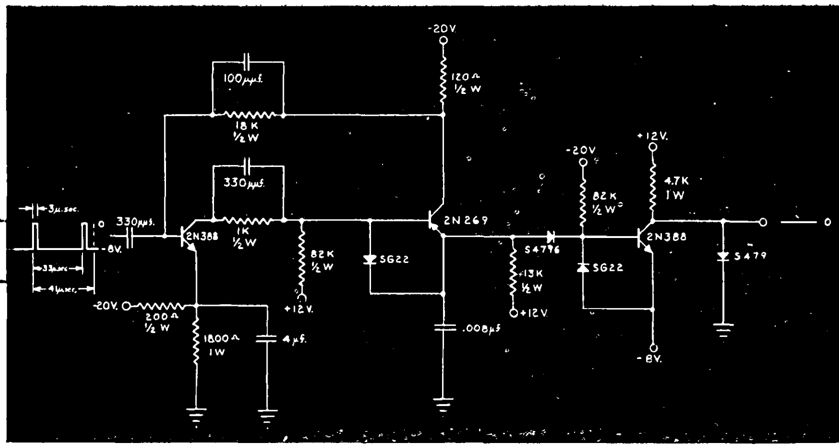

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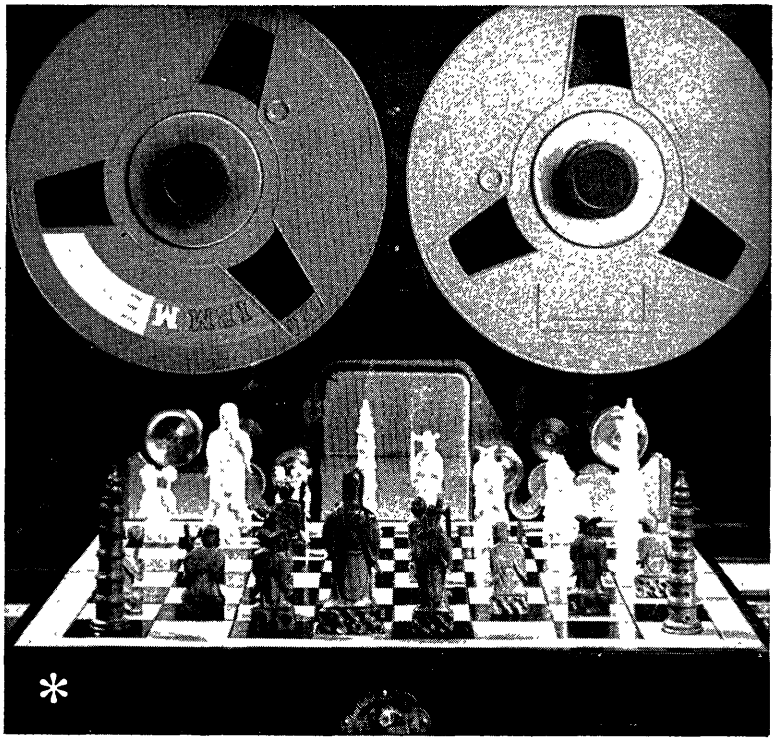

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*Final position in the famed simultaneous exhibition at Pernau, 1910: Nimzovich (white) vs Ryckhoff (black).

article describes the functions to be controlled by the computer, and illustrates the economy and efficiency of the system.

The Real Pushbutton War / M. Carasso / Journal of Machine Accounting, vol. 10, no. 7, July, 1959, pp 7-12 / National Machine Accountants Assn., 720 Kensington Rd., Arlington Hts., Ill.

Computers which have decision-making ability, will be used to control the mobilization of the U.S., if the "cold" war becomes "hot." Electronic data processing will perform a mass of calculations to direct industry in the mobilization. This article describes a number of computer systems which are performing functions similar to the wartime operation. A hypothetical control system is discussed — "MADCAP", or, Mobilization Analyzer for Determination and Control of Allocations and Priorities.

GE's 704-709 Provides a Dynamic Computer Approach to Business Measurements / A. Keller, Mgr., Operations Research and Synthesis, General Electric / Journal of Machine Accounting, vol. 10, no. 7, July, 1959, p 17 / NMAA, 720 Kensington Rd., Arlington Hts., Ill.

This article discusses a 704/709 computer program aimed at an integrated solution to the total business numbers Problem in General Electric's Medium Steam Turbine, Generator, and Gear Dept. The system will be used for scheduling, ordering, accounting, engineering design calculations, and payrolls, among other applications. The article includes examples of information which the computer furnishes.

Developing Mathematical Models for Computer Control / Dr. D. B. Brandon, Thompson - Ramo - Wooldridge Prods. Co., Los Angeles, Calif. / ISA Journal, vol. 6, no. 7, July, 1959, p 70 / Instrument Society of America, 313 Sixth Ave., Pittsburgh 22, Pa.

This paper describes a method which has been successfully used in designing mathematical models used in the development of computer control systems for processes. The paper emphasizes the interesting fact that the required equations can be written for many incompletely understood processes.

"Fortransit," A Universal Automatic Coding System for the IBM 650 / B. C. Borden, Applied Science Representative, IBM / Journal of Machine Accounting, vol. 10, no. 7, p 44 / NMAA, 720 Kensington Rd., Arlington Hts., Ill.

This paper deals with automatic programming in general, defining a number of terms which are used in the "Fortransit" system. It includes as well, a review of "Fortran," and an introduction to "Fortransit," the automatic coding system for the IBM 650. It is hoped that the new system will eliminate many delays that present programming methods cause.

WHO'S WHO IN THE COMPUTER FIELD

(Supplement)

A full entry in the "Who's Who in the Computer Field" consists of: name / title, organization, address / interests (the capital letters of the abbreviations are the initial letters of Applications, Business, Construction, Design, Electronics, Logic, Mathematics, Programming, Sales) / year of birth, college or last school (background), year of entering the computer field, occupation / other information such as distinctions, publications, etc. An absence of information is indicated by - (hyphen). Other abbreviations are used which may be easily guessed like those in the telephone book.

Every now and then a group of completed Who's Who entry forms come in to us together from a single organization. This is a considerable help to a compiler, and we thank the people who are kind enough to arrange this. In such cases, the organization and the address are represented by . . . (three dots).

Following are several sets of such Who's Who entries.

Burroughs Corp., ElectroData Div., 460 Sierra Madre Villa, Pasadena, Calif.

Brown, Leland W / Electronic Engr, . . . / A, punched card perif equip / '22, Univ of Ark, '50, engr

Canova, G M / Assoc Engr, . . . / ADEL / '30, CIT, '54, electronic engr / Research Asst, E E Dept, Caltech '58-59

Lindley, P L / Mgr, Spec Products Engrg Sec, . . . / ACDEL / '22, Ohio Wesleyan Univ, Purdue Univ, '47, electronic engr / M.S. Thesis "Magnetic Recording for Digital Compr Memory," Member Sigma Xi, RESA

Reaction Motors Div., Thiokol Chemical Corp., Ford Rd., Denville, N.J.

Behar, Joseph / Sr Prgmr, . . . / ALMP / '32, CCNY, NY Univ, '57, apld mathn

Morrill, Duncan E / Supv, Compr Aplns Unit, . . . / AMP / '28, Univ of Miss, '54, mathn

Robinson, Richard / Jr Prgmr, . . . / AMP / '34, Farleigh Dickinson Univ, '58, mathn

Shell Oil Co., Midland Area, PO Box 1509, Midland, Texas

Anstine, L. Paul / prgmr, . . . / ABP / '25, Hastings Coll, '57, data procg accnt

Bailey, Joe A / prgmr, . . . / ALMP / —, Texas Univ, — , systems analyst

Fragapane, Lou C / prgmr, . . . / ABMP / '30, Pitt, Penn State, '56, mathn

Gant, William T / Chief, Data Processor, . . . / ABDELMP / '27, Okla State, '51, data procg

Hutto, J. Merrell / Supt of Machines, . . . / ABP / '20, Hardin Simmons, '58, machine operator

Romberg, F. Arnold / prgmr, . . . / ABDLMP / '34, Rice, Harvard, '57, mathn

Shaner, Douthea E / prgmr, . . . / ALP / '34, Texas Christian Univ, '57, prgmr

Thompson, Warren L / prgmr, . . . / AMP / '19, L S U, '54, analyst

Tool, Myrtle A / prgmr, . . . / AIMP / '29, Central State, Okla Univ, '57, mathn

Wagner, Harry H / prgmr, . . . / ABP / '24, Univ of Nebr, '53, data proc accnt

Rechenzentrum der Rhein, Westf. Technischen Hochschule, Krämerstrasse 20-34, Aachen, Germany

Haupt, Dieter / Diplom-Mathematiker, . . . / ACLMP / '28, Rheinisch-Westfälische Technische Hochschule Aachen, '56, math prgmg

Moeskes, Max / Diplom-Ingenieur, . . . / ACDELMP / '30, Rheinisch-Westfälische Technische Hochschule Aachen, '57, devt, prgmg, math

Bryant Computer Products Division, P.O. Box 620, Springfield, Vt.

Ashbridge, Jr, G Harry / Mgr, Prod Planning, . . . / ABES / '29, Ill Inst of Tech, '55, electronics engr-bus mgr / Triangle, RESA

Casey, James P / Asst Sales Mgr, . . . / S / '28, Brown Univ, '58, sales engr

Cheney, George D / design engr, . . . / D / '30, MIT, mech engr

Foley, Tim / Western Sales Mgr, . . . / S / '28, Seton Hall Univ, '50, sales engr

Forand, Joseph / Sales Engr, . . . / BS / '29, Norwich Univ, '58, sales engr

Foster, Theodore C / Electronic Components Dept Foreman, . . . / A, mfg / '33, Northeastern Univ, '56, ind engr

Francois, Alex C / Circuit Designer, . . . / DEL / '26, Fairleigh Dickinson Univ, —, electronic engr

Karpin, Jay H / Devt Engr, . . . / D / '24, I.C.S., '58, tool engr

Lohan, Frank J / Sr Devt Engr, . . . / ELM / '29, Drexel Inst of Techn, '50, devt engr

Mitchell, Darrell L / Supv of Engrg Stds & Design, . . . / D / '22, Univ of N.H., '55, mech engr

Pozner, W S / Prodn Mgr, . . . / C / '18, Pratt Inst, '55, mfg engr

Quick, Lloyd S / Supv of Assy & Test, . . . / Assy & testing of memory systems / '32, Cornell Univ, '57, mechl engr

Ripley, Merton L / Chief Designer, . . . / D / '29, Dunwoody Inst, '56, designer

Ramon, Ray J / Midwest Sales Mgr, . . . / ADELS / '24, Northwestern Univ, '47, component design; sales

Smith, Joseph E / Genl Mgr, . . . / ABCDS, electro-mech & magnetic memory systems, electro-mechl peripheral eqpm / '21, Lehigh Univ, '55, mngt / several patents on electro-mechl file

Smith, Prentiss L / Sales Mgr, . . . / ABDES / '22, Norwich Univ, '56, sales

Spahr, J. Alan / Sales Engr, . . . / AS / '34, MIT, '57, sales engr

Stover, Richard A / Chief Engr, . . . / comp design / '29, Univ of Maine, '56, mechl engr

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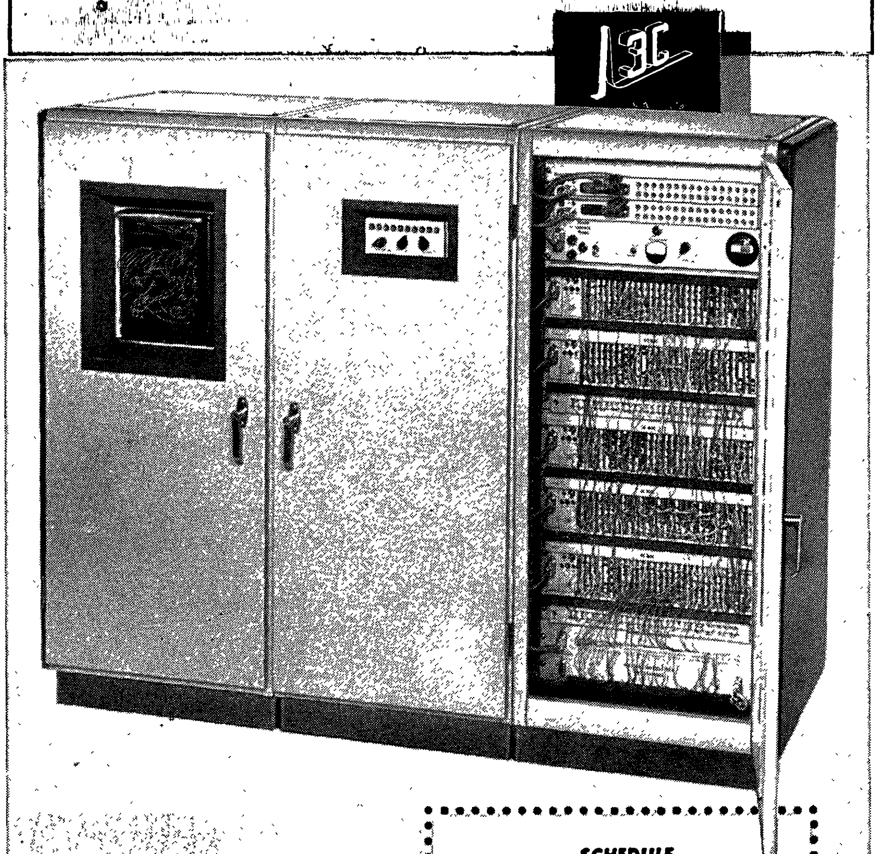

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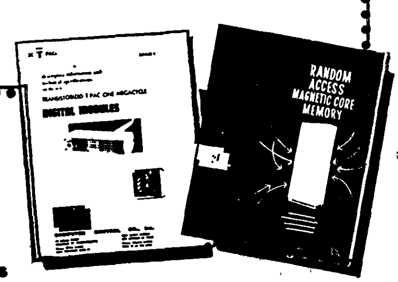

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Reg. Patent Agent
Ford Inst. Co., Div. of Sperry Rand Corp.
Long Island City 1, New York

THE following is a compilation of patents pertaining to computers and associated equipment from the "Official Gazette of the United States Patent Office," dates of issue as indicated. Each entry consists of: patent number / inventor(s) / assignee / invention. Printed copies of patents may be obtained from the U.S. Commissioner of Patents, Washington 25, D.C., at a cost of 25 cents each.

June 2, 1959 (cont'd):

2,889,543 / Erich Block, Poughkeepsie, N.Y. and Robert C. Paulsen, Boonton, N.J. / International Business Machines Corp., New York, N.Y. / A magnetic not or circuit.

June 9, 1959: 2,890,439 / Raymond Bird, Letchworth, and Brian Taylor, Wiltshire, Eng. / The British Tabulating Machine Co., Lim., London, Eng. / A data storage apparatus made up of a matrix of storage devices.

2,890,441 / Simon Duinker, Eindhoven, Netherlands / North American Philips Co., Inc., New York, N.Y. / A magnetic memory Device.

June 16, 1959: 2,890,829 / J. R. Logan, Norristown, Pa. / Sperry Rand Corp., a corp. of Del. / A logical binary Powering circuit.

2,890,830 / W. Letchworth, Eng. / The British Tabulating Machine Co., Lim., London, Eng. / An electronic adder apparatus with sum radix correction means.

2,890,831 / Ralph Townsend, Letchworth, Eng. / The British Tabulating Machine Co., Lim., London, Eng. / A serial adder with radix correction.

2,891,237 / Robert L. Sink, Altadena, and Glyn A. Neff, Pasadena, Calif. / A data processing apparatus.

2,891,238 / David L. Nettleton, Haddonville, N.J. / Radio Corp. of America, a corp. of Del. / A memory system.

June 23, 1959: 2,891,723 / Edward A. Newman, Teddington, Donald W. Davies, Southsea, and David O. Clayden, Heston, Eng. / National Research Development Corp., London, Eng. / A programmed control means for data transfer apparatus.

2,891,724 / Otto P. Fuchs, Haverford, Pa., and Horst Kottas, Vienna, Austria / ——— / An automatic apparatus for transforming statistical or stochastical functions.

2,891,725 / Irwin S. Blumenthal, Manhattan Beach, Ross M. Chiles and Chester W. Larsen, Jr., Inglewood, and Kenneth M. Stevenson, Jr., Palos Verdes, Calif. / Northrop Corp., Hawthorne, Calif. / A reset integrator.

2,891,726 / Richard O. Decker, Murrysville, and Kan Chen, Wilkinsburg, Pa. / Westinghouse Electric Corp., East Pittsburgh, Pa. // A four quadrant analog multiplier circuit.

2,891,727 / Paul Kaufman, Deal, N.J. / ——— / An analogue device for computing the numerical value of the standard deviation of a given set of numerical values.

2,891,728 / Nick A. Schuster, Ridgefield, Conn. / Schlumberger Well Surveying Corp., Houston, Tex. / An electronic computing apparatus for computing a root or a power of the ratio of two quantities.

2,892,084 / Dwight D. Wilcox, Jr., Los Altos, Calif. / U.S.A. as represented by the Sec. of the Navy / A pulse gating circuit.

2,892,103 / Alfred D. Scarborough, Los Angeles, Calif. / Thompson Ramo Wooldridge, Inc., Cleveland, Ohio / Gating circuits for electronic computers.

2,892,147 / Morton W. Bell, Monrovia, Calif. / Consolidated Electro-dynamics Corp., Pasadena, Calif. / A digital-to-analog converter.

June 30, 1959: 2,892,587 / John V. Blankenbaker, Los Angeles, Calif. / Hughes Aircraft Co., a corp. of Del. / An arithmetic unit for performing an operation of addition or subtraction upon binary-coded decimal numbers represented by electrical input signals.

2,892,588 / Frederic C. Williams, Timperley, Tom Kilburn, Davyhulme, Manchester, and Arthur A. Robinson, Scunthorpe, Eng. / International Business Machines Corp., New York, N.Y. / A multiplying arrangement for digital computing machines.

2,892,589 / Robert T. Blakely, Poughkeepsie, N.Y. and Dorval C. Sprong, Long Beach, Calif. / An electronic accumulator.

2,892,590 / Joseph R. Esher, Jr., Schenectady, N.Y. / General Electric Co., a corp. of N.Y. / An apparatus for generating a trigonometric function and multiplying by a D.C. voltage.

July 7, 1959: 2,893,636 / Herman D. Parks, Schenectady, N.Y. / General Electric Company, a corp. of N.Y. / A network for effecting mathematical multiplication.

2,894,151 / Louis A. Rusell, Poughkeepsie, N.Y. / International Business Machines Corp., New York, N.Y. / A magnetic core inverter circuit.

2,894,253 / Lawrence R. Peaslee and Murray Rosenblatt, Waynesboro, Va. / General Electric Co., a corp. of N.Y. / A selsyn exciter for positioning programming control systems.

2,894,254 / Raymond P. Mock, Needham Heights, Mass. / Raytheon Co., a corp. of Del. / A conversion of binary coded information to pulse pattern form.

July 14, 1959: 2,894,686 / Thomas G. Holmes, Melbourne, Fla. / ——— / A binary coded decimal to binary number converter.

2,895,124 / Ben A. Harris, Rochester, N.Y. / General Dynamics Corp., Rochester, N.Y. / A magnetic core data storage and readout device.

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July 21, 1959: 2,895,671 / Andrew St. Johnston, Buntingford, Eng. / International Business Machines Corp., New York, N.Y. / An electronic digital computing machine.

2,895,672 / Arthur H. Dickinson, Greenwich, Conn. / International Business Machines Corp., New York, N.Y. / An electronic multiplying system.

2,895,673 / Frederic C. Williams, Romiley, Eng. / National Research Development Corp., London, Eng. / A transistor binary adder.

2,895,783 / Samuel G. Cohen, Ossining, N.Y. / General Precision Lab., Inc., a corp. of N.Y. / A data correlator for correlating by serial numbering two data recorders emitting graphic and punched card records respectively of identical data.

2,896,193 / Richard C. Herrmann, Chicago, Ill. / Zenith Radio Corp., a corp. of Del. / A magnetic memory storage apparatus.

2,896,198 / Robert R. Bennett, Los Angeles, Calif. / Hughes Aircraft Co., a corp. of Del. / An electrical analog-to-digital converter.

July 28, 1959: 2,897,355 / Arnold Lesti, Arlington, Va. / International Standard Electric Corp., New York, N.Y. / A diode coincidence gate.

2,897,380 / Carl Neitzert, Morris County, N.J. / General Time Corp., New York, N.Y. / A magnetic pulse counting and forming circuit.

2,897,480 / Tom T. Kumagai, West Los Angeles, Calif. / Hughes Aircraft Co., Culver City, Calif. / An error detecting system.

2,897,482 / Milton Rosenberg, Santa Monica, Calif. / Telemeter Magnetics, Inc., a corp. of Calif. / A magnetic core memory system.

2,897,486 / Matthew A. Alexander and Raymond Stuart-Williams, Pacific Palisades, Calif. / Telemeter Magnetics, Inc., a corp. of Calif. / An analog-to-digital conversion system.

August 4, 1959: 2,898,040 / Floyd G. Steele, La Jolla, Calif. / Digital Control Systems, Inc., a corp. of Calif. / A computer and indicator system.

2,898,041 / Hubert J. Crawley, Beckenham, and Christopher Stracheg, London, Eng. / International Business Machines Corp., New York, N.Y. / An instruction modifier means for electronic digital computing machines.

2,898,043 / Robert A. Mathias, Pittsburgh, and Leo A. Finzi, Irwin, Pa. / U.S.A. as represented by the Sec. of the Navy / An electronic circuit for performing analytic operations.

2,898,460 / Morris J. Taubenslag and Edward G. May, Baltimore, Md. / U.S.A. as represented by the Sec. of the Navy / A D.C. Discriminator gating circuit.

2,898,578 / Floyd G. Steele, La Jolla, Calif. / Digital Control Systems, Inc., La Jolla, Calif. / A magnetic reading device for selectively passing an applied timing signal to either a first or second output terminal, respectively.

August 11, 1959: 2,899,133 / John G. Tryon, Chatham, N.J. / Bell Telephone Laboratories, Inc., New York, N.Y. / A serial binary computing circuit for adding or subtracting two binary numbers in which the digits of the numbers appear successively spaced by a predetermined time period.

2,899,134 / Yves Rocard, Paris, Fr. / Compagnie Generale de Telegraphie Sans Fil, a corp. of Fr. / An electrical analog computing system for solving ordinary and partial non-linear differential equations.

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ADVERTISING INDEX

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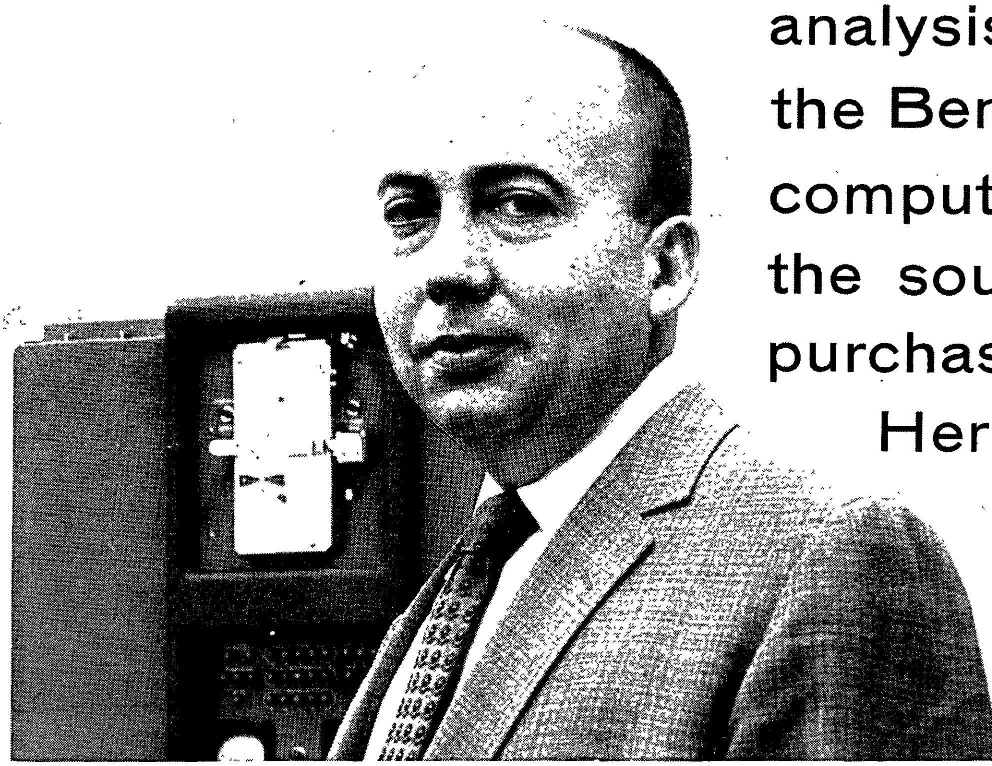

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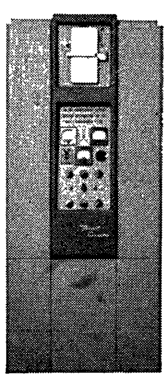

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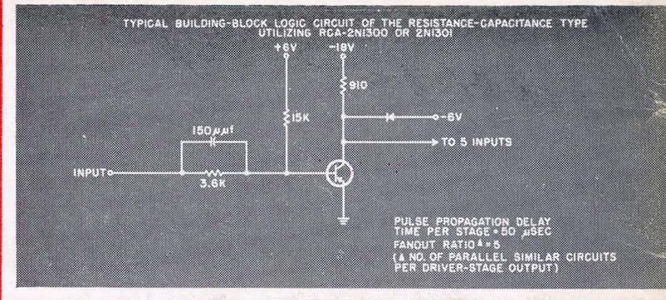

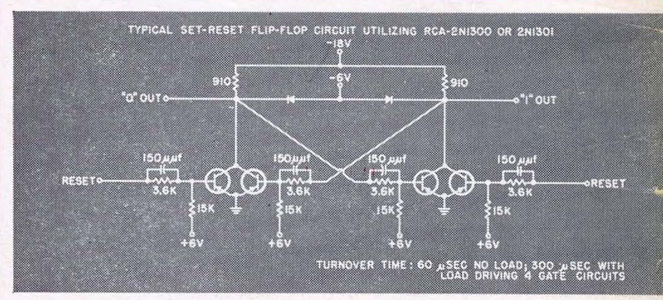

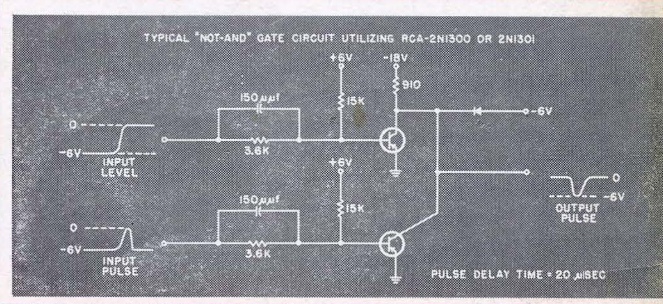

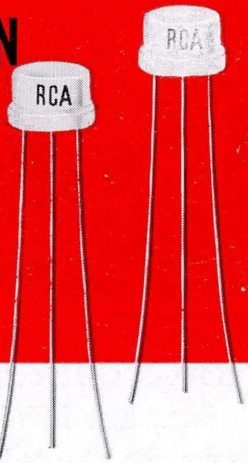

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					at 25°C	at 55°C	at 71°C	at collector ma = —10	at collector ma = —40	
2N1300	−13	−12	−1	−100	150	75	35	30	—	40
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