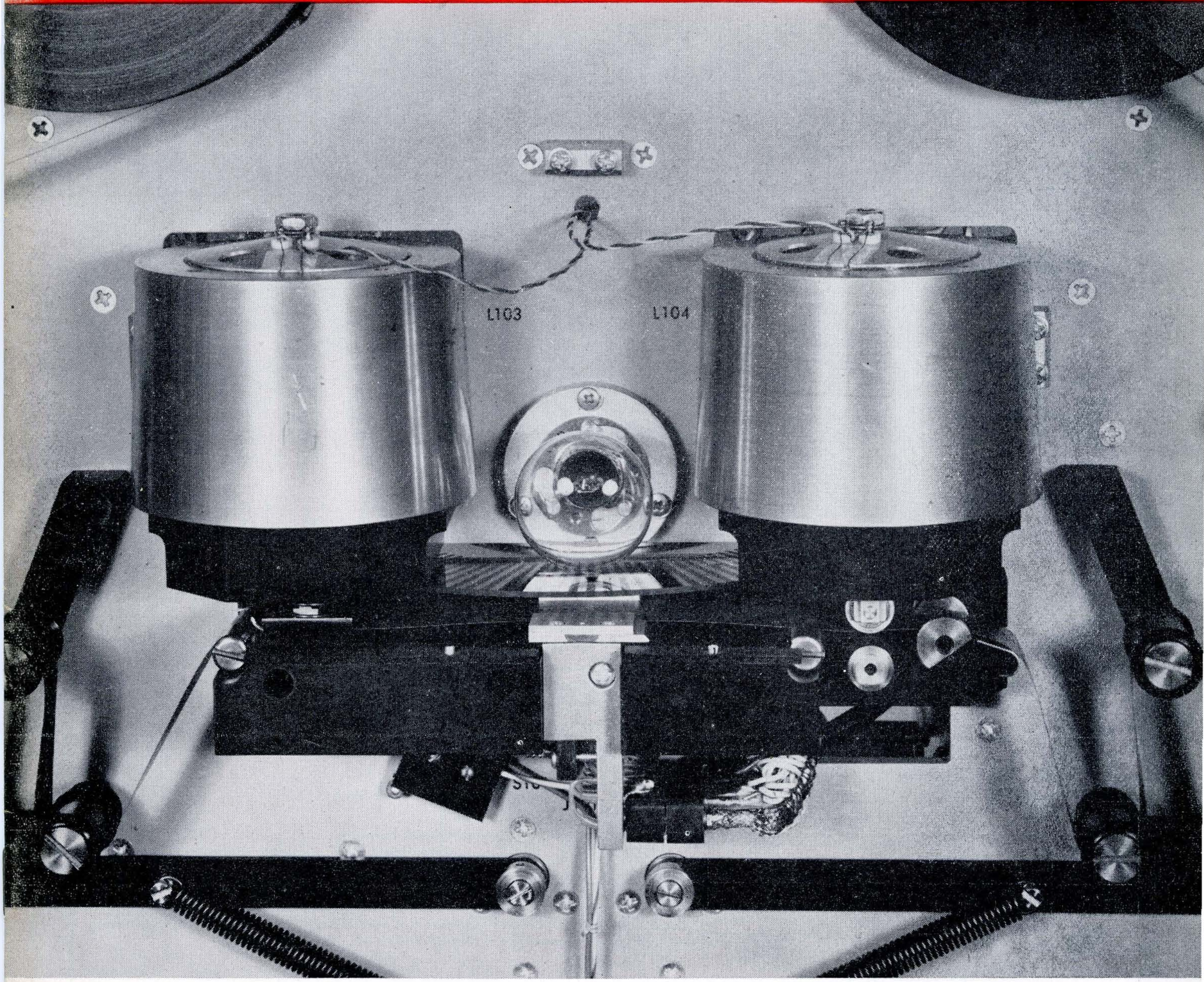
COMPUTERS
and AUTOMATION

DATA PROCESSING • CYBERNETICS • ROBOTS



DECEMBER
1958
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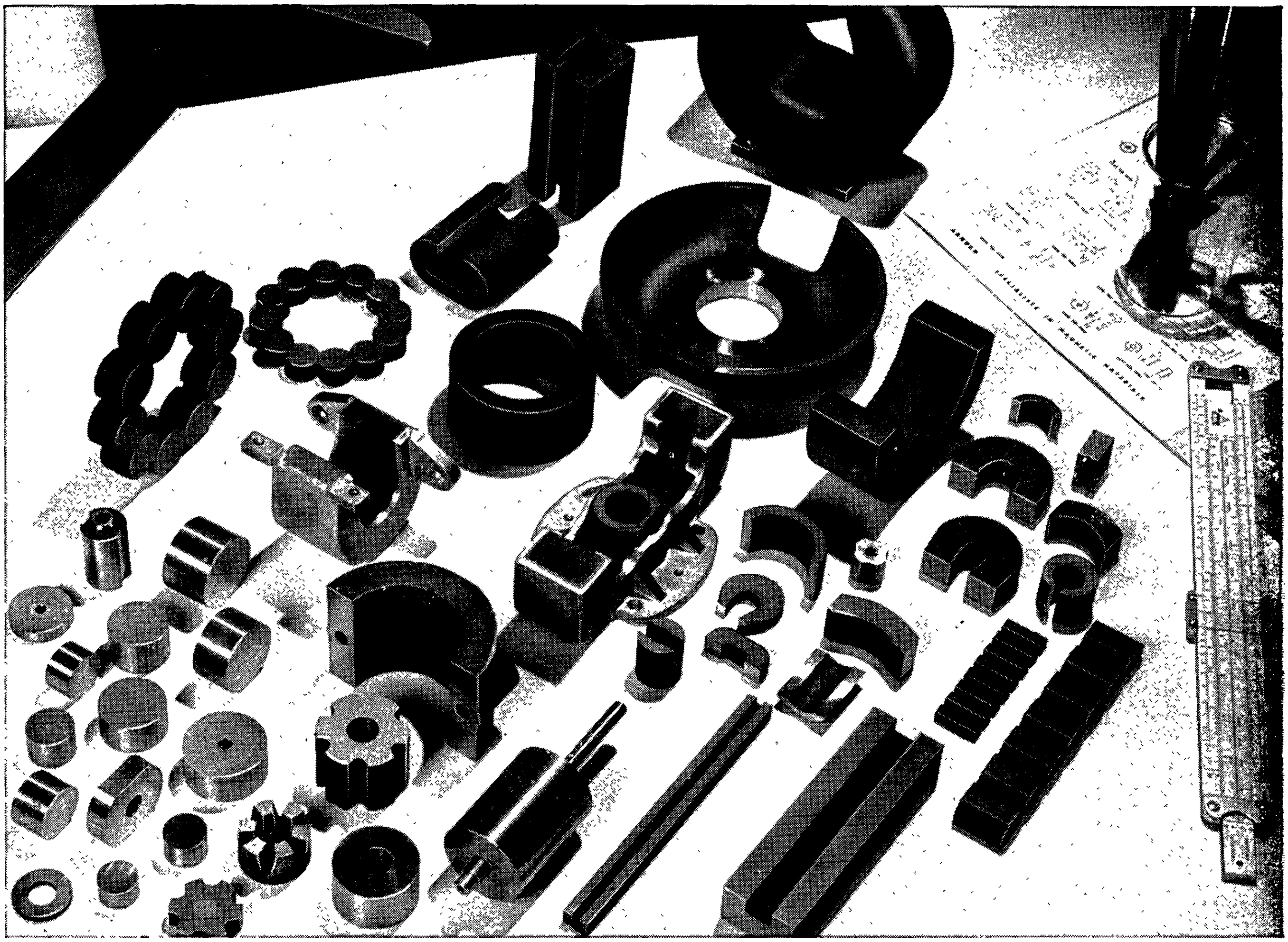
VOL. 7 - NO. 12

1958 PICTORIAL REPORT ON THE COMPUTER FIELD



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Volume 7
Number 12

DECEMBER, 1958

Established
September 1951

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Readers' and Editor's Forum

FRONT COVER: 1000 CHARACTERS PER SECOND

HOW CAN YOU read perforated paper tape at the rate of 1000 characters a second?

The front cover shows the inside of a Burroughs 220 Tape Photoreader, which does this. The lamp is the source of light; below it is a light chopper disc; still further below is the paper tape; and below that are the photodiode reading heads. This photoreader may be used with any computer or control system, but is a part of the Burroughs 220, made by Burroughs Electrodata Div., Pasadena, Calif.

ANNUAL INDEX IN JANUARY

As a result of a useful suggestion from a librarian, we shall no longer publish the annual index to **Computers and Automation** in the December issue, covering the twelve preceding months December to November. Instead, we shall publish the index in the January issue, covering the twelve preceding months January to December. To provide for the changeover, the index published in January 1958 will cover the issues of 13 months December 1957 to December 1958.

GREETINGS TO COMPUTERS

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

```
    M E R R Y                A
+     X M A S        +   S A N E
= W D W R W D        +     N E W
+       A N D        +   Y E A R
= W D A D E D        = W W X X Y
```

25092 71636 61959 23256 87628. (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 fifth December, remains unanswered so far as we know.

APPLICATIONS OF COMPUTERS TO A TEACHER'S PAPER WORK

L. Wayne Johnson
95 South Cedar St.
Battle Creek, Mich.

For several years now there have been many reports of applications of data processing equipment or computer mechanisms in fields of science, industry, business, and the military.

It seems to me there is another important area in our society where scientific advances do not reflect themselves as rapidly as they do in the just mentioned fields — and this is schools. School systems are more and more adopting modern business practices in the administration of their finances and personnel relationships among staff people, and some of the business applications of computing machinery are readily transferable to a school system's accounting and inventory uses. This is very creditable; but it seems to me a much larger area of application, and one more to the advantage of our educational system, would be down at the lower roots where students are first influenced: in the classrooms of the public elementary and high schools. If there were means by which the paper work of the teacher could be lessened, more time could be applied to performing the much more important psychological work of a teacher.

Now to get to the point of this letter. Have you any information, research, or references which explain applications of computing machinery towards (1) school report card systems, (2) analysis of grouping of students based on varied test results, (3) teaching aids or tools of instruction, (4) accumulative student school records, and any other specific or general classroom uses?

I would appreciate knowing of school systems which are presently employing or investigating the uses of computers on this type of data.

I also am interested in exploring the relative costs of general purpose computers on a rental basis to be employed in the above uses.

I shall appreciate any information your readers may be able to send me.

1958 Pictorial Report on the Computer Field

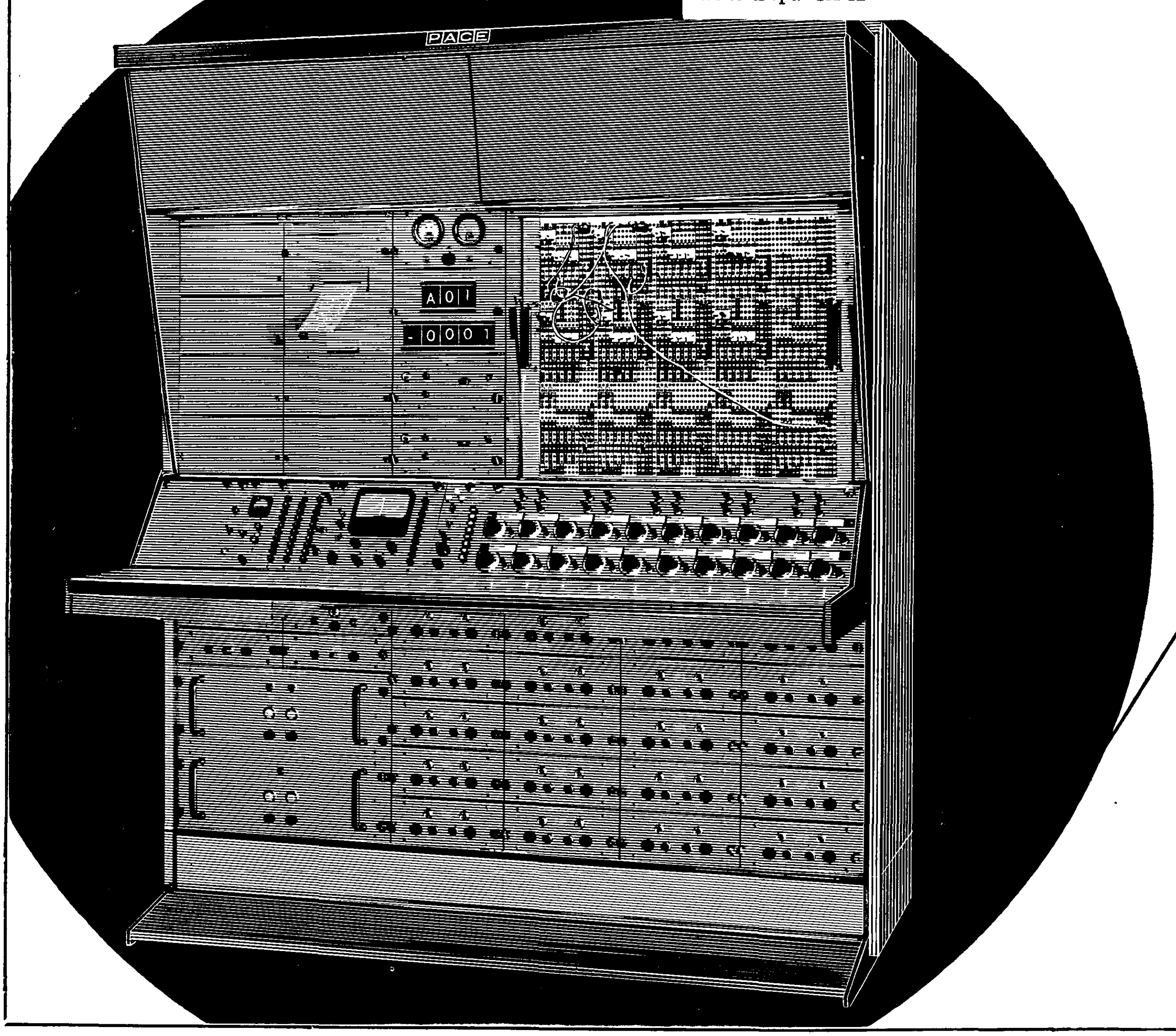
This is a pictorial report for 1958 on the computer field, including computers, data processors, components, etc. To put together this report, we sent out a letter to many organizations in the computer field, asking for:

interesting, striking, and dramatic pictures related to the computer field in 1958 — pictures that answer questions:

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

and similar questions.

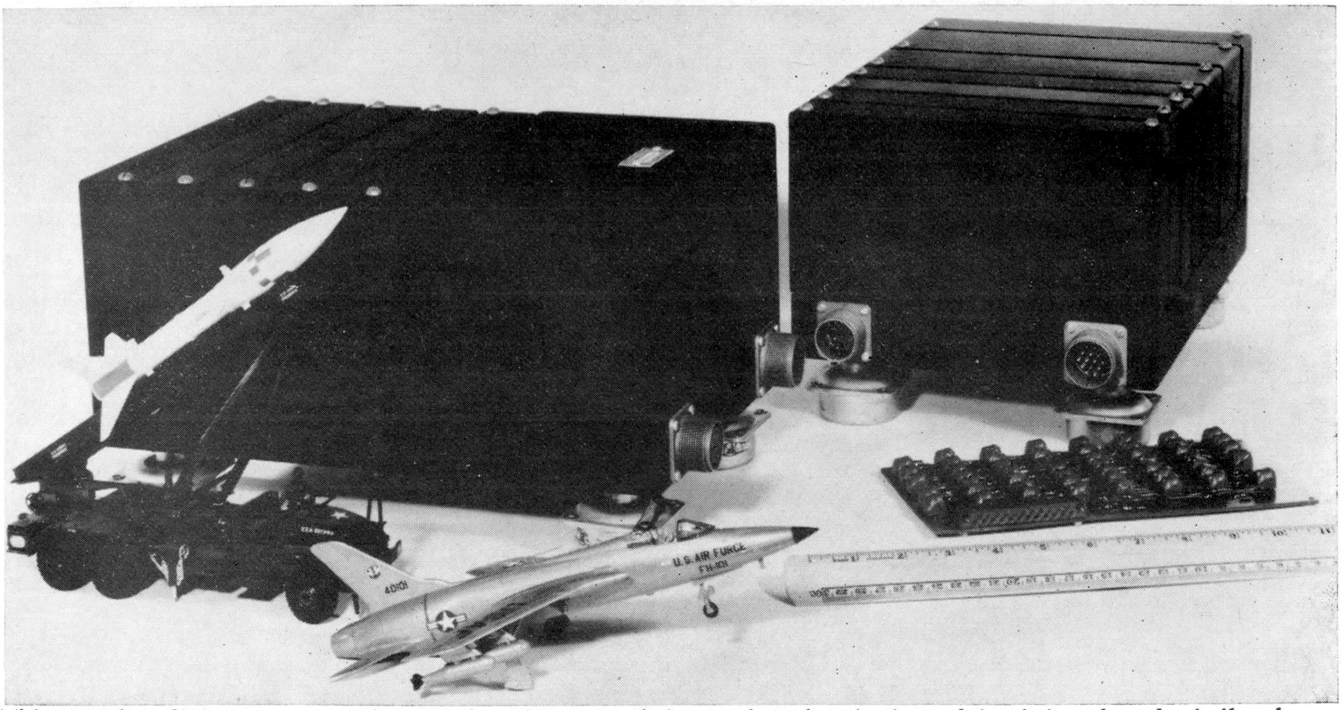
We said we wanted to avoid pictures that showed only "smooth and featureless outside coverings."


PACE
A01
-0001

A large number of good pictures have been sent to us, and we are very grateful for them. A number of them 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.

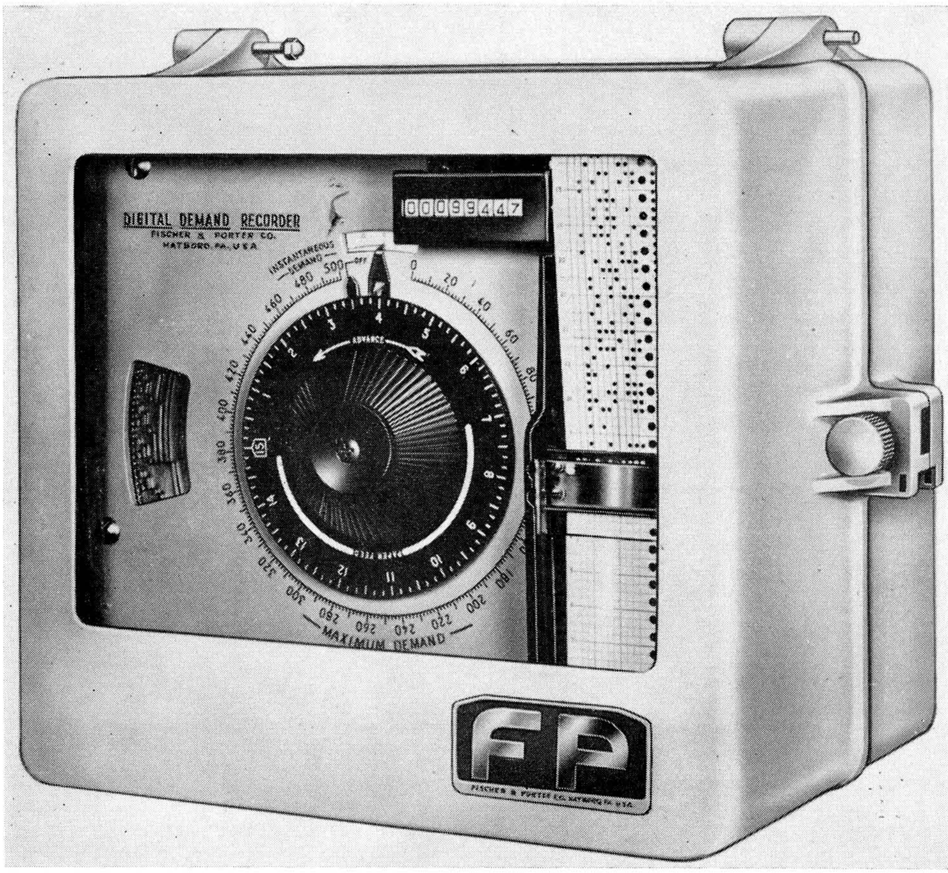
The present report is a continuation of our report a year ago "A Pictorial Manual on Computers." This was first printed in two parts, one in December 1957, the other in January 1958, and these issues were promptly exhausted; the two parts were then combined and reprinted as a special issue of "Computers and Automation," vol. 6, no. 12B, which is still in print.

Governor George M. Leader of Pennsylvania and M. N. Rand, executive vice president of Remington Rand Division of Sperry Rand Corp., talking together at a ceremony in Harrisburg on October 9, which opened the new data processing center of the State of Pennsylvania. This center is the first to be used by a State of the U.S. for all its departments. In the background is the large scale Univac electronic computer. (Figure 1)



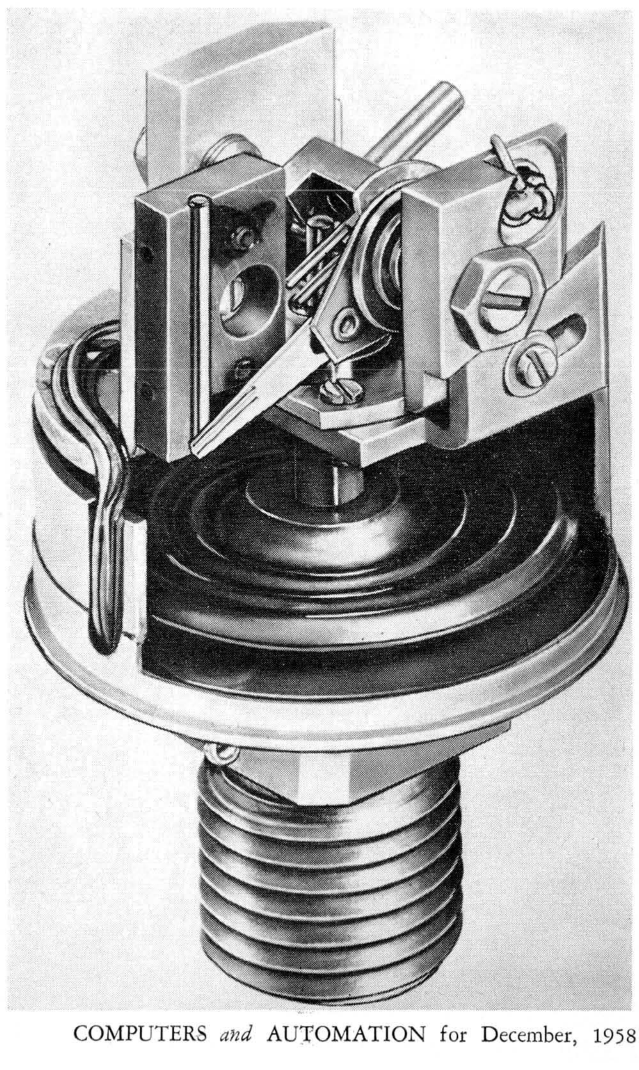
This complete digital computer above, although not much larger than the plastic models of aircraft and missiles shown, processes enough information to make a modern fighter-bomber nearly automatic. The computer is GEVIC, General Electric Variable Increment Computer; it was designed and developed by GE Light Military Electronics Department, Utica, N.Y. One of the circuit modules is also shown. (Figure 2)

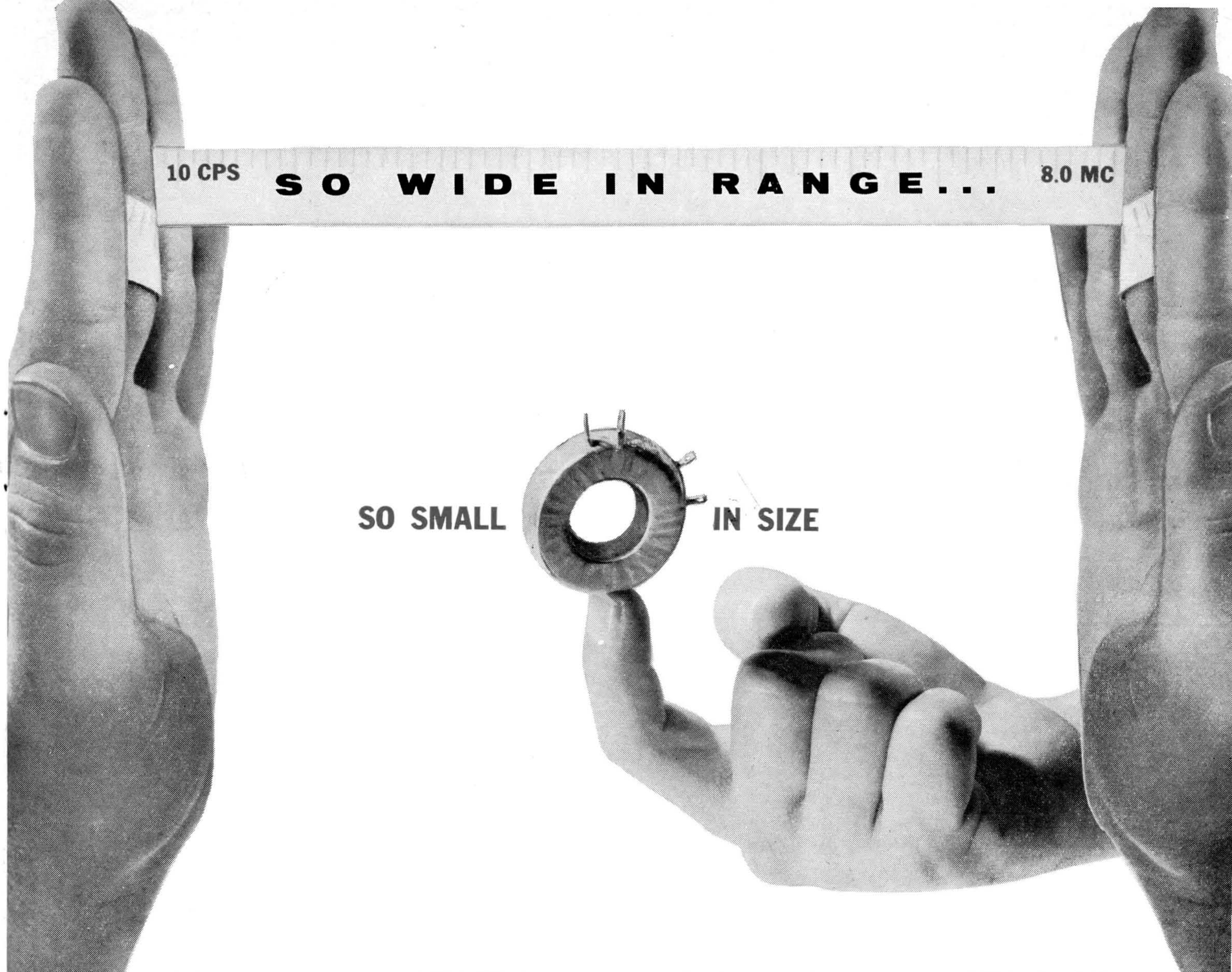
Below is a new paper tape reader, announced in November 1958, called the Bendix PR-2 Universal Paper Tape Reader, made by Bendix Computer Division, Los Angeles, Calif. It was developed for use with the Bendix G-15 General Purpose Digital Computer, and will accept 5, 6 or 7 level paper tapes in any numeric code. It reads photoelectrically at the rate of 400 characters per second and stops on 1 character. It provides input to the computer from tapes prepared by almost any type of on-line device, such as cash registers and point-of-sale recorders. (Figure 3)



How do you get input as a by-product of the operation of a production machine?—As each production operation is performed, an electrical impulse is transmitted to this device, made by Fischer and Porter Co., Hatboro, Pa. The device then counts the pulses, and at the end of each 5 minutes (or other set time), records the total in punched holes in paper tape. Also, a cumulative total of production operations is reported visually. The punched paper tape then becomes input to an automatic computer (Figure 4)

How does a pressure transducer work? — Here is the internal mechanism of a device which senses pressure changes in the range from 0 pounds up to 350 pounds per square inch, and translates the pressure into an electric output using a potentiometer. The movement of the capsule-like diaphragm is converted into the motion of a potentiometer wiper arm. This is a TP-100 made by Fairchild Controls Corp., Components Div., Hicksville, N.Y. (Figure 5)





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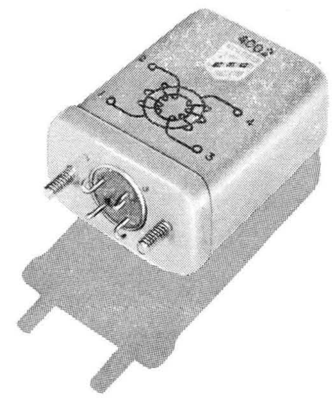

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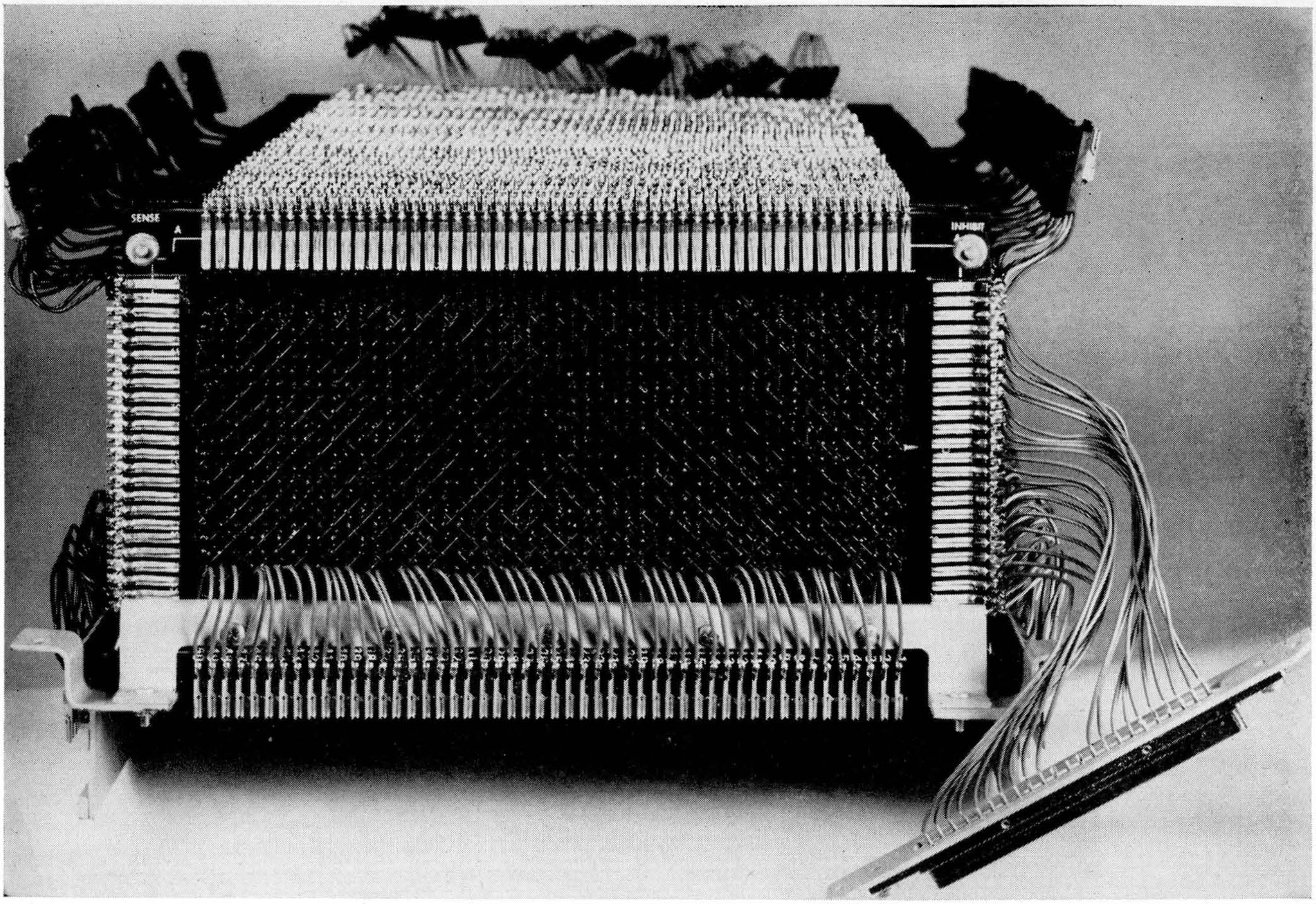
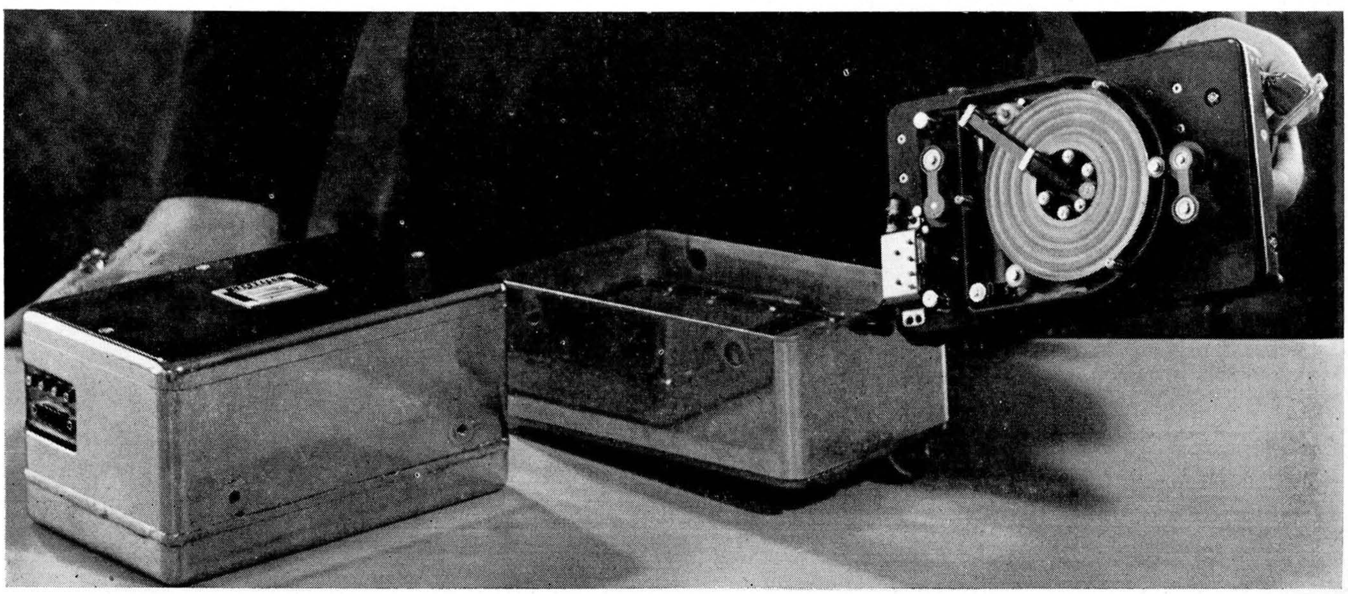
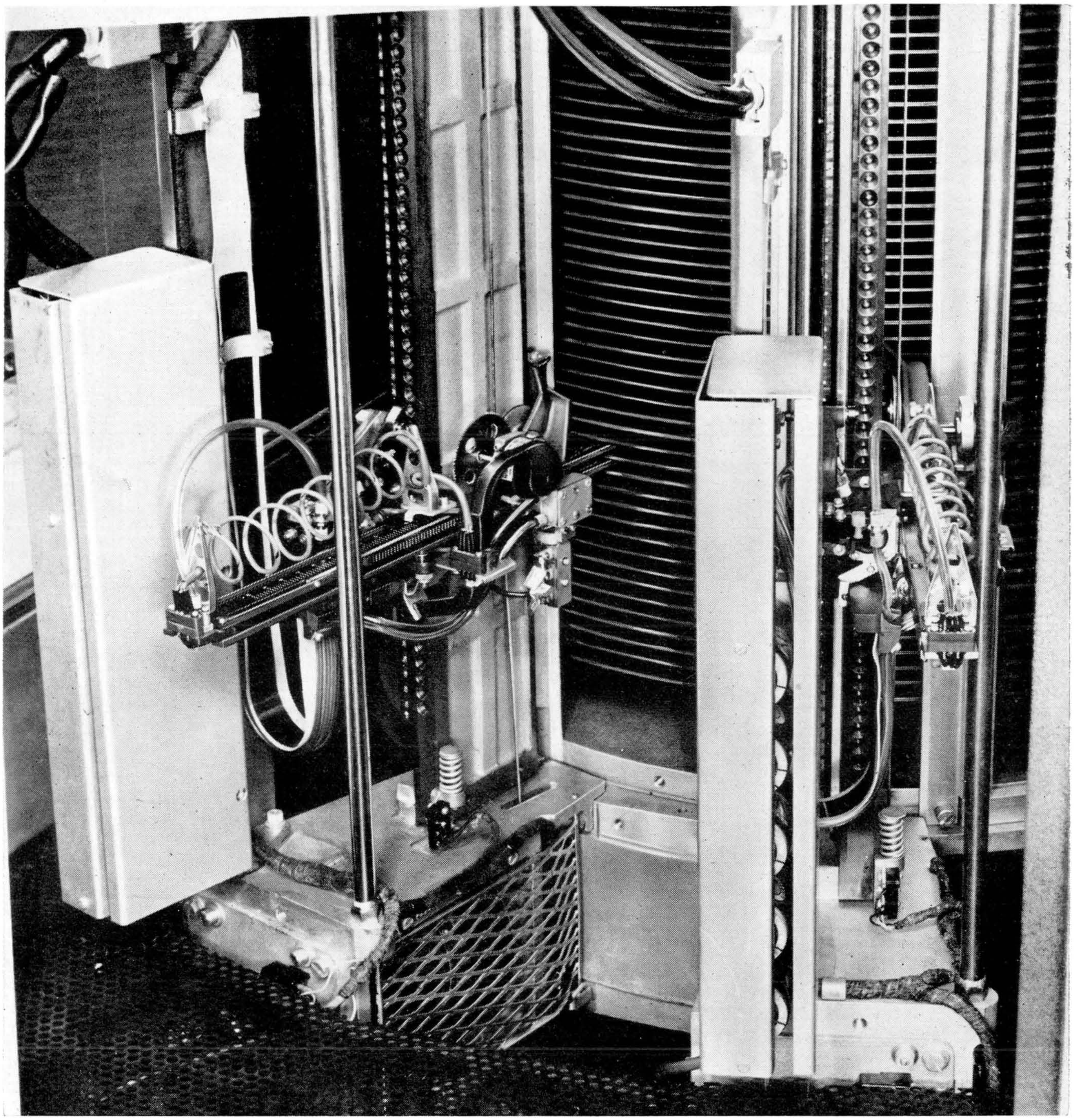


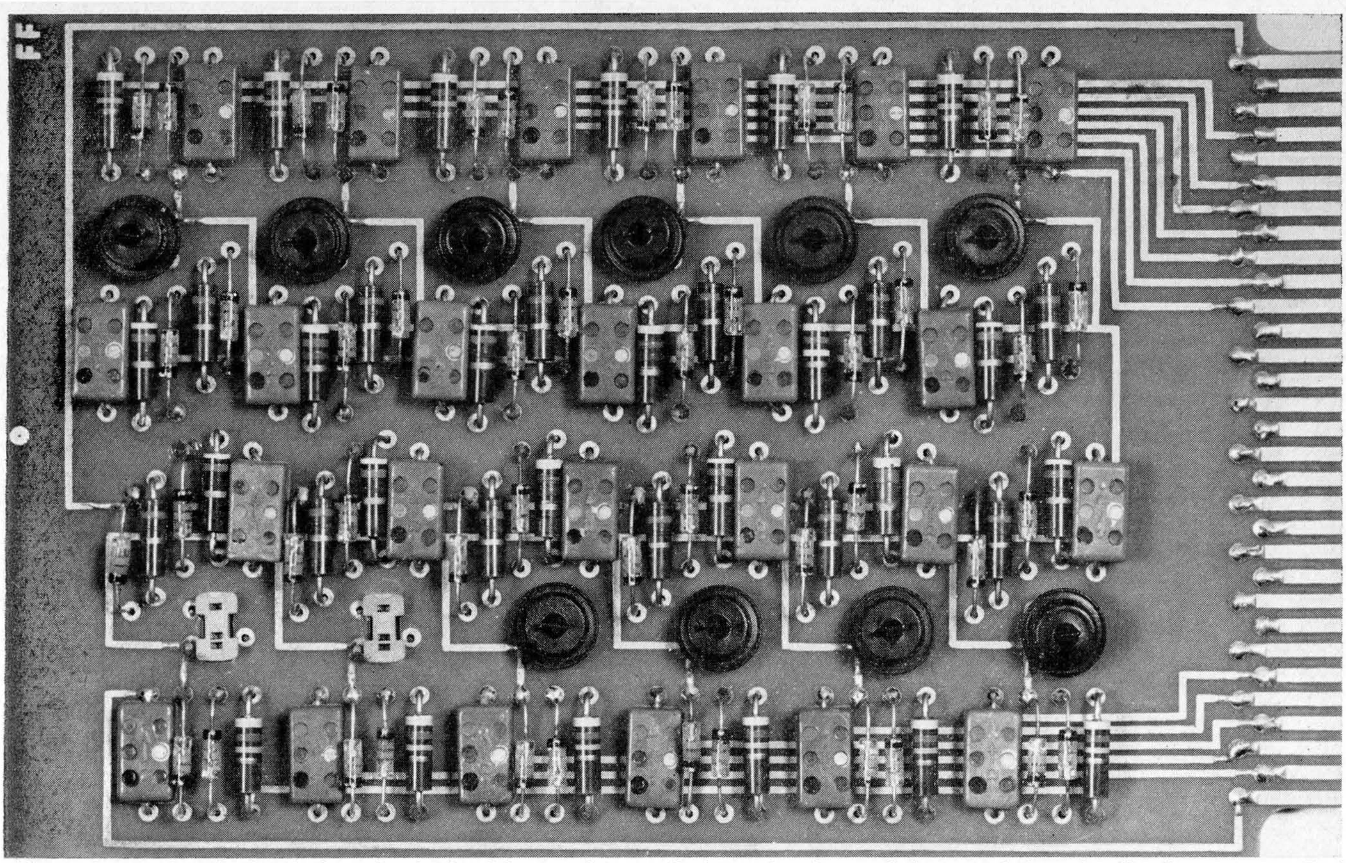
Here is a magnetic core quick-access memory used in a Burroughs 220 computer. In front is the first plane of 1000 tiny doughnut shaped cores. Behind it are 43 more just like it. The memory is entered in parallel by impulsing the same core position in each one of the 44 planes; access time is 10 microseconds. The memory is made by the ElectroData Division of Burroughs Corp., Pasadena, Calif. (Figure 6)

Below is a miniature tape recorder able to store 3 million pieces of scientific information; it is built with sufficient ruggedness to withstand 50 times the force of gravity. It was developed at Lockheed Missile Systems Division, Palo Alto, Calif. It can record and store data, and then on receiving a command signal, transmit it six times as fast. It weighs only 8 pounds; occupies 200 cubic inches; and requires only 10 watts of power for the entire electronic system. (Figure 7)



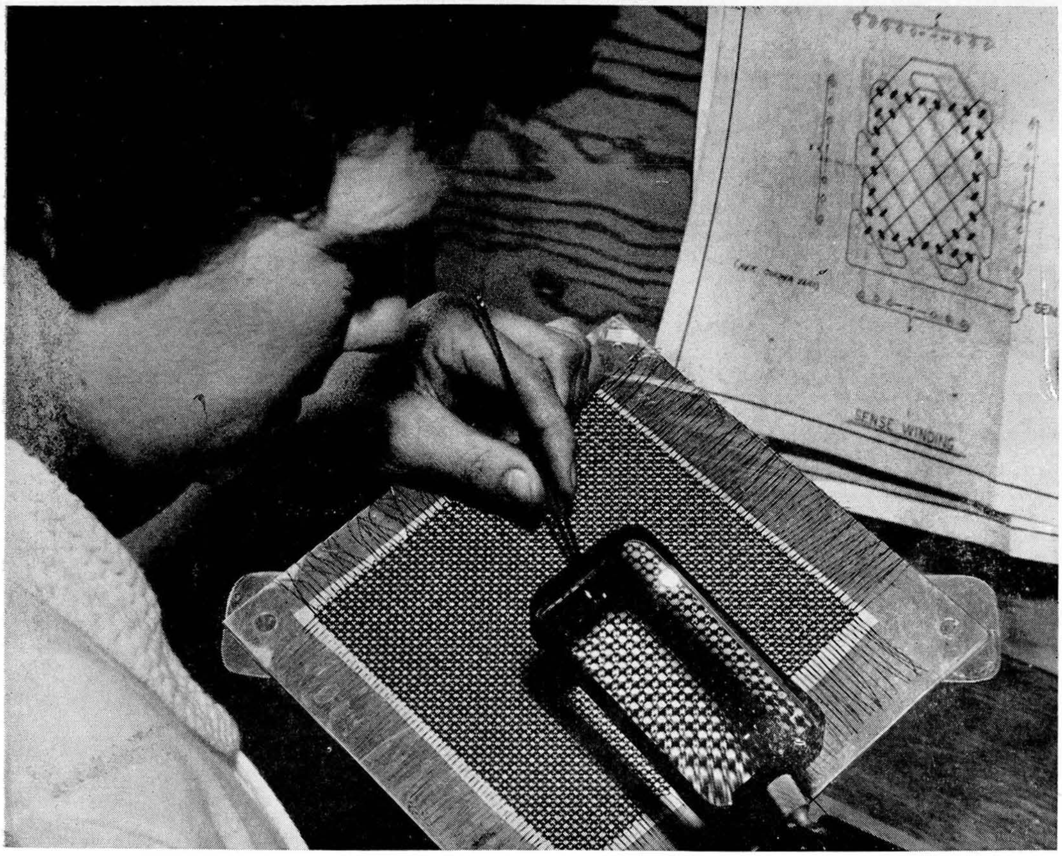


How do you get twice as much access to a magnetic disk memory? — Here is the disk memory unit of an IBM 305 RAMAC random access magnetic memory, built with two access arms instead of one. This makes it possible for one access unit to be in position for reading or writing while the other arm is moving to the next record; and both arms may be in motion simultaneously. Made by International Business Machines Corp., White Plains, N.Y., the vertical stack of 50 spinning magnetic disks is able to store 5 million characters of information, recorded on both sides of the disks. (Figure 8)

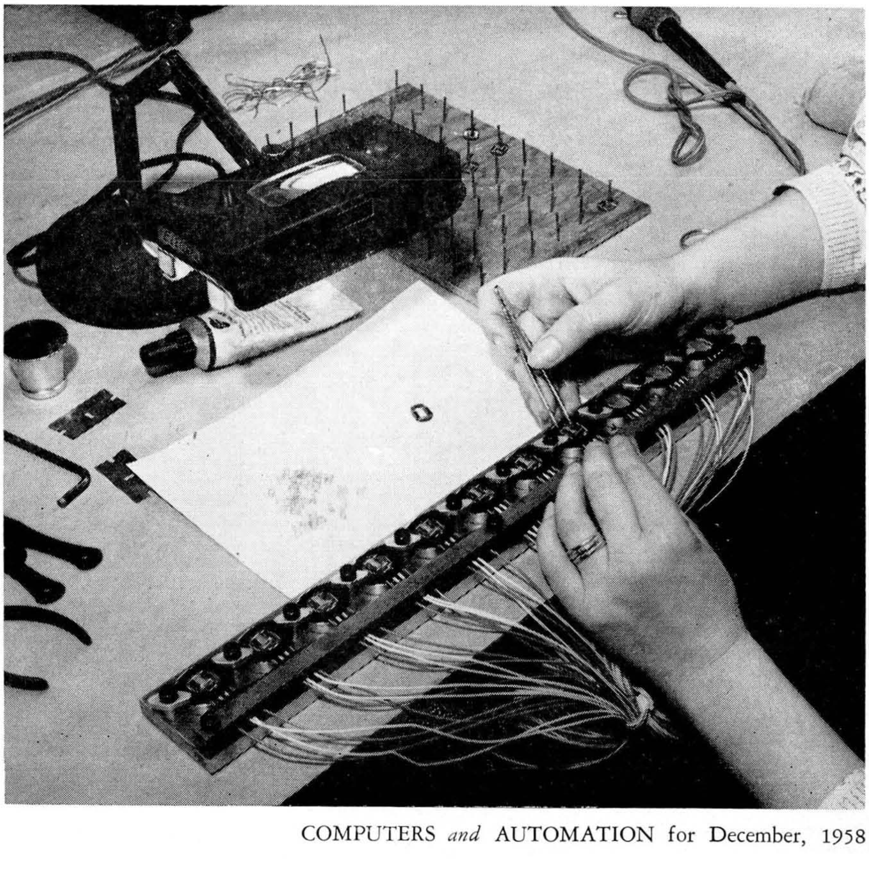


Above is a printed circuit board wired with transistors. It is a plug-in module containing six flip-flop stages. It is used in computers and data processors made by Monroe Calculating Machine Co., Orange, N.J. (Figure 9)

Below is a wire harness being put together for use in an electronic business machine. The place is the National Cash Register Company plant in Dayton, Ohio. (Figure 10)

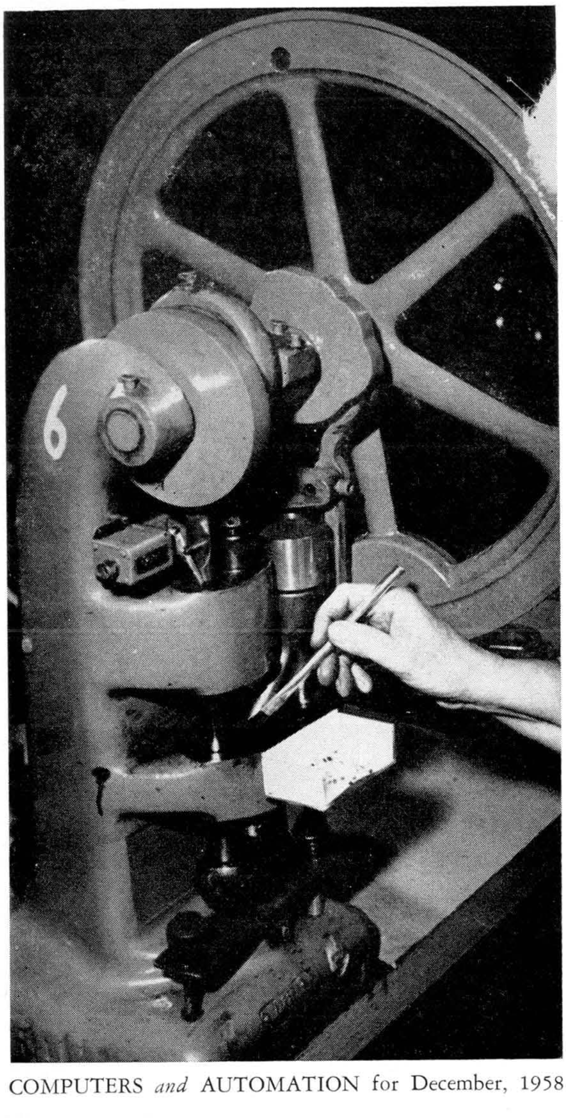


The operator is sewing fine strands of insulated copper wire through tiny magnetic cores, in order to make computer memory planes, at RCA's plant, Needham Heights, Mass. (Figure 11)



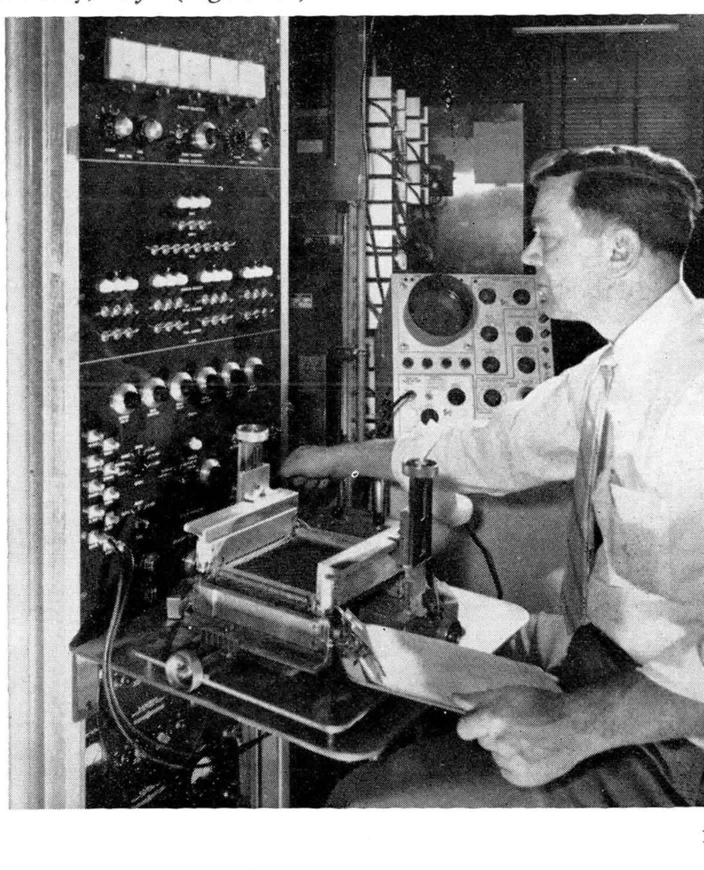
How does an operator assemble magnetic heads? — Here is a production worker assembling read/write magnetic heads, using low loss ferrite core heads, which are completely shielded in a metal case of aluminum and MU metal. These heads permit high density recordings and precise timing of information, in the commercial computers made by Monroe Calculating Machine Co., Orange, N.J. (Figure 12)

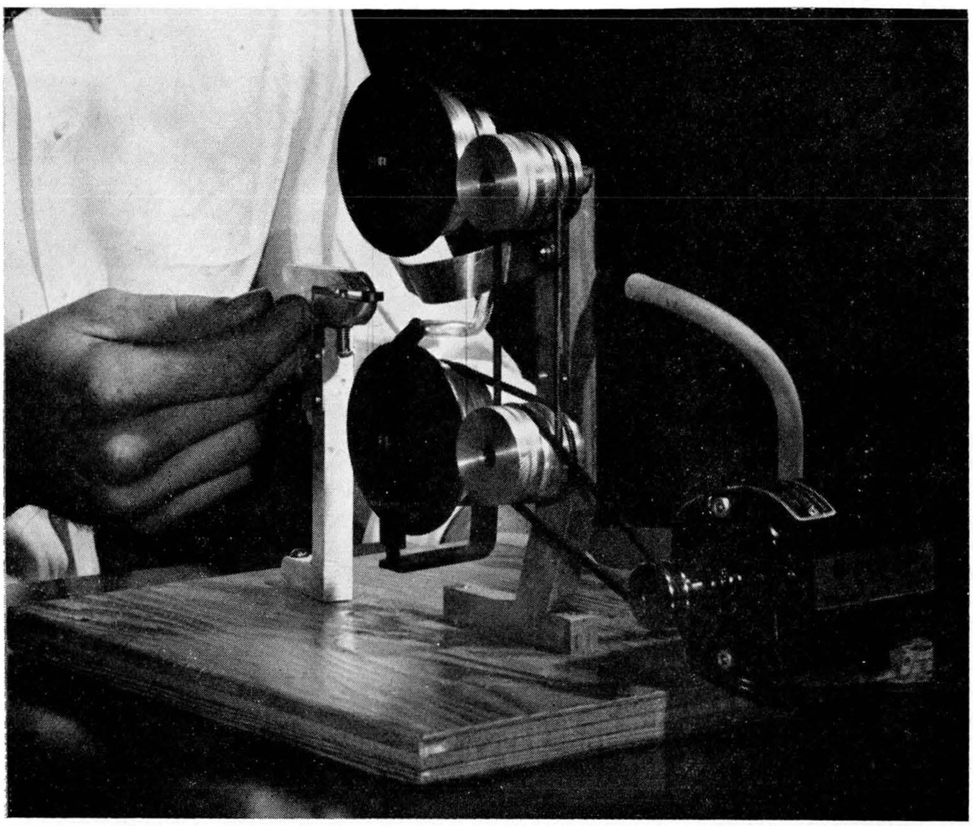
Here are some of the new 50 mil (1/20 of an inch) ferrite memory cores that are presently being used in transistorized coincident current computer memories. According to General Ceramics, Keasbey, N.J., demand for this core has skyrocketed, and it appears that these cores will quickly replace the 80 mil cores that have previously been standard for the computer industry. In the last few months, the memory plane stringing department has increased from 10 girls to 74 girls, and there has been a proportional increase in technicians. (Figure 13)



This press squeezes out tiny rings of ferrite powder, which after heating and testing will become ferrite cores for computer memory frames. The place is the RCA plant, Needham Heights, Mass. (Figure 14)

This testing machine automatically tests computer memory planes made of strung ferrite cores, in use at General Ceramics, Keasbey, N.J. (Figure 15)





How do you wind a wire coil around a miniature toroid core, filling up the hole with hair-thin insulated wire? — At left (Figure 16) is a new kind of coil-winding machine that does this; it was conceived and developed by M. J. Matovich, Computer Development Group, Stanford Research Institute, Menlo Park, Calif. By an ingenious arrangement, the wire forming the coil "pulls itself" through the hole or holes in the core as many times as the number of required turns. Above (Figure 17) is an example of the work of the machine; the wound toroid is as small as Franklin D. Roosevelt's eye on the U.S. dime. (Figures 16 and 17)

Ampex Digital Tape Handlers

Compatible and a speed for each application

DIGITAL-TAPE-SYSTEM PERFORMANCE

21

AMPEX CORPORATION

In back is the much talked of Ampex FR-300. Its 30,000- to 90,000-character-per-second transfer rates set a lively pace for the fastest digital computers. But these speeds must be brought back to earth for slower peripheral equipment. The Ampex FR-400 on the left is exactly the machine for this job. Tapes are transferable between the two (and also meet widely accepted industry standards).

The FR-400s can be likened to the entry and exit roads feeding traffic to a super-speed freeway. To put data into computer format, it serves in such conversions as analog-to-digital, punched-tape-to-magnetic-tape, and cards-to-tape. On the other end, the FR-400 feeds printers that get the answers back in writing. The FR-400 is also used for input/output for slower computers, but that's another story.

WORKHORSE QUALIFICATIONS

Carrying the freeway analogy a step further, imagine the traffic snarls that occur when exits are blocked. The Ampex FR-400 has a similar responsibility in the digital-data flow. It has been designed with tremendous stamina. It stays on the job.

For example, the FR-400's pinch-roller assembly passed a 15,000,000-cycle start-stop endurance test in our laboratory. Its design is the same as on the higher-speed FR-300. Also, the FR-400's torque motors are like those on the faster FR-300. And the heads are typical Ampex quality, made to take thousands of hours of wear without serious change.

A heavy-duty machine needn't demand heavy-duty people. The FR-400 has quick, easy in-line tape threading. Local controls are an available option, very convenient for tape change and equipment checkout. Then remote controls can take over — even from a source wired in from 1000 miles away.

COMPATIBILITY OF SPEEDS

In the matter of speeds, the FR-400 is like a power-line transformer that steps voltages down to the required levels of electrical equipment. Typical tapes made off computer by Ampex FR-300s involve transfer rate of 30,000 bits per second. Tape speed is 150 in/sec. Suppose a particular printer operates at 6000 characters per second. An FR-400 with 30 in/sec tape speed cuts transfer rate to ⅕th making the tape compatible with the printer's speed.

This can be carried still further — for example, to 5 in/sec tape speed and a 1000 character-per-second transfer. For still slower devices like paper-tape punches or card punches, a storage buffer is used. The magnetic-tape handler operates on a start-stop basis. A short burp fills the buffer. The card or paper-tape punch trails along after.

The FR-400 is available in a wide range of basic speed pairs. But Ampex also provides for sharing of tape handlers among conversion and readout devices of widely differing transfer rates. For this the FR-400 is available in 4-speed multirange versions, having two independent capstan motors. Thus the pairs of speeds may be very widely separated. 75, 37½, 10 and 5 inches per second is a typical example.

May we send specifications and descriptions on Ampex's various digital tape handlers or assist in some specific application? Write Department Z-21

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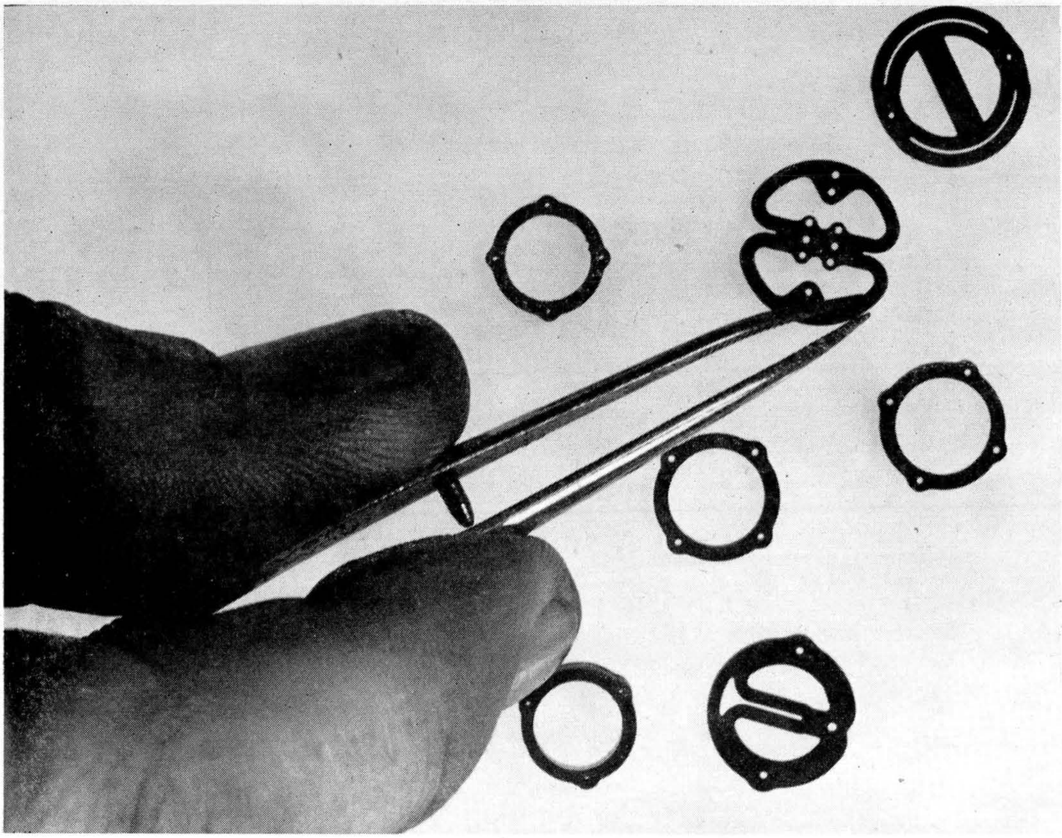
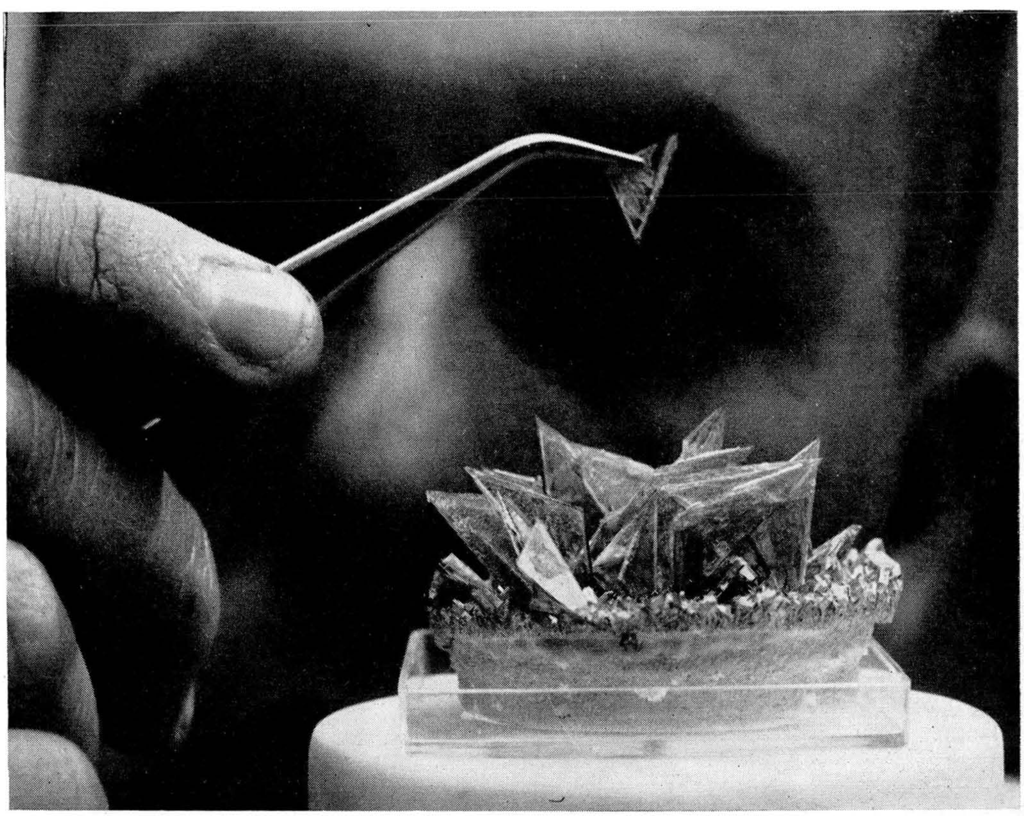
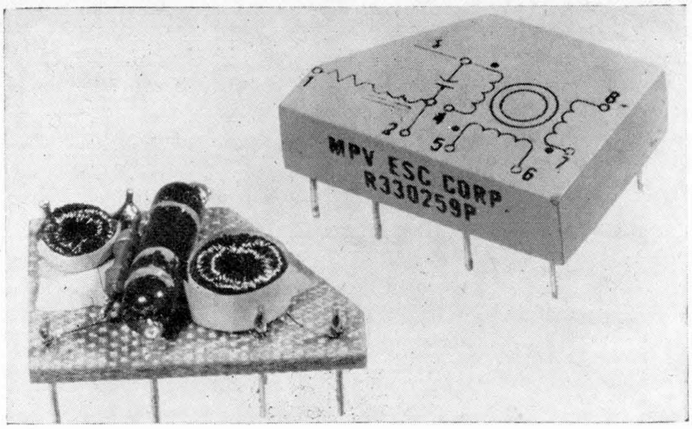
Phone your Ampex data specialist for personal attention to your recording needs. Offices serve U. S. A. and Canada. Engineering representatives cover the free world.



Here are MAD's, or Multi-Aperture Devices, made of ferrite in various forms, and able to perform AND, OR, NOT functions, and other logical functions in computers. They require only single-turn wire for interconnection, are highly reliable, and function over wide temperature ranges. They are still in the experimental stage, being studied at Stanford Research Institute, Menlo Park, Calif. (Figure 18)

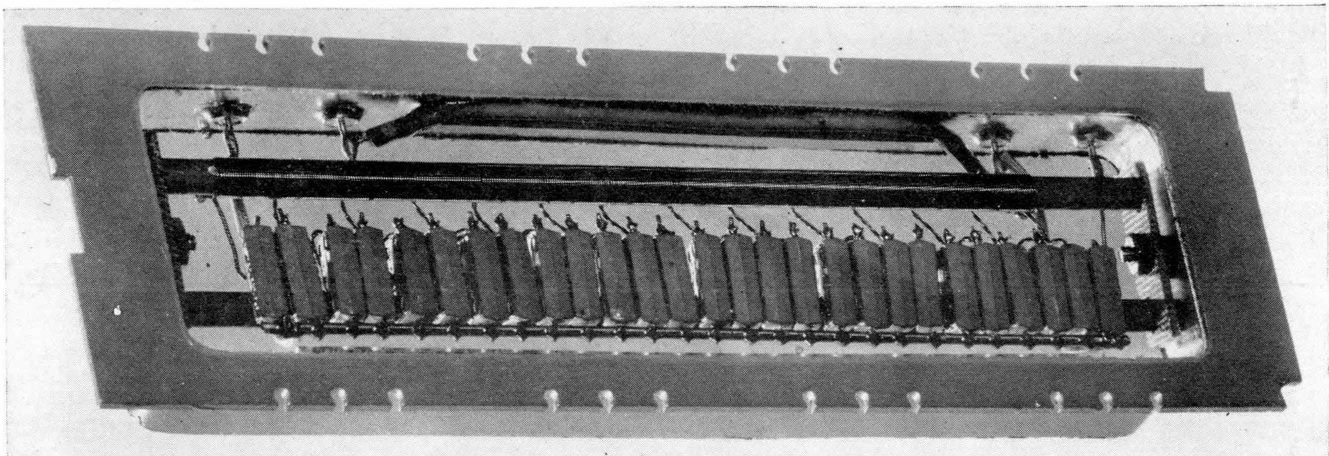


These synthetic crystals are the basic material for an experimental logical device for an electronic business machine. They were crystallized in the research laboratories of the National Cash Register Company, Dayton, Ohio. (Figure 19)



At left is a magnetic shift register, one bit per core, information rate 5000 kilocycle, size 2/10 of a cubic inch, made by ESC Corp., Palisades Park, N.J. (Figure 20)

Below is a lumped constant delay line, potted in transparent plastic with a glass-like finish, constructed for a computer application requiring extremely high reliability, by ESC Corp., Palisades Park, N.J. (Figure 21)



Editorial Policy of 50 Technical Magazines on Publishing Discussion and Argument on the Social Responsibility of Scientists and Engineers

Edmund C. Berkeley

FOR some time we have wondered what is the policy of technical and trade magazines in regard to the publication of discussion and argument on the social responsibility of scientists. So in September we decided to inquire. We selected 92 technical and trade magazines and sent each of them the following letter:

"To the Editor:

"*Computers and Automation* is making a survey of editorial policy of technical or trade magazines in regard to the publication of articles, letters, discussion, argument, etc., on the social responsibility of scientists in regard to the scientific developments which they produce. Enclosed is a reprint from our January issue on the subject. [This reprint was the editorial "Curse or Blessing?", from page 9 of the January 1958 issue.]

"Would you be so kind as to give us information about your editorial policy? Enclosed is a reply form and a business reply envelope for your convenience.

"We should much appreciate knowing what is your editorial policy now (in September 1958), a view of the extraordinary influence on human affairs of current scientific developments, such as the Sputniks, the Nautilus voyage under the polar ice cap, the Hydrogen Bomb, etc.

Yours sincerely,
Edmund C. Berkeley
Editor
Computers and Automation

"P.S. The results of the survey will also be reported to a committee of the Association for Computing Machinery which was appointed in June to consider 'the social responsibilities of computer scientists to advance socially desirable applications of computers and to help prevent socially undesirable applications.' So your reply will be doubly useful."

The reply form enclosed was the following:

( ) Our editorial policy is that our magazine should from time to time present discussion and argument about the social implications of the work of the scientists and engineers in our field, and their social responsibilities — subject to the usual editorial considerations of space, wording, balance, etc.

( ) Our editorial policy is that our magazine should stick to the discussion of technical subjects, and not discuss or argue in any way the social implications of the work of scientists or engineers in our field, or their social responsibilities.

( ) Other views? (please explain) ....

....

....

Filled in by .... Title ....

Magazine ....

Address ....

When you have filled in this form to the extent you conveniently can, please send it to E. C. Berkeley, Editor, *Computers and Automation*, 815 Washington St., Newtonville 60, Mass. A reply envelope is enclosed for your convenience.

After a followup, we had by the middle of November received 50 replies. One of these, being simply a printed announcement of policy regarding free advertising, did not answer our question, and so could hardly be tallied.

The replies can be classified as follows:

I.	YES, our magazine should from time to time present discussion	20
II.	OTHER VIEWS, but essentially yes	10
III.	OTHER VIEWS, but essentially no	6
IV.	NO, our magazine should stick to the discussion of technical subjects	13
	Total,	49

Needless to say, we were surprised that approximately 60 percent of the magazines replying said that they would on at least some occasions present discussion and argument on the social responsibility of scientists. This unexpected state of affairs seems to be the result of the undeniable fact that science nowadays is penetrating further and further; and so more and more attention must certainly be given to the influence of science in human society.

Following is the detailed report of the 49 replies, either verbatim or slightly edited. The "Yes" indicates a check mark in the box next to the statement of the first policy. "No" indicates a check mark in the box next to the statement of the second policy.

I. YES

1. "Yes — No one can ignore the social implications of technological progress. If the social sciences don't catch up pretty soon, there won't be anybody left to worry about the physical sciences."
   — *Ceramic Industry;* K. A. Brent, Managing Editor

2. "Yes — We from time to time report on the expressions of attitudes toward science and scientists, and engineering and engineers, expressed by political leaders and others who command widespread attention before the public. We are concerned about apathy and misinformation."
   — *Chemical Engineering Progress;* J. B. M., Editor

3. "Yes — We do believe we should publish material showing social implications of work done by engineers. This does not mean, however, that our articles have a political bias. We are not Democrat or Republican, Conservative or Liberal. But we are conscious of the social responsibility of our engineer readers."
   — *Consulting Engineer;* Hunter Hughes, Editor

4. "Yes (see my October editorial) — I believe that our publication has the responsibility to stimulate engineers and scientists to form a stronger and more defined view on the subject. I will therefore publish such material as may lead to success of this objective, and more responsibility."
   — *ISA Journal;* Charles W. Carey, Editor

5. "Yes — To supplement the above check mark, I should like to add that we carry both editorials and lead articles on controversial issues. The Saturday Review, for example, bases much of its material about science and the social implications of science on articles that originally appeared in *Science.*"
   — *Science;* Graham DuShane, Editor

6. "Yes — Although it may seem to be separate from the area outlined in the policy we have indicated is ours, the "social responsibilities" of the industry we serve, of industrial management — these are of prime concern to us — and expressions about them are always considered appropriate material for publication in our magazine."
   — *Electric Light and Power;* N. H. Jacobson, Exec. Bus. Editor

7. "Yes — Such discussion most often is published in our weekly Chemical and Engineering Newsletter rather than in the scientific and technical monthlies."
   — ACS Applied Publications, Walter J. Murphy, Editorial Director

8. "Yes — Our magazine is sufficiently broad in its scope to include such discussion as you suggest. As to specific instances, we would have to reserve judgment until we have had an opportunity to review the discussion."
   — *Gas Age;* William J. Nickel, Editor

9. "Yes — While primarily a technical publication, our editorial policy does not exclude mention of the social impacts of scientific and engineering achievements in the marine field. For example, it would be silly to report on a notable safety advancement in cargo handling without noting its effect on the longshoreman, who works in the country's most hazardous industry."
   — *Marine Engineering;* Robert Ware, Assoc. Editor

10. "Yes, but our editorial policy is that our magazine *might* from time to time present discussion and argument about the social implications of the work of the scientists and engineers in our field, and their social responsibilities — subject to the usual editorial considerations of space, wording, balance, etc. But we prefer to stick to the discussion of technical subjects."
    — *Tooling and Production;* E. Willard Pennington, Editor

11. "Yes — Our editorial policy is that our magazine should *but very rarely* present discussion and argument about the social implications of the work of scientists and engineers in our field, and their social responsibilities — subject to the usual editorial considerations of space, wording, balance, etc."
    — *Physics Today;* Regula Davis, Asst. Editor

12. "We assume that the reader of the *American Engineer* . . . is intensely interested in his profession. He is

IF YOU CAN CHECK ANY ONE OF THESE BOXES

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GENERAL ELECTRIC

proud of his profession and wants it to gain in prestige and take leadership in other than technical fields by assuming social responsibility for the things it creates. He expects to find in our pages professional articles, features, and news that treat non-technical engineering topics in the fields of industry, legislation, government, social transition, economics, and public relations. . . . Every month a legislative analyst reviews happenings on Capitol Hill that affect the private and business life of the engineer. . . . ."

—*American Engineer;* Kenneth E. Trombley, Editor

13. "Yes — We should and do discuss such subjects as required to correct misapprehensions and misunderstandings but these must be mostly admonishments since our readers know the facts. The real job is needed in consumer publications and newspapers where fact and fiction have become indistinguishable."

—*Automation;* R. W. Bolz, Editor

14. "Yes"

—*The Petroleum Engineer;* J. E. Kastrop, Editorial Director

15. "Yes"

—*Electronic Industries;* Bernard F. Osbahr, Editor

16. "Yes"

—*Missiles & Rockets Magazine;* D. W., News Editor

17. "Yes"

—*Industrial Gas;* Harold W. Springborn, Editorial Dir.

18. "Yes"

—*Design News;* J. P. Dubois, Managing Editor

19. "Yes"

—*Electrical World;* D. T. Braymer, Asst.-to-the-Editor

20. "Yes"

—*Astronautics;* Irwin Hersey, Editor

II. ESSENTIALLY YES

21. "We have written an occasional editorial on the subject of an engineer's social responsibilities. We would consider running a scholarly article on this theme — and rebuttals if the viewpoint was controversial. We couldn't give the same space to the subject as the Saturday Review does, for example. We have not solicited such articles. Will be interested in your survey results. Maybe we can write another editorial when the results are in. At the moment I feel engineers shirk social responsibility."

—*Electronic Design;* James A. Lippke, Managing Editor

22. "The first statement above would express our policy if the word "should" in the statement were changed to "may." Our mission is purely technical, but we are willing to consider "social" material. In practice, "social" material appears only very infrequently in Proceedings of the IRE."

—*Proceedings of the IRE;* E. K. Gannett, Managing Editor

23. "Since *Radio & TV News* is a technical publication, our prime interest is in the presentation of technical facts. We do not overlook the social responsibilities; and if at any time there is something important along these lines, we would cover it in our monthly editorial."

—*Radio & TV News;* W. A. Stocklin, Editor

24. "We lean toward the first hypothesis. At the same time, we do believe that any scientific development can be used in a good or bad manner; and it follows from this that the scientists' responsibility in evaluating this is not much greater than the average citizen. Such questions are philosophical and should be aired by philosophers but finally determined by the citizenry. Thus, we view the scientist as an expert witness and a citizen, and not an evangelist, or arbiter."

—*Petroleum Refiner;* George B. Gibbs, Editor

25. "In general, the second viewpoint stated above fits our editorial policy more closely, except that we will not arbitrarily exclude from any consideration the discussion of social implications. We just don't plan to start crusading on the subject. While we are primarily a technical journal, we are also a professional journal, and we do quite actively get into the professional aspects of the engineers' life and work, which sometimes involves relations with the public."

—*Machine Design;* Colin Carmichael, Editor

26. "This is purely a technical journal. The only exception to this can be on the editorial page, where attention has occasionally been called to the social responsibility of scientists."

—*Journal of the Electrochemical Society;* Cecil V. King, Editor

27. "As a business publication, the *Oil and Gas Journal* has kept its readers well abreast of the technical and economic aspects of computer and automation applications. The impact of these new techniques on petroleum is still so new that we see no serious social problems to date. Wherever computers and instrument controls have been applied, they have for the most part improved productivity and their benefits have accrued to both management and labor. If we should determine, however, that unemployment threatened from these new uses, we would feel called upon to discuss them editorially."

—*The Oil and Gas Journal;* George H. Weber, Editor

28. "Your letter and questionnaire of Sept. 18 are not easy to answer — they're like trying to decide the morality of war! Speaking for *Metlfax,* we have no formalized editorial policy regarding, as you put it, the social responsibility of scientists. We're a monthly directed to manufacturing people. We publish brief articles about weapons, but we do it by mentioning first and foremost the processes involved in manufacturing the product, not the weapons themselves. Indirectly, we imply that such manufacturing techniques are feasible for consumer products as well as fierce weapon systems. None of us can forget weapons completely, however. It's only right that we be prepared to defend our people if the need arises. Of course, we cannot be certain either, that all the test firings, etc., are defensive or offensive. We're faced with a dilemma, and I'm afraid few editors — or few scientists, or few statesmen — have sufficient reasonable facts to decide the case for once and for all. On the other hand, if we preach too much about the evils of weapons, we may end up with an overflow of good scientists and engineers who've become scrupulous regarding such things, and who are no good to themselves or our country. Another dilemma. I doubt that these ramblings will add percentage points to either the pro or the con side of your survey findings; in my own mind I cannot see how anyone can settle the question

statistically. I'll be anxious to see a complete report of your findings."

—*Metlfax Magazine;* Carol E. Reuss (Miss), Editor

29. "We have little occasion to deal with this topic, since we are primarily a business management magazine concerned with specific trends and problems of industry. We do not, however, have any editorial taboos in this area. Would not deliberately avoid discussion and argument where pertinent to our interests."

—*Dun's Review & Modern Industry;* Roland Mann, Assoc. Editor

30. "No paper has been submitted to the *Journal of the Association for Computing Machinery* so far on the social aspects of computers, and no definite policy is in existence. Were such a paper submitted, it would, I believe, be judged on its merits, and if outstanding in many aspects it would be accepted. It is fair to say, however, that probably a lot higher standards would be applied to it than to the usual technical paper. I am also inclined to believe it would be sent to *Communications* rather than the *JACM,* as being more appropriate there."

—*Journal of Association for Computing Machinery;* R. W. Hamming, Editor

III. ESSENTIALLY NO

31. "Since the bulk of our editorial matter is the publication of technical talks given before the chapters of the A.S.M., we cover social responsibilities only in-so-far as they might be brought out in such talks."

—*Metals Review;* Betty A. Bryan, Editor

32. "The American Chemist Society has another magazine, Chemical and Engineering News, which is the one which can discuss the social implications of science."

—*Analytical Chemistry;* Robert G. Gibbs, Managing Editor

33. "Our magazine deals strictly with product news. Thus, we do not 'take a stand' one way or the other on this question."

—*Electrical Equipment;* E. C. Mead, Editor

34. "Ours is more a product information news service than it is a standard trade publication. There isn't much we can say to your questionnaire. Perhaps the best way to answer it is to send you a copy of the paper which you will find enclosed."

—*Industrial Equipment News;* J. W. Moss, Mng. Editor

35. "Our editorial material is devoted almost exclusively to mass production metalworking. We deal but little with *pure* research—rather with *how* products are produced and the plants that produce them. The subjects above are normally outside the scope of our editorial material."

—*Production;* Albert J. Taylor, Exec. Editor

36. "No — This magazine is the official publication of the Society for . . . . ., a non-profit engineering society, controlled by lethargic lizards in a sinecure, men afraid of controversy — whether social, ethical, or moral (this of course is my personal view). GOOD LUCK!"

— name omitted for obvious reasons

IV. NO

37. "No — While our publication realizes that there are social implications of the work that scientists and engineers in our field do, we feel that a technical magazine such as ours should stick strictly to the technical aspects of the job, in our case the design engineering of all types of electrically operated and electronic machines, equipment and appliances. We leave to the general magazines and those dealing with philosophy and religion man's responsibility as a social being."

—*Electrical Manufacturing;* Frank J. Oliver, Editor

38. "No — *Wire and Wire Products* is only interested in publishing news items and articles that bear directly upon the interests of those wire mill personnel concerned with management and production problems. Computers and automation are having the attention of the industry and great strides have been made in the development of production controls and automated processes. General information, not applied to the production of wire and wire products, is of no practical value to our readers."

— *Wire and Wire Products;* Edmund D. Sickels, Editor

39. "No — Our readers are on the executive level and are interested primarily in the significant facts and data on new developments in the industrial fields of our editorial coverage. Given the facts, they are capable of forming their own opinions."

—*Automotive Industries;* James R. Custer, Editor

40. "No — Such discussion should properly be left to journals of opinion — Harper's, Atlantic, Commonweal, Saturday Review, etc. Of course the responsibility of scientists is equal to — but no greater than — that of other intelligent citizens such as doctors,

lawyers, or businessmen. I deplore attempts to make them seem wiser."

— *Chemical Week;* Howard W. Johnson, Editor-in-Chief

41. "No — It is the AIEE's policy to stay away from all such controversial forums and all commercialism."

— *Electrical Engineering;* G. C. B. Rowe, Assoc. Editor

42. "No — This policy is established by the Publisher, not the Editor, of the publication."

— *Instruments & Automation;* M. Aronson, Editor

43. "No — We are purely an industrial magazine, serving the practical plant needs of production and maintenance engineers. We cover only plant problems relating to their daily work."

— *Mill & Factory;* Carl C. Harrington, Editor

44. "No — This Journal is devoted exclusively to technical descriptions of scientific instruments and the theory underlying their design. We do not publish so-called 'News' items so that articles on social implications of science would be quite out of place."

— *The Review of Scientific Instruments;* J. B. H. Kuper, Editor

45. "No"

— *Foundry;* Frank G. Steinebach, Editor

46. "No"

— *Products Finishing;* Ezra A. Blount, Editor

47. "No"

— *Metalworking;* H. S. Wharen, Mng. Ed.

48. "No"

— *Iron & Steel* Engineer; T. J. Ess, Editor

49. "No — *Automatic Machining* magazine, serving the automated metalworking field, has for the past 20 years been dedicated to expounding and promoting every phase of automation as it applies to the plants we reach.

As to the impact of Sputnik, and similar innovations, we have no direct coverage for such matters, and hence little editorial interest.

Automation began with the wheel, and has advanced steadily ever since. It is here to stay, and a discussion of whether it is good or bad sociologically would be purely academic. Our aim is to keep our readers informed of new developments which can help them make more parts in less time, with less effort, and more profit.

We are more concerned with what we consider to be a major shift in consumer buying preference. If our findings are correct, the American public is rapidly revising its thinking as to what should be the most-wanted prestige item. The automobile, for instance, may be losing ground to a desire for home improvements, recreational facilities, and security savings. To this end we advise our readers to keep their production facilities flexible, and to remain ready to shift quickly into other production items as the buyer changes his mind.

The engineer, in our book, is a devoted man whose sole aim is to help his plant produce more, and thus enrich the standard of living for mankind."

— *Automatic Machining;* Donald E. Wood, Technical Editor

V. THE POLICY OF *COMPUTERS AND AUTOMATION*

The policy of *Computers and Automation* is to present articles, papers, discussion, and argument in regard to the social responsibilities of computer scientists and engineers, in an appropriate way, and as an integral and important part of our coverage of our field: "computers and data processors, and their applications and implications including automation."

During the discussion printed in our pages from time to time over the past year, we have become convinced that the "ivory-towerness" of "science for science' sake" or "technology for technology's sake" must inevitably give way to the goals "science for humanity's sake" and "technology in the service of human beings." Accordingly, the responsibility of scientists is not only to do good work in the near-at-hand field of their employer's and profession's interests but also in the broader field of the interests of their country and the whole world. This is the same kind of responsibility that all human beings have — but a scientist or engineer has special knowledge and perhaps special wisdom, and so has a special opportunity to be a help or a hindrance in the social applications of his science, and a special duty to be informed and to spread information. The information area is particularly where a magazine can be of assistance.

We should be very glad to hear from other technical and trade magazines what their editorial policy is in this area.

Obsolete—At Age 29

M. D. Witty
Witty-Polon Management Consultants
New York, N. Y.

Since the Korean war the United States has been fighting a "cold war" that has made demands upon industry in the United States for advanced development in military electronics that ordinarily, within normal times, would have taken twenty years to achieve. Daily, today's machines are making yesterday's machines obsolete. Today's components are advances on yesterday's. As electronic equipment comes off the production line, new advances are simultaneously on the drawing board, making present equipment obsolete. Every important company today has an advanced theory department tucked away in special laboratories with engineers and scientists who are the dreamers of tomorrow.

We recently made a survey of the computer industry which shows that, among 78 companies competing in the manufacture of computers and computer systems, the race is on. The price: the best brains in the country assigned to component areas. The objectives: simplification of systems and components, increased memory storage, faster data processing, greater reliability, greater adaptability for special purposes, smaller machines through miniaturization.

In order to achieve these purposes the most brilliant young engineers in the country are selected, many at the graduate school level, trained broadly for a year or two and then assigned to development work in highly specialized component and systems areas. It appears to us that there are at present approximately 46,000 engineers in the computer industry and in electronics related to it. The greatest number of these men are electronic engineers. We estimate that last year approximately 6% of these engineers became obsolete! These young men, ranging in age between 29 and 34, with Master's and Doctorate degrees in electronics, had been selected because of their superior abilities, to work in highly specialized computer areas.

During a recent search for engineering specialists in the $300,000,000 computer field we found the following case histories:

One brilliant young engineer, 29 years old, with a Master's degree from MIT in electronics, working for a leading computer manufacturer for five years, currently earning a salary of $10,000, is faced with the problem of obsolescence within his present company. The first year he was assigned to general computer circuits areas. The second year he was assigned to a specific project, a large computer. During this year he showed great interest and ability in a specialized component area, and so, at the beginning of his third year he was assigned to this area where he showed such great promise. During the following two years he became expert in the knowledge and application of this component. He was so proficient that he became leader of the group.

Recently, he was called into a staff meeting where he was introduced, for the first time, to a new component developed by a small electronics component company. This new component will replace the whole sphere of work in which he has spent three years in development. In essence, the need for his special skills has disappeared. The problem now was what to do with this brilliant young man at the $10,000 a year level. From the company's point of view, he is too expensive to retrain and too young for management.

During an interview with another young computer engineer, a problem of even greater scope came to light. He told us of his anxiety over the future in relation to his current position, the area in which he has spent four and one-half years of concentrated work in specific circuit design.

Three desks away from this young man is an engineer working on automatic implementation of computer logic. Implementation is the process of fitting specific circuits to computer logic. The young engineer who was interviewed stated that he was presently working on tedious and lengthy hand calculations of logic relating to transistor circuits. His associate engineer, three desks away, is working on methods that will make a computer perform the calculations he is currently doing. He realized that the work it takes him a month to perform will, in a short time, be reduced to a single day's work using machine programming. Now, he too fears becoming obsolete — at 31! And he is only one of a group of 22 men working on the same project.

The computer industry is growing rapidly month by month. The need for special purpose computers increases daily, not only in the commercial field but in the rapidly expanding area of military electronics where time and reliability are very important. Mammoth amounts of calculations are necessary to find workable electronic circuits, chemical formulas for fuels, solutions to problems of the resistance of metals to heat, etc.

We estimate that in 1954 there were approximately 50 companies who could have used a computer; but today there are over 1700 computers in commercial and military use, and well over 3,000 computers on order.

There is currently a critical need for engineers and scientists in the computer industry primarily for military applications. Thousands of engineers and scientists could be converted successfully into the computer industry, but these men have heard many stories of other young men who are obsolete and are becoming obsolete at 29. They are most reluctant, though interested in changing positions, to enter the computer field. We predict that the next year will prove to be a peculiarly difficult time to recruit both college graduates and convertible engineers and scientists into the computer industry, unless the industry sets up a program to prevent obsolescence of critically needed engineers and scientists.

Symbolic Logic and Automatic Computers (Part 2)

Edmund C. Berkeley

(Based on two chapters in a forthcoming book "Symbolic Logic and Intelligent Machines," to be published in 1959 by Reinhold Publishing Corp., New York)

(Continued from the November issue, vol. 7, no. 11, p. 20)

A third branch of symbolic logic is called the algebra of relations. This deals with such concepts as symmetric relations, transitive relations, connected relations, series, etc.

Still another branch of symbolic logic deals with what are called *decision problems,* that is, finding effective computational procedures for deciding the truth or falsity of whole classes of statements. Symbolic logicians have investigated the problem of proving statements in any mathematical system. These studies have produced some remarkable results. For example, it can be shown that there are classes of statements in arithmetic, and in other mathematical systems, that can never be decided as true or false, in this sense: it can be shown that there exists no effective computational procedure for deciding them. (See "Computability and Unsolvability" by Martin Davis, McGraw Hill Book Co., New York, 1958.)

7. An Illustrative Context

To make clear the specific ideas of symbolic logic (in an area wider and deeper than Boolean algebra), and show how they apply and how powerful they are, we shall choose an illustrative context, which is not mathematical, and which in fact belongs in the common everyday experience of all people: the context of family relationships. Within this context we can show how these relationships can be described using two kinds of words: words which belong specifically to the field of family relationships (we can call them *"brick"* words); and words which are completely general and belong in symbolic logic (we can call them *"cement"* words).

Problem 1: Define "father" in terms of "parent" and "male," and separate between the brick words and the cement words.

Solution: Definition: A person is the *father* of another person if and only if he is male and is the parent of that other person.

Separating the two kinds of words, we have:

(a) Words which belong in the field of family relationships (brick words): person, father, male, parent;

(b) Words which belong in the field of symbolic logic (cement words): A . . . . is the . . . . of another . . . . if and only if it (we replace "he" by "it" to avoid the idea of animateness) is . . . . and is the . . . . of that other . . . . .

Problem 2: Express "uncle" in terms of "parent" and "male."

Solution: First, we shall define "brother."

Definition: A person is a brother of another person if and only if he is male and there is somebody who is a parent of both of them.

Brick words (words which belong to family relationships): person, brother, male, body, parent.

Cement words (words which belong to symbolic logic): A . . . . is a . . . . of another . . . . if and only if it is . . . . and there is some . . . . which is a . . . . of both of them. (We must change "who" to "which" so as not to imply animateness.)

Second, having defined "brother," let us define "uncle."

Definition: A person is an uncle of another person if and only if he is a brother of a parent of that other person.

Brick words: person, uncle, male, brother, parent.

Cement words: A . . . . is a . . . . of another . . . . if and only if it is a . . . . of a . . . . of that other . . . . .

8. Things, or Elements

Now, we need to get rid of some of the shapelessness of these patterns of logical words, because of their blanks. We need to take out the blanks and put in the most general ideas that are implied by the blanks.

To help us in this process, and enable us to imagine the ideas a little better, let us use "thing" instead of "person." (Actually "entity" or "element" or "individual" would be a better word, in the sense of being more correct technically, because we intend to designate nonphysical things also; but "thing" is a comfortable everyday kind of word, and is not an unreasonable choice.)

Also, let us use capital letters F, M, P, B, U to take the place of words "father, male, parent, brother, uncle," while we try to imagine the kinds of still more general ideas that are needed in place of these letters.

With these changes, our three statements become:

Statement 1: A thing is the F of another thing if and only if it (the first-mentioned thing) is M, and is a P of that other thing (the second-mentioned thing).

Statement 2: A thing is a B of another thing if and only if it is M and there exists something which is a P of both of them.

Statement 3: A thing is a U of another thing if and only if it is a B of a P of that other thing.

We can now begin to see some of the basic ideas of symbolic logic emerging. What these are we shall now try to explain.

9. A . . . . , Another . . . . , Still Another . . . .

In order to talk about the things in some class or collection, we often use some scheme for identifying them one after another, naming them off, and referring to them briefly. This is a process or scheme which belongs to the field of symbolic logic. The need for brief reference to previously mentioned things is recognized in the grammar of natural language, where the *pronouns* "he, she, it, they" (or similar words in other languages than English), are used to refer to previously mentioned things. But in English, the grammar of natural language mixes up thoroughly the logical need for clear designation of previously mentioned things with an unrelated need to specify sex (masculine, feminine, common, or neuter) and number (singular, plural).

In the context of symbolic logic, we are not concerned with sex, grammatical or otherwise. Also, in the context of symbolic logic, we are ordinarily only slightly interested in the difference between singular and plural, although every now and then we find it necessary or desirable in symbolic logic to distinguish between one and more than one.

The translation of "a . . . . , another . . . . , still another . . . ." into symbolic logic can be done in several ways. One way, which is ordinarily not useful in symbolic logic, is to use different letters: as in: "a thing x, another thing y, still another thing z." (We shall not use italic type, so as to make typewriter type acceptable.) A second way is to use subscripts as in: "a thing x_1, another thing x_2, still another thing x_3, x_4, x_5, ..." A third way is to use no mark for the first-mentioned thing, a prime (′) for the second-mentioned thing, a second mark (″) for the third-mentioned thing: as in, x, x′ (read "x prime"), x″ (read "x second"). If in a discussion, we do not talk of more than three things in a class, this method is rather convenient.

Note that in all these cases these symbols may include the case where another thing x′ turns out to be the same as a first thing x; for instance, there will be some occasions where a rule becomes much more general because this case $x = x'$ is not prohibited by the scheme of designating.

10. Properties, Characteristics, Kinds, Sorts

In regard to anything that we talk about, we often make statements telling what properties it has, what characteristics it has, what kind of a thing it is, what sort of a thing it is. For example, "it is male," "it is a father," "it is an uncle," "it is savage," "it is a savage." Note how a property may be grammatically a noun or an adjective.

For designating a property or a class, we shall in general use the capital letter K (the first letter of "kind" and of the German word "Klasse" for class).

x K stands for "x has the property K."

x ε K stands for "x is in the class K," "x is a member of K." Some of the time we think of the property K "being male, having maleness, being a male, being a father, being in fatherhood." At other times we think of the class K "males," "fathers," the group or collection or set of all things which have a stated property. Although the two ideas of property or class are often basically the same, x K and x ε K are two different but largely interchangeable ways used in symbolic logic for expressing this same basic idea.

11. Relations

Also, in regard to anything that we talk about, we often make statements telling what relations it has to other things, what connections or associations it has with other things. For example: x is an F of x′, x if a P of x′, x is a brother of x′, x has the same father as x′. Any statement which mentions two things and asserts some kind of association or connection between them is a statement expressing a relation.

For designating a relation, we shall in general use the capital letter R (the first letter of the word "relation").

x R x′ means "x has the relation R to x′."

We can think of x,x′ (read "x comma x prime") as constituting an *ordered pair,* or an *ordered couple,* or *dyad,* and then say, if we wish, x,x′ ε R. This means "the ordered pair x,x′ is a member of R." On such occasions we think of the relation R as a class of ordered pairs of elements.

For example, suppose we think of the relation "opposite to" and the four points of the compass "north (N), east (E), south (S), west (W)."

The class of N, E, S, W, standing for the four points of the compass contains four elements. From these we can make 16 ordered pairs:

N, N	E, N	S, N	W, N
N, E	E, E	S, E	W, E
N, S	E, S	S, S	W, S
N, W	E, W	S, W	W, W

Of these 16 only four are in the relation "opposite to," namely:

N, S	S, N	E, W	W, E

The other 12 ordered pairs are in the relation "not opposite to."

For a relation to be completely stated, more than two terms may have to be mentioned. For example, *betweenness* is a relation with three terms: for example, "New Haven is between Boston and New York." Betweenness is a class of *ordered triples,* a *triadic* relation. For another example, *exchange* is a relation of four terms: "exchange by somebody of something with somebody else for something else." Exchange is therefore essentially a class of ordered quadruples, ordered sets of four elements, a *tetradic* relation.

12. Statements, Sentences, Assertions, Propositions

One of the most basic ideas of symbolic logic is the idea of a statement (sentence, assertion, proposition). In general a statement is an expression which can be true or false. For example: "Jack has had measles," "x is male," "the connection between point A and B is broken."

For designating a statement we shall in general use the letter S.

A statement has a truth value, which is "true" or "yes" or checkmark (v) or T or 1 if it is true, and "false" or "no" or cross (x) or F or 0 if it is false. We write:

T(S) = the truth value of the statement S, which is T if S is true, F if S is false.

[To be continued]

Computing Services Survey (Supplement)

Neil Macdonald
Assistant Editor
Computers and Automation

This supplement provides some more entries to be added to the 40 entries published in the July and September issues.

The editors will be glad to receive additional entries so that the "Computing Services Survey" may be made still more complete and brought up to date in future issues of **Computers and Automation**. The reply form (which may be copied on any piece of paper) follows:

1. Brief description of the quantity and types of computing machines and equipment which you have —...
....
....
2. Brief description of the types of computing problems which you specialize in ....
....
....
3. Number of employees..........
4. Year established..........
5. Any remarks? (attach paper if needed) ....
....
....

Filled in by.......... Title..........
Organization ....
Address ....
....

When this is completed, please send it with your literature to

Computers and Automation
815 Washington Street
Newtonville 60, Mass.

Each entry is in the form: Name and address of organization/EQPM: Brief description of quantity and types of computing machines and equipment which organization has / PROB: Types of computing problems which the organization specializes in / Number of employees, Year established. Abbreviations: s — size in number of employees, e — year established, S — small or short time ago, M — medium, L — large or long time ago.

General Electric Co., Computer Department, Phoenix, Ariz. / EQPM: IBM 704 / PROB: all types / Ms(150) Se(1957) / not restricted as to users

General Electric Co., Electric Utility Engrg Section, Schenectady, N.Y. / EQPM: Digital; IBM 704, IBM 650. Analog: AC Network Analyzer, DC Network Analyzer, Transient Network Analyzer, electronic differential analyzer / PROB: electric power system planning and operating, electric utility problems, industrial engineering problems; programming services / ?s ?e / not restricted as to users

General Electric Co., Flight Propulsion Laboratory, (a) 950 Western Ave., Lynn, Mass. and also (b) Evendale Plant, Cincinnati 15, Ohio / EQPM: IBM 704 with 32,768 words of core storage, cathode ray display, ten on-line tapes, etc., and full complement of peripheral equipment. Also conventional punch card supporting equipment. 704 program for simulation of IBM 650 available / PROB: aerodynamics, thermodynamics, engine performance, mechanical design and analysis, diffusion, heat transfer, business systems, automatic processing of test data, mechanical systems, engineering systems, special problems on computer techniques and development, trajectory analysis, missile analysis, information retrieval, production scheduling, general mathematical applications. Programming services available / Ms (86) Se(1951) / not restricted as to users

University of Kentucky, Computing Center, Lexington, Ky. / EQPM: IBM 650 and peripheral equipment / PROB: research, educational / ?s Se(1958)

NEW PATENTS

RAYMOND R. SKOLNICK
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.

March 11, 1958 (cont'd):

2,826,359 / William J. Deerhake, Dumont, Charles R. Borders, Alpine, and Byron L. Havens, Closter, N.J. / International Business Machines Corp., New York, N.Y. / A checking circuit for use in conjunction with a storage device having stored therein a plurality of binary bits of information.

2,826,366 / Natale Capellaro, Ivrea, Italy / Ing. C. Olivetti & C., S. p.A., Ivrea, Italy / A transfer mechanism for computing machines.

2,826,715 / Frederic C. Williams, Timperley, Tom Kilburn, Danghulme, Manchester, and Hubert J. Crawley, London, Eng. / National Research Development Corp., London, Eng. / A method of electronic storage of numerical information.

March 18, 1958: 2,827,233 / Walter C. Johnson, Summit, and John G. Rtyon, Chatham, N.J. / Bell Telephone Laboratories, Inc., New York, N.Y. / A digital to analog converter.

2,827,602 / Robert B. Horsfall, Jr., and Henry R. Brown, Jr., Whittier, Calif., and George K. Turner, Huntsville, Ala. / North American Aviation, Inc. / An electro-mechanical shaft positioning mechanism.

2,827,626 / Frank E. De Motte, New Vernon, N.J. / Bell Telephone Laboratories, Inc., New York, N.Y. / An electromagnetic device for converting binary electrical signals into decimal signals.

March 25, 1958: 2,828,070 / David M. Boyd, Jr., Clarendon Hills, Ill. / Universal Oil Products Co., Des Plaines, Ill. / An electric computer.

2,828,071 / Everett T. Burton, Milburn, N.J. / Bell Telephone Laboratories, Inc., New York, N.Y. / A selectable base counter.

2,828,418 / Lorin Knight and Alec Trussell, Letchworth, Eng. / British Tabulating Machine Co., Lim., London, Eng. / A data storage device.

2,828,456 / Lawrence J. Kamm, Forest Hills, N.Y. / Sperry Products, Inc., Danbury, Conn. / A servomechanism having a final output and a data input having a coarse part and a fine part.

April 1, 1958: 2,828,910 / Jacques Fagot, Paris, Fr. / Compagnie Generale de Telegraphie Sans Fil, Paris, Fr. / An electronic pulse-counting system adapted to indicate a plurality of digits each capable of assuming n different numerical values.

2,829,323 / Floyd G. Steele, La Jolla, Calif. / Digital Control Systems, Inc., La Jolla, Calif. / A rate digital control system.

April 8, 1958: 2,829,822 / Eugene E. Reynolds, Richmond, Calif. / Marchant Calculators, Inc., Calif. / A binary value calculator for the selective performance of division or multiplication in the binary system.

2,829,824 / Nick A. Schuster, Houston, Texas / Schlumberger Well Surveying Corp., Houston, Texas / An automatic computing apparatus.

2,829,825 / Henri-Georges Doll, Ridgefield, Conn. / Schlumberger Well Surveying Corp., Houston, Texas / An automatic computing apparatus.

2,829,827 / Carl A. Bergfors, San Jose, Calif. / International Business Machine Corp., New York, N.Y. / An electronic multiplying machine.

2,829,828 / Frank J. Hollenbach, Hollis, N.Y. / Emerson Radio and Phonograph Corp., New York, N.Y. / A computing apparatus for determining the square root of the sum of the squares of a plurality of quantities.

2,830,242 / Horace E. Darling, North Attleboro, Mass. / The Foxboro Company, Foxboro, Mass. / A servo system measuring apparatus.

April 15, 1958: 2,830,758 / Paul F. M. Gloess, Paris, Fr. / Societe d'Electronique et d'Automatisme, Courbevoie, Seine, Fr. / A binary to decimal conversion system.

2,830,759 / Ellis Hudes, and Waldemar Saeger, Gloucester, N.J. / Radio Corp. of America, Del. / A data handling system.

2,831,150 / Esmond P. G. Wright, Joseph Rice, and Ray C. Orford, London, Eng. / International Standard Electric Corp., New York, N.Y. / An electrical information storage circuit.

April 22, 1958 to June 17, 1958 (portion): published in the November, 1958, issue, pp. 28-30

June 17, 1958 (cont'd.):

2,839,705 / Gerald R. Paul, Webster, N.Y. / General Dynamics Corp., Rochester, N.Y. / A binary pulse counting chain.

2,839,727 / John C. Lozier, Short Hills, N.J. / Bell Telephone Lab. Inc., New York, N.Y. / An encoder for pulse code modulation.

2,839,728 / Donald L. Jacoby, Elberon, Bernard J. Keigher, Shrewsbury, and Alfred Mack, Little Silver, N.J. / U.S.A. as represented by the Secıetary of the Army / A pulse code modulation system.

2,839,740 / John W. Haanstra, San Jose, Calif. / International Business Machines Corp., New York, N.Y. / An analog-to-digital converter.

2,839,744 / George M. Slocomb, Altadena, Calif. / Consolidated Electrodynamics Corp., Pasadena, Calif. / A non-linear analog-to-digital converter.

June 24, 1958: 2,840,304 / Frederic C. Williams, Timperley, Tom Kilburn, Manchester, Geoffrey C. Tootill, Swindon, and Brian W. Pollard, Hollinwood, Eng., and Gordon E. Thomas, Port Talbot, and David B. Edwards, Pontypridd, Wales / National Research Development Corp., London, Eng. / Data storage arrangements for electronic digital computing machines.

2,840,305 / Frederic C. Williams, Timperley, Tom Kilburn, Manchester, Geoffrey C. Toothill, Swindon, and Brian W. Pollard, Hollinwood, Eng. / National Research Development Corp., London, Eng. / Rhythm Control means for electronic digital computing machines.

2,840,306 / Floyd G. Steele, La Jolla, Calif. / Digital Control Systems, Inc., a Corp. of Calif. / Di-function multiplexers and multipliers.

2,840,307 / Willis S. Campbell, Gaithersburg, Md. / — / A dynamic multiplier circuit.

2,840,308 / Thomas B. Van Horne, Culver City, Calif. / Hughes Aircraft Co., Culver City, Calif. / An electronic correlator.

2,840,309 / John M. Hunt, Binghamton, N.Y. / Link Aviation Inc., Binghamton, N.Y. / A computer function generation.

2,840,709 / John V. Blankenbaker, Inglewood, Calif. / Hughes Aircraft Co., Culver City, Calif. / A frequency to digital conversion.

2,840,798 / Frank Cooper and Harry Malbon, Hollinwood, Eng. / National Research Development Corp., London, Eng. / A magnetic storage system.

July 1, 1958: 2,841,328 / Floyd G. Steele, Manhattan Beach, and Richard E. Sprague and Bernard T. Wilson, Los Angeles, Calif. / Northrup Aircraft Inc., Hawthorne, Calif. / A digital differential analyzer.

2,841,332 / Sidney Lees, Newton, Mass. / — / A torsional fourier transformer.

2,841,649 / Jacques M. Boisvieux, Gennevilliers, Fr. / Compagnie Francaise Thomson-Houston, Paris, Fr. / A pulse code modulation system.

2,841,707 / James M. McCulley, Barrington, N.J. / R.C.A., a Corp. of Delaware / An information handling system.

2,841,708 / Leonard R. Harper, Poughkeepsie, N.Y. / I.B.M. Corp., New York, N.Y. / An electronic logical circuit.

2,841,719 / Arthur J. Radcliffe, Jr., La

Grange, Ill. / International Telephone & Telegraph Corp., New York, N.Y. / A diode gate and its control circuit.

2,841,720 / Jacob Tellerman, Brooklyn, N.Y. / American Bosch Arma Corp., Brooklyn, N.Y. / A function shaping network.

July 8, 1958: 2,842,312 / Donald L. Weeks, Dayton, Ohio / The National Cash Register Co., Dayton, Ohio / A card reading apparatus.

2,842,662 / Robert J. Williams, Berwyn, Pa. / Burroughs Corp., Detroit, Mich. / A flip-flop circuit.

2,842,663 / John Presper Eckert, Jr., Gladwyne, and Adelbert W. Reickord, Drexel Hill, Pa. / Sperry Rand Corp., New York, N. Y. / A comparator.

2,842,754 / Hans P. Luhn, Armonk, N.Y. / I.B.M. Corp., New York, N.Y. / A magnetic storage device.

2,842,755 / Richard C. Lamy, Hyde Park, N.Y. / I.B.M. Corp., New York, N.Y. / A ternary magnetic storage device.

2,842,757 / James Evans, Flushing, N.Y. / Teleregister Corp., Stamford, Conn. / A system for data storage indexing.

July 15, 1958: 2,843,317 / William F. Steagall, Merchantville, N.J. / Sperry Rand Corp., New York, N.Y. / A parallel adder for binary numbers.

2,843,318 / John W. Gray, Pleasantville, N.Y. / General Precision Lab., Inc., a Corp. of New York / An earth ellipticity corrector for dead reckoning computers.

2,843,320 / Hamilton C. Chisholm, Richmond, Calif. / Beckman Instruments, Inc., Fullerton, Calif. / A transistorized indicating decade counter.

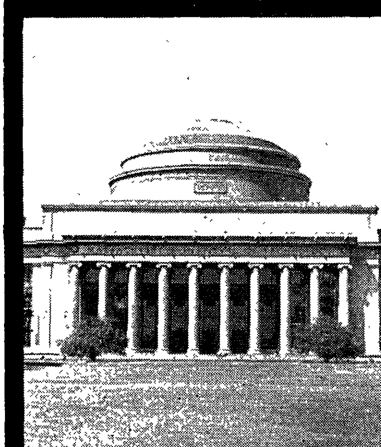
2,843,761 / Arthur W. Carlson, Arlington, Mass. / U.S.A. as represented by the Sec. of the Air Force / A high speed transistor flip-flop.

2,843,837 / Samuel Thaler, Rome, N.Y., and Ernie R. Ruterman, Douglas, Ariz. / U.S.A. as represented by the Sec. of the Air Force / A digital comparison gate.

2,843,841 / Gilbert W. King, Pacific Palisades, Edwin L. Hughes, Los Angeles, George W. Brown, Pacific Palisades, and Louis N. Ridenour, Los Angeles, Calif. / International Telemeter Corp., Los Angeles, Calif. / An information storage system.

ADVERTISING INDEX

Following is the index of advertisements. Each item contains: Name and address of the advertiser / page number where the advertisement appears / name of agency if any.



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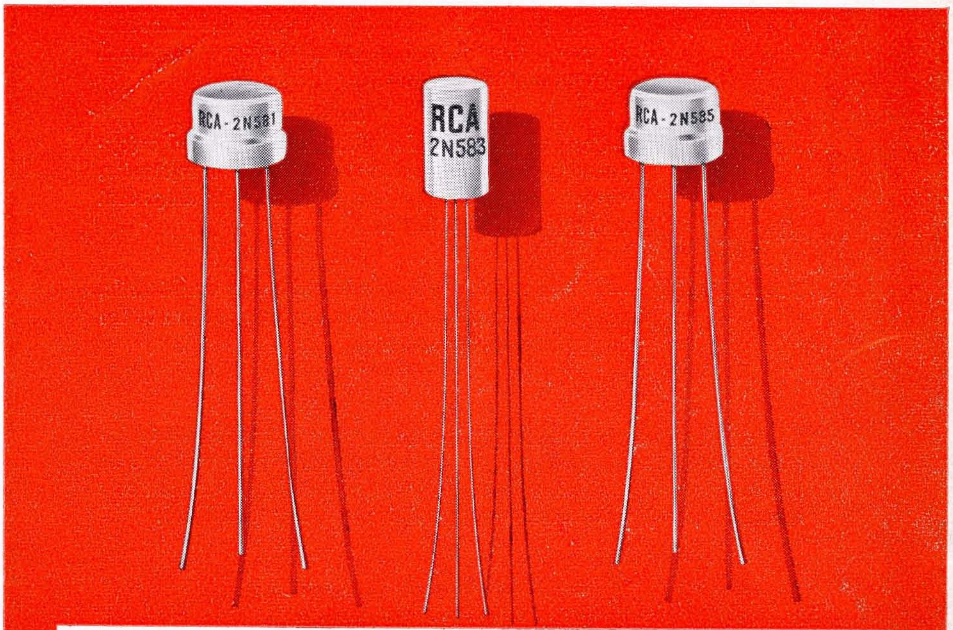
For technical data on RCA Transistors, write RCA Commercial Engineering, Section L - 90 - NN, Somerville, New Jersey.



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RCA Type	Typical Alpha-Cutoff Frequency Mc	Typical DC-Current Transfer Ratio Value at Collector Ma.	Maximum Collector Ma.
2N581* (p-n-p)	8	30 at −20	−100
2N583** (p-n-p)	8	30 at −20	−100
2N585* (n-p-n)	5	40 at +20	+200

*Jetec TO-9 Outline (formerly referred to as Jetec Size-Group 30 Case)
**Jetec TO-1 Outline

EAST: 744 Broad Street, Newark, N. J., HUmboldt 5-3900

MIDWEST: Suite 1154, Merchandise Mart Plaza, Chicago, Ill., WHitehall 4-2900

WEST: 6355 E. Washington Blvd., Los Angeles, Calif., RAymond 3-8361

GOV'T: 224 N. Wilkinson Street, Dayton, Ohio, BAldwin 6-2366
1625 "K" Street, N.W., Washington, D.C., DIstrict 7-1260

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